YASKAWA

MotoSim EG-VRC Ver2021
OPERATOR'S MANUAL

Upon receipt of the product and prior to initial operation, read these instructions thoroughly, and retain for future reference.

Have the following information available when contacting the YASKAWA Representative:

- System
- Primary Application
- Software Version *(Located on Programming Pendant by selecting: {Main Menu} - {System Info} - {Version})*
- Warranty ID *(Located on Robot Controller)*
- Robot Serial Number *(Located on Manipulator data plate)*
- Robot Sales Order Number *(Located on Robot controller data plate)*

The Americas YASKAWA Representative

- 24-hour Telephone Number: **(937) 847-3200**
  Use for urgent or emergency needs for technical support, service and/or replacement parts
- Routine Technical Inquiries: *techsupport@motoman.com*
  Allow up to 36 hours for response

Part Number: 156225-1CD
Revision: 20

MANUAL NO.
HW0485348 ⑱

DANGER

- This manual explains the MotoSim EG-VRC. Read this manual carefully and be sure to understand its contents before operation.
- General items related to safety are listed in the Chapter 1: Safety of Controller Instructions. To ensure correct and safe operation, carefully read Controller Instructions before reading this manual.

CAUTION

- YASKAWA is not responsible for incidents arising from unauthorized modification of its products. Unauthorized modification voids your product's warranty.
- Software described in this manual is supplied against licensee only, with permission to use or copy under the conditions stated in the license. No part of this manual may be copied or reproduced in any form without written consent of YASKAWA.

NOTICE

- Some drawings in this manual are shown with the protective covers or shields removed for clarity. Be sure all covers and shields are replaced before operating this product.
- The drawings and photos in this manual are representative examples and differences may exist between them and the delivered product.
- YASKAWA may modify this model without notice when necessary due to product improvements, modifications, or changes in specifications. If such modification is made, the manual number will also be revised.
- If your copy of the manual is damaged or lost, contact a YASKAWA representative to order a new copy. Be sure to tell the representative the manual number listed on the front cover.

Notes for Safe Operation

Before using this product, read this manual and all the other related documents carefully to ensure knowledge about the product and safety, including all the cautions.
In this manual, the Notes for Safe Operation are classified as “DANGER”, “WARNING”, “CAUTION”, or ”NOTICE”.

Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. Safety Signs identified by the signal word DANGER should be used sparingly and only for those situations presenting the most serious hazards.

Indicates a potentially hazardous situation which, if not avoided, will result in death or serious injury. Hazards identified by the signal word WARNING present a lesser degree of risk of injury or death than those identified by the signal word DANGER.

Indicates a hazardous situation, which if not avoided, could result in minor or moderate injury. It may also be used without the safety alert symbol as an alternative to “NOTICE”.

NOTICE is the preferred signal word to address practices not related to personal injury. The safety alert symbol should not be used with this signal word. As an alternative to “NOTICE”, the word “CAUTION” without the safety alert symbol may be used to indicate a message not related to personal injury.

Even items described as “CAUTION” may result in a serious accident in some situations. At any rate, be sure to follow these important items.

To ensure safe and efficient operation at all times, be sure to follow all instructions, even if not designated as “DANGER”, “WARNING” and “CAUTION”.

Notation for Menus and Buttons

Descriptions of the programming pendant, buttons, and displays are shown as follows:

Item	Manual Designation
Menu	The menus displayed on screen are denoted with { }. ex. {TOOL}.
Button	The buttons, check boxes, radio buttons displayed on screen are denoted with [ ]. ex. [Close]; [Sync] check box; [Fast] radio button.

Description of the Operation Procedure

In the explanation of the operation procedure, the expression "Select • • • " means the following operations:

- To move the cursor to the object item and left-click on it with the mouse.
- To pick out the object item by the tab key and press the Enter key.
  (In case of selecting a menu, use arrow keys instead of the tab key to pick out the object item, then press the Enter key.)

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1 Introduction

2 MotoSim EG-VRC Quick Tour

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1 Introduction

1.1 Overview of MotoSim EG-VRC

MotoSim EG-VRC is a software which has been developed as an offline teaching system for YASKAWA industrial robot MOTOMAN series.
MotoSim EG-VRC reduces teaching time requiring an actual robot, supports improvement of productivity and insures operator’s safety by enabling robot teaching on a personal computer.
MotoSim EG-VRC is an application software for MS-Windows having excellent operability and many advantages such as running multiple applications at once.

1.1.1 Difference of the operation from 5.00

The appearance of MotoSim EG-VRC Ver5.00 differs greatly from Ver4.10 or before.
Therefore, the difference in the operation method of a main screen is summarized so that the user before Ver4.10 could get used early.

- Runs two or more MotoSim EG-VRC. However, the number of the cells which can be used by MotoSim EG-VRC is one.
- " Docking Window "
- " Quick Access Toolbar "
- " Quick Access Toolbar "

1.2 Notice and Restriction about MotoSim EG-VRC

1.2.1 Optional Functionof controller

Below is a list of the available optional functions on MotoSim EG-VRC. For any other optional function not listed below, please consult with your Yaskawa representative.

Function Name	YRC1000	YRC1000 micro	DX200	DX100	FS100	NX100
Relative Job	○	○	○	○	○	○
TCP	○	○	○	○	○	○
Macro Instruction	○	○	○	○	○	○
I/F Panel	○	○	○	○	○	○
External Reference Point	○	○	○	○	○	○
Parallel Start Instruction	○	○	○	○	○	○
Coordinated Instruction	○	○	○	○	○	○
Extended Control Group	○	—	○	○	○	○
Station Angle Display	○	○	○	○	○	—
Softlimits Customization	○	—	○	○	—	—
Tool No. Switching	○	○	○	○	○	○
SI Unit Indication	○	○	○	○	○	—
Display IO Name in Job	○	○	○	○	○*1	—
Variable Allocation	○	○	○	○	○	—
Functional safety	○*2	○	○*2	—	—	—

1 Standard function for FS100.

2 Please refer to section "1.2.5 Restriction of Function of Controller" for Functional safety.

Please refer to section

" 15.4 Standard function about YRC1000 "

" 15.5 Standard function about YRC1000micro "

" 15.6 Standard function about DX200 "

" 15.7 Standard function about DX100 "

for the list of available standard function.

1.2.2 Using data saved from a real controller with MotoSim EG-VRC

To use the data saved from a real controller, depending on the environment, there are circumstance where the "CMOS.BIN' from the real controller can be used.
However, in some cases there may be problem cause by "CMOS.BIN" version incompatibility.
In such cases, please use the individual data file save from the real controller for the jobs, condition files, parameters, etc. to reconstruct the system environment.

NOTE In regard to the FS100 controller, the "CMOS.BIN" file saved from a real controller can not be used with MotoSim EG-VRC to create the environment.

1.2.3 Using MotoSim EG-VRC data on a real controller

Some data created with MotoSim EG-VRC can be use on the real controller, and some data cannot be use.

Usable data	Job Condition files General data All the name data
Unusable data	Parameters CIO Program

NOTE
- The "CMOS.BIN" file cannot be saved from MotoSim EG-VRC.
  Therefore, the "CMOS.BIN" cannot be used with a real controller.
- Option function selected by MotoSim EG-VRC can not be executed on the real robot.
- Parameter file or CIO program file of MotoSim EG-VRC can not be executed on the real robot. YASKAWA is not responsible for incidents arising from using these files.
- The format of the arc welding start condition file and arc welding end condition file (ARCSRT.CND, ARCEND.CND) has been changed in the YRC1000 system software YAS2.00-00. Therefore, if the version of the real controller is earlier than YAS2.00-00, the above files created with MotoSim EG-VRC2018 or later cannot be loaded. On the other hand, the above files created with the real controller before YAS2.00-00 can be loaded to MotoSim EG-VRC2018 or later.

1.2.4 Function depending on the system version of controller

Some functions of MotoSim EG-VRC can not use depending on the system version of controller. Please refer to section " 15.8 List of Function depending on the system version of controller ".

1.2.5 Restriction of Function of Controller

- MotoSim EG-VRC can not be connected to the real robot or pendant.
- MotoSim EG-VRC can not simulate the job in real time.
- MotoSim EG-VRC can not simulate CIO in real time.
- The function needed the special hardware (sensor, COMARC etc.) is disable.
- VPP is not supported the Enable Switch.
- MotoSim EG-VRC is supported the standard controller version only.
- The simulated coasting range is different from the real robot, when the emergency stop is done.
- Some INFORM connecting to the external device is not supported. ARCON/ARCOF SVSPOT SVSPOTMOV are supported.
- In regard to the NX100 controller, SVSPOT and SVSPOTMOV are not supported.
- Data transmission is not supported.
- Remote mode is not supported.
- Collision Detection is not supported.
- The standard CIO ladder is supported only. Modified CIO ladder is out of guaranteed operating range. So, lamps at the top of VPP (ex. servo lamp) may not work correctly, or IO Connect/IO Monitor/IO Event may not work correctly.
- Loading batch CMOS file "CMOSxx.HEX" saved from memory expanded system is supported only.
- Saving batch CMOS file "CMOSxx.HEX" and all CMOS area file "ALCMSxx.HEX" is not supported.
- In regard to the FS100 controller series, Loading/Saving/Verifying/Deleting the batch files and the all CMOS area file is not supported.
  The appropriate files are "JOBxx.HEX", "CMOSxx.HEX", and "ALCMSxx.HEX".
- Ladder editor, PP application for arc welding, and MOTOPAL are not supported.
- MotoPlus function, MotomanSync function, and the applications used these functions are not supported.
- PP customize function is not supported.
- The simulation of spot gun change system is not supported.
- "PP display scroll function DX200 by touching operation" of DX200 controller is not available.
- Function of MotoSim EG-VRC for Function Safety is available only when the controller is YRC1000, YRC1000micro, DX200 and Function safety option is available. Simulation is possible only during jog operation in VPP or playback. It cannot be simulated with other functions like positional panels or OLP function.
- Function safety in which a simulation is possible on MotoSim EG-VRC is as follows.
  - Robot Range Limit
  - Axis Range Limit
  - Speed Limit
  - Tool Angle Monitor

  Following function safety can not be simulated on MotoSim EG-VRC.
  - Axis Speed Monitor
  - Tool Change Monitor
  - Safety Signal
- When the edited files are loaded to YRC1000, YRC1000micro, DX200, it is necessary to

put in "SAFETY MODE", and to disable "SAVE DATA CRC CHECK FUNC.(FSU)". After loading, please make sure to enable "SAVE DATA CRC CHECK FUNC.(FSU)".
And, please make sure to check the settings on YRC1000, YRC1000micro, DX200.

1.2.6 Accuracy

- Positional Accuracy
  When the job made in MotoSim EG-VRC is executed on the real robot, teaching points may be misaligned by the strain and placement error of work, and the deflection of robot. So, check the teaching points by NEXT/BACK, and modify them.
- Trajectory Accuracy
  The simulated trajectory range is different from the real robot. When the job made in MotoSim EG-VRC is executed on the real robot, check the teaching points by NEXT/BACK, and do test running. After sufficient operation check, execute playback.
- Cycle time Accuracy
  The simulated cycle time is different from the real robot. If robot job contain the position level "PL=0" in move command, the resulting cycle time simulation may not provide sufficient accuracy compared to the actual robot.
- Robot model Accuracy
  Robot model is only external form, bolt hole and anchor bolt may be left out. Movable parts other than robot (ex. cable) can not be simulated.

1.2.7 Hardware Requirements

When simulate follow situation, PC with high-end CPU or graphic board may need.

- Multiple controllers are used. (4 or more)
- High-capacity CAD data is used.
- Collision check is used.
- Cable simulation is used.

1.2.8 Supported robot model

The robot models supported by MotoSim EG-VRC are those displayed on the virtual pendant for the controller version selected at the time of creation. Please refer to section " 15.9 List of Manipulator Models and Offset Values Supported by MotoSim EG-VRC " for the list of available model.
However, for similar robot model that only have differences in the details of their shape, it maybe possible to do simulation using the standard robot model (model ending with A0*).

1.3 Environment Required for MotoSim EG-VRC

To run MotoSim EG-VRC, the following hardware and software are required:

OS	Microsoft Windows 10 (64bit) <Tested version 2004> <Windows 10 IoT and Windows 10 on ARM are not supported.> Microsoft Windows 7 Service Pack1 (32bit / 64bit) JAPANESE and ENGLISH Windows version are supported only. *1
CPU	Intel Core i7 or higher multi-core processor. *2
Memory Capacity	4 GB or more
Free Hard Disk Space	500 GB or more
Monitor	Supported by MS-Windows (256 colors or more)
Hardware Key	Used under single user environment. For details, refer to " 1.4 Hardware Key " in the following section.
GPU	NVIDIA graphic card*3 Quadro series, etc.

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2 Intel Core is a trademark of Intel Corporation in the U.S. and/or other countries.

3 NVIDIA is a trademark and/or a registered trademark of NVIDIA Corporation in the U.S. and/or other countries.

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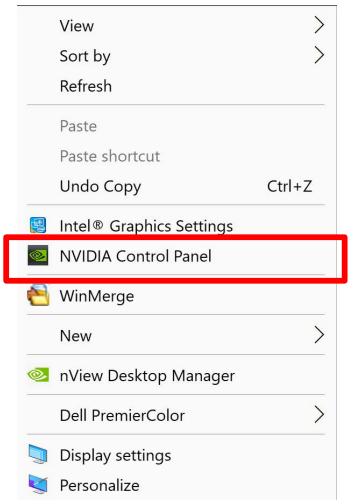
MotoSim EG-VRC may not execute correctly, because of PC model, Graphic Board, other connected peripherals, and installed software, etc.

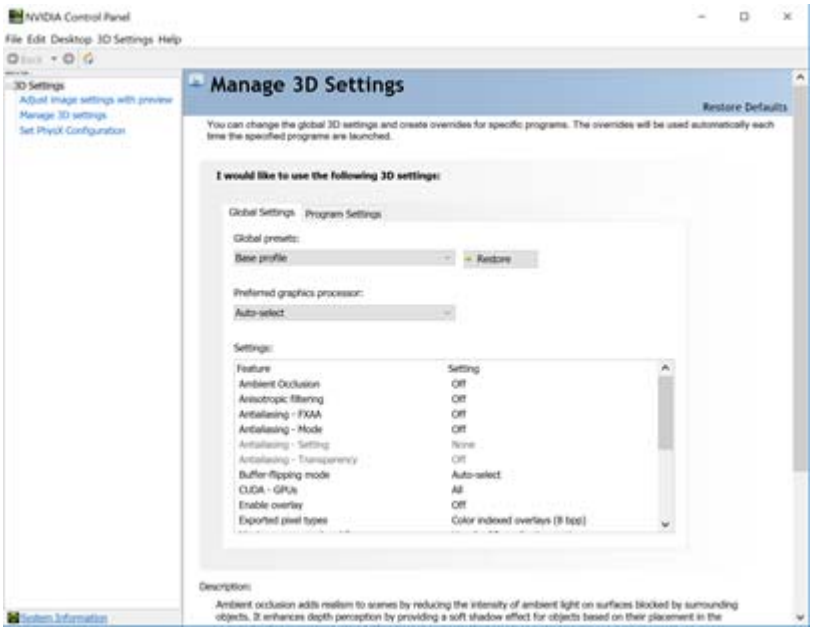
1.3.1 3D Graphic Board Setting

3D graphics board may be disabled even on a computer with 3D graphics board installed. Unexpected error may occur when the 3d graphics board is disabled, so it is necessary to set to become 3D graphic board effective. The following is an example of setting when 3D graphics board is NVIDIA.

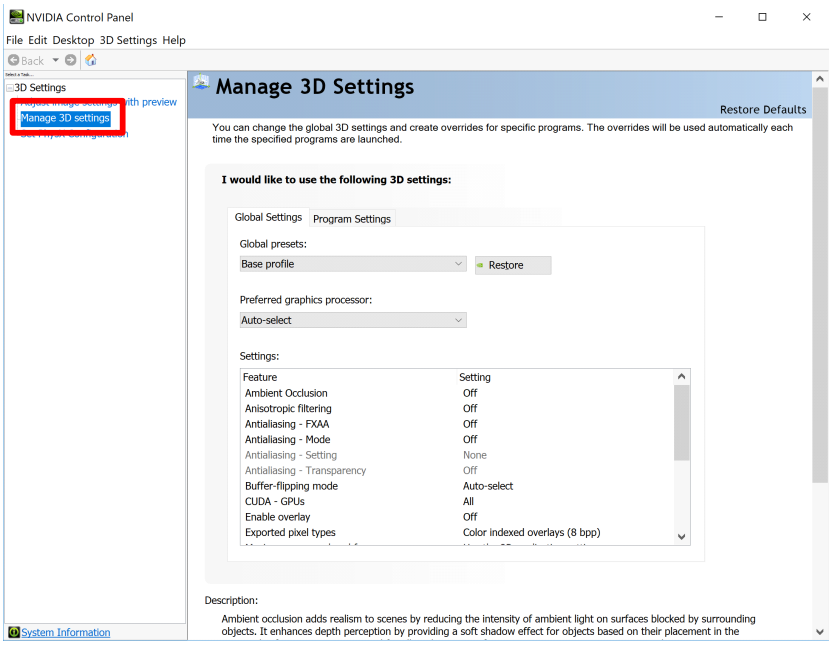
1. Right-click on the desktop to display the pop-up menu.



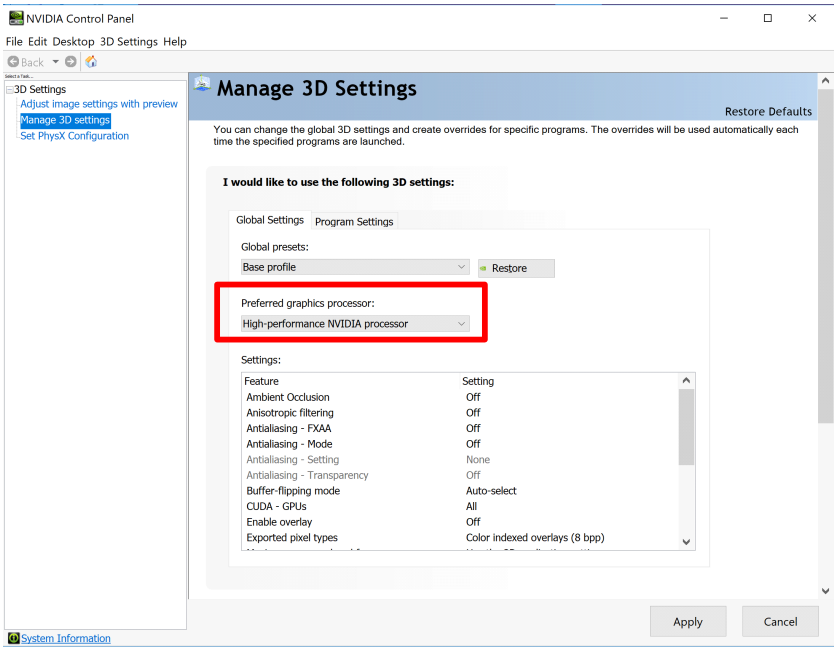
2. Select "NVIDIA Control Panel" from the menu above.



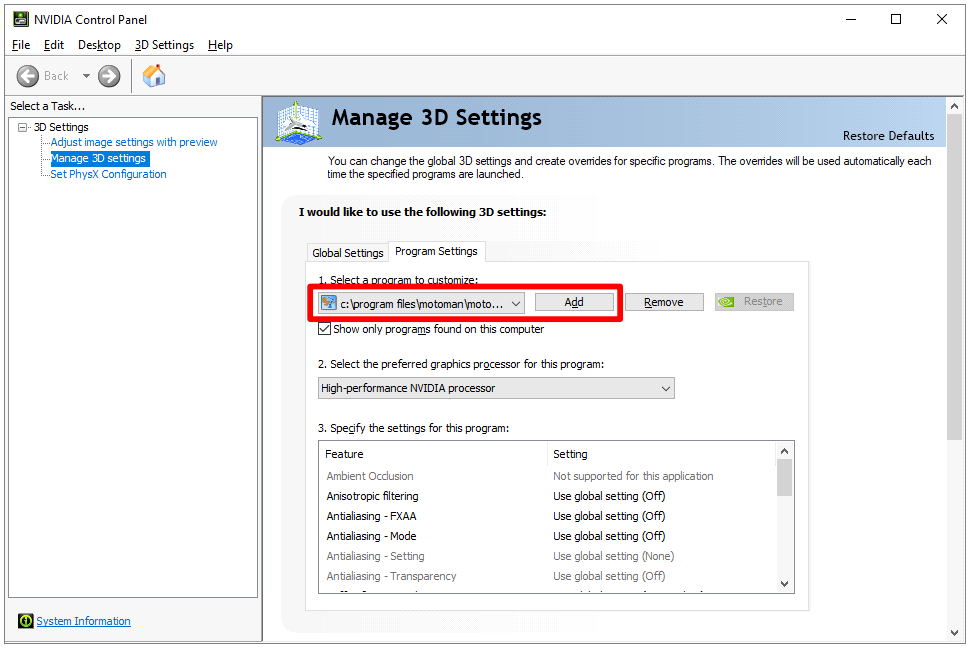
3. Select "Manage 3D settings".



4. Select "High-performance NVIDIA processor" of the "Preferred graphics processor.



5. Add MotoSimEG-VRC.exe when it isn't set at "Program Settings" tab.



NOTE

- When setting of 3D graphics board is invalid, unexpected error may occur.
- Depending on the graphics board and OS version, the setting dialog may be different from the above. Please refer to the manual of 3D graphics board for details of setting.

1.4 Hardware Key

For proper operation, connect provided hardware lock key (USB type) to the personal computer before using this software.

Check and execute <Checking the computing environment> <Installing the driver> before connecting the key to USB port.

<Checking the computing environment>
Multi-connection of USB type key is not available for one USB port because of hardware structure. Therefore, only one key can be connected to one USB port. When installing multiple offline software into one personal computer and multi-connectiong USB keys, use the personal computer which is provided same numbers of USB ports as the number of software to be installed.

<Installing the driver>

NOTE Please install the driver after detaching the all sentinel hardware key from the personal computer.

Execute "\SentinelDriver\Sentinel System Driver Installer 7.6.0.exe" of installation DVD. Refer to "\SentinelDriver\Manual\Sentinel System Driver ReadMe.pdf" for the details of installation.

NOTE
- Be sure to install the driver.
- When installing the driver, be sure to login in administrator mode in order to add files to system folder and input information in registry.
- If a key is connected to personal computer before installing the driver,the message concerning the driver is displayed. In this case, and detach the key from personal computer and then install the driver.
  If a key is connected to personal computer before installing the driver under Windows 95/98/NT4.0/2000/XP environment, Windows wizard ([Add New Hardware] Wizard) starts up. In this case, push [cancel], and detach the key from personal computer and then install the driver.
- When installing the driver under Windows NT4.0, 2000 environment, please install the driver located in the folder "\SentinelDriver\SSD5411\SSD5411-32bit.EXE" of installation DVD.
  For the driver installation procedure, please consult the installation manuarl "\SentinelDriver\SSD5411\Manual\us\Readme.pdf".

Refer to " 15.9 List of Manipulator Models and Offset Values Supported by MotoSim EG-VRC " for other countermeasures concerning hardware key.

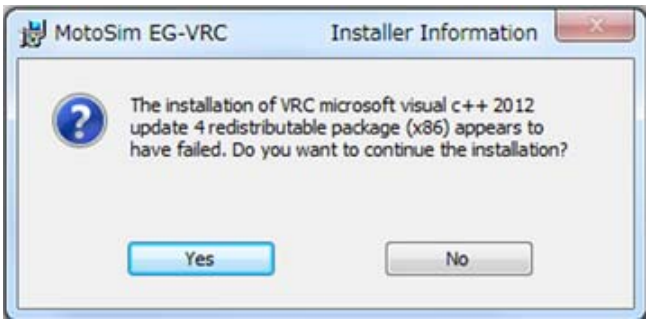
1.5 Installing MotoSim EG-VRC

1. It is strongly recommended that you exit all applications before running the setup program..

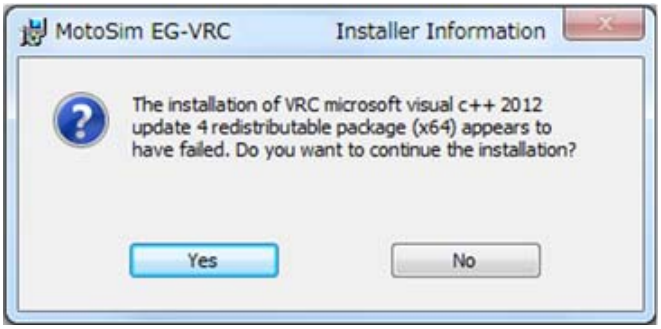
NOTE Be sure to login in administrator mode when installing the MotoSim EG-VRC in Windows 7/10, or else the system related DLL files in Windows might not be updated.

2. Insert the installation DVD into the DVD drive.
3. If want to install the 32-bit version, run the "\setup_32bit\setup.exe". If want to install the 64-bit version, run the "\setup_64bit\setup.exe". When the User Account Control dialog is displayed, click [Yes]. [MotoSim EG-VRC InstallShield Wizard] will be displayed.
4. Follow the on-screen instructions.

NOTE If the following message appears during the installation, press [Yes] to continue installation.
This message is displayed when the installation of redistribution package of Visual C ++ 2012 has been executed but installation is required.
If this message is displayed, run manually \setup_32bit\ISSetupPrerequisites\{BF2F04CD-3D1F-444e-8960-D08EBD285C3F}\vcredist_x86.exe
after installing MotoSim EG-VRC, and install or repair the redistribution package of Visual C ++ 2012.



If the following message appears during the installation of the 64-bit version, press [Yes] to continue installation.
If this message is displayed, run manually \setup_64bit\ISSetupPrerequisites\{3A3AF437-A9CD-472f-9BC9-8EEDD7505A02}\vcredist_x64.exe
after installing MotoSim EG-VRC, and install or repair the redistribution package of Visual C ++ 2012.

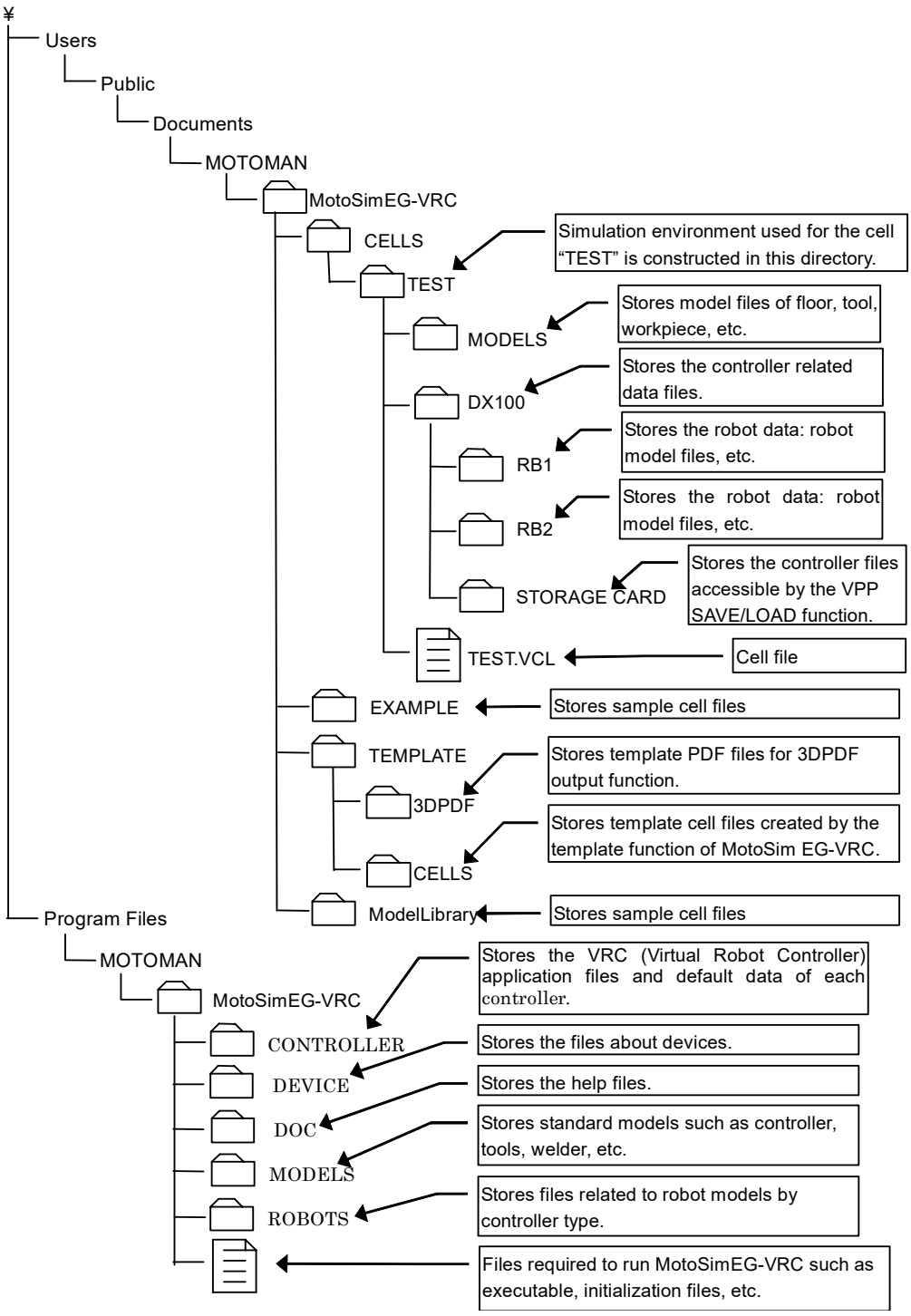


5. When the setup is completed, MotoSim EG-VRC is registered under the {MotoSim EG-VRC} folder that appears by clicking the [Start] button in the task bar and selecting {Program} and then {Motoman}.
6. Connect the hardware key to the printer port or USB port.
   For details, refer to " 1.4 Hardware Key " in this chapter.

1.6 Definition of Terms

Cell (*.vcl)	A file in which MotoSim EG-VRC simulation environmental data are recorded. Folder information to store the operation contents, model file information such as robots, workpieces or tools, data of operational environment layout, etc. is recorded.
Model file (*.mdl)	A file in which geometric data of robots, workpieces or tools are recorded.
Parent model	Each model requires a coordinate that refers to something in the layout. Model to which the coordinate of a model refers to is called "parent model". The most basic reference model in the MotoSim EG-VRC is "world". Normally, world becomes parent for workpiece models or robot models. However, since tool models or positioners move along with external axis or robot axes, they refer to different parent models than fixed model. Since tool models must move with the robot, the robot model flange is normally set as the parent model of the tool model.

1.7 Folder Configuration



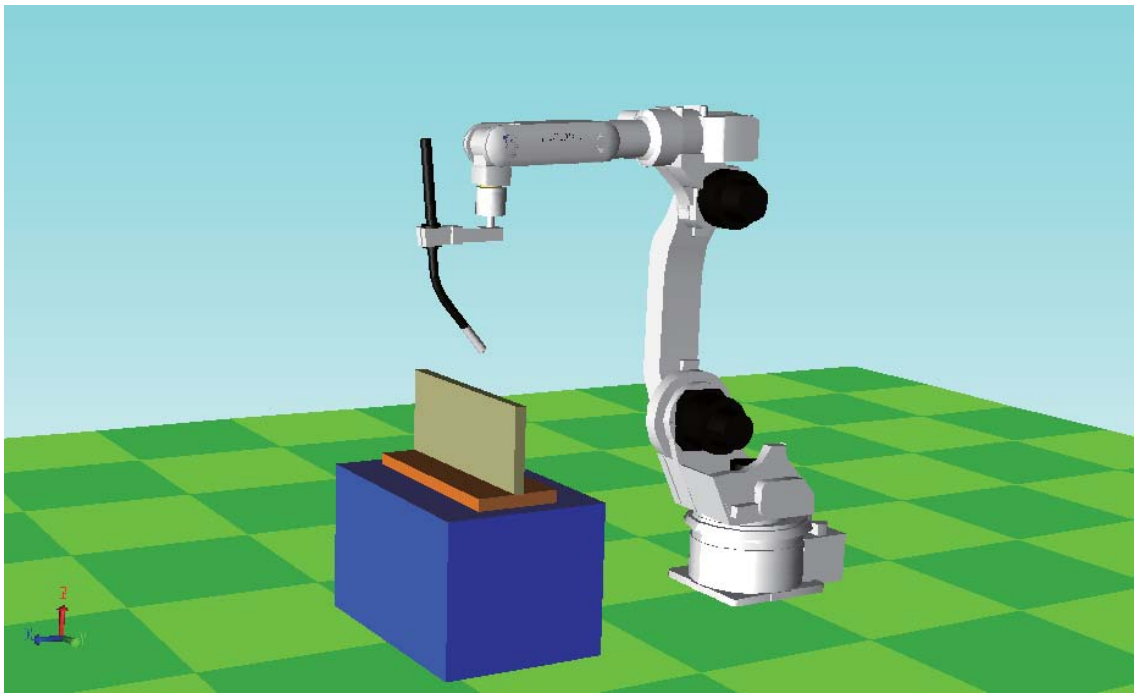
The above diagram is based on the assumption that the cell "TEST" is the file in which the simulation environmental data is stored, and that there is one controller named "NX100" with 2 robots defined under the folders “RB1” and “RB2”.
The model files other than the robot model files are stored in the folder "TEST\MODELS".

2 MotoSim EG-VRC Quick Tour

This chapter describes the basic operation of MotoSim EG-VRC by giving practical examples to first time users of this system.
Read this chapter thoroughly in order to quickly take advantage of the excellent operability and various functions of MotoSim EG-VRC.

2.1 Overview

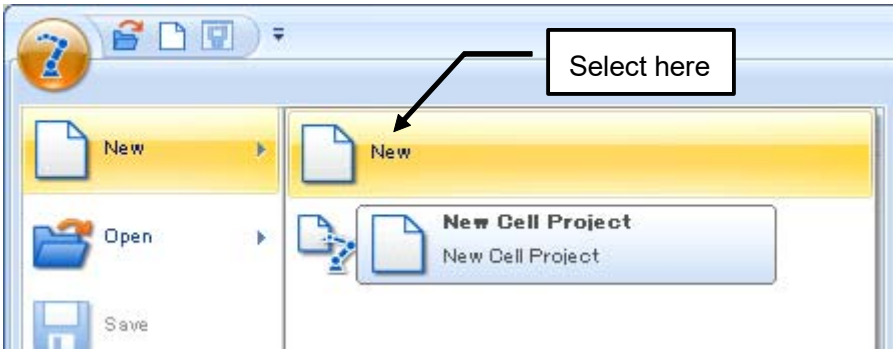
This chapter describes the procedures from cell construction to job creation. An arc welding application is used as an example to illustrate the creation of workpieces for fillet-welding and a welding torch for tool, and then to teach a welding path.
The following sections aim to create a robot, a workpiece and a stand like the ones prepared in "Arc_samp_NX" sample cell shown in the figure below.



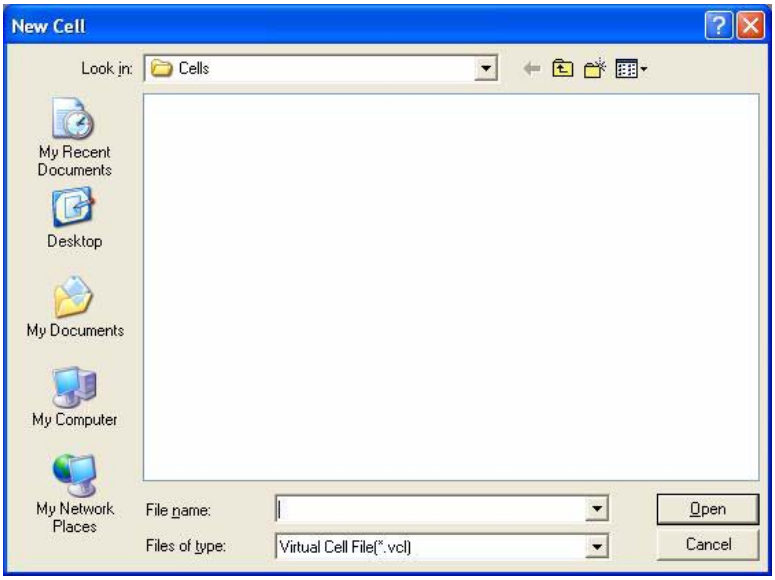
2.2 Cell Construction

1. Click on [START] in the task bar menu, then click {PROGRAM} - {Motoman} - {Moto-Sim EG-VRC} - {MotoSim EG-VRC} to run MotoSim EG-VRC.

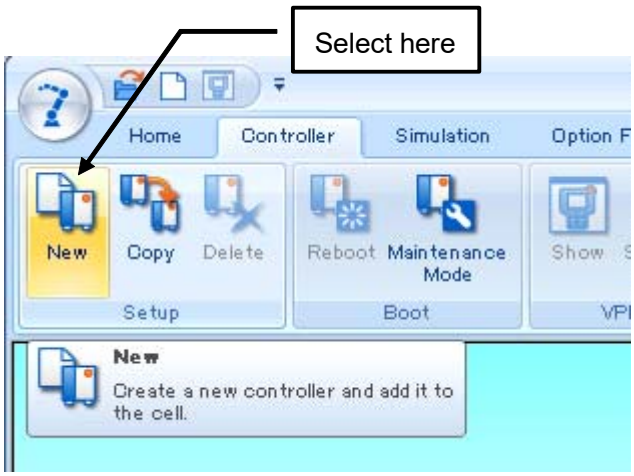
2. When the main window appears, Click the MotoSim EG-VRC button ( ), and select the [New] - [New] menu.



3. When the New Cel dialog box appears, enter any cell name: a folder where cells, parameter data, model data, job data, etc. are stored can also be set. (The new folder name is the same as the cell name.) In this example, the "TestCell" cell is created in the "CELLS" folder in the "Cells" folder.
Enter "CelTest" in the File name edit box and click the [OK] button.

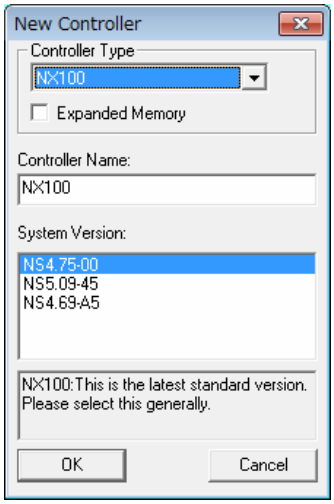


4. The new cell with only a floor model appears.
   Register a controller in the cell by selecting the [Controller] tab, in the [Setup] group, click the [New] button.

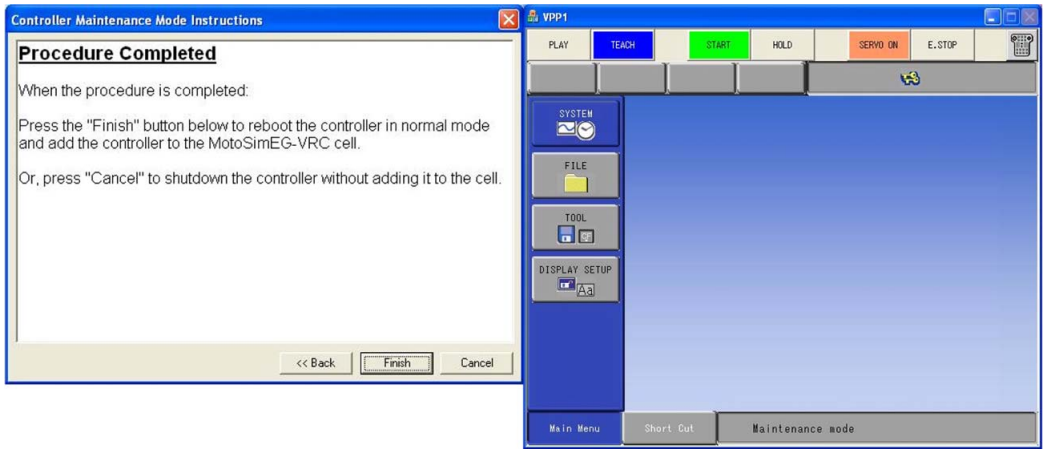


5. The “Create Controller with” will display.
   Select “No CMOS.BIN file” and press the [OK] button.

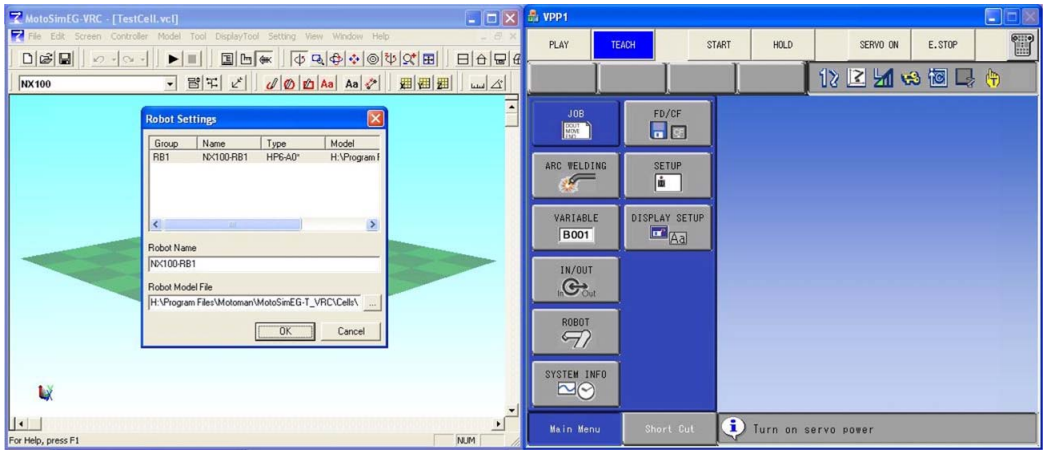
6. Select the controller system version, then press the [OK] button.



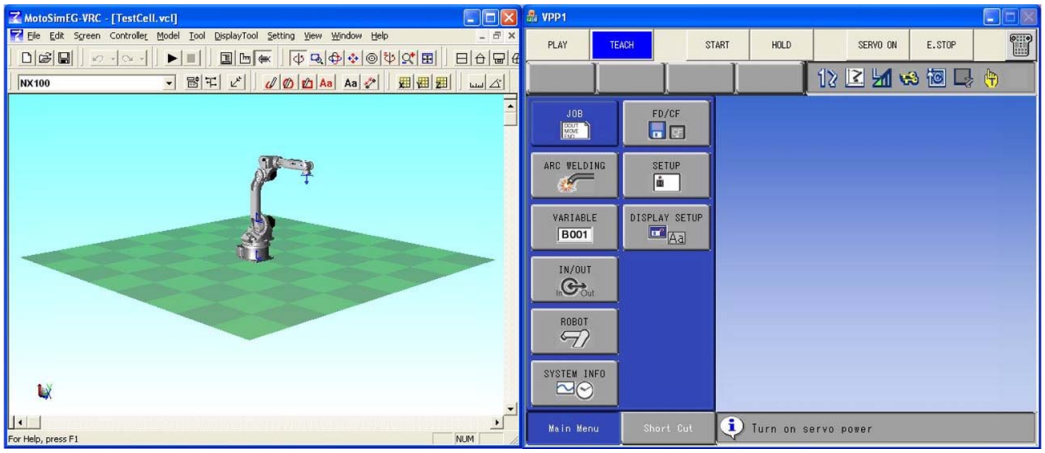
7. Controller Initialization.
   The virtual controller will boot with the selected sytem version. This may take a few moments. Once the boot up is completed, the virtual pendant will display in maintenance mode along with the “Controller Maintenance Mode Instructions” guide.
   When adding a controller with “No CMOS.BIN”, the controller needs to be initialized. Follow the steps displayed by the intstruction guide dialog to initialize the controller.
   When asked for the “Control Group”, select the robot “HP6-A0*” for the R1 group (press the spacebar to display the list of available robots.)
   When all the initialization steps are completed, press the [Complet] button of the instruction guide dialog to reboot the controller in normal operation mode.



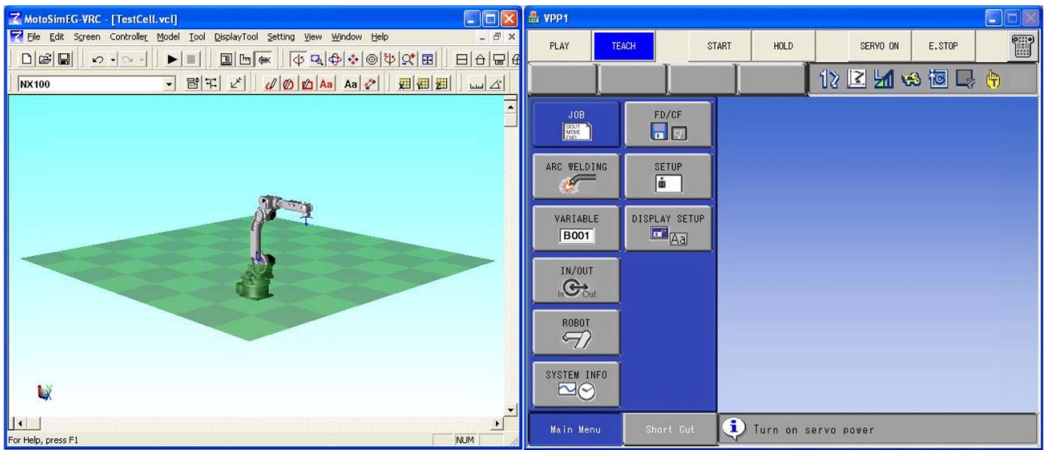
8. Once the virtual controller has rebooted, the virtual programming pendant will display in normal mode.
   In the “Robot Settings” dialog that will also appear, enter a name for the robot (for this example, the default name “NX100-RB1” is used.) Select the model file corresponding to the robot type (for the HP6-A0* select the “HP6-a00.mdl” file).
   Press the [OK] button.



9. When the controller registration has been completed normally, the robot model appears in the cell screen as shown in the figure below.



However, as shown in the following figure, the robot may be displayed as if it is sank in the floor. This is because the offset value of the robot operational origin and the floor center coordinate has been set to 0 (initial value). In this case, correct the robot position by following steps 10 and 11.

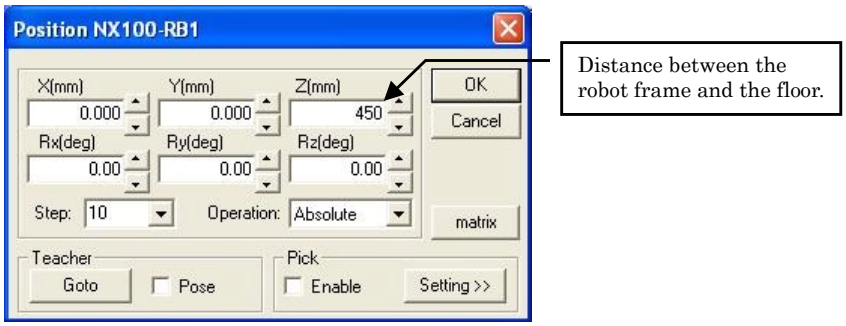


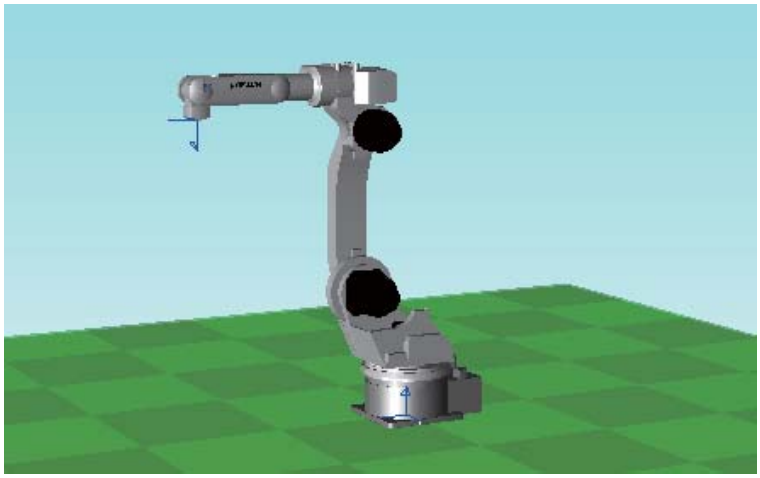
10. On the [Home] tab, in the [Model] group, click the [CadTree] button, display the Cad Tree selection box.
Select “NX100-RB1” and click on [Pos] button.

11. In the Position dialog box below, the robot model can be moved to any arbitrary place. In the case of NX100-RB1, the height from the floor to the robot operational origin is 450 mm, enter "450" for "Z" and click the [OK] button.

NOTE

The height from the floor to the robot operational origin (here the height is 450 mm) can be obtained by measuring the distance between the floor and the robot bottom by clicking the on the [Home] tab, in the [Mesurement] group, click the [Distance] button. Refer to " 5.1 MotoSim EG-VRC Display " for the details of measuring tools, and " 15.9 List of Manipulator Models and Offset Values Supported by MotoSim EG-VRC " for each robot offset values.





NOTE

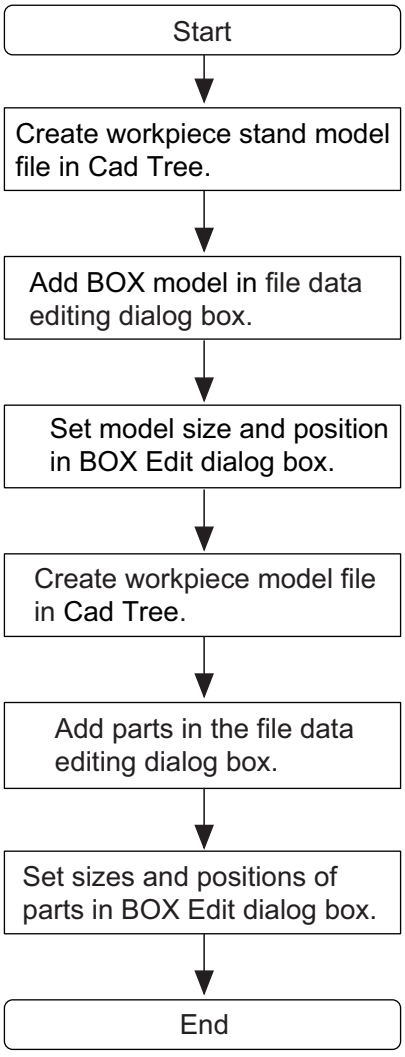
When initialized the robot controller, MotoSim EG-VRC set the absolute data automatically. So absolute setting is not needed in MotoSim EG-VRC.
Refer to " 7.1.4 Initializing the Controller (FS100) " for details.

2.3 Creation of Models

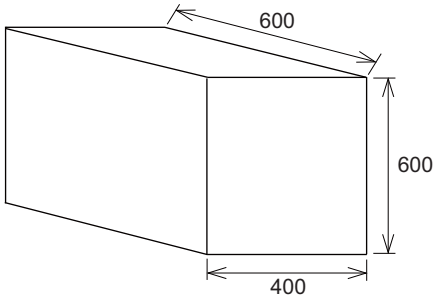
This section explains how to create workpiece models and tool models using the CAD functions.

2.3.1 Creating a Workpiece and a Workpiece Stand

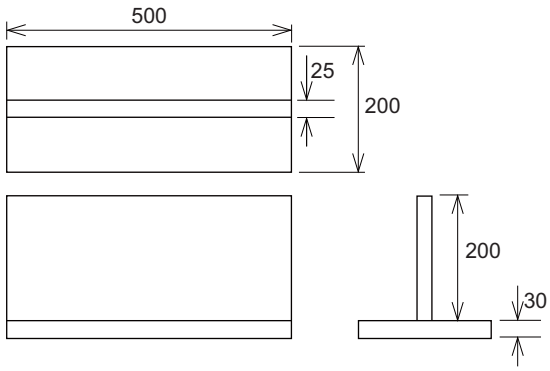
Follow the flowchart below to create a workpiece and its stand.



1. The dimensions of the workpiece model and workpiece stand model are shown in the following figure:



Workpiece Stand Model



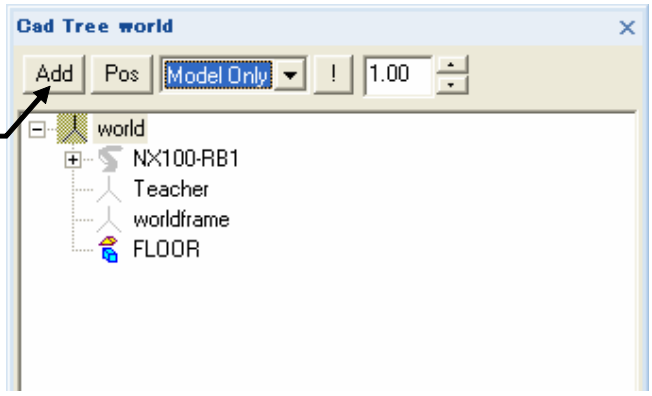
Units: mm

Workpiece Model

2. On the [Home] tab, in the [Model] group, click the [CadTree] button, the [CadTree] dialog appears.

3. When the Cad Tree appears, select "world" from the model tree; select {New Model} in the right-click menu, or click the [Add] button.

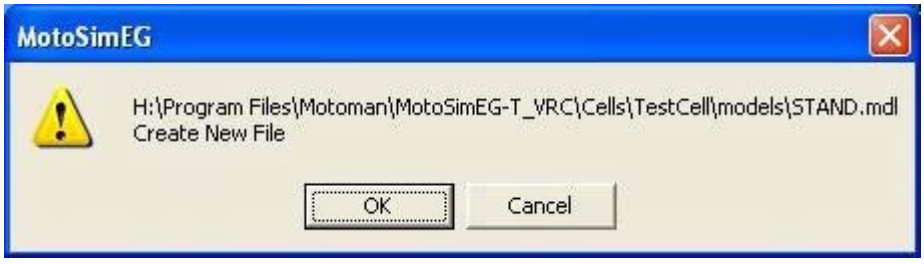
Click the [Add] button



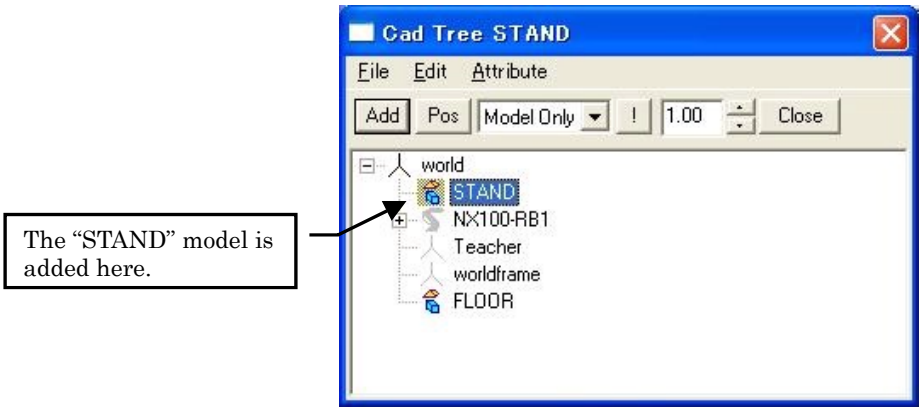
NOTE To create a new model in the model selection screen, verify that the cursor is pointed to "world" so that it will be the parent model.

4. Enter "STAND" (a word for “stand” in Japanese) in the Add Model Dialog box and click the [OK] button.

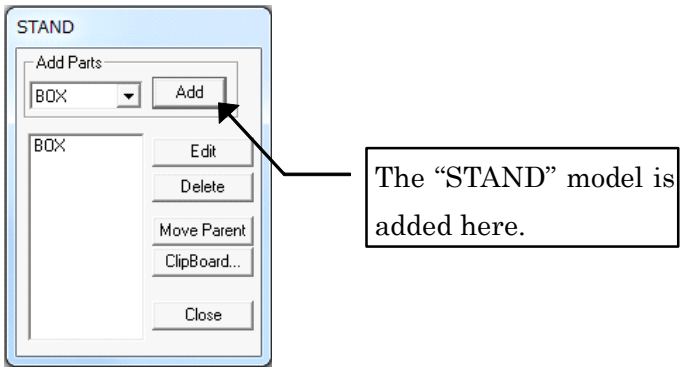
A confirmation dialog box appears, to create the new model: click on [OK].



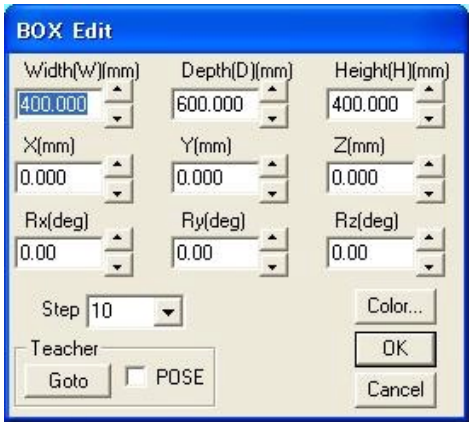
5. The "STAND" model appears in the Cad Tree: point the cursor to "STAND" and double-click it.



6. The model editing dialog box appears: select “BOX” from the "Add Parts" combo box, and click [Add].



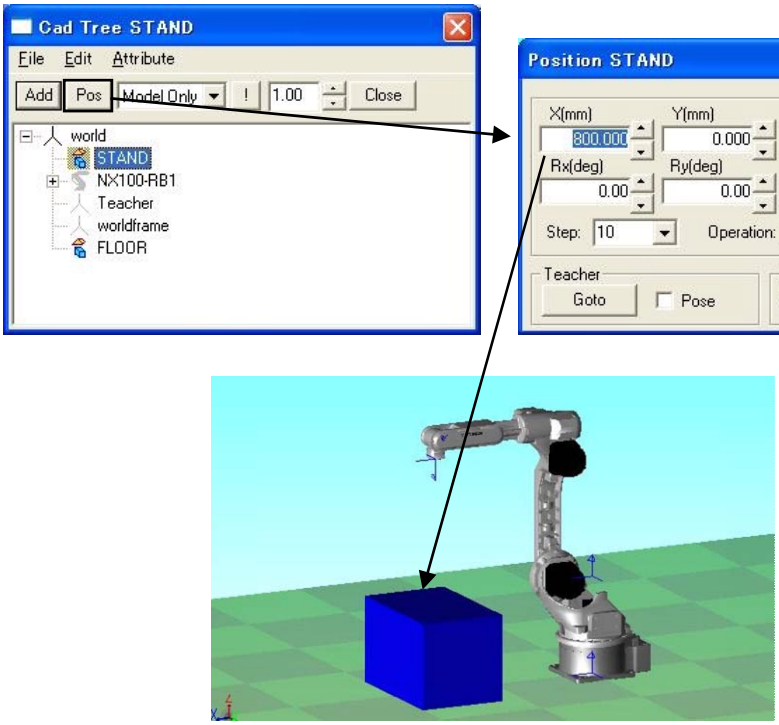
7. The BOX Edit dialog box appears: input the dimensions of the workpiece stand.



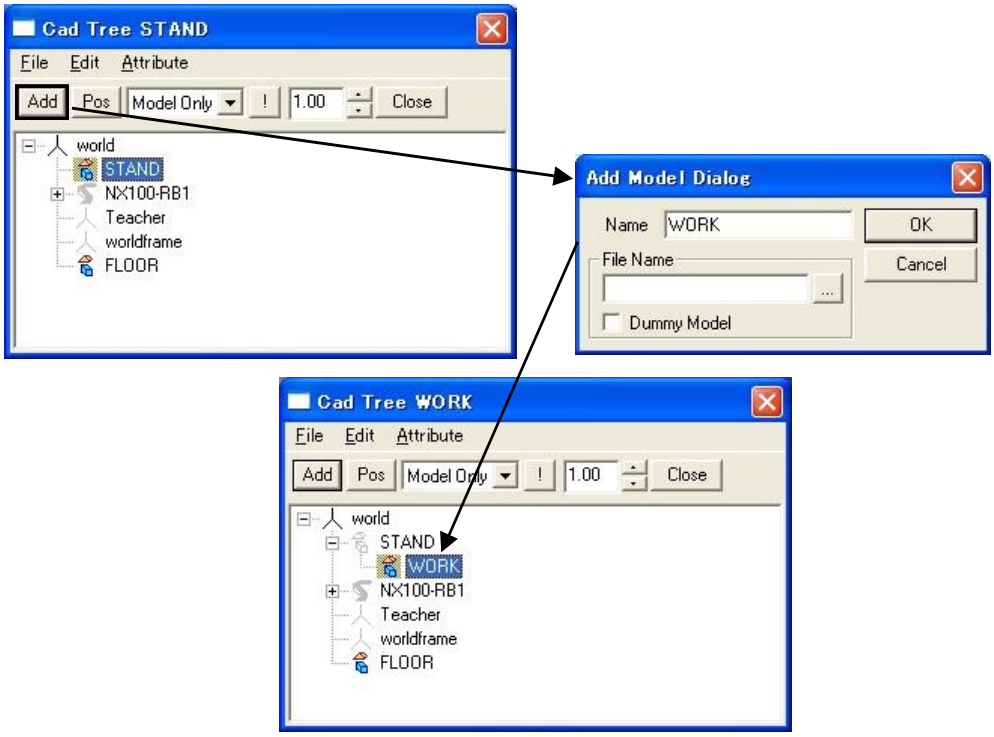
NOTE When a part is added with the [Add] button, the parts editing dialog box appears automatically. However, to reedit a part that has already been added, use the [Edit] button to display the part editing dialog box after selecting the subject part name.

Select 400 for width, 600 for depth and 400 for height by using the spin button at the side of the edit box or by entering the values directly. The incremental values of the spin box can be changed from 0.1 to 100 in the incremental value list box. Select desired colors, and check if the stand is displayed properly.
When satisfied, click the [OK] button to return to the file data editing box. Click the [Close] button in the file data editing dialog box to complete the creation of workpiece stand model.

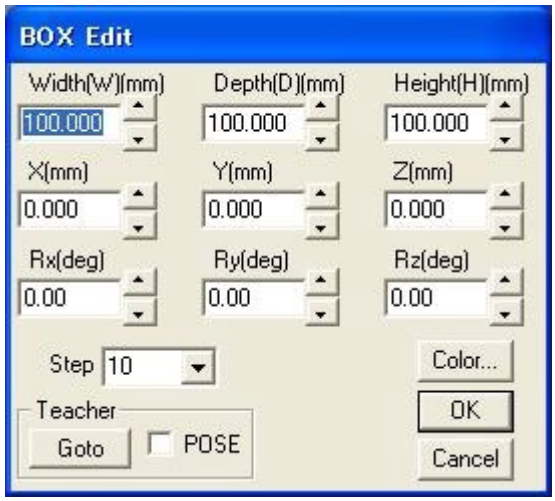
8. The workpiece stand model is located at the center of the floor under the current conditions: therefore, click the [Pos] button in the Cad Tree to display the position dialog box, and input 800 for X, 0 for Y and 200 for Z to modify the model location.



9. To create a workpiece, set "STAND" as the parent model by pointing the cursor to "STAND" in the Cad Tree. Create a new model named "WORK" as shown in the figures below.



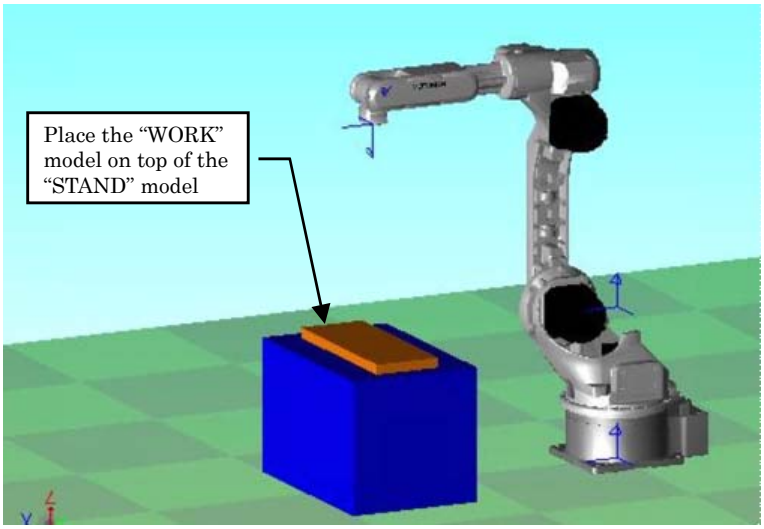
10. Display the BOX Edit dialog box by selecting "BOX" from the "Add Parts" combo box in the model editing dialog box, then click [Add].



11. Set the workpiece size and position as shown in the table below in the BOX Edit dialog box: this model will be the bottom part of the fillet-welding workpiece.

Width (W)	200	Depth (D)	500	Height (H)	30
X (mm)	0	Y (mm)	0	Z (mm)	0
Rx (degree)	0	Ry (degree)	0	Rz (degree)	0

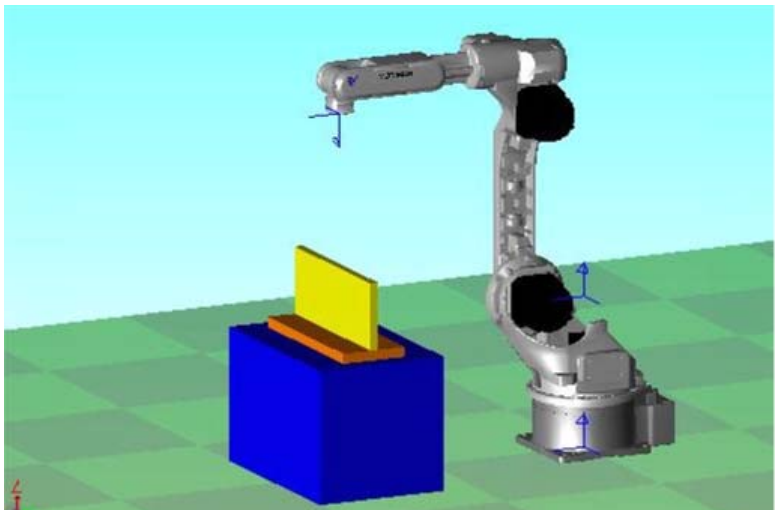
12. The model is currently displayed in the center of STAND model: to modify its position, first close the BOX Edit dialog box by clicking [OK] and the file data editing dialog box by clicking [Close]; after closing those dialog boxes, click the [Pos] button in Cad Tree to display the Position dialog box, and enter 0 for X, 0 for Y, and 215 for Z to display WORK model on top of STAND model.



13. Create the upper part of the workpiece: the upper workpiece is composed of a second BOX part. Double-click "WORK" in Cad Tree to call up the file data editing dialog box, and add another BOX model (note that this operation should not be done by clicking the [Add] button in the Cad Tree).

14. Set the workpiece size and position as shown in the table below in the BOX Edit dialog box.

Width (W)	25	Depth (D)	500	Height (H)	200
X (mm)	0	Y (mm)	0	Z (mm)	115
Rx (degree)	0	Ry (degree)	0	Rz (degree)	0



15. Check if the workpiece model has been created according to the dimensions specified in the step 1.
    If the model has different dimensions or to change the color of the model, proceed to the step 16 and 17 to make modifications.

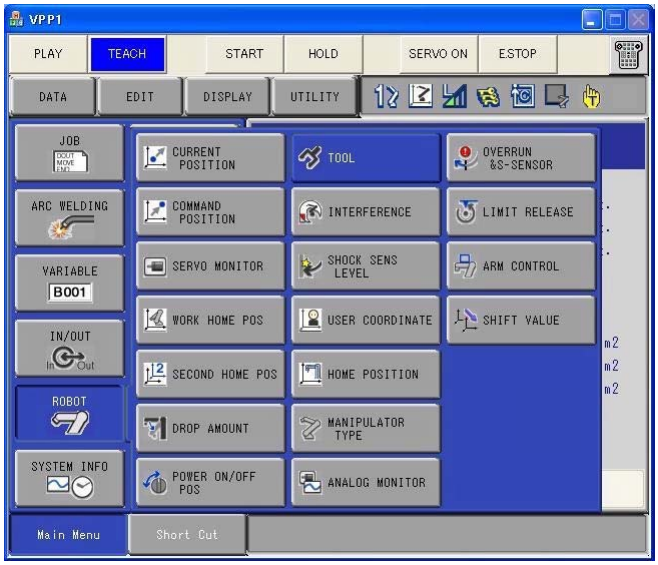
16. Display the BOX Edit dialog box by pointing the cursor to BOX model to be edited among the models added to the Cad Tree, then double-click it.

17. Reedit the workpiece size, etc. in the BOX Edit dialog box. To modify the color of the model, click on the [Color...] button.

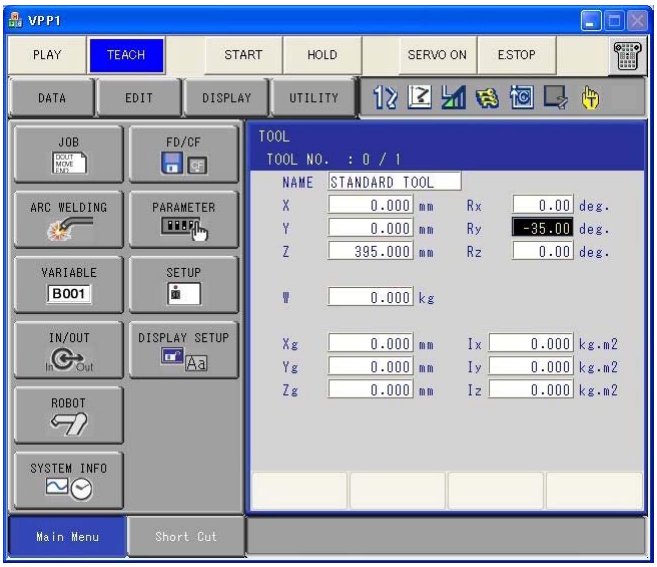
2.3.2 Editing Tool Data

This section explains on how to edit the tool data. The tool to be created is a torch for arc-welding. The tool dimensions are: 0 mm for X, 0 mm for Y, and 395 mm for Z.

1. On the Virtual Programming Pendant, select from the main menu {ROBOT} - {TOOL}.



2. The TOOL settings appear. Move the cursor with the arrow keys to the Z field. Press the [Spacebar] to select the Z field for edition and enter the value “395”. Press [Enter] to register the entered value. Repeat the same procedure for the Ry field and enter a value of -35. (In this example, the tool end curves by “Ry = -35” relative to the flange axis.



2.3.3 Adding a Tool Model

There are two ways to add a tool model:

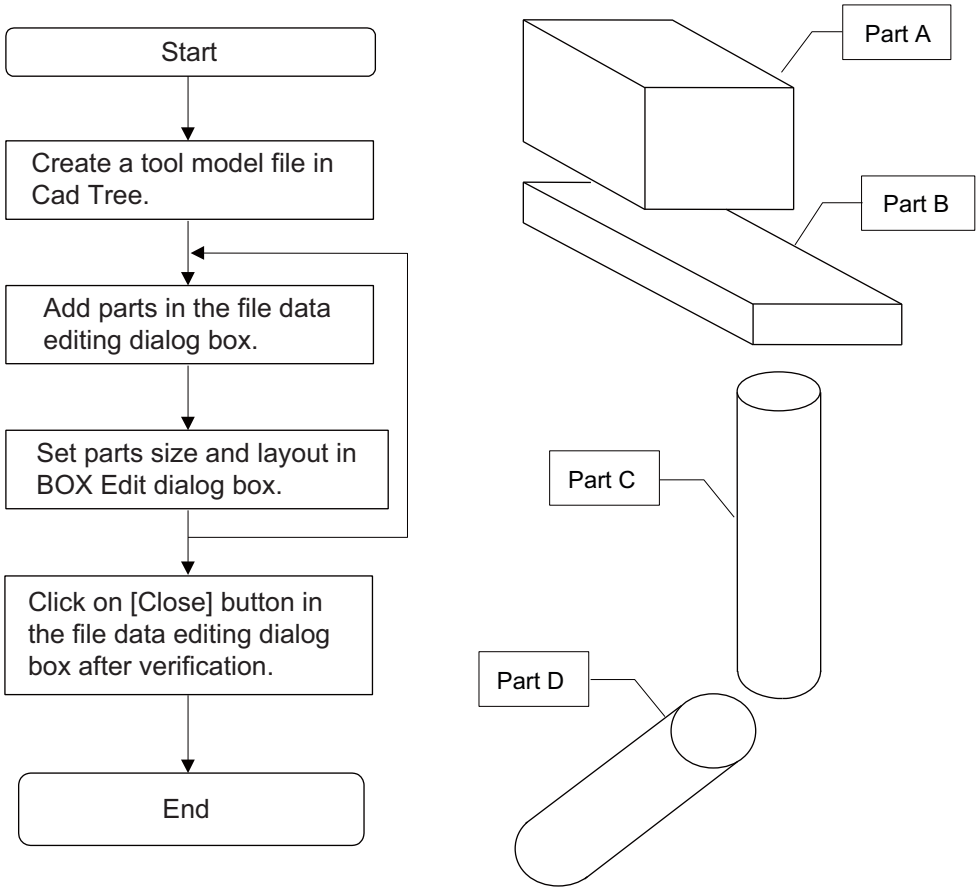
(1) Create a tool model with the CAD function of MotoSim EG-VRC.
(2) Read a tool model in the HSF format (*.hsf).

First, method (1) is used to explain the creation of a tool model with the MotoSim EG-VRC CAD function.

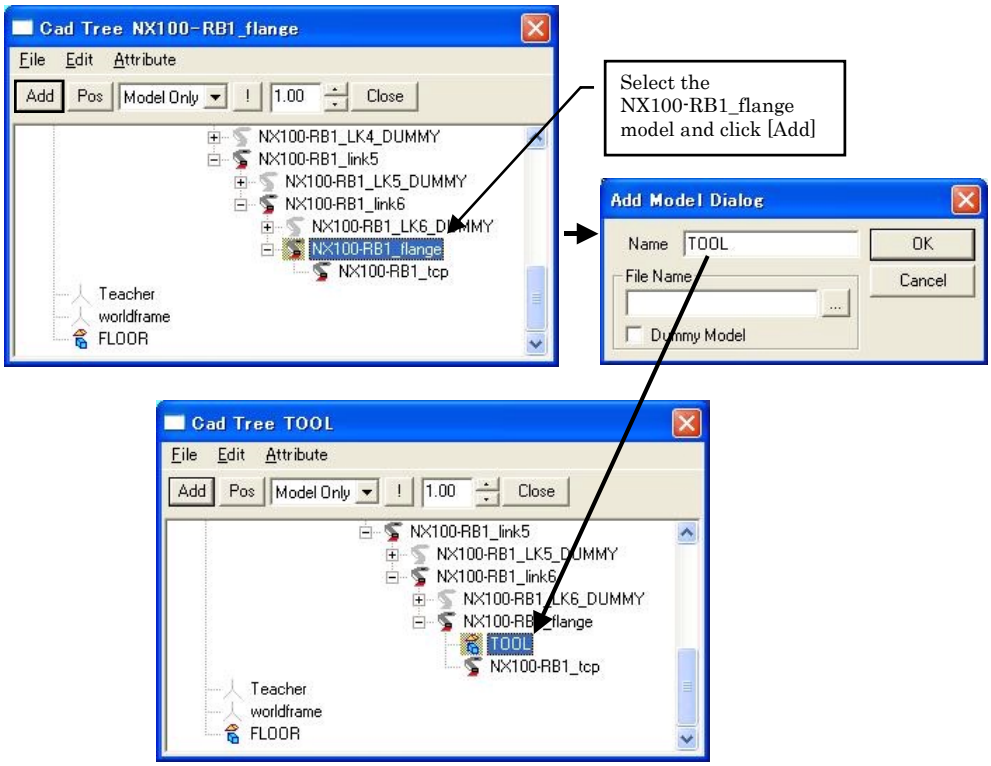
In method (2), an HSF format model is used; this is explained in " Reading the HSF Format Model " later on.

■ Creating and Adding a Tool Model with the CAD Function

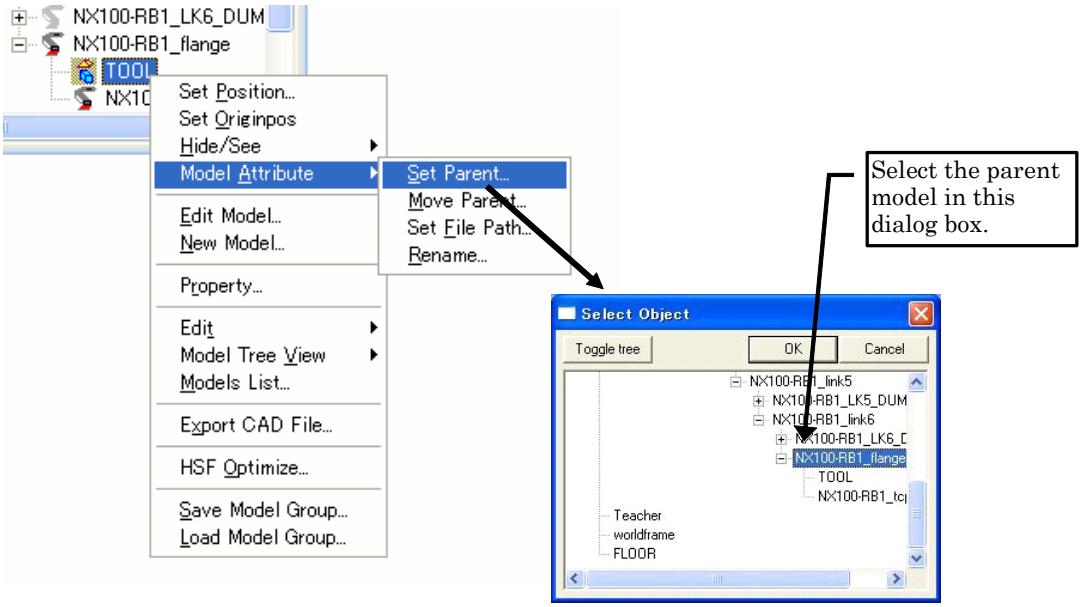
Follow the flowchart below to create a tool model.



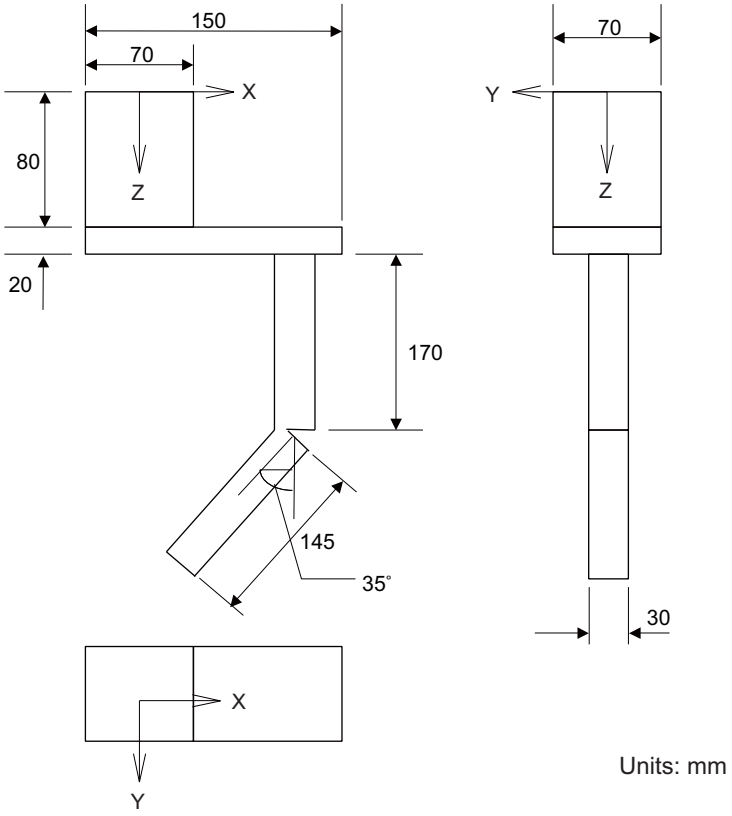
1. Display the Cad Tree to create a new model names "TOOL". In this case, point the cursor to "NX100-RB1_flange" and create a new model so that the parent model of the tool model is the flange of the robot.



If the parent model is not set correctly, change the parent model by selecting {Model Attribute} - {Set Parent } as shown in the following figure.



2. The dimensions of the tool model are shown in the following figure:



3. Double-click "TOOL" in the Cad Tree to display the file data editing dialog box, and add parts in the file data editing dialog box.
The tool model is composed of two BOX models and two CYLINDER models. Assume these four parts as parts A, B, C and D, respectively: edit parts A and B in the BOX edit dialog box and parts C and D in the CYLINDER Edit dialog box.
The following tables show the size and layout of each parts A, B, C and D.

• Part A (BOX)

Width (W)	70	Depth (D)	70	Height (H)	80
X (mm)	0	Y (mm)	0	Z (mm)	40
Rx (degree)	0	Ry (degree)	0	Rz (degree)	0

• Part B (BOX)

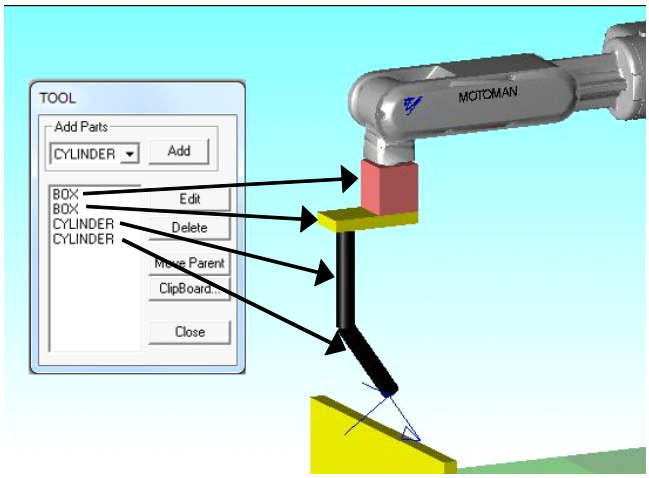
Width (W)	150	Depth (D)	70	Height (H)	20
X (mm)	40	Y (mm)	0	Z (mm)	90
Rx (degree)	0	Ry (degree)	0	Rz (degree)	0

• Part C (CYLINDER)

Lower Dia.	30	Height (mm)	170	Division	16	Upper Dia.	30
X (mm)	80	Y (mm)	0	Z (mm)	100		
Rx (degree)	0	Ry (degree)	0	Rz (degree)	0		

• Part D (CYLINDER)

Lower Dia.	30	Height (mm)	145	Division	16	Upper Dia.	30
X (mm)	80	Y (mm)	0	Z (mm)	270		
Rx (degree)	0	Ry (degree)	-35	Rz (degree)	0		

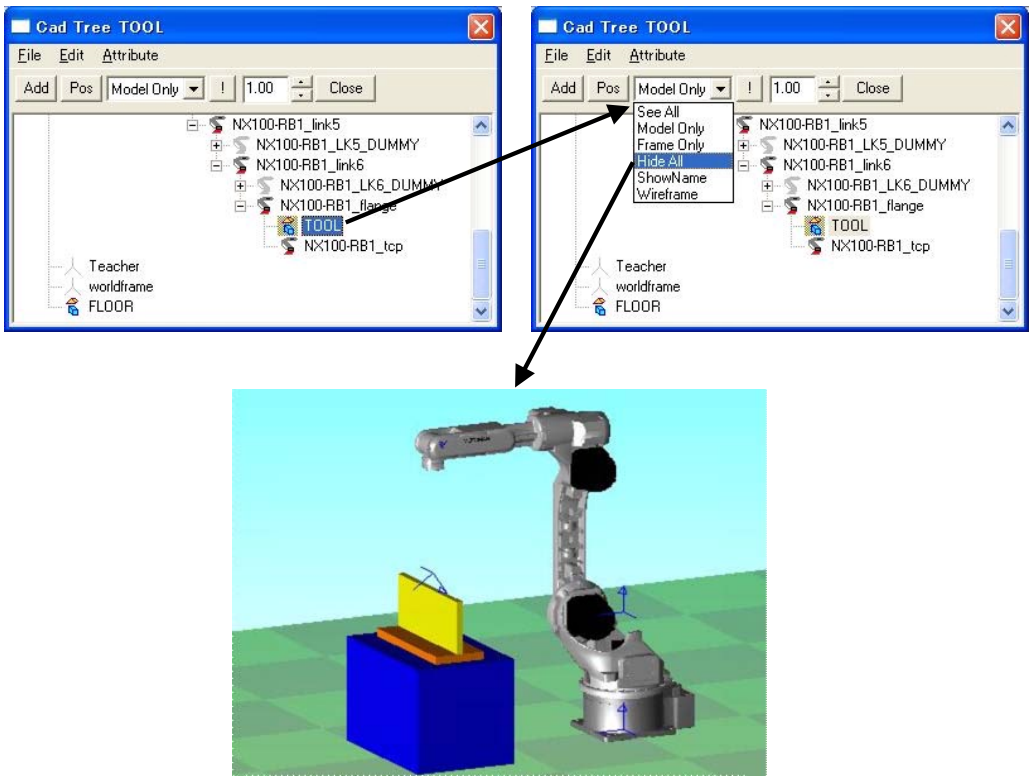


4. When the parts are all added, check the tool model on the screen, then click on the [Close] button to exit the file data editing dialog box.

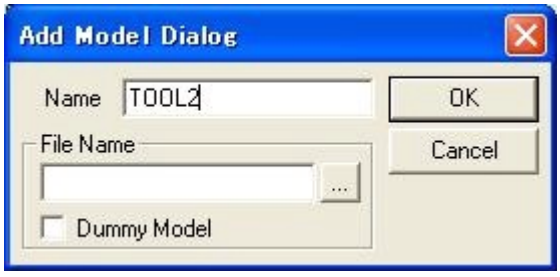
5. Verify that the size and layout of the tool model, STAND model and WORK model are properly set, and click the [Close] button in the Cad Tree to complete creation of the models.

■ Reading the HSF Format Model

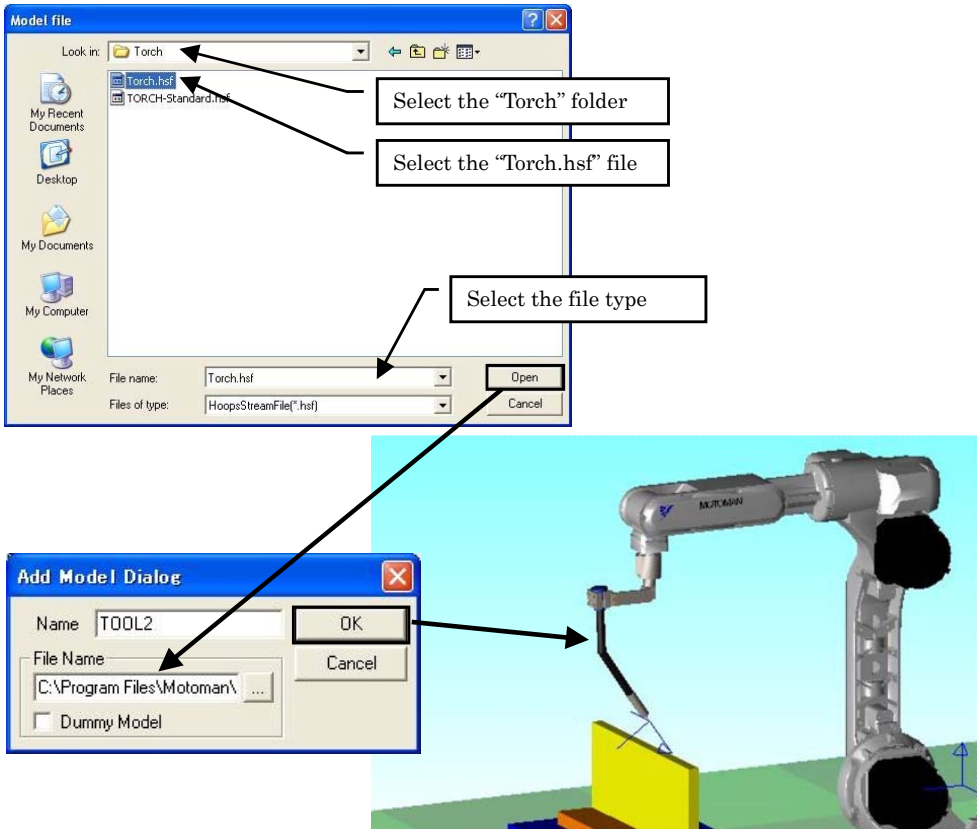
This section describes how to add a tool model which is provided as an HSF format (*.hsf).
If the tool model has been already added in the previous section " Creating and Adding a Tool Model with the CAD Function ", select "TOOL" from the Cad Tree and select "Hide" to hide it.



1. Select "NX100-RB1_tcp" in Cad Tree and click [Add] to display the Add Model Dialog dialog box, then enter "TOOL2" in the Name edit box.



2. Click the [...] button of the file name and select "Torch.hsf" file in the folder "Models\Torch"; click the [OK] button.



NOTE The HSF model files can be added by drag and drop from the Explorer. (Refer to" 11.11 Reading a Model " for details.) In this case, answer "Yes" when prompt "Select the parent model? and then select "NX100-RB1_tcp" as the parent.

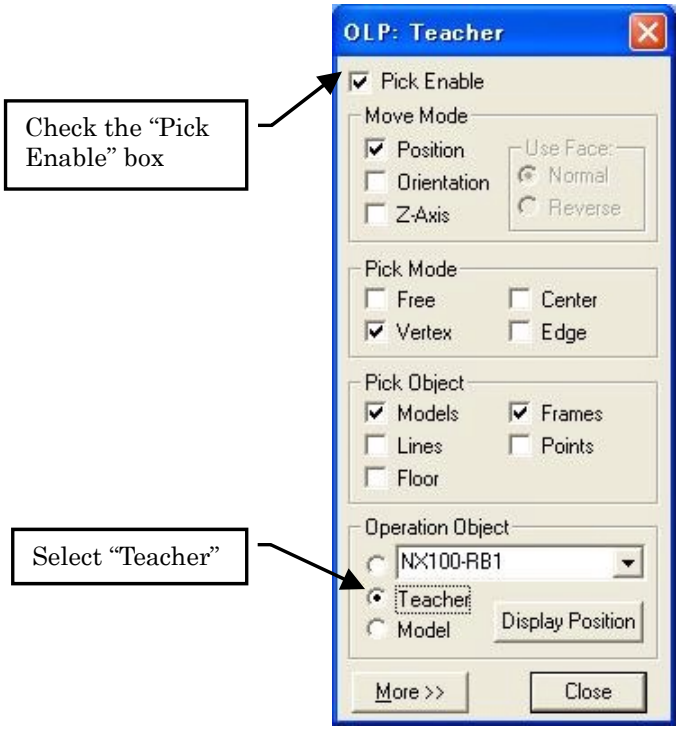
2.4 Setting of Target Points (AXIS6 Model)

This section explains on how to add an AXIS6 model before starting to teach. This procedure is not necessarily required, however, it makes future teaching easier.

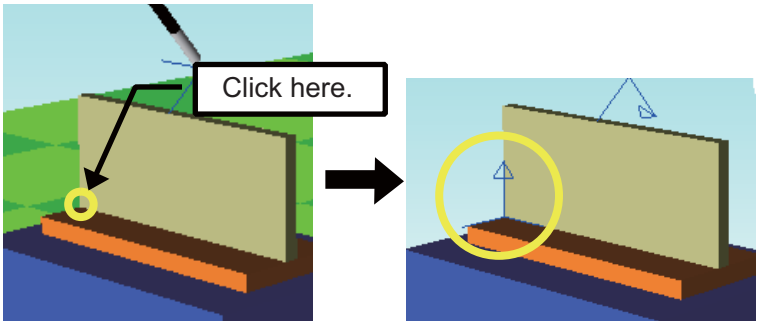
AXIS6 is a model composed of only X, Y and Z-axis frames. Set AXIS6 as target points for the following two steps which will be teach later.

- Step 3: welding start position
- Step 4: welding end position

1. On the [Home] tab, in the [Teaching] group, click the [OLP] button to display OLP dialog box as shown below. Select the [Teacher] radio button in the “Operation Obj” section, check the [OLP Pick] check box.



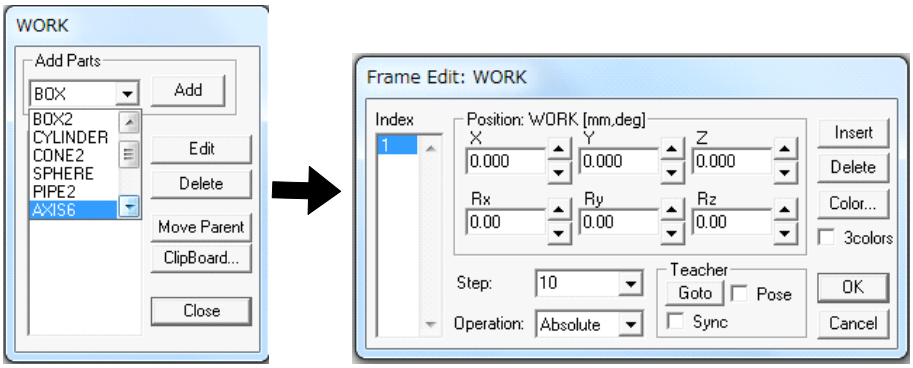
2. Set the Teacher to the welding start position of Step 3: click the welding start position with [Enable] checked.



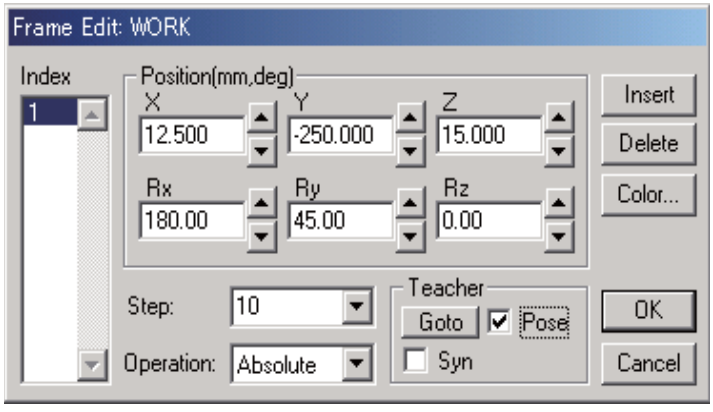
3. Set the Teacher to optimum angle for the tool welding position: in the following example, welding is performed at an angle of 45° to the welding position. Press the [Display Position] button from the OLP panel and set Rx, Ry and Rz as shown below.

Rx (degree)	180	Ry (degree)	45	Rz (degree)	0

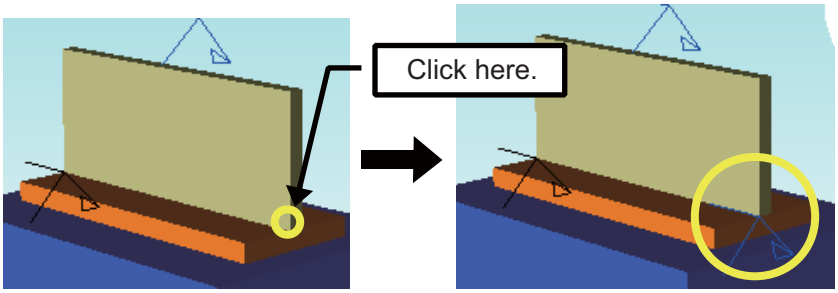
4. Double-click the "WORK" model in the Cad Tree and add AXIS6 in the file editing dialog box.



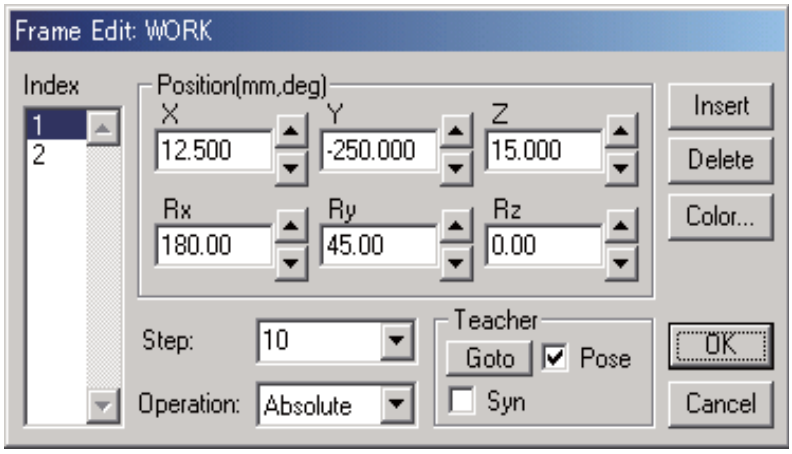
5. Click on [Add] and verify that the number “1” has been added to the Index list box. Then, check the [Pose] check box in the Teacher group and click the [Goto] button. With this operation, the teacher frame color in the cell window changes, which means that AXIS6 has been set to the teacher coordinate and orientation and now overlaps it.



6. Set AXIS6 to the welding end point by performing steps 1 and 2 again, however, since the welding end point is to be set this time, be sure to click the part shown below in the OLP function. (Since the teacher angle has already been modified in the 3rd step, the angle modification is not necessary here.)



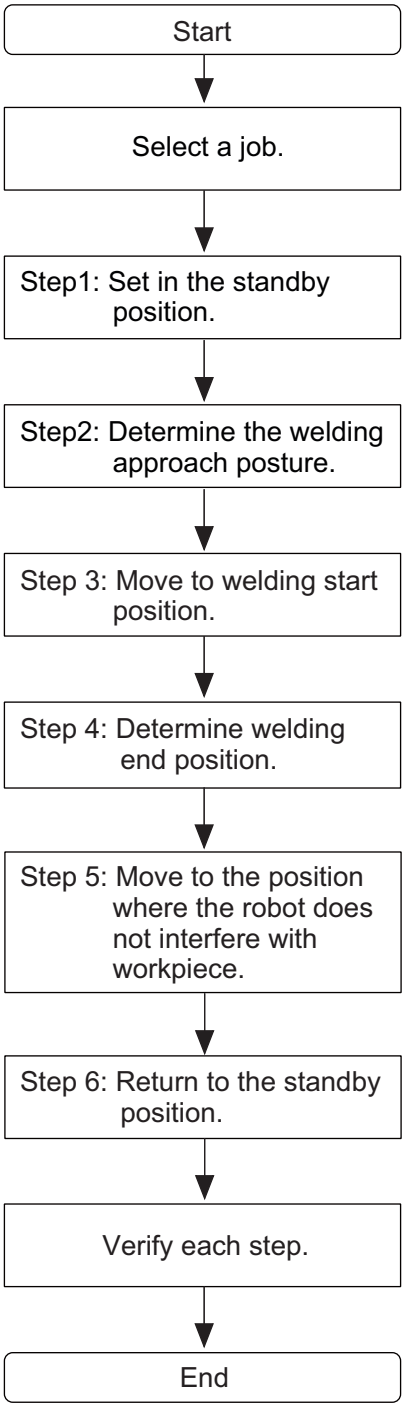
7. Add frame number 2 by clicking the [Insert] button in Frame Edit dialog box for AXIS6 which has been previously set; verify that the [Pose] check box is checked and click on [Goto].



8. When AXIS6 is set, click on [OK] to complete the setting.

2.5 Teaching

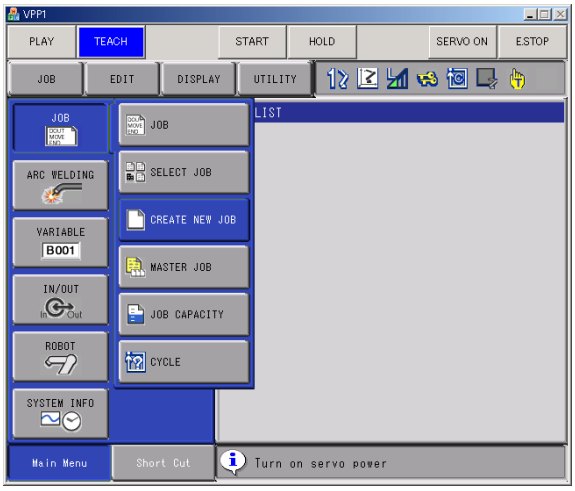
Follow the flowchart below to create an actual job for arc-welding.



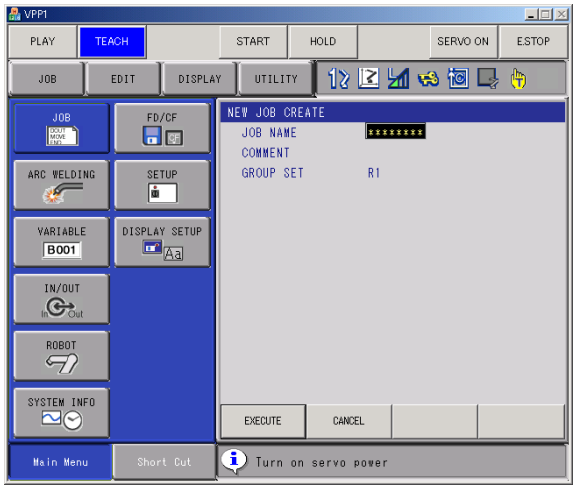
2.5.1 Creating a New Job

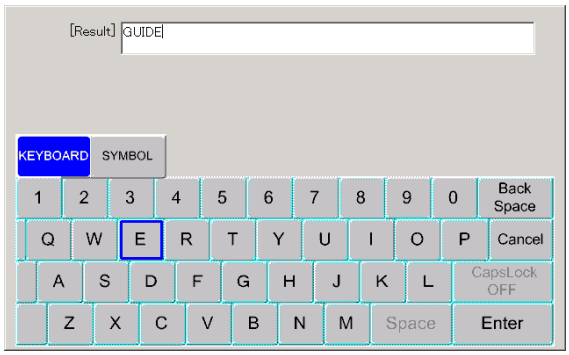
Create a new job before teaching:

1. On the virtual pendant main menu, select {JOB} - {CREATE NEW JOB}



2. With the cursor in the “JOB NAME” field, press the [Spacebar] to select the “JOB NAME” field and display the alphanumeric input window. Enter a name for the job. For this example, enter "GUIDE" in the “Result” field and then press [ENTER]. To enter a name for the job, the keyboard is also available. For details, please refer to the section " 5.2.6 Input with keyboard ".

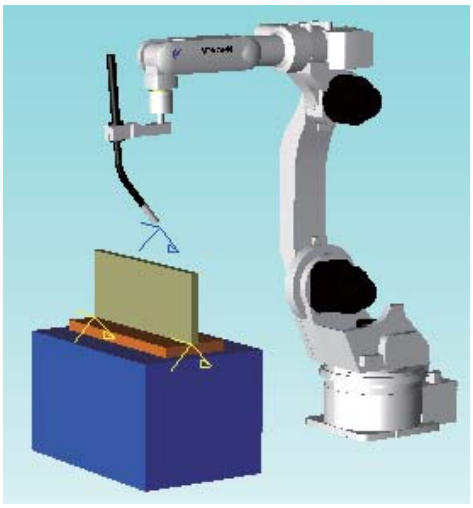




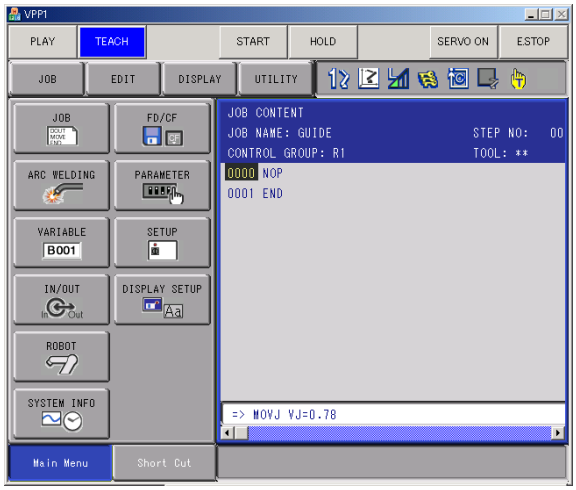
3. Click the [EXECUTE] button or press [ENTER], to create the new job.

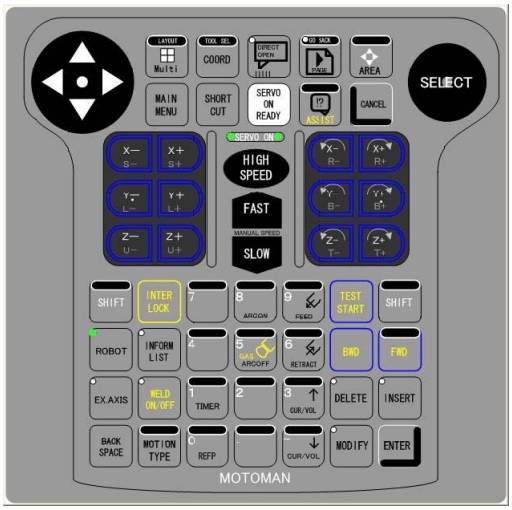
2.5.2 Teaching the Standby Position

1. Press the [SERVO ON] button. Once the servo power is activated, move the robot to its standby position by using the Virtual Pendant axis keys.



To display or hide the pendant keypad, press the [/] key or click on the  icon.



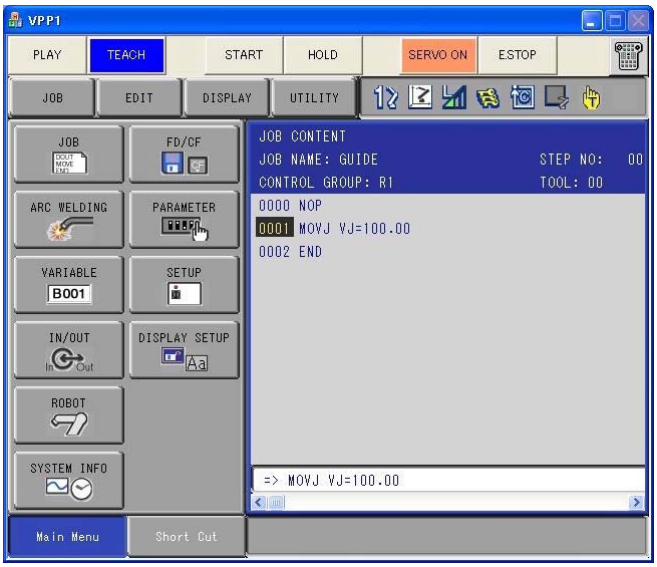


2. In the input line, select the motion type using the [MOTION TYPE] key of the pendant keypad.
   For this example, select joint motion (MOVJ)

3. Set the motion speed:
   - Press [Select] to the focus in the input line.
   - Move the cursor to the speed value with the cursor key.
   - Select the speed value by using the [SHIFT] and the up and down arrow of the cursor key.

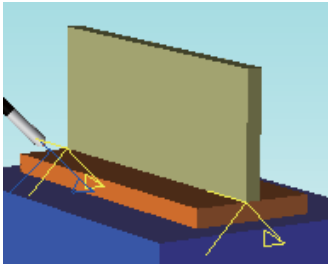
   For this example, set the motion:
   - Type: Joint Motion (MOVJ)
   - Speed: 100%

4. Press [Enter] to register the motion instruction to the robot current position.



2.5.3 Determining the Welding Approach Posture

Use the virtual pendant to posture the robot so that it can perform welding.
Press [Enter] to register this step (Step 2).

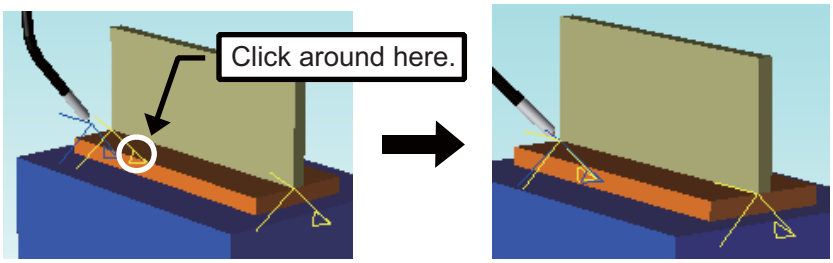


2.5.4 Teaching the Welding Start Position

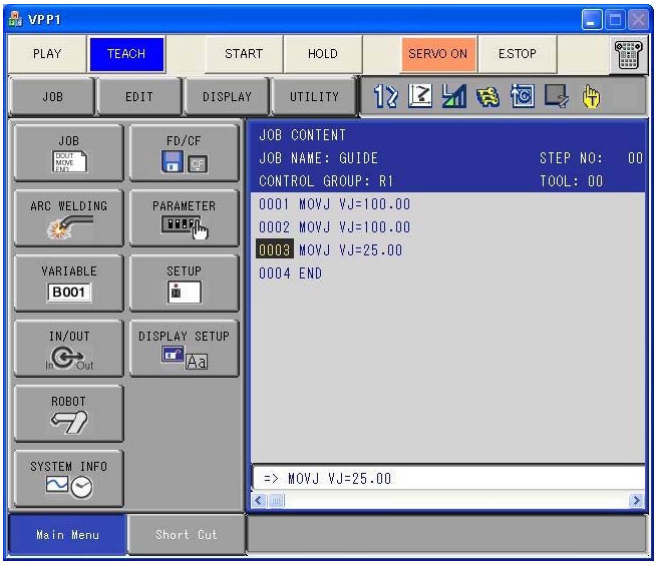
1. On the [Home] tab, in the [Teaching] group, click the [OLP] button to display the OLP dialog box.

2. Select the [OLP Pick] check box and [Vertex] check box in the “Pick type” section, and click an arbitrary point; the TCP moves to overlap the vertex near the clicked point.
   To make the most of the AXIS6 which has been set to the welding start point in the previous section, the OLP settings should be made as follows:
   - OLP Active: Checked
   - Move Mode: Position, Orientation
   - Pick Mode: Vertex
   - Pick Object: Frames
   - Operation Object: Robot Name (NX100-RB1)
   -

3. Click on AXIS6 displayed on the screen with the mouse as shown in the figure below: the tool angle is adjusted to the angle of the AXIS6.
   If the tool collides with the workpiece due to an improper tool angle, avoid the collision by manually repositioning the robot with the programming pendant dialog box.

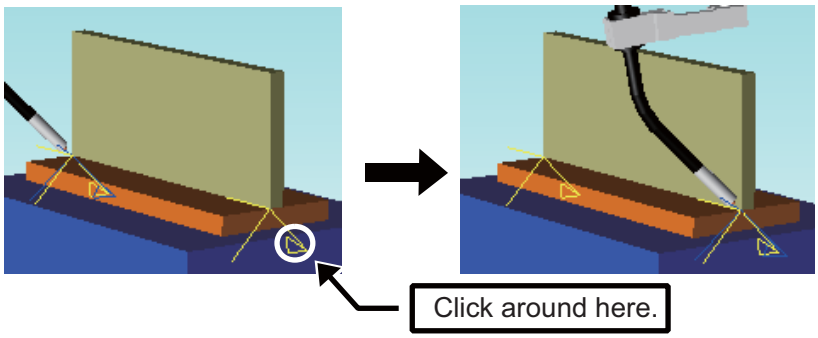


4. With the virtual pendant, set the motion:
   - Type: Joint Motion (MOVJ)
   - Speed: 25%
5. Press [Enter] to register this step (Step 3).



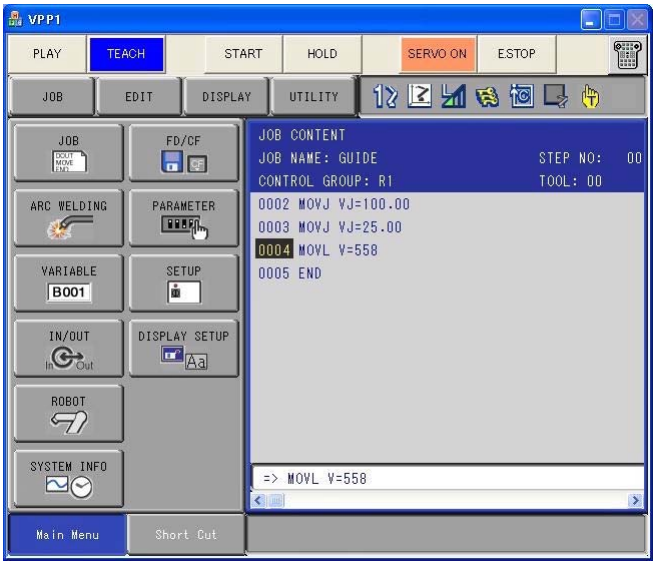
2.5.5 Teaching the Welding End Position

1. Enable the OLP function and click on AXIS6 which has been set to the welding end point to move the tool to the welding end point.



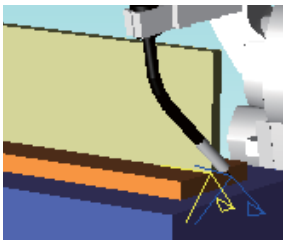
2. With the virtual pendant, set the motion:
   - Type: Linear Motion (MOVL)
   - Speed: 558 cm/min

3. Press [Enter] to register this step (Step 4).



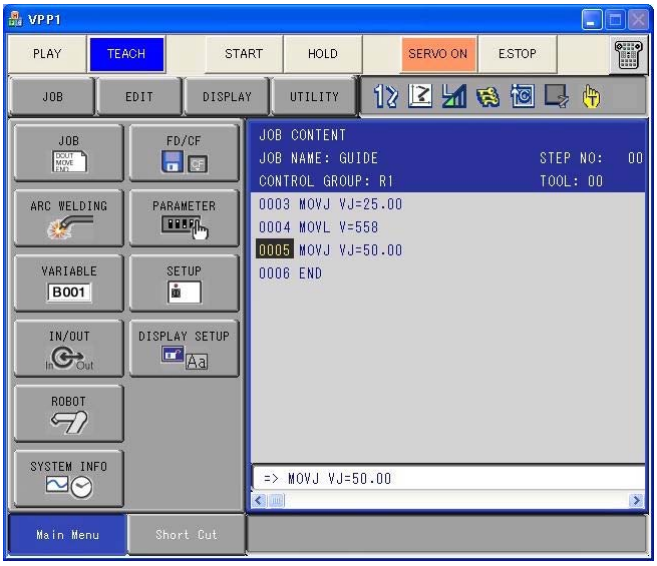
2.5.6 Teaching the Torch Retraction

1. Use the virtual pendant axis keys to move the robot away from the weld.



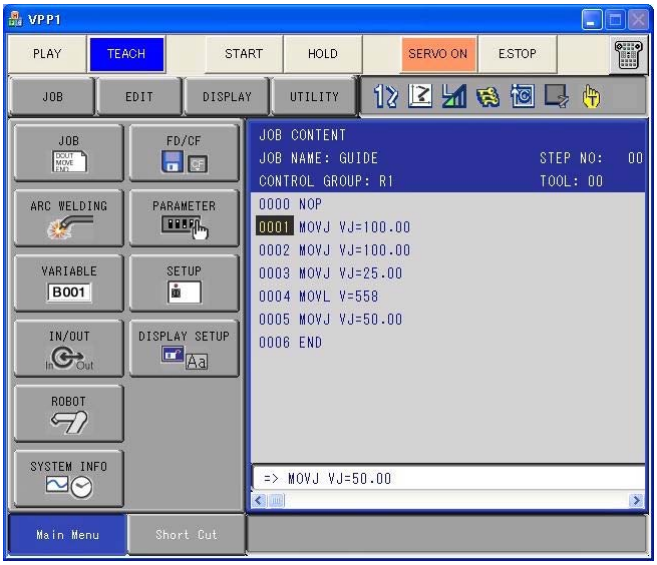
2. Set the motion:
   - Type: Joint Motion (MOVJ)
   - Speed: 50%

3. Press [Enter] to register this step (Step 5).



2.5.7 Returning to the Standby Position

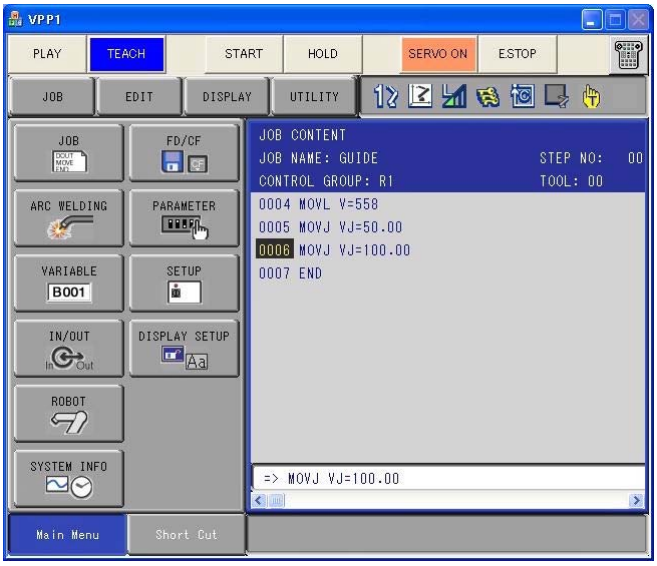
1. On the virtual pendant, move the cursor in the job to the first step.
   Press and hold the [FWD] key on the virtual pendant keypad to move the robot to this position.
   (Use the [FAST] and [SLOW] keys to adjust the speed for manual operation.)
   When the robot reaches the position for step 1, the robot will stop and the job cursor will stop blinking.



2. Set the motion:
   - Type: Joint Motion (MOVJ)
   - Speed: 100%

3. Move the job cursor back to Step 5 (before the END command).

4. Press [Enter] to register this step (Step 6).



2.5.8 Verifying Each Step

On the virtual pendant, move the cursor in the job to the first step.
Press and hold the [FWD] key on the virtual pendant keypad to move the robot to this position.
When the robot reaches the position, the robot will stop and the job cursor will stop blinking.
Release the [FWD] key, then press it again to move to the next step of the job. Repeat until the end of the job is reached.

2.5.9 Editing a JOB

A JOB can be edited with the following procedure.

■ Modifying Steps Position

1) Move the cursor to the step to be modify.
2) Move the robot to the desired position using the virtual pendant or MotoSim EG-VRC functions (OLP, Position panel...)
3) Press the [MODIFY] key of the pendant keypad and the [ENTER] key.

■ Adding Steps

1) Move the cursor to the step preceding the insertion point.
2) Move the robot to the desired position using the virtual pendant or MotoSim EG-VRC functions (OLP, Position panel...)
3) Set the motion type and motion speed.
4) Press the [ADD] key of the pendant keypad and then the [ENTER] key

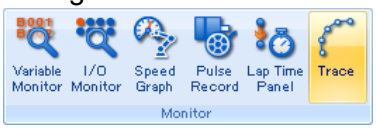
■ Deleting Steps or Instructions

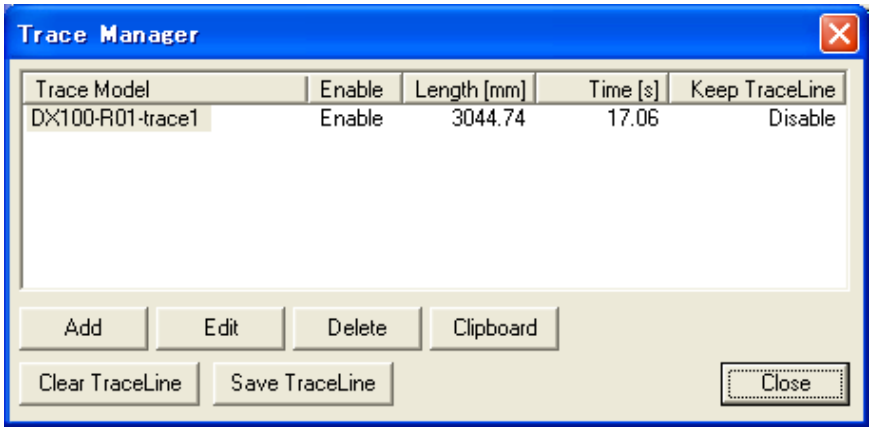
1) Move the cursor to the instruction to delete.
2) If the instruction is a motion instruction (step), move the robot to the step position by pressing and holding the [FWD] key until the robot stops moving and the cursor stops blinking.
3) Press the [DELETE] key of the pendant keypad and then the [ENTER] key.

2.6 Playback

1. On the virtual pendant, move the job cursor to the top of the job.
2. In MotoSim EG-VRC, click the job execution button [Start] to perform playback and check the movement.

3. When the playback is completed, the play time can be displayed by clicking [Trace] to show the Trace Manager dialog.





NOTE

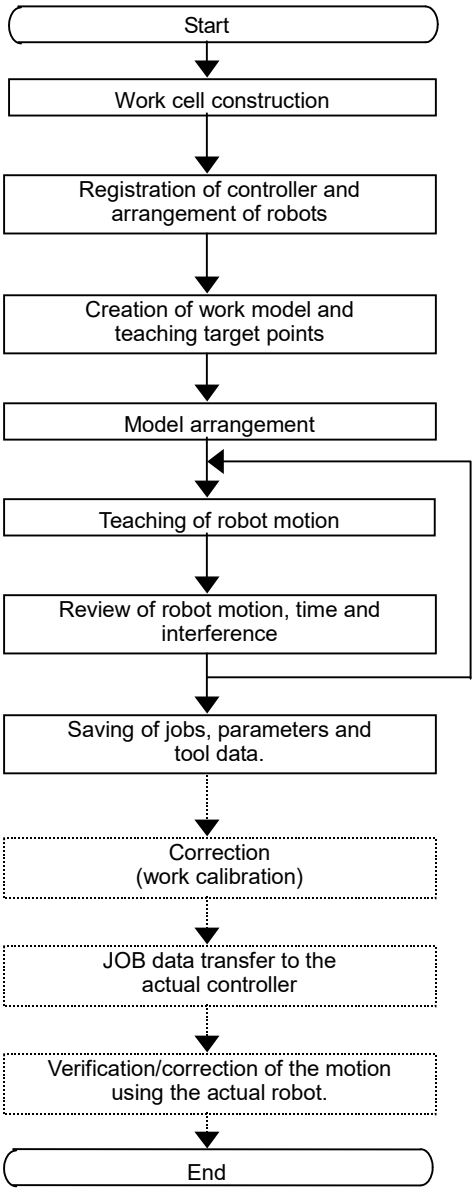
- To modify the job after playback the virtual pendant next to be change back to teach mode by pressing the [TEACH] button.
- During the execution of job, please do not sleep or hibernate the PC.
  The display of cell window may not recover.

3 Offline Teaching Procedure

This chapter describes the procedure for offline teaching and examination of robot application with MotoSim EG-VRC, and other related software.

3.1 Operation Flow

The following flowchart shows the general flow of the offline teaching using MotoSim EG.



Construct MotoSim EG-VRC operational environment (cell) on the computer.

Register created controller and layout the robots in the cell.

Create models to represent the workpiece, tool, etc. using MotoSim EG-VRC. Set target points to simplify teaching.

Layout the model on the cell.

Perform teaching and playback by using MotoSim EG-VRC to examine the motion.

From the virtual pendant menu, select {FD/CF} - {SAVE} ans save the job and data.

Correct the layout error between MotoSim EG-VRC and the actual manipulator.

Send/receive job and data to the actual controller using CompactFlash or transmission software.

Reduce the error between MotoSim EG-VRC data and actual robot using calibration software, and verify and correct the motion.

Solid lines indicate operation by MotoSim EG-VRC and dotted lines indicate operations by other software.

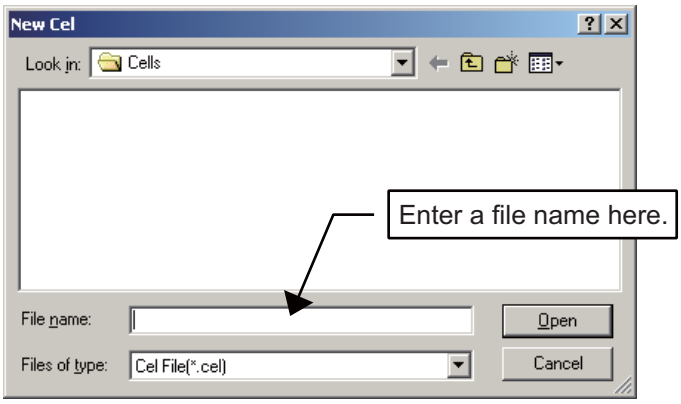
4 Creating and Editing a Cell

This chapter explains on how to create and edit a cell. Before starting to program robot motion with MotoSim EG-VRC, first create a cell and then register the controllers with the type and number of the robots to be used.
For controller and robot registration, refer to " 7.1 Adding a New Controller ".

4.1 Creating a New Cell

Procedure

1. Click the MotoSim EG-VRC button ( ), and select the [New] - [New] menu.
2. Enter a file name in the File name edit box, and click on [Open] to create a basic cell.



4.1.1 Template Function

If the template cells are registered, the new cell is created from the template, so creation time is shortened. And the template cells can be renamed and deleted.

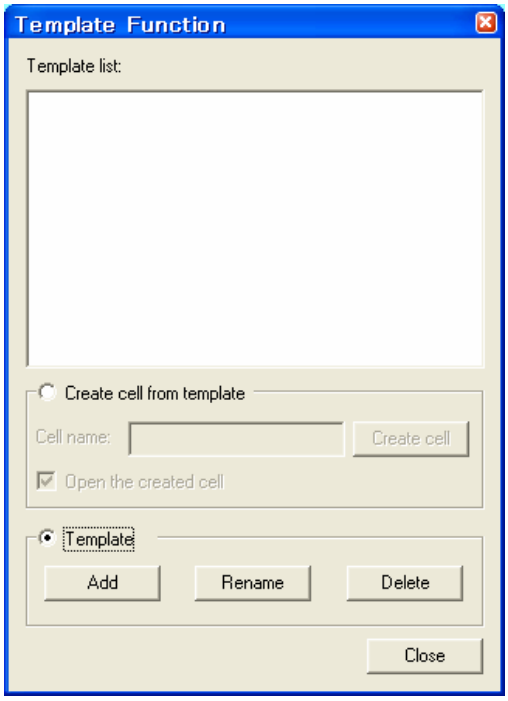
■ Registration of Template

The cell are currently open is registered as the template. When many cells with same robot configuration are created, creating the cell can be easily through the use of the template.

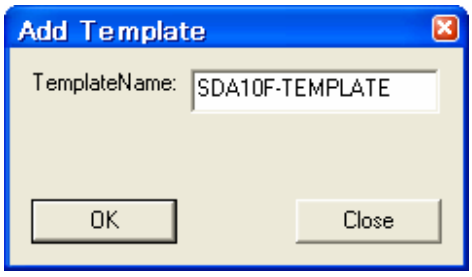
Procedure

1. Open the cell to register as template.
2. Click the MotoSim EG-VRC button ( ), and select the [New] - [Template] menu.

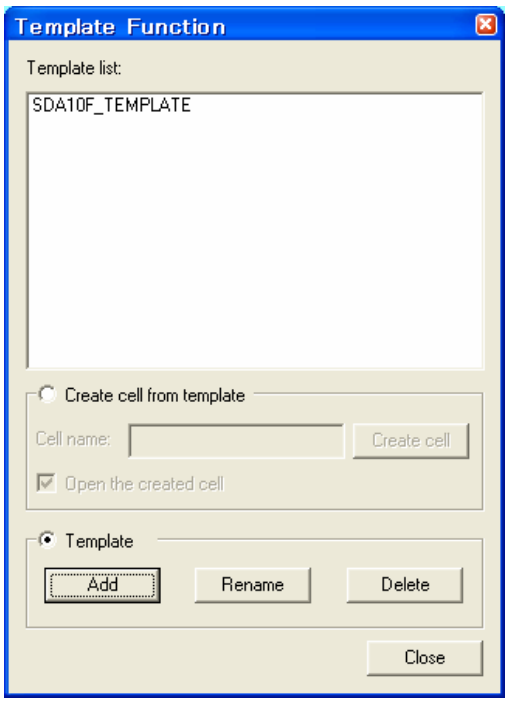
3. Select the [Template] radio button, and click the [Add] button.



4. Set the name of template, and click the [OK] button.



5. The registered template is displayed in the template list.

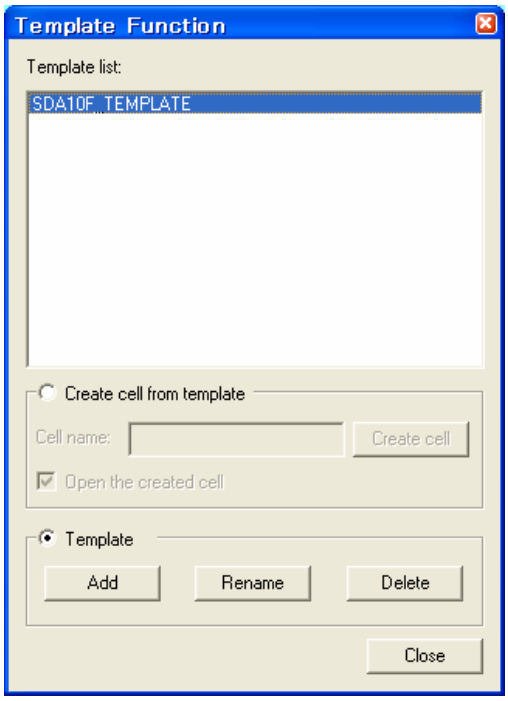


■ Rename the Template

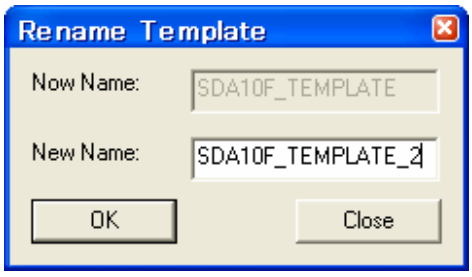
The registered template is renamed.

Procedure

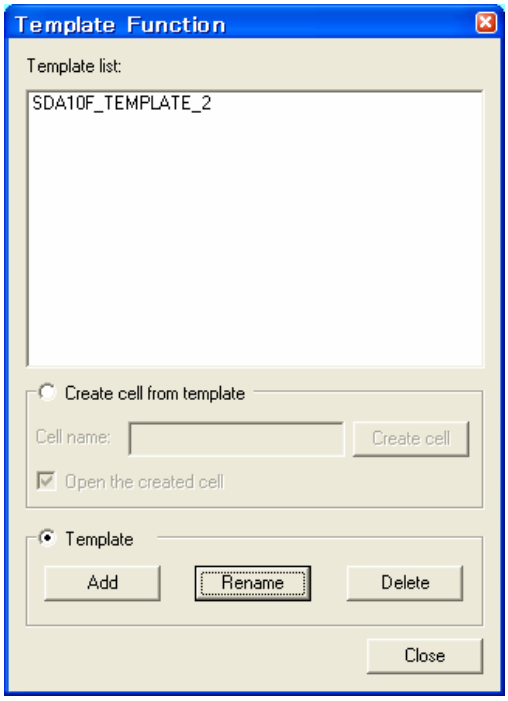
1. Click the MotoSim EG-VRC button ( ), and select the [New] - [Template] menu.
2. Select the name of template to rename in the template list.



3. Select the [Template] radio button, and click the [Rename] button.
4. Set the new name of template, and click the [OK] button.



5. The renamed template is displayed in the template list.

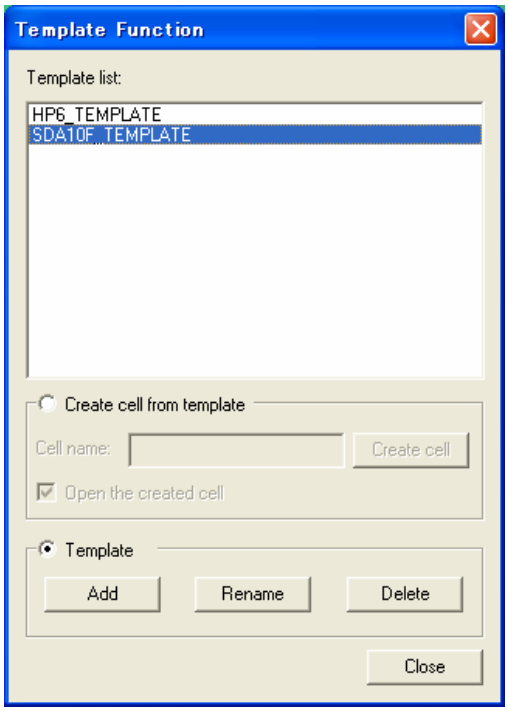


■ Delete the template

The registered template is deleted.

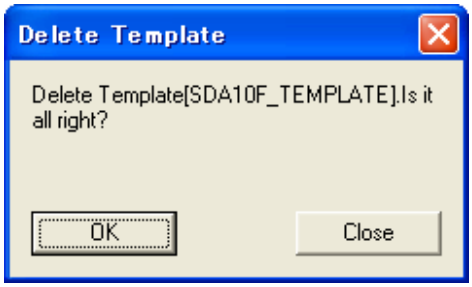
Procedure

1. Click the MotoSim EG-VRC button ( ), and select the [New] - [Template] menu.
2. Select the name of template to delete in the template list.

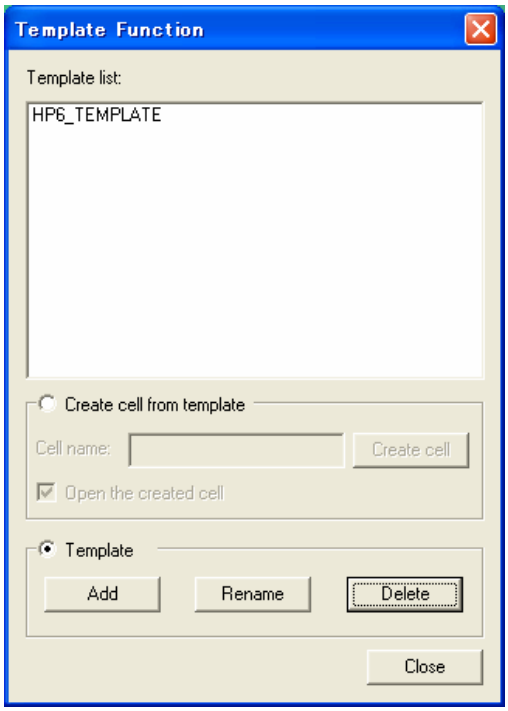


3. Select the [Template] radio button, and click the [Delete] button.

4. A confirmation dialog box is displayed. Click the [OK] button.



5. The deleted template disappears in the template list.



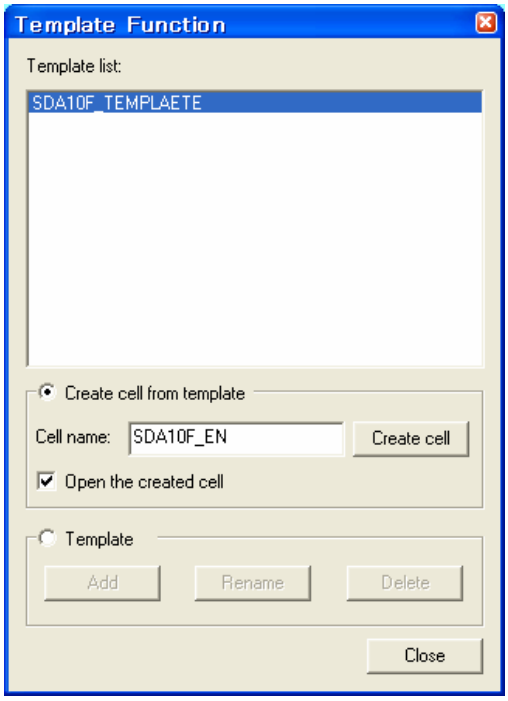
■ Create the new cell from the template

The new cell is created from the registered template.

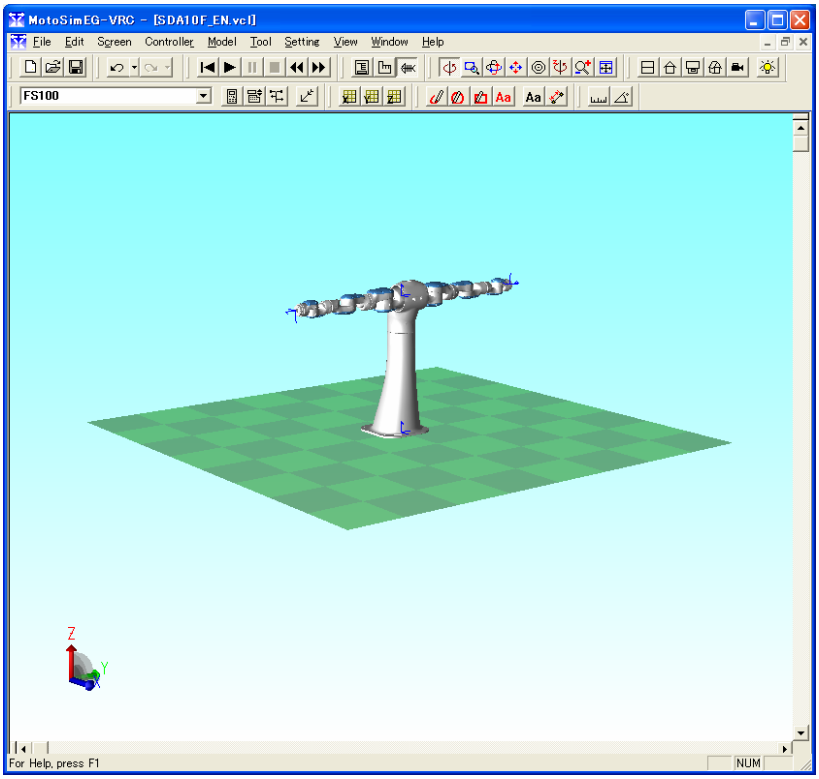
Procedure

1. Click the MotoSim EG-VRC button ( ), and select the [New] - [Template] menu.
2. Select the name of template to delete in the template list.
3. Select the [Create cell from template] radio button, and set the name of new cell.

4. Click the [Create cell] button.



5. The new cell is created. If the [Open the created cell] is checked, the new cell is opened.



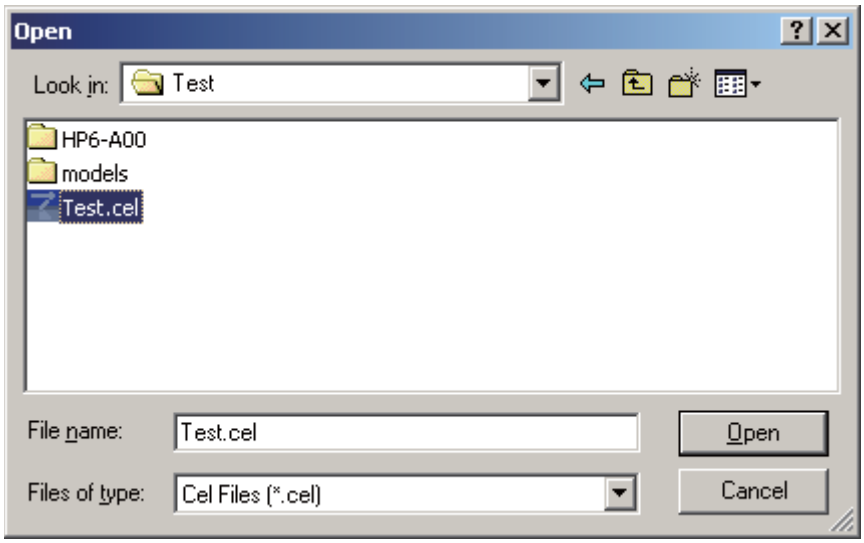
4.2 Opening a Cell

Procedure

1. Click the MotoSim EG-VRC button ( ), and select the [Open] - [Open] menu.

   When the sample cell is opened, click the MotoSim EG-VRC button ( ), and select the [Open] - [Open Sample Cell] menu.

2. Select a cell file, and click on [Open]: the cell appears.



NOTE When opening a cell with LINE data (wire frame), it is recommended to use LINE data in the HMF format: opening a cell with LINE data in other format may take some time.
If the LINE data is in the format other than HMF, convert the LINE data with “MDL2HMF.EXE” (located in a folder where MotoSim EG has been installed).

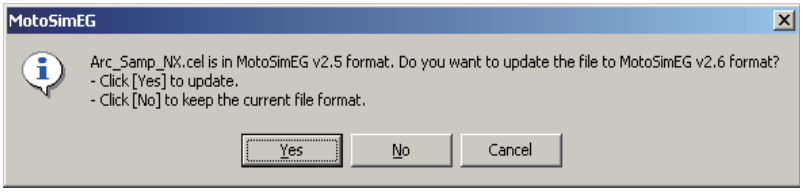
4.3 Storing a Cell

A cell file can be stored either under it current name “Save” or under a new name “Save As”.

NOTE Newer cell files containing HSF files may not display properly on older MotoSim EG-VRC versions. If a cell file need to be used with an older MotoSim EG-VRC version, it is recommended to save it in the corresponding version with the "Save As" dialog box.

4.3.1 Save

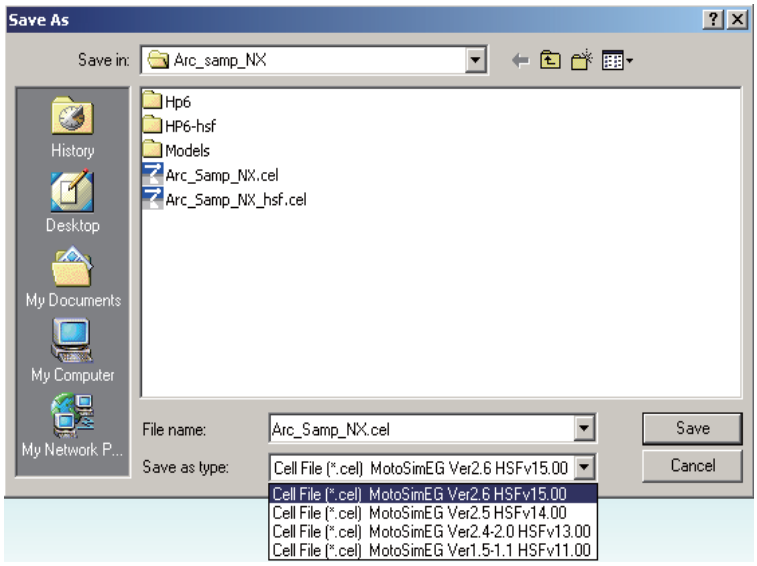
To store a file under its current name, click the MotoSim EG-VRC button ( ), and select the [Save] menu.
If the cell file was loaded from an older MotoSim EG-VRC version, the following message will display to confirm if the cell should be saved in the cell original format or in the MotoSim EG-VRC current version.



Click [Yes] to save the file in MotoSim EG-VRC current version. Click [No] to save the file in its original version. Click [Cancel] to abort saving the cell file.

4.3.2 Save As

To store a file under a new name, click the MotoSim EG-VRC button ( ), and select the [Save As] menu. Then store the file with the desired cell name. By changing the "Save as type" selection, the cell file may also be saved in a previous MotoSim EG-VRC format.



4.3.3 Save For SharePoint

Conversion operations are required when saving cells containing YRC1000, YRC1000micro controllers to SharePoint Server. To convert to a format that can be saved to SharePoint Server, click [MotoSimEG - VRC Button] and select [Save For SharePoint].

4.4 Exiting a Cell and MotoSim EG-VRC

To exit MotoSim EG-VRC, click the MotoSim EG-VRC button ( ), and select the [Exit] menu.
They can also be terminated by clicking button in the control menu box on each window.

5 Displays

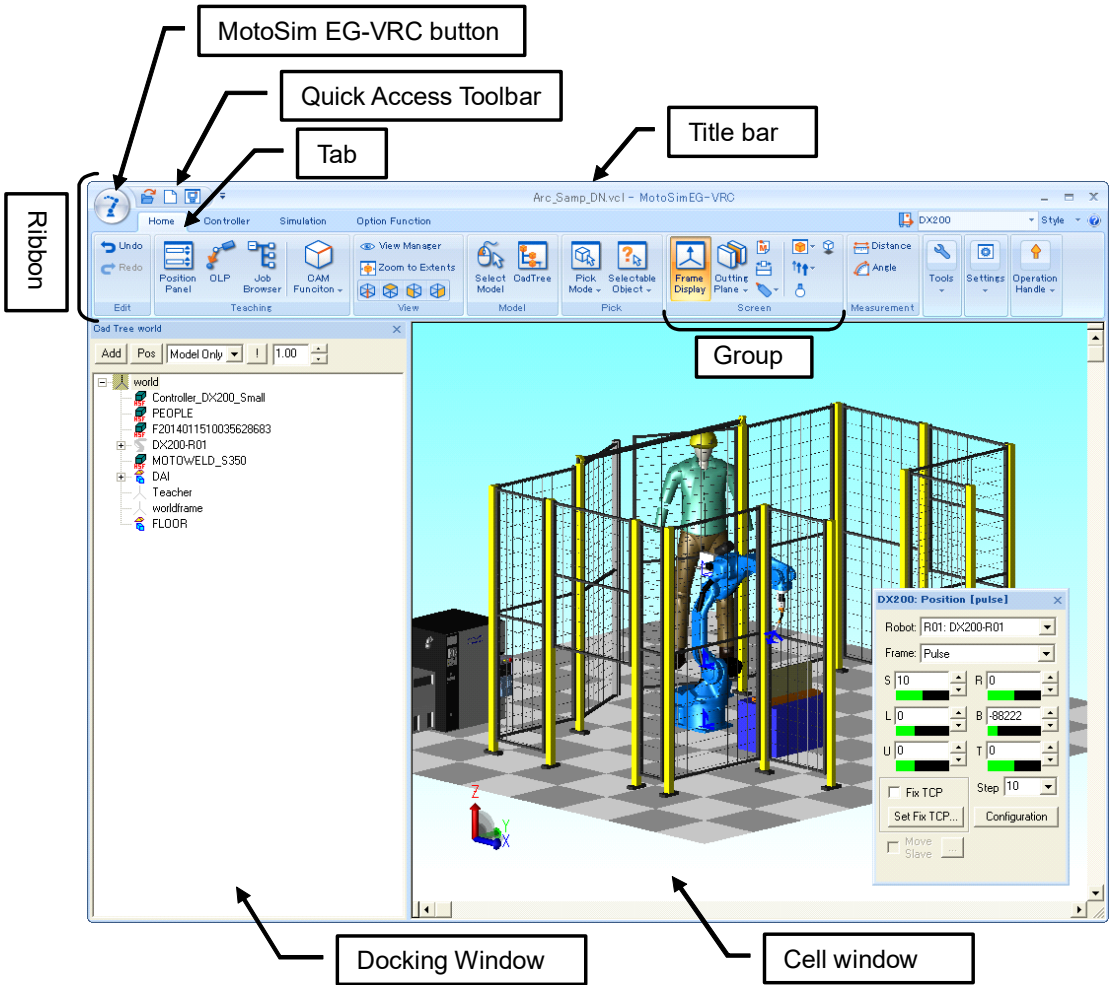
MotoSim EG-VRC has various displays. The main MotoSim EG-VRC display shows the cell layout and the robot motion in a 3D environment. Also, for every VRC controller in the cell there is a Virtual Pendant that allows to operate the VRC controller in the same manner than the real controller.

5.1 MotoSim EG-VRC Display

For improvement of operability, the basic operations of MotoSim EG-VRC are common with those of other Windows applications.

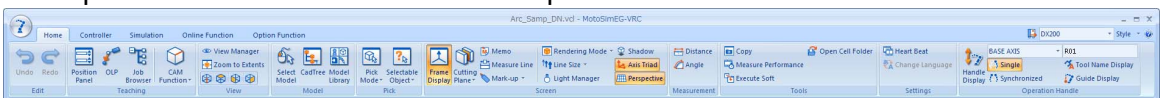
The following figure shows the MotoSim EG-VRC main window.

NOTE The appearance of MotoSim EG-VRC Ver5.00 differs greatly from Ver4.10 or before. For more detail, please refer to the " 1.1.1 Difference of the operation from 5.00 " section.

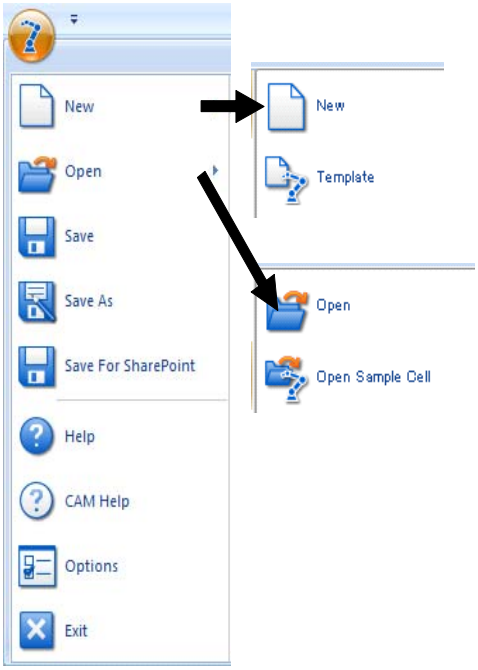


5.1.1 Ribbon

The ribbon is a command bar that organizes the features of an application into a series of tabs at the top of the main window. The ribbon replaces the traditional menu bar and toolbars.



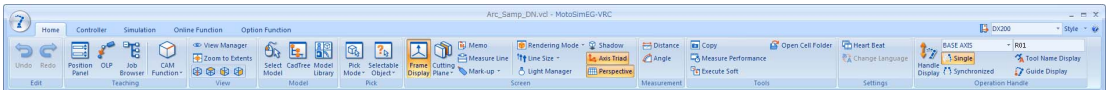
■ MotoSim EG-VRC button



New	
New	Creates a new cell. For details, refer to section " 4.1 Creating a New Cell " .
Template	Create the new cell form the template. For details, refer to section ." 4.1.1 Template Function "
Open	
Open	Reads an existing cell. For details, refer to section " 4.2 Opening a Cell ".
Open Sample Cell	Reads an existing sample cell. For details, refer to section " 4.2 Opening a Cell ".

Save	Saves the edited cell information of a cell file. For details, refer to section " 4.3.1 Save ".
Save As	Save the active cell file with a new name. For details, refer to section " 4.3.2 Save As ".
Save For SharePoint	Convert the cell folder to a format that can be saved to Share-Point Server and overwrite it. For details, refer to section " 4.3.3 Save For SharePoint ".
Help	The help of MotoSim EG-VRC is displayed.
CAM Help	The help of a MotoSim EG-VRC CAM function is displayed.
Options	Displays the Option dialog box. For details, refer to section " 12 Configuration Settings ".
Exit	To close the active cell. For details, refer to section " 4.4 Exiting a Cell and MotoSim EG-VRC ".

■ Home



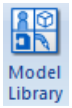
Edit	
Undo	Undoes the last operation. Click the down arrows beside the icon to display the last 9 operations. Selecting an operation from the list will undo this operation and all the operations performed after.
Redo	Redoes the last undone operation. Click the down arrows beside the icon to display the last 9 undone operations. Selecting an operation from the list will redo this operation and all the undone operations performed before.
Open Cell Folder	Open the cell folder.

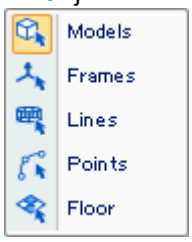
NOTE

- Undo and Redo function supports the robot position change, model edition, Cad Tree operations and camera viewpoint operations. Any operation generated by the virtual pendant or the playback of a JOB is not supported by the Undo and Redo function.
- Undo and Redo function may generate temporary files (mseg????.tmp) located in the Temp folder under the MotoSimEG installation folder. Deleting these files while MotoSimEG-VRC is running may prevent undoing some operations. Normal termination of the MotoSimEG-VRC application will automatically remove all temporary files in this folder.

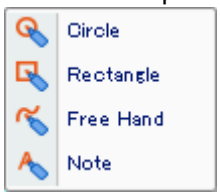
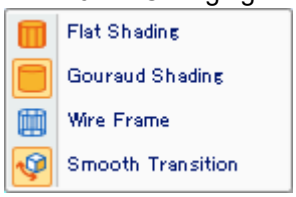
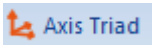
Teaching	
	Displays the Position Panel. Position Panel displays the robot position, pulse data, etc. For details, refer to section " 8.1 Position Panel ".
	Displays OLP dialog box and enables OLP function. Moves the end of the robot tool or a model to a target point with one-click operation. For details, refer to section " 8.10 Teaching ".
	Displays the Job Browser. For details, refer to section " 8.16 Job Browser ".
	For detail on the CAM function please refer to CAM help (click  and select [CAM Help] menu).  • This function is available MotoSim EG-VRC ver4.00 or later. • To use this function (CadPack option), the MotoSim EG-VRC-CadPack is required. (The MotoSim EG-VRC-CadPack is separate product from MotoSim EG-VRC.) • For Laser-welding use and Laser-cutting use, the additional options sold separately are needed.

View	
	Displays the View Manager panel, which offers a wider selection of standard view and allows to save and load up to 10 user defined views. For details, refer to section " 6.1.2 Preset Viewpoint Operation ".
	Displays all the models in the cell to fit in the view.
	Change the viewpoint to display the default isometric view.
	Changes the viewpoint to display the default top view.
	Change the viewpoint to display the default side view.
	Changes the viewpoint to display the default front view.

Model	
	Selects a model: click any point of the desired model for selection.
	Displays the model “Cad Tree” (tree structure organization of the models), indicating models display status and relationship. Can be used to add and edit models. For details, refer to section " 11.1.1 Outline of the Cad Tree ".
	Displays the model library dialog. For details, refer to section " 8.17 Model Library ".

Pick	
	The Pick Mode sets conditions determining the selected point in the clicked area. For details, refer to section " Pick Mode Setting ". 
	Pick object set filters on the type of objects that can be selected by the mouse pick. For details, refer to section " Pick Object Setting ". 

Screen	
	Toggles display of the AXIS6 in frame indicators in the view.

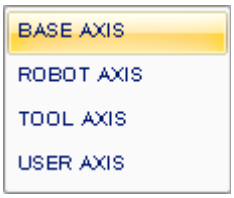
	Displays cross-section X/Y/Z. For details, refer to section " 6.7 Cutting Planes ". 
	Creates a memo (text). For details, refer to section " 6.6 Memo ".
	Creates a dimension line. For details, refer to section " 6.10 Measure Line ".
	Draws a free-form line/circle/rectangle or adds a note (text). For details, refer to section " 6.5 Markup ". 
	The display mode can be change. For details, refer to section " 6.11 Changing the Rendering Mode ". 
	Changes the frame line to display the width. For details, refer to section " 6.12.1 Changing Frame Width ". 
	Displays the Light Manager panel, which allows to add or remove lights, and to modify each light's properties. For details, refer to section " 6.2 Light Manager Operation ".
	Shadows can be displayed for the models on the screen. For details, refer to section " 6.3 Displaying Shadows ".
	Displays the axis triad. For details, refer to the section " 12.1.3 Display ".
	Changes the perspective. For details, refer to the section " 12.1.3 Display ".

Mesurement	
	Measures the distance between two clicked points. For details, refer to section " 6.8 Measure Distance ".

Angle	Measures the angle between three clicked points. For details, refer to section " 6.9 Measure Angle ".

Tools	
Copy	Copy the static image of the cell window. For details, refer to section " 6.12.2 Copying the Image ".
Measure Performance	Drawing performance is measured.
Execute Soft	External software is executed. For details, refer to section " 8.15 Running an External Software ".

Settings	
Heart Beat	The re-drawing interval at the playback is set every second (s). For details, refer to section " 7.5.4 Refresh Interval ".
Change Language	Sets the language. For details, refer to section " 12.4 Language and Unit Settings ".

Operation Handle	For details, refer to section " 8.10.2 Operation Handle ".
Handle Display	Display/Hide the operation handle.
Single	When operate the Operation handle, the selected robot only moves.
Synchronized	When operate the Operation handle, the selected robot and another robot move to keep their TCP the same relative position.
BASE AXIS	Select the coordinate of the Operation handle. The following coordinates are available. 
R01+R02+B01+B02	Display the control group of the current job.
Display Settings	Display/Hide the tool names at the tip of tool (TCP). 

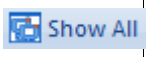
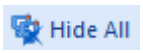
Grid Settings	Display/Hide the guide line.

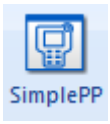
■ Controller

Setup	
New	Create a new controller and define a system in MotoSim EG-VRC. For details, refer to section " 7.1 Adding a New Controller ".
Copy	A controller already define in a MotoSimEG-VRC cell can be copied over to another cell. For details, refer to section " 7.2 Copying a Controller ".
Delete	To delete the controller and its associated robots from a cell. For details, refer to section " 7.3 Deleting a Controller ".

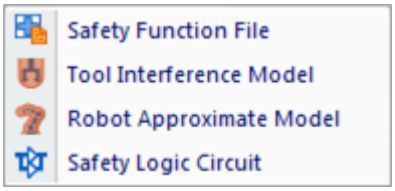
Boot	
Reboot	Reboot the controller to update parameter changes. For details, refer to section " 7.5.3 Reboot Controller ".
Maintenance Mode	The controller is rebooted in the maintenance mode. For details, refer to section " 7.10 VRC Maintenance Mode ".

VPP	
Show	Displays the Virtual Pendant. Virtual Pendant can be operated same as Teaching Pendant of each controller. When click the button with pressing [Ctrl] key, the [Virtual Pendant] is displayed at upper left of MotoSim EG-VRC dialog. For details, refer to section " 5.2 Virtual Pendant ".
CF Storage Card	Open the Storage Card folder

	Displays all Virtual Pendants. When click the button with pressing [Ctrl] key, all [Virtual Pendant] are displayed at upper left of MotoSim EG-VRC dialog.
	Hides all Virtual Pendants.

Job	
	Displays the Simple Pendant dialog. For details, refer to the section " 8.18 Simple PP ".
	Displays the JobPad dialog. For details, refer to the section " 8.19 JobPad ".

File Settings	
	Modify the tool data file. For details, refer to section " 7.5.1 Tool Editor ".
	Modify the user frame data. For details, refer to section " 7.5.2 User Frame ".
	Modify robot callbration data file. For details, refer to section " 7.6.3 Robot Calibration Setting ".
	Set the welding machine for spot welding. For details, refer to section " 13.8.3 Setting of welding machine ".
	Display/delete the cube interference area. For details, refer to section " 7.5.6 Cube Interference Area ".

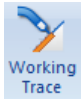
Safety Function	Display and modify the safety function. And switch the input signal of safety logic circuit. For function safety's details, refer to " 7.10 VRC Maintenance Mode " and " 7.11 Displaying model / Editing Data of Safety Function ". For safety logic circuit details, refer to " 7.13 Safety Logic Circuit Setting Support Function ".. 
Arc Welding Condition	Set the welding machine for arc welding. For details, refer to section " 13.20 Setting of arc welding simulation ".

Robot	
Model Setting	Set the robot model. For details, refer to section " 7.6.1 Robot Property ".
TCP Reach	Draw TCP Reach View. For details, refer to section " 7.6.2 Reach View ".

External Device	
New	Creates a new external device. For details, refer to section " 7.7 Peripheral Equipment ". 
Soft Limit	Set the soft limit. For details, refer to section " 7.7.4 Modifying the Soft Limit of a Device ".
Job Panel	Displays the Job Panel. For details, refer to section " 7.7.6 Programming a Device ".
Conveyor Settings	Edit conveyor specification. For details, refer to section " Conveyor Setting ".
Conveyor Condition File	Set the conveyor condition file. For details, refer to section " 7.7.9 Conveyor Synchronization ".
Conveyor Operation Panel	Display conveyor operation panel. For details, refer to section " 7.7.8 Conveyor Operation Panel ".

■ Simulation

Playback	
	Moves the cursor in the job to the first step on the virtual pendant, and sets the robot position to the position of starting the job. NOTE This function can not use depending on the system version of controller. Please refer to section " 15.8 List of Function depending on the system version of controller ".
	Executes the job currently selected of all the controllers in the cell. Use the virtual pendant to change the selected job. NOTE During the execution of job, please do not sleep or hibernate the PC. The display of cell window may not recover..
	Interrupts the job under execution.
	Enables a job to skip backward step by step.
	Enables a job to skip forward step by step.
	Display the Stage master. For details, refer to section " 8.7 Stage Master ".
	To playback without considering the lag of servo.
	Display the Cycle time. For details, refer to section " 7.8 Cycle Time ".

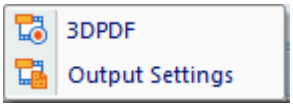
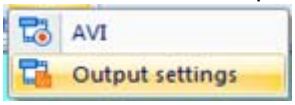
Monitor	
	Display the Variable Monitor. For details, refer to section " 8.5 Variable Monitor ".
	Displays a window which enables monitoring of the [Virtual I/O] signals. The I/O signals are link to the job I/O instructions execution. For details, refer to section " 8.2 I/O Monitor ". 
	Display the Speed Graph. For details, refer to section " 8.14 Speed Graph Function ".
	Display the Pulse Record. For details, refer to section " 8.9 Pulse Recorder ".
	Display the Lap Time Panel. For details, refer to section " 8.6 Lap Time Panel ".
	Display the Trace Manager. For details, refer to section " 7.9 Trace ".
	Display the Working Trace Manager. For details, refer to section " 7.12 Working Trace ".

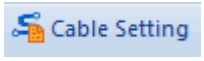
Collision	
	Display the Collision Detection. For details, refer to section " 8.11 Collision Detection ".

I/O Settings	
	Display the I/O Events. For details, refer to section " 8.3 I/O Events ".
	Display the I/O commection. For details, refer to section " 8.4 I/O connection ".

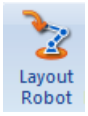
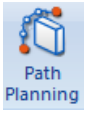
Model Simulation	
	Display the Model Script Editor. For details, refer to section " 11.12 Model Script ".

Settings	
	Display the Sensing Option Setting. For details, refer to section " 8.12 Sensing Option Setting ".
	Display the Paint Panel. For details, refer to section " 8.13 Spray Model for Paint ".

OutPut	
	Outputs the 3DPDF file. For details, refer to the section " 13.16 3DPDF Output Function ". 
	Outputs the AVI file. For details, refer to the section " 13.17 AVI Output Function ". 

Cable Simulation	
	Outputs the 3DPDF file. For details, refer to the section " 8.21 Cable Simulation ".
	Outputs the AVI file. For details, refer to the section " 8.21.3 Cable Setting ".

■ Tool

Teaching Assistance	
	Displays the Layout Robot dialog. For details, refer to section " 8.20 Layout Robot Function ".
	Displays the Path Planning dialog. For details, refer to section " 8.22 Path Planning ".
Retrofit	
	Displays the Safety fence interference setting dialog. For details, refer to section " 13.22.2 Setting of Safety Fence Model and Collision Check ".
	Displays the Job conversion and Analyze dialog. For details, refer to section " 13.22.3 Job Conversion and Analysis ".
	Displays the Trajectory difference report dialog. For details, refer to section " 13.22.4 Trajectory Difference Report ".
Estimate	
	Displays the Motor Load Estimate. For details, refer to section " 13.23 Motor Load Estimate ".
	Displays the Life Estimate. For details, refer to section " 13.24 Life Estimate ".

■ About Saving Display Positions in Dialogs

From MotoSimEG-VRC 2019SP1, several dialogs called from the ribbon menu have their display position saved. The following table shows the supported dialogs.
These dialogs are displayed in the upper left or center of the screen by pressing the Ctrl key with selecting the ribbon menu.

Tab name	Group name	Button name
Home	Teaching	CAM Function
	View	View Manager
	Screen	Light Manager
	Tools	Execute Soft
	Settings	Heart Beat
	Operation Handle	Grid Settings
Controller	Setup	New
	Job	Visual Path Edit - Settings
	File Settings	Tool Data
		User Frame
		Robot Calibration
		Functon Safety - Safety Function File
		Function Safety - Tool Interference Model
		Function Safety - Robot Approximation Model
		Welding Condition
		Arc Welding Condition
	Robot	Model Setting
		TCP Reach
	External Device	New - Conveyor
		New - Gantry
		New - Press
		Soft Limit
		Conveyor Settings
		Conveyor Condition File
		Conveyor Operation Panel

Simulation	Playback	Stage Master
	Monitor	Trace
		Working Trace
	I/OSettings	I/O Event Manager
		I/O Connection Manager
	Model Simulation	Model Script Manager
	Settings	Sensing Setting
		Paint Setting
	Output	3DPDF - Output Settings
		AVI - Output Settings
	Debug	Job Stack
	Cable Simulation	Setting
Tool	Teaching Assistance	Layout Robot
		Path Planning
	Retrofit	Safety fence setting
		Job conversion and analysis
		Difference report
	Estimate	Motor Load Estimate
		Life Estimate
Online Function	Connect	File Manager

5.1.2 Mouse Operation Switching Bar

■ Viewpoint Operation Switching Bar

Click the button, the icon is surrounded with yellow frame and viewpoint operation by right button is changed.
To show the viewpoint operation switching bar, refer to the section " 12.6 Mouse Customization ".

	Zoom in and out the image by dragging the mouse upward (to zoom in) or downward (to zoom out) over the screen; rotate the image centering on the Z-axis of "world" coordinates by dragging the mouse from side to side.
	Drag the mouse over the desired range to be enlarged.
	For vertical rotation, drag the mouse up and down; for horizontal rotation, drag the mouse from side to side.
	Drag the mouse from side to side and up and down to synchronize the viewpoint with the mouse motion.
	Zoom in and out the image by dragging the mouse upward (to zoom in) or downward (to zoom out) over the screen; rotate the image horizontally by dragging the mouse from side to side.

	Zoom in and out the image by dragging the mouse upward (to zoom in) or downward (to zoom out) over the screen.
	Click any desirable point so that the image is displayed with the clicked point located in the center of the screen.

5.2 Virtual Pendant

When a Virtual Robot Controller (VRC) is registered in a cell, the associated Virtual Pendant is displayed. The Virtual Pendant can be use to operate the VRC controller is the same manner as with the programming pendant of each controller. The Virtual Pendant is composed of two separed windows: the pendant screen and the prendant keypad. The display of the pendant keypad can be toggled from the pendant screen by pressing the [/] key or by clicking on the  icon.

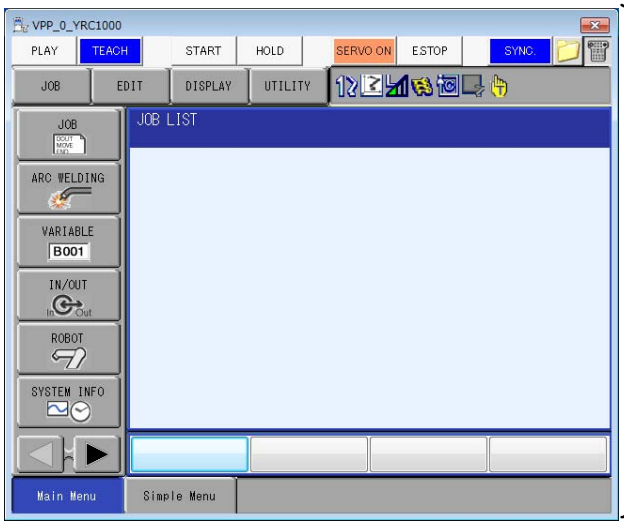
When the mouse right button is clicked on the pendant keypad, "Fit" menu is displayed. When "Fit" menu is clicked, the pendant keypad moves to the center of the bottom of the pendant screen window.

When the  icon is clicked with the [Ctrl] key of the keyboard, the pendant keypad moves similarly.

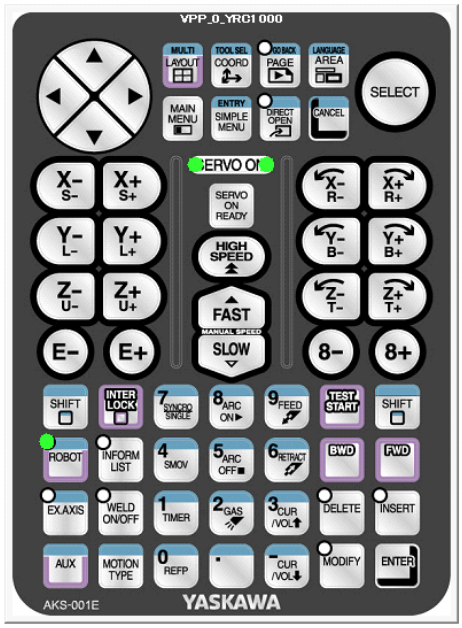
NOTE

- For operation on the Virtual Pendant, please refer to each controller “Operator Manual”.
- When two keys are to be pressed simultaneously, the keys are shown with a “+” sign between them, such as [SHIFT]+[COORD]. Press and hold the first key and then press the 2nd key.
- Multiple axis keys cannot be used simultaneously.
- When resizing the pendant screen, if necessary, the display font size can be adjusted by selecting {DISPLAY SETUP} - {CHANGE FONT} from the Virtual Pendant main menu.

5.2.1 YRC1000, YRC1000micro Virtual Pendant



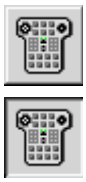
Pendant Screen



Pendant Keypad

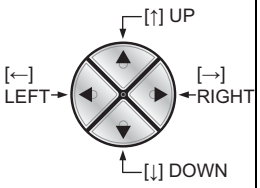
■ Virtual Pendant Button

Button	Keyboard Equivalent	Description
	Insert	**TEACH Mode** The axis operation and edition from the programming pendant are enabled.
	Home	**PLAY Mode** The playback of taught job is enabled.
	Delete	**Starts the manipulator motion in play-back operation.** The lamp on this button is lit during the playback operation. The lamp turns OFF when the playback operation is stopped by alarm occurrence, HOLD signal, or mode change.
	End	**Holds the manipulator motion.** When lamp is turned OFF, the manipulator stays stopped until a START command is input. The start and axis operations are disabled while the lamp is lit.
	Page Down	**Turns ON the servo power.** Press this button to enable the servo power to be turned ON. The SERVO ON lamp is lit while the servo power is ON.
		**Turns OFF the servo power.** When the servo power is turned OFF, the SERVO ON LED on the programing pendant will extinguish. An emergency stop message is displayed on the screen.
		**Activates the job synchronization mode.** When the SYNC button is blue, the robot position is instantly change to match the selected step of the displayed job.
		**Open the Storage Card folder** When this button is clicked, the storage card folder of this controller is opened.

	/	**Displays the Virtual Pendant keypad** When the button is down, the Virtual Pendant keypad is displayed.

NOTE When resizing the pendant screen to a smaller size, the displayed text maybe shorten to fit in the smaller size buttons.

■ Virtual Pendant Keypad

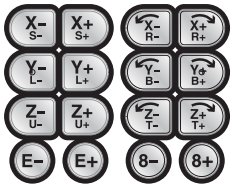
Keypad key	Keyboard Equivalent	Description
[SELECT] 	Space	**Works as described below.** • Selects a menu item in the main menu area and the menu area. • Makes the selected item ready to be set in the general-purpose display area. • Shows two or more messages in the human interface display area.
[Cursor Key] 	↑ ←→ ↓	**Moves the Cursor in the direction of the arrow.** • The size of the Cursor and the range/place where the cursor can move vary depending on the window. • In the JOB CONTENT window, if the UP cursor is pressed when the cursor is on the first line, the cursor moves to the last line of the job. Conversely, if the cursor is on the last line of the job and the DOWN cursor is pressed, the cursor will jump to the first line of the job. [SHIFT] + [↑] (UP) Scrolls the screen upward. [SHIFT] + [↓] (DOWN) Scrolls the screen downward. [SHIFT] + [→] (RIGHT) Scrolls the screen to the right. [SHIFT] + [←] (LEFT) Scrolls the screen to the left.
[MAIN MENU] 	F1	**Displays the main menu.** • When the main menu is shown, press this key to hide the main menu. [MAIN MENU] + UP Increases the brightness of the screen. [MAIN MENU] + DOWN Decreases the brightness of the screen.
[SIMPLE MENU] 	F2	**Displays the simple menu.** • When the simple menu is shown, press this key to hide the simple menu. [SHIFT] + [SIMPLE MENU] Registers the layout displayed in the general-purpose area to the user defined menu. Press [SIMPLE MENU] for three seconds to display the pop-up menu window.

Keypad key	Keyboard Equivalent	Description
[SERVO ON READY] 	Page Down	**Enables the servo power supply to be turned ON.** • IIf the servo power supply is shut OFF by the emergency stop or overrun signal, press this key to enable the servo power supply to be turned ON. • When this key is pressed, 1. in the play mode, the servo power supply turns ON if the safeguarding is securely closed; 2. in the teach mode, the “SERVO ON” LED blinks, and the servo power supply turns ON with the Enable Switch turned ON; 3. while the servo power is ON, the “SERVO ON” LED lights up.
[CANCEL] 	Esc	**Cancels the current status.** • Hides the sub menu in the main menu area and the menu area. • Cancels the current input data or input status in the general-purpose display area. • Cancels the list of messages in the human interface display area. • Cancels the current error. [SHIFT] + [CANCEL] When the job content is shown and the undo function is enabled, the assist menu is shown.
[MULTI] 	F5	**Works for the multi mode.** • If this button is pressed when the multi mode is ON, the active window switches. [SHIFT] + [MULTI] Switches between the multi-window display and the single-window display when the multi mode is ON.
[COORD] 	K	**Select the operation coordinate system when the manipulator is operated manually.** • The coordinate system can be selected from the six coordinate systems, i.e., joint, Cartesian, cylindrical, tool, user, and teaching line. Each time this key is pressed, the coordinate system is switched in the following order: JOINT ? CAR/CYL ? TOOL ? USER ? TEACHING LINE (only for arc welding purpose) • The selected coordinate system is shown in the status display area. [SHIFT] + [COORD] The number of the coordinate system can be changed when the “TOOL” or “USER” coordinate system is selected.

Keypad key	Keyboard Equivalent	Description
[DIRECT OPEN] 	L	**Displays the content related to the current line.** • When the job content is displayed, move the cursor to an instruction and press this key to show its related content. Example: For a CALL instruction, the content of the called job is shown. For a work instruction, the content of the current condition file is shown. For an input/output instruction, the input/output status is shown. • The lamp on this button lights up while the direct open is ON. While the lamp lights up, press this button to return to the previous window.
[PAGE] 	F4	**Displays the next page.** • The page can be switched only when the lamp on this button lights up. [SHIFT] + [PAGE] Switches to the previous page.
[AREA] 	TAB	**Moves the cursor in the display in the following order: Menu Area ? General-Purpose Display Area ? Human Interface Display Area ? Main Menu Area. If no item is displayed, the cursor does not move.** [SHIFT] + [AREA] Switches the language when the bilingual function is valid. (Bilingual function is optional.) [AREA] + DOWN Moves the cursor from the general-purpose display area to the operation button when the operation button is displayed. [AREA] + UP Moves the cursor to the general-purpose display area when the cursor is on the operation button.
[SHIFT] 	Shift	**Changes the functions of other keys by pressing together.** Can be used with [SIMPLE MENU], [PAGE], [DIRECT OPEN], [MULTI], [COORD], [AREA], [MOTION TYPE], the cursor, [Numeric Key], [ROBOT], [EX. AXIS], or [AUX] to access alternate functions. Refer to the description of each key for the alternate functions with [SHIFT].
[INTERLOCK] 	Ctrl	**Changes the functions of other keys by pressing together.** Can be used with [TEST START], [FWD], [Numeric Key] (Numeric key customize function), [ROBOT], or [AUX]. Refer to the description of each key for the alternate functions with [INTERLOCK].
[INFORM LIST] 	O	**Displays the list of instructions available for editing the job.**

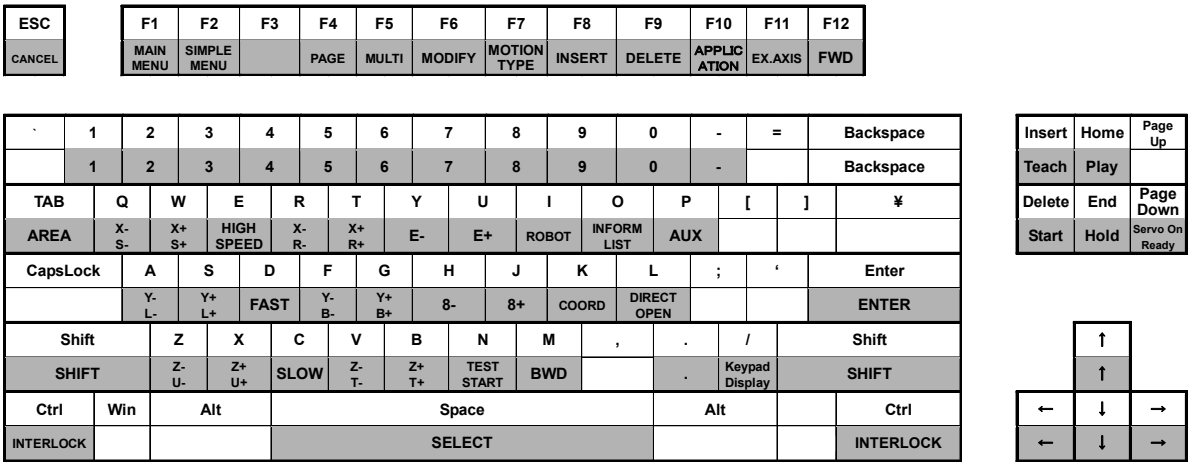
Keypad key	Keyboard Equivalent	Description
[ROBOT] 	I	**Switches the robot axis to be operated.** • Press this key to enable the robot axis operation. • [ROBOT] is enabled for the system with one YRC1000, YRC1000micro and multiple manipulators or the system with one or more external axes. [SHIFT] + [ROBOT] The robot axis to be operated is switched to a robot axis which is not registered in the currently selected job. [INTERLOCK] + [ROBOT] Switches the application when multiple applications are set to one robot.
[EX.AXIS] 	F11	**Switches the external axis to be operated.** • Press this key to enable the external axis (base axis or station axis) operation. • [EX.AXIS] is enabled for the system with one or more external axes. [SHIFT] + [EX. AXIS] The external axis to be operated is switched to an external axis which is not registered in the currently selected job.
[MOTION TYPE] 	F7	**Selects the interpolation type for playback operation.** • The selected interpolation type is shown in the input buffer line in the display. • Each time this key is pressed, the interpolation type changes in the following order: MOVJ → MOVL → MOVC → MOVS [SHIFT] + [MOTION TYPE] The interpolation mode changes in the following order: STANDARD ? EXTERNAL REFERENCE POINT* ? CONVEYOR* In each interpolation mode, by pressing only [MOTION TYPE], the usable interpolation method is switched as in the above STANDARD mode. *: These modes are options.
[AUX] 		**Calls a function.** [INTERLOCK] + [AUX] Shows the confirmation dialog for enabling/disabling the touch panel. [SHIFT] + [AUX] When the job content is shown the welding line control list function is called. (Only for the arc welding application)

Keypad key	Keyboard Equivalent	Description
[TEST START] 	N	**Press [TEST START] and [INTERLOCK] simultaneously to move the manipulator through the taught steps in a continuous motion for checking the path.** • The manipulator moves in the currently selected operation cycle: AUTO, 1 CYCLE, or STEP. • The manipulator moves at the taught speed. If the taught speed exceeds the maximum teaching speed, the operation proceeds at the maximum teaching speed. [INTERLOCK] + [TEST START] The manipulator moves through the taught steps in a continuous motion. Operation immediately stops when this key is released during the continuous motion.
[FWD] 	F12	**Moves the manipulator through the taught steps only while this key is pressed.** • Only the move instruction is executed. • The manipulator moves at the selected manual speed. Before operating the manipulator, make sure that the selected manual speed is set as intended. [INTERLOCK] + [FWD] All instructions including the move instruction are executed. [REFP] + [FWD] The manipulator moves to the reference point indicated by the line with the cursor.
[BWD] 	M	**Moves the manipulator through the taught steps in the reverse direction only while this key is pressed.** • Only the move instruction is executed. • The manipulator moves at the selected manual speed. Before operating the manipulator, make sure that the selected manual speed is set as intended.
[DELETE] 	F9	**Deletes the registered instruction.** • Deletion completes when [ENTER] is pressed while the lamp on this key lights up.
[INSERT] 	F8	**Inserts a new instruction.** • Insertion completes when [ENTER] is pressed while the lamp on this key lights up.
[MODIFY] 	F6	**Modifies the taught position data or instruction.** • Modification completes when [ENTER] is pressed while the lamp on this key lights up.

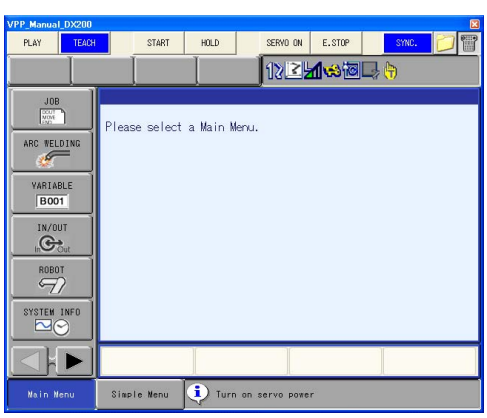
Keypad key	Keyboard Equivalent	Description
[ENTER] 	Enter	**Completes the execution of each process for registration and edition of instructions, data, current position of the manipulator, etc.** • When [ENTER] is pressed, the instruction or data shown in the input buffer line moves to the cursor position to complete a registration, insertion, modification, etc.
MANUAL SPEED 	D C	**Sets the speed for manual operation. This speed is also valid for operations with [FWD] and [BWD].** • There are four speed levels (slow, medium, fast, and inching). The speed changes as described below. The selected speed is displayed on the status area. Each time [FAST] is pressed, manual speed changes in the following order: INCH →SLOW → MED → FST. Each time [SLOW] is pressed, manual speed changes in the following order: FST → MED → SLOW → INCH
[HIGH SPEED] 	E	**Makes the manipulator move at high speed while this key and one of the axis keys are pressed simultaneously during manual operation. No need to change the setting of speed.** • The speed for [HIGH SPEED] is specified in advance.
Axis Key 	Q W R T A S F G Z X V B Y U H J	**Moves specified axes on manipulator.** • The manipulator operates only while the key is pressed. • By pressing two or more keys simultaneously, multiple axes can be operated at the same time. • The manipulator operates in the selected coordinate system at the selected manual speed. Before operating the axis, make sure that the selected coordinate system and the manual speed are set as intended. • A user-selected external axis can be allocated to [E-], [E+], [8-], or [8+]. For details, refer to chapter 6.9 “Jog Key Allocation” .
Numeric Key 	0-9 - .	**Enters the number or symbol on the key when the prompt “>” appears on the input line.** • “.” is the decimal point. “-” is a minus sign or hyphen. • [Numeric Keys] are also used as function keys. Refer to the explanation of each function for details.
USAGE 	F10	**A dedicated key to be used according to the application. Cannot be used with MotoSim EG-VRC.**

■ Keyboard Layout

The Virtual Pendant keypad key all have a corresponding key on the computer keyboard. When the Virtual Pendant Screen has the input focus, the those keyboard key can be pressed instead of clicking the keys on the pendant keypad.



5.2.2 DX200 Virtual Pendant



Pendant Screen

Pendant Keypad

■ Virtual Pendant Button

The pendant buttons are the same as those for YRC1000, YRC1000micro virtual pendant. For details, please refer to the " Virtual Pendant Button " of the " 5.2.1 YRC1000, YRC1000micro Virtual Pendant " section.

■ Virtual Pendant Keypad

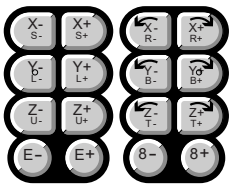
Keypad key	Keyboard Equivalent	Description
[SELECT] 	Space	**Works as described below.** • Selects menu items in the main menu area and the pull-down menu area. • Makes the selected item ready to be set in the general-purpose display area. • Displays multiple messages in the message area.
Cursor 	↑ ←→ ↓	**Moves the Cursor in the direction of the arrow.** • The size of the Cursor and the range/place where the Cursor can move will vary depending on the window. • If the UP Cursor button is pressed when the Cursor is on the first line, the Cursor will move to the last line of the job. Conversely, if the Cursor is on the last line of the job and the DOWN Cursor button is pressed, the Cursor will jump to the first line of the job. SHIFT key + UP Scrolls the screen upward. SHIFT key + DOWN Scrolls the screen downward. SHIFT key + RIGHT Scrolls the screen to the right. SHIFT key + LEFT Scrolls the screen to the left.
[MAIN MENU] 	F1	**Displays the main menu.** If this button is pressed while the main menu is displayed, the main menu disappears. MAIN MENU key + UP Increases the brightness of the screen. MAIN MENU key + DOWN Decreases the brightness of the screen.
[SIMPLE MENU] 	F2	**Displays the simple menu.** If this button is pressed while the simple menu is displayed, the simple menu disappears.

Keypad key	Keyboard Equivalent	Description
[SERVO ON READY] 	Page Down	**Enables the servo power supply to be turned ON.** Press this button to enable the servo power supply to be turned ON if the servo power supply is shut OFF by the emergency stop or overrun signal. When this button is pressed: • In the play mode, the servo power supply is turned ON if the safeguarding is securely closed. • In the teach mode, the SERVO ON lamp flashes and the servo power supply is turned ON when the Enable switch is ON. • The SERVO ON lamp is lit while the servo power is ON.
[ASSIST] 	F3	**Displays the menu to assist the operation for the currently displayed window.** Pressing this button with SHIFT key  or INTERLOCK key  displays the help guidance for the operation. • SHIFT key  + ASSIST key  The function list of key combinations with SHIFT key  appears. • INTERLOCK key  + ASSIST key  The function list of key combinations with INTERLOCK key  appears.
[CANCEL] 	Esc	**Cancels the current status.** • Deletes the sub menu in the main menu area and the pull-down menu area. • Cancels the input data or the input status in the general-purpose display area. • Cancels the multiple views in the message area. • Cancels the occurred error.
[MULTI] 	F5	**Works for the multi mode.** If this button is pressed when the multi mode is ON, the active window switches. SHIFT key  + MULTI Key  Switches between the multi-window display and the single-window display when the multi mode is ON.

Keypad key	Keyboard Equivalent	Description
[COORD] 	K	**Select the operation coordinate system when the manipulator is operated manually.** • Five coordinate systems (joint, cartesian, cylindrical, tool and user) can be used. Each time this key is pressed, the coordinate system is switched in the following order: "JOINT"→"WLD/CYL"→"TOOL"→"USER" • The selected coordinate system is displayed on the status display area. SHIFT key + COORD Key The coordinate number can be changed when the "TOOL" or "USER" coordinate system is selected.
[DIRECT OPEN] 	L	**Displays the content related to the current line.** • To display the content of a CALL job or condition file, move the Cursor to the next line and press DIRECT OPEN key. The file will be displayed for the selected line. Display content will vary depending on the type of instruction used in the job. Example: For a CALL instruction, the content of the called job will be displayed. For a work instruction, the content of the condition file will be displayed. For Input/output instructions, the input/output condition will be displayed. • The lamp on this button is lit while the direct open is ON. Press this button while the lamp is lit to return to the previous window.
[PAGE] 	F4	**Displays the next page.** The page can be switched only when the lamp on this button is lit. SHIFT key + PAGE key Switches to the previous page.
[AREA] 	TAB	**Moves the Cursor in the following order : "Menu Area"→"General-Purpose Display Area"→"Message Area"→"Main Menu Area". If no item is displayed, the Cursor does not move.** SHIFT key + AREA key The language can be switched when the bilingual function is valid. (Bilingual function is optional.) AREA key + DOWN Moves the Cursor from the general-purpose display area to the operation button when the operation button is displayed. AREA key + UP Moves the Cursor to the general-purpose display area when the Cursor is on the operation button.
[SHIFT] 	Shift	**Changes the functions of other keys by pressing this key together.** Can be used with ASSIST key, COORD key, AREA key, [MOTION TYPE], [ROBOT], [EX. AXIS], Cursor key or Numeric key to access alternate functions. Refer to the description of each key for the alternate SHIFt functions.

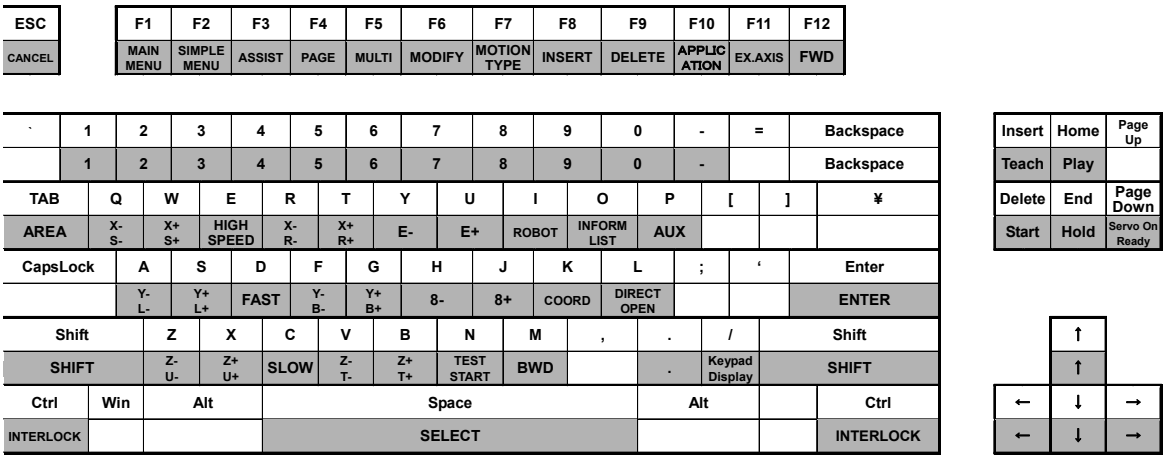
Keypad key	Keyboard Equivalent	Description
[INTERLOCK] 	Ctrl	**Changes the functions of other keys by pressing together.** Can be used with ASSIST key, MULTI key, [TEST START], [FWD], or Numeric key (Numeric key customize function), [ROBOT]. Refer to the description of each key for the alternate NTERLOCK functions.
[INFORM LIST] 	O	**Displays instruction lists of commands available for job editing.**
[ROBOT] 	I	**Enables the robot axis operation.** [ROBOT] is active for the system where multiple manipulators are controlled by one DX200 or the system with external axes. SHIFT key + [ROBOT] The robot under axis operation can be switched to a robot axis which is not registered to the currently selected job. INTERLOCK key + [ROBOT] Switchs the application when several applications are set to a robot.
[EX.AXIS] 	F11	**Enables the external axis (base axis or station axis) operation.** [EX.AXIS] is active for the system with external axes. SHIFTkey + [**EX. AXIS**] The external axis under axis operation can be switched to an external axis which is not registered to the currently selected job.
[MOTION TYPE] 	F7	**Selects the interpolation type for playback operation.** The selected interpolation type is shown in the status display area on the screen. • Each time this key is pressed, the interpolation type changes in the following order: "MOVJ"→" MOVL"→"MOVC" SHIFT key + [MOTION TYPE] The interpolation mode changes in the following order: "STANDARD"→" EXTERNAL REFERENCE POINT"*→" CONVEYOR"* Interpolation type can be changed in any mode. *: These modes are purchased options.

Keypad key	Keyboard Equivalent	Description
[TEST START] 	N	**Moves the manipulator through taught steps in a continuous motion when [TEST START] and INTERLOCK key are simultaneously pressed.** The manipulator can be moved to check the path of taught steps. Operation stops immediately when this key is released. • The manipulator operates according to the currently selected operation cycle: "AUTO", "1CYCLE" or "STEP". • The manipulator operates at the taught speed. However, if the taught speed exceeds the maximum teaching speed, the operation proceeds at the maximum teaching speed.
[FWD] 	F12	**Moves the manipulator through the taught steps while this key is pressed.** • Only move instructions are executed (one instruction at a time, no welding instructions). INTERLOCK key + [FWD] All instructions are executed. [0] + [FWD] Moves to the reference point of the cursor line. The manipulator operates at the selected manual speed. Make sure that the selected manual speed is the desired one before starting operation.
[BWD] 	M	**Moves the manipulator through the taught steps in the reverse direction while this key is pressed.** • Only move instructions are executed (no weld commands). The manipulator operates at the selected manual speed. Make sure that the selected manual speed is the desired one before starting operation.
[DELETE] 	F9	**Deletes the registered instruction.** • Deletion completes when [ENTER] is pressed while this key lamp is lit.
[INSERT] 	F8	**Inserts a new instruction.** • Insertion completes when [ENTER] is pressed while this key lamp is lit.
[MODIFY] 	F6	**Modifies the taught position data or instruction.** • Modification completes when [ENTER] is pressed while this key lamp is lit.
[ENTER] 	Enter	**Registers instructions, data, current position of the manipulator, etc.** • When [ENTER] is pressed, the instruction or data displayed in the input buffer line moves to the Cursor position to complete a registration, insertion, or modification.

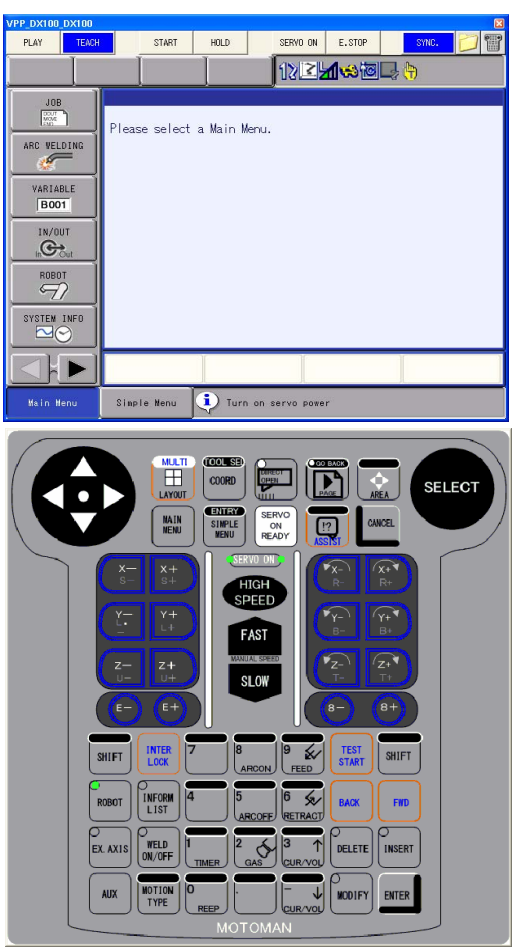
Keypad key	Keyboard Equivalent	Description
MANUAL SPEED keys 	D C	**Sets the speed for manual operation. This speed is also valid for operations with [FWD] and [BWD].** • There are four speed levels (slow, medium, fast, and inching). The speed changes as described below. The selected speed is displayed on the status area. Each time [FAST] is pressed, manual speed changes in the following order: "INCH"→" SLOW"→"MED"→"FST". Each time [SLOW] is pressed, manual speed changes in the following order: "FST"→"MED"→"SLOW"→"INCH"
[HIGH SPEED] 	E	**Makes the manipulator move at high speed while this button and one of the axis keys are pressed simultaneously during manual operation. No need to change the setting of speed.** • The speed for [HIGH SPEED] is specified in advance.
Axis Key 	Q W R T A S F G Z X V B Y U H J	**Moves specified axes on manipulator.** • The manipulator axes only move while the key is pressed. • Multiple axes can be operated simultaneously by pressing two or more keys at the same time. The manipulator operates in the selected coordinate system at the selected manual speed. Make sure that the selected coordinate system and the manual speed are the desired ones before starting the axis operation. It is possible to allocate any external axes to [E-] + [E+], [8-] + [8+] keys to operate them.
Numeric Key 	0-9 - .	**Enters the number or symbol when the ">" prompt appears on the input line.** • "." is the decimal point. "-" is a minus sign or hyphen. The Numeric keys are also used as function keys. Refer to the explanation of each function for details.
USAGE 	F10	**A dedicated key to be used according to the application. Cannot be used with MotoSim EG-VRC.**

■ Keyboard Layout

The Virtual Pendant keypad key all have a corresponding key on the computer keyboard. When the Virtual Pendant Screen has the input focus, the those keyboard key can be pressed instead of clicking the keys on the pendant keypad.



5.2.3 DX100 Virtual Pendant



■ Virtual Pendant Button

The pendant buttons are the same as those for YRC1000, YRC1000micro virtual pendant. For details, please refer to the " Virtual Pendant Button " of the " 5.2.1 YRC1000, YRC1000micro Virtual Pendant " section.

■ Virtual Pendant Keypad

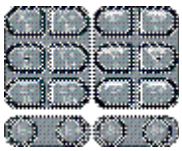
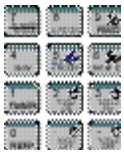
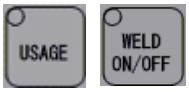
Keypad key	Keyboard Equivalent	Description
[SELECT] 	Space	**Works as described below.** • Selects menu items in the main menu area and the pull-down menu area. • Makes the selected item ready to be set in the general-purpose display area. • Displays multiple messages in the message area.
Cursor 	↑ ←→ ↓	**Moves the cursor in the direction of the arrow.** • The size of the cursor and the range/place where the cursor can move will vary depending on the window. • If the UP cursor button is pressed when the cursor is on the first line, the cursor will move to the last line of the job. Conversely, if the cursor is on the last line of the job and the DOWN cursor button is pressed, the cursor will jump to the first line of the job. [SHIFT] + UP Scrolls the screen upward. [SHIFT] + DOWN Scrolls the screen downward. [SHIFT] + RIGHT Scrolls the screen to the right. [SHIFT] + LEFT Scrolls the screen to the left.
[MAIN MENU] 	F1	**Displays the main menu.** If this button is pressed while the main menu is displayed, the main menu disappears. [MAIN MENU] + UP Increases the brightness of the screen. [MAIN MENU] + DOWN Decreases the brightness of the screen.
[SIMPLE MENU] 	F2	**Displays the simple menu.** If this button is pressed while the simple menu is displayed, the simple menu disappears.
[SERVO ON READY] 	Page Down	**Enables the servo power supply to be turned ON.** Press this button to enable the servo power supply to be turned ON if the servo power supply is shut OFF by the emergency stop or overrun signal. When this button is pressed: • In the play mode, the servo power supply is turned ON if the safeguarding is securely closed. • In the teach mode, the SERVO ON lamp flashes and the servo power supply is turned ON when the Enable switch is ON. • The SERVO ON lamp is lit while the servo power is ON.

Keypad key	Keyboard Equivalent	Description
[ASSIST] 	F3	**Displays the menu to assist the operation for the currently displayed window.** Pressing this button with [SHIFT] or [INTERLOCK] displays the help guidance for the operation. • [SHIFT] + [ASSIST] The function list of key combinations with [SHIFT] appears. • [INTERLOCK] + [ASSIST] The function list of key combinations with [INTERLOCK] appears.
[CANCEL] 	Esc	**Cancels the current status.** • Deletes the sub menu in the main menu area and the pull-down menu area. • Cancels the input data or the input status in the general-purpose display area. • Cancels the multiple views in the message area. • Cancels the occurred error.
[MULTI] 	F5	**Works for the multi mode.** If this button is pressed when the multi mode is ON, the active window switches. [SHIFT] + [MULTI] Switches between the multi-window display and the single-window display when the multi mode is ON.
[COORD] 	K	**Select the operation coordinate system when the manipulator is operated manually.** • Five coordinate systems (joint, cartesian, cylindrical, tool and user) can be used. Each time this key is pressed, the coordinate system is switched in the following order: "JOINT"→"WLD/CYL"→"TOOL"→"USER" • The selected coordinate system is displayed on the status display area. [SHIFT] + [COORD] The coordinate number can be changed when the "TOOL" or "USER" coordinate system is selected.

Keypad key	Keyboard Equivalent	Description
[DIRECT OPEN] 	L	**Displays the content related to the current line.** • To display the content of a CALL job or condition file, move the cursor to the next line and press [DIRECT OPEN]. The file will be displayed for the selected line. Display content will vary depending on the type of instruction used in the job. Example: For a CALL instruction, the content of the called job will be displayed. For a work instruction, the content of the condition file will be displayed. For Input/output instructions, the input/output condition will be displayed. • The lamp on this button is lit while the direct open is ON. Press this button while the lamp is lit to return to the previous window.
[PAGE] 	F4	**Displays the next page.** The page can be switched only when the lamp on this button is lit. [SHIFT] + [PAGE] Switches to the previous page.
[AREA] 	TAB	**Moves the cursor in the following order : "Menu Area"→"General-Purpose Display Area"→"Message Area"→"Main Menu Area". If no item is displayed, the cursor does not move.** [SHIFT] + [AREA] The language can be switched when the bilingual function is valid. (Bilingual function is optional.) [AREA] + DOWN Moves the cursor from the general-purpose display area to the operation button when the operation button is displayed. [AREA] + UP Moves the cursor to the general-purpose display area when the cursor is on the operation button.
[SHIFT] 	Shift	**Changes the functions of other keys by pressing together.** Can be used with [MAIN MENU], [ASSIST], [COORD], [AREA], [MOTION TYPE], cursor key or Numeric key to access alternate functions. Refer to the description of each key for the alternate [SHIFT] functions.
[INTERLOCK] 	Ctrl	**Changes the functions of other keys by pressing together.** Can be used with [ASSIST], [MULTI], [TEST START], [FWD], or Numeric key (Numeric key customize function). Refer to the description of each key for the alternate [INTERLOCK] functions.
[INFORM LIST] 	O	**Displays instruction lists of commands available for job editing.**

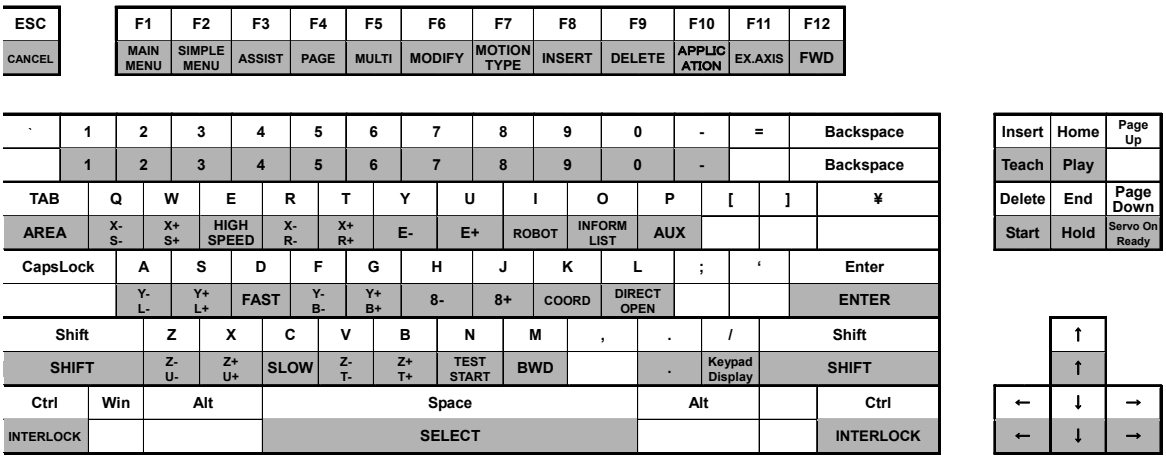
Keypad key	Keyboard Equivalent	Description
[ROBOT] 	I	**Enables the robot axis operation.** [ROBOT] is active for the system where multiple manipulators are controlled by one DX100 or the system with external axes.
[EX.AXIS] 	F11	**Enables the external axis (base axis or station axis) operation.** [EX.AXIS] is active for the system with external axes.
[MOTION TYPE] 	F7	**Selects the interpolation type for playback operation.** The selected interpolation type is shown in the status display area on the screen. • Each time this key is pressed, the interpolation type changes in the following order: "MOVJ"→" MOVL"→"MOVC"→"MOVS" [SHIFT] + [MOTION TYPE] The interpolation mode changes in the following order: "STANDARD"→" EXTERNAL REFERENCE POINT"*→" CONVEYOR"* Interpolation type can be changed in any mode. *: These modes are purchased options.
[TEST START] 	N	**Moves the manipulator through taught steps in a continuous motion when [TEST START] and [INTERLOCK] are simultaneously pressed.** The manipulator can be moved to check the path of taught steps. Operation stops immediately when this key is released. • The manipulator operates according to the currently selected operation cycle: "AUTO," "1CYCLE," or "STEP." • The manipulator operates at the taught speed. However, if the taught speed exceeds the maximum teaching speed, the operation proceeds at the maximum teaching speed.
[FWD] 	F12	**Moves the manipulator through the taught steps while this key is pressed.** • Only move instructions are executed (one instruction at a time, no welding instructions). [INTERLOCK] + [FWD] All instructions are executed. [REFP] + [FWD] Moves to the reference point of the cursor line. The manipulator operates at the selected manual speed. Make sure that the selected manual speed is the desired one before starting operation.

Keypad key	Keyboard Equivalent	Description
[BWD] 	M	**Moves the manipulator through the taught steps in the reverse direction while this key is pressed.** • Only move instructions are executed (no weld commands). The manipulator operates at the selected manual speed. Make sure that the selected manual speed is the desired one before starting operation.
[DELETE] 	F9	**Deletes the registered instruction.** • Deletion completes when [ENTER] is pressed while this key lamp is lit.
[INSERT] 	F8	**Inserts a new instruction.** • Insertion completes when [ENTER] is pressed while this key lamp is lit.
[MODIFY] 	F6	**Modifies the taught position data or instruction.** • Modification completes when [ENTER] is pressed while this key lamp is lit.
[ENTER] 	Enter	**Registers instructions, data, current position of the manipulator, etc.** • When [ENTER] is pressed, the instruction or data displayed in the input buffer line moves to the cursor position to complete a registration, insertion, or modification.
MANUAL SPEED keys 	D C	**Sets the speed for manual operation. This speed is also valid for operations with [FWD] and [BWD].** • There are four speed levels (slow, medium, fast, and inching). The speed changes as described below. The selected speed is displayed on the status area. Each time [FAST] is pressed, manual speed changes in the following order: "INCH"→" SLOW"→"MED"→"FST" Each time [SLOW] is pressed, manual speed changes in the following order: "FST"→" MED"→"SLOW"→"INCH"
[HIGH SPEED] 	E	**Makes the manipulator move at high speed while this button and one of the axis keys are pressed simultaneously during manual operation. No need to change the setting of speed.** • The speed for [HIGH SPEED] is specified in advance.

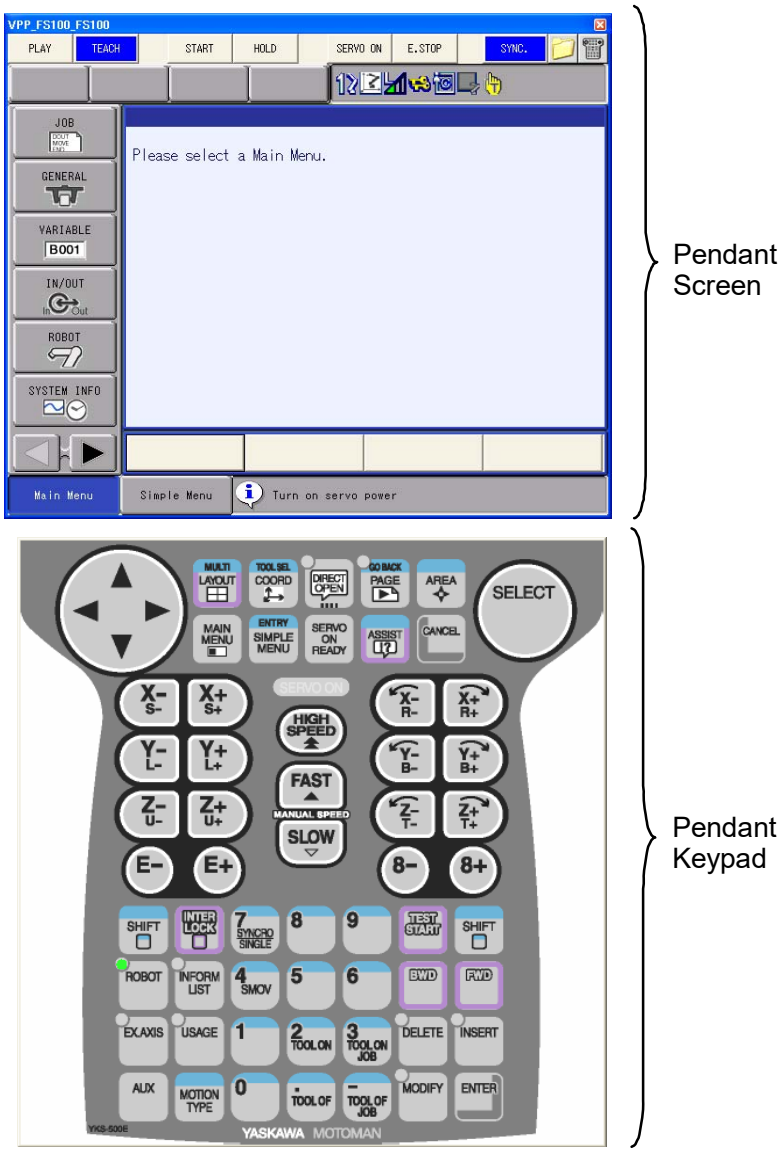
Keypad key	Keyboard Equivalent	Description
Axis Key 	Q W R T A S F G Z X V B Y U H J	**Moves specified axes on manipulator.** • The manipulator axes only move while the key is pressed. • Multiple axes can be operated simultaneously by pressing two or more keys at the same time. The manipulator operates in the selected coordinate system at the selected manual speed. Make sure that the selected coordinate system and the manual speed are the desired ones before starting the axis operation.
Numeric Key 	0-9 - .	**Enters the number or symbol when the ">" prompt appears on the input line.** • "." is the decimal point. "-" is a minus sign or hyphen. The Numeric keys are also used as function keys. Refer to the explanation of each function for details.
USAGE 	F10	**A dedicated key to be used according to the application. Cannot be used with MotoSim EG-VRC.**

■ Keyboard Layout

The Virtual Pendant keypad key all have a corresponding key on the computer keyboard. When the Virtual Pendant Screen has the input focus, the those keyboard key can be pressed instead of clicking the keys on the pendant keypad.



5.2.4 FS100 Virtual Pendant



■ Virtual Pendant Button

The pendant buttons are the same as those for YRC1000, YRC1000micro virtual pendant. For details, please refer to the " Virtual Pendant Button " of the " 5.2.1 YRC1000, YRC1000micro Virtual Pendant " section.

■ Virtual Pendant Keypad

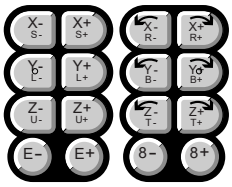
Keypad key	Keyboard Equivalent	Description
[SELECT] 	Space	**Works as described below.** • Selects menu items in the main menu area and the pull-down menu area. • Makes the selected item ready to be set in the general-purpose display area. • Displays multiple messages in the message area.
Cursor 	↑ ←→ ↓	**Moves the Cursor in the direction of the arrow.** • The size of the Cursor and the range/place where the Cursor can move will vary depending on the window. • If the UP Cursor button is pressed when the Cursor is on the first line, the Cursor will move to the last line of the job. Conversely, if the Cursor is on the last line of the job and the DOWN Cursor button is pressed, the Cursor will jump to the first line of the job. SHIFT key + UP Scrolls the screen upward. SHIFT key + DOWN Scrolls the screen downward. SHIFT key + RIGHT Scrolls the screen to the right. SHIFT key + LEFT Scrolls the screen to the left.
[MAIN MENU] 	F1	**Displays the main menu.** If this button is pressed while the main menu is displayed, the main menu disappears. MAIN MENU key + UP Increases the brightness of the screen. MAIN MENU key + DOWN Decreases the brightness of the screen.
[SIMPLE MENU] 	F2	**Displays the simple menu.** If this button is pressed while the simple menu is displayed, the simple menu disappears.
[SERVO ON READY] 	Page Down	**Enables the servo power supply to be turned ON.** Press this button to enable the servo power supply to be turned ON if the servo power supply is shut OFF by the emergency stop or overrun signal. When this button is pressed: • In the play mode, the servo power supply is turned ON if the safeguarding is securely closed. • In the teach mode, the SERVO ON lamp flashes and the servo power supply is turned ON when the Enable switch is ON. • The SERVO ON lamp is lit while the servo power is ON.

Keypad key	Keyboard Equivalent	Description
[ASSIST] 	F3	**Displays the menu to assist the operation for the currently displayed window.** Pressing this button with SHIFT key or INTERLOCK key displays the help guidance for the operation. • SHIFT key + ASSIST key The function list of key combinations with SHIFT key appears. • INTERLOCK key + ASSIST key The function list of key combinations with INTERLOCK key appears.
[CANCEL] 	Esc	**Cancels the current status.** • Deletes the sub menu in the main menu area and the pull-down menu area. • Cancels the input data or the input status in the general-purpose display area. • Cancels the multiple views in the message area. • Cancels the occurred error.
[MULTI] 	F5	**Works for the multi mode.** If this button is pressed when the multi mode is ON, the active window switches. SHIFT key + MULTI Key Switches between the multi-window display and the single-window display when the multi mode is ON.
[COORD] 	K	**Select the operation coordinate system when the manipulator is operated manually.** • Five coordinate systems (joint, cartesian, cylindrical, tool and user) can be used. Each time this key is pressed, the coordinate system is switched in the following order: "JOINT"→"WLD/CYL"→"TOOL"→"USER" • The selected coordinate system is displayed on the status display area. SHIFT key + COORD Key The coordinate number can be changed when the "TOOL" or "USER" coordinate system is selected.

Keypad key	Keyboard Equivalent	Description
[DIRECT OPEN] 	L	**Displays the content related to the current line.** • To display the content of a CALL job or condition file, move the Cursor to the next line and press DIRECT OPEN key . The file will be displayed for the selected line. Display content will vary depending on the type of instruction used in the job. Example: For a CALL instruction, the content of the called job will be displayed. For a work instruction, the content of the condition file will be displayed. For Input/output instructions, the input/output condition will be displayed. • The lamp on this button is lit while the direct open is ON. Press this button while the lamp is lit to return to the previous window.
[PAGE] 	F4	**Displays the next page.** The page can be switched only when the lamp on this button is lit. SHIFT key + PAGE key Switches to the previous page.
[AREA] 	TAB	**Moves the Cursor in the following order : “Menu Area”→“General-Purpose Display Area”→“Message Area”→“Main Menu Area”. If no item is displayed, the Cursor does not move.** SHIFT key + AREA key The language can be switched when the bilingual function is valid. (Bilingual function is optional.) AREA key + DOWN Moves the Cursor from the general-purpose display area to the operation button when the operation button is displayed. AREA key + UP Moves the Cursor to the general-purpose display area when the Cursor is on the operation button.
[SHIFT] 	Shift	**Changes the functions of other keys by pressing this key together.** Can be used with ASSIST key, COORD key, AREA key, [MOTION TYPE], [ROBOT], [EX. AXIS], Cursor key or Numeric key to access alternate functions. Refer to the description of each key for the alternate SHIFt functions.
[INTERLOCK] 	Ctrl	**Changes the functions of other keys by pressing together.** Can be used with ASSIST key, MULTI key, [TEST START], [FWD], or Numeric key (Numeric key customize function), [ROBOT]. Refer to the description of each key for the alternate NTERLOCK functions.
[INFORM LIST] 	O	**Displays instruction lists of commands available for job editing.**

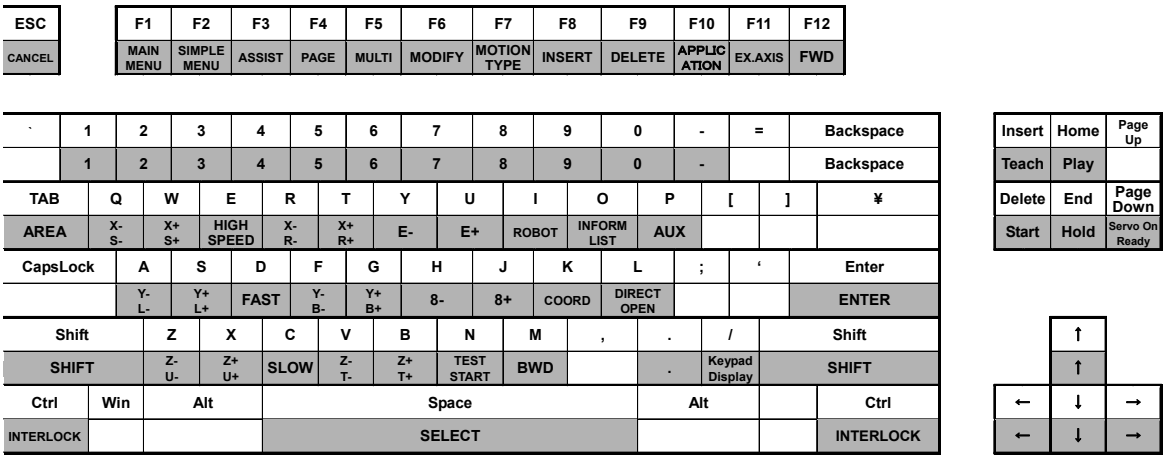
Keypad key	Keyboard Equivalent	Description
[ROBOT] 	I	**Enables the robot axis operation.** [ROBOT] is active for the system where multiple manipulators are controlled by one FS100 or the system with external axes. SHIFT key + [ROBOT] The robot under axis operation can be switched to a robot axis which is not registered to the currently selected job. INTERLOCK key + [ROBOT] Switchs the application when several applications are set to a robot.
[EX.AXIS] 	F11	**Enables the external axis (base axis or station axis) operation.** [EX.AXIS] is active for the system with external axes. SHIFTkey + [**EX. AXIS**] The external axis under axis operation can be switched to an external axis which is not registered to the currently selected job.
[MOTION TYPE] 	F7	**Selects the interpolation type for playback operation.** The selected interpolation type is shown in the status display area on the screen. • Each time this key is pressed, the interpolation type changes in the following order: "MOVJ"→" MOVL"→"MOVC" SHIFT key + [MOTION TYPE] The interpolation mode changes in the following order: "STANDARD"→" EXTERNAL REFERENCE POINT"*→" CONVEYOR"* Interpolation type can be changed in any mode. *: These modes are purchased options.
[TEST START] 	N	**Moves the manipulator through taught steps in a continuous motion when [TEST START] and INTERLOCK key are simultaneously pressed.** The manipulator can be moved to check the path of taught steps. Operation stops immediately when this key is released. • The manipulator operates according to the currently selected operation cycle: "AUTO", "1CYCLE" or "STEP". • The manipulator operates at the taught speed. However, if the taught speed exceeds the maximum teaching speed, the operation proceeds at the maximum teaching speed.

Keypad key	Keyboard Equivalent	Description
[FWD] 	F12	**Moves the manipulator through the taught steps while this key is pressed.** • Only move instructions are executed (one instruction at a time, no welding instructions). INTERLOCK key + [FWD] All instructions are executed. [0] + [FWD] Moves to the reference point of the cursor line. The manipulator operates at the selected manual speed. Make sure that the selected manual speed is the desired one before starting operation.
[BWD] 	M	**Moves the manipulator through the taught steps in the reverse direction while this key is pressed.** • Only move instructions are executed (no weld commands). The manipulator operates at the selected manual speed. Make sure that the selected manual speed is the desired one before starting operation.
[DELETE] 	F9	**Deletes the registered instruction.** • Deletion completes when [ENTER] is pressed while this key lamp is lit.
[INSERT] 	F8	**Inserts a new instruction.** • Insertion completes when [ENTER] is pressed while this key lamp is lit.
[MODIFY] 	F6	**Modifies the taught position data or instruction.** • Modification completes when [ENTER] is pressed while this key lamp is lit.
[ENTER] 	Enter	**Registers instructions, data, current position of the manipulator, etc.** • When [ENTER] is pressed, the instruction or data displayed in the input buffer line moves to the Cursor position to complete a registration, insertion, or modification.
MANUAL SPEED keys 	D C	**Sets the speed for manual operation. This speed is also valid for operations with [FWD] and [BWD].** • There are four speed levels (slow, medium, fast, and inching). The speed changes as described below. The selected speed is displayed on the status area. Each time [FAST] is pressed, manual speed changes in the following order: "INCH"→" SLOW"→"MED"→"FST". Each time [SLOW] is pressed, manual speed changes in the following order: "FST"→"MED"→"SLOW"→"INCH"

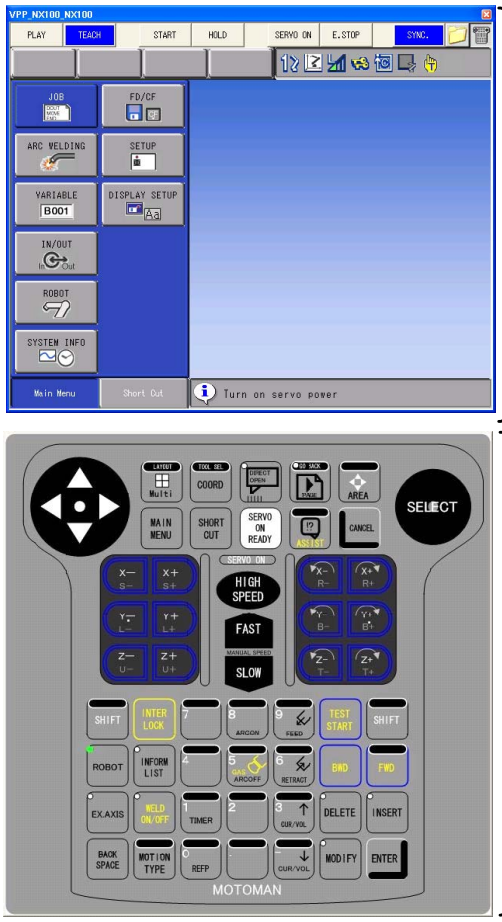
Keypad key	Keyboard Equivalent	Description
[HIGH SPEED] 	E	**Makes the manipulator move at high speed while this button and one of the axis keys are pressed simultaneously during manual operation. No need to change the setting of speed.** • The speed for [HIGH SPEED] is specified in advance.
Axis Key 	Q W R T A S F G Z X V B Y U H J	**Moves specified axes on manipulator.** • The manipulator axes only move while the key is pressed. • Multiple axes can be operated simultaneously by pressing two or more keys at the same time. The manipulator operates in the selected coordinate system at the selected manual speed. Make sure that the selected coordinate system and the manual speed are the desired ones before starting the axis operation. It is possible to allocate any external axes to [E-] + [E+], [8-] + [8+] keys to operate them.
Numeric Key 	0-9 - .	**Enters the number or symbol when the ">" prompt appears on the input line.** • "." is the decimal point. "-" is a minus sign or hyphen. The Numeric keys are also used as function keys. Refer to the explanation of each function for details.
USAGE 	F10	**A dedicated key to be used according to the application. Cannot be used with MotoSim EG-VRC.**

■ Keyboard Layout

The Virtual Pendant keypad key all have a corresponding key on the computer keyboard. When the Virtual Pendant Screen has the input focus, the those keyboard key can be pressed instead of clicking the keys on the pendant keypad.



5.2.5 NX100 Virtual Pendant



■ Virtual Pendant Button

The pendant buttons are the same as those for YRC1000, YRC1000micro virtual pendant. For details, please refer to the " Virtual Pendant Button " of the " 5.2.1 YRC1000, YRC1000micro Virtual Pendant " section.

■ Virtual Pendant Keypad

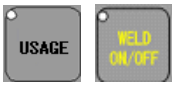
Keypad key	Keyboard Equivalent	Description
Cursor 	↑ ← → ↓	**Moves the cursor in the direction of the arrow.** The size of the cursor and the range/place where the cursor can move will vary depending on the window. If the UP cursor button is pressed when the cursor is on the first line, the cursor will move to the last line of the job. Conversely, if the cursor is on the last line of the job and the DOWN cursor button is pressed, the cursor will jump to the first line of the job. • [SHIFT] + UP Goes back to the previous page. • [SHIFT] + DOWN Goes to the next page. • [SHIFT] + RIGHT Scrolls the instruction area of the job content or play back display to the right. • [SHIFT] + LEFT Scrolls the instruction area of the job content or playback display to the left.
[SELECT] 	Space	**Selects menu items such as main menu, pull-down menu, etc.**
[MAIN MENU] 	F1	**Displays the main menu.** If this button is pressed while the main menu is displayed, the main menu disappears. [SHIFT] + [MAIN MENU] While a window opens, the window is switched in the following order: Window → Sub-menu → Main menu
[SERVO ON READY] 	Page Down	**Enables the servo power supply to be turned ON.** Press this button to enable the servo power supply to be turned ON if the servo power supply is shut OFF by the emergency stop or overrun signal. When this button is pressed: • In the play mode, the servo power supply is turned ON if the safeguarding is securely closed. • In the teach mode, the SERVO ON lamp flashes and the servo power supply is turned ON when the Enable switch is ON. • The SERVO ON lamp is lit while the servo power is ON.

Keypad key	Keyboard Equivalent	Description
[AREA] 	TAB	**Moves the cursor between “Menu Area” and "General Purpose Display Area."** When [SHIFT] is pressed simultaneously: • [SHIFT] + [AREA] The language can be switched when the bilingual function is valid. (Bilingual function is optional.) • DOWN cursor button + [AREA] Moves the cursor to the operation button on the screen if displayed. • UP cursor button + [AREA] Moves the cursor to the general-purpose display area when the cursor is on the operation button.
[PAGE] 	F4	**Displays the next page.** [SHIFT] + [PAGE] The previous page is displayed. The page can be changed when appears in the status area on the screen.
[DIRECT OPEN] 	L	**Displays the content related to the current line.** To display the content of a CALL job or condition file, move the cursor to the next line and press [DIRECT OPEN]. The file will be displayed for the selected line. Display content will vary depending on the type of instruction used in the job. Example: For a CALL instruction, the content of the called job will be displayed. For a work instruction, the content of the condition file will be displayed. For Input/output instructions, the input/output condition will be displayed.
[COORD] 	K	**Select the operation coordinate system when the manipulator is operated manually.** Five coordinate systems (joint, cartesian, cylindrical, tool and user) can be used. Each time this key is pressed, the coordinate system is switched in the following order: "JOINT"→"WLD/CYL"→"TOOL"→"USER" The selected coordinate system is displayed on the status display area. [SHIFT] + [COORD] The coordinate number can be changed when the "TOOL" or "USER" coordinate system is selected.

Keypad key	Keyboard Equivalent	Description
MANUAL SPEED keys 	D C	**Sets the speed for manual operation.** This speed is also valid for operations with [FWD] and [BWD]. There are four speed levels (slow, medium, fast, and inching). Each time [FAST] is pressed, manual speed changes in the following order: "INCH"→" SLOW"→"MED"→"FST" Each time [SLOW] is pressed, manual speed changes in the following order: "FST"→" MED"→"SLOW"→"INCH" The selected speed is displayed on the status area.
[HIGH SPEED] 	E	**Changes the speed of axis operation when the axis button is pressed.** The speed of the manipulator will change to high regardless of the programmed speed while this key is pressed. The speed for [HIGH SPEED] is specified in advance.
[MOTION TYPE] 	F7	**Selects the interpolation type for playback operation.** The selected interpolation type is shown in the status display area on the screen. Each time this key is pressed, the interpolation type changes in the following order: "MOVJ"→" MOVL"→"MOVC"→"MOVS" [SHIFT] + [MOTION TYPE] The interpolation mode changes in the following order: "STANDARD"→" EXTERNAL REFERENCE POINT"*→" CONVEYOR"* Interpolation type can be changed in any mode. *: These modes are purchased options.
[ROBOT] 	I	**Enables the robot axis operation.** [ROBOT] is active for the system where multiple manipulators are controlled by one NX100 or the system with external axes.
[EX.AXIS] 	F11	**Enables the external axis (base axis or station axis) operation.** [EX.AXIS] is active for the system with external axes.
Axis Key 	Q W R T A S F G Z X V B	**Moves specified axes on manipulator.** The manipulator axes only move while the key is held down. Multiple axes can be operated simultaneously by pressing two or more keys at the same time. The manipulator operates in the selected coordinate system at the selected manual speed. Make sure that the selected coordinate system and the manual speed are the desired ones before starting the axis operation.

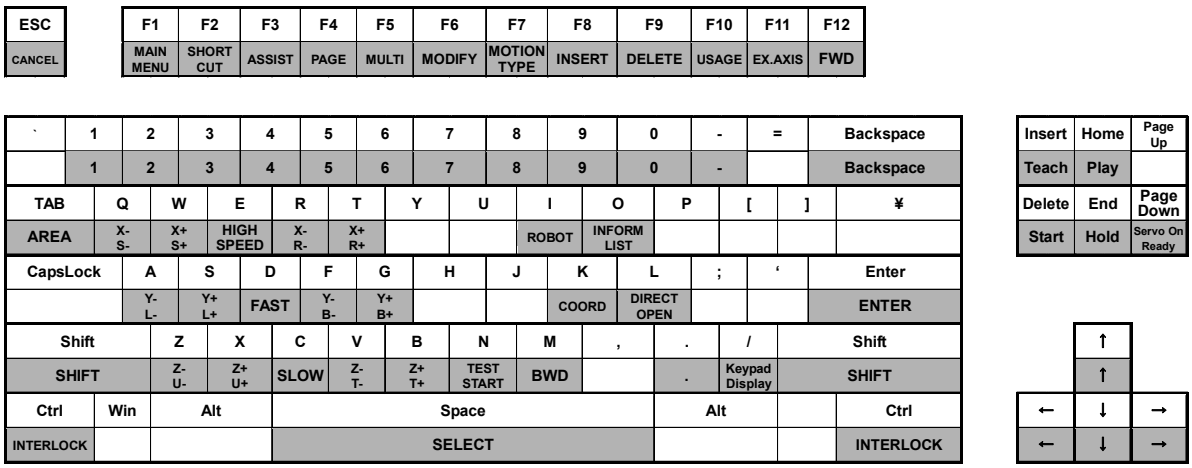
Keypad key	Keyboard Equivalent	Description
[TEST START] 	N	**Moves the manipulator through taught steps in a continuous motion when [TEST START] and [INTERLOCK] are simultaneously pressed.** The manipulator can be moved to check the path of taught steps. The manipulator operates according to the currently selected operation cycle: "AUTO," "1CYCLE," or "STEP." The manipulator operates at the taught speed. However, if the taught speed exceeds the maximum teaching speed, the operation proceeds at the maximum teaching speed. Operation stops immediately when this key is released.
[FWD] 	F12	**Moves the manipulator through the taught steps while this key is pressed.** Only move instructions are executed (one instruction at a time, no welding instructions). [INTERLOCK] + [FWD] All instructions except move instructions are executed. [SHIFT] + [FWD] Move instructions are executed in succession. As for the operation of pressing [REFP] simultaneously, refer to the “NX100 Operator Manual”. The manipulator operates at the selected manual speed. Make sure that the selected manual speed is the desired one before starting operation.
[BWD] 	M	**Moves the manipulator through the taught steps in the reverse direction while this key is pressed.** Only move instructions are executed (no weld commands).
[INFORM LIST] 	O	**Displays instruction lists of commands available for job editing.**
[CANCEL] 	Esc	**Cancels data input and resets errors.**
[DELETE] 	F9	**Deletes registered instructions and data.** Deletion completes when [ENTER] is pressed while this key lamp is lit.

Keypad key	Keyboard Equivalent	Description
[INSERT] 	F8	**Inserts new instructions or data.** Insertion completes when [ENTER] is pressed while this key lamp is lit.
[MODIFY] 	F6	**Modifies taught position data, instructions, and data.** Modification completes when [ENTER] is pressed while this key lamp is lit.
[ENTER] 	Enter	**Registers instructions, data, current position of the manipulator, etc.** When [ENTER] is pressed, the instruction or data displayed in the input buffer line moves to the cursor position to complete a registration, insertion, or modification.
[SHIFT] 	Shift	**Changes the functions of other keys by pressing together.** Can be used with [MAIN MENU], [COORD], [MOTION TYPE], cursor key, Numeric key, page key  to access alternate functions. Refer to the description of each key for the alternate [SHIFT] functions.
[INTERLOCK] 	Ctrl	**Changes the functions of other keys by pressing together.** Can be used with [TEST START], [FWD], Numeric key (Numeric key customize function). Refer to the description of each key for the alternate [INTERLOCK] functions.
Numeric Key 	0-9 - .	**Enters the number or symbol when the ">" prompt appears on the input line.** "." is the decimal point. "-" is a minus sign or hyphen. The Numeric keys are also used as function keys. Refer to the explanation of each function for details.
[BACK SPACE] 	Back space	**Deletes the last character while typing characters.**
[Multi] 	F5	**Displays multiple windows.** **This function is for future use. (Cannot be used with the NX100 of the current version.)**
[SHORTCUT] 	F2	**Displays the shortcut selection dialog box.** **This function is for future use. (Cannot be used with the NX100 of the current version.)**

Keypad key	Keyboard Equivalent	Description
[ASSIST] 	F3	**Displays the menu to assist the operation for the currently displayed window.** **This function is for future use. (Cannot be used with the NX100 of the current version.)**
USAGE 	F10	**A dedicated key to be used according to the application. Cannot be used with MotoSim EG-VRC.**

■ Keyboard Layout

The Virtual Pendant keypad key all have a corresponding key on the computer keyboard. When the Virtual Pendant Screen has the input focus, the those keyboard key can be pressed instead of clicking the keys on the pendant keypad.

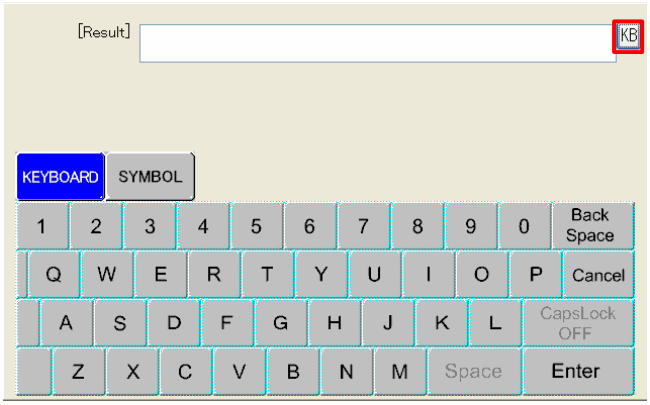


5.2.6 Input with keyboard

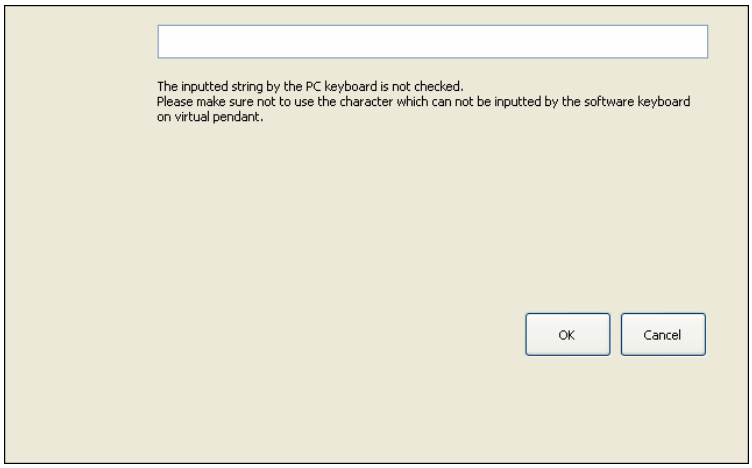
In MotoSim EG-VRC, To enter the string, the keyboard is also available.

Procedure

1. Click the [KB] button in the software keypad.



2. Enter the string, and click the [OK] button, the inputted string is fixed and the previous screen appears. Press the [Cancel button, the inputted string is canceled and the previous screen appears.



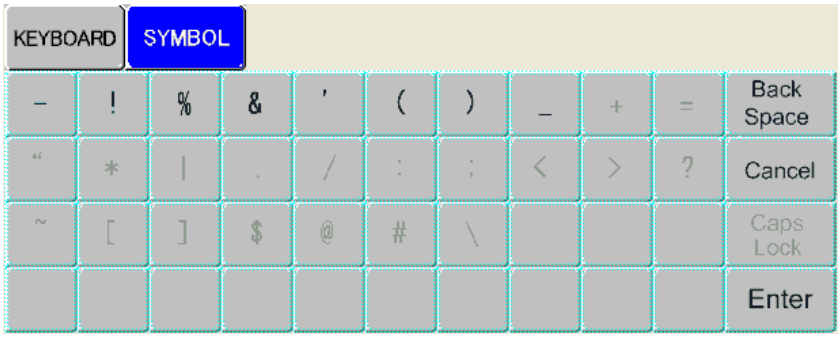
NOTE

- The inputted string is not checked. Please make sure not to use the character which can not be inputted by the software keyboard.
- The other operation can not used on the input mode. When use the other operation, Press the [OK] button or the [Cancel] button to close the input window.

■ Input the job name or folder name

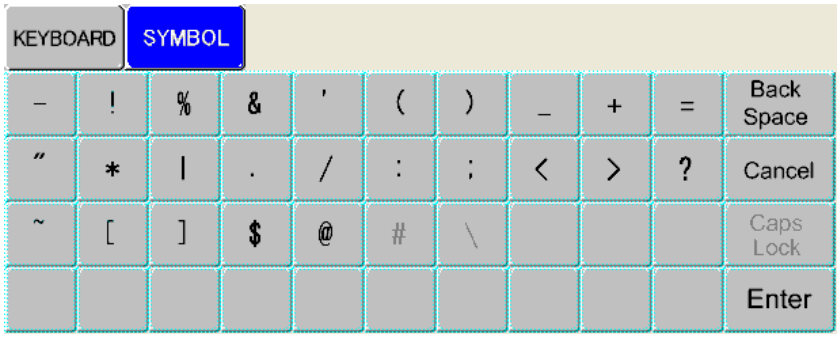
If the gray-out characters as bellow are inputted, the characters are deleted from the inputted

string, when the inputted string is fixed (when the previous screen appears)



■ Input the label name

If the gray-out characters as bellow are inputted, the characters are deleted from the inputted string, when the inputted string is fixed (when the previous screen appears).



6 Display Operation

The display tool functions help to achieve better visualization enabling text input on the cell window, sectional display of models, display mode change, etc.

6.1 Viewpoint Operation Tools

MotoSim EG-VRC can control the display with the viewpoint operation tool as follows:

6.1.1 Viewpoint Operation with the Mouse

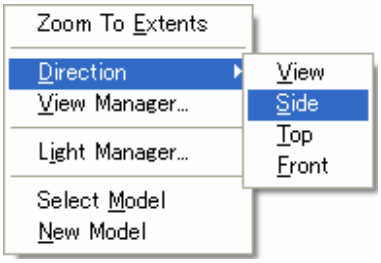
Each viewpoint operation mode is assigned to the button of the mouse.
Drag with the mouse to the up to down or side to side, a viewpoint will change by the viewpoint operation mode currently assigned to the button.

The assignment of the viewpoint operation mode is as follows.

Viewpoint Operation Mode	Mouse Operation	Viewpoint Movement
Parallel	Press-and-hold the scroll wheel and drag	Drag the mouse from side to side and up and down to synchronize the viewpoint with the mouse motion.
Rotate	Press-and-hold the scroll wheel and the right button, and drag	For vertical rotation, drag the mouse up and down; for horizontal rotation, drag the mouse from side to side.
Zoom	Rotate the scroll wheel	Zoom in and out the image by dragging the mouse upward (to zoom in) or downward (to zoom out) over the screen.
Zoom And Rotate	Press-and-hold the right button and drag	Zoom in and out the image by dragging the mouse upward (to zoom in) or downward (to zoom out) over the screen; rotate the image centering on the Z-axis of "world" coordinates by dragging the mouse from side to side.
Change the viewpoint	Press the scroll wheel	Click any desirable point so that the image is displayed with the clicked point located in the center of the screen.
Free Zoom	Press [CTRL] key + Press-and-hold the right button and drag	Drag the mouse over the desired range to be enlarged.

■ Right Mouse Button Operation

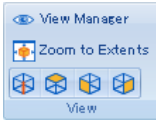
A pop-up menu for viewpoint operation appears by clicking the right mouse button on the cell window.



6.1.2 Preset Viewpoint Operation

The camera viewpoint can also be changed to a preset viewpoint.

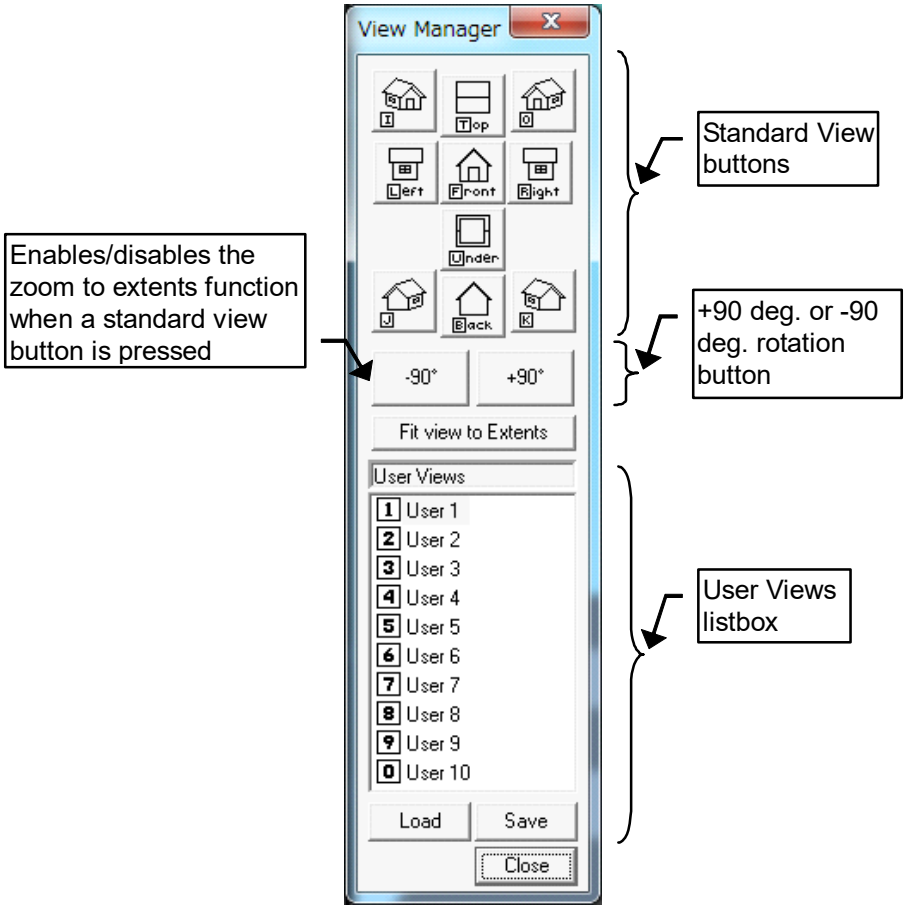
The most communly used viewpoint are available by clicking on the [Home] tab, in the [View] group  .
For detail on the preset viewpoint choices please refer to section " 5.1.1 Ribbon ".



Further preset viewpoint choices are available with the View Manager.

■ Viewpoint Operation with the View Manager

The View Manager panel allows to quickly change the view point of the scene by selecting one of the standard views or user views. And, +90 degree or -90 degree rotation from the current viewpoint can be executed.
The View Manager panel can be displayed by clicking the [Home] tab, in the [View] group, the [View Manager] button.



View Manager

Item	Description
[Standard View] buttons	Changes the viewpoint to display associated the standard view.
+90 deg. or -90 deg. rotation button	Rotates the viewpoint + 90 degree or -90 degree from the current viewpoint.
[Fit view to extends] button	Displays all the models in the cell to fit in the view.
[User View] listbox	Double clicking one of the views will display the associated user defined view.Clicking the selected view name will enable the edition mode to allow renaming the selected view.
[Load] button	Changes the viewpoint displayed on the screen to the user view selected in the "User View" listbox.
[Save] button	Saves the current viewpoint displayed on the screen to the user view selected in the "User View" listbox.
[Close] button	Closes the View Manager panel.

NOTE User views definitions are only saved to the file when the cell is saved.

■ Using Shortcuts

Each view has an associated shortcut key that can be used to recall one of the defined views when the input focus is on either the cell display or on the View Manager panel. Pressing one of the numeric keys (1... 9, 0) will load the corresponding user view; the "0" key is used for the 10th user view. The first letter of the standard view name is used (.e.i. "T" for the Top view, "F" for the Front view...), the letters are indicated on the buttons of the View Manager panel. The keys "I", "O", "J" and "K" are used for the four isometric views.

■ Smooth Transition

The viewpoint can be changed with or without smooth transition function by setting the display as follows:

Smooth transition ON (smooth transition checked in the menu):

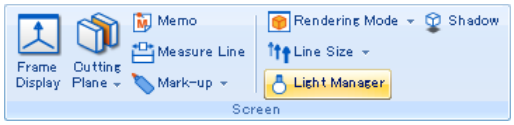
- The viewpoint changes as the image continuously moves.
- For the duration setting, click the MotoSim EG-VRC button ( ), and select the [Options] menu.

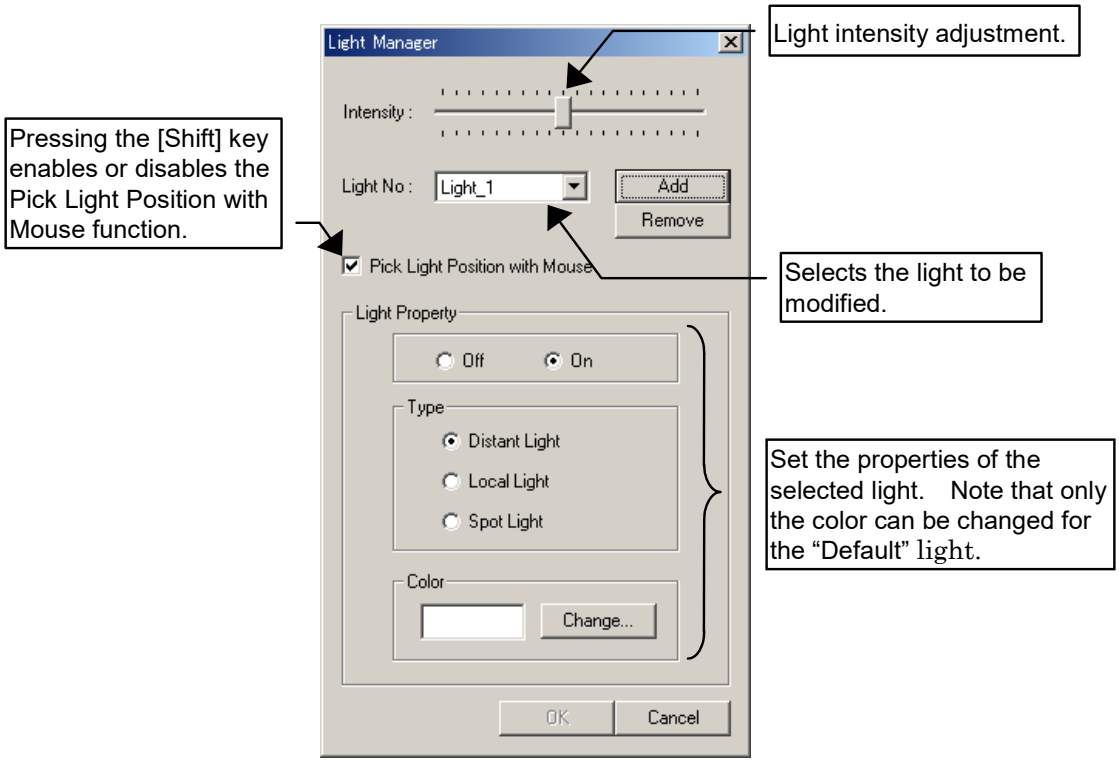
Smooth transition OFF (smooth transition unchecked in the menu):

- The viewpoint changes instantaneously.

6.2 Light Manager Operation

The Light Manager panel allows to add or remove lights and to modify the settings or each light. In addition to the default light, up to 4 additional lights can be added.
On the [Home] tab, in the [Screen] group, click the [Light Manager] button, the [Light Manager] dialog appears.





Light Manager

Intensity	Adjusts the intensity of the lights. Sliding the control toward the left will reduce the general lighting of the scene. Sliding the control toward the right will increase it. (The standard intensity is 100) All the lights are affected by this control.
Light No.	Selects a light for operations. The properties of the currently selected light are displayed in the Light Property section.

Light Manager

Add	Adds a new light. To complete the operation, click on the main view to position the light. A light object will be displayed to indicate the location of the light. Up to 4 lights can be added. For more details please refer to the " Adding and Modifying Lights " and " Light Sources " sections.
Remove	Deletes the currently selected light. Note that the "Default" light cannot be deleted.
Pick Light Position with Mouse	When checked, clicking on the main view will move the position of the light to the clicked position. (When unchecked, clicking the main view doesn't change the light position and allows view point change operation.) Pressing the [Shift] key toggles the Pick Light Position with Mouse check mark.
Light Property	[On / Off] [Off] : The selected light is turned off. But, the light is not erased, the settings remains valid. [On] : The selected light is turned on. [Type] Distant Light : Light rays are all parallel (coming from an infinite distance) Local Light : Omni directional rays coming from the light source point (light marker). Spot Light : Cone shaped directional rays coming from the light source point (light marker). For more detail, please refer to the " Light Sources " section. [Color] The color of the light is displayed in the rectangle. [Change] Displays the Color Dialog to change the color of the light.
OK	Closes the Light Manager panel.The lights information will be save to the cell file when the cell is saved. The light markers in the main view will disappear when Light Manager is closed. To display the light markers again, reopen the Light Manager panel.
Cancel	Cancels the light setting modifications and closes the Light Manager panel. The light markers in the main view will be deleted.

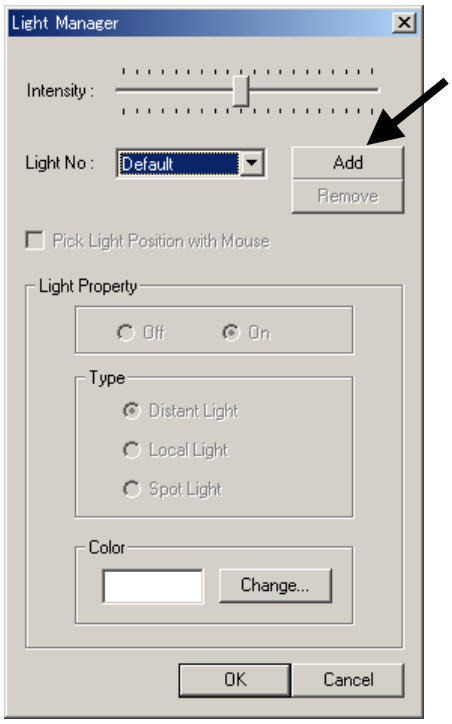
NOTE

- To preserve the light settings for next time the cell is opened, the cell needs to be saved after the light settings are changed.
- When exporting files (i.e. html format), changing the light settings don't affect the resulting exported file.

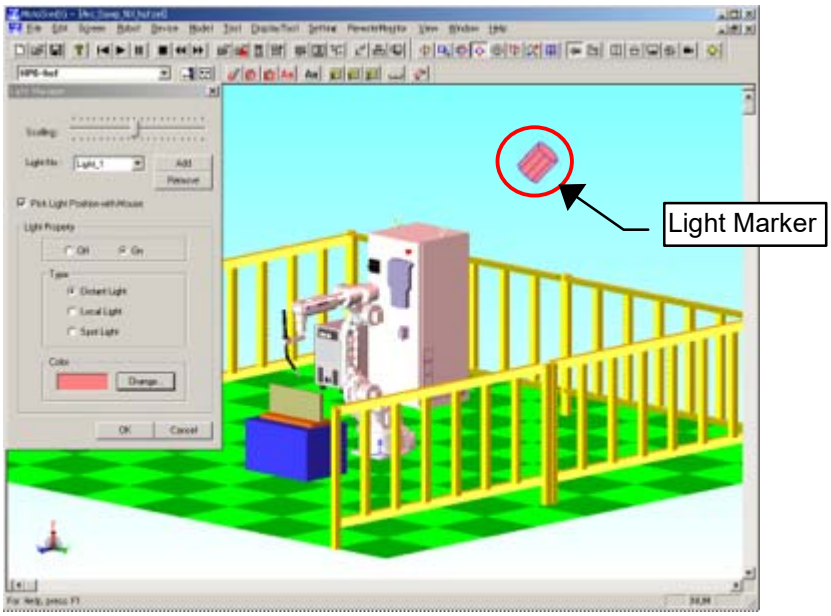
■ Adding and Modifying Lights

Operation Procedure

1. Press the [Add] button. The properties of the newly added light will display in the Light Property section. (At this stage, the light source still isn't created.)

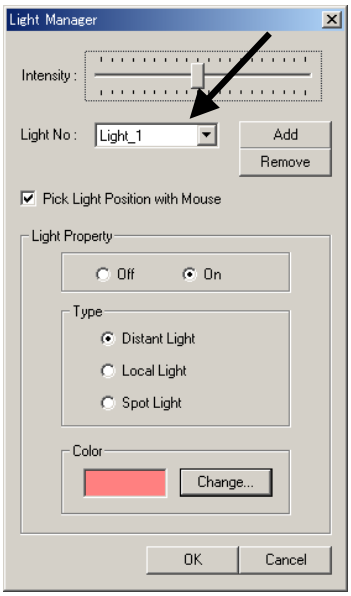


2. Click on the main view to position the light. The light will be created and a light marker will be displayed to indicate the location of the light.
The light location and type can be confirmed by looking at the light marker in the main view.



The lighting of the cell will change to reflect the new light influence.
As long as the [Pick Light Position with Mouse] is checked, clicking on the main view will move the light to the clicked position. Other items can be changed in the Light Property section.
Note that a maximum of 4 lights can be added to the cell.

3. To modify existing light, first select the "Light No." and then change the settings in the "Light Property" section.



4. Press [OK] or [Cancel] to close the Light Manager panel.
When the Light Manager is closed the light markers in the main view will disappear. To display the light markers again, reopen the Light Manager panel.

NOTE To preserve the light settings for next time the cell is opened, the cell needs to be saved after the light settings are changed.

■ Deleting Lights

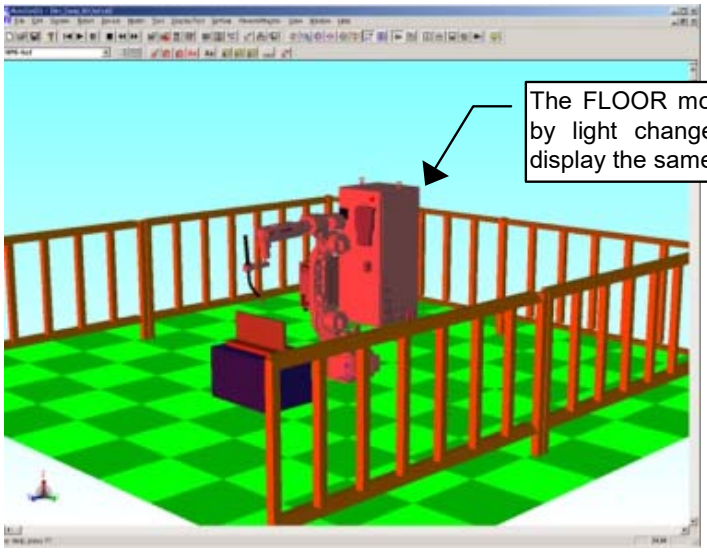
Select the light number. Press the [Remove] button to remove the light.
Note that the "Default" light cannot be deleted.

■ Light Sources

Default

Directional light constantly attached to the viewpoint. The initial light color is white.

Result after changing the light color

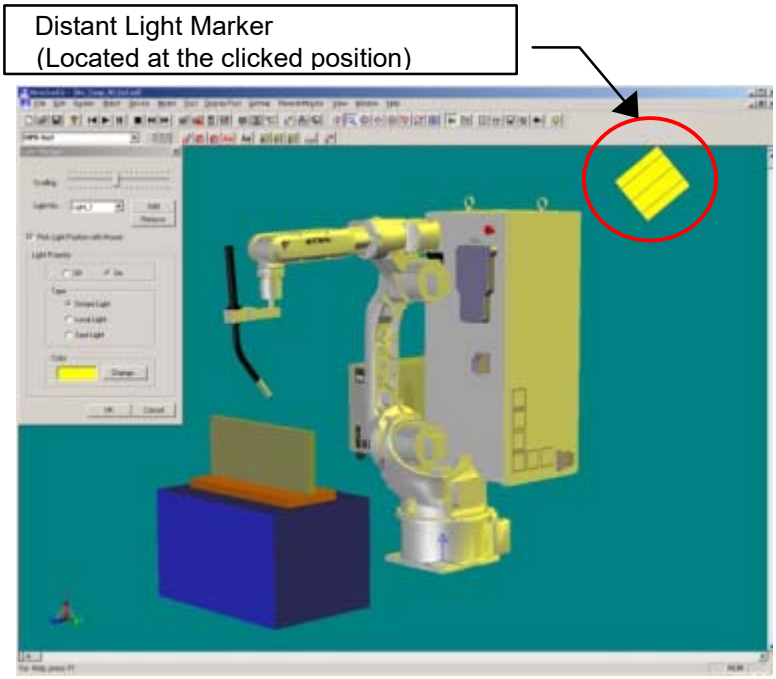


The light reflection and intensity of the whole scene can be modified by adjusting the "Intensity" value.

Intensity: 100 75 50

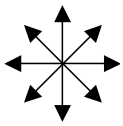
Distant Light

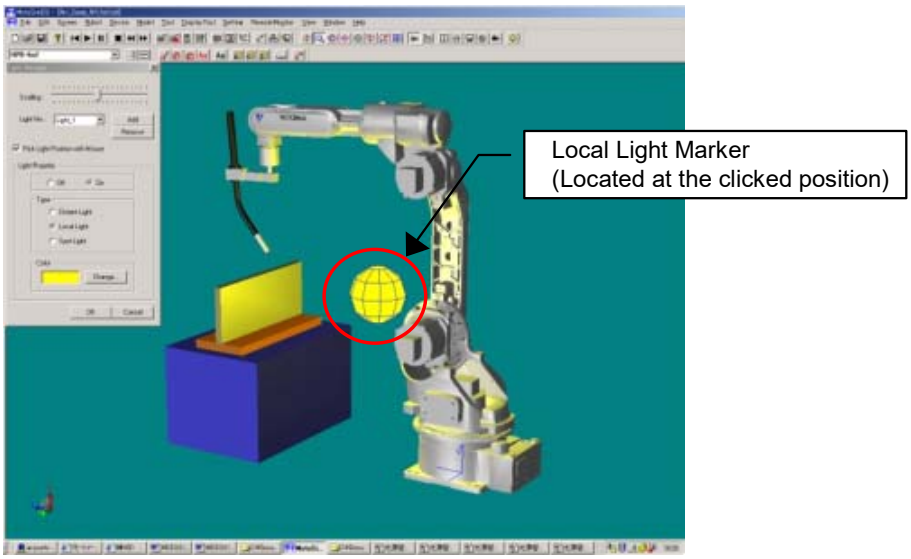
Light is emitted from a infinite distance so that all the rays are parallel.Light type for general use. The light direction is from the clicked position toward the viewpoint center.



Local Light

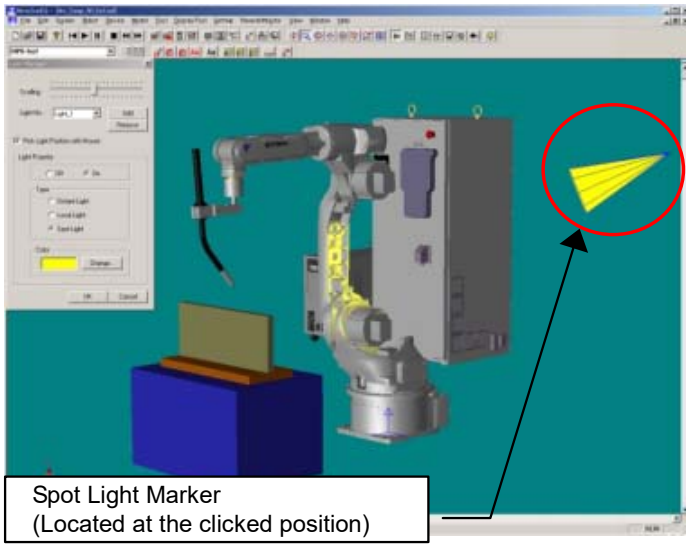
Light is emitted in all direction from the light position.
Useful for generating light from a given point.





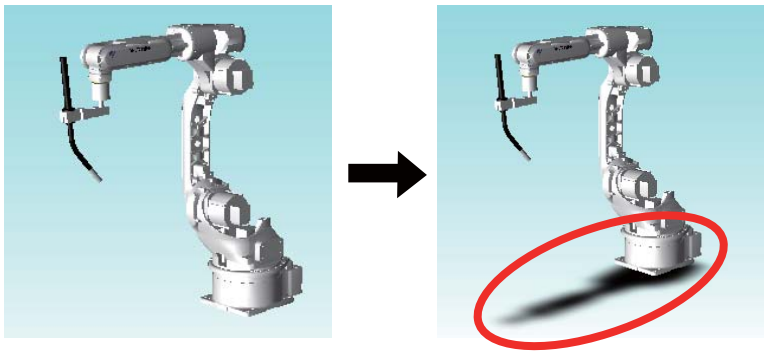
Spot Light

Light is emitted in a specific direction forming a cone from the light position in a cone shape. Useful to illuminate a specific face of a part.
The light direction is from the clicked position toward the viewpoint center.
For proper illumination of a model or a face, it may be necessary to relocate the viewpoint center on the intended target before setting the light position.
Viewpoint center can be moved with click on the mouse wheel.



6.3 Displaying Shadows

Shadows can be displayed for the models on the screen.
Since the shadows are not easily visible when the floor is displayed, use the shadow with the opacity of floor image decreased (approx. to 0.5 or less), or hide the floor image.
For the detailed setting of shadow, refer to " 12.1.4 Shadow ".



6.4 Pick Settings

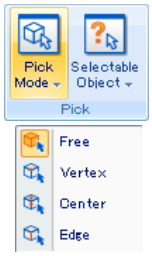
The Pick settings influence the selection of objects when picking object in the cell view with the mouse.

■ Pick Mode Setting

The Pick Mode sets conditions determining the selected point in the clicked area.

Procedure

On the [Home] tab, in the [Pick] group, click the [Pick Mode] button, and select one of the following items.



- Free: Selects the point of the model corresponding to the clicked position.
- Vertex: Selects the model vertex nearest to the clicked position.
- Center: Selects the face or edge center nearest to the clicked position. Note that in order to select the center of the cylindrical model, select the model using [Vertex] instead of [Center].
- Edge Selects the edge point nearest to the clicked position.

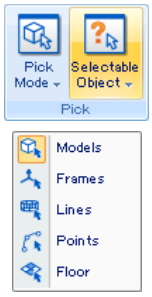
NOTE That these settings are also linked to the same settings available in the OLP dialog.

■ Pick Object Setting

Pick object set filters on the type of objects that can be selected by the mouse pick.

Procedure

On the [Home] tab, in the [Pick] group, click the [Selectable Object] button, and select one of the following items.

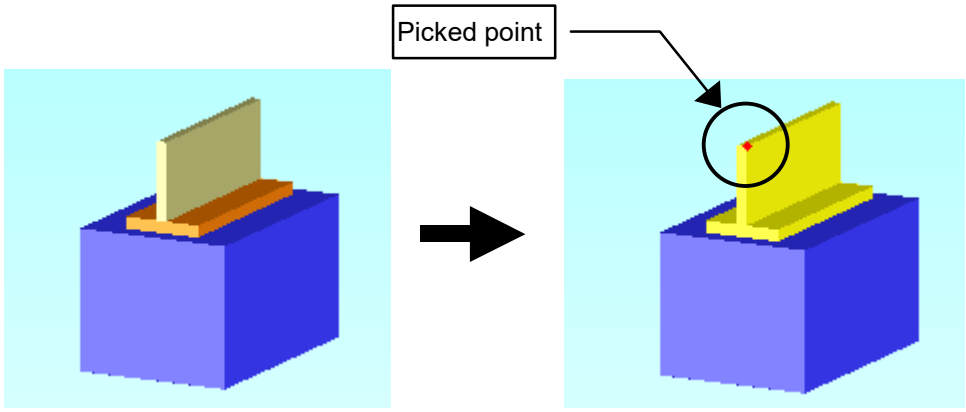


- Models: Solid models.
- Frames: Model frame or AXIS6 models. (Note: The model frame needs to be visible to be selected.)
- Lines & Inters: Lines such as LINE part, WORK line and wireframe model, and intersection lines generated by the intersection of parts or models. (Note the intersection lines are displayed during the pick operation when the left mouse button is pressed down. In cells with many detailed models, the intersection generation may slow down the pick function response. In such case, you may uncheck this item to improve performance.)
- Points: Points such as TRACE points.
- Floor: FLOOR parts. (Note: FLOOR parts tend to interfere selection depending on the viewpoint, therefore their selection is managed independently from other models.)

NOTE That these settings are also linked to the same settings available in the OLP dialog.

■ Pick method and screen display

When the mouse pointer is over the cell view, press down the left mouse button. The model considered for selection will display in yellow with a red dot to indicate the specific point location. The display will update to represent change of selection as the mouse pointer is moved over different models. The actual selection is made only when the mouse button is released.


Picked point

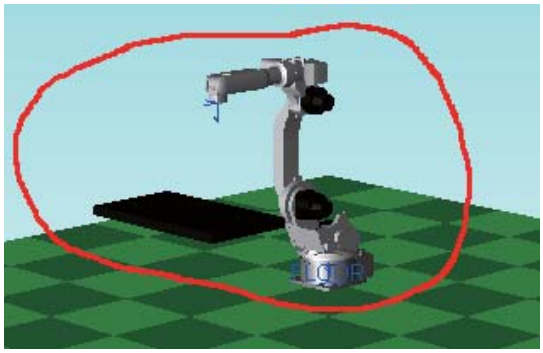
6.5 Markup

Graphic forms (such as circles, rectangles) and text can be temporarily drawn on the cell window.

6.5.1 Freehand

This section explains on how to draw a free-form line.

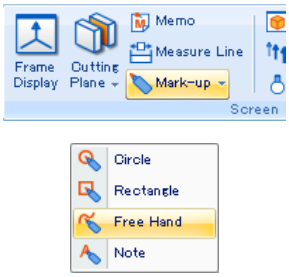
NOTE The line drawn on the cell is deleted by changing the viewpoint of the window.



Procedure

1. Set the viewpoint of the window. (This step must be done first since the line will be deleted when the viewpoint is changed.)

2. On the [Home] tab, in the [Screen] group, click the [Make-up] button, and select [Free Hand].



Position the mouse pointer at a desired point, and drag the mouse freely so that the mouse pointer on screen draws a line with the mouse movement.

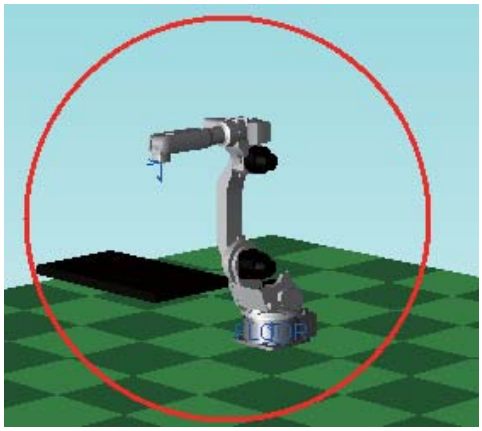
Click the MotoSim EG-VRC button ( ), and select the [Options] menu to set the

color and thickness of the line. Refer to " 12.2 Markup Settings " for details.

6.5.2 Circle

This section explains on how to draw a circle.

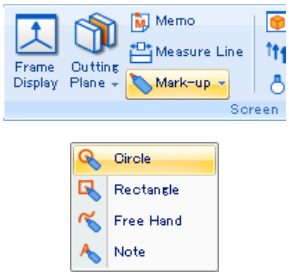
NOTE The circle drawn on the cell is deleted by changing the viewpoint of the window.



Procedure

1. Set the viewpoint of the window. (This step must be done first since the circle will be deleted when the viewpoint is changed.)

2. On the [Home] tab, in the [Screen] group, click the [Make-up] button, and select [Circle].



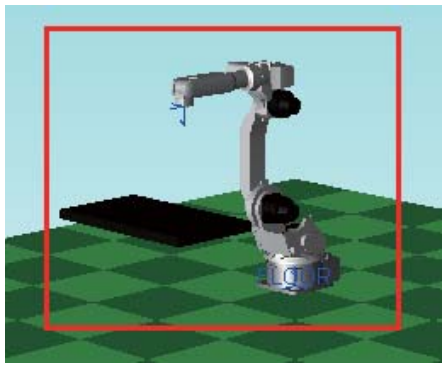
Position the mouse pointer at a desired point, and drag the mouse: a circle is drawn centering around the point where the mouse started dragging.

Click the MotoSim EG-VRC button ( ), and select the [Options] menu to set the color and line thickness of the circle. Refer to " 12.2 Markup Settings " for details.

6.5.3 Rectangle

This section explains on how to draw a rectangle.

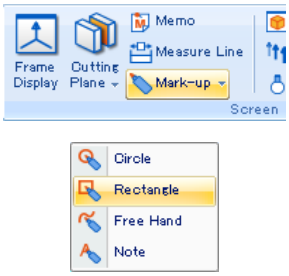
NOTE The rectangle drawn on the cell is deleted by changing the viewpoint of the window.



Procedure

1. Set the viewpoint of the window. (This step must be done first since the rectangle will be deleted when the viewpoint is changed.)

2. On the [Home] tab, in the [Screen] group, click the [Make-up] button, and select [Rectangle].



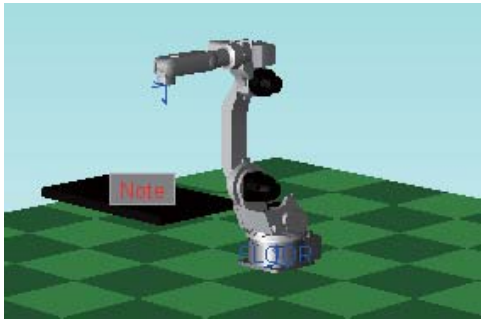
Position the mouse pointer at a desired point, and drag the mouse: a rectangle is drawn from the point where the mouse started dragging.

Click the MotoSim EG-VRC button ( ), and select the [Options] menu to set the color and line thickness of the rectangle. Refer to " 12.2 Markup Settings " for details.

6.5.4 Notes

This section explains on how to add a note.

NOTE The note added on the cell is deleted by changing the viewpoint of the window.

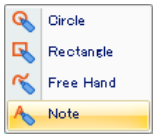


■ Adding a Note

Procedure

1. Set the viewpoint of the window. (This step must be done first since the note will be deleted when the viewpoint is changed.)

2. On the [Home] tab, in the [Screen] group, click the [Make-up] button, and select [Notes].



Click any point on the window where to add notes; a "Note" indication appears at the clicked point. Right-click the “Note” to open a pop-up menu, and select {Edit} to enter texts.

3. Click on [OK] after entering the texts.

Click the MotoSim EG-VRC button ( ), and select the [Options] menu to set the font and color of the text. Refer to " 12.2 Markup Settings " for details.

NOTE
- The note added on the cell is deleted by changing the viewpoint of the window.
- When adding two-byte characters, use a font that properly displays two-byte characters.

■ Deleting a Note

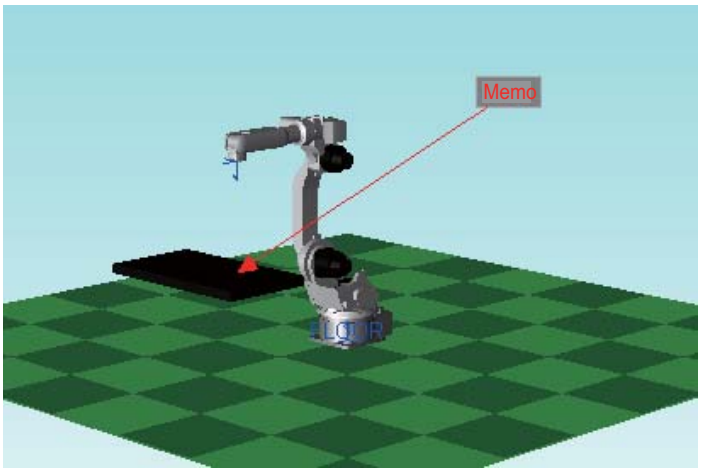
Select the note to be deleted, and right-click it. Select {Delete} from the pop-up menu to delete the text.

■ Relocating a Note

Drag a note to a different location with on the [Home] tab, in the [Screen] group, click the [Make-up] button, and selected [Notes].
Note that the arrow remains at the same point.

6.6 Memo

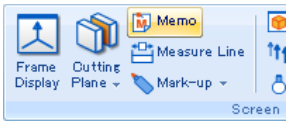
This section explains on how to create a memo (text).



■ Creating a Memo

Procedure

1. On the [Home] tab, in the [Screen] group, click the [Memo] button.



   Click the desired model and drag the mouse to the desired memo location; a "Memo" indication with an arrowed line appears at the position where the mouse button is released after dragging.

NOTE Non-displayed model or the point where there is no model cannot be selected as a subject for the memo indication whereas any point of the model displayed on the window can be selected for the memo indication.

2. Right-click “Memo” to open a pop-up menu, and select {Edit} to enter texts.

3. Enter texts, and click on [OK].
   Click the MotoSim EG-VRC button ( ), and select the [Options] menu to set the

font and color of the texts. Refer to " 12.2 Markup Settings " for details.

NOTE When adding two-byte characters, use a font that properly displays two-byte characters.

■ Deleting a Memo

Select a memo to be deleted, and right-click it. Select {Delete} from the pop-up menu to delete the memo with the arrowed line.

■ Relocating a Memo

Drag a note to a different location with on the [Home] tab, in the [Screen] group, click the [Make-up] button, and selected [Memo].
Note that the arrow remains at the same point.

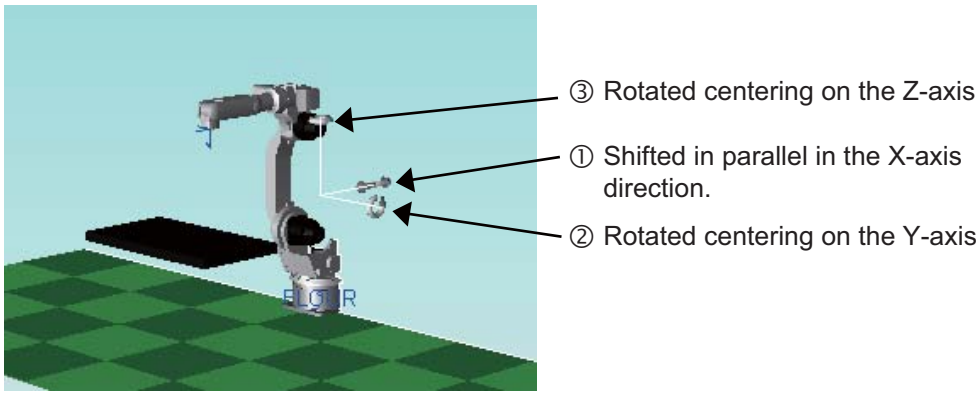
6.7 Cutting Planes

This section explains on how to display cross sections that are perpendicular to the X-, Y-, Z-axes directions in the cell window.
When the cell is saved with the cutting plane displayed, the next time the cell starts up, it starts up in cutting plane displayed state.

NOTE When do not use or set up the recommended graphic board, MotoSim EG-VRC may not execute correctly.

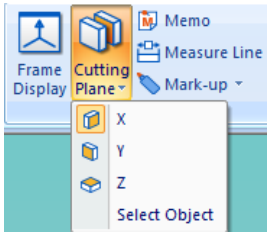
6.7.1 X-Cutting Planes

With this command, the X-cutting plane (a cutting plane which is perpendicular to the X-axis direction in the window) can be displayed as shown in the following figure:



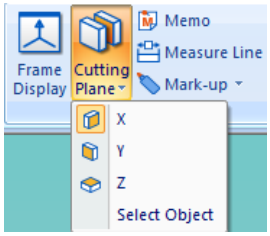
■ Displaying the X-Cutting Plane

When the X-cutting plane is not displayed.On the [Home] tab, in the [Screen] group, click the [Cutting Plane] button, and select [X]



■ Deleting the X-Cutting Plane

When the X-cutting plane is displayed.On the [Home] tab, in the [Screen] group, click the [Cutting Plane] button, and select [X]



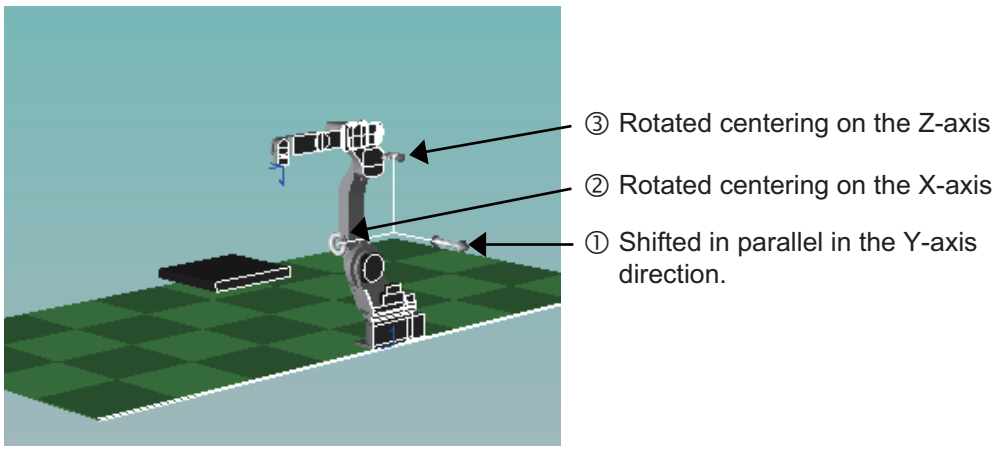
■ Changing Display of the X-Cutting Plane

Drag the tools ① to③ on the figure above to rotate the X-cutting plane centering on the Y- or Z-axis, or shift it in a direction parallel to the X-axis.

①	Shift the X-cutting planes in a direction parallel to the X-axis.
②	Rotate the X-cutting planes centering on the Y-axis.
③	Rotate the X-cutting planes centering on the Z-axis.

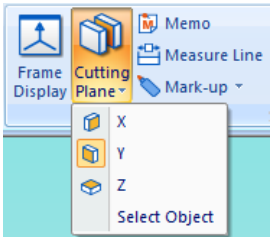
6.7.2 Y-Cutting Planes

With this command, the Y-cutting plane (a cutting plane which is perpendicular to the Y-axis direction in the window) can be displayed as shown in the following figure:



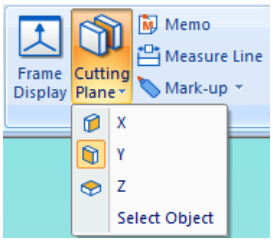
■ Displaying the Y-Cutting Plane

When the Y-cutting plane is not displayed.On the [Home] tab, in the [Screen] group, click the [Cutting Plane] button, and select [Y]



■ Deleting the Y-Cutting Plane

When the Y-cutting plane is displayed.On the [Home] tab, in the [Screen] group, click the [Cutting Plane] button, and select [Y]



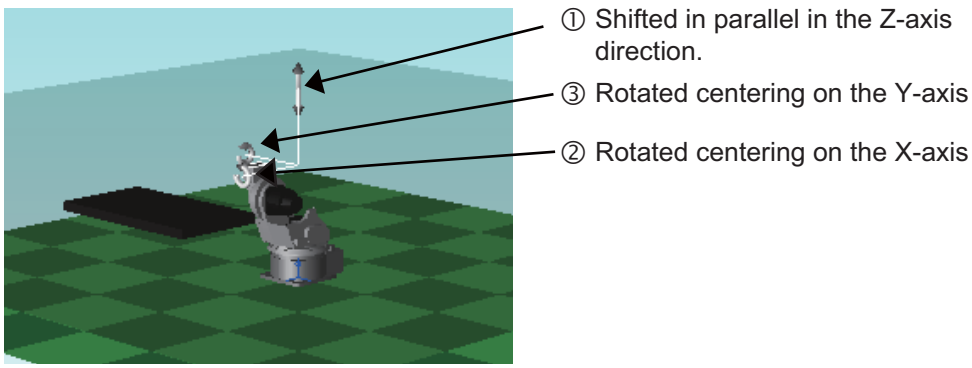
■ Changing Display of the Y-Cutting Plane

Drag the tools ① to ③ on the figure above to rotate the Y-cutting plane centering on the X- or Z-axis, or shift it in a direction parallel to the Y-axis.

①	Shift the Y-cutting plane in a direction parallel to the Y-axis.
②	Rotate the Y-cutting plane centering on the X-axis.
③	Rotate the Y-cutting plane centering on the Z-axis.

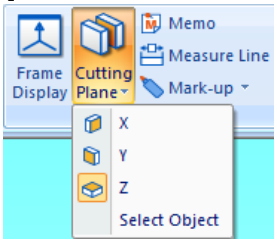
6.7.3 Z-Cutting Planes

With this command, the Y-cutting plane (a cutting plane which is perpendicular to the Z-axis direction in the window) can be displayed as shown in the following figure:



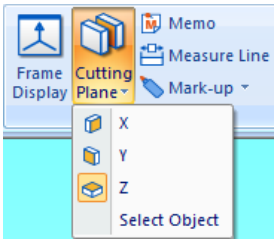
■ Displaying the Z-Cutting Plane

When the Z-cutting plane is not displayed.On the [Home] tab, in the [Screen] group, click the [Cutting Plane] button, and select [Z]



■ Deleting the Z-Cutting Plane

When the Z-cutting plane is displayed.On the [Home] tab, in the [Screen] group, click the [Cutting Plane] button, and select [Z]



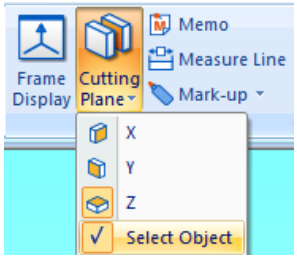
■ Changing the Z-Cutting Plane

Drag the tools ① to ③ on the figure above to rotate the Z-cutting plane centering on the X- or Y-axis, or shift it in a direction parallel to the Z-axis.

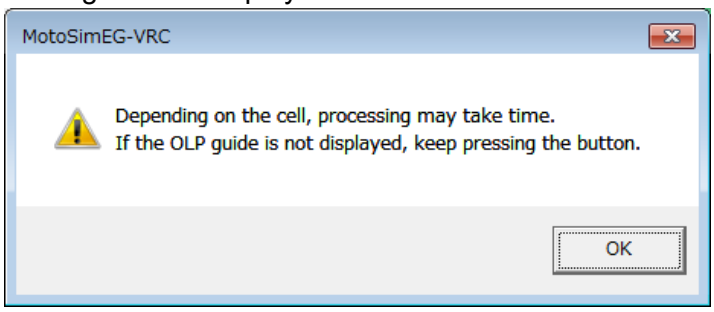
①	Shift the Z-cutting plane in a direction parallel to the Z-axis.
②	Rotate the Z-cutting plane centering on the X-axis.
③	Rotate the Z-cutting plane centering on the Y-axis.

6.7.4 Pick Object

When [Select Object] is enabled, you can pick cutting plane during OLP operation.

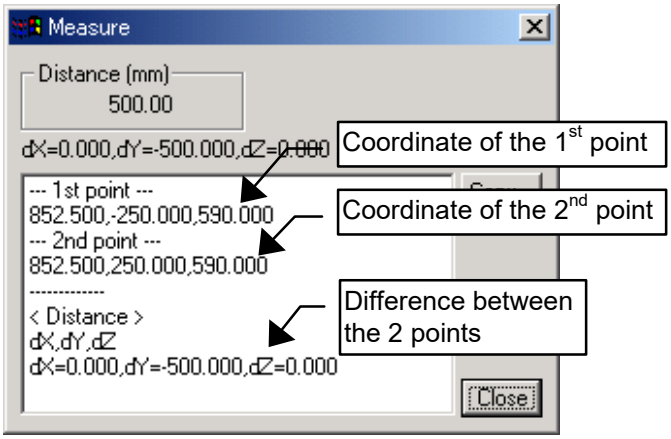


However, depending on the size of cell, this operation takes time. So when [Select Object] is enabled, following message box is displayed.



6.8 Measure Distance

Click 2 points to measure the distance between them.



Measure Distance dialog

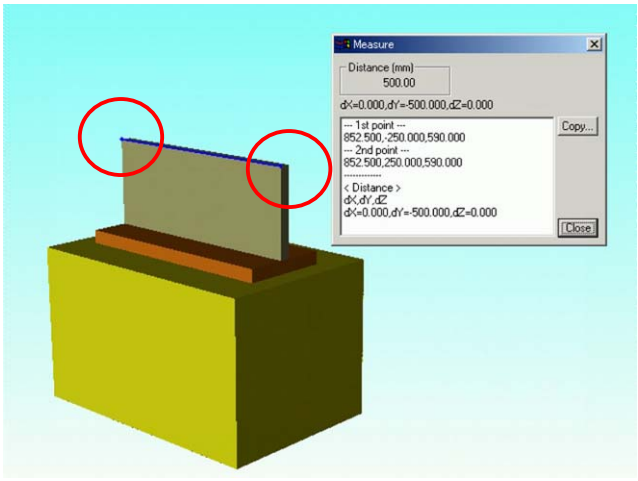
Copy	Copies the measurement result to the clipboard.
Close	Closes the Measure Distance dialog.

Procedure

1. On the [Home] tab, in the [Mesurement] group, click the [Distance] button.

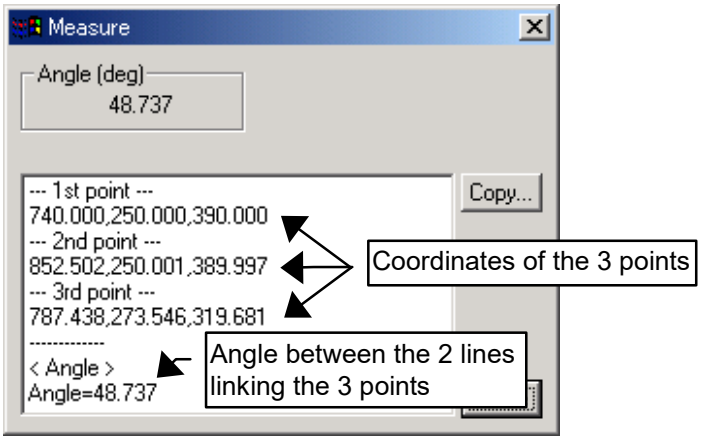
2. Click with the mouse any 2 points on models. (Blue dots on the clicked positions and a blue line joining the points will appear.) The Measure Distance dialog will display with the measurement results.

NOTE When clicking in an area the selected point depends on the current "Pick Mode" and "Pick Object" settings. Please refer to " 6.4 Pick Settings " for details.



6.9 Measure Angle

Click 3 points to measure the angle between them.



Measure Distance dialog

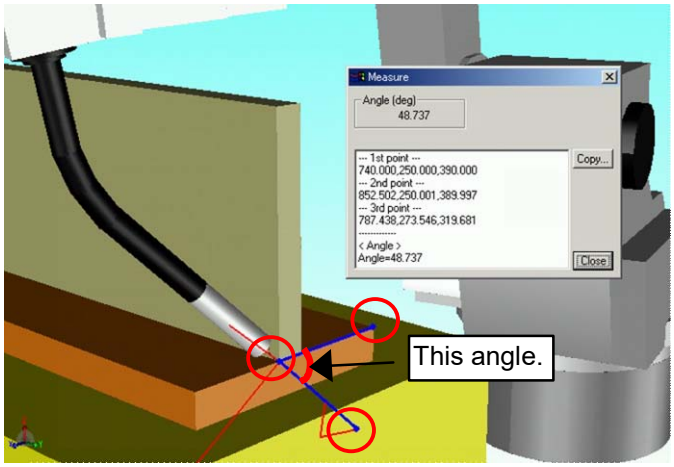
Copy	Copies the measurement result to the clipboard.
Close	Closes the Measure Angle dialog.

Procedure

1. On the [Home] tab, in the [Mesurement] group, click the [Angle] button.

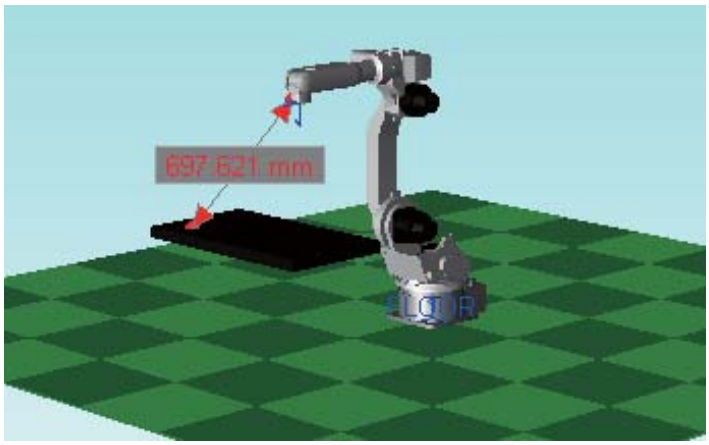
2. Click with the mouse any 3 points on models. (Blue dots on the clicked positions and blue lines joining the points will appear.) The Measure Angle dialog will display with the measurement results.

NOTE When clicking in an area the selected point depends on the current "Pick Mode" and "Pick Object" settings. Please refer to " 6.4 Pick Settings " for details.



6.10 Measure Line

With this command, a dimension line can be created as shown in the figure below.



■ Creating a Dimension Line

Procedure

1. On the [Home] tab, in the [Mesurement] group, click the [Measure Line] button.

2. Click a model and drag; a dimension line with two-headed arrow appears where the mouse is dragged across, displaying the dimension between the both ends.

NOTE

- Non-displayed model or the point where there is no model cannot be selected as a subject for the dimension line indication whereas any point of the model displayed on the window can be selected for the dimension indication.
- When clicking in an area the selected point depends on the current "Pick Mode" and "Pick Object" settings. Please refer to " 6.4 Pick Settings " for details.

■ Deleting a Dimension Line

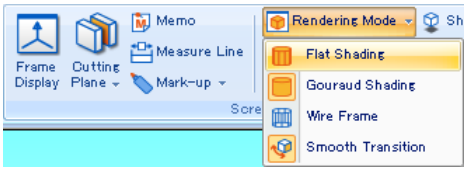
Select a dimension to be deleted, and right-click it. Select {Delete} from the pop-up menu to delete the dimension with the dimension line.

■ Relocating a Dimension Line

Drag a note to a different location with on the [Home] tab, in the [Mesurement] group, click the [Measure Line] button.
Note that the arrow remains at the same point.

6.11 Changing the Rendering Mode

On the [Home] tab, in the [Screen] group, click the [Rendering Mode] button, the display mode can be change..

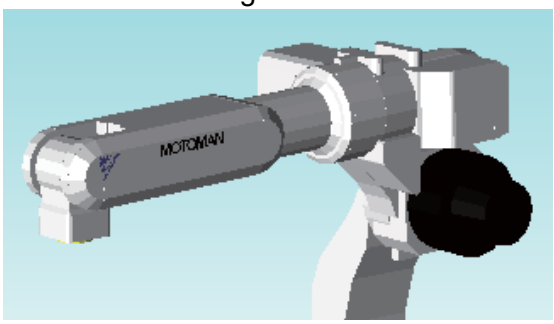


SUPPLE -MENT

- The cell is displayed in "GourandShading" mode when it is opened.
- For edition, select desired mode from "FlatShading", "GourandShading", or "Wireframe".

Flat Shading

The image displayed in flat shaded rendering mode:

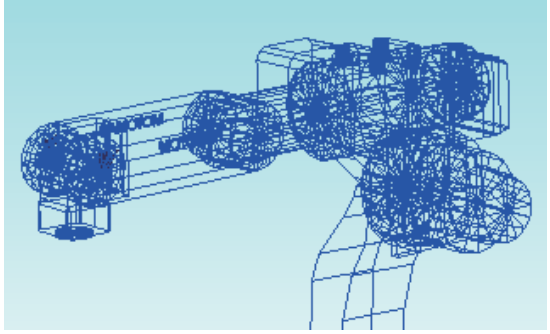


Gourand Shading

The image displayed in Gourand shaded rendering mode:

Wire Frame

The image displayed in wire frame:



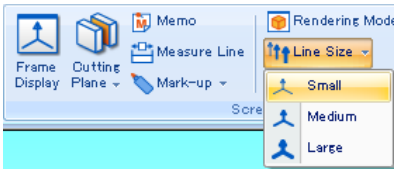
6.12 Other Display Operations

6.12.1 Changing Frame Width

Modify the frame line width for better visualization on the display.
Refer to " 12.1.5 Frame & AXIS6 " to set the frame length.

Procedure

On the [Home] tab, in the [Screen] group, click the [Line Size] button,and select the frame width from {Small}, {Medium}, or {Large}.



6.12.2 Copying the Image

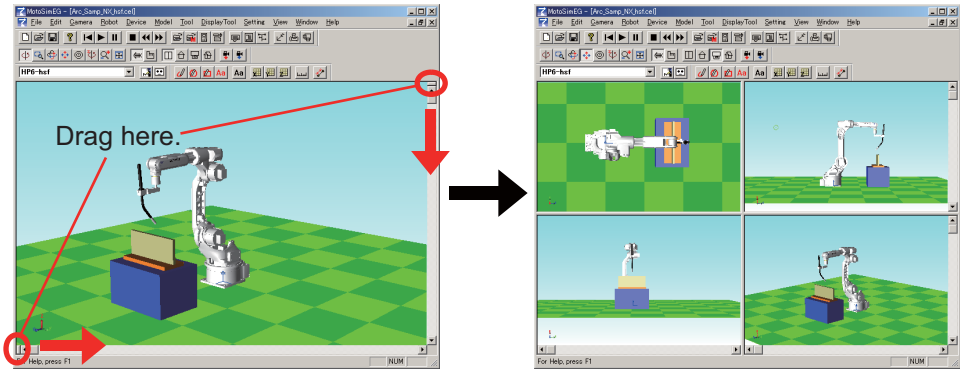
Copy the static image of the cell window: the copied data can be used in other application software by pasting it.

Procedure

Display the cell to be copied. On the [Home] tab, in the [Tools] group, click the [Copy] button, or hold down the Ctrl key and press the C key.

6.12.3 Dividing a Cell Window

A cell window can be divided up to four views by dragging a separator of the vertical or horizontal scroll bar in the cell window. This function provides users with different viewpoint angles, enabling teaching or playback operations viewed from several directions.
However, depend on PC spec and size of the cell, simulatiton with four windows might not be able.



6.12.4 Printing the Image

MotoSim EG-VRC does not have any printing function.
On the [Home] tab, in the [Tools] group, click the [Copy] button, or hard-copy the screen (Alt + Print Screen), and paste it to another application.

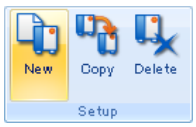
7 Controller and Robot Settings

MotoSim EG-VRC allows many robot and controller operations, such as adding, deleting, etc. This chapter describes operation related to setting controllers and robots

7.1 Adding a New Controller

A single controller may have one or more control group representing robot, base station or external stations. Then, there are 2 ways to create the environment. One is to recreate the system configuration in the MotoSim EG-VRC with the "CMOS.BIN" file saved from a real controller. The "CMOS.BIN" file contains all the information defining a controller and its robots. The other is to create the "CMOS.BIN" file in the MotoSim EG-VRC.

On the [Controller] tab, in the [Setup] group, click the [New] button, the new controller can be created.



There are 2 ways to proceed depending on the presence or absence of the "CMOS.BIN" file.

- If there is not the "CMOS.BIN" file (the "CMOS.BIN" file is created in the MotoSim EG-VRC), proceed to section " 7.1.1 Create a New VRC Controller (no file) ".
- If there is the "CMOS.BIN" file (the "CMOS.BIN" file is taken from a real controller), proceed to section " 7.1.2 Create VRC Controller (using CMOS.BIN file or ALL.PRM file) ".

NOTE In regard to the FS100 controller, the "CMOS.BIN" file saved from a real controller can not be used with MotoSim EG-VRC to create the environment.

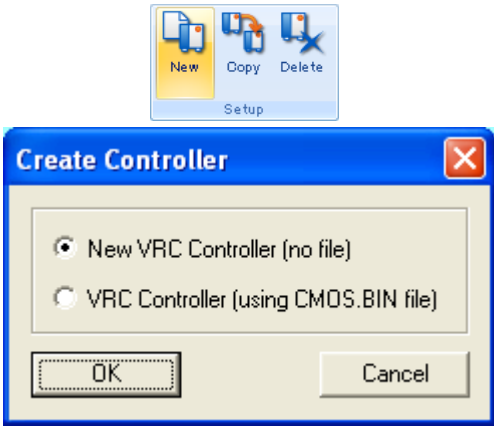
Note that a controller that has already been created by MotoSim EG-VRC cell can be simply copied into the cell. To do so, please refer to section " 7.2 Copying a Controller ".

7.1.1 Create a New VRC Controller (no file)

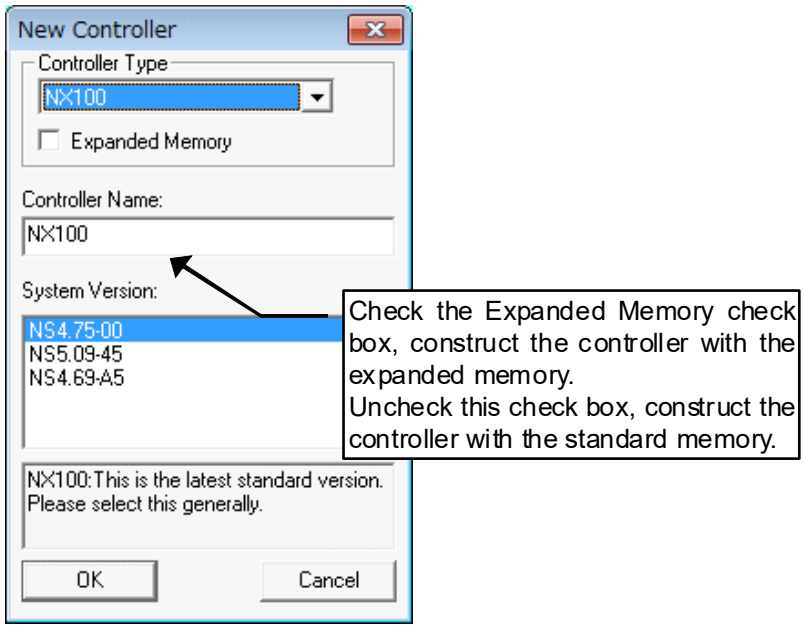
Create a new controller and define a system in MotoSim EG-VRC.

Procedure

1. On the [Controller] tab, in the [Setup] group, click the [New] button. To display the “Create Controller” dialog. Select “New VRC Controller (no file)” and press the [OK] button.



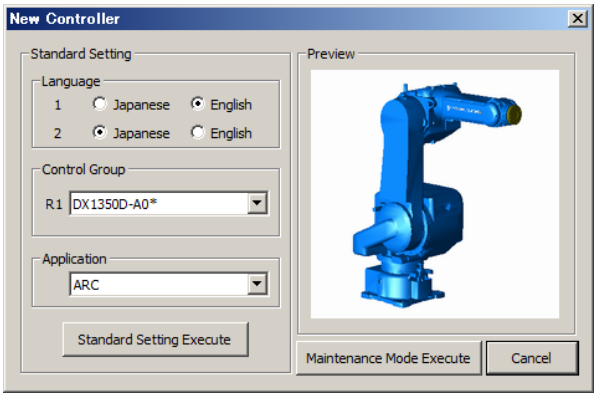
2. The "New Controller" dialog box appears. Select the controller type and then the system version from the list below. If desired you may change the default name for the controller. Click the "OK" button.



NOTE

- When ECD80D-A00 (NX100) is registered, select the following controller certainly. That robot model is only used with the following controller system version.
  [Controller Type] NX100
  [System Version] NS 4.69-A5
- The expanded memory option is not supported for the FS100 controller.

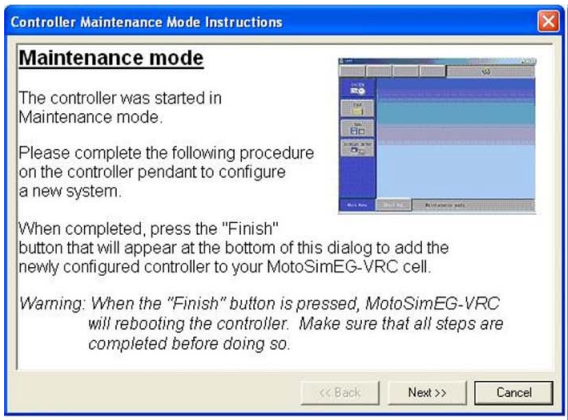
3. New controller dialog for the selected controller version is displayed.
   When executes standard setting, set the "Language", "Control Group" and "Application" and press the [Standard Setting Execute] button. Proceed the step 5 next.When executes setup on maintenance mode of controller, press the [Maintenance Mode Execute] button. Proceed the step 4 next.

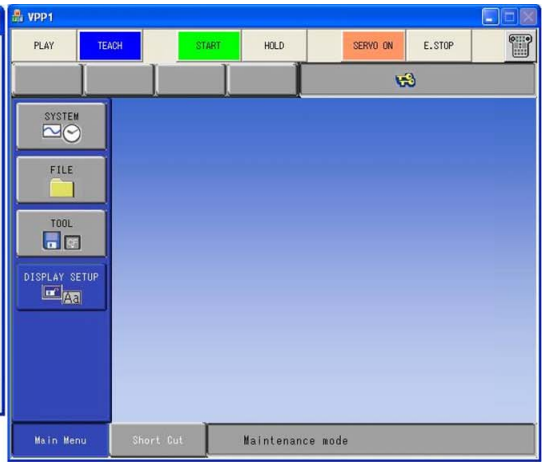


NOTE
- When the controller is "FS100", "Application" of Standard Setting cannot be set.
- When the controller system version is "NS4.69-A5", Standard Setting is not supported.

4. The controller will launch with the selected system version and display the Virtual Pendant in maintenance mode. (This may take a few moments.) At the same time, the “Controller Maintenance Mode” Instruction Guide will appear.
   Since there is no CMOS.BIN file, it is necessary to initialize the controller with the Virtual Pendant in order to define the system (language, robot, application...).
   To do so:
   - Initialize the controller
   - Once the controller initialization is completed, click on the “Finish” button of the Instruction Guide to reboot.

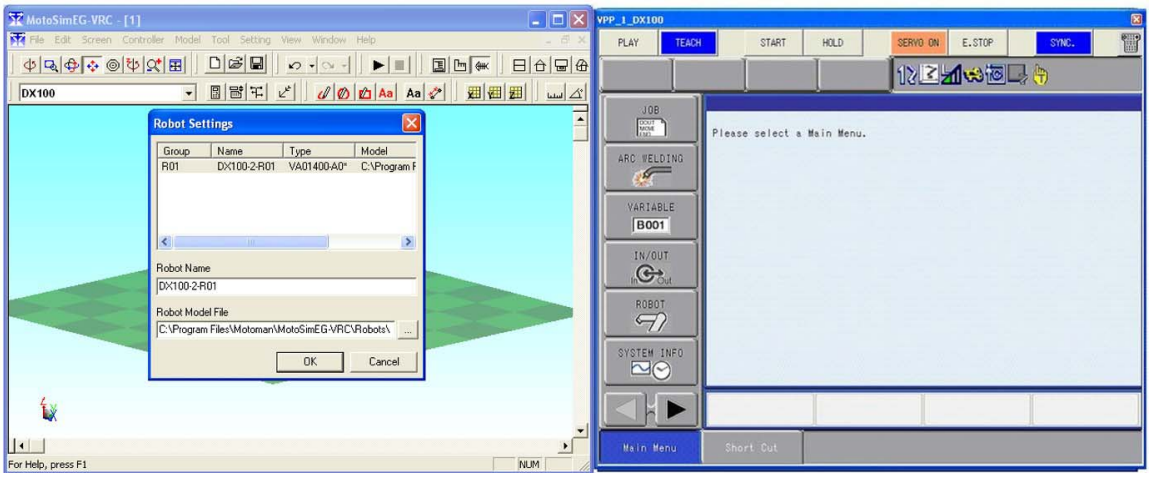
   For details how to proceed to set initialize the controller, follow the procedure described in the “Instruction Guide” or refer to the " 7.1.3 Initializing the Controller (YRC1000, YRC1000micro, DX200, DX100, NX100) " sections that follow later in this chapter.



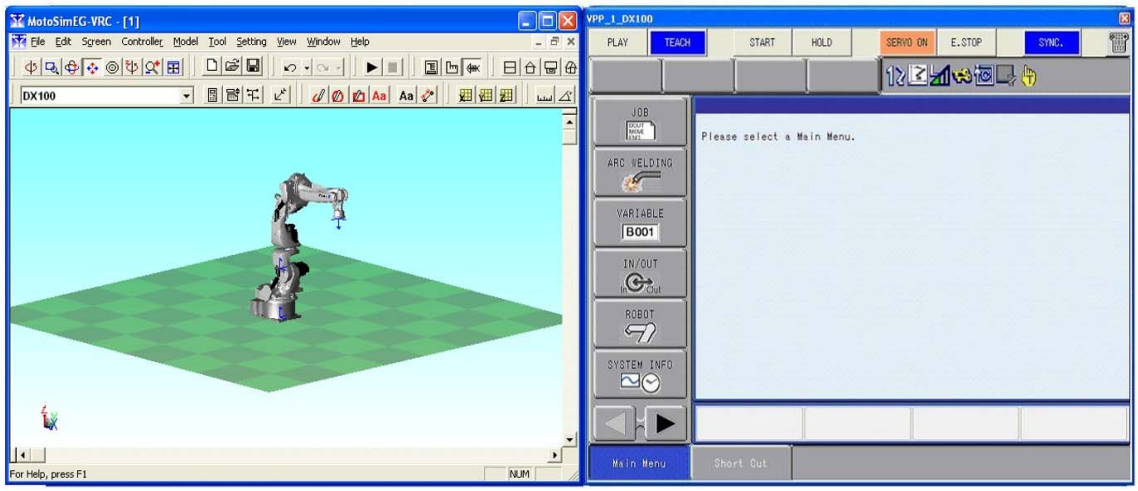


5. The Virtual Pendant will close and reboot in normal mode. (This may take a few moments.) The “Robot Setting” dialog will display. A default robot name and model file should be pre-entered. If required, enter a name for the robot and select a robot model

file corresponding to the robot type. (In the example below, the robot model is “VA01400-A00” the corresponding model is “VA01400-A00.mdl”.) Robot models are found in the “Robot” folder under MotoSimEG-VRC install folder. Click the [OK] button.



6. The robot will display with the selected model file.



NOTE When initialized the robot controller, MotoSim EG-VRC set the absolute data automatically. So absolute setting is not needed in MotoSim EG-VRC.
Refer to " 7.1.4 Initializing the Controller (FS100) " for details.

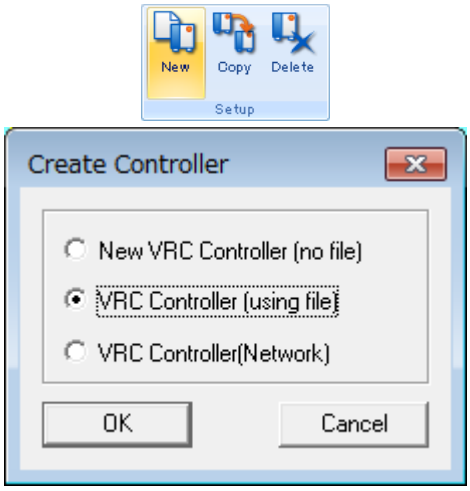
7.1.2 Create VRC Controller (using CMOS.BIN file or ALL.PRM file)

Reproduce an existing system composition in MotoSim EG-VRC using the "CMOS.BIN" file or "ALL.PRM" file saved from a real system.

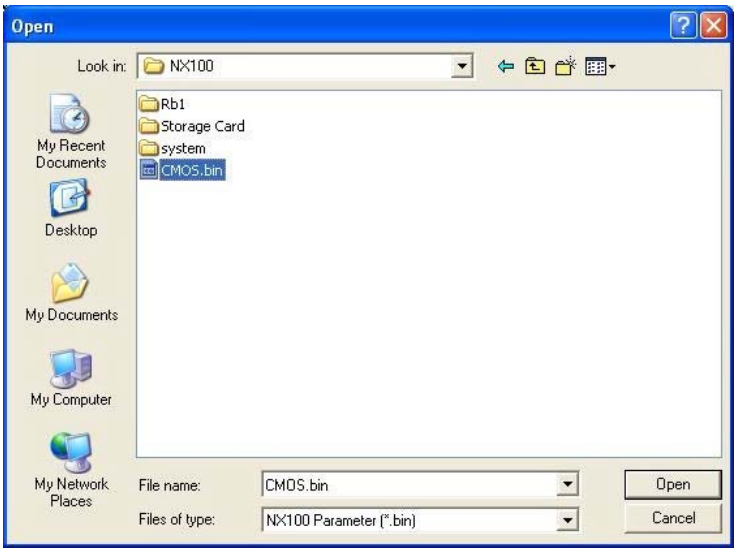
NOTE
- In regard to the FS100 controller, the "CMOS.BIN" file saved from a real controller can not be used with MotoSim EG-VRC to create the environment.
- In regard to the NX100 controller, the "ALL.PRM" file saved from a real controller cannot be used with MotoSim EG-VRC to create the environment.

Procedure

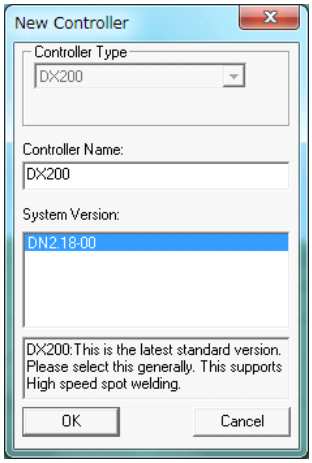
1. On the [Controller] tab, in the [Setup] group, click the [New] button. To display the “Create Controller” dialog. Select “VRC Controller (using file)” and press the [OK] button.



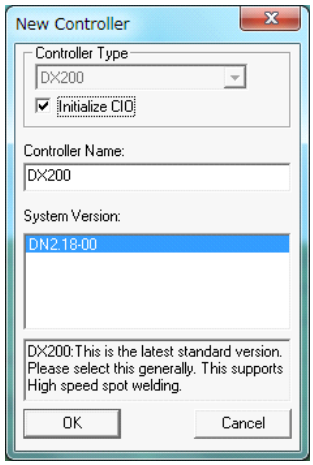
2. The “Open” dialog box appears. Select the CMOS.BIN file or “ALL.PRM” file to be used to create the controller, and click [Open].



3. The "New Controller" dialog box appears. If desired you may change the default name for the controller. Select the system version from the list below that corresponds to the version of "CMOS.BIN" or "ALL.PRM" selected in step 2. If you do not want to initialize the CIO while "CMOS.BIN" is selected, uncheck "Initialize CIO". When the kind of controller corresponding to "CMOS.BIN" or "ALL.PRM" cannot be detected automatically, the controller type can be selected. Please select the controller type.



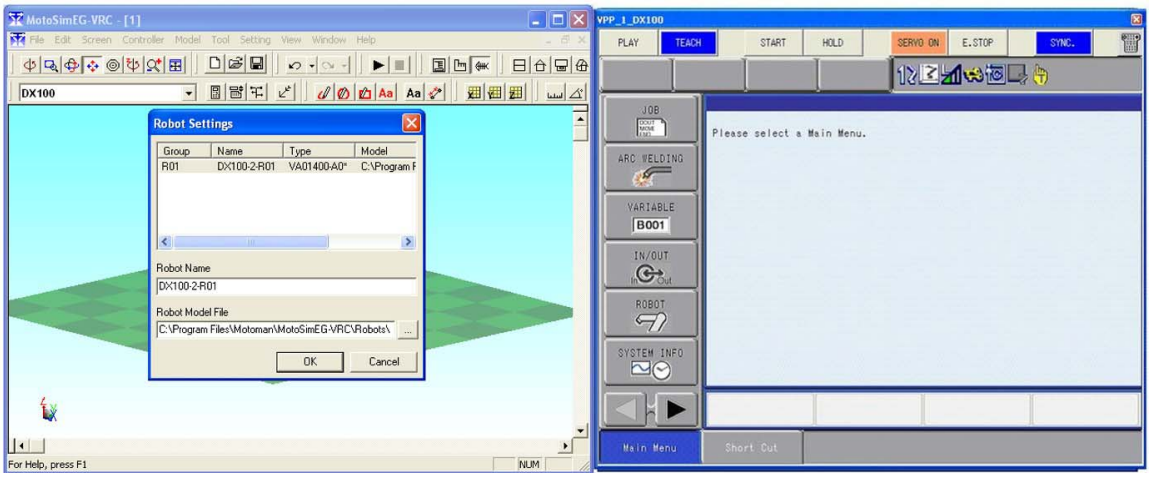
ALL.PRM is selected



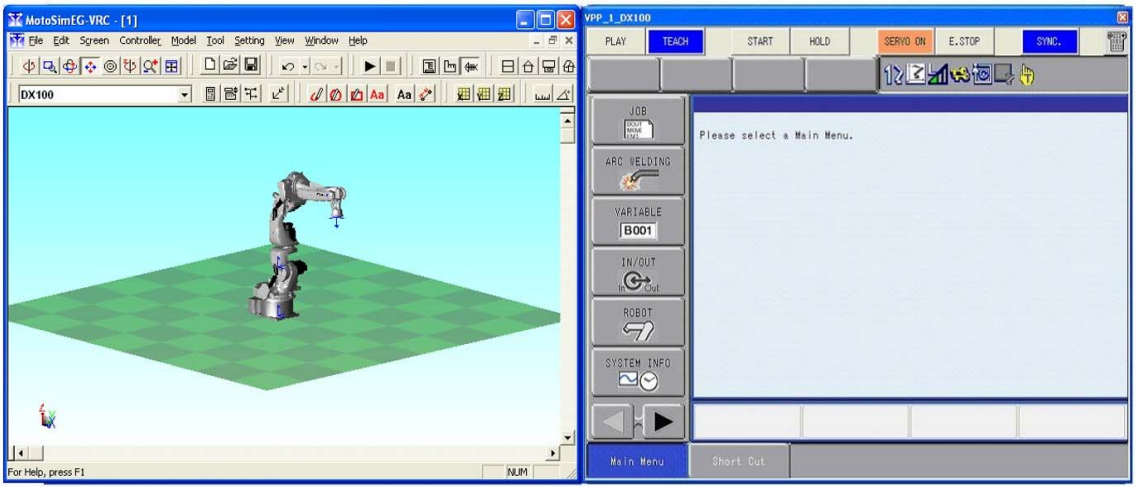
CMOS.BIN is selected

NOTE When ECD80D-A00 (NX100) is registered, select the following controller certainly. That robot model is only used with the following controller system version.
[Controller Type] NX100
[System Version] NS 4.69-A5

4. The Virtual Pendant will close and reboot in normal mode. (This may take a few moments.) The “Robot Setting” dialog will display. A default robot name and model file should be pre-entered. If required, enter a name for the robot and select a robot model file corresponding to the robot type. (In the example below, the robot model is “VA01400-A00” the corresponding model is “VA01400-A00.mdl”.) Robot models are found in the “Robot” folder under MotoSimEG-VRC install folder. Click the [OK] button.



5. The robot will display with the selected model file.

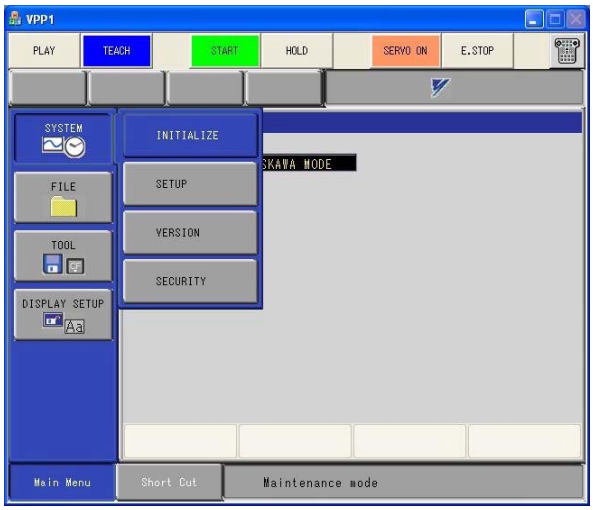


7.1.3 Initializing the Controller (YRC1000, YRC1000micro, DX200, DX100, NX100)

Using the virtual pendant in maintenance mode, the system of controller (language, robot, application…) can be set.

Procedure

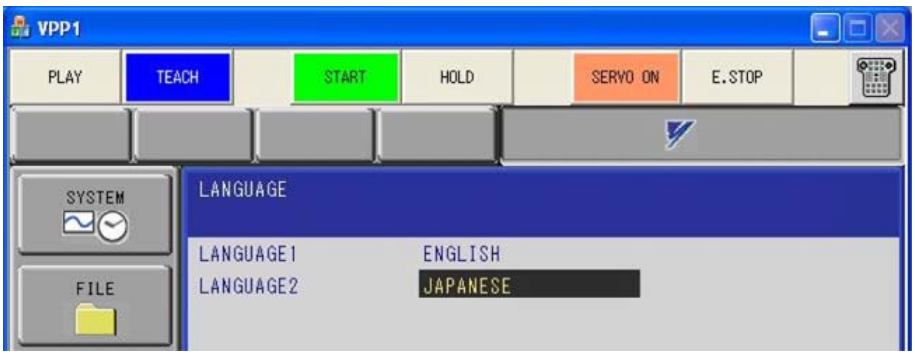
1. Select {SYSTEM} - {INITIALIZE} from the main menu.



NOTE A series of configuration screen will display to configure the controller. Press [ENTER] to go to the next screen. Press the [Esc] key on the keyboard or [CANCEL] on the pendant keypad to go back to the previous screen.

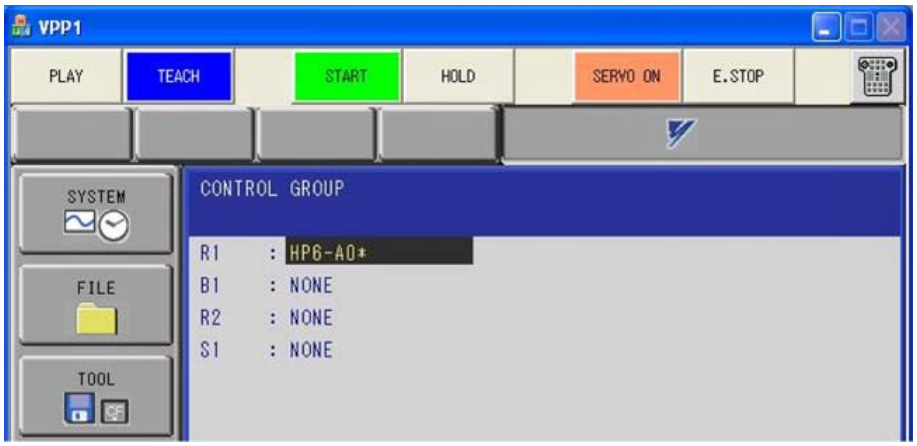
NOTE To change a field, move the cursor over that field with the arrow keys and then select it by pressing the [Space] key on the keyboard or by clicking the [Select] button on the pendant keypad. Depending on the field, either select a value from the list of choices; or enter the required value and press [ENTER] to register the value.

2. In the “LANGUAGE” screen, select a language for LANGUAGE1 and LANGUAGE2.



NOTE The Virtual Pendant interface can change between the set languages by pressing the [SHIFT] key on the keyboard and clicking the [AREA] key on the pendant keypad.

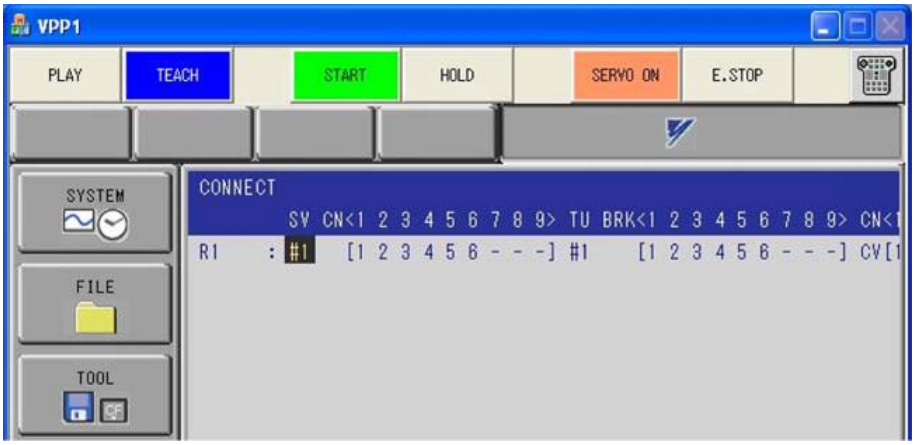
3. In the “CONTROL GROUP” screen, define the control groups by selecting the manipulator connecter to the each group. “R” groups are for robot, “B” groups are for robot base station and “S” groups are for external axis devices. When the selection is complet, press [ENTER] to go to the next screen.



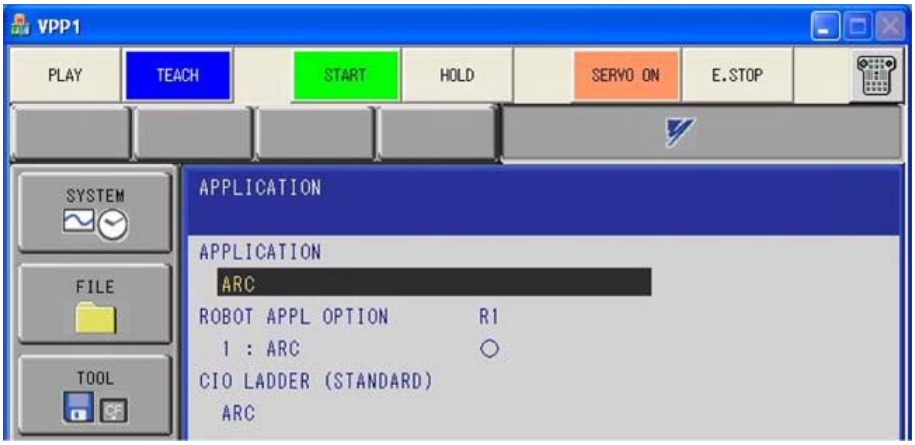
NOTE

- The robot models supported by MotoSim EG-VRC are those displayed on the virtual pendant for the controller version selected at the time of creation. Please refer to section " 15.9 List of Manipulator Models and Offset Values Supported by MotoSim EG-VRC " for the list of available model. However, for similar robot model that only have differences in the details of their shape, it maybe possible to do simulation using the standard robot model (model ending with A0*).
- When ECD80D-A00 (NX100) is registered, select the following controller certainly. That robot model is only used with the following controller system version.
  [Controller Type] NX100
  [System Version] NS 4.69-A5

4. The “CONNECT” screen doesn’t need any change. Press [ENTER] to go to the next screen.



5. In the “APPLICATION” screen, select the application that correspond best to what the robot will be doing.



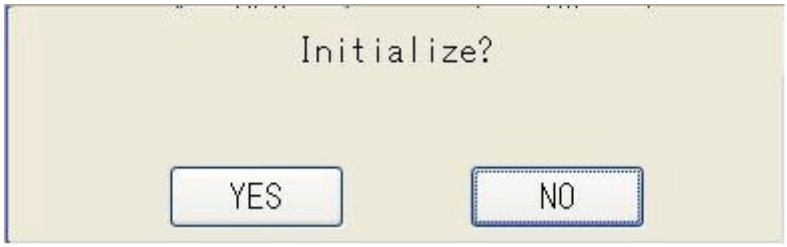
6. The “OPTION BOARD” screen doesn’t need any change. Press [ENTER] to go to the next screen.

7. The “I/O MODULE” screen is only for confirmation and I/O modules selection cannot be changed at this step. Press [ENTER] twice to go to the next screen. To add I/O modules please refer to section " 13.3 Collision Detection Setting ".

8. The “CMOS MEMORY” screen cannot be modified. Press [ENTER] to go to the next screen.

9. The “DATE/TIME SET” screen cannot be modified. Press [ENTER] to go to the next screen.

10. A confirmation dialog box will appear, select [YES] to start initializing the CMOS data. Then, the message "Initializing system data. Don't turn the power off." is displayed at the bottom of the virtual pendant. Don't operate anything while that message is displayed. If the initialization is finished, the message is changed to "Maintenance Mode".

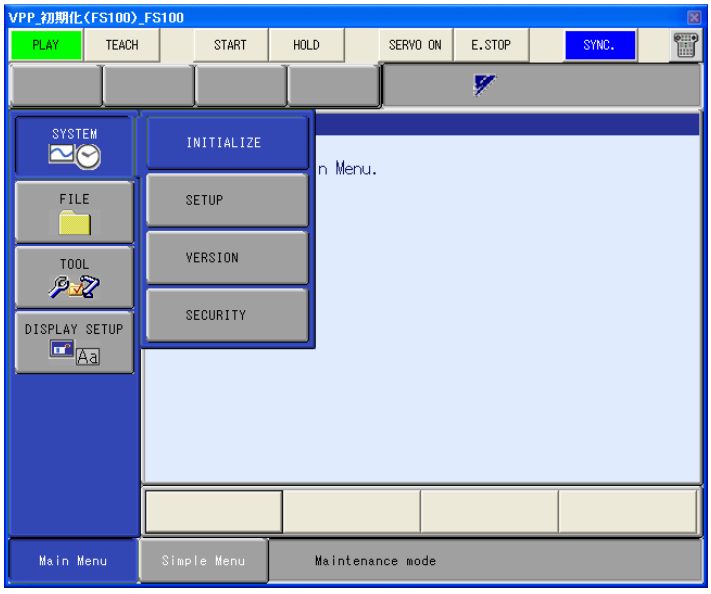


7.1.4 Initializing the Controller (FS100)

Using the virtual pendant in maintenance mode, the system of controller (language, robot, application…) can be set.

Procedure

1. Select {SYSTEM} - {INITIALIZE} from the main menu.



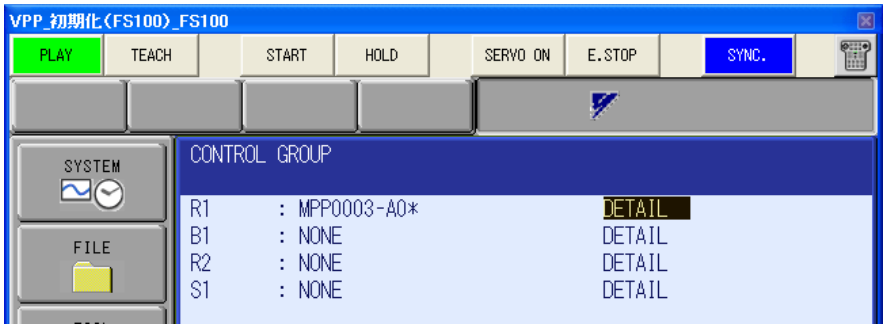
NOTE A series of configuration screen will display to configure the controller. Press [ENTER] to go to the next screen. Press the [Esc] key on the keyboard or [CANCEL] on the pendant keypad to go back to the previous screen.

NOTE To change a field, move the cursor over that field with the arrow keys and then select it by pressing the [Space] key on the keyboard or by clicking the [Select] button on the pendant keypad. Depending on the field, either select a value from the list of choices; or enter the required value and press [ENTER] to register the value.

2. In the "LANGUAGE" screen, select a language for LANGUAGE1 and LANGUAGE2. When the selection is completed, press [ENTER] to go to the next screen.

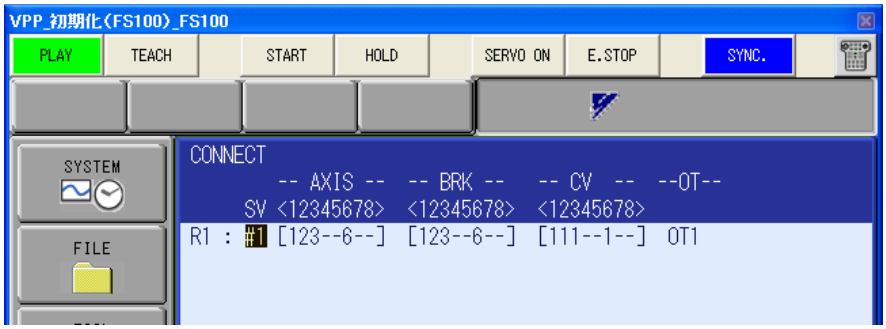
NOTE The Virtual Pendant interface can change between the set languages by pressing the [SHIFT] key on the keyboard and clicking the [AREA] key on the pendant keypad.

3. In the "CONTROL GROUP" screen, define the control groups by selecting the manipulator connecter to the each group. "R" groups are for robot, "B" groups are for robot base station and "S" groups are for external axis devices. When the selection is completed, press [ENTER] to go to the next screen.

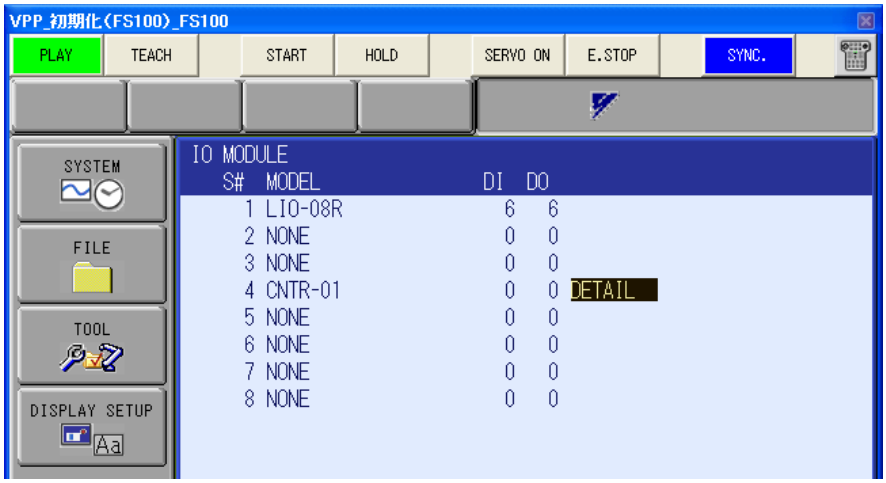


NOTE The robot models supported by MotoSim EG-VRC are those displayed on the virtual pendant for the controller version selected at the time of creation. Please refer to section " 15.9 List of Manipulator Models and Offset Values Supported by MotoSim EG-VRC " for the list of available model. However, for similar robot model that only have differences in the details of their shape, it maybe possible to do simulation using the standard robot model (model ending with A0*).

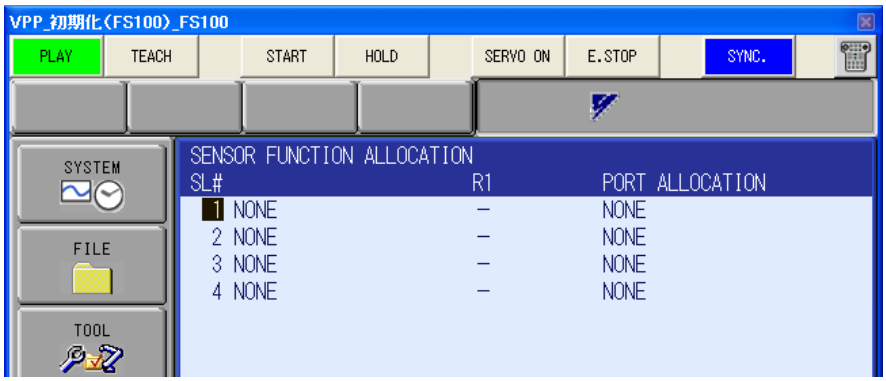
4. The "CONNECT" screen doesn't need any change. Press [ENTER] to go to the next screen.



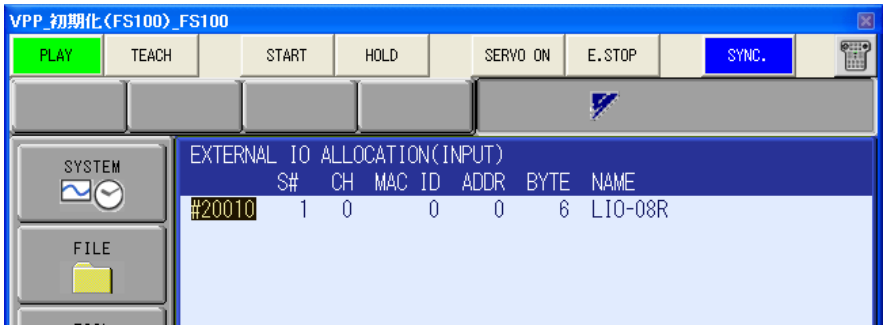
5. The "IO MODULE" screen doesn't need any change. Press [ENTER] to go to the next screen.



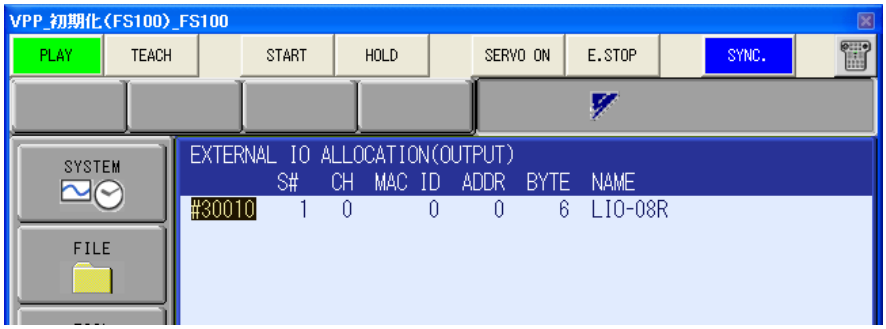
6. The "SENSOR FUNCTION ALLOCATION" screen doesn't need any change. Press [ENTER] to go to the next screen.



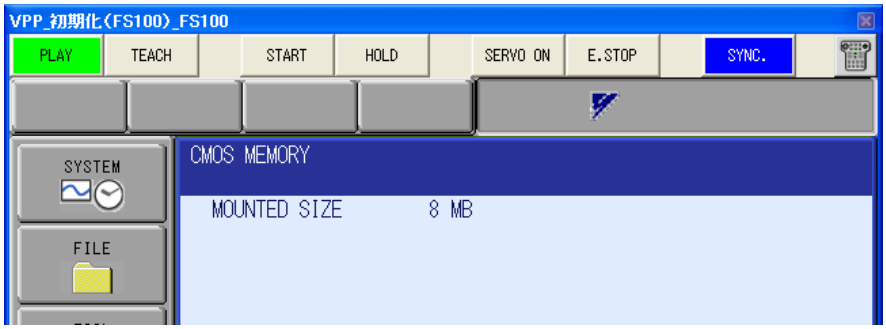
7. The "EXTERNAL IO ALLOCATION(INPUT)" screen doesn't need any change. Press [ENTER] to go to the next screen.



8. The "EXTERNAL IO ALLOCATION(OUTPUT)" screen doesn't need any change. Press [ENTER] to go to the next screen.

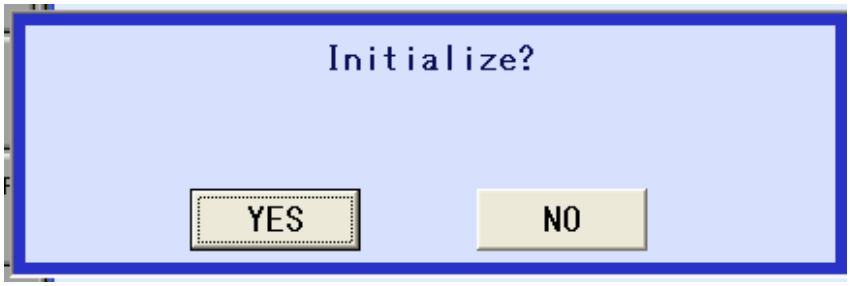


9. The "CMOS MEMORY" screen doesn't need any change. Press [ENTER] to go to the next screen.



10. The "DATE/TIME SET" screen doesn't need any change. Press [ENTER] to go to the next screen.

11. A confirmation dialog box will appear, select [YES] to start initializing the CMOS data. Then, the message "Initializing system data. Don't turn the power off." is displayed at the bottom of the virtual pendant. Don't operate anything while that message is displayed. If the initialization is finished, the message is changed to "Maintenance Mode"



7.1.5 Defining the Robot Home Position

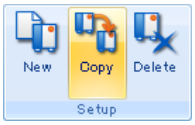
When initialized the robot controller, MotoSim EG-VRC set the absolute data automatically. So absolute setting is not needed in MotoSim EG-VRC. (This setting should be needed in real robot.)

7.2 Copying a Controller

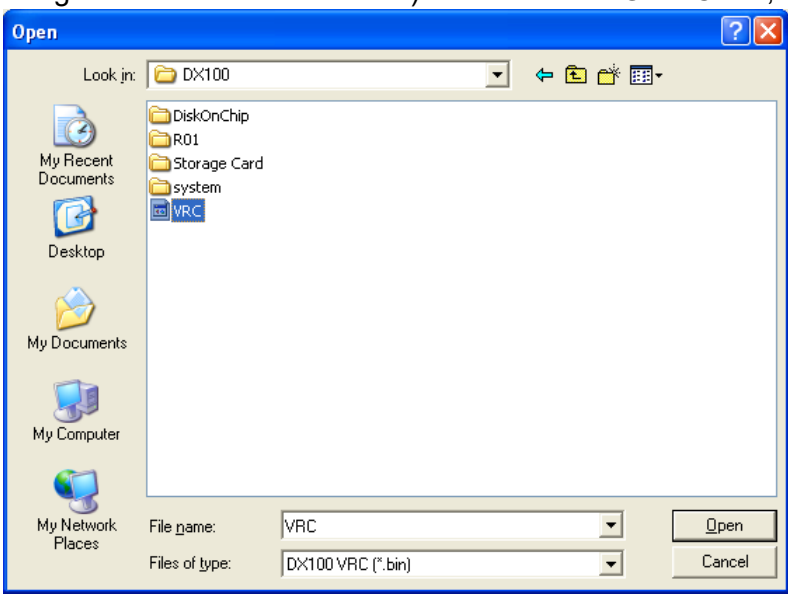
A controller already define in a MotoSimEG-VRC cell can be copied.

Procedure

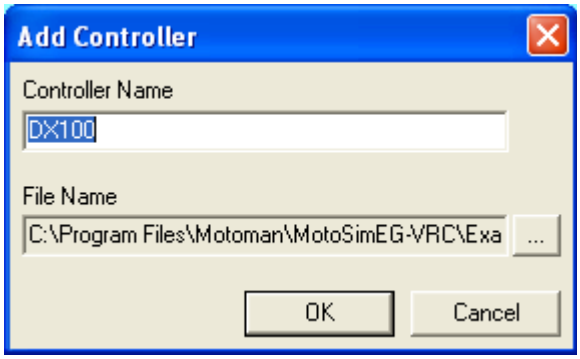
1. On the [Controller] tab, in the [Setup] group, click the [Copy] button.



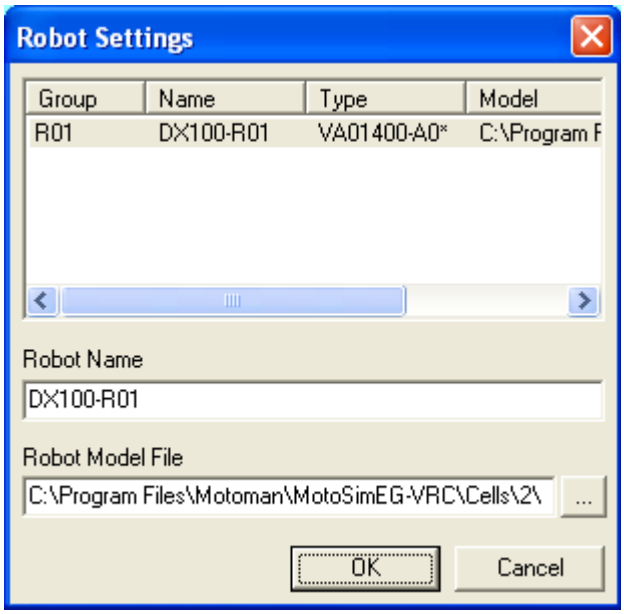
2. The “Open” dialog box appears. Select the VRC.BIN file located in the controller folder (folder bearing the name of the controller) of a MotoSimEG-VRC cell, and click [Open].



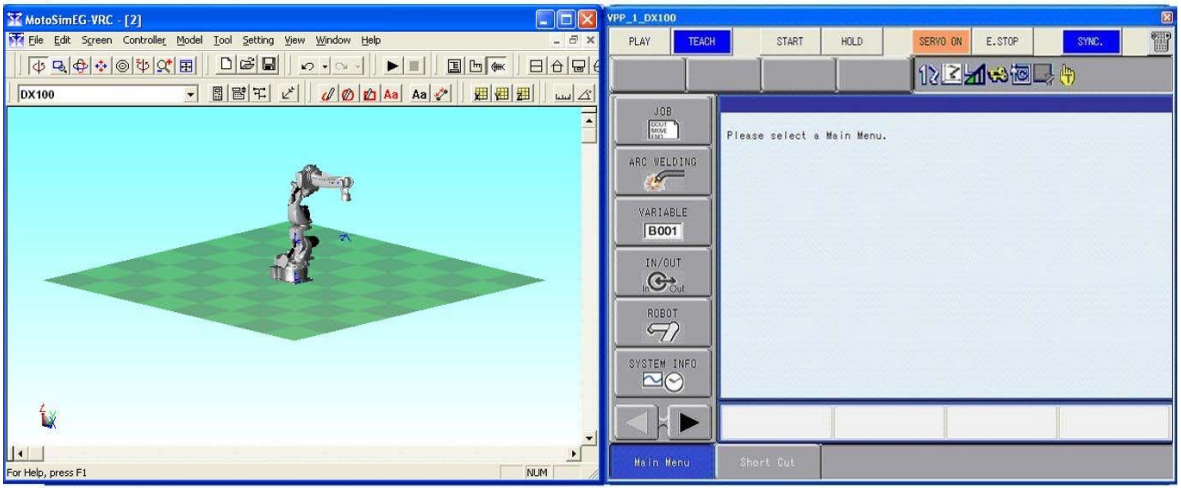
3. The “Add Controller” dialog box appears. Enter a name for the controller. The “File Name” field already contains the path to the VRC.BIN selected in step 2 above. Click [OK]. The controller and robot files will be copied over to the current cell folder and the controller will boot in normal mode. This may take a few moments.



4. When the controller has completed its boot up, the “Robot Setting” dialog will display. Default robot name and model file should be pre-entered. If required, they may be modified. Click the [OK] button.



5. The robot will display with the selected model file.



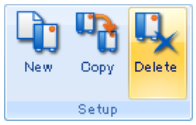
NOTE If you copy the controller from within the same cell, the tool model is also copied.

7.3 Deleting a Controller

To delete the controller and its associated robots from a cell, follow the procedure below.

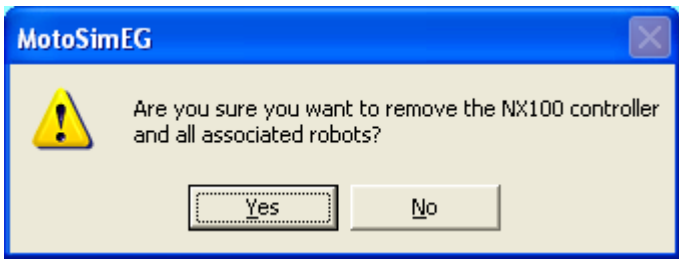
Procedure

1. On the [Controller] tab, in the [Setup] group, click the [Delete] button.



2. The “Select Controller/Robot” dialog box appears. Select the controller to be deleted, then click on [OK].

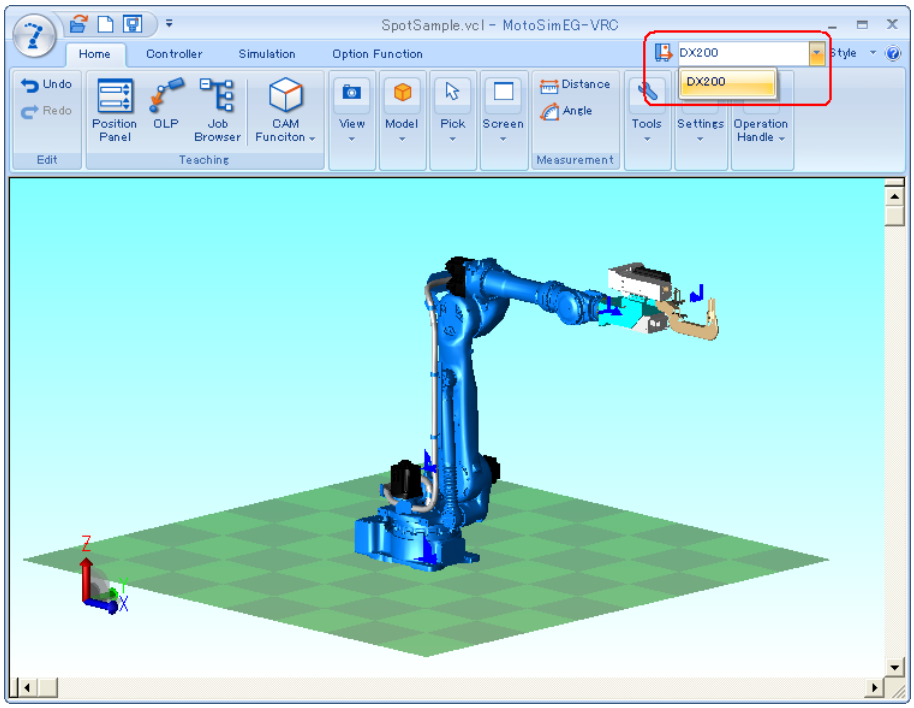
3. The confirmation message below will appear. Select [Yes] to remove the controller from the cell.



NOTE The controller is removed from the cell but its corresponding folder and files are not deleted from the cell folder.
A delete controller may be added later on by using the “Copy Controller...” menu. (For details refer to section " 7.2 Copying a Controller ")

7.4 Select Controller

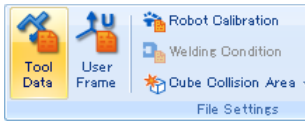
A cell always have an active controller .
Simply click on the down arrow to display the list of controllers and select the desired controller. (See figure below)



7.5 Controller Setting

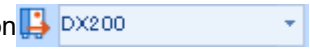
7.5.1 Tool Editor

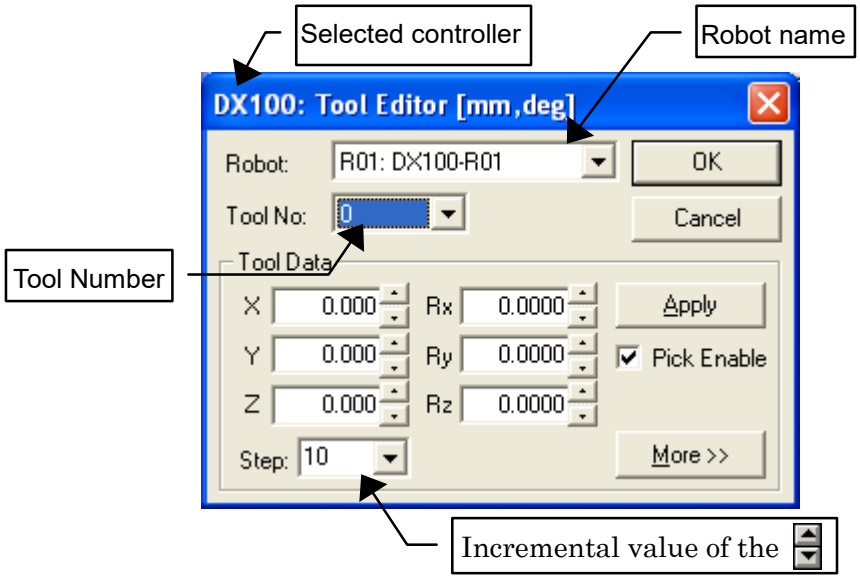
The Tool Editor is used to select the active tool and to modify the tool data.
On the [Controller] tab, in the [File Settings] group, click the [Tool Data] button, the [Tool Editor] dialog appear.



Select the tool number, and then, if required, modify the tool data by using the spin button at the side of each edit box or entering a value directly. The tool data can also be changed by checking the [Pick Enable] check box and clicking in the cell window.

NOTE

- In a cell with multiple controllers, it is necessary to select the controller to edit with the ribbon  before opening the Tool Editor dialog box.
- In order to change the Tool No., the controller must be set to operate with multiple tools. Use the following parameter to activate the multiple tool function on the controller:
  YRC1000, YRC1000micro, DX200, DX100, FS100
  S2C431: Tool number change (0: Single tool, 1: Multiple tool)
  NX100 S2C333: Tool number change (0: Single tool, 1: Multiple tool)
  For more detail please refer to the "Tool Coordinates" section of the controller "Operator's Manual".
- To change the tool selection and tool data using the virtual pendant, please refer to the "Tool Coordinates" section of the controller "Operator's Manual".

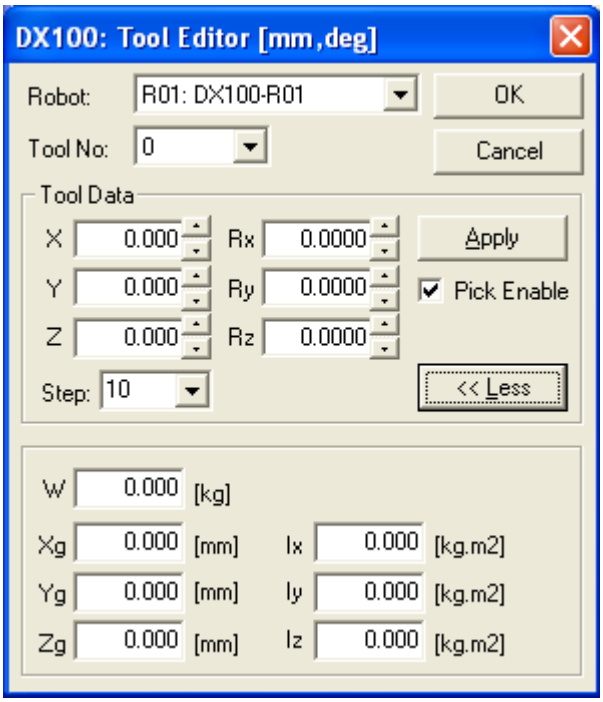


Tool Editor Dialog Box

Item	Description
[OK] button	Closes the dialog box after modifying the tool data.
[Cancel] button	Closes the dialog box without modifying the data to the new values.
[Apply] button	Modifies the tool data; does not close the dialog box.
[Pick Enable] check box	Enables mouse picking operation to move the tool center point to the clicked position. When clicking in an area the selected point depends on the current "Pick Mode" and "Pick Object" settings. Please refer to " 6.4 Pick Settings " for details. Pressing the [Shift] key enables or disables the [Active] checkbox.
[Exp >>] button	Displays tool load information, enabling data setting.

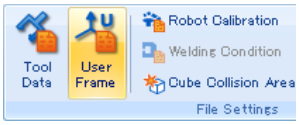
■ Setting the Tool Load Information

Tool Editor dialog box extends to show the tool load information as follows when [Exp. >>] button is selected.

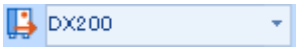


7.5.2 User Frame

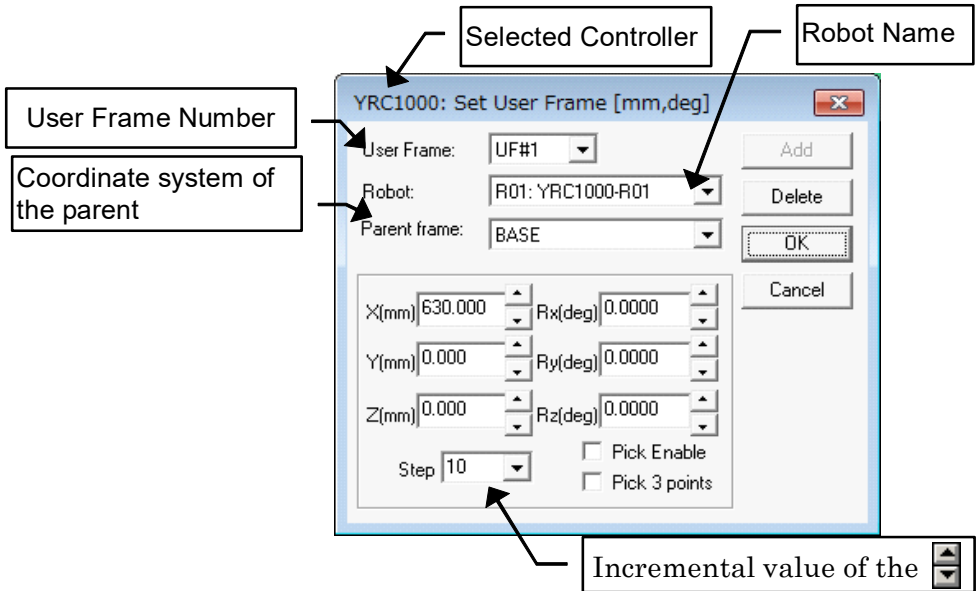
The Set User Frame dialog box is used define user coordinate system or delete existing ones. On the [Controller] tab, in the [File Settings] group, click the [User Frame] button, the [Set User Frame] dialog appear.



NOTE

- In a cell with multiple controllers, it is necessary to select the controller to edit with the ribbon  before opening the Set User Frame dialog box.
- To change the user coordinate selection and the coordinate system definition using the virtual pendant, please refer to the "User Coordinates" section of the controller "Operator's Manual".
- Master tool user coordinate can be edited the values only. New master tool user coordinate can not be created in this dialog. When select the existing master tool user coordinate, robot name is gray out.
- The user coordinate made by this function is for only simulator. Use the user coordinate made by virtual pendant for real robot.
- The error 3140 occurs when loading to controller for user coordinate format change on DX200. In this case, delete the below two lines in the "uframe.cnd" file, and load to the controller.

  ///BASICFRM
  ///BASEP



Set User Frame Dialog Box

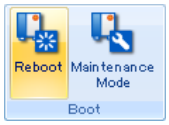
Item	Description
Parent frame display box	Displayed only with a controller after YRC1000, YRC1000micro. The user coordinate system is made on the basis of the coordinate system of the parent. The selectable coordinate system is only [BASE coordinate system] and [USER coordinate system]. The parent-child relation of the USER coordinate system is limited by two levels.
[Add] button	Create a coordinate system for the selected user frame number.
[Delete] button	Delete the coordinate system of the selected user frame number.
[Pick Enable] check box	Enables mouse picking operation to move the user frame. When clicking in an area the selected point depends on the current "Pick Mode" and "Pick Object" settings. Please refer to " 6.4 Pick Settings " for details. Pressing the [Shift] key disables, enables, and 3 point the [Active] checkbox.
[Pick 3 Points] check box	Enables 3 points picking operation to move the user frame. When clicking in an area the selected point depends on the current "Pick Mode" and "Pick Object" settings. Please refer to " 6.4 Pick Settings " for details. Pressing the [Shift] key disables, [Pick Enable] checkbox, enables and [Pick 3 points] checkbox.
[OK] button	Closes the dialog box after confirming the overwrite of user frame.
[Cancel] button	Closes the dialog box without modifying the data to the new values.

Procedure

1. Select the user frame number to be edited with the top left combobox.
2. If the selected UF#2 doesn't already exist, press to the [Add] button.
3. Check the [Pick Enable] or [Pick 3 points] check box, and then left-click with the mouse on the cell window to move the user frame.
   - [Pick Enable]
     Check the [Pick Enable] checkbox, and then left-click with the mouse on the cell window to move the user frame to the clicked position.
   - [Pick 3 points]
     Check the [Pick 3 points] checkbox, and then left-click with the mouse on the cell window to move the user frame to the clicked position. Next, left-click with the mouse on the cell window to define the X-axis direction. Finally, left-click with the mouse on the cell window to define the XY-plane. Then the user frame is shown.
4. If necessary, set the axis values to move the user frame.
5. Press [OK] to save the user frame settings.

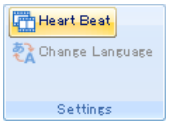
7.5.3 Reboot Controller

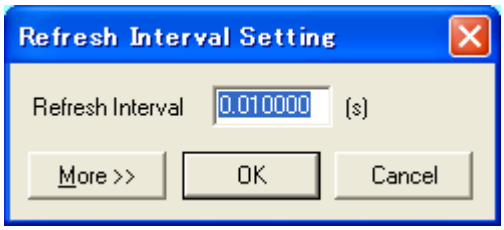
Some operation perform in the Virtual Pendant such as parameter changes may require to reboot the controller in order for the change to be affective.
On the [Controller] tab, in the [Boot] group, click the [Reboot] button,The controller can be rebooted.



7.5.4 Refresh Interval

The re-drawing interval at the playback is set every second (s).
During playback, the drawing time interval can be set in the “Refresh Interval” dialog box.
On the [Home] tab, in the [Settings] group, click the [Heart Beat] button,the [Refresh Interval] dialog appears.
The VRC sends position data to MotoSimEG-VRC for every segment (usually between 10 and 20 milliseconds). For animation purpose, the screen doesn’t need to be refreshed so quickly. The refresh interval can be adjusted to optimize the playback visualization according to a specific computer capability.





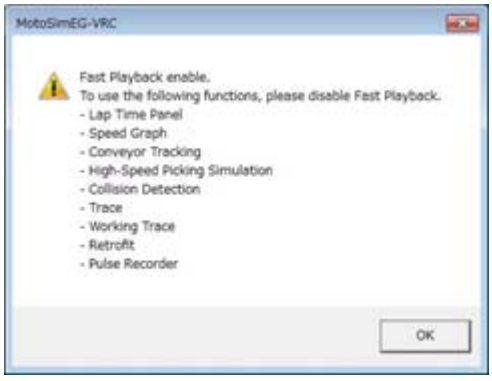
■ Setting of high-speed playback function

When [More >>] button is pushed, the high-speed playback set up information is displayed.
The playback can be done at high speed by setting the high-speed playback function.

NOTE

- The high-speed playback function is a function sped up by omitting the segment data. The effect might not become visible according to a set value at drawing intervals and computers that use it.
- Please do not use this function when you want to check the movement of every one segment on the pulse record.

Refresh Interval Setting Dialog Box

Item	Description
[Enable Fast Playback] check box	The high-speed playback function is made effective. When you press OK with the checked, the following message box will be displayed. 
[Subject Pass]	The section where the high-speed playback function is made effective is set. All : The function is made effective in all sections. Welding Pass : The function is made effective while welding (ARCON-ARCOF section).
[Speed]	The degree at the speed of the high-speed playback function is set by five stages.

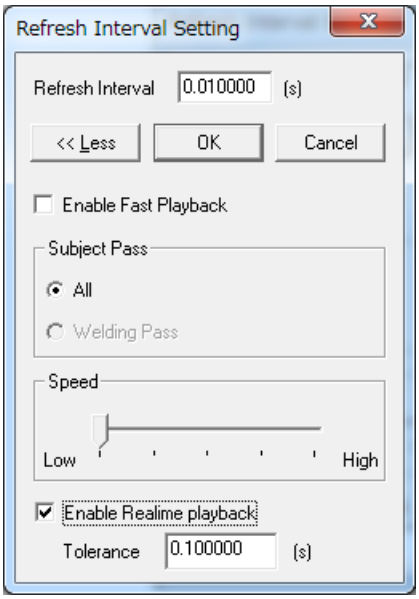
■ Setting of real time playback function

When [More>>] button is pushed, the real time playback set up information is displayed.

The playback can be done at real time by setting the real time playback function.

NOTE

- This function is to simulate the segment processing of controllers in real time.
  Usually, there is a difference in the actual time it takes to play back simulation by PC performance.
  When real time playback enabled, playback is performed so as to coincide with the real time.
- When used with a heavy load function (e.g. interference checking or trace display), segment processing can not run in real time, and playback might be interrupted. In that case, disable the high-load function, or increase the setting of tolerance.
- Real time playback function and high-speed playback function can not be used at the same time.



Refresh Interval Setting Dialog Box

Item	Description
Enable Realtime playback	The real time playback function is made effective.
Tolerance	Sets the maximum allowable error between the actual time and playback time during playback. If the playback is delayed more than the set value, playback will be interrupted.

7.5.5 Servo Emulation

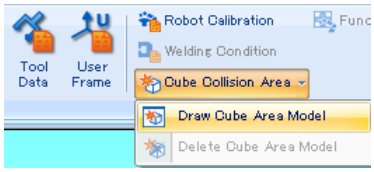
To playback without considering the lag of servo, On the [Simulation] tab, in the [Playback] group, click the [Servo Emulation] button.

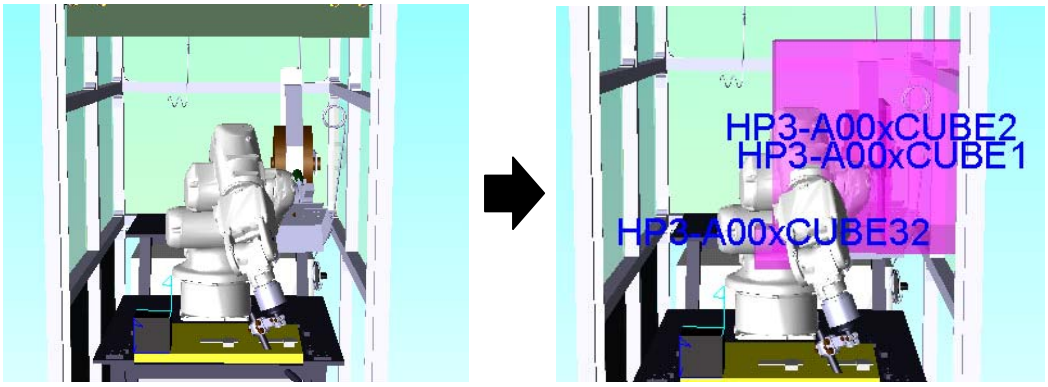
7.5.6 Cube Interference Area

Interference area can be define on the controller to determine if a robot is in a given cube or prevent the robot to enter the defined area.

■ Displaying the Cube Interference Area

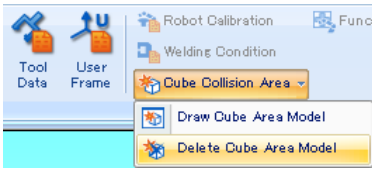
On the [Controller] tab, in the [File Settings] group, click the [Cube Interference Area] button and select [Draw Cube Area Model] , the defined interference cubes display.





■ Deleting the Cube Interference Area

On the [Controller] tab, in the [File Settings] group, click the [Cube Interference Area] button and select [Delete Cube Area Model] , the defined interference cubes display.
This will only delete the models, the cube area definition in the controller will not be affected.



■ Setting the Cube Interference Area

The cube interference areas can be defined by using the Virtual Pendant. Please refer to the “INSTRUCTIONS” of the controller for the procedure.

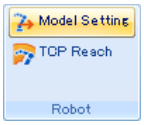
NOTE

If the cube areas are already displayed and the cube definitions are changed, the cube model in MotoSimEG-VRC will not automatically be updated.
After modifying the cubes with the Virtual Pendant, the {Cube Area Update & Display} menu need to be selected in order to update the MotoSimEG-VRC display.

7.6 Robot Settings

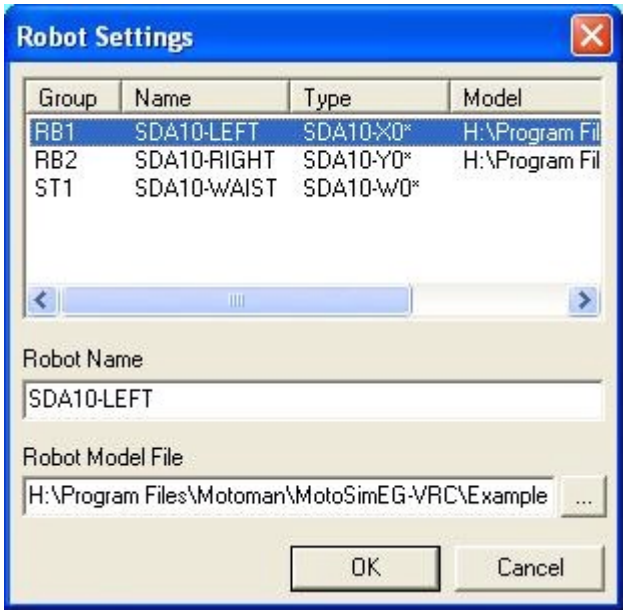
7.6.1 Robot Property

The “Robot Property” diaog can be used to change the robots name and their model files. On the [Controller] tab, in the [Robot] group, click the [Model Setting] button, the [Robot Settings] dialog appears.



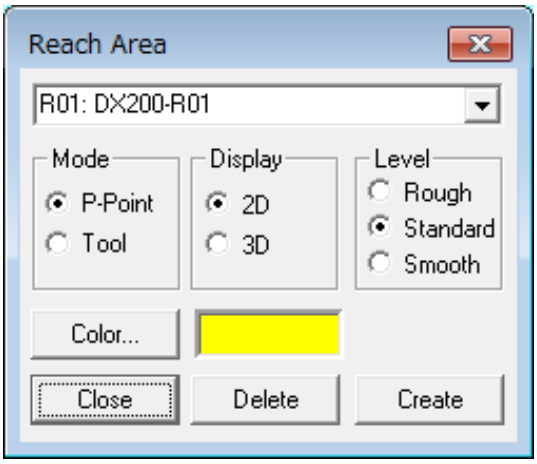
Procedure

1. Select a robot from the robot list. Its name and model file will display in the corresponding field in the section below the robot list.
2. Edit the robot name or select a new model file.
3. If multiple changes are required, repeat the above steps. As new selections are made the data in the robot list will be updated.
4. When all the changes have been entered, press the “OK” button to apply those changes and close the “Robot Settings” dialog. Or, press “Cancel” to discard the changes.



7.6.2 Reach View

The motion range of the robot P-point (wrist rotation center) can be displayed in 2D or 3D.
To create or delete Reach View models,
On the [Controller] tab, in the [Robot] group, click the [TCP Reach] button, the [Reach Area] dialog appears.



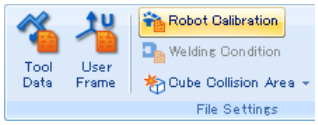
Reach Area Dialog Box

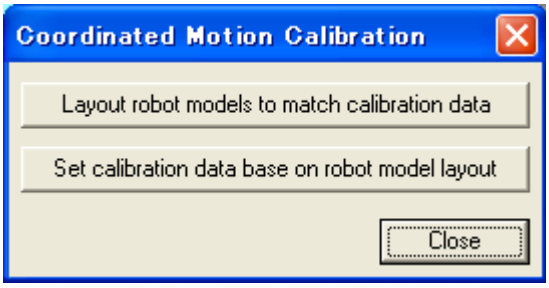
Item	Description
“Mode” section	Selects P-point or tool end as a base point of range motion. NOTE When [Tool] is selected, the motion range model is created at P-point. And displayed at a position shifted by the tool position at the time of creation.
“Disp” section	Specifies display style for range of motion. (For some robot models, 3D display is not available.) • [2D] radio button: displays range of motion in 2D style. • [3D] radio button: displays range of motion in 3D style. NOTE Motion Range can be displayed in both 2D and 3D style simultaneously: Select 2D and press the [Create] button; then select 3D, change color (optional) and press [Create] again.
“Level” section	Selects display level (rough/standard/fine) of range of motion.
[Color] button	Displays Color dialog box to specify colors.
[Delete] button	Deletes the previously created Reach View models.
[Create] button	Creates a Reach View model of the specified style representing the range of motion of the cell active robot.
[Close] button	Closes Reach Area dialog box.

7.6.3 Robot Calibration Setting

The robot calibration data define the relative position between robots and stations of a same controller. This information is necessary to use the “Coordination Motion” function of the controller. In order for MotoSimEG-VRC to properly display the coordinated motion between robots/stations, the controller calibration data and robot/station model layout must correspond to each other.

To adjust the controller calibration and robot/station model layout to correspond to each other, display the “Coordinated Motion Calibration” dialog by selecting: on the [Controller] tab, in the [File Setting] group, click the [Robot Calibration] button.





“Coordinated Motion Calibration” Dialog Box

Item	Description
Layout robot models to match calibration data	Adjusts the relative position between the robot/station models to match the calibration data of the controller. NOTE The calibration data must be define in the controller before using this function.
Set calibration data base on robot model layout	Sets the calibration data of the controller based on the relative position between the robot/station models in the MotoSimEG-VRC layout.
[Close] button	Closes the “Coordinated Motion Calibration” dialog box.

NOTE The “Calibration” menu item is only available for controller with the “Coordinated Motion” option activated. In order to activate this function,please refer to the steps to set {OPTION FUNCTION} for each controller in the section " 13.5 Dual-Arm robot Setting ".

7.7 Peripheral Equipment

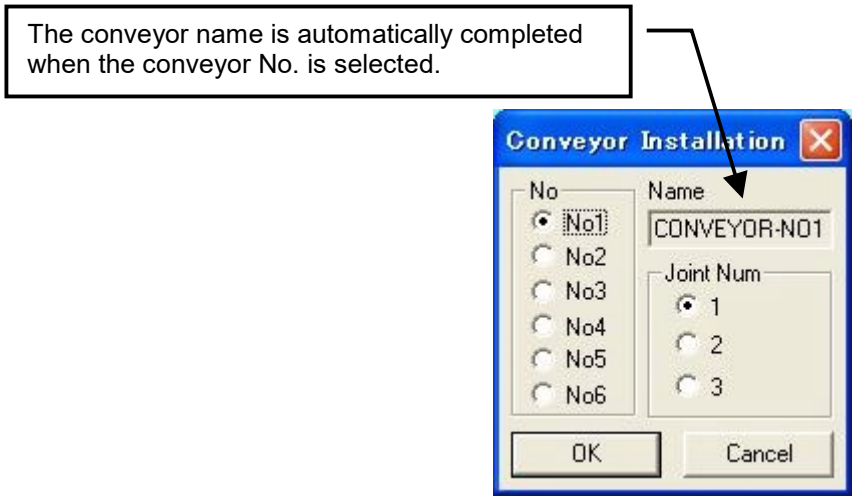
Peripheral Equipment or Device are considered as a RCS controllers. Their name appears in the Controller lists with the other controllers. They can be programmed to move in the same manner as a robot controller by creating jobs and then playing them back.
Three types of device are available: conveyor, press and gantry.

7.7.1 Adding a Conveyor

■ Adding a Conveyor

Conveyors are device that can be setup with 1 to 3 linear axis (X, Y, Z).
To add a conveyor to the cell. On the [Controller] tab, in the [External Device] group, click the [New] button, and select [Conveyor] the [Conveyor Installation] dialog appears.

NOTE Up to 6 conveyors can be added to a cell. The conveyor is registered as a controller with the name displayed in the "Name" edit box of the Conveyor Install dialog box. This name is determine by the selection of the conveyor number and cannot be changed.



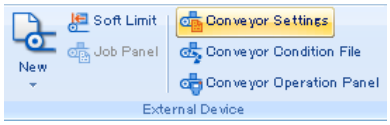
Conveyor Installation dialog box

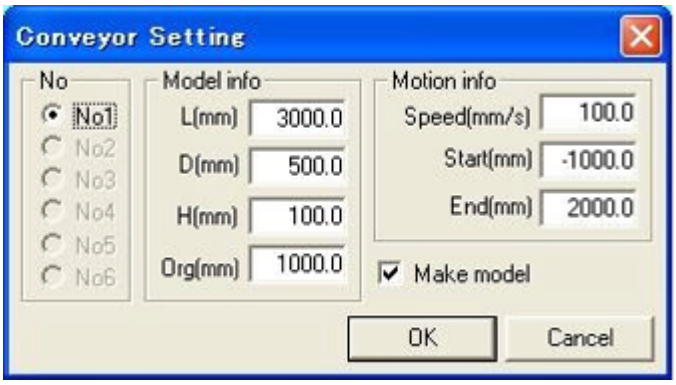
Item	Description
"No" section	Specifies the conveyor number.
"Joint Num" section	Specifies the number of axis by selecting one of the radio buttons.

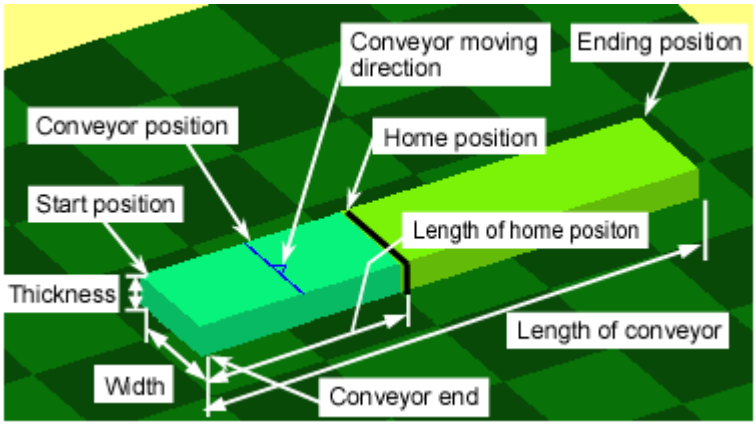
Conveyor Installation dialog box	
Item	Description
[OK] button	Adds the conveyor to the cell and then displays the “Conveyor Setting” dialog box. Refer to " 7.7.1 Adding a Conveyor " for details.

■ Conveyor Setting

Specify the dimensions, speed, and operating range of the conveyor to be registered in the Edit Conveyor Information dialog box.
This dialog is automatically displayed when a new conveyor is installed. It can also be displayed afterward to modify the conveyer settings by selecting:
On the [Controller] tab, in the [External Device] group, click the [Conveyor Setting] button.







Conveyor Setting dialog box

Item	Description
"No" section	Specifies the conveyor number to set the condition.

Conveyor Setting dialog box

<table>
<tr><th>Item</th><th>Description</th></tr>
<tr><td>"Model info" section</td><td>Specifies the dimensions of the conveyor to be registered.
<table>
<tr><td>"L(mm)" edit box</td><td>Entire length of the conveyor.</td></tr>
<tr><td>"D(mm)" edit box</td><td>Width of the conveyor.</td></tr>
<tr><td>"H(mm)" edit box</td><td>Thickness of the conveyor. (Distance from the floor to the conveyor top.)</td></tr>
<tr><td>"Org(mm)" edit box</td><td>Limit switch position for the conveyor home position. (Distance from the conveyor end.)</td></tr>
</table></td></tr>
<tr><td>"Motion info" section</td><td>Specifies the dimensions of the conveyor to be registered.
<table>
<tr><td>"Speed(mm/s)" edit box</td><td>Operation speed of the conveyor.</td></tr>
<tr><td>"Start(mm)" edit box</td><td>Start position of the conveyor operation. (Specify the distance from the home position of the conveyor.)</td></tr>
<tr><td>"End(mm)" edit box</td><td>End position of the conveyor operation. (Specify the distance from the home position of the conveyor.)</td></tr>
</table></td></tr>
<tr><td>[make model] check box</td><td>Creates a default conveyor model.</td></tr>
</table>

NOTE

- When the default conveyor model is modified, clear the [make model] check box unless the default conveyor model is to be used. If the [make model] check box is not cleared, the modification for the model becomes invalid, and the model is restored to the default model.

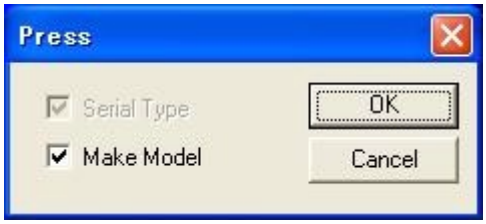
7.7.2 Adding a Press

Presses are device that have 3 linear axis (X, Y, Z). By default, only the Z-axis is enabled to move because the X and Y axes motion have been restrained by soft limits. To change the soft limit restriction please refer to the " 7.7.4 Modifying the Soft Limit of a Device " section.

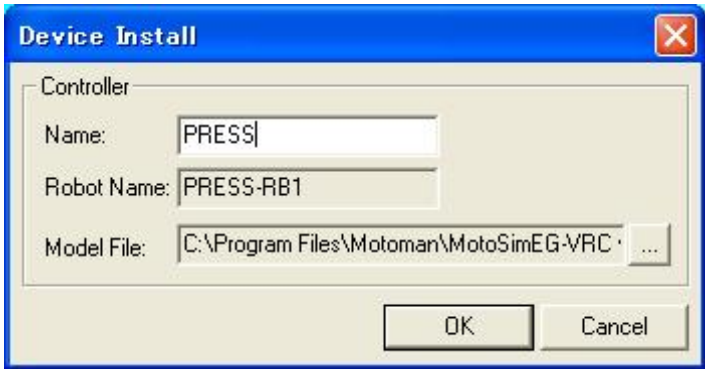
To add a press to the cell. On the [Controller] tab, in the [External Device] group, click the [New] button, and select [Press] .

Procedure

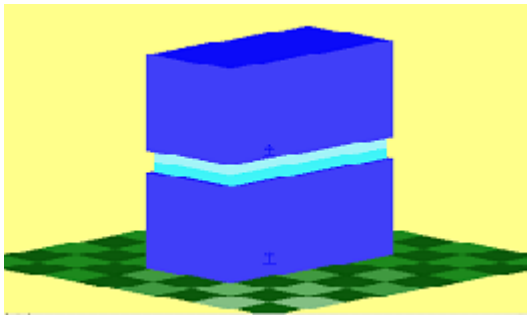
1. On the [Controller] tab, in the [External Device] group, click the [New] button, and select [Press] the [Press] dialog appears.
   Select if the default press model is to be used or not by checking or unchecking the [Make Model] check box. (The [Make Model] check box is selected by default.)
   Press the [OK] button.



2. Enter the name of the press in the “Device Install” dialog, as shown in the figure below.
   Press the [OK] button.



3. The press is added to the cell and a model is automatically generated if the [Make Model] option was checked in the “Press” dialog.



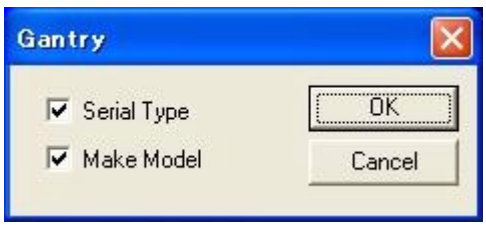
7.7.3 Adding a Gantry

A gantry device is composed of a “robot” model (RB1) with three linear axes (X, Y, Z) for the base and a “station” model (ST1) with three external rotation axes for the head (Rx, Ry, Rz). The control point (TCP) is thoroughly determined by the three rectangular linear axes, and is independent of the external axes.

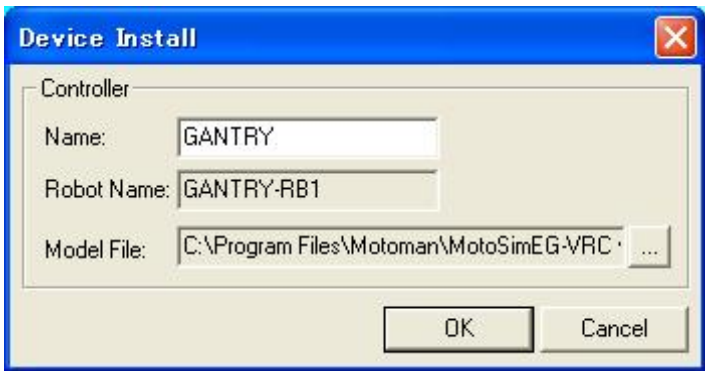
To add a gantry to the cell. On the [Controller] tab, in the [External Device] group, click the [New] button, and select [Gantry] .

Procedure

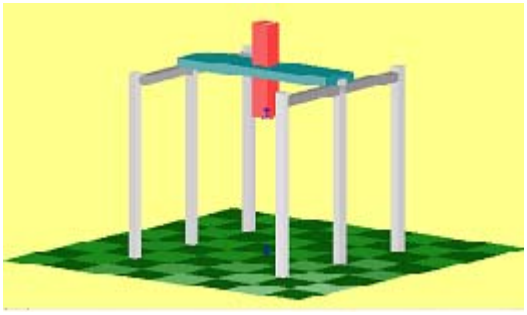
1. On the [Controller] tab, in the [External Device] group, click the [New] button, and select [Gantry] the [Gantry] dialog appears.
   Select the check box to specify if the following items in “Gantry” dialog box are required.
   [Series List] check box: Configuration of external rotation axis.
   (Checked: serial configuration; cleared: parallel configuration.)
   [Make Model] check box: Creation of a model. (Check the box if model creation is desired.)
   Note that both check boxes are selected by default.
   Press the [OK] button.



2. Enter the name of the gantry in the “Device Install” dialog, as shown in the figure below. Press the [OK] button.



3. The gantry is added to the cell and a model is automatically generated if the [Make Model] option was checked in the “Gantry” dialog.



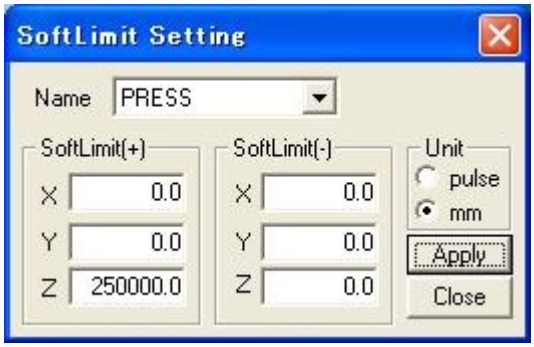
7.7.4 Modifying the Soft Limit of a Device

The motion range of device can be modified with the “Soft Limit Setting” dialog.

Procedure

1. On the [Controller] tab, in the [External Device] group, click the [Soft Limit] button, the [Soft Limit Setting] dialog appears.

2. Select the device to be edited from the “Name” combobox.
Note that when a gantry device is selected, the dialog expand to also display settings for the Rx, Ry, Rz axes.



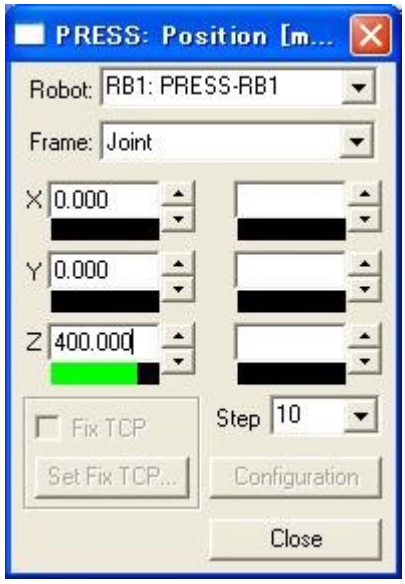
3. Modify the values as required and press the [Apply] button to make the modification.
4. Press “Close” to close the dialog.
5. For the modification to take affect, close the cell file and then open it again.

NOTE To enable the modifications, reload the cell.

7.7.5 Moving a Device

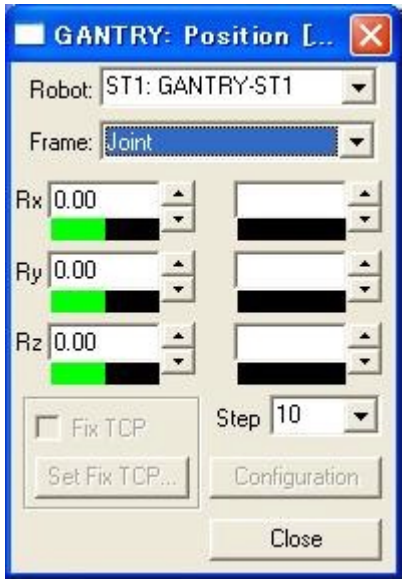
Devices can be moved by using the Position Panel.
On the [Home] tab, in the [Teaching] group, click the [Position Panel] button, the [Position Panel] dialog appears.

Unlike other robots, they can only be moved using the “Pulse” or “Joint” frame coordinate system. Using the “Joint” frame is the equivalent of a rectangular coordinate system (coordinate X, Y, Z in millimeters).



Gantry also have a station (external axes) mounted at the end of the robot TCP (X, Y, Z axes) that allows Rx, Ry and Rz rotations. To move this axis, change the selection in the robot com-

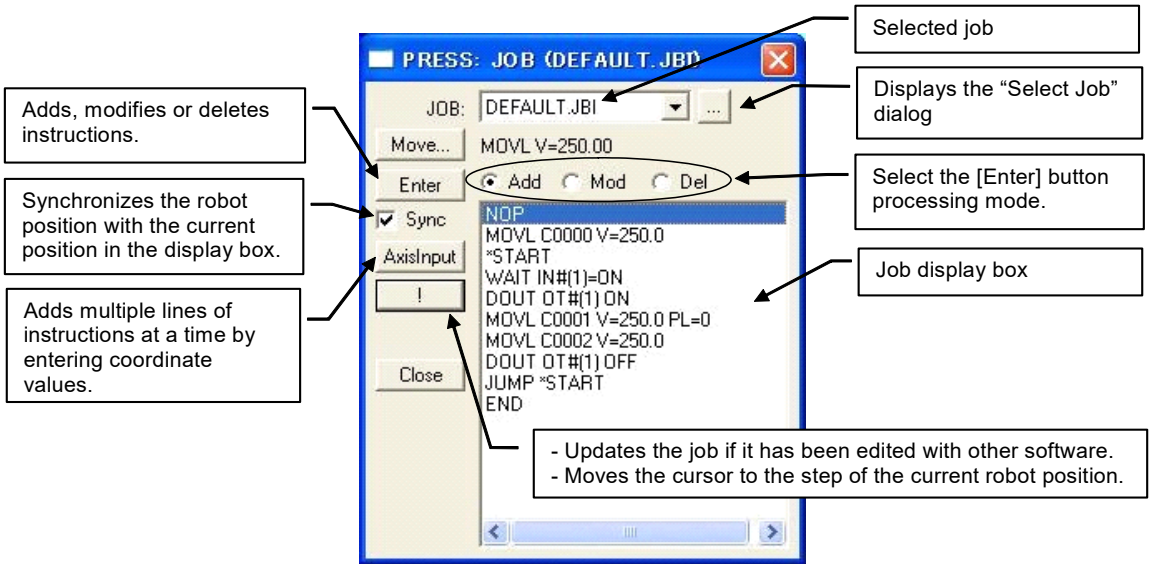
bobox to the robot name ending by “-ST1”.



For further detail on the Position Panel operation, please refer to section " 8.1 Position Panel " .

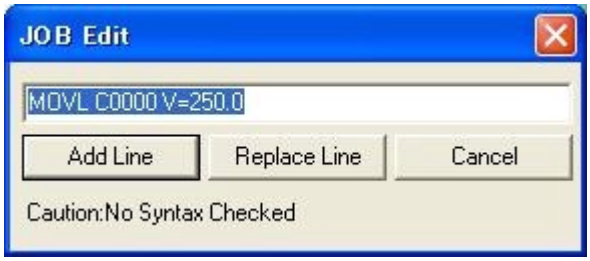
7.7.6 Programming a Device

Devices can be programmed to move in the same manner as a robot controller by creating jobs and then playing them back.
The Job panel is used to display the job and allow teaching. On the [Controller] tab, in the [External Device] group, click the [Job Panel] button, the [Job Panel] dialog appears.



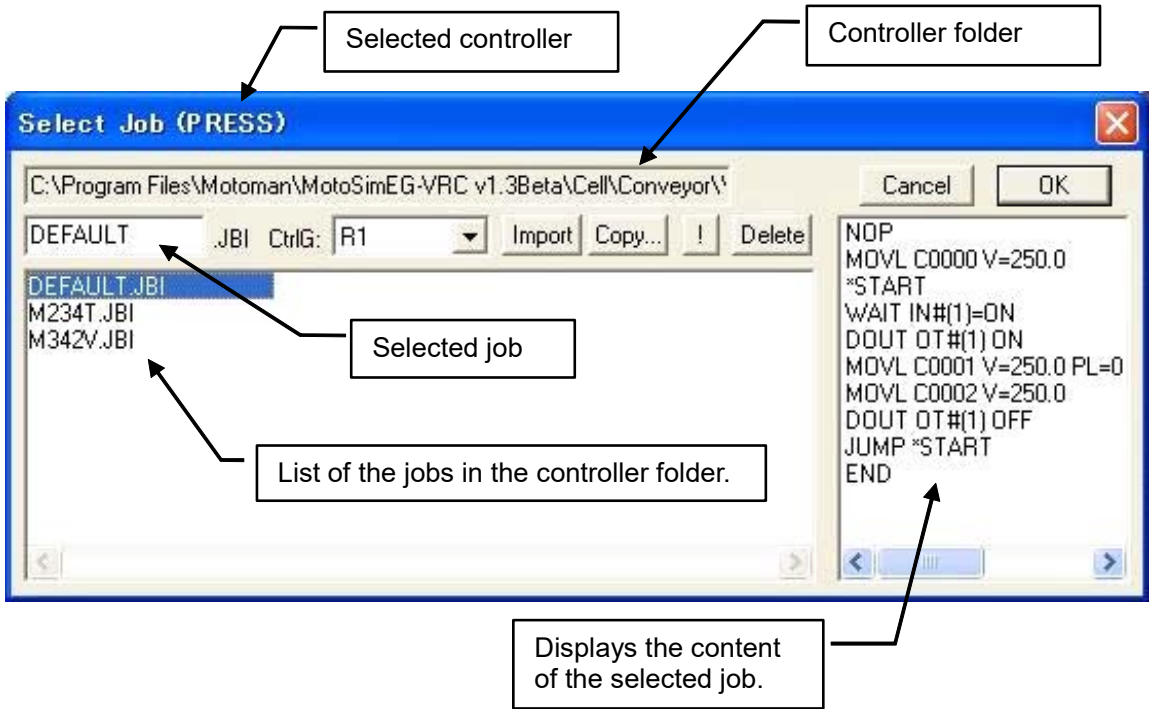
NOTE If the cell contains multiple devices and the "Multiple Controller Dialog" mode is enable, a separate Job panel can be displayed for each device in the cell. Select the device to be displayed in the controller combobox of the toolbar before displaying the Job panel.

Job Panel

Item	Description
Job selection combobox	Select the current job from the dropdown list or click on the [...] button to its right to display the “Select Job” dialog. (Refer to the " Select Job " section for details.
Job display box	The device moves to the step selected in the job display panel if the [Sync] step synchronization check box is selected. JOB Edit dialog box for job editing appears by double-clicking the selected line. JOB Edit Dialog Box: Modify the instruction in the edit box. Select either the [Add Line] or [Replace Line] button. 
[Enter] button	Executes the command selected among [Del], [Add], [Mod] radio buttons.
[MOVE...] button	Displays the Interpolation dialog box. Specify motion type, speed and position level for the playback operation, and click [OK].  NOTE To enable the modification of the motion type and speed when a teaching position is modified, select the [Allow Modif.] check box.
[Close] button	Closes the Job Panel

■ Select Job

The Select Job dialog box (see the figure below) allows to select, copy, delete the jobs. It can also import jobs registered in other cells.



Selecting a Job

Select a job from the job list, then click on [OK].

Creating a Job

Type the name of the new job in the “Selected Job” field. The job name may not exceed 8 characters and cannot contain any spaces.

Importing a Job

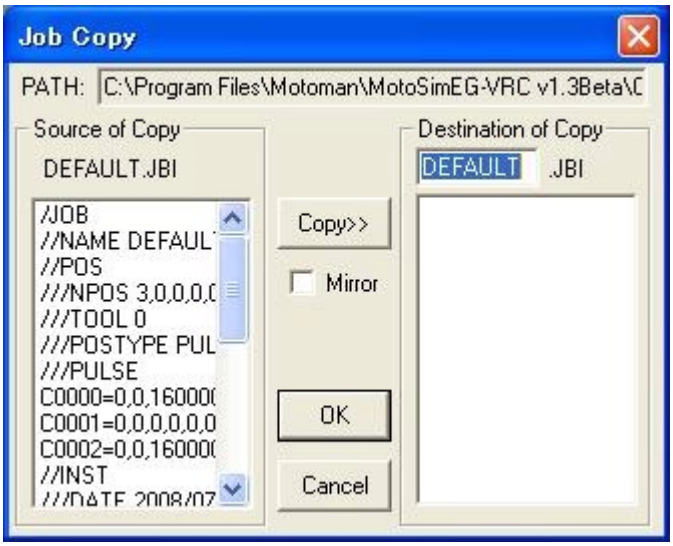
Procedure

1) Click on [Import].
2) Select a job, and click [Open].
3) Click [OK] to import the job.

Copying a Job

Procedure

1) Select a job to be copied, and click on [Copy...]: the Job Copy dialog box as shown below appears.



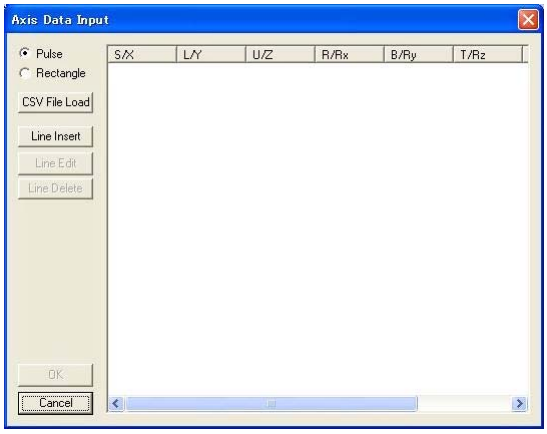
2) Enter a job name in the Destination of Copy edit box, and click on [Copy>>].
3) The job to be copied is displayed on the right; check the item, then click on [OK] to copy the job.

Deleting a Job

Select a job to be deleted from the job list in the Select dialog box, then click on [Delete].

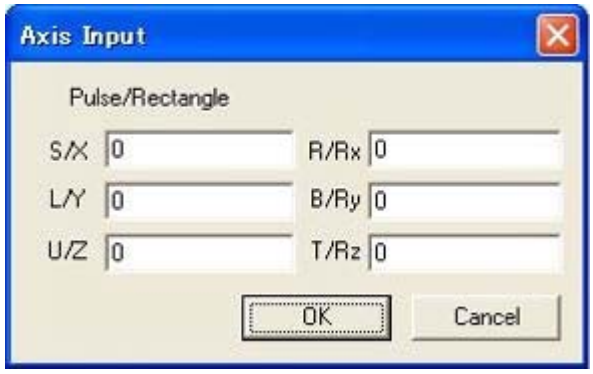
■ Input of Coordinates (AxisInput)

Press [AxisInput] in the Job Panel to display Axis Data Input dialog box shown below, and create a list by entering coordinate values (either pulse or rectangle). Instructions are added to the job for each point of the list.



Axis Data Input Dialog Box

Item	Description
[Pulse] radio button	Coordinate values are entered in pulse value.
[Rectangle] radio button	Coordinate values are entered in rectangle value.
[CSV File Load] button	Loads the coordinate values from a CSV file, and inserts the coordinate values right after the selected line in the list.
[Line Insert] button	Inserts the coordinate entered in the Axis Input dialog box right after the selected line in the list.
[Line Edit] button	Edits the selected line in the Axis Input dialog box.
[Line Delete] button	Deletes the selected line from the list. (Multiple selection is allowed.)
[OK] button	Closes the Axis Data Input dialog box; the list is added as instructions.
[Cancel] button	Closes the Axis Data Input dialog box without modifying the job.



Axis Input Dialog Box

<table>
<tr><th>Item</th><th>Description</th></tr>
<tr><td>Pulse/Rectangle</td><td>
<table>
<tr><th rowspan="2">Coordinate</th><th colspan="2">Radio Button selected in
the Axis Data Input Dialog Box</th></tr>
<tr><th>Pulse</th><th>Rectangle</th></tr>
<tr><td>S/X</td><td>S-axis</td><td>X-axis</td></tr>
<tr><td>L/Y</td><td>L-axis</td><td>Y-axis</td></tr>
<tr><td>U/Z</td><td>U-axis</td><td>Z-axis</td></tr>
<tr><td>R/Rx</td><td>R-axis</td><td>Rx-axis</td></tr>
<tr><td>B/Ry</td><td>B-axis</td><td>Ry-axis</td></tr>
<tr><td>T/RZ</td><td>T-axis</td><td>Rz-axis</td></tr>
</table>
</td></tr>
<tr><td>[OK] button</td><td>Applies the modification, and closes the Axis Input dialog box.</td></tr>
<tr><td>[Cancel] button</td><td>Closes the Axis Input dialog box without executing the modification.</td></tr>
</table>

Procedure

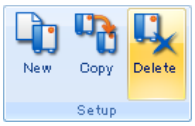
1. Select either the [Pulse] or [Rectangle] radio button in Axis Data Input dialog box.
2. Edit coordinate values with [Line Insert], [Line Edit], or [Line Delete], and create a list. If a CSV file already exists, load coordinate values by selecting [CSV File Load].
3. When the list is completed, press [OK] to add the created list as instructions after the selected line in the job.

The motion type and speed of MOVE instructions which have been added with the input of coordinates are the set values specified in Interpolation dialog box displayed by clicking [MOVE...] in the Job Panel.

7.7.7 Other Operations with devices

■ Deleting a Device

Device and their model can be deleted by using the same procedure as other controllers.
On the [Controller] tab, in the [Setup] group, click the [Delete] button, the [Select Controller/ Robot] dialog appears..



■ I/O Signals for Devices

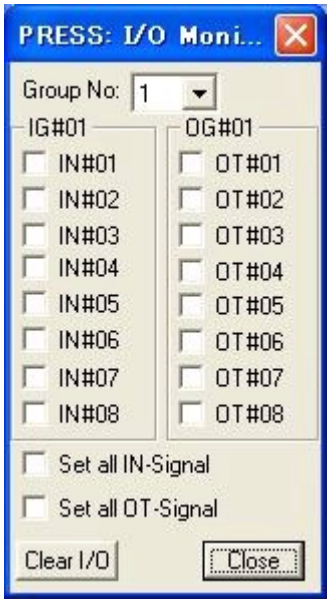
Devices also have I/O signals that can be use to interact with other controllers in the cell. They can be used in a similar way than those of a VRC controller.

Device I/O Monitor

The I/O Monitor for device is displayed in the same way as other controller but the displayed dialog is different.
On the [Simulation] tab, in the [Monitor] group, click the [I/O Monitor] button, the [I/O Monitor] dialog appears

NOTE If the cell contains multiple device and the "Multiple Controller Dialog" mode is enable, a separate I/O Monitor can be displayed for each device in the cell. Select the device to be displayed in the controller combobox of the toolbar before displaying the I/O Monitor.

I/O Monitor can display signals change from an instruction and also give signals to the robot by selecting an IN signal before or during playback.
The I/O data specified in I/O Monitor can be saved as well.

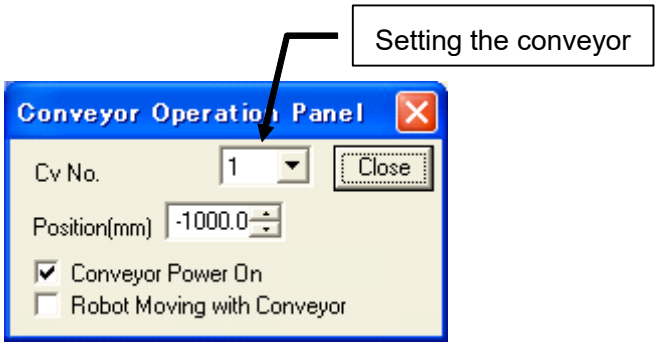


I/O Monitor Dialog Box

Item	Description
[Group No]	Specifies the I/O group number to display.
[Set all IN-Signal] check box	Turns ON all the IN signals of all registered robots. Uncheck the box to turn OFF all the IN signals.
[Set all OT-Signal] check box	Turns ON all the OUT signals of all registered robots. Uncheck the box to turn OFF all the OUT signals.
[Clear I/O] button	Clears all the signals of the selected robot.
[Close] button	Closes I/O Monitor dialog box.

7.7.8 Conveyor Operation Panel

This panel is used to operate the conveyor with 1 axis.
To operate the conveyor with multi-axis, refer to section " 7.7.5 Moving a Device ".

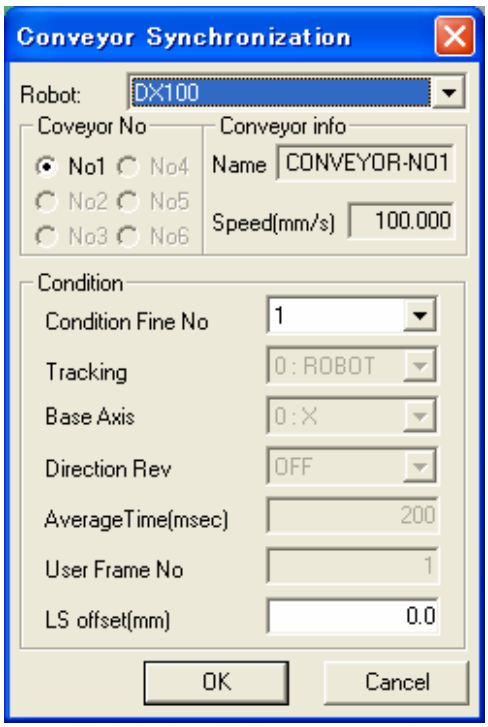


Conveyor Operation Panel

Item	Description
Position	To set the conveyer position for teaching the robot, input the number or set the number by the button. NOTE The position of conveyor in [Position] is reflected LS offset value of the each robot. When the other robot is selected, the position of conveyor in [Position] is changed, without the displayed conveyor is not operating.
Conveyor Power On	When this is turned off during playback, the review on stopping the conveyor is enabled.
Robot Moving with Conveyor	If this is turned on, the selected robot moves with conveyor on operating the conveyor. When [Robot Moving with Conveyor] is used, set the conveyor synchronization of the selected robot in advance.

7.7.9 Conveyor Synchronization

This panel is used to set the synchronization condition between the robot and the conveyor.
If the conveyor synchronization option is available, this panel is displayed automatically when the conveyor is added. Refer to section " 13.7 Registering the Equipment Model " about conveyor synchronization option.
To change the synchronization condition of registered conveyor. On the [Controller] tab, in the [External Device] group, click the [Conveyor Condition File] button, the [Conveyor Synchronization] dialog appears.



Conveyor Synchronization Setting

Item	Description
Robot	The list of the controller which can use the conveyor synchronized function is displayed. Select the controller by the list.
Conveyor No	Select the conveyor synchronized with the controller selected by [Robot].
Conveyor Info	The name and speed of the conveyor selected by [Conveyor No] is displayed.

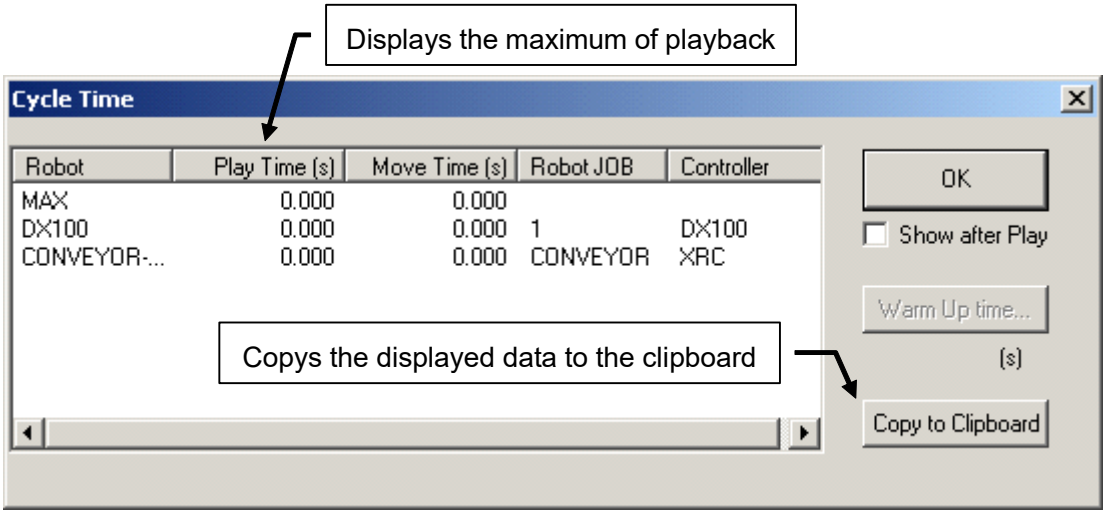
Conveyor Synchronization Setting

Item	Description
Condition	[Condition File No] : Select the conveyor condition file of the selected conveyor and controller. the file is registered by the virtual pendant. [Tracking] : Specify whether to carry out the synchronization with the robot-axis or the base-axis. [Base Axis] : When the [Base Axis] is selected by [Tracking], the selected axis is displayed. [Direction Rev] : When the [Base Axis] is selected by [Tracking], the item is displayed. When the conveyor traveling direction is opposite of the forward direction of base axis, this item is "ON". [Average Time (msec)] : The averaged travel time of conveyor is displayed. [User Frame No] : The user frame number of the conveyor direction is displayed. The user frame number corresponding to the conveyor number is selected automatically. [LS offset (mm)] : Set the distance of the conveyor origin position. When this item is set to 1000mm, the conveyor origin position of the selected robot is located 1000mm before the origin position on the display.

7.8 Cycle Time

On the [Controller] tab, in the [Playback] group, click the [Cycle time] button.
The latest cycle time of playback is displayed on the following display.

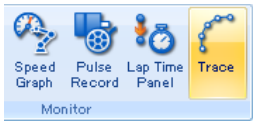
NOTE This function can not use depending on the system version of controller. Please refer to section " 15.8 List of Function depending on the system version of controller ".



7.9 Trace

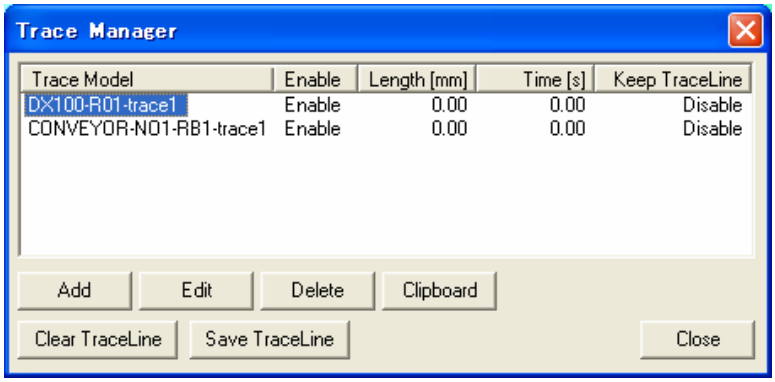
Trace is a function to display update points of the robot position when the robot playback is performed. Larger dots in the traces mean the separation of the command data (step end). Traces can be set with the "Trace Manager" dialog box. On the [Simulation] tab, in the [Monitor] group, click the [Trace] button.

NOTE This function can not use depending on the system version of controller. Please refer to section " 15.8 List of Function depending on the system version of controller ".



7.9.1 Trace Manager

Multiple traces can be set.
When a controller is registered to the cell a trace is automatically added for Tool Center Point (TCP) of each robot.



"Trace Manager" Dialog Box

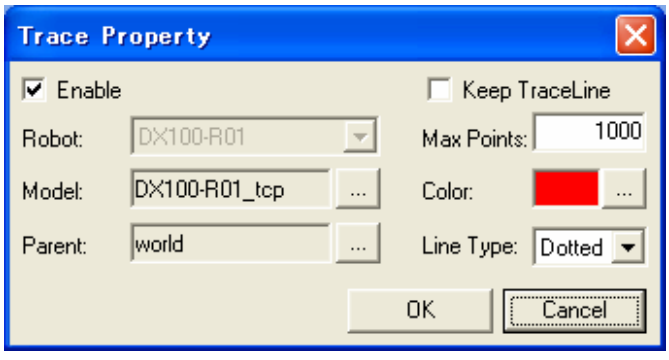
Item	Description
Trace list	Displays the information of the defined traces. Trace Model: Name of the trace model (used in the CadTree) Enable: Enable/Disable the trace generation during playback. Length: Approximate travel distance of the traced point during playback. Time: Playback Time Keep TraceLine: In the case of Disable, the trace lines is deleted automatically before the playback is started. The "Trace Property" of a trace can be displayed by double-clicling on a trace from the list.
[Edit] button	Edits a trace with the "Trace Property" dialog. For details refer to section " 7.9.2 Trace Properties ".

"Trace Manager" Dialog Box

Item	Description
[Add] button	Defines a new trace with the "Trace Property" dialog. For details refer to section " 7.9.2 Trace Properties ".
[Delete] button	Deletes the trace definition currently selected in the trace list.
[Clipboard] button	Opens the "Trace Copy" dialogs with the data of the trace currently selected in the list. For details refer to section " 7.9.3 Trace Copy ".
[Clear Model] button	Deletes all the trace models. Note that before playback, all the previously generated trace models are automatically deleted.
[Clear TraceLine] button	Delete all the trace lines.
[Save TraceLine] button	Save the trace lines as the model file. NOTE The trace is not saved on the cell. When it needs that the trace is saved, the trace is saved by [Save TraceLine], and save the cell.
[Close] button	Closes the "Trace Manager" dialog box.

7.9.2 Trace Properties

The "Trace Property" dialog box is displayed by pressing the [Edit] or [Add] button of the "Trace Manager" dialog box.
It allows to set the trace properties such as the color, number of points, traced model, etc.



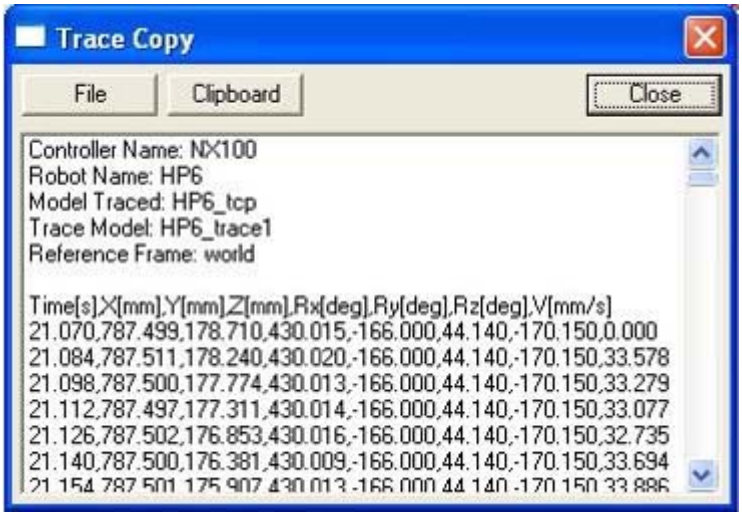
"Trace Property" Dialog Box

Item	Description
[Enable]	Indicates that the trace will be generated during playback when checked.

Item	Description
[Robot]	Selects the robot associated with the trace. A trace point is generated everytime the robot position is updated during playback. This field cannot be modified when editing an existing trace.
[Model]	Displays the name of the model that will be traced. The default model is the robot TCP. To change model, press the [...] button beside the “Model” field to display the “Select Model” dialog box. Select a model and press [OK].
[Parent]	Displays the name of the model that is used as the parent of the trace and as a coordinated system for the trace point. The default model is the “world” model. To change model, press the [...] button beside the “Parent” field to display the “Select Model” dialog box. Select a model and press [OK].
[Keep TraceLine]	When this item is checked, the trace lines before playback is not deleted and the playback is started.
[Max Points]	Defines the maximum number of data points that are generates in the trace model. The value may be increase up to 20 000 points. When the maximum value is reached, the oldest points are erased as new points are generates.
[Color]	Displays the color of the trace model. To change the color, press the [...] button beside the “Color” field to display the “Color” dialog box. Select a color and press [OK].
[Line Type]	Selects the line type: dotted, normal, thick.
[OK] button	If in [Add] mode: adds a new trace definition. If in [Edit] mode: updates the selected trace definition. Closes the “Trace Property” dialog box.
[Cancel] button	Closes the “Trace Property” dialog box.

7.9.3 Trace Copy

The “Trace Copy” dialog box is displayed by pressing the [Clipboard] button of the “Trace Manager” dialog box.
It allows to copy the last playback data points of the selected trace to the clipboard or a text file.
The displayed trace data are "Controller Name", "Robot Name", "Model Traced", "Trace Model", and "Reference". Then, the values of position and speed at each trace points are displayed.

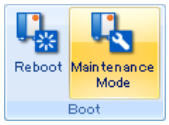


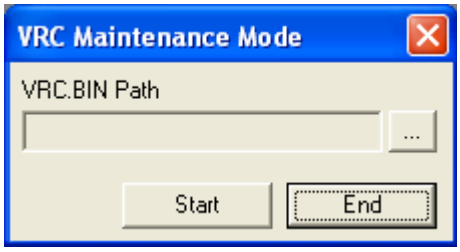
“Trace Copy” Dialog Box

Item	Description
[File] button	Saves the displayed trace information to a text file.
[Clipboard] button	Copies the displayed trace information to the clipboard.
[Close] button	Closes the “Trace Copy” dialog box.

7.10 VRC Maintenance Mode

The VRC controller can be started up in maintenance mode to perform various maintenance task such as initializing data, setting, etc. When there are no opened cell, the “VRC Maintenance Mode” dialog can be displayed by selecting from MotoSim EG-VRC : on the [Controller] tab, in the [Boot] group, click the [Maintenance Mode] button.





VRC Maintenance Mode

VRC.BINPath	Select the VRC.BIN file to be maintenance by pressing the [...] button.
Start	Start up the controller (VRC.BIN) and displays the Virtual Pendant in maintenance mode.
End	Closes the Virtual Pendant and shuts down the controller.

NOTE Some operations in the Virtual Pendant may take a few moments. Do not press the “End” button until the Virtual Pendant has completed its current operation.
Closing the “Virtual Pendant” in the middle of an operation may cause the lost of VRC.BIN data.

7.11 Displaying model / Editing Data of Safety Function

Display the model from Safety Function File. And the file can be edited.
Following function is available in MotoSim EG-VRC.

- Display the robot range limit data
- Edit the safety function data
- Display the tool interference model
- Display the robot approximate model

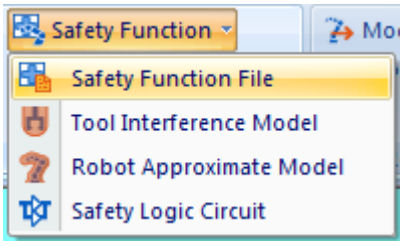
NOTE

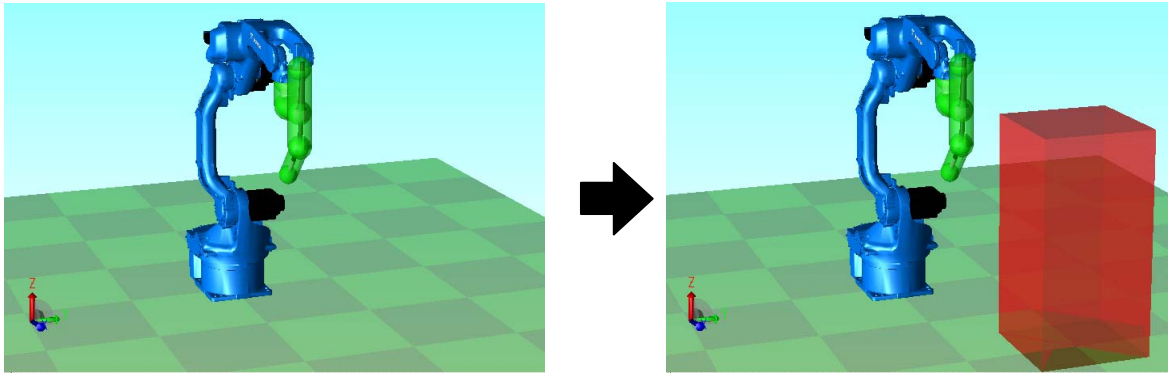
- This function is available only when the controller is YRC1000/YRC1000micro/DX200 and the parameter of safety function is available.
  Simulation is possible only during jog operation in VPP or playback. It cannot be simulated with other functions like positional panels or OLP function.
- Function safety in which a simulation is possible on MotoSim EG-VRC is as follows.
  Robot Range Limit
  Axis Range Limit
  Speed Limit
  Tool Angle Monitor
  Following function safety can not be simulated on MotoSim EG-VRC.
  Axis Speed Monitor
  Tool Change Monitor
  Safety Signal
- YASKAWA does not warrant the result of this function. It should be used only as a guide. Because it is affected by load condition of real robot, lubricated condition of grease, and temperature. Whether or not an alarm occurs may be different from the actual robot.
- This function simulates when the job is executed. Therefore, the coasting in the interruption (ex. the emergency stop) is not included.
- When the edited files are loaded to YRC1000/YRC1000micro/DX200, it is necessary to put in "SAFETY MODE", and to disable "SAVE DATA CRC CHECK FUNC.(FSU)". After loading, please make sure to enable "SAVE DATA CRC CHECK FUNC.(FSU)".
  And, please make sure to check the settings on DX200.

7.11.1 Displaying Robot Range Limit

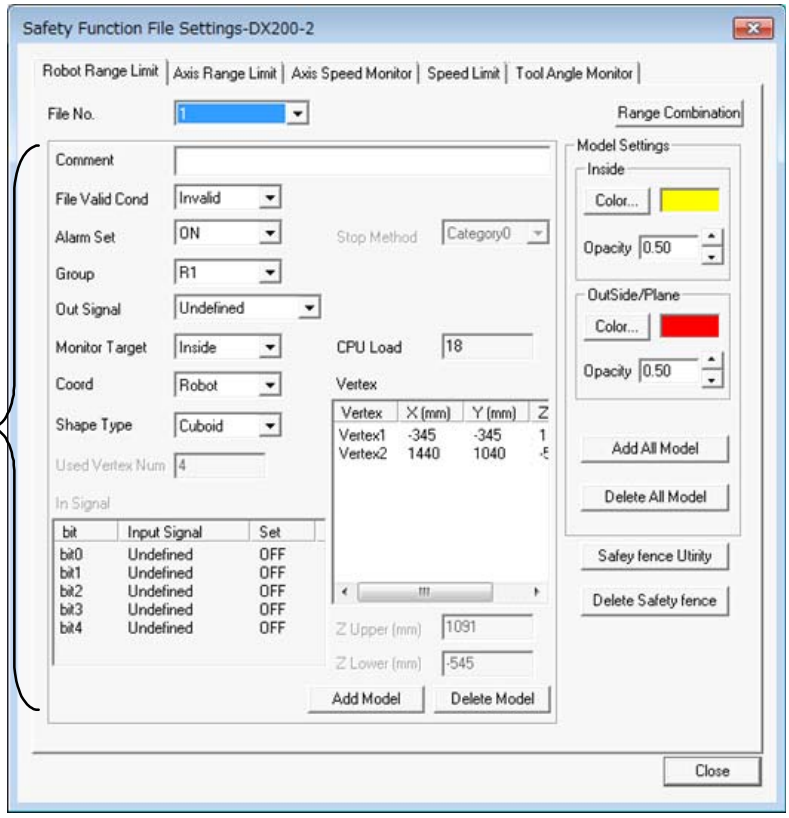
Display the model from the Robot Range Limit.
On the [Controller] tab, in the [File Settings] group, click the [Safety Function] button, and

select [Safety Function File]. And. choose the [Robot Range Limit]tab.

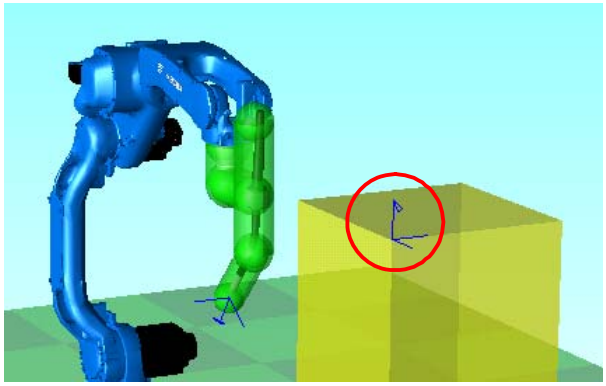




Parameter



[Robot Range Limit]

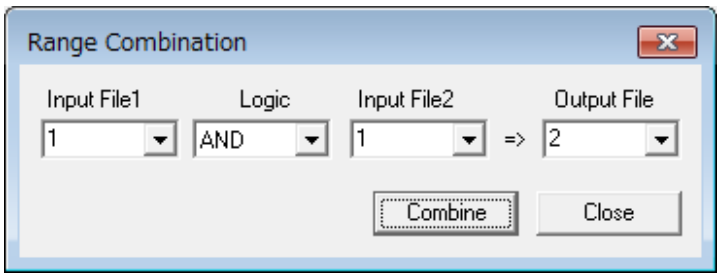
Item	Description
File No.	Select the file number. When selecting the file number, the parameter is displayed. [Add Model] The model of selected file number is displayed. Click the vertex list when the model is displayed, teacher model is moved to that position.  [Delete Model] The model of selected file number is cleared.
Parameter	For those details or Editing them, please refer to "DX200 OPTIONS INSTRUCTIONS FOR FUNCTIONAL SAFETY BOARD OPERATION".
Range Combination	Range combination dialog appears, and combine the ranges.
Model Settings	Set the contents of Inside model or Outside/Plane model. [Color] Displays the Color Dialog to change the color of model. [Opacity] Specifies the opacity of model. The value can be set between 1.00 and 0.00, which corresponds respectively to fully opaque and completely transparent. [Add All Model] The models of all file number are displayed. [Delete All Model] The models of all file number are cleared.
Safety fence Utility	Displays a support dialog for creating a safety fence. This function cannot be used in the following cases. ・When the controller is other than DX200, YRC1000 ・When the "Monitor Target" selected other than "Inside" ・For 7-axis robot ・When the model is MHC0130-J0* ・When the multiple tool numbers are used.
Delete Safety fence	Delete the safety fence model created on the safety fence utility dialog.
Close	Close the dialog.

SUPPLE-MENT

When the "Monitor Target" is selected "Plane", the boundary surface of the safe/non-safe area is displayed. This boundary surface is displayed as a plate model with a limited area on drawing, but it actually extends infinitely.

■ Area Combination

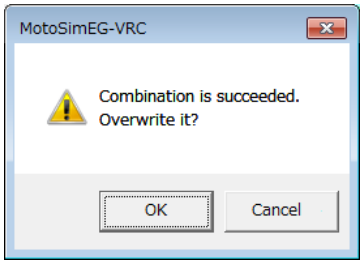
Creates a new area by combining two already-specified areas.
Click the [Area Combination] button, the [Range Combination] dialog is displayed.
For details, please refer to "DX200 OPTIONS INSTRUCTIONS FOR FUNCTIONAL SAFETY BOARD OPERATION".



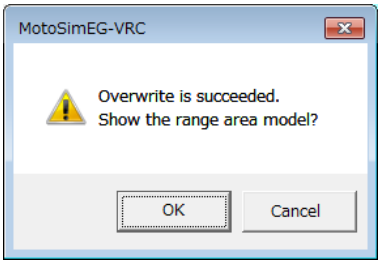
[Range Combination]

Item	Description
Input File1	Select the input file1.
Logic	Select "AND" or "OR".
Input File2	Select the input file2.
Output File	Select the output file.
Combine	Execute Combination.
Close	Close the dialog.

When combination is finished, the following dialog is displayed. Click the [OK] button, a new area is written to output file. Click the [Cancel] button, a new area is not written.



When overwriting is finished, the following dialog is displayed. Click the [OK] button, a new area model is displayed. Click the [Cancel] button, a new area model is not displayed.



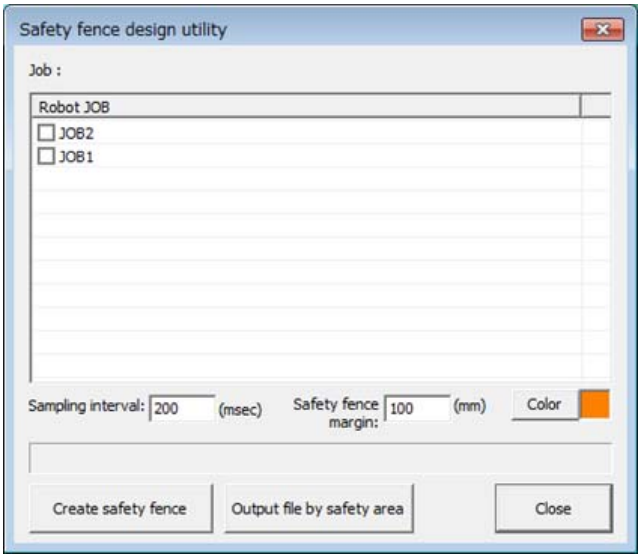
■ Safety fence Utility

It is a function to support creation of robot range limit based on the trajectory of the job.
By creating a safety fence model which covers the trajectory of the job, the robot range limit is determined.

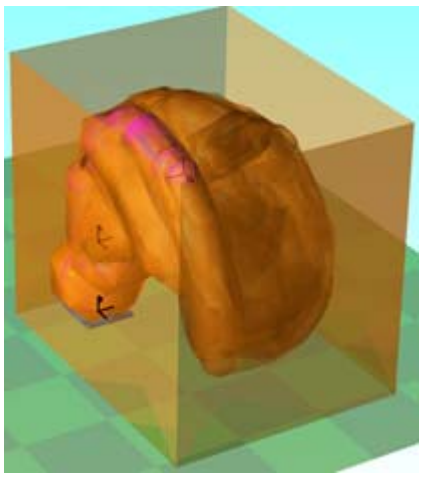
NOTE

This function cannot be used in the following cases.

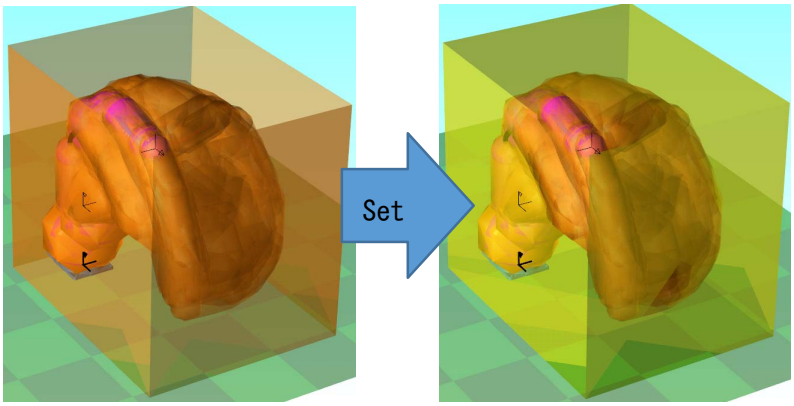
- When the controller is other than DX200, YRC1000.
- When the "Monitor Target" selected other than "Inside".
- For 7-axis robot.
- When the model is MHC0130-J0*.
- When using tool interference setting, create a tool interference model.
- When the model has linear axis.
- It is not supported the tool number switching function.
- YASKAWA does not warrant the result of safety fence utility function. It should be used only as a guide. Because it is affected by load condition of real robot, lubricated condition of grease, and temperature. Whether or not an alarm occurs may be different from the actual robot.
- Please make sure to check the settings on real controller when setting is applied to the real controller.
- When the multiple tool numbers are used.



Safety fence design utility

Item	Description
Job list	The job containing the control group selected in "Group" on the robot range limit tab is displayed in the list.
Sampling Interval	Sets the interval to analyze the trajectory of the job. The shorter the interval, the longer it will take to create a safety fence model.
Safety fence margin	Sets the margin of the fence which covers the robot trajectory.
Color	Sets the color of the safety fence model to be created.
Create safety fence	Jobs selected in the job list are executed sequentially, and a fence which covers all the trajectories is created. When creating a safety fence model, a safety fence margin is added. 

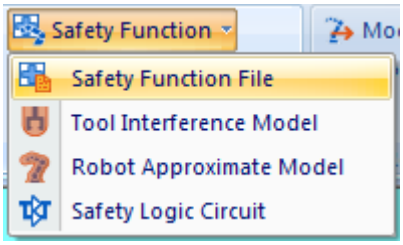
Safety fence design utility

Item	Description
Output file by safety area	The robot range limit is saved as a file in the setting contents of the safety fence displayed. When set, the safety fence model is displayed in yellow. 
Close	Closes the dialog.

NOTE If you have not set the tool interference settings, you will see the error "Model can not be created". This error is displayed when a tool interference model cannot be created. If the tool interference setting is set, the error is eliminated. Even if the tool interference setting is not set, if there is no problem in parts other than the tool, a safety fence area and an operation area are created.

7.11.2 Editing the Safety Function Data

Edit the safety function file. Following files are available. To edit the files, it is necessary to put them into the robot folder. On the [Controller] tab, in the [File Settings] group, click the [Safety Function] button, and select [Safety Function File] the [Safety Function File Settings] dialog appears.



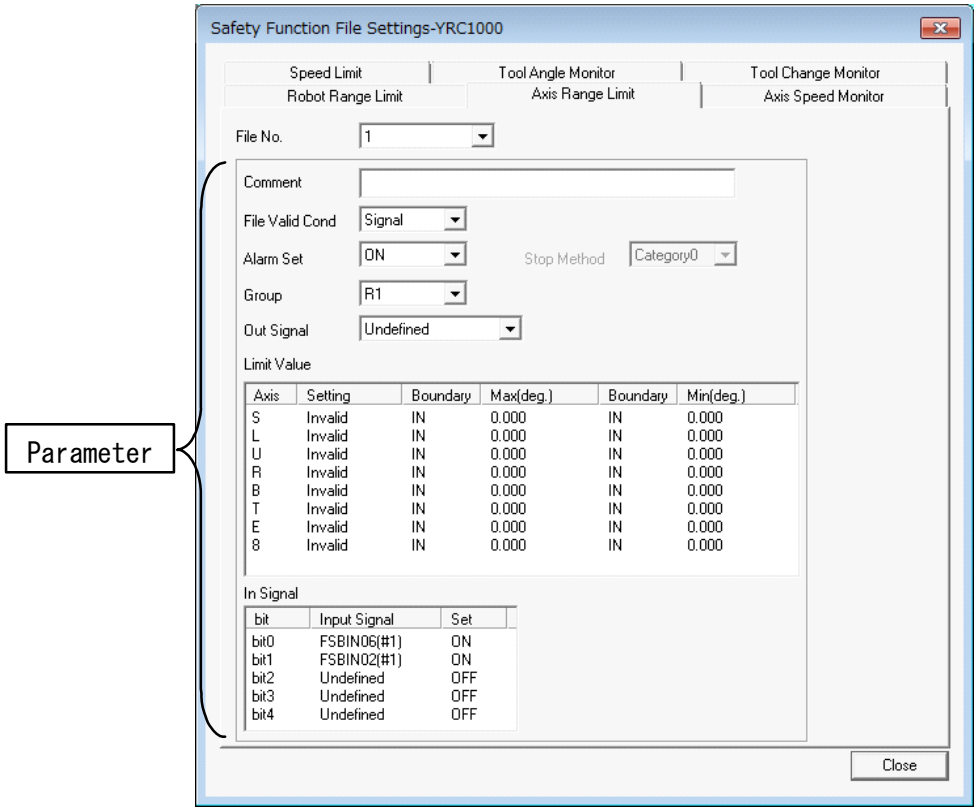
- Robot Range Limit
- Axis Range Limit
- Axis Speed Monitor
- Speed Limit
- Tool Angle Monitor
- Tool Change Monitor

■ Robot Range Limit Data

Edit the Robot Range Limit Data. Choose the {Robot Range Limit} tab. For details, please refer to " 7.11.1 Displaying Robot Range Limit ".

■ Axis Range Limit Data

Edit the Axis Range Limit Data. Choose the {Axis Range Limit} tab.

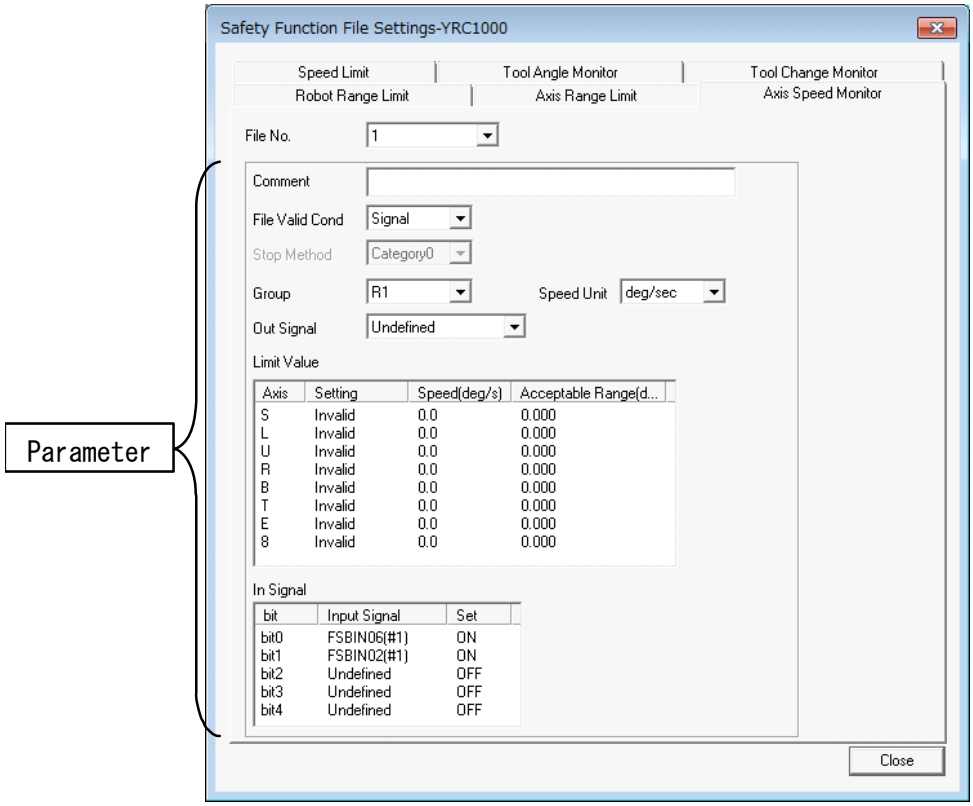


[Axis Range Limit]

Item	Description
File No.	Select the file number. When selecting the file number, the parameter is displayed.
Parameter	For those details or Editing them, please refer to "DX200 OPTIONS INSTRUCTIONS FOR FUNCTIONAL SAFETY BOARD OPERATION".
Close	Close the dialog.

■ Axis Speed Monitor Data

Edit the Axis Speed Monitor Data. Choose the {Axis Speed Monitor} tab.

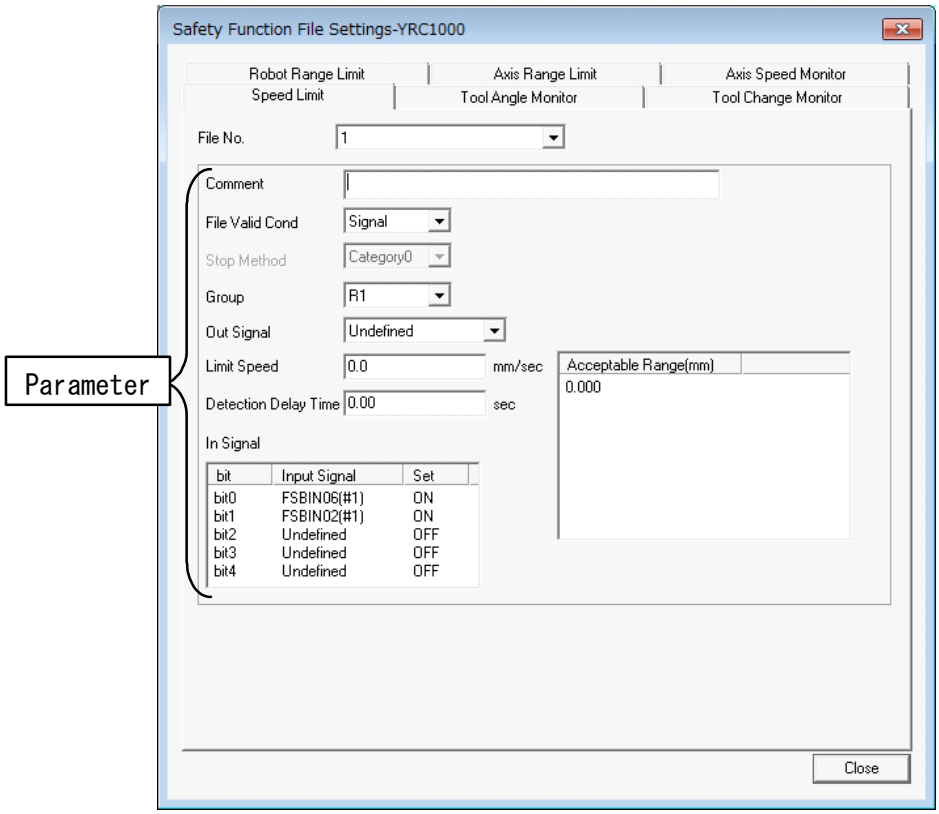


[Axis Speed Monitor]

Item	Description
File No.	Select the file number. When selecting the file number, the parameter is displayed.
Parameter	For those details or Editing them, please refer to "DX200 OPTIONS INSTRUCTIONS FOR FUNCTIONAL SAFETY BOARD OPERATION".
Close	Close the dialog.

■ Speed Limit Data

Edit the Speed Limit Data. Choose the {Speed Limit} tab.

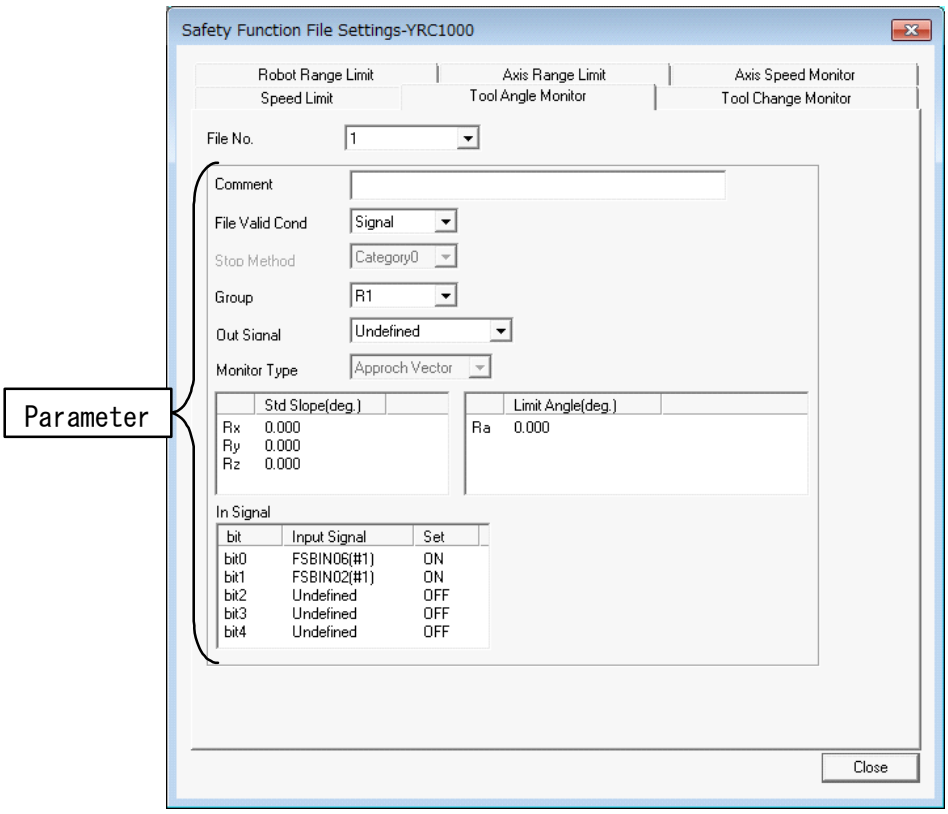


[Speed Limit]

Item	Description
File No.	Select the file number. When selecting the file number, the parameter is displayed. Select the Speed Limit in Teach Mode, the setting of it is available.
Parameter	For those details or Editing them, please refer to "DX200 OPTIONS INSTRUCTIONS FOR FUNCTIONAL SAFETY BOARD OPERATION".
Close	Close the dialog.

■ Tool Angle Monitor Data

Edit the Tool Angle Monitor Data. Choose the {Tool Angle Monitor} tab.

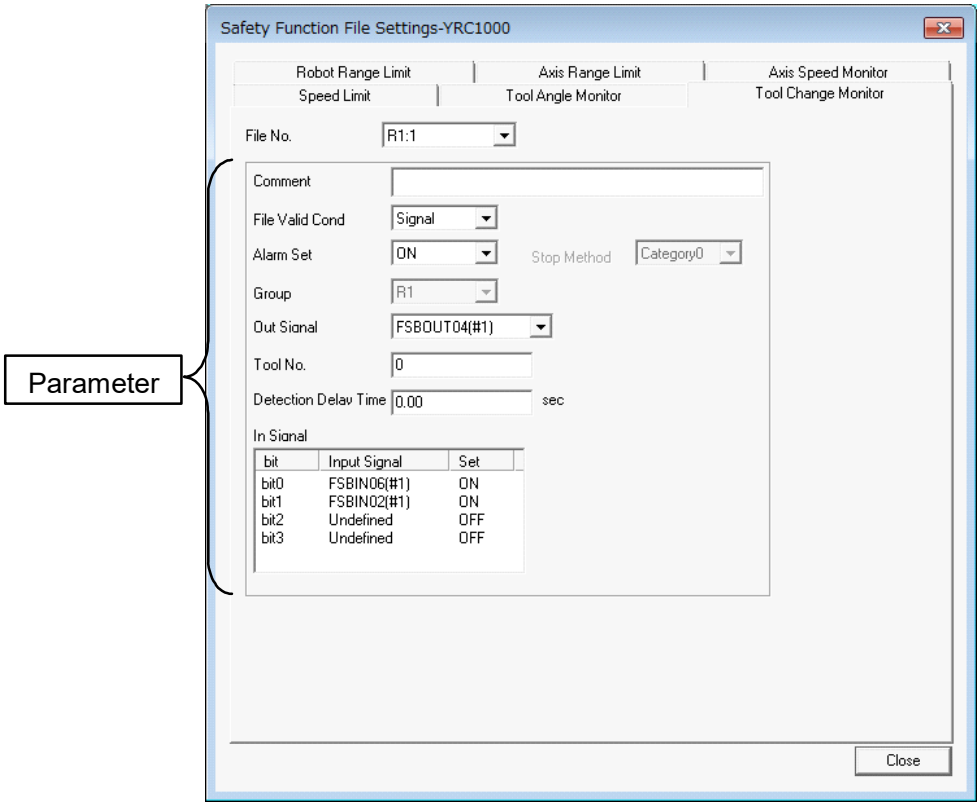


[Tool Angle Monitor]

Item	Description
File No.	Select the file number. When selecting the file number, the parameter is displayed.
Parameter	For those details or Editing them, please refer to "DX200 OPTIONS INSTRUCTIONS FOR FUNCTIONAL SAFETY BOARD OPERATION".
Close	Close the dialog.

■ Tool Change Monitor Data

Edit the Tool Change Monitor Data. Choose the {Tool Change Monitor} tab.

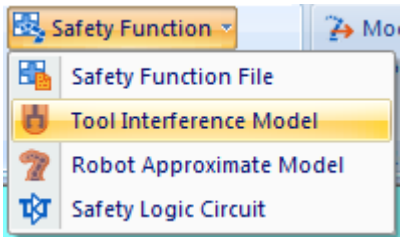


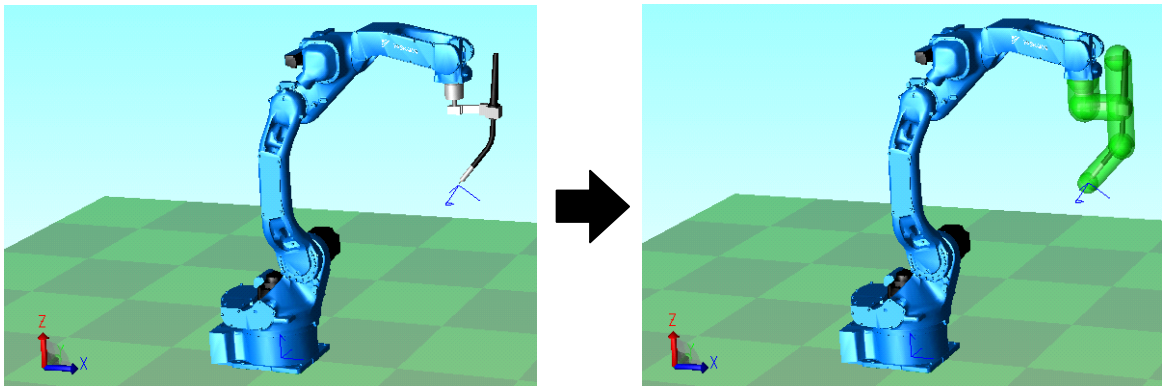
[Tool Change Monitor]

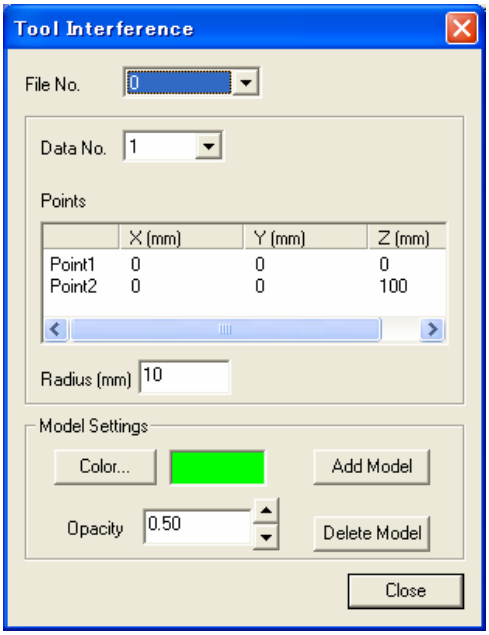
Item	Description
File No.	Select the file number. When selecting the file number, the parameter is displayed.
Parameter	For those details or Editing them, please refer to "DX200 OPTIONS INSTRUCTIONS FOR FUNCTIONAL SAFETY BOARD OPERATION".
Close	Close the dialog.

7.11.3 Displaying the Tool Interference Model

Display the tool interference model from the Tool Interference Data.
On the [Controller] tab, in the [File Settings] group, click the [Safety Function] button, and select [Tool Interference Model] the [Tool Interference] dialog appears.





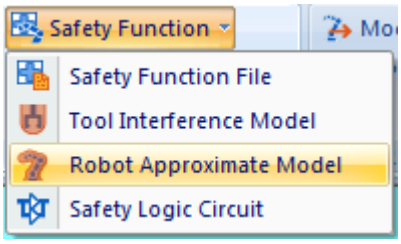


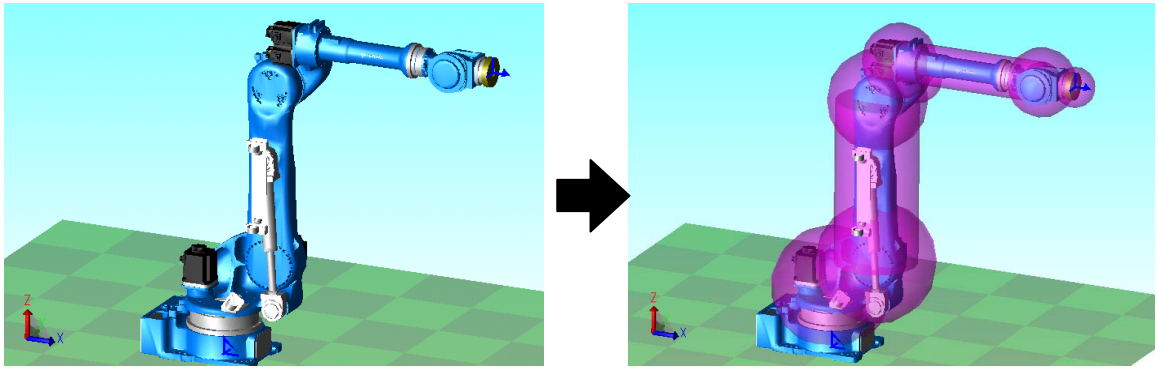
Item	Description
File No.	Select the file number. When selecting the file number, the parameter is displayed.

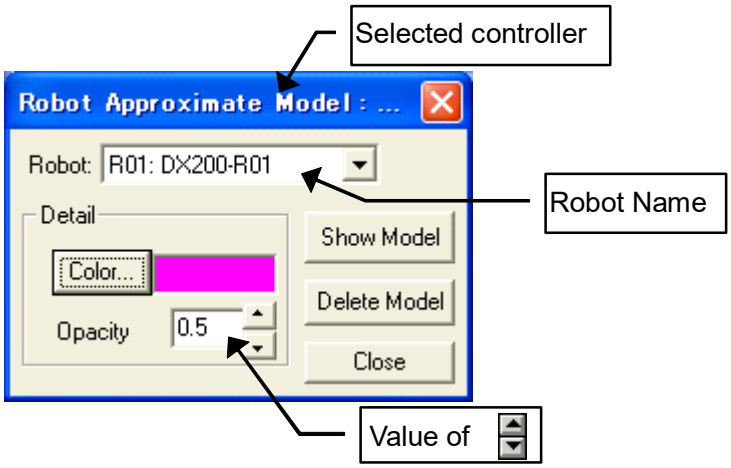
Item	Description
Data No.	Select the data number. [Points] Specify the X, Y, and Z of two points. [Radius] Specify the radius of sphere and cylinder. For those details or Editing them, please refer to "DX200 OPTIONS INSTRUCTIONS FOR FUNCTIONAL SAFETY BOARD OPERATION".
Model Settings	Display/Clear the tool interference model. [Color] Displays the Color Dialog to change the color of model. [Opacity] Specifies the opacity of model. The value can be set between 1.00 and 0.00, which corresponds respectively to fully opaque and completely transparent. [Add Model] The model of the file number is displayed. [Delete Model] The model of the file number is cleared.
Close	Close the dialog.

7.11.4 Displaying the Robot Approximate Model

Display the robot approximate model from robot parameter.
On the [Controller] tab, in the [File Settings] group, click the [Safety Function] button, and select [Robot Approximate Model] the [Robot Approximate] dialog appears.





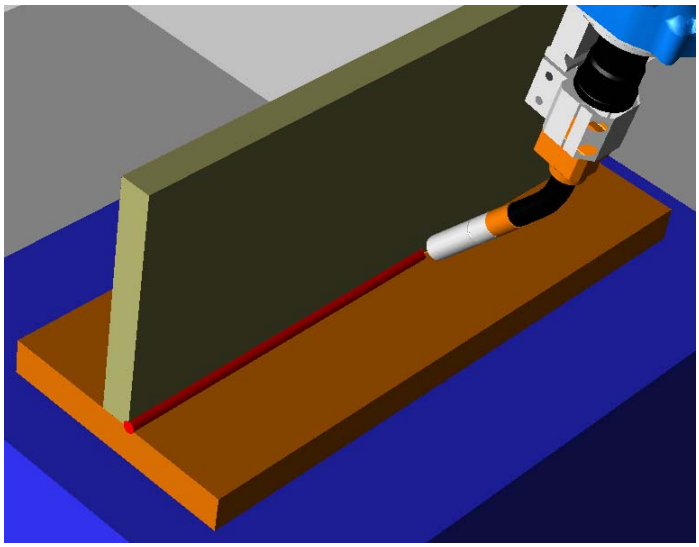


[Robot Approximate Model]

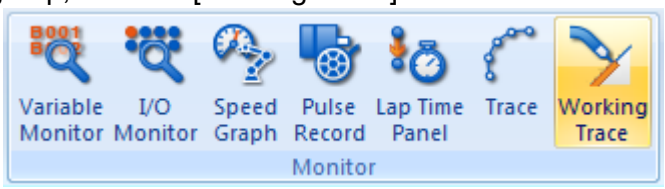
Item	Description
Show Model	Display the approximate model. [Color] Displays the Color Dialog to change the color of model. [Opacity] Specifies the opacity of model. The value can be set between 1.00 and 0.00, which corresponds respectively to fully opaque and completely transparent. NOTE When the parameter does not have approximate model, the model is not displayed.
Delete Model	Clear the approximate model.
Close	Close the dialog.

7.12 Working Trace

When the lines where drawing starting and where drawing end are inserted a job, the continuous cylinder, line and seat is drawn on the TCP position of the robot at the time of a playback.



Working trace can be set with the "Working Trace Manager" dialog box. On the [Simulation] tab, in the [Monitor] group, click the [Working Trace] button.



To draw the working trace, it is necessary to execute the following two procedure.

1. Adds/Edits the setting of working trace
2. Inserts the lines where drawing starting and where drawing ending to the job

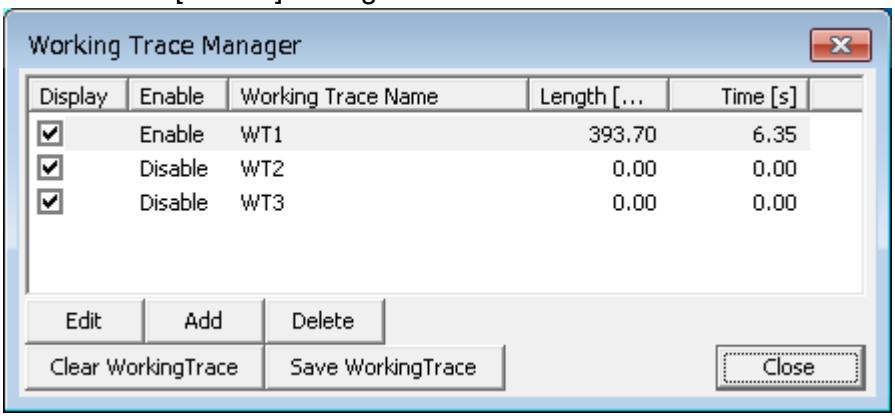
For details about above step1, refer to the section " 7.12.1 Working Trace Manager " and " 7.12.2 Working Trace Property ". For details about above step2, refer to the section " 7.12.3 Specify the Start Point and End Point ".

NOTE

- This function can use virtual robot controller only.
- The working trace is not saved on the cell. When it needs that the working trace is saved, the working trace is saved by [Save WorkingTrace], and save the cell.
- When working trace has many points, the playback may become slowly.
- When the 3DPDF file is output, that working trace is that when playback is finished. Working trace is not moved on the animation of 3DPDF.
- When the type of working trace is "Line" and the 3DPDF file is output, the width of the line is not reflected. When the tick line is needed on 3DPDF file, the type is needed to set "Cylinder" or "Sheet".
- Drawing start and end by the ARCON/ARCOF instruction can be used only the following system version of controller.
  - YRC1000: Since YAS1.01-00
  - DX200: Since DN1.61-00
  - DX100: DS3.93-00
  - NX100: NS4.75-00
- NS4.69-A5 Controller is not supported.

7.12.1 Working Trace Manager

Multiple working traces can be set.
When a controller is registered to the cell a trace is automatically added for Tool Center Point (TCP) of each robot. The [Enable] setting is set to "Disable".



Working Trace Manager

Working Trace list	Displays the information of the defined traces. Display: Show/Hide the working trace Enable: Enable/Disable the working trace generation during playback Working Trace Name: Name of the working trace model Length: Approximate travel distance of the working trace Time: Time during working trace generation The "Working Trace Property" of a trace can be displayed by double-clicking on a working trace from the list.
[Edit] button	Edits a trace with the "Working Trace Property" dialog. For details refer to section " 7.12.2 Working Trace Property ".

Working Trace Manager

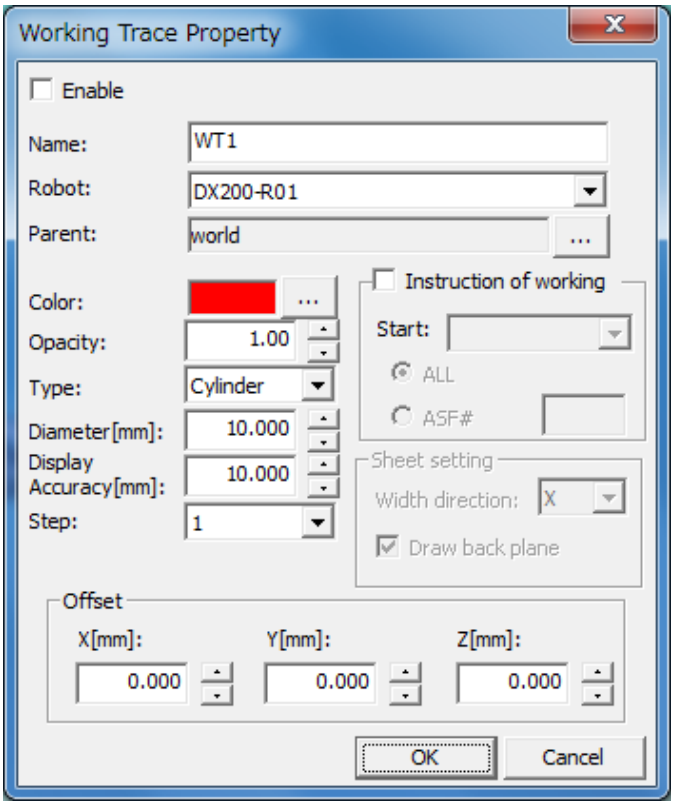
[Add] button	Defines a new working trace with the "Working Trace Property" dialog. For details refer to section " 7.12.2 Working Trace Property ".
[Delete] button	Deletes the working trace definition currently selected in the working trace list.
[Clear WorkingTrace] button	Deletes all working traces.
[Save WorkingTrace] button	Save the working trace as a model file. NOTE The working trace is not saved on the cell. When it needs that the working trace is saved, the working trace is saved by [Save WorkingTrace], and save the cell.
[Close] button	Closes the "Working Trace Manager" dialog box.

NOTE The working trace is deleted automatically when the following operation is done.

- Start playback
- Click the [Reset] button
- Close the cell
- Click the [Clear WorkingTrace] button
- Add/Edit/Delete the setting of working trace

7.12.2 Working Trace Property

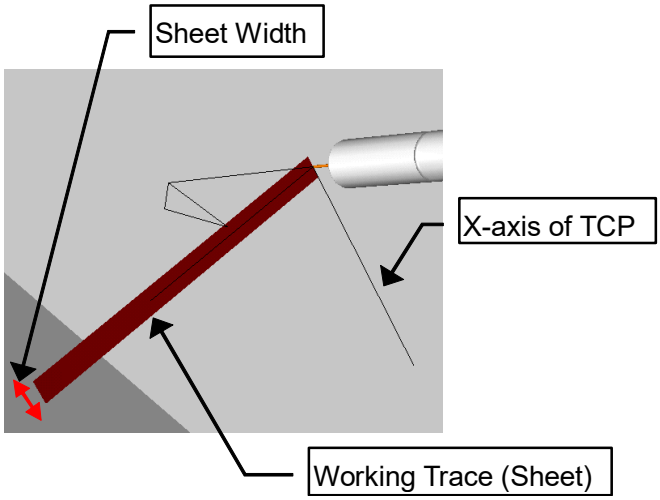
The "Working Trace Property" dialog box is displayed by pressing the [Edit] or [Add] button of the "Working Trace Manager" dialog box.
It allows to set the trace properties such as the color, type, opacity, diameter, traced model, etc.



Working Trace Property

[Enable]	Indicates that the working trace will be generated during playback when checked.
[Name]	Input the name of working trace. (Up to 8 one-byte characters) When adding the working manager, WT[serial number] is set automatically.
[Robot]	Selects the robot associated with the working trace.
[Parent]	Displays the name of the model that is used as the parent of the working trace and as a coordinated system for the working trace. The default model is the "world" model. To change model, press the [...] button beside the "Parent" field to display the "Select Object" dialog box. Select a model and press [OK].
[Color]	Displays the color of the working trace model. To change the color, press the [...] button beside the "Color" field to display the "Color" dialog box. Select a color and press [OK].
[Opacity]	Specifies the opacity of model. The value can be set between 1.00 and 0.00, which corresponds respectively to fully opaque and completely transparent.
[Type]	Specifies the type of working trace. (Cylinder, Line or Sheet).
[Diameter]	Specifies the diameter of working trace.

Working Trace Property

[Display Accuracy]	Specifies the minimum distance to add the point to working trace. NOTE When display accuracy becomes smaller, the working trace becomes finer. When display accuracy becomes larger, the working trace becomes rougher.
[Step]	Specifies the increment value of the spin control.
[Instruction of working]	Sets whether to display the work trace when executing a work instruction such as ARCON.
[Start]	Selecta the target instruction among the work instructions. Select-able instructions are as follows. ARCON DOUT HAND SPYON TOOLON
[ALL]	Regardless of condition number, all are displayed.
[other]	Set the condition number to display the work trace. (e.g.) ASF# 1 OT# 3
[Width Direction]	Specifies the direction of TCP as the width direction of sheet. (e.g. Width Direction is set to "X")  NOTE This item is available only when type is "Sheet".

Working Trace Property

[Draw back plane]	If this is disable, the back plane of sheet is not drawn. NOTE This item is available only when type is "Sheet".
[Offset]	Specifies the offset values of working trace point. These values are the value of the tool coordinates.

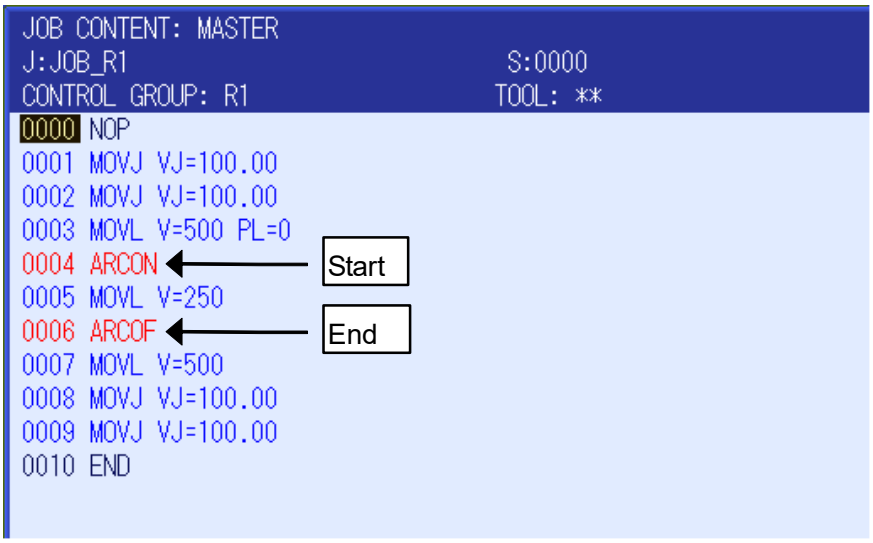
7.12.3 Specify the Start Point and End Point

Inserts the lines where drawing starting and where drawing ending to the job.

To insert the lines, there are two methods as follows.

- ARCON/ARCOF instruction
  When ARCON and ARCOF instructions are inserted in the job, working trace is created between ARCON and ARCOF.

  Examples are given below.
  Working trace is created between ARCON and ARCOF. Working trace property of R1 of this controller is reflected.



  When the job is for multiple robots, working traces of all robots are created between ARCON and ARCOF.

  When the job has many ARCON/ARCOF pairs as follows, working traces of each pair are

created between ARCON and ARCOF.

```
0003 MOVL V=500 PL=0
0004 ARCON
0005 MOVL V=250
0006 ARCOF
0007 MOVL V=500
0008 MOVL V=500 PL=0
0009 ARCON
0010 MOVL V=250
0011 ARCOF
0012 MOVL V=500
```

NOTE

Drawing start and end by the ARCON/ARCOF instruction can be used only the following system version of controller.

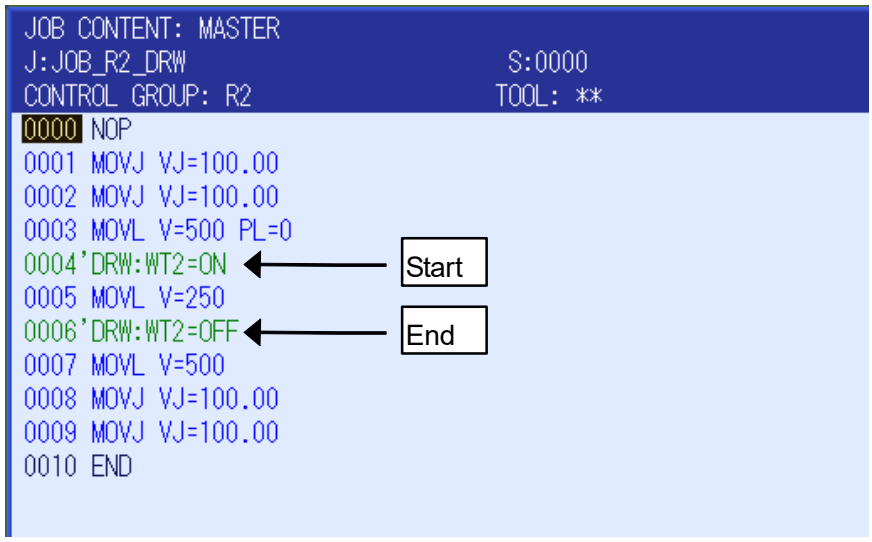
- YRC1000: YAS1.01-00
- DX200: Since DN1.61-00
- DX100: DS3.93-00
- NX100: NS4.75-00

- Comment instruction

  When the following two comment instructions are inserted in the job, working trace is created during two comment instructions.

  'DRW?[Name]=ON?(Where drawing starts)
  'DRW?[Name]=OFF (Where drawing ends)

  Examples are given below.
  Working trace is created during two comment instructions. Working trace property of "WT2" is reflected.



When the job has many comments pairs as follows, working traces of each pair are cre-

ated between comments.

```
0003 MOVL V=500 PL=0
0004'DRW:WT2=ON
0005 MOVL V=250
0006'DRW:WT2=OFF
0007 MOVL V=500
0008 MOVL V=500 PL=0
0009'DRW:WT2=ON
0010 MOVL V=250
0011'DRW:WT2=OFF
0012 MOVL V=500
```

NOTE NS4.69-A5 Controller is not supported.

7.13 Safety Logic Circuit Setting Support Function

Edit safety logic circuit files and simulate logic circuits. By switching the input signal, it is possible to check whether the designed logic circuit operates as intended.

■ RESTRICTION

- The safety logic signal of this function is applied and affected only on the safety logic circuit screen. Signal information cannot be linked with other VRC functions.
- Signal information can be switched only for some input signals.
- This function is used when the controller is YRC100. When the controller is DX200 or YRC1000micro, you can only edit the safety logic circuit file.
- The signal names which circuit information can be checked in MotoSim EG-VRC YRC1000 controller are as follows :

Input Signals

PPESP	PBESP	EXESP	PPDSW	SAFF
ONEN (only ONEN1)	GSIN	GSOUT	FSBIN	FSBOUT
FS-OUT	MS-OUT	PLAY	TEACH	REMOTE
HOLD	SPIN	SFRON	SVON	SVONRDY0
RBSY	RBSM	RBSX	SFBIN	SFBOUT
PROFISafe	R	S-EXDSW	S-EXESP	S-FST
S-SAFF	S-ONEN (only S-ONEN1)	S-SVON_EN	S-GSEDM	S-XEDM
CSCFG01	CSCFG02	CSCFG03	CSCFG04	SICFGTRG

Output Signals

GSOUT	FSBOUT	MS-OUT	RBSX	SFBOUT
SVOFF CAT0	SVOFF CAT1	R	S-EXDSW	S-EXESP
S-FST	S-SAFF	S-ONEN (only S-ONEN1)	S-SVON_EN	SICFGTRG

- The signal names which signal information can be checked in MotoSim EG-VRC YRC1000 controller are as follows :

Input Signals

PPESP	PBESP	EXESP	PPDSW	SAFF
ONEN	GSIN	GSOUT	FSBIN	FSBOUT
FS-OUT	MS-OUT	PLAY	TEACH	REMOTE

Input Signals

HOLD	SPIN	SFRON	SVON	SVONRDY0
RBSY	RBSM	RBSX	SFBIN	SFBOUT
PROFISafe	R	S-EXDSW	S-EXESP	S-FST
S-SAFF	S-ONEN	S-SVON_EN	S-GSEDM	S-XEDM

Output Signals

GSOUT	FSBOUT	MS-OUT	RBSX	SFBOUT
SVOFF CAT0	SVOFF CAT1	R	S-EXDSW	S-EXESP
S-FST	S-SAFF	S-ONEN	S-SVON_EN	

- The signal names which input signal information can be switched in MotoSim EG-VRC YRC1000 controller are as follows :

Input Signals

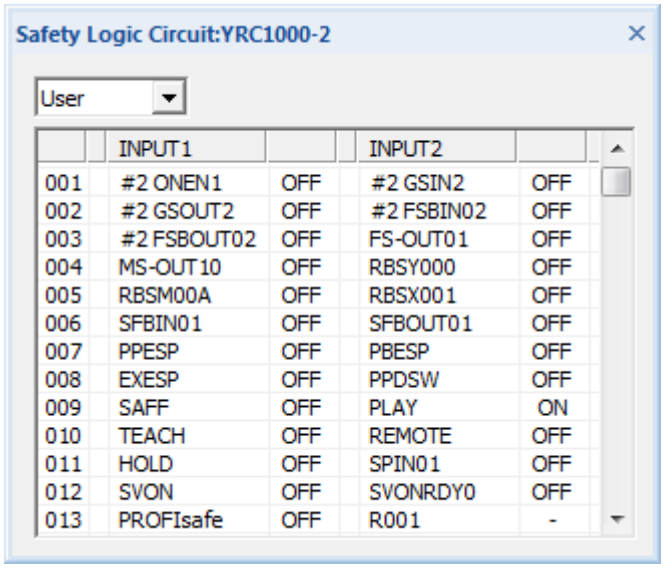
PPESP	PBESP	EXESP	PPDSW	SAFF
ONEN	GSIN	FSBIN	FS-OUT	PLAY
TEACH	REMOTE	HOLD	SPIN	SFRON
SVON	SVONRDY0	RBSY	RBSM	SFBIN
PROFISafe				

7.13.1 Editing the Safety Logic Circuit Data

Edit and check safety logic circuit files on Virtual Programming Pendant.
Select and display from the main menu {Safety Func.}-{Safety Logic Circuit}.
The signal information for each signal is calculated by the logic circuit.
Please refer to "INSTRUCTIONS for each controller" for how to edit the safety logic circuit file.

7.13.2 Changing the Input Signal

By switching the input signal, it is possible to check whether the designed logic circuit operates as intended.
On the [Controller] tab, in the [File Settings] group, click the [Safety Function] button, and select [Safety Logic Circuit], then the [Safety Logic Function] dialog is displayed.
The circuit information written in safety logic circuit file and the signal information are displayed for each controller. When you click the area of signal information, ON/OFF switched for some signals. At this time, the virtual pendant display also changes, and you can check whether the designed logic circuit operates as intended.



[Safety Logic Circuit:Controller Name]

Item	Description
User/System	You can select User mode or System mode.
Leftmost column	Same number with safety logic circuit on virtual programming pendant.
INPUT1	Same with INPUT1 on virtual programming pendant. When signal information can be acquired, ON or OFF is displayed in the right adjacent column.
INPUT2	Same with INPUT2 on virtual programming pendant. When signal information can be acquired, ON or OFF is displayed in the right adjacent column.

NOTE

- Signal information is not updated in real time. If the virtual programming pendant display differs from the [Safety Logic Circuit] display, update the user or system.
- "○" on the virtual pendant shows the result based on the logic calculation such as "NOT", so it may be reversed with ON / OFF of [Safety logic circuit].
- When the input signal SVONRDY0 is set, that is, when SVONRDY0 is ON at [Safety Logic Circuit], the virtual pendant displays it "○". (When the bit is OFF, it is "●")

8 Tool Functions

MotoSim EG-VRC has tools to operate and teach a robot, including functions to display the current position and pulses of the robot; it also has functions that simplifies teaching operations such as OLP (on-screen teaching function to teach target point) and interference check function.
This chapter explains each function and its application.

8.1 Position Panel

The Position panel displays position data of a robot, and enables robot operation by entering numerical values in pulses or coordinate units.
On the [Home] tab, in the [Teachingl] group, click the [Position Panel] button, the [Position Panel] dialog appears.

NOTE If the cell contains multiple controllers and the "Multiple Controller Dialog" mode is enable, a separate Position panel can be displayed for each robot in the cell. Select the robot to be displayed in the robot combobox of the toolbar before displaying the Position panel.

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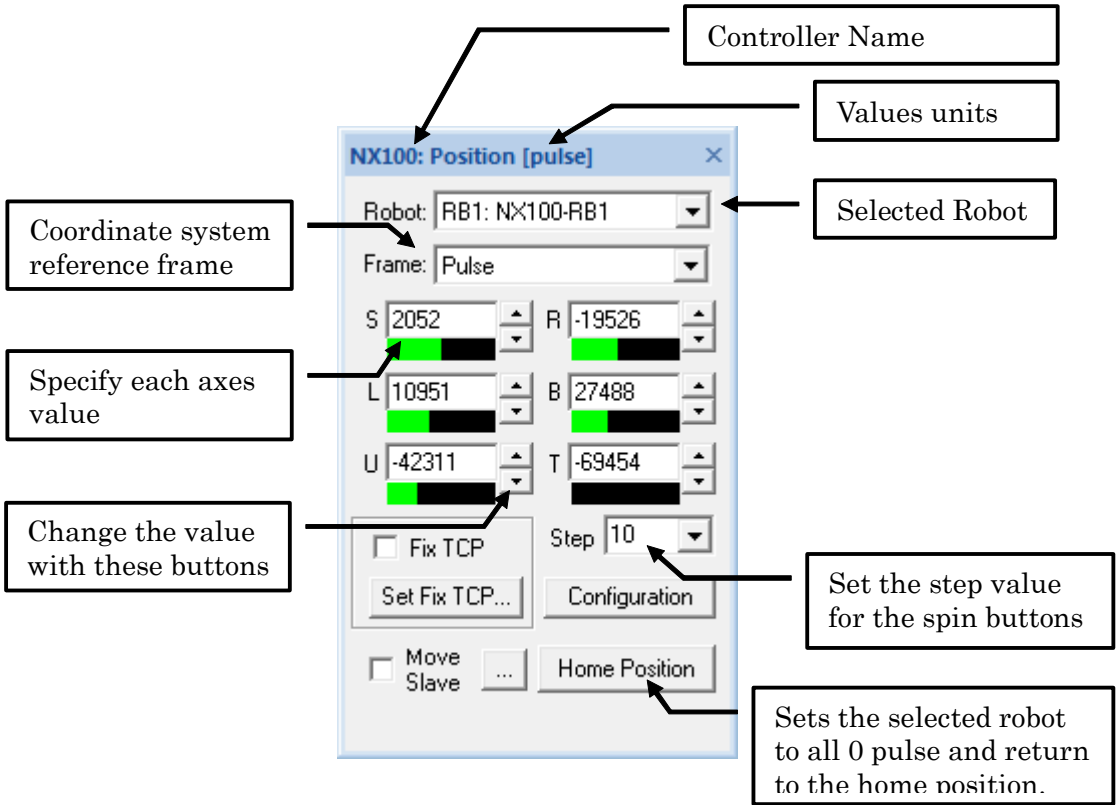


Position Data Panel

Item	Description
[Frame] combobox	The coordinate system reference frame can be selected with the "Frame" combobox. The choice of frame available in the list may change depending on the robot configuration.
[Fix TCP] checkbox	When checked, the [Fix TCP] function is enabled. The robot TCP position remains fixed relative to another model in the cell. Refer to section " 8.1.2 Fix TCP " for details.
[Set Fix TCP...] button	Displays the "Select Model" dialog to change the model reference used by the Fix TCP function.
[Configuration] button	Displays the robot "Configuration" dialog to select a different robot configuration to reach the current position. (Refer to section " 8.1.3 Robot Position Configuration " for details)
[Move Slave] checkbox	When checked, the [Move Slave] function is enabled. When a robot or station is moved, other slave robots from the same controller are moved with it so that their TCP maintain the same relative position to the moved robot or station. By default all robots are set as slave. The individually setting of each robot can be changed by pressing the [...] button to display the “Set Slave Robot” dialog. Note that when the function is enable, if one of the robot cannot reach the proper position, all the robots are prevented from moving.

Position Data Panel	
Item	Description
[Home Position] button	Sets the selected robot to all 0 pulse and return to the home position. NOTE • When "Fix TCP" is enabled, the robot does not return to 0 pulse even if this button is pressed. • Even if the "Move Slave" is enabled, only the selected robot returns to 0 pulse.

NOTE The Fix TCP section is not available when the Frame is set to "Work Angle".

Keyboard entry

The value of an axis can be entered directly with the numeric keys. Select the desired axis edit box, enter the new value, and then press the [Enter] key to update the robot position or the [Tab] key to move to the next axis.

■ Pulse

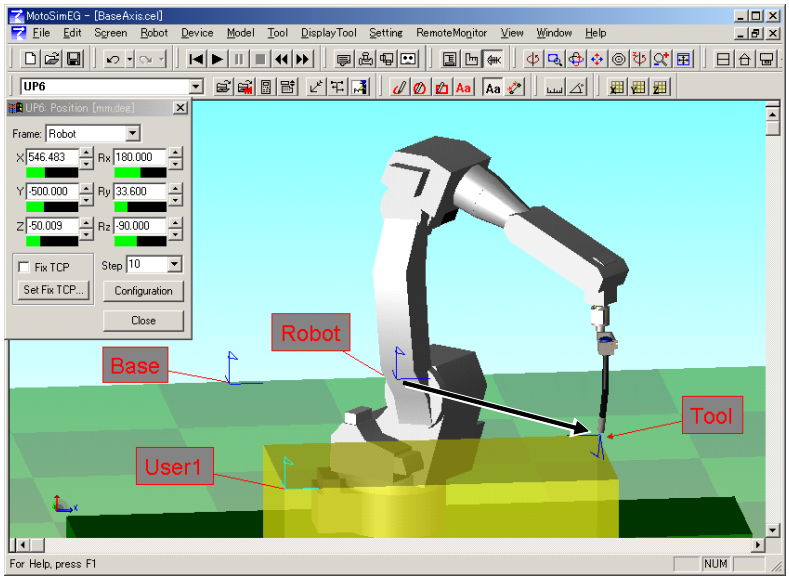
Displays the pulse values of the S, L, U, R, B, T axis of the robot.

■ Joint

Displays the angular values of the S, L, U, R, B, T axis in angular units (degrees or radians).

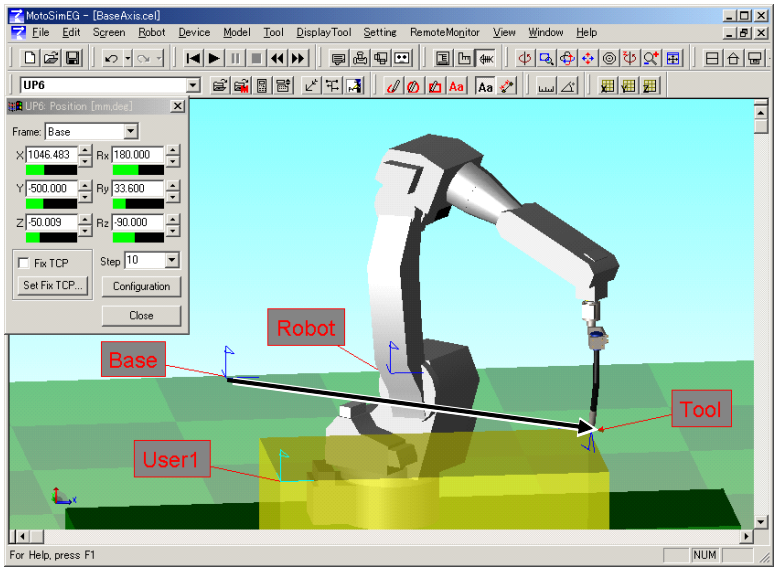
■ Robot

Displays the position (X, Y, Z, Rx, Ry, Rz) of the robot current Tool frame (TCP) relative to the Robot frame.



■ Base

Displays the position (X, Y, Z, Rx, Ry, Rz) of the robot current Tool frame (TCP) relative to the Base frame. If the robot doesn't have any base axis, the Base frame and Robot frame overlaps each other.

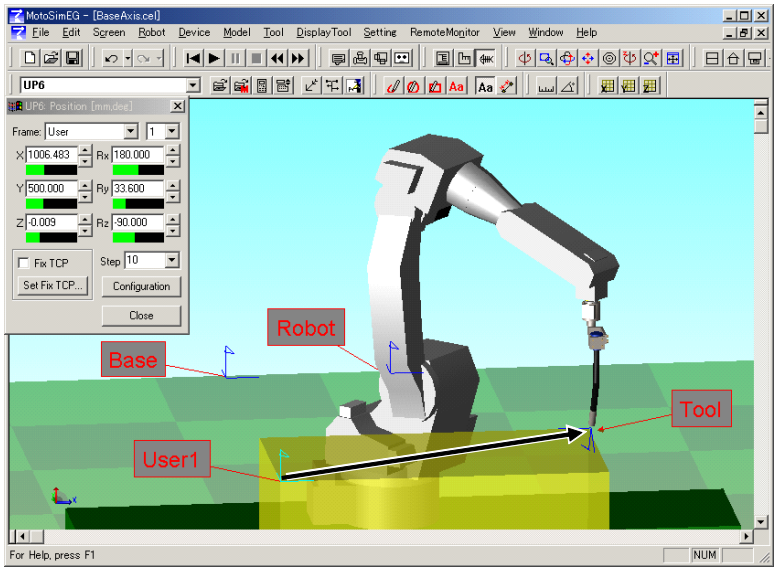


■ Tool

This frame is useful to move the robot in the Tool coordinate system (X, Y, Z, Rx, Ry, Rz) but the displayed values are always "0" even though the robot moves since the reference system and the Tool coordinate frame are the same.

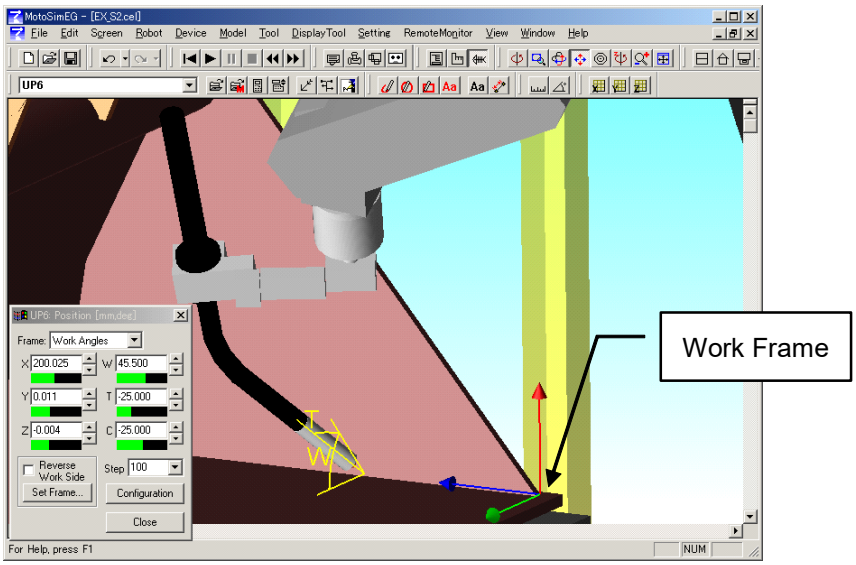
■ User

Displays the position (X, Y, Z, Rx, Ry, Rz) of the robot current Tool frame (TCP) relative to the selected user frame. When selected, a 2nd combobox will appear next to the "Frame" combobox to allow the selection of the user frame number. Only the defined user frame will appear in the list. At least one user frame need to be define in order to select the User Frame reference system.



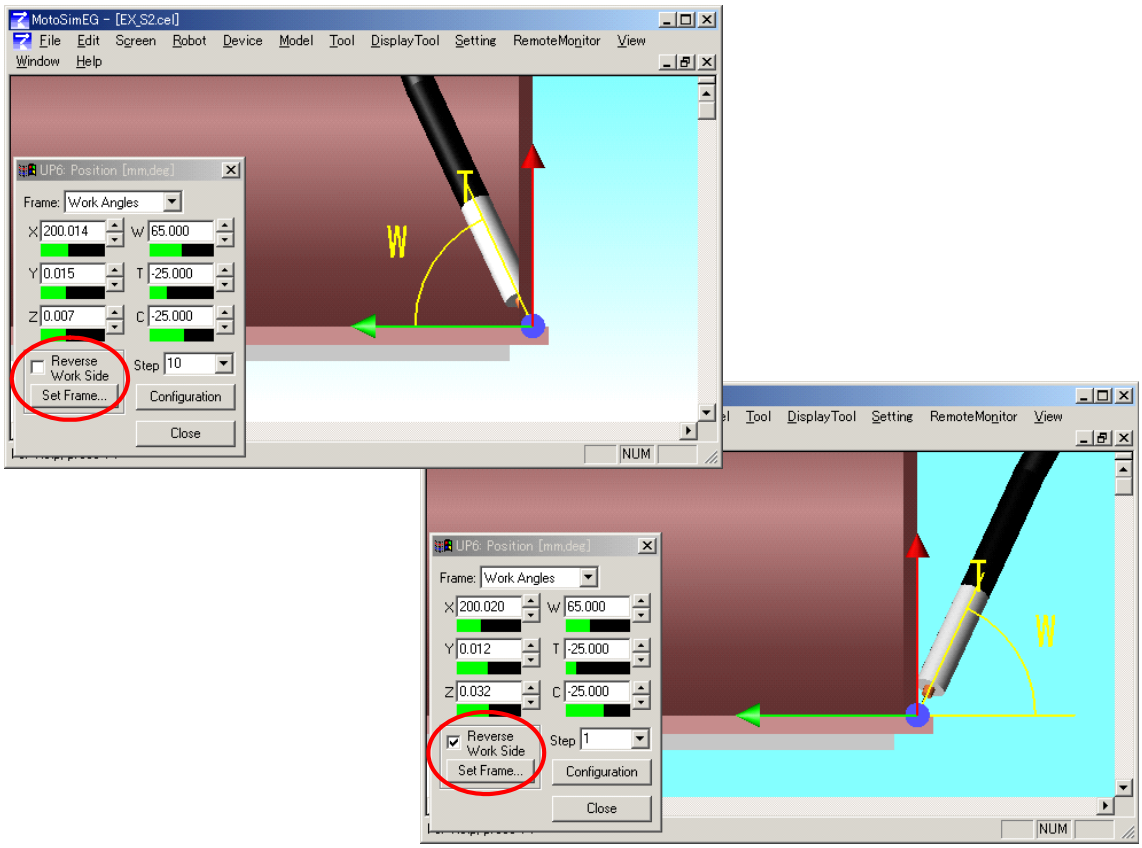
■ Work

Displays the position (X, Y, Z, W, T, C) of the robot current Tool frame (TCP) relative to the set Work frame. When this coordinate system is selected, the "Set Frame..." button and the "Reverse Work Side" checkbox will appear under the axis values.



The Work frame is defined by three components: the frame position (or origin), the travel direction, and the work surface. The normal of the work surface is set as the Z-axis (red arrow) and the tool travel direction is set as the X-axis (blue arrow). The Y-axis (green arrow) will be set perpendicular to the other two axes.

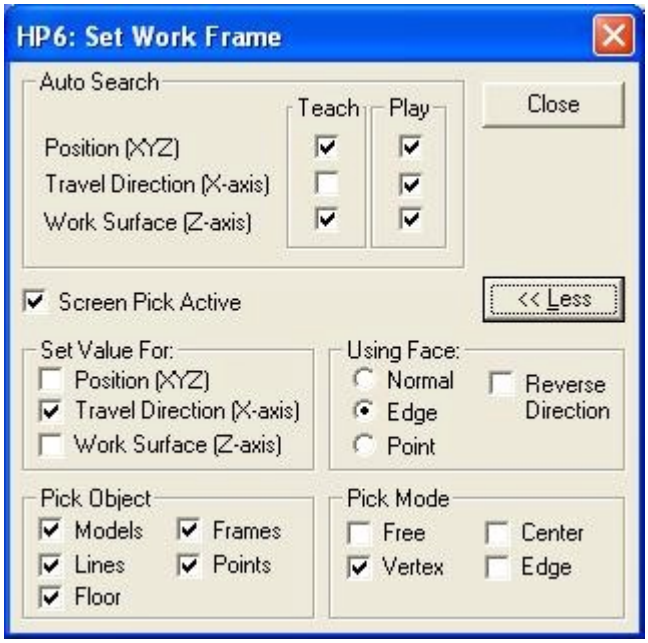
The Work angle (W) is defined by the angle between the tool and the work surface in the YZ plane. Changing the value of "W" will rotate the tool around the Work frame X-axis. The "W" angle is define between -90.0 and 90.0 degrees. The Reverse Work Side checkbox indicates if the Work Angle is on the same side then the Y-axis (unchecked) or on the opposite side (checked). If a work angle is moved over the 90.0 degree limit, the work angle side will change and the work angle will be set back within its allowable limit.



The Travel angle (T), also called the Push/Pull angle, is defined as the angle between the torch and the YZ plane. When set to 0 degree, the tool is in perpendicular to the travel direction. If "T" is positive, the tool is pushing; and if it is negative, the tool is pulling. The "C" angle is the rotation angle around the Tool Z axis.

8.1.1 Work Frame Setting

The Work frame can be set manually or automatically. Press the "Set Frame..." button to display the Work Frame Set dialog and set your preferences.



Set Work Frame

Item	Description
"Auto Search" section	Determine which components of the Work frame are to be automatically updated as the robot moves. Settings during teaching [Teach] and during playback [Play] are independently set.
[Screen Pick Active] check box	Enables the mouse picking operation.Pressing the [Shift] key enables or disables the "Screen Pick Active" mode.
[Close] button	Closes the dialog box.
[More] or [Less] button	Displays or hides the pick mode setting section.
"Set Value For:" section	Determine which values of the Work Frame will be changed when the screen is clicked.
"Use Face:" section	Determines which information for a click surface is used to set the Travel Direction or the Work Surface. [Normal] radio button: The normal of the face is used. [Edge] radio button: The edge direction closes to the picked point is used. Note if both the X-axis and the Z-axis are checked, the Z-axis is set in the Edge direction. [Point] radio button: The direction defined by the Work frame origin and the picked face point is used. The [Reverse Direction] checkbox can be used to select the opposite direction.

Set Work Frame

Item	Description
"Pick Object" section	Sets the type of objects that can be selected when clicking on the screen. Please refer to " 6.4 Pick Settings ".
"Pick Mode" section	Sets conditions determining the selected point in the clicked area. Please refer to " 6.4 Pick Settings ".

Auto Search

MotoSimEG can automatically set the Work frame by searching from the work surface. The tool Z-axis positive direction is searched to find the first intersecting face. The found face intersection point and normal can be used to calculate the frame position and Z-axis. The travel direction (or Work frame X-axis) can automatically be determined by using the robot previous position and new position.

Each component of the Work frame can be set to automatically updated as the robot moves or not. The settings are independently set for "Teach" and "Play" mode. By default the "Auto Search" is active (checked) for all the components except for the "Travel Direction" in "Teach" which tends make jogging operation of the robot difficult because the Work frame changes after each position change.

NOTE

- The Work surface search and calculation can become fairly intensive in cells with large models made of thousand of faces and will slow down the playback animation. For such cases, it may necessary to turn off (uncheck) the Work Surface auto search and manually set the Z-direction.
- When the tool is close to an edge formed by multiple faces, the face with the normal pointing upward will be selected over the other ones.
- If no surface can be found, the position is set as the tool position and the previously found normal (Z-axis) is reused.

Manually setting the Work Frame

The Work frame components can be set manually by clicking on the screen. To control the pick result, press the "More" button to display the Pick Setting section of the dialog. Select the value to be set and click on the screen to change those values to those of the clicked geometry.

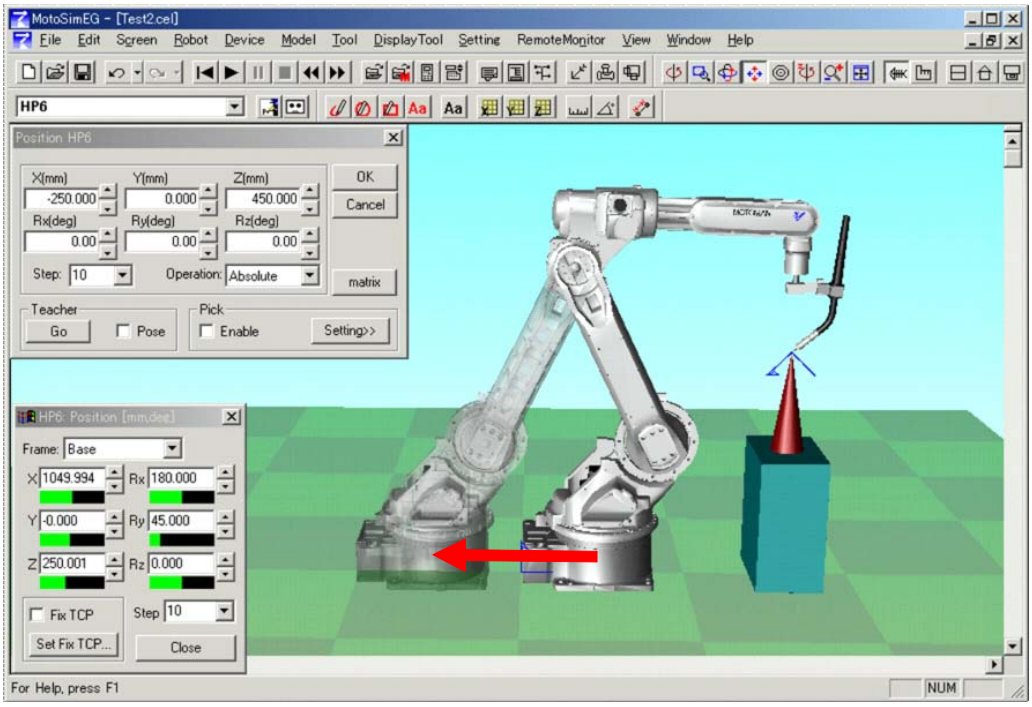
Note that the "Auto Search" - "Teach" check boxes and the "Pick" - "Set Value for" check boxes are exclusive of one another. By default, only the "Travel Direction" is checked to be manually set by using the face point information ("Use Face: point"). Therefore, clicking on the screen will cause travel direction (X-axis) to turn in the work surface plane to point toward the clicked point.

8.1.2 Fix TCP

The Fix TCP function allows fixing (or attaching) the robot TCP position relative to another model in the cell. If the robot base or the attached model is moved, the robot changes position so that it TCP remains in the same position relative to the specified model.

The Fix TCP function is enabled by the robot Position panel. Check the "Fix TCP" check box to enable the function. The default model to which the TCP is attached is the world. To change the model, press the "Set Fix TCP..." button to display the "Select Model" dialog.

This function is useful to determine the layout of a cell. For example the robot TCP can be attached to a work piece. As the robot base or work piece are moved around during the layout procedure, the robot automatically adjust itself to keep its TCP in the same position on the work piece. It then becomes obvious if the work piece become out of reach, because robot will no longer maintain its position on the work piece.

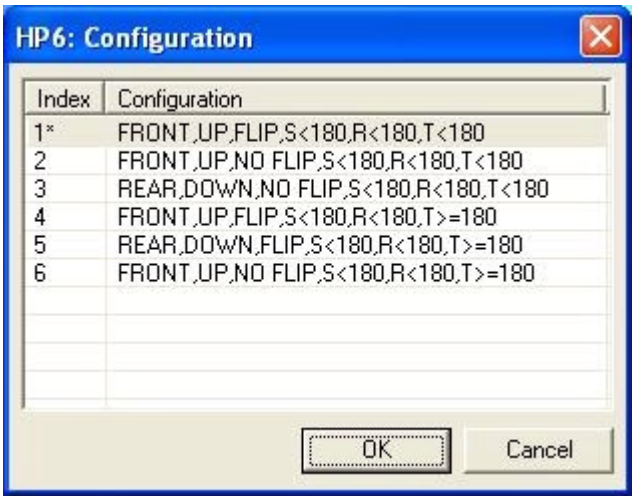


NOTE

- The function is automatically disabled if the Position panel is closed or if a job is played back.
- The Fix TCP section is not available when the Frame is set to "Work Angle".
- The Fix TCP section is not available when move the robot external axis.

8.1.3 Robot Position Configuration

The robot position "Configuration" dialog displays a list of different ways the robot can reach its current position. To display the "Configuration" dialog, select {Tool} - {Teaching} - {Robot Configuration} or from the robot "Position" panel click the "Configuration" button.



Configuration Dialog Box

Item	Description
Configuration List	Displays the list of all available robot configurations in which the robot can reach the current position. Changing the selected configuration will move the robot into the specified configuration. The asterisk next to the index number indicates the initial configuration of the robot.
[OK] button	Closes the Configuration dialog and changes the robot configuration to the select one.
[Cancel] button	Closes the Configuration dialog and returns the robot to its initial configuration.

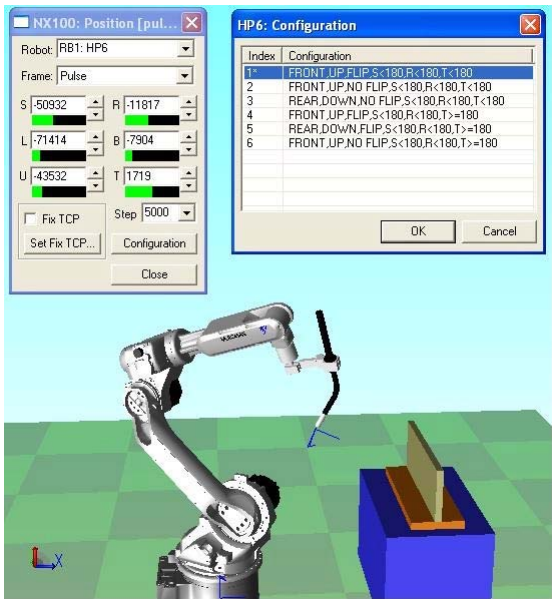
A robot can often reach the same position in different ways. The robot resulting pulse position will be different but the tool will be at same position (XYZ position). The robot configuration is used to differentiate between those possibilities.

The configuration is define by six parameters:

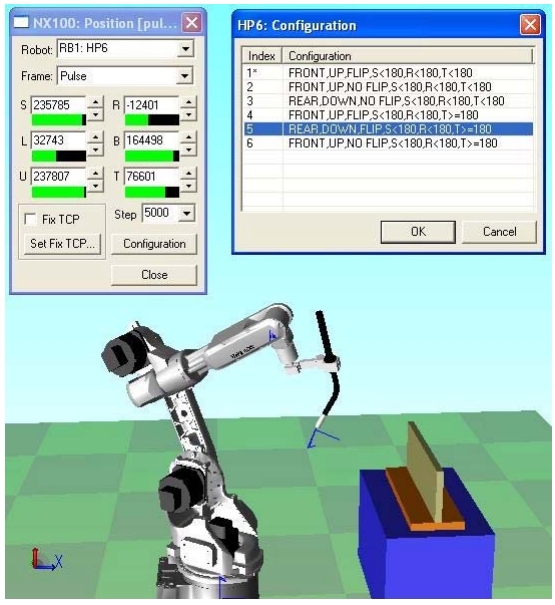
FRONT or REAR	Specifies if the B-axis rotation center is in the FRONT or the REAR of the S-axis rotation center.
UP or DOWN	Specifies if the elbow of the robot (angle between the lower and upper arm) is UP or DOWN.

FLIP or NO FLIP	YRC1000, YRC1000micro, DX200, DX100, FS100 : B-axis position Specifies if the angle of the B-axis is to be positive or negative. FLIP: B-axis angle is greater or equal to 0° NO FLIP: B-axis angle is small than 0° NX100 : R-axis position Specifies if the R axis is FLIP or NOFLIP. FLIP position indicates an angle from -90° to 90°, 270° to 360°, or -360° to -270°.
S<180 or S>=180	Specifies if the S-axis absolute angle is smaller then 180° (within one turn) or greater (over one turn).
R<180 or R>=180	Specifies if the R-axis absolute angle is smaller then 180° (within one turn range) or greater (over one turn range).
T<180 or T>=180	Specifies if the S-axis absolute angle is smaller then 180° (within one turn range) or greater (over one turn range).

Example:



FRONT,UP,FLIP,S<180,R<180,T<180



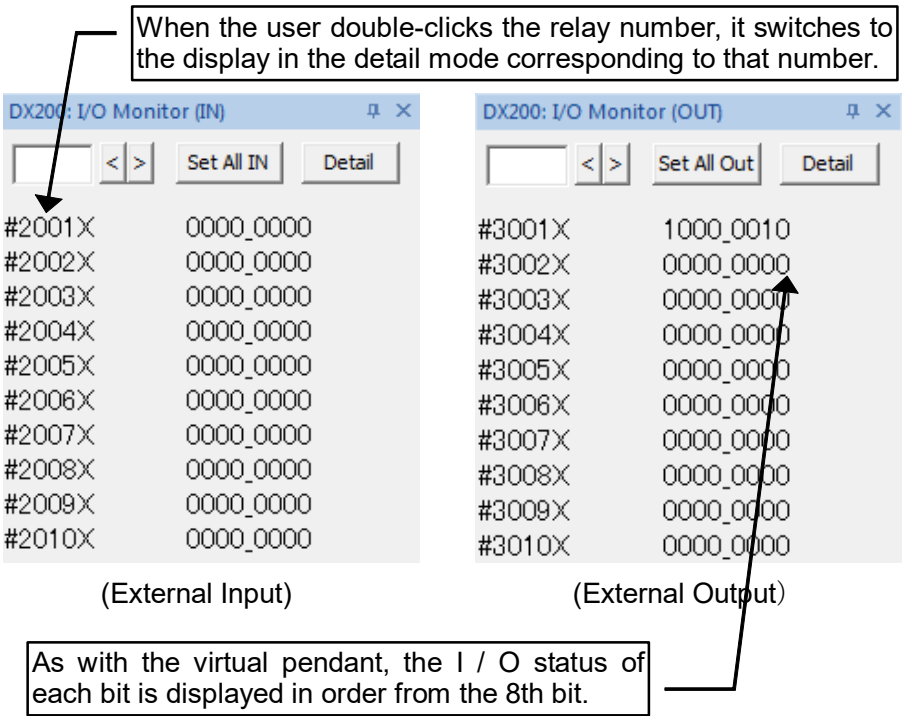
REAR,DOWN,FLIP,S<180,R<180,T>=180

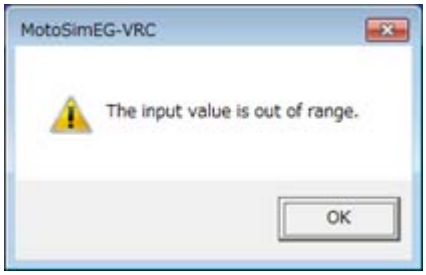
8.2 I/O Monitor

The I/O Monitor allows the simulation of input and output signals. It displays the current I/O states of the controller. The users can change input signals before or during playback of the job. Output signals can be changed by the execution of I/O instructions during job playback or by the virtual pendant.
On the [Simulation] tab, in the [Monitor] group, click the [I/O Monitor] button, and select [I/O Monitor(IN)] button, input signal monitor appears, and click the [I/O Monitor] button, and select [I/O Monitor(OUT)] button, output signal monitor appears.
The [Operation Panel] button is valid only for MOTOFEEDER cells. For details, refer to section " 13.13 Setting of Paint workpiece supplying system "MOTOFEEDER"(NX100) ".

8.2.1 Simple Mode

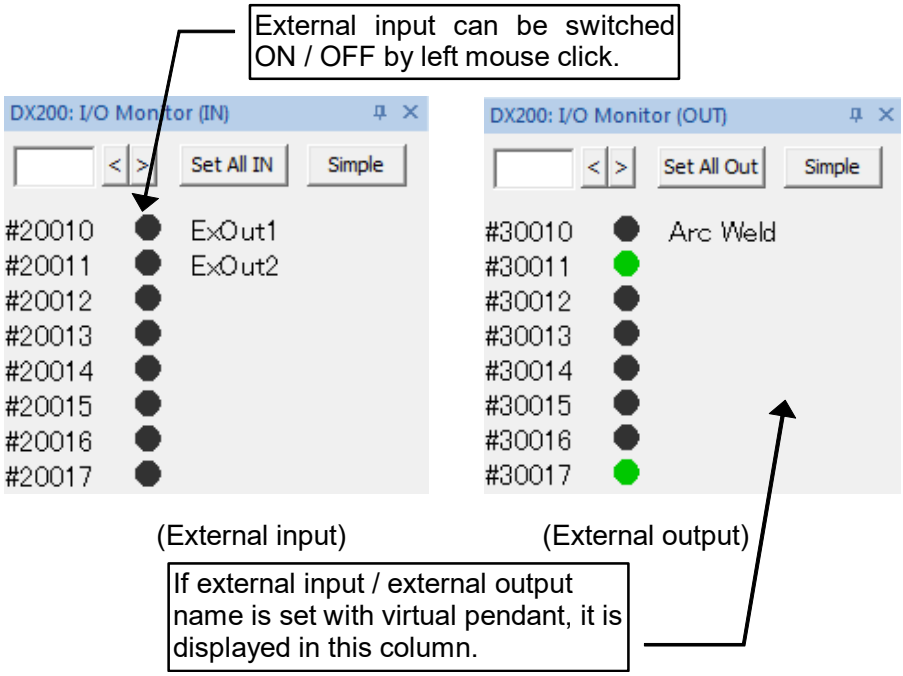
In the simple mode, you can monitor the I/O status of each group in units of 10.

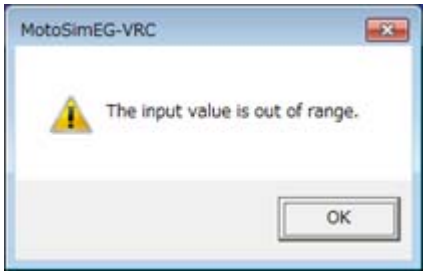


Relay number search	Enter a 5 digit number and display the page containing the corresponding I / O number. If you enter a number less than 5 digits, the following message will be displayed.  Also, if you enter a value out of range, the following message will be displayed. (example : #25128, #80080) 
Next page button	Increase I/O group number by 10.
Previous page button	Decrease I/O group number by 10.
(IN) Set All-In button	Set the I/O general input area to the forced ON state. (General input area : IN#0001?)
(OUT) Set All-Out button	Set the I/O output area to the forced ON state.
Detail mode button	Display the first group number of simple mode in detail mode.

8.2.2 Detail Mode

In the detail mode, you can check the I/O ON / OFF status in bit units of individual groups.



Relay number search	Enter a 5 digit number and display the page containing the corresponding I / O number. If you enter a number less than 5 digits, the following message will be displayed.  Also, if you enter a value out of range, the following message will be displayed. (example : #25128, #80080) 
Next page button	Move to the next group number.
Previous page button	Move to the previous group number.

(IN) Set All-In button	Set the I/O general input area to the forced ON state. (General input area : IN#0001-)
(OUT) Set All-Out button	Set the I/O output area to the forced ON state.
Simple mode button	The display returns to the simple mode display including the group number displayed at that time.
IN	The ON / OFF status from external input number from #20010 to the upper limit value for each controller is displayed. Users can also switch the ON / OFF state with the left click of the mouse.? ● (Green) : ON ● (Black) : OFF
OUT	The ON / OFF status from external output number from #30010 to the upper limit value for each controller is displayed. However, users cannot switch ON / OFF state. ● (Green) : ON ● (Black) : OFF

8.2.3 Inputs and Outputs

■ YRC1000, YRC1000micro, DX200, DX100, NX100

YRC1000

Classification of I/O signals

Logic Name	Classification	Description	Range
0xxxx	General Input	Reference with input instruction of the job.	00010 - 05127 (4096 signals)
1xxxx	General Output	Reference with input instruction of the job.	10010 - 15127 (4096 signals)
2xxxx	External Input	Signal No. corresponding to the input terminal.	20010 - 25127 (4096 signals)
3xxxx	External Output	Signal No. corresponding to the output terminal.	30010 -35127 (4096 signals)
4xxxx	Specific Input	Signal to change the operating condition of the robot.	40010 - 42567 (2048 signals)
5xxxx	Specific Output	Signal notifying the operating condition of the robot.	50010 - 55127 (4096 signals)
6xxxx	Interface Panel Input	Signal notifying the operating condition of the interface panel.	60010 - 60647 (512 signals)
7xxxx	Auxiliary Relay	Auxiliary relay in the concurrent I/O	70010 - 79997 (7992 signals)
80xxx - 85xxx	Control Status	Monitoring of the hardware signal status of the robot control section.	80010 - 85127 (4096 signals)
87xxx	Pseudo Input	Pseudo input relay reading from the system parameter.	87010 - 87207 (160 signals)
27xxx - 29xxx	Network Input	Input signal from thenetwork device.	27010 - 29567 (2048 signals)
37xxx - 39xxx	Network Output	Output signal to the network device.	37010 - 39567 (2048 signals)
Mxxxx	Register	1 word data (16 bits) General Register M000 - M559 Analog output register M560 - M599 Analog input register M600 - M639 System Register M650 - M999	M00 - M999 (1000 signals)

YRC1000micro

Classification of I/O signals

Logic Name	Classification	Description	Range
0xxxx	General Input	Reference with input instruction of the job.	00010 - 05127 (4096 signals)
1xxxx	General Output	Reference with input instruction of the job.	10010 - 15127 (4096 signals)
2xxxx	External Input	Signal No. corresponding to the input terminal.	20010 - 21287 (1024 signals)
3xxxx	External Output	Signal No. corresponding to the output terminal.	30010 -31287 (1024 signals)
4xxxx	Specific Input	Signal to change the operating condition of the robot.	40010 - 42567 (2048 signals)
5xxxx	Specific Output	Signal notifying the operating condition of the robot.	50010 - 55127 (4096 signals)
6xxxx	Interface Panel Input	Signal notifying the operating condition of the interface panel.	60010 - 60647 (512 signals)
7xxxx	Auxiliary Relay	Auxiliary relay in the concurrent I/O	70010 - 79997 (7992 signals)
80xxx - 85xxx	Control Status	Monitoring of the hardware signal status of the robot control section.	80010 - 85127 (4096 signals)
87xxx	Pseudo Input	Pseudo input relay reading from the system parameter.	87010 - 87207 (160 signals)
27xxx - 29xxx	Network Input	Input signal from thenetwork device.	27010 - 29567 (2048 signals)
37xxx - 39xxx	Network Output	Output signal to the network device.	37010 - 39567 (2048 signals)
Mxxxx	Register	1 word data (16 bits) General Register M000 - M559 Analog output register M560 - M599 Analog input register M600 - M639 System Register M650 - M999	M00 - M999 (1000 signals)

DX200

Classification of I/O signals

Logic Name	Classification	Description	Range
0xxxx	General Input	Reference with input instruction of the job.	00010 - 05127 (4096 signals)
1xxxx	General Output	Reference with input instruction of the job.	10010 - 15127 (4096 signals)
2xxxx	External Input	Signal No. corresponding to the input terminal.	20010 - 25127 (4096 signals)
3xxxx	External Output	Signal No. corresponding to the output terminal.	30010 -35127 (4096 signals)
4xxxx	Specific Input	Signal to change the operating condition of the robot.	40010 - 41607 (1280 signals)
5xxxx	Specific Output	Signal notifying the operating condition of the robot.	50010 - 53007 (2400 signals)
6xxxx	Interface Panel Input	Signal notifying the operating condition of the interface panel.	60010 - 60647 (512 signals)
7xxxx	Auxiliary Relay	Auxiliary relay in the concurrent I/O	70010 - 79997 (7992 signals)
80xxxx	Control Status	Monitoring of the hardware signal status of the robot control section.	80010 - 80647 (512 signals)
82xxxx	Pseudo Input	Pseudo input relay reading from the system parameter.	82010 - 82207 (160 signals)
27xxxx	Network Input	Input signal from thenetwork device.	27010 - 29567 (2048 signals)
37xxxx	Network Output	Output signal to the network device.	37010 - 39567 (2048 signals)
Mxxxx	Register	1 word data (16 bits) General Register M000 - M559 Analog output register M560 - M599 Analog input register M600 - M639 System Register M650 - M999	M00 - M999 (1000 signals)

DX100

Classification of I/O signals

Logic Name	Classification	Description	Range
0xxxx	General Input	Reference with input instruction of the job.	00010 - 02567 (2048 signals)
1xxxx	General Output	Reference with input instruction of the job.	10010 - 12567 (2048 signals)
2xxxx	External Input	Signal No. corresponding to the input terminal.	20010 - 22567 (2048 signals)
3xxxx	External Output	Signal No. corresponding to the output terminal.	30010 -32567 (2048 signals)
4xxxx	Specific Input	Signal to change the operating condition of the robot.	40010 - 41607 (1280 signals)
5xxxx	Specific Output	Signal notifying the operating condition of the robot.	50010 - 52007 (1600 signals)
6xxxx	Interface Panel Input	Signal notifying the operating condition of the interface panel.	60010 - 60647 (512 signals)
7xxxx	Auxiliary Relay	Auxiliary relay in the concurrent I/O	70010 - 79997 (7992 signals)
80xxxx	Control Status	Monitoring of the hardware signal status of the robot control section.	80010 - 80647 (512 signals)
82xxxx	Pseudo Input	Pseudo input relay reading from the system parameter.	82010 - 82207 (160 signals)
25xxxx	Network Input	Input signal from thenetwork device.	25010 - 27567 (2048 signals)
35xxxx	Network Output	Output signal to the network device.	35010 - 37567 (2048 signals)
Mxxxx	Register	1 word data (16 bits) General Register M000 - M559 Analog output register M560 - M599 Analog input register M600 - M639 System Register M650 - M999	M00 - M999 (1000 signals)

FS100

Classification of I/O signals

Logic Name	Classification	Description	Range
0xxxx	General Input	Reference with input instruction of the job.	00010 - 01287 (1024 signals)
1xxxx	General Output	Reference with input instruction of the job.	10010 - 11287 (1024 signals)
2xxxx	External Input	Signal No. corresponding to the input terminal.	20010 - 21287 (1024 signals)
3xxxx	External Output	Signal No. corresponding to the output terminal.	30010 -31287 (1024 signals)
4xxxx	Specific Input	Signal to change the operating condition of the robot.	40010 - 41607 (1280 signals)
5xxxx	Specific Output	Signal notifying the operating condition of the robot.	50010 - 52007 (1600 signals)
6xxxx	Interface Panel Input	Signal notifying the operating condition of the interface panel.	60010 - 60647 (512 signals)
7xxxx	Auxiliary Relay	Auxiliary relay in the concurrent I/O	70010 - 79997 (7992 signals)
80xxxx	Control Status	Monitoring of the hardware signal status of the robot control section.	80010 - 80647 (512 signals)
82xxxx	Pseudo Input	Pseudo input relay reading from the system parameter.	82010 - 82207 (160 signals)
25xxxx	Network Input	Input signal from thenetwork device.	25010 - 26287 (1024 signals)
35xxxx	Network Output	Output signal to the network device.	35010 - 36287 (1024 signals)
Mxxxx	Register	1 word data (16 bits) General Register M000 - M559 Analog output register M560 - M599 Analog input register M600 - M639 System Register M650 - M999	M00 - M999 (1000 signals)

NX100

Classification of I/O signals

Logic Name	Classification	Description	Range
0xxxx	General Input	Reference with input instruction of the job.	00010 - 01287 (1024 signals)
1xxxx	General Output	Reference with input instruction of the job.	10010 - 11287 (1024 signals)
2xxxx	External Input	Signal No. corresponding to the input terminal.	20010 - 21287 (1024 signals)
3xxxx	External Output	Signal No. corresponding to the output terminal.	30010 -31287 (1024 signals)
4xxxx	Specific Input	Signal to change the operating condition of the robot.	40010 - 40807 (640 signals)
5xxxx	Specific Output	Signal notifying the operating condition of the robot.	50010 - 51007 (800 signals)
6xxxx	Interface Panel Input	Signal notifying the operating condition of the interface panel.	60010 - 60647 (512 signals)
7xxxx	Auxiliary Relay	Auxiliary relay in the concurrent I/O	70010 - 79997 (79921 signals)
80xxxx	Control Status	Monitoring of the hardware signal status of the robot control section.	80010 - 80647 (512 signals)
82xxxx	Pseudo Input	Pseudo input relay reading from the system parameter.	82010 - 82127 (96 signals)
22xxxx	Network Input	Input signal from thenetwork device.	22010 - 23287 (1024 signals)
32xxxx	Network Output	Output signal to the network device.	32010 - 33287 (1024 signals)
Mxxxx	Register	1 word data (16 bits)	M00 - M499 (500 signals)

An External Input signal (#20010 - #25127(YRC1000, DX200), #22567(DX100), #21287(YRC1000micro, FS100, NX100)) or External Output signal (#30010 - #35127(YRC1000, DX200), #32567(DX100), #31287(YRC1000micro, FS100, NX100)) can be operated in the I/O monitor dialog..

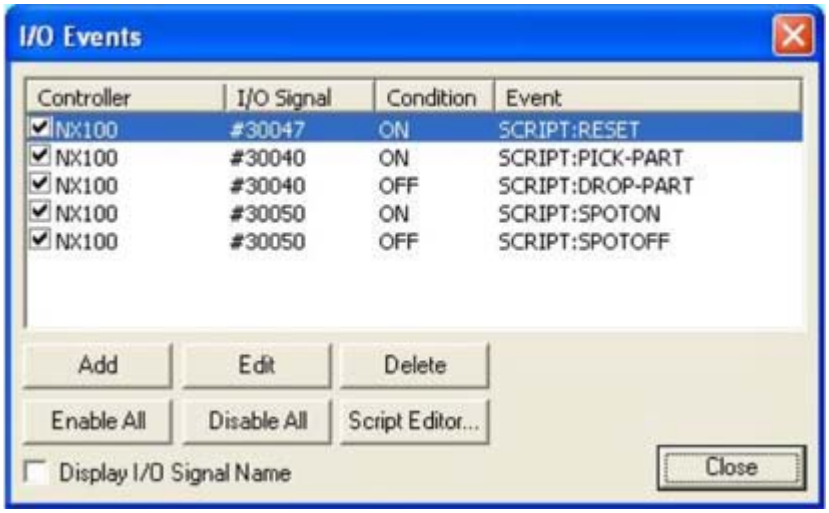
The dedicated I/O assignment depends on the controller selected application, the first 16 I/O points are normally configured has dedicated I/O. The remaining I/O points are assigned to the General I/O.

Input	Output
20010 - 20017: Dedicated Input 20020 - 20027: Dedicated Input	30010 - 30017: Dedicated Output 30020 - 30027: Dedicated Output
20030 - 20037 : General I/O (IN#001-008) 20040 - 20047 : General I/O (IN#009-016) 20050 - 20057 : General I/O (IN#017-024) : : :	30030 - 30037 : General I/O (OUT#001-008) 30040 - 30047 : General I/O (OUT#009-016) 30050 - 30057 : General I/O (OUT#017-024) : : :

8.3 I/O Events

An I/O Event allows to monitor a specific I/O state during playback. When the I/O state changes to a set condition, it triggers an event, which executes a model script.
For example, in a handling application, if the output #1 is used to open and close the gripper, an event can be linked to this I/O signal in MotoSim EG-VRC to execute a model script to change the gripper appearance to an open or close state.
On the [Simulator] tab, in the [I/O Setting] group, click the [I/O Events Maneger] button, the [I/O Events] dialog appears.

8.3.1 I/O Event Manager



I/O Events Dialog Box

Item	Description
I/O Event list	List of all the I/O Events registered in the cell. • Controller: Name of the controller. The checkbox on the left of the controller name, indicates if the I/O Event is enables or not. The enable state can be changed by clicking on the checkbox. • I/O Signal: Displays the I/O number or I/O name of the I/O signal being monitors. Displayed information is changed by checking or unchecking the “Display I/O Signal Name” checkbox. • Condition: The event will execute when the I/O signal changes to this condition (ON or OFF). • Event: Description of the event that will be executed when the I/O signal changes to the set condition. Double-clicking on an I/O Events will display its I/O Event Property dialog for edition.
[Display I/O Signal Name] checkbox	When checked the I/O Signal column in the list displays the I/O name instead of the I/O number.
[Add] button	Displays the “I/O Event Property” dialog to create a new I/O event.
[Edit] button	Displays the “I/O Event Property” dialog of the currently selected I/O Event for edition.
[Delete] button	Deletes the currently selected I/O Event.
[Enable All] button	Enables all of the I/O Events
[Disable All]button	Disables all of the I/O events.
[Script Editor]button	Displays the “Model Script Editor” dialog to add or edit the model scripts. (For details, refer to " 11.12 Model Script ")
[Close]button	Closes the I/O Events dialog.

■ Adding the comment for each external I/O points

The comment for each external I/O points can be added in the VRCNXMAIN.INI file under the [IO_ALLOC] section.

The information is entered in the following format:
LG<External I/O No.>=Comment
For example:
File:VRCNXMAIN.INI
[IO_ALLOC]
LG20030=IN0001
LG20031=IN0002
LG20032=IN0003
:
:
:

8.3.2 I/O Event Property

The “I/O Event Property” dialog box is displayed by pressing the [Edit] or [Add] button of the “I/O Events” dialog box.
It allows setting the I/O Event properties such as the I/O signal, condition and event.

“I/O Event Property” Dialog Box

Item	Description
[Enable]	Indicates that the I/O Event will be monitored during playback when checked.
[Controller]	Selects the controller associated with the I/O Event. This field cannot be modified when editing an existing I/O Event.

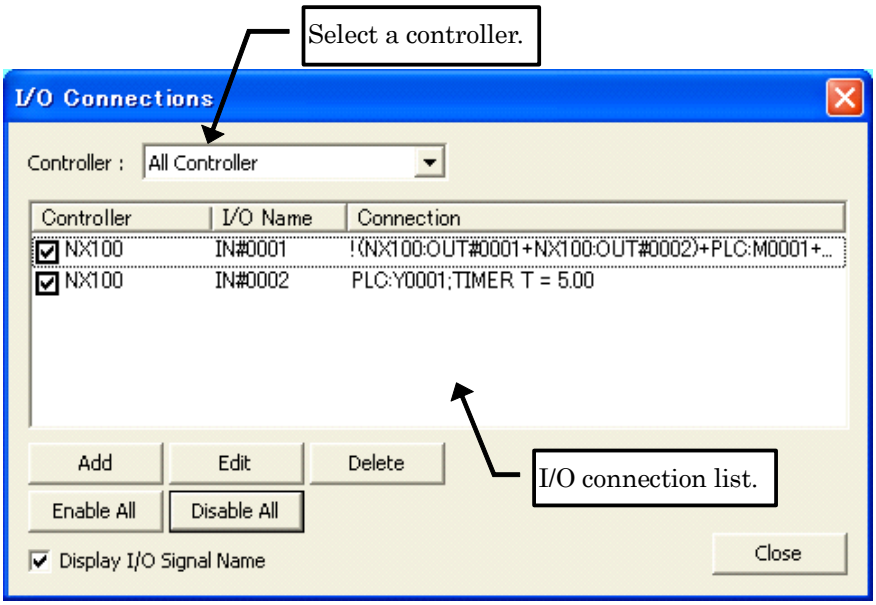
Item	Description
[I/O Signal]	Selects the controller I/O signal that will be monitored during playback. The combobox list contains both the I/O number and I/O name, but only one of the information will display in the box. Displayed information is changed by checking or unchecking the “Display I/O Name” checkbox. The combobox list only contains the I/O signals available on the selected controller. Changing controller selection changes the list content.
[Condition]	Selects if the event will execute when the I/O signal changes to the ON or OFF condition.
[Event]	Enter or select the script name to be executed when the I/O signal changes to the set condition.
[OK] button	If in [Add] mode: adds a new I/O Event definition. If in [Edit] mode: updates the selected I/O Event definition. Closes the “I/O Event Property” dialog box.
[Cancel] button	Closes the “I/O Event Property” dialog box.

NOTE The I/O names displayed for the I/O signals correspond to those defined in the VRCNXMAIN.INI file (For detail, refer to section " Adding the comment for each external I/O points ")

8.4 I/O connection

The I/O connect allows to exchange I/O signals between robot controllers.
It is possible to interlock the motion of robot to set this function.
On the [Simulator] tab, in the [I/O Setting] group, click the [I/O Connection Maneger] button, the [I/O Connections] dialog appears.

8.4.1 Management of I/O connection



I/O Connection

Item	Description
Controller	The robot controller can be selected. When selected the "ALL Controller", all setting can be displayed in current cell.

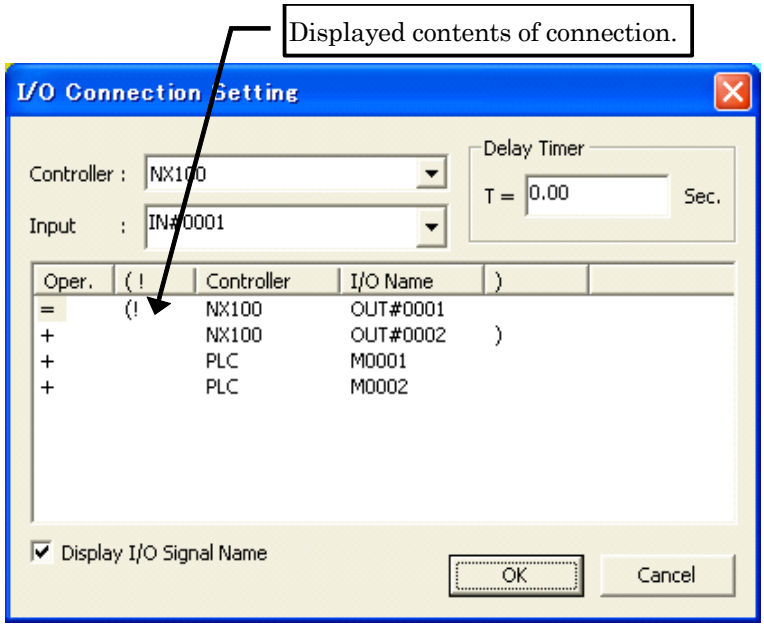
I/O Connection

Item	Description
I/O connection list	List of all the I/O connections registered in the cell. • Controller: Name of the controller. The checkbox on the left of the controller name, indicates if the I/O Event is enables or not. The enable state can be changed by clicking on the checkbox. • I/O Name: Displays the I/O number or I/O name of the I/O signal being input. Displayed information is changed by checking or unchecking the “Display I/O Signal Name” checkbox. • Connection: The value of connection will be output to I/O name signal. Double-clicking on an I/O Connections will display its I/O Connection Property dialog for edition.
[Display I/O Signal Name] checkbox	When checked the I/O Name column in the list displays the I/O name instead of the I/O number.
[Add] button	Displays the I/O Connection Setting dialog to create a new I/O Connection.
[Edit] button	Displays the I/O Connection Setting dialog of the currently selected I/O Connection for edition.
[Delete] button	Deletes the currently selected I/O Connection.
[Enable All] button	Enables all of the I/O Connection.
[Disable All]button	Disables all of the I/O Connection.
[Close]button	Closes the I/O Connection dialog.

The I/O names displayed for the I/O signals correspond to those defined in the VRCNXMAIN.INI file (For detail, refer to section " Adding the comment for each external I/O points ")

8.4.2 I/O Connection setting

The I/O Connect setting dialog box is displayed by pressing the [Edit] or [Add] button of the I/O Connection dialog box. It allows setting the I/O Connection properties such as the I/O Name and connection.



I/O Connection setting

Controller	The robot controller can be selected to edit the I/O connection.
Input	Select the controller I/O name that will be connected. Displayed information is changed by checking or un-checking the [Display I/O Name check] box. The combo-box list only contains the I/O Names available on the selected controller. Changing controller selection changes the list content.
Delay Timer	The time can be set to delay to substitute connection for input. (Unit of time is second)
[Display I/O Signal Name] checkbox	When checked the I/O Name column in the list displays the I/O name instead of the I/O number
Connection	Displayed contents of connection by selecting the Input. • [Oper.]: "+","*", " " can be selected. • [(!]: "!", "(", "!(", "(!", " " can be selected. • [Controller]: The robot controller can be selected that will have the output signals. • [I/O Signal]: Displayed I/O signals as output by un-checking the [Display I/O Signal Name] checkbox. • [I/O Name]: Displayed I/O names as output. • [ )]: ")", " " can be selected. Should be set to be equal to the number of pre brackets.
[OK] button	If in [Add] mode: adds a new I/O Connection definition. If in [Edit] mode : updates the selected I/O Connection definition. Closes the I/O Connection Property dialog.

I/O Connection setting

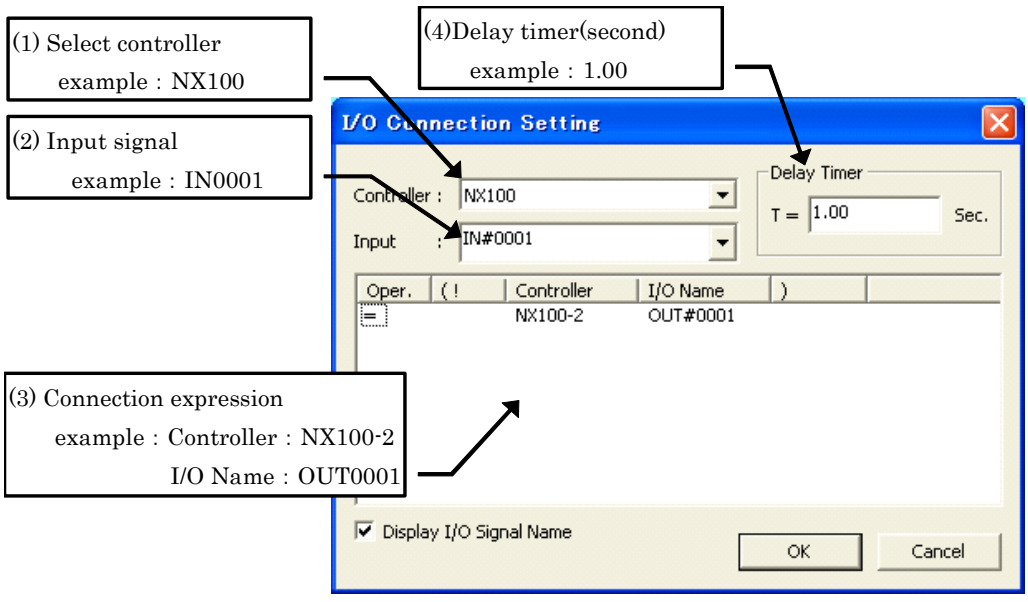
[Cancel] button	Closes the I/O Connection Property dialog.

Logical expression

+	Mean OR (∪).
*	Mean AND (∩).
!	Mean NOT. This will be used to set "make-before-break contact".
( )	Mean bracket.

Procedure

1. When pushed [Add] button, displays the I/O Connection Setting dialog to create a new I/O Connection. When pushed [Edit] button , Displays the I/O Connection Setting dialog of the currently selected I/O Connection for edition.
2. After setting each items, and pushed [OK] button, connection will be updated. Below is example setting, the [OUT001] of [NX100-2] will be set to the [IN001] of [NX100-1] after 1.0 second.



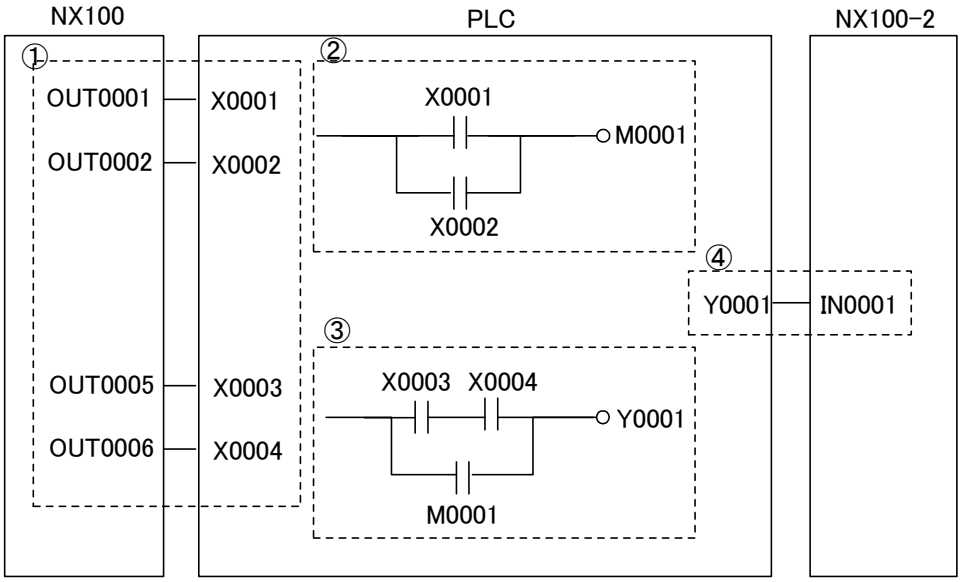
■ PLC setting

The PLC device can be used to set the complicated connection
“X“, “Y“, “M“ means,

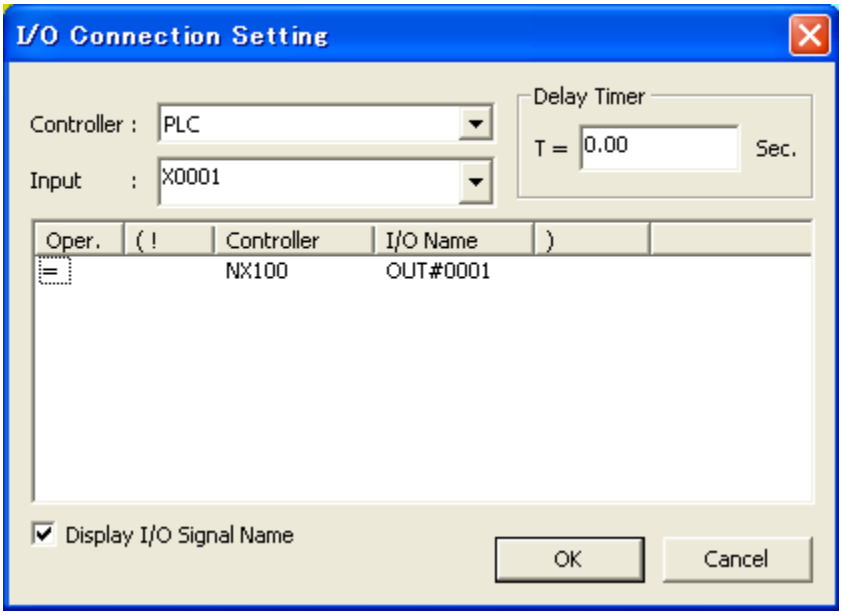
- “X“ : Input signal
- “Y“ : Output signal
- “M“ : Internal register

The maximum number of each signal is 128.

Below is example diagram to set,

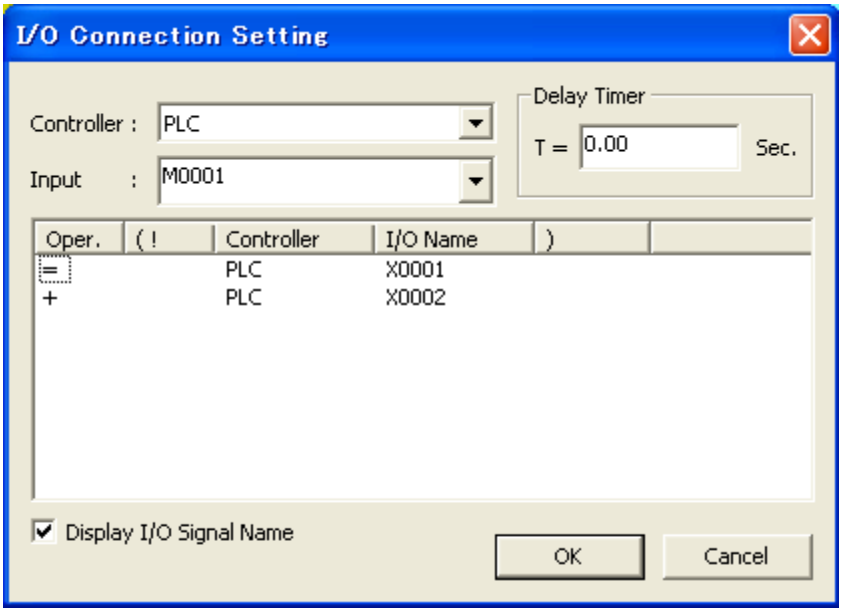


1. Set to substitute OUT001 of NX100 for X001 of PLC device.

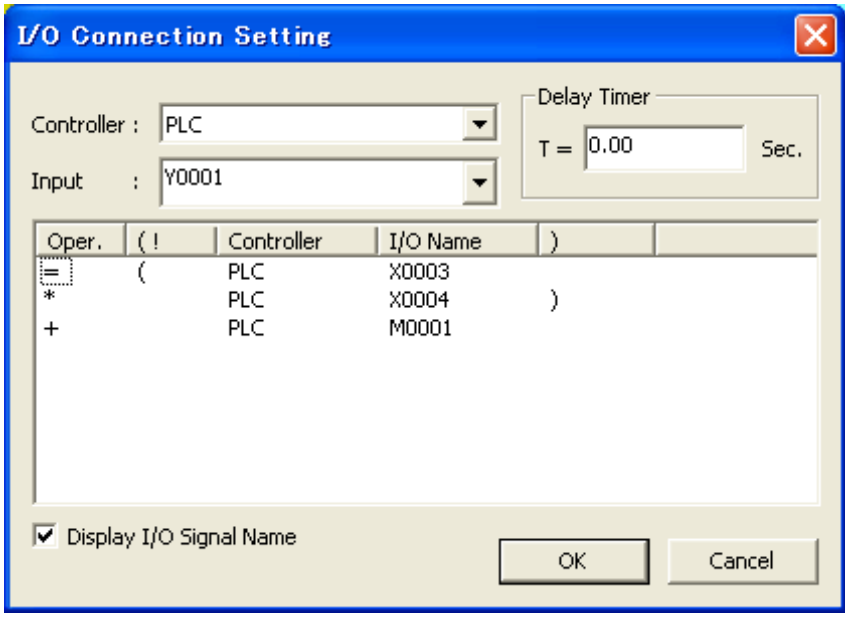


Also, “OUT0002”, “OUT0005” and “OUT0006”set to substitute “X0002”, “X0003” and “X0004” of PLC device.

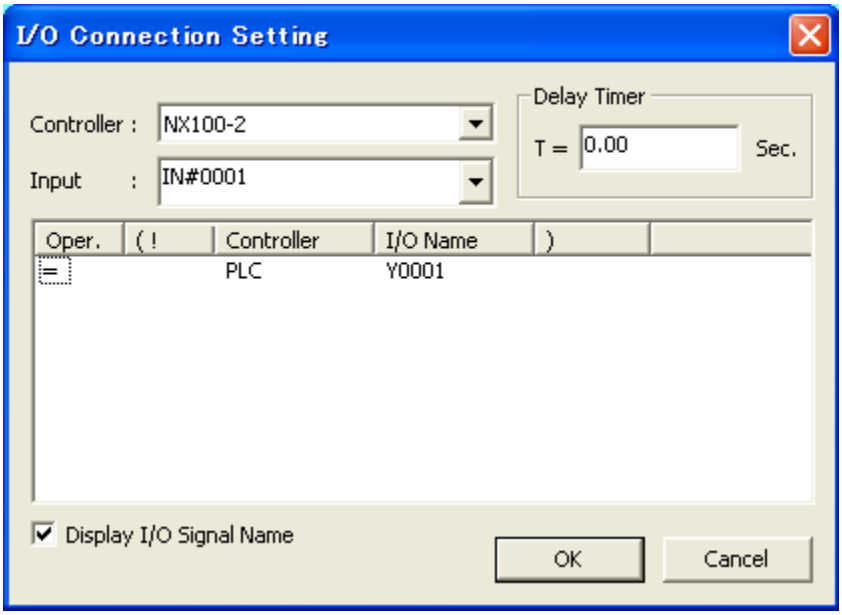
2. Set to substitute the internal register [PLCX:0001+PLC:X0002] for [PLC:M0001].



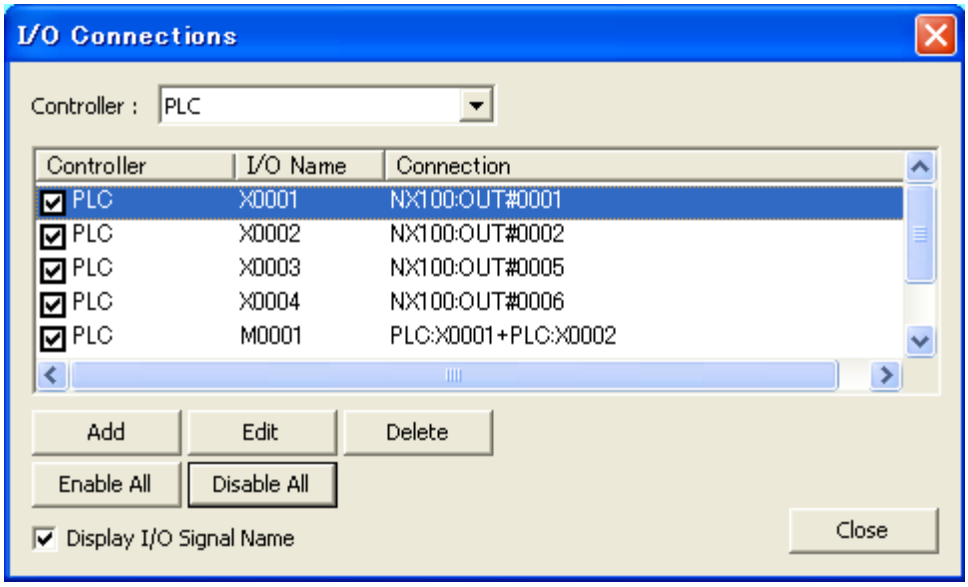
3. Set to substitute the internal register [(PLC:X0003*PLC:X0004) + PLC:M0001] for PLC:Y0001.



4. Finally, set to substitute PLC:Y001 for NX100-2:IN001.

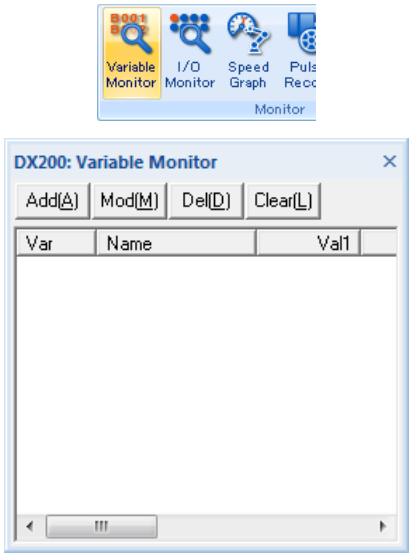


The setting of example diagram is finished,

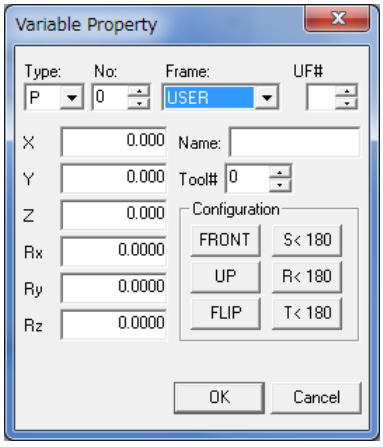


8.5 Variable Monitor

Displaying and editing the robots are enabled by setting the Variable Monitor.
On the [Simulator] tab, in the [Monitor] group, click the [Variable Monitor] button, the [Variable Monitor] dialog appears.



Variable Monitor

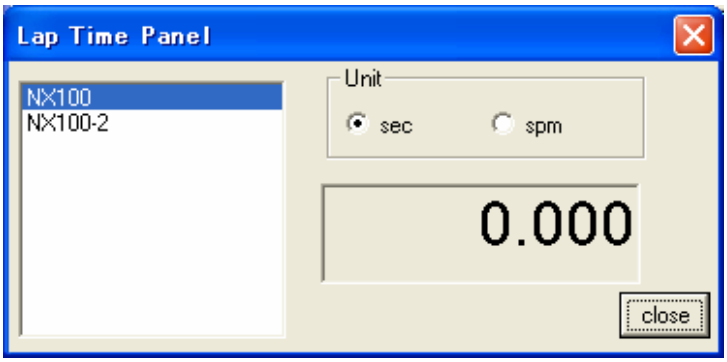
Item	Description
[Add(A)] button	Displays the Variable Property dialog box to set the variables to be displayed and edited. When setting a position variable (such as P, BP, EX variables), be sure to specify the frame (coordinate) in the FRAME combo box. Setting of FRAME: Variable P: When "USER" has been selected, set the user coordinate number in the [UF#] box. Variable BP: Enabled only when "PULSE" or "BASE" is selected. Variable EX: Enabled only when "PULSE" is selected. 

Variable Monitor

Item	Description
[Mod(M)] button	Displays the Variable Property dialog box to modify the variables. If "PULSE" is selected in the FRAME combo box when a position variable (such as P, BP, EX variables) is selected in the Name combo box, no selection can be made in the .TYPE. section.
[Del(D)] button	Deletes the selected variables.
[Clear(L)] button	Deletes all the variables displayed in the Variable Monitor window.
[Close(C)] button	Closes the Variable Monitor window.

8.6 Lap Time Panel

The Lap Time Panel dialog box shows playback time of a specified section or the number of stroke per minute (spm).
On the [Simulator] tab, in the [Monitor] group, click the [Lap Time Panel] button, the [Lap Time Panel] dialog appears.



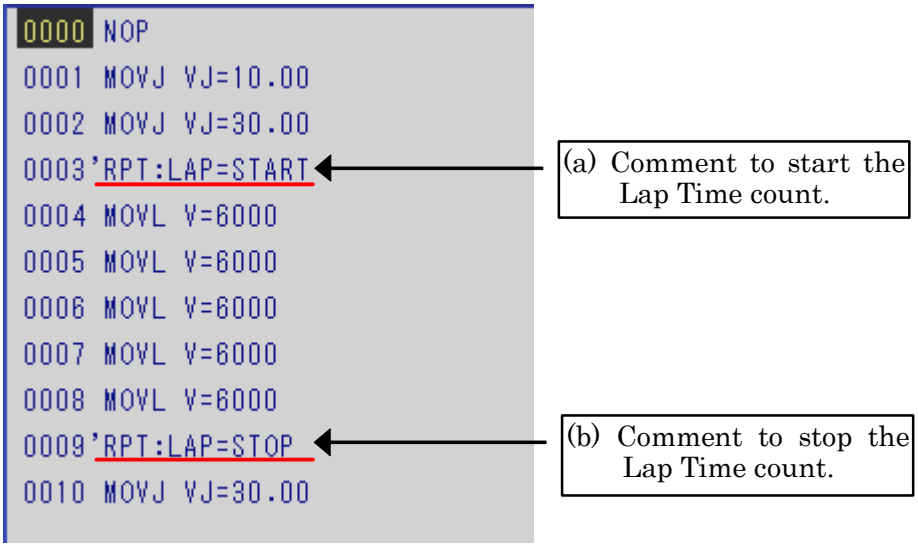
NOTE This function can not be used with high-speed playback function. Refer to section " 7.5.4 Refresh Interval " about high-speed playback function.

Procedure

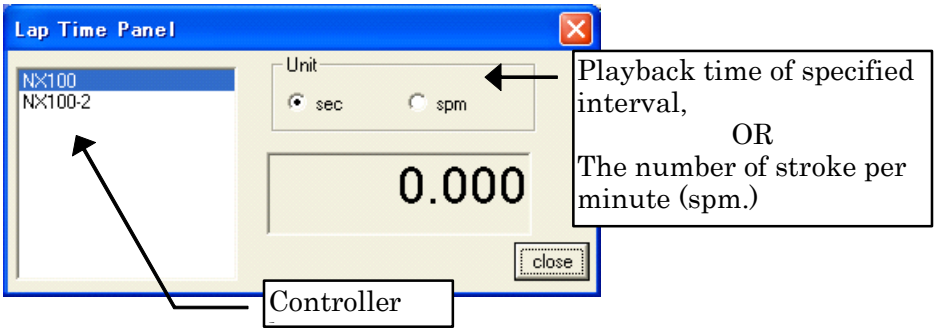
1. Enter the following comment at the point where the lap time count is to be started. (Note that the comment has to be entered before the start point as shown in the figure below at "(a)".)
   'RPT:LAP=START

2. Enter the following comment at the point where the lap time count is to be stopped. (Note that the comment has to be entered after the end point as shown in the figure below at "(b)".)

   'RPT:LAP=STOP



3. On the [Simulator] tab, in the [Monitor] group, click the [Lap Time Panel] button, the [Lap Time Panel] dialog appears.



4. Play back the job.

NOTE Controllers can not be selected during the playback.

5. After the playback, the Lap Time Panel dialog box shows the playback time between two points specified in step 1 and 2 above, or the number of stroke per minute (spm) of the currently selected controller.
   To display the lap time of each controllers, change the robot selection in the controller list.

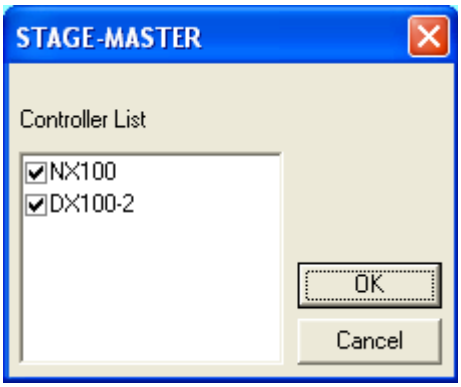
6. Press 

to reset the value to zero in the Lap Time Panel dialog box.

8.7 Stage Master

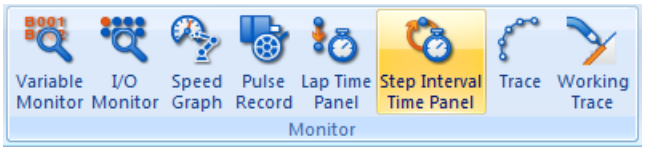
The Stage Master dialog allows selecting which controller will be affected by the 

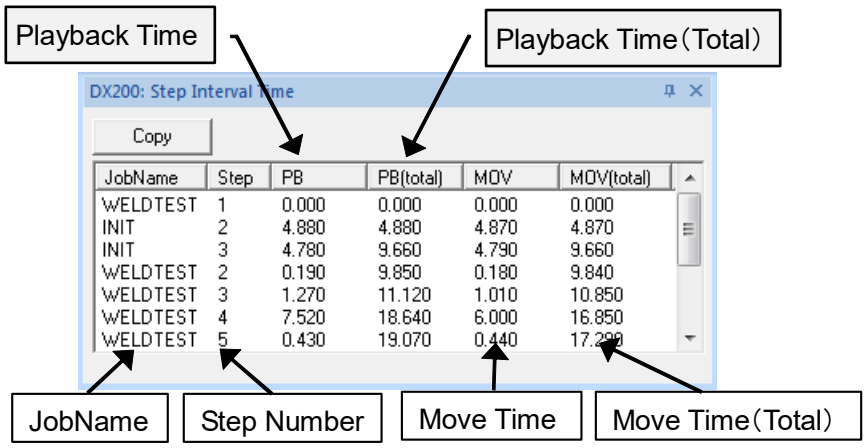
playback start command.
On the [Simulator] tab, in the [Playback] group, click the [Stage Master] button, the [Stage Master] dialog appears.
In the Stage Master dialog, put a check mark next to the controller that will be affected by the playback start command then press [OK] to close the dialog.



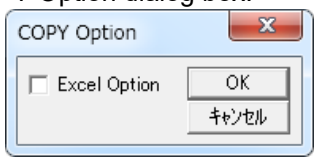
8.8 Step Interval Time Panel

When playback with the Step Interval Time dialog box, the tact time of every step are shown. When a cursor moves to an indicated list after playback completion, a robot moves to the teaching point.
To display the Step Interval Time dialog box, on the [Simulation] tab, in the [Monitor] group, click the [Step Interval Time Panel] button.





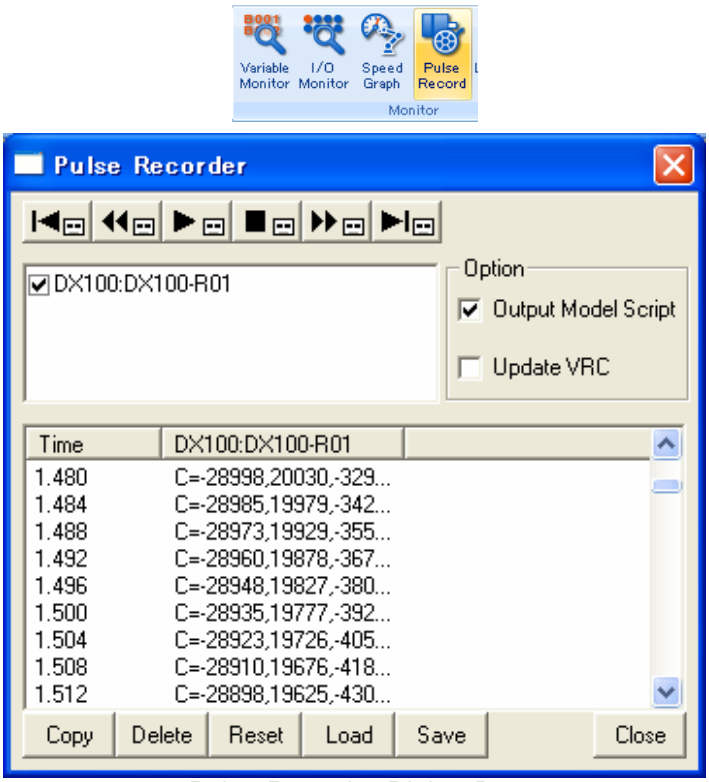
Step Internal Time Dialog Box

Item	Description
[Copy]button	Stores the content of the list on the clipboard. Selects whether to paste data into the text document or Excel spread sheet in COPY Option dialog box. 

8.9 Pulse Recorder

When playback is performed with [Pulse Recorder] dialog box displayed on the screen, the pulse position of the specified robot or the model information are displayed in the dialog box at every screen refresh. When it needs that the model information are displayed, Check the [Output Model Script].
When moving the cursor in the displayed list of data, if the selected data line contains pulse information, the robots are moved to the specified pulse positions. If the selected data line contains model information, the model script is executed.

On the [Simulator] tab, in the [Monitor] group, click the [Pulse Recorder] button, the [Pulse Recorder] dialog appears.



Pulse Recorder Dialog Box

Item	Description
	Moves the cursor to the first data line and executes it.
	Move the cursor to the previous data line and executes the line.
	Continuously executes the data line in the pulse record from the cursor current position to the end of the list or until stopped.
	Stops the continuous execution of the data lines started by pressing the  button.
	Moves the cursor to the next data line and executes the line.

Pulse Recorder Dialog Box

Item	Description
	Moves the cursor to the last data line and executes it.
Output Model Script	Model information is displayed in the list of pulse record.
Update VRC	When the pulse record is played, the robot position is set to the controller. If this item is "OFF", the playback gets faster because the robot position is not reflected.
[Copy] button	Copies all the data lines to the clipboard.
[Delete] button	Deletes the data line where the cursor is located.
[Reset] button	Deletes the all the data lines.
[Load] button	Retrieves the previously saved data lines from a text file (.txt).
[Save]button	Stores all the data lines in a text file (.txt).
[Close]button	Closes the Pulse Recorder.

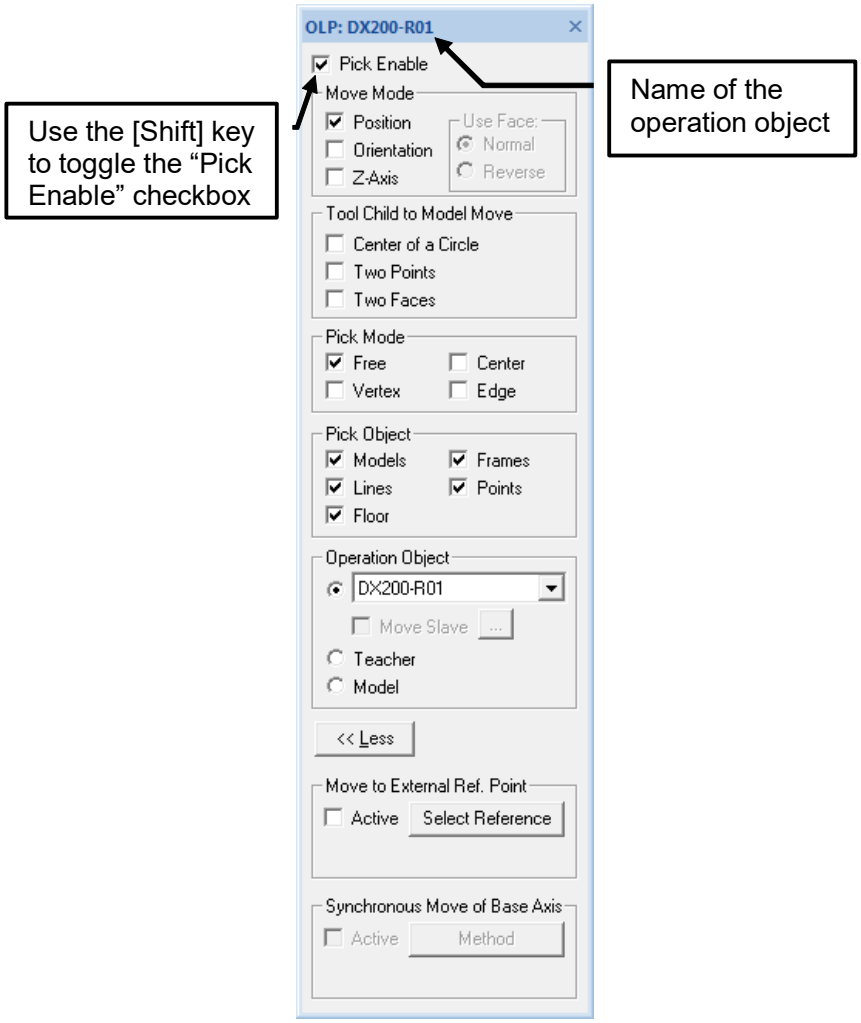
NOTE

- Buttons in the Pulse Recorder dialog box can only be used after a job has been played back.
- When the pulse record is played, the robot position is updated at refresh intervals. Refer to section " 7.5.4 Refresh Interval "" for refresh interval.

8.10 Teaching

8.10.1 OLP

OLP is a teaching tool that simplifies the robot teaching by moving the robot to an target position.
On the [Home] tab, in the [Teaching group, click the [OLP] button, the [OLP] dialog appears.
For the details on how to use OLP, refer to " 13.1 Teaching Using OLP Function ".



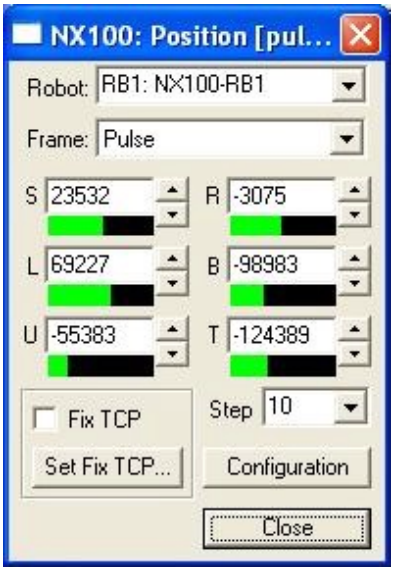
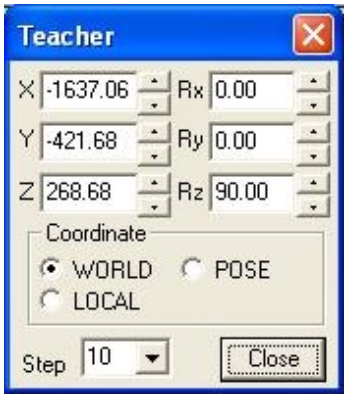
OLP dialog box

Item	Description
[OLP Pick] check box	To be selected whenever OLP is used. The check box is automatically cleared when another function is selected to operate the robot.
“Move Mode” section	Determines the method to move to the target point. [Position] check box: The Operation Object is moved to the position (XYZ) of the target point. [Orientation] check box: The Operation Object is turned to match the orientation (Rx, Ry, Rz) of the target point frame. [Z-Axis] check box: The Operation Object is turned so that its Z-axis matches the Z-axis of the target point frame. [Use Face] section: This setting is enable with [Orientation] or [Z-Axis] mode. It can be use to change the direction of the Z-Axis when selecting a face. [Normal] radio button: The Z-axis is in the same direction as the face normal. [Reverse] radio button: The Z-axis is in the opposite direction of the face normal. NOTE If only the orientation is to be changed without changing the position, uncheck the [Position] checkbox before clicking any point.
“Tool Child to Model Move” section	Sets the movement method when moving the target point. NOTE • Only the robot can be selected as the operation target. • The model that can be picked at the first point by [Two Point] or [Two Faces] is only the model registered under the flange of the selected robot in [Operation Object]. • When the item of [Tool Child to Model Move] is enabled, [Move to External Ref. Point] is disabled. [Center of a circle] check box: Move the robot's TCP toward the center of the circle obtained by picking three points. [Two Points] check box: Moves the robot's TCP so that the selected first point matches the second point. [Two Faces] check box: Move the robot's TCP so that the selected first face matches the second face.

OLP dialog box

Item	Description
“Pick Mode” section	Sets conditions determining the selected point in the clicked area. [Free] check box: Point of the model at the clicked position. [Vertex] check box: Nearest vertex from the clicked position. [Center] check box: Center of the nearest face or edge from the clicked position. [Edge] check box: Nearest edge point from the clicked position.
“Pick Object” section	Sets the type of the object to be selected when clicking on the cell view. (Multiple items can be selected) [Model] check box: Solid models. [Frame] check box: Model frame or AXIS6 models. [Lines & Inters] check box: Lines such as LINE part, WORK line and wireframe model, and intersection lines generated by the intersection of parts or models. [Point] check box: Points such as TRACE points. [Floor] check box: FLOOR parts.

OLP dialog box

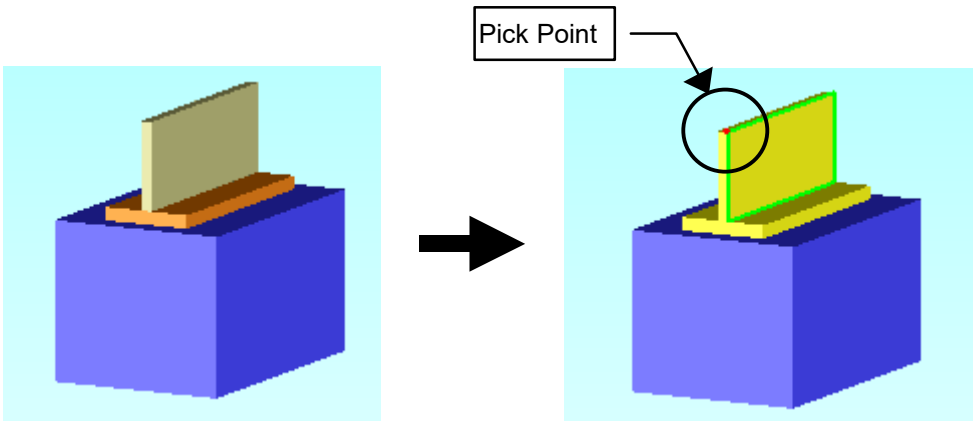
Item	Description
“Operation Obj” section	Selects an object to be moved to the target point. [Robot TCP] radio button: -Sets the robot TCP as the object to move.To select the robot, please refer to section " 7.3 Deleting a Controller ". [Move Slave] checkbox: - When checked, the [Move Slave] function is enabled. When a robot or station is moved, other slave robots from the same controller are moved with it so that their TCP maintain the same relative position to the moved robot or station. By default all robots are set as slave. The individually setting of each robot can be changed by pressing the [...] button to display the “Set Slave Robot” dialog. [Teacher] radio button: -Sets the “Teacher” coordinate axis as the object to move. [Model] radio button: -Sets the selected model as the object to move. Model can be selected with or {Screen} - {Model} - {SelectModel} or the [CADTree]. [XYZ] button: -Displays the position data panel as shown below to manually modify the position or orientation of the operation object.  Position dialog  Teacher dialog NOTE Refer to the dialog title bar to confirm the operation object name.

OLP dialog box

Item	Description
“Move to External Ref. Point” section	TUse to move the part held by the robot to a specific point (External Reference Point). [Active] check box: - When check the robot will move the point clicked on the model it is holding to the defined external reference. [Select Reference] button: Displays the Select Model dialog to select a model (frame) as the external reference point.
"Synchronous Move of Base Axis" section	Use to move the base axis (servotrack) at the same time as the robot when moving to a target point. [Active] check box: - When check the base axis will move according the set method to enable the robot to reach the target point. [Method...] button -Specifies the method to move the base axis.

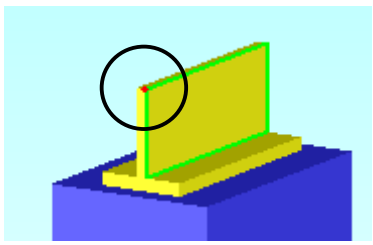
■ OLP Function Pick Method and Display

When the mouse pointer is over the cell view, press down the left mouse button. The model considered for selection will display in yellow with a red dot to indicate the specific point location. In the case of a solid model, the border (edges) of the pick face will be highlighted in green. The display will update to represent change of selection as the mouse pointer is moved over different models. The actual selection is made only when the mouse button is released.

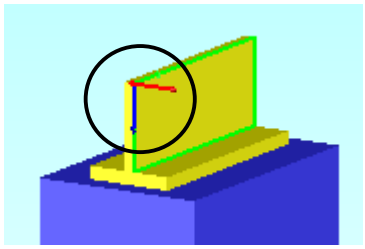


The pick point display will change depending on the selected move mode.

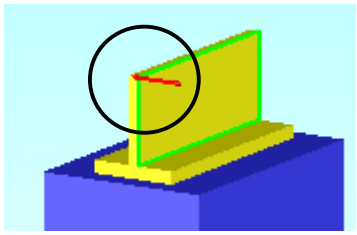
Position Displays a point.



Orientation	Displays a frame (Z-axis is in red).

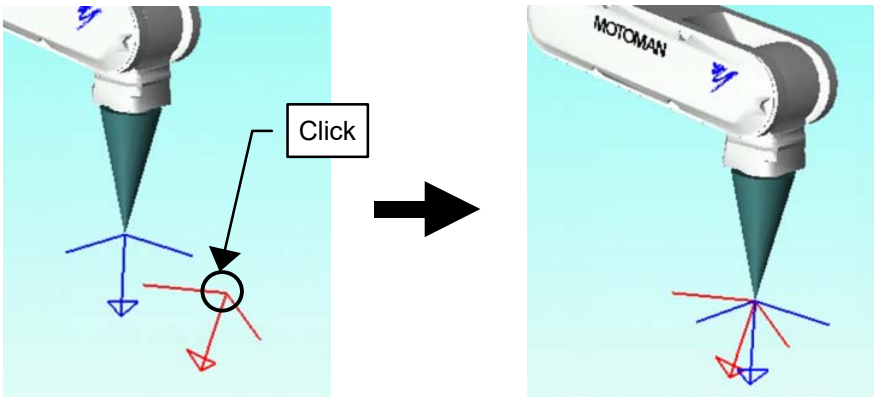


Z-axis	Display an arrow (Z-Axis).



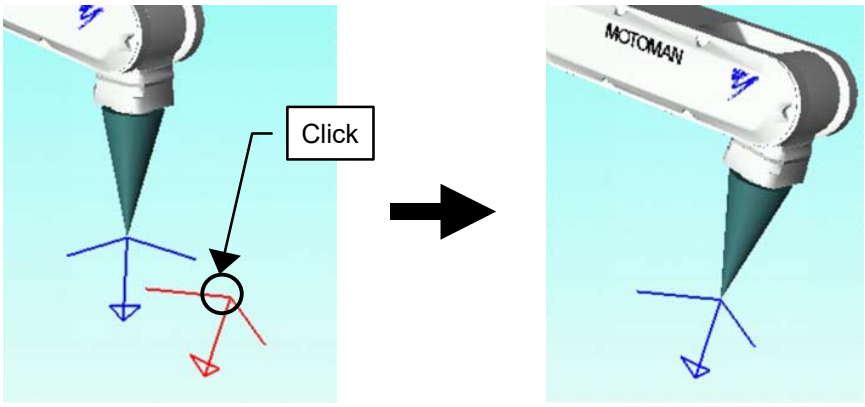
■ Selecting [Position] in the "Move Mode" section: (Other items set at default)

The robot moves so that the robot TCP overlaps with any clicked point.
Note that this motion does not involve any change in the wrist posture.



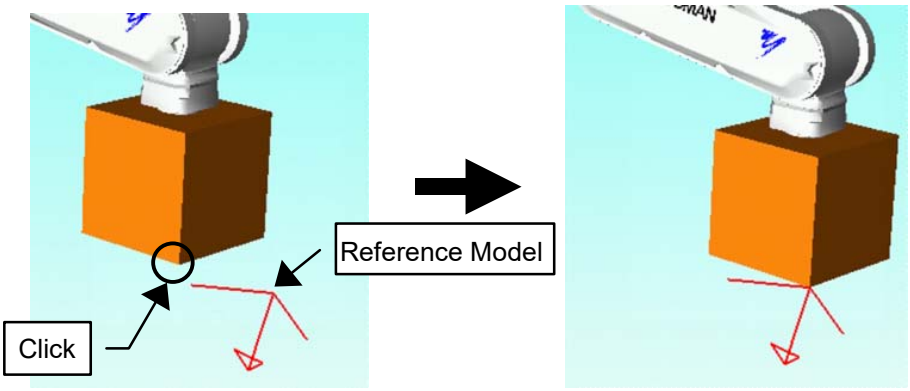
■ Selecting [Position] and [Orientation] in the "Move Mode" section: (Other items set at default)

The robot moves changing its wrist's posture so that the frame of the robot TCP overlaps the frame of the clicked point.



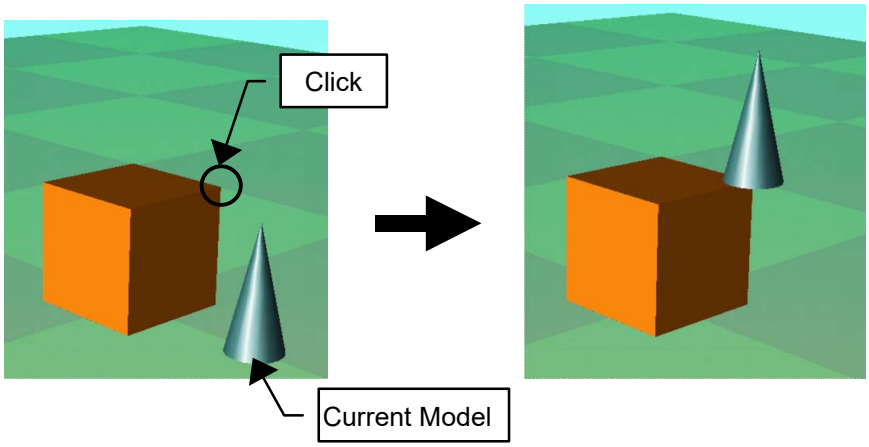
■ Selecting "Move to External Reference Point"

Click a point on a model carried by the robot and the robot will move to bring that point to the reference point. (The reference point needs to have been set before this operation can be used.)



■ Selecting [CurModel] in the "Operation Object" section

Click a point and the currently selected model will be move to the click location. The name of the current model is displayed in the OLP dialog title bar.



NOTE For more details on the OLP operation, please refer to section " 13.1 Teaching Using OLP Function ".

8.10.2 Operation Handle

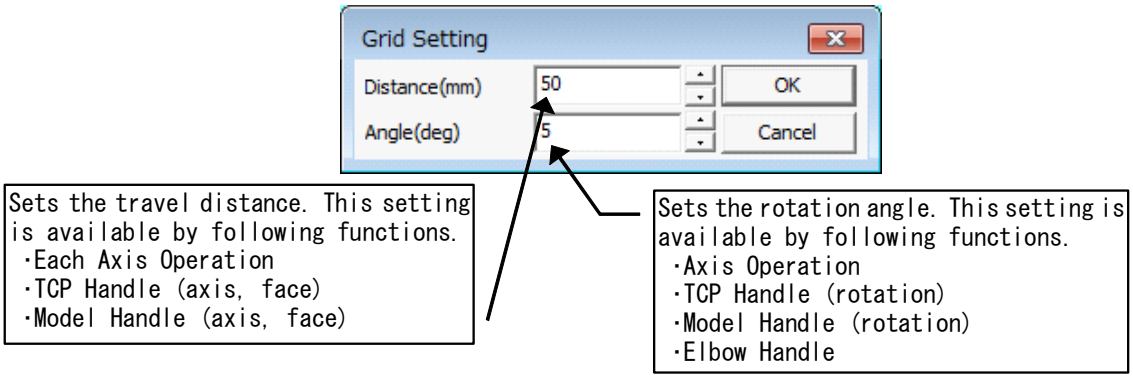
The operation handle is to perform robot jog operation or model allocating by intuitive operation.
Drag the operation handle on the cell screen, the position of the robot is changed. So, unskilled engineers can perform robot operation easily.
And, drag the operation handle of the model, model allocating can be performed easily.

■ Grid Settings

Sets the distance or angle of grid. This grid setting is available by following functions.

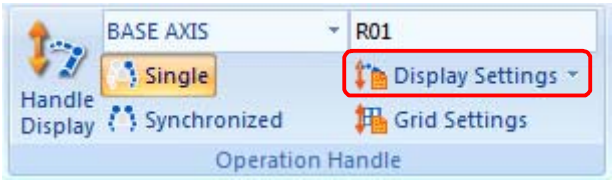
- Each Axis Operation
- TCP Handle
- Model Handle

On the [Home] tab, in the [Operation Handle] group, click the [Grid Settings] button. Grid Setting dialog box is displayed.



■ Display Settings

Display/Hide the additional information of operation handle.



Tool Name Display	Display/Hide the tool names at the tip of tool (TCP).
Guide Display	Display/Hide the guide line. For details, please refer to the "Guide Line" section of "TCP Handle".

■ Handle Display

On the [Home] tab, in the [Operation Handle] group, click the [Handle Display] button, the operation handle bar is displayed on the upper center of the view.

	When enabled, each axis can be operated. When drag the robot model, that axis can be operated.

	When enabled, TCP handle (axis) is displayed.
	When enabled, TCP handle (face) is displayed.
	When enabled, TCP handle (rotation) is displayed.
	When enabled, OLP drag function is enabled. When drag to the model, the TCP of the robot is moved to the position of mouse cursor.
	When enabled, model handle (axis) is displayed.
	When enabled, model handle (face) is displayed.
	When enabled, model handle (rotation) is displayed.

SUPPLE-MENT

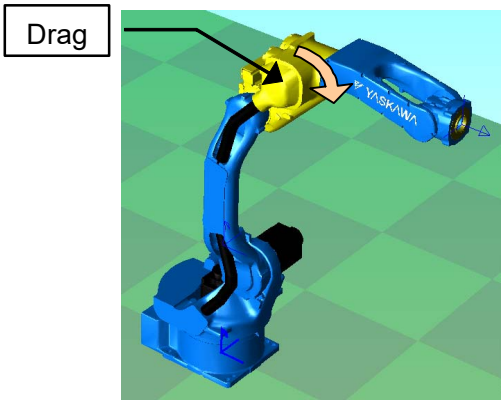
- A yellow frame is shown to an icon of the function performed.
- When the TCP handle is displayed in the cell with a double arm robot included in a current controller, the elbow angle handle to operate an elbow corner is displayed.

■ Each Axis Operation

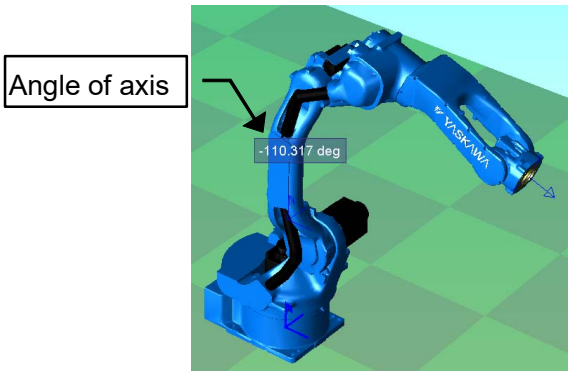
When drag the robot model, each robot axis is rotated. And, station and base axis can be operated. The base axis moves to the movable direction.
The distance while dragging, that is set by grid setting. For details, refer to the "Grid Setting".

Procedure

1. Click the icon  .
2. Move the mouse cursor to the robot model.
3. When a mouse cursor comes to the robot model, robot model is highlighted.



4. Drag the highlighted robot model. During dragging, the angle of axis is displayed.

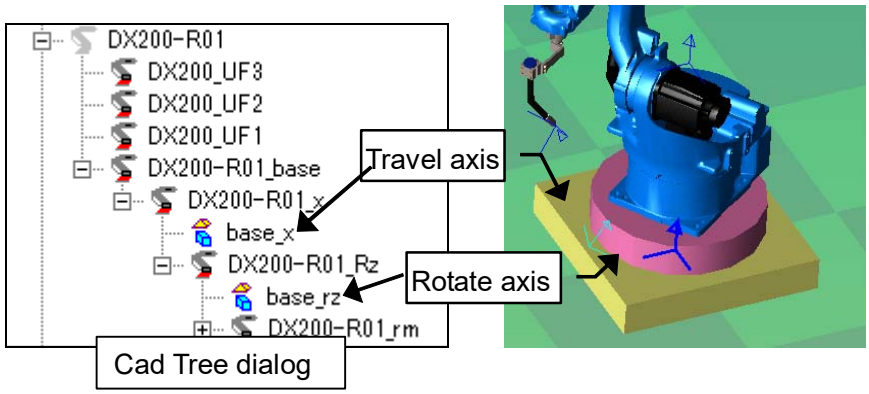


NOTE

- The operable robot is only a robot of a current controller. To operate the robot besides the current controller, it is necessary to change the current controller.
- The operable robot is only a robot of a VRC controller.

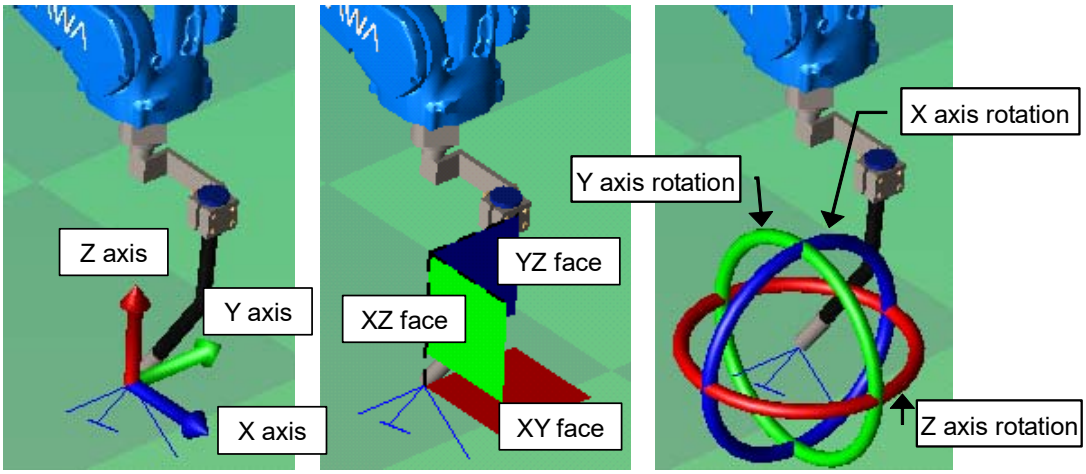
Base axis/Station

Because drag the model, base model or station model need be added to operate the base axis or station. It provides the following example of base (BASE-XT).

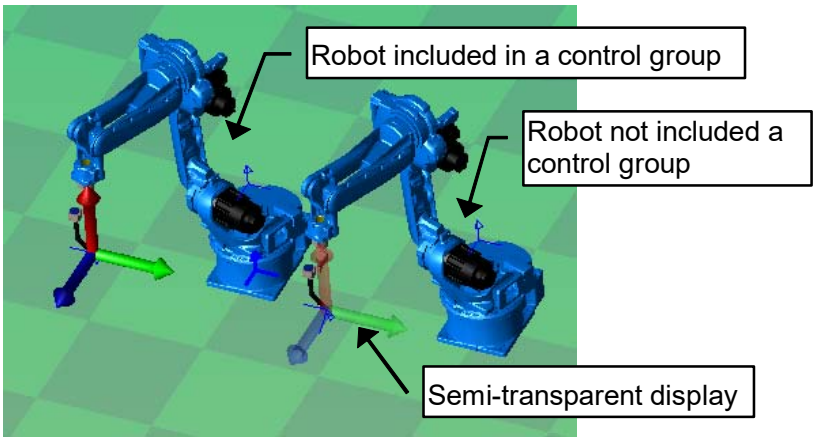


■ TCP Handle

This handle is to operate the position of TCP, it displayed on the TCP frame.
The distance while dragging, that is set by grid setting. For details, refer to the "Grid Setting".



TCP handle is displayed at the position of all robots of the current controller, but all except for a robot included in a control group of a current job will be semi-transparent displayed. But, the operation of the semi-transparent handle is also possible.



NOTE

- The operable robot is only a robot of a current controller. To operate the robot besides the current controller, it is necessary to change the current controller.
- The operable robot is only a robot of a VRC controller.

Procedure

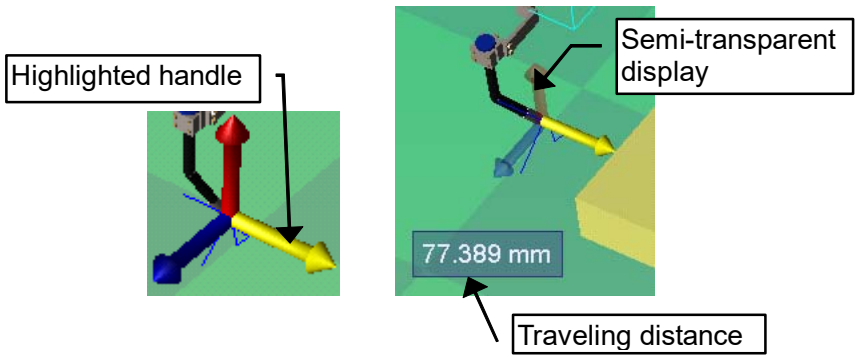
- Display the operation handle
  To display the TCP handle, click the icon of the operation handle bar.

  TCP handle (axis) … 

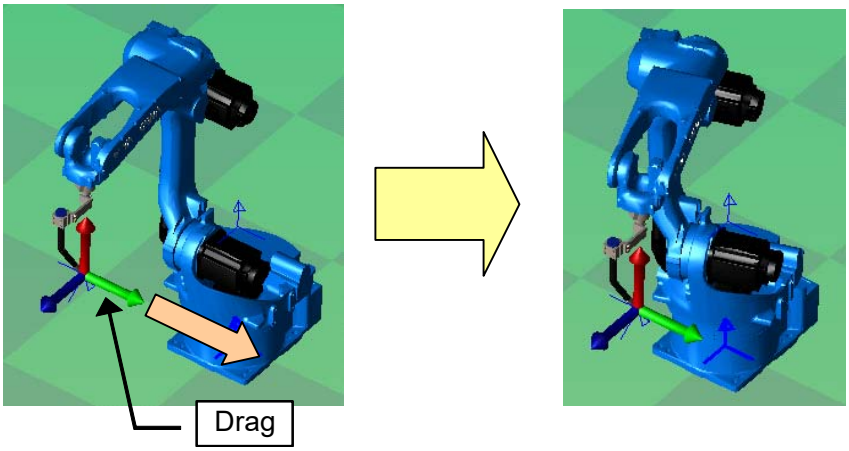
  TCP handle (face) … 

  TCP handle (rotation) … 
- Operate the operation handle
  To operate the handle, drag the handle to move. When a mouse cursor comes to the handle, the handle is highlighted. And, during dragging, the traveling distance (or rotating

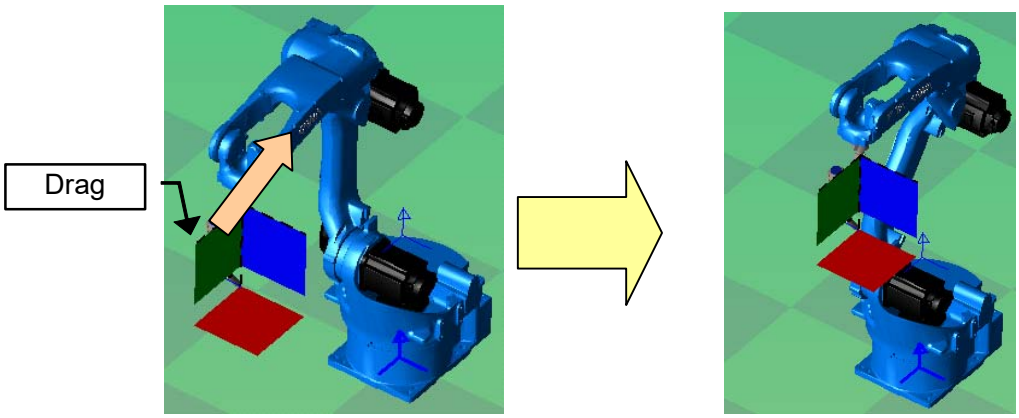
amount) is displayed. When the coordinate system is "Tool", traveling distance is the relative value from drug start position. Otherwise, traveling distance is absolute value.



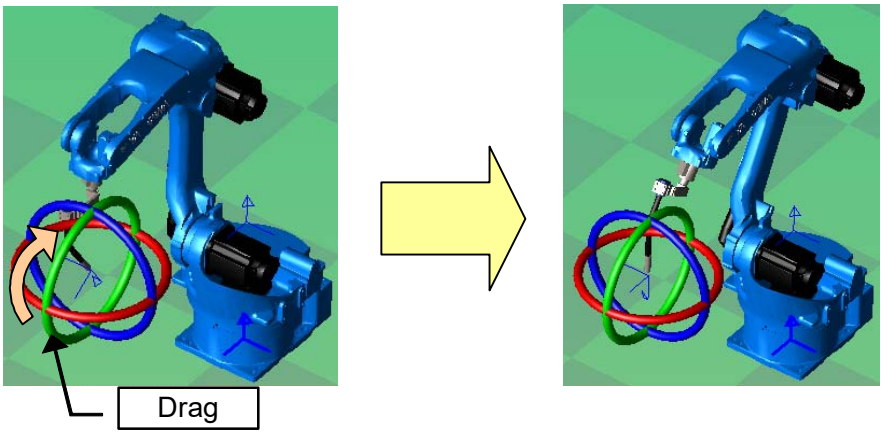
For example, to move as follows, drug the green handle to the following direction.



When drag the handle (face), TCP moves on the same plane as the dragged face.



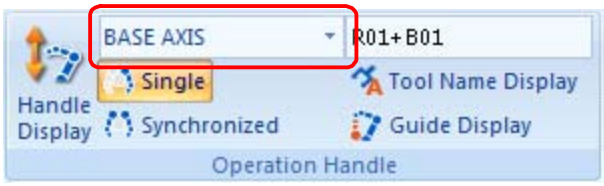
When drag the handle (rotation), TCP rotates on the same direction as the dragged ring.



NOTE When operating the handle (rotation) by a base coordinate, a robot coordinate and the user coordinate, the handle doesn't rotate together, but a robot moves.

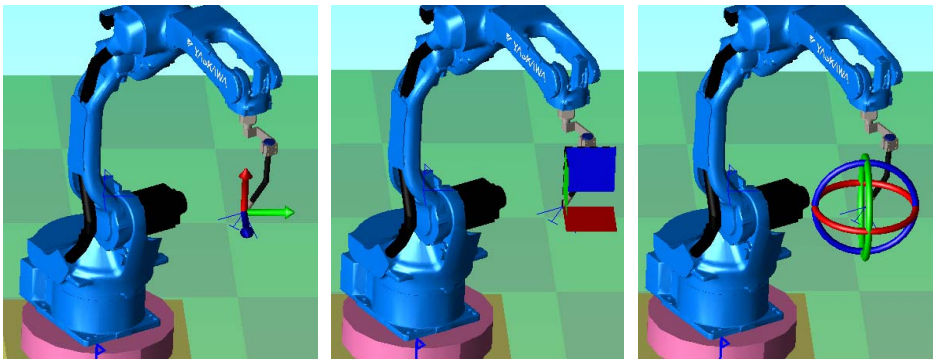
• Select the Coordinate

The following coordinates are available to operating TCP handle. On the [Home] tab, in the [Operation Handle] group, select the coordinate by the combo box.

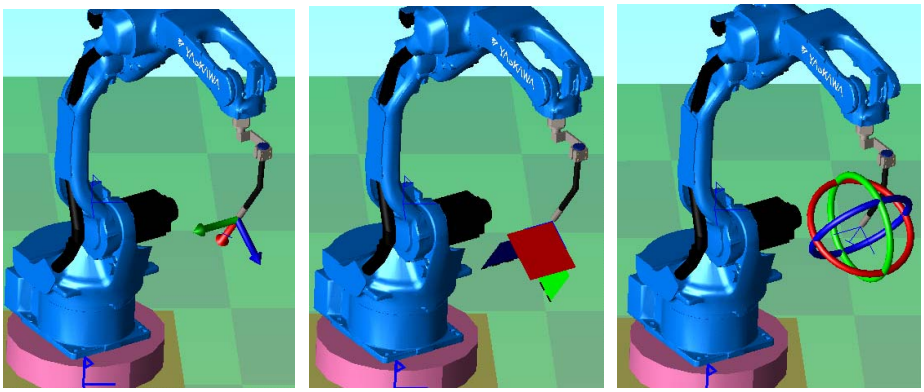


• Base coordinate and Robot coordinate

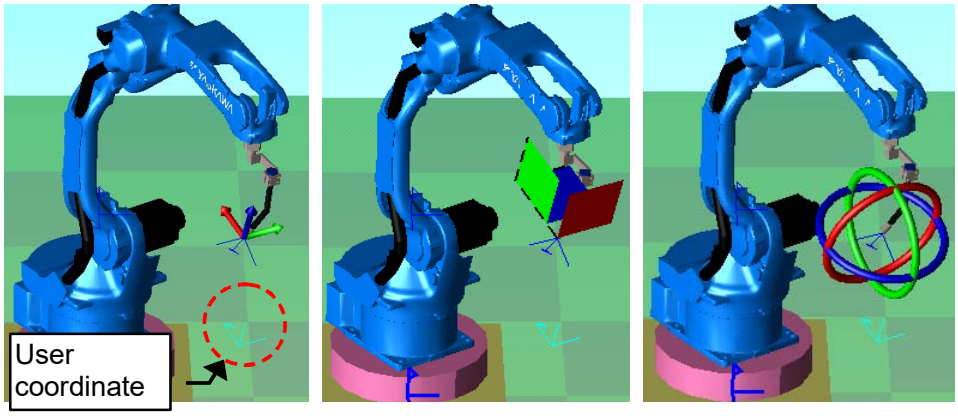
Robot always moves by the same posture as a base coordinate and a robot coordinate.



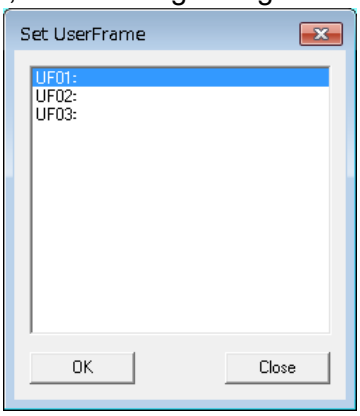
• Tool coordinate
Robot always moves by the same position and posture as TCP.



• User coordinate
Robot always moves by the same posture as a selected user coordinate.

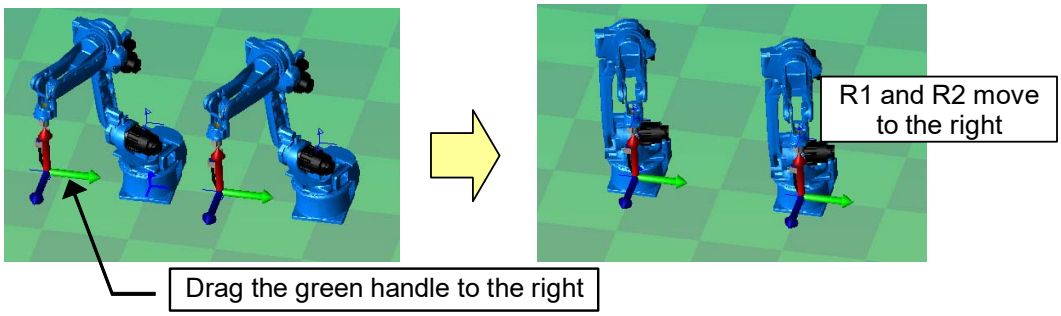


When selects USER AXIS, the following dialog box is displayed.

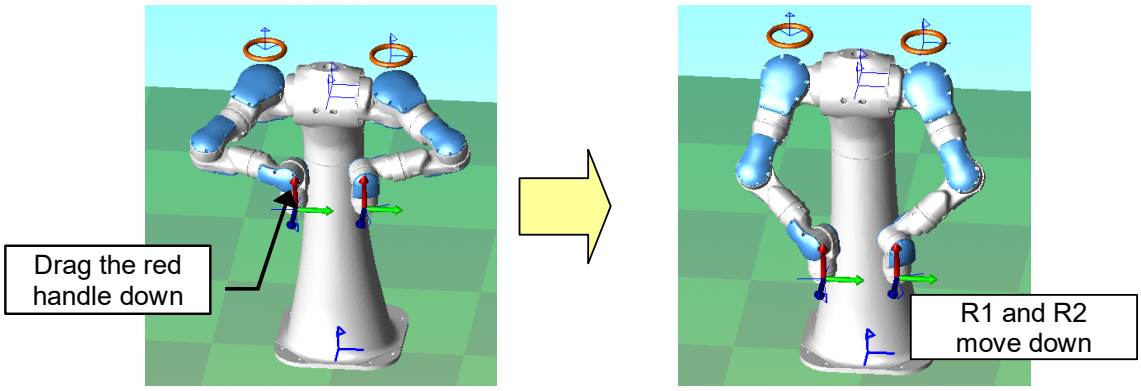


• Synchronized operation
When operate the Operation handle, the selected robot and another robot can move to keep their TCP the same relative position.
On the [Home] tab, in the [Operation Handle] group, click the [Synchronized] button,

and operate the operation handle.



A double arm robot moves as follows.

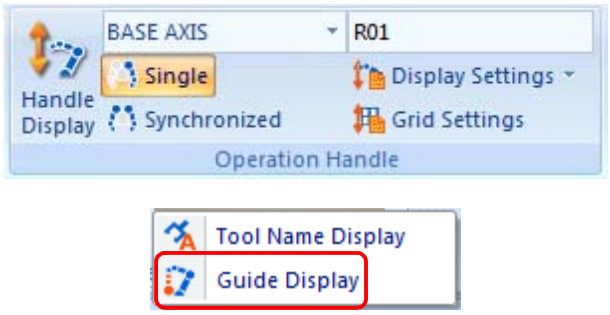


The above is an example of the TCP handle (axis), but TCP handle (face) and TCP handle (rotation) can also do synchronized operation.

- Guide Line

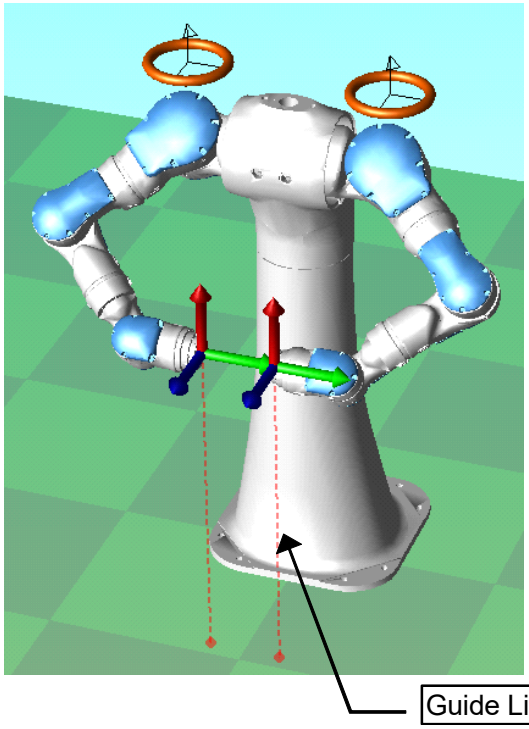
The guide line helps to recognize the TCP position at the XY-plane. A vertical broken line is displayed to the XY-plane from the TCP handle.

When some operation handle is displayed, on the [Home] tab, in the [Operation Handle] group, click the [Display Settings] button and the [Guide Display] button, the guide line is displayed.



When the [Guide Display] button is enabled, a vertical broken line is displayed to the XY-plane from the TCP handle

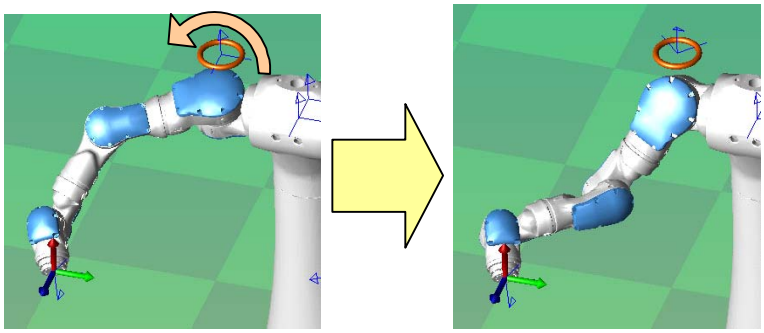
.



NOTE The guide line of the current controller (VRC controller) is displayed only.

■ Elbow Handle

When a double arm robot is included in a current controller and one of TCP handles (axis, face, or rotation) are displayed, the elbow handle is also displayed at the same time. When drags the elbow handle, the elbow angle can be changed. When a mouse cursor comes to the handle, the handle is highlighted. And, during dragging, the rotating amount is displayed. The angle while dragging, that is set by grid setting. For details, refer to the "Grid Setting". When drags like a left figure, robot moves as a right figure.

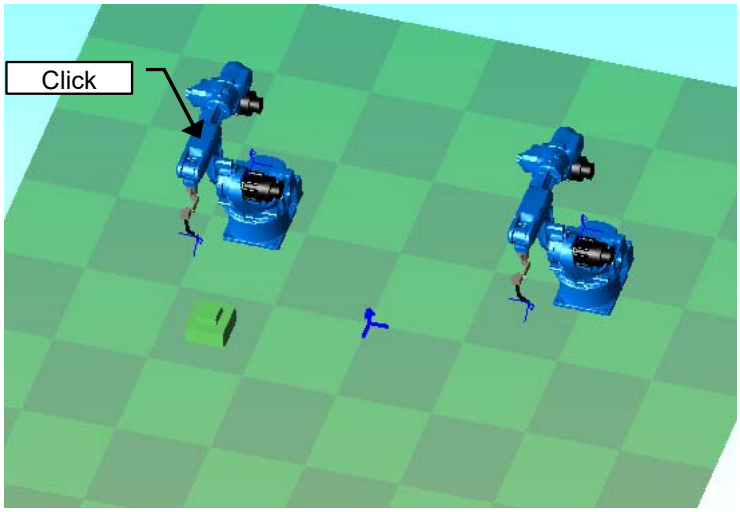


■ OLP Drag

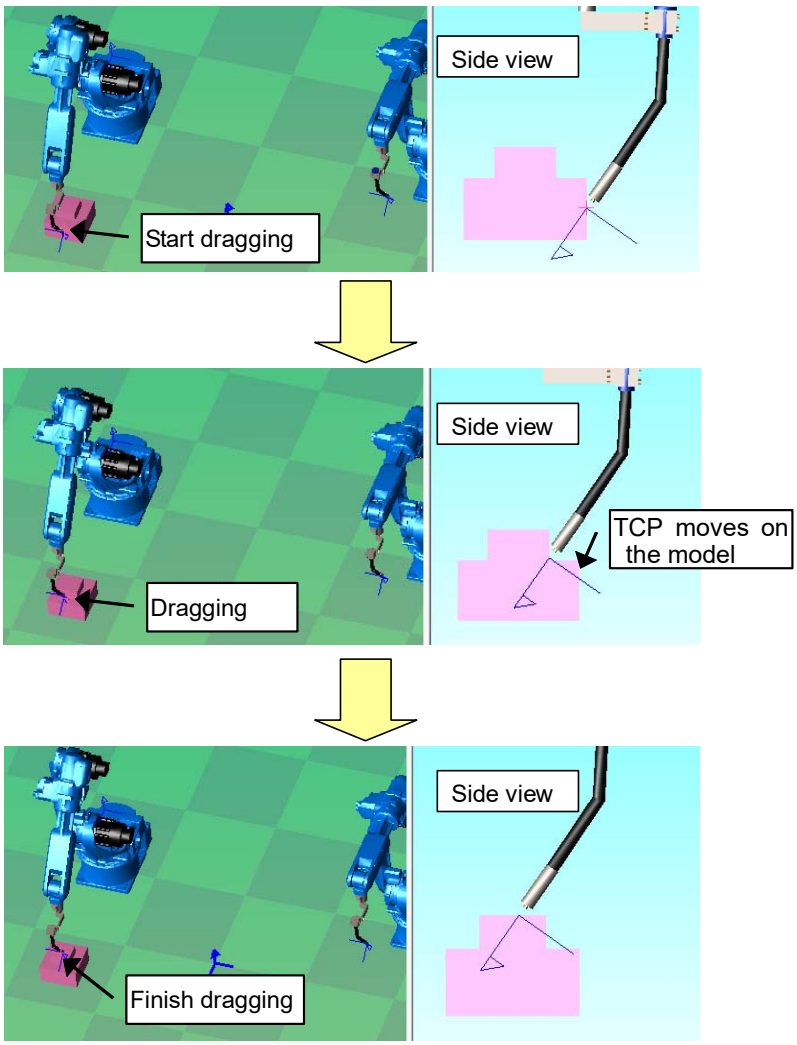
When drag to the model, the TCP of the robot is moved to the position of mouse cursor. A pink marker is shown to a point on the model at the mouse cursor location.

Procedure

1. Click the icon  .
2. Click the robot model to operate.



3. Drag on the model. TCP of the robot is moved to the position of mouse cursor
   To operate another robot, proceed the step 2. But, only a robot in the current controller can be selected..



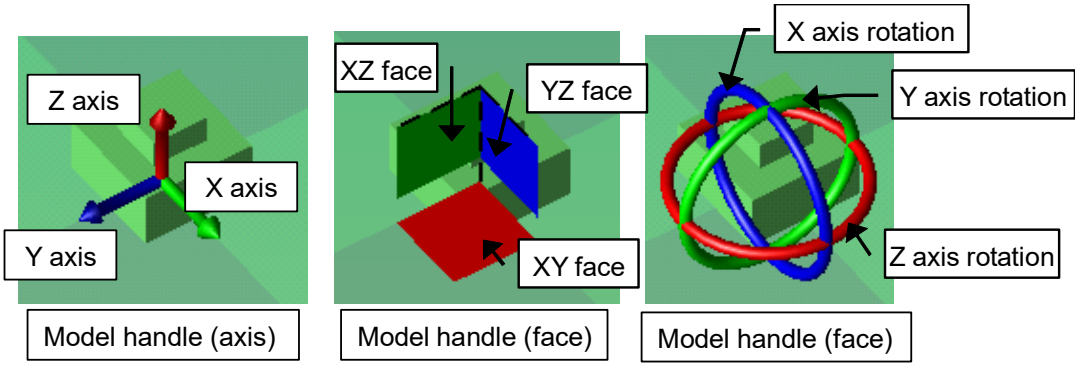
NOTE

- The operable robot is only a robot of a current controller. To operate the robot besides the current controller, it is necessary to change the current controller.
- The operable robot is only a robot of a VRC controller.
- When drag at the location outside the reach of TCP, robot does not move. When mouse is outside the reach of TCP, robot stops at that position.

■ Model Handle

Model handle appears at the origin position of the model. When operates the model handle, Model is moved.

The distance while dragging, that is set by grid setting. For details, refer to the "Grid Setting".



NOTE

- FLOOR model cannot be operated.
- When click the robot model, robot position is moved.

Procedure

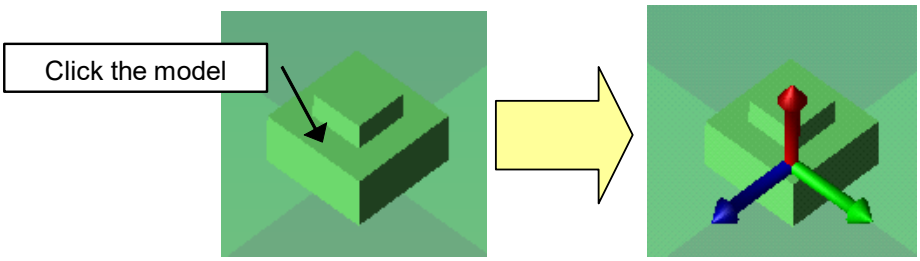
- Display the Model handle
  1) To display the Model handle, click the icon of the operation handle bar.

     Model handle (axis)… 

     Model handle (face)… 

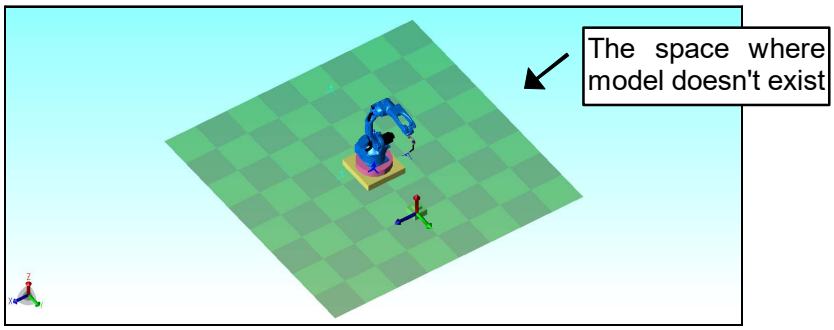
     Model handle (rotation)… 
  2) Select the model to operate

     Click the model to operate. Model handle appears as follows.

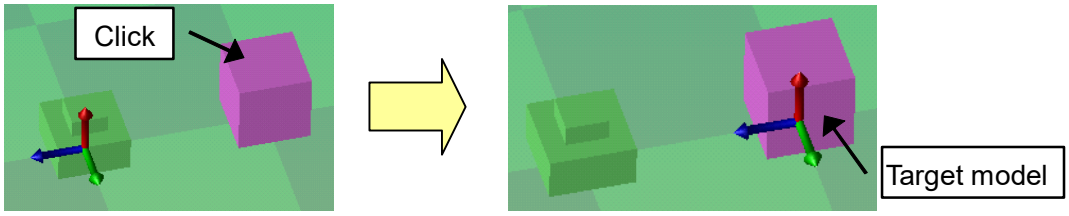


3) Release of handle

To finish operating the model, click a FLOOR model or the space where model doesn't exist on the cell screen (light-blue space of the following figure).



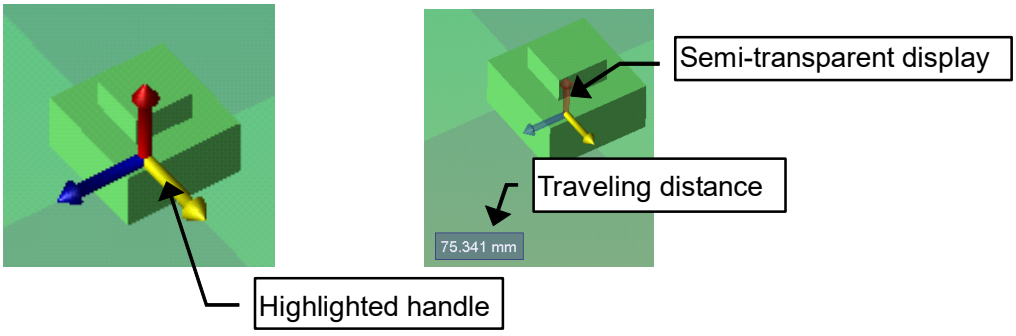
And, to operate another model, proceed the step 2. Then, Model handle is appears at the selected model and it is the target model.



SUPPLE -MENT When hide the operation handle bar or change to another operation handle, the operation is finished.

• Operate the handle

To operate the handle, drag the handle to move. When a mouse cursor comes to the handle, the handle is highlighted. And, during dragging, the traveling distance or rotating amount is displayed.

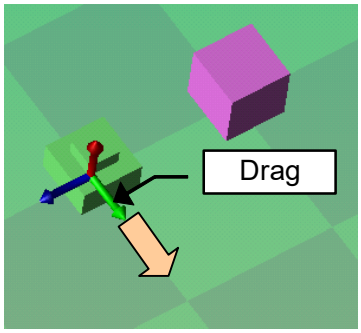


• Model handle (axis)

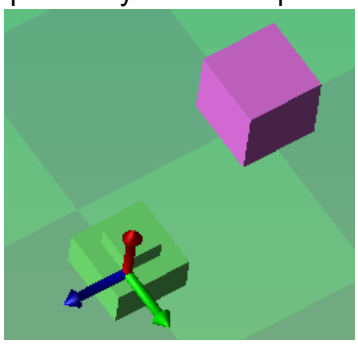
When drag the colored model handle (axis), the model is moved to the handle direction.

For example, the model is moved to the Y axial direction of model coordinates.First,

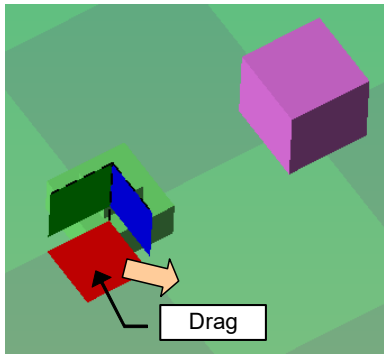
drag the green handle to the following direction.



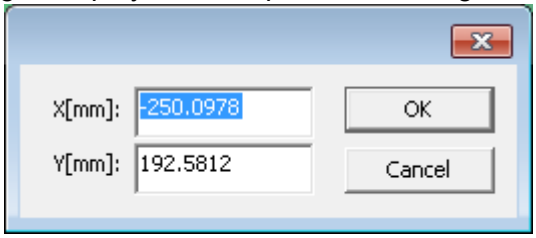
Release the mouse at the position you want to place and the model will be placed.



• Model handle (face)
When drag the handle (face), the model moves on the same plane as the dragged face.
For example, the model is moved on the XY plane of the model coordinates.First, drag the red handle to the following direction.

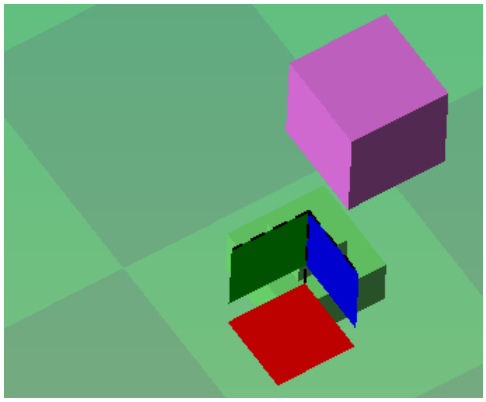


The following dialog is displayed and input the traveling distance manually.

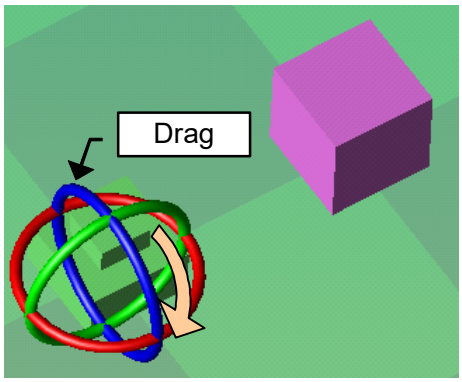


When the [OK] button is clicked, the operation is fixed. When the [Cancel] button is

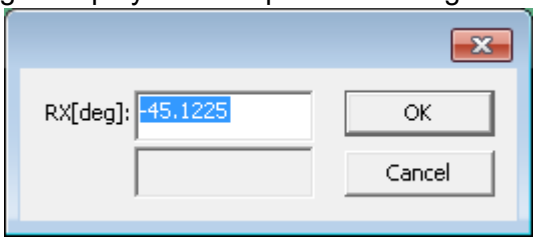
clicked, the operation is canceled and the model returns to the original position.



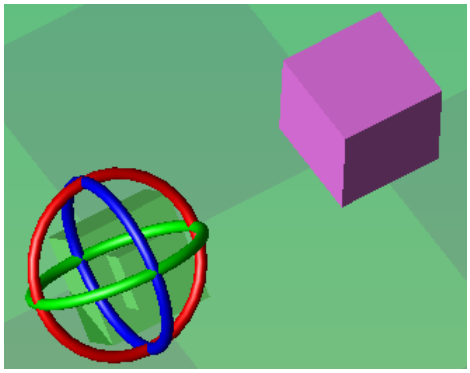
• Model handle (rotation)
When drag the handle (rotation), the model rotates on the same direction as the dragged ring.
For example, the model is rotated around X axis of the model coordinates.First, drag the blue handle to the following direction.



The following dialog is displayed and input the rotating amount manually.

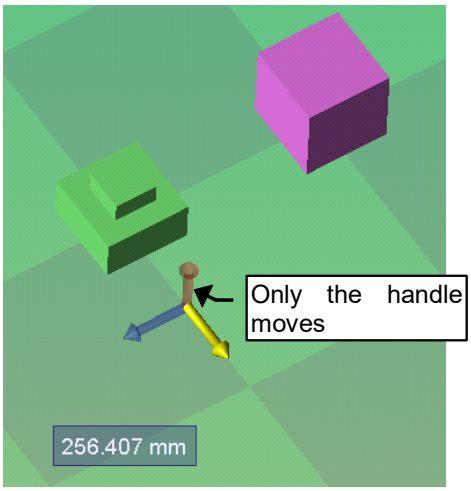


When the [OK] button is clicked, the operation is fixed. When the [Cancel] button is clicked, the operation is canceled and the model returns to the original position.

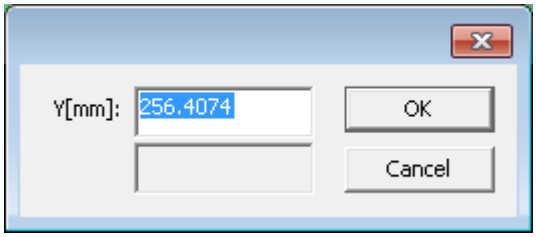


• Model Copy
When the [Ctrl] key of a keyboard is pressed during handle operating, a model returns

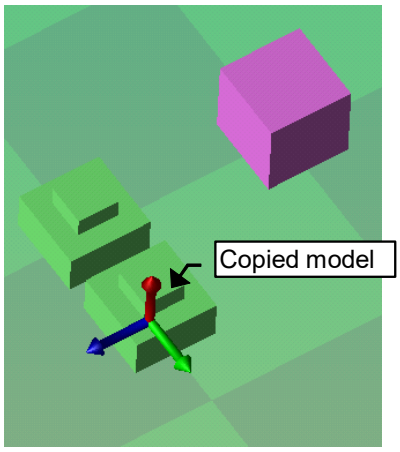
to the original location and only the handle moves.



When drag operation is ended, the following dialog is displayed and input the traveling distance manually.

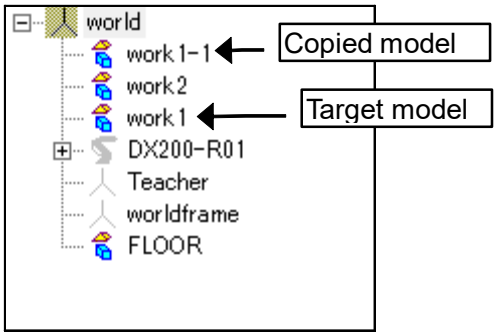


When the [OK] button is clicked, the model is copied and copied model is displayed at the position of handle.



The parent of the copied model is the same as an original model. A serial number is

added to the model name.



When the [Ctrl] key is released in the state with the [Ctrl] key was pressed in the dragging, a model moves to the location of the handle again. Then, the model is not copied and drug operation is the usual model handle.

8.10.3 Visual Path Edit Function

Each step position is displayed and is connected with a line. And, drag the marker, the job is edited intuitively.

■ RESTRICTION

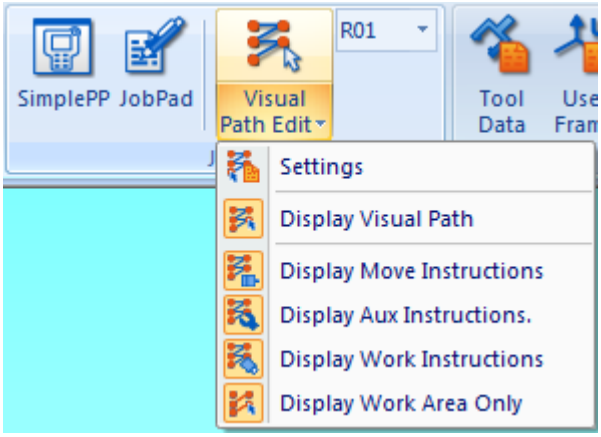
- Visual path edit function is available only the current job of the current controller.
- Each step position is displayed and is connected with a line or a curve simply. So, visual path is different from the trace of playback. And, visual path is not supported the position level.
- Relative job is not supported.
- In the case of coordinated job, the operation target is only robot selected in the robot selection combo box. And, even paint use, functions for paint use cannot be used.
- Only following move instruction is supported.
  - MOVJ
  - MOVL
  - MOVC
  - MOVS
  - SYMOVJ
  - SYMOVL
  - SYMOVC
  - SVSPOTMOV
  - SMOVL
  - SMOVC
  - SMOVS
  - +MOVL
  - +MOVJ
  - +MOVC
  - +MOVS
  - +SMOV
  - +SMOVX
- If the curve of MOVC, SYMOVC, +MOVC, and SMOVC cannot calculated (ex. Lack of

teaching point), the path is connected with a line.

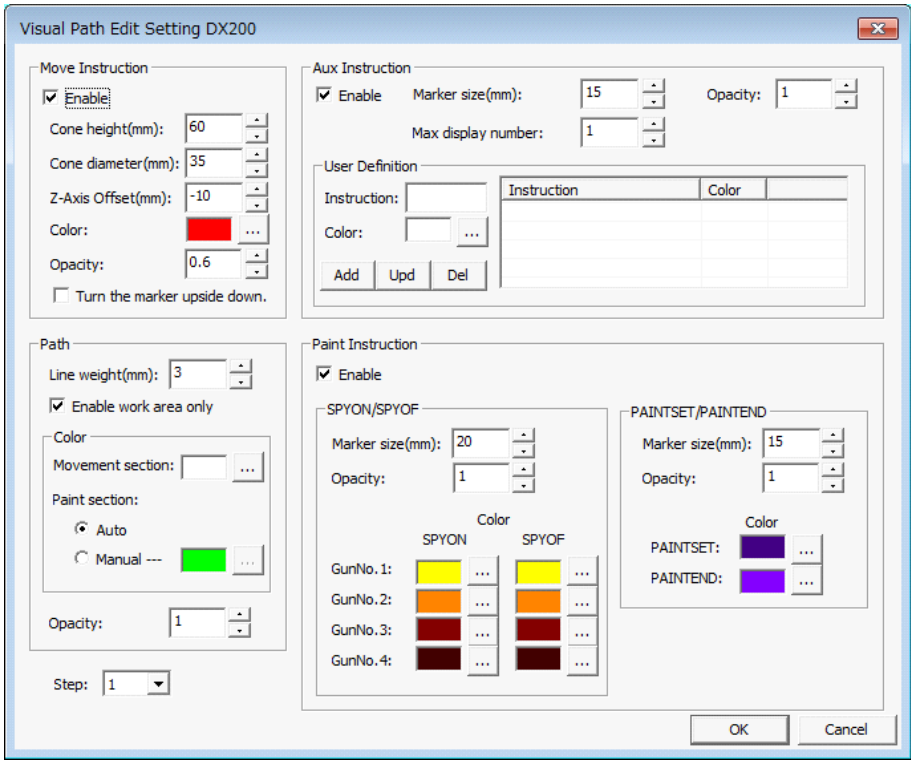
- The line is drawn in order of step number. Visual path is not supported when the sequence is changed by the control instruction.
- When the CTP is set by variable, visual path is not supported.
- When job has any error (ex. Robot cannot reach the teaching point), visual path is not displayed.
- The following function cannot be used in PLAY mode. Change to the TEACH mode.
    - Step move by clicking the move instruction marker
    - Modify/Add the teaching point by TCP handle
    - Modify the anticipation value by dragging the SPYON/SPYOF marker
    - Modify the PAINTSET tags by double-click
    - Modify the instruction, add the instruction or delete the instruction by the right-button menu
- P variable is not supported by visual path edit.

■ Setting

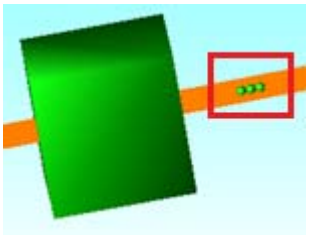
On the [Controller] tab, in the [Job] group, click the [Visual Path Edit] button and select the [Settings] menu, the visual path edit setting dialog is displayed.



Items of paint instruction can be set only the use of controller is paint.



Move Instruction	
Enable	Shows/Hides the move instruction marker.
Cone height (mm)	Sets the height of move instruction marker.
Cone diameter (mm)	Sets the diameter of move instruction marker.
Z-Axis Offset (mm)	Set the display position of the Z-direction (tool coordinates) of move instruction marker.
Color	Sets the color of move instruction.
Opacity	Sets the opacity of move instruction.
Turn the marker upside down	Move instruction marker is turned upside down.
Path	
Line weight (mm)	Sets the line weight of path.
Enable work area only	Selects whether the path of work area is displayed only or not.
Color	
Movement section	Sets the color of movement section.
Paint section	

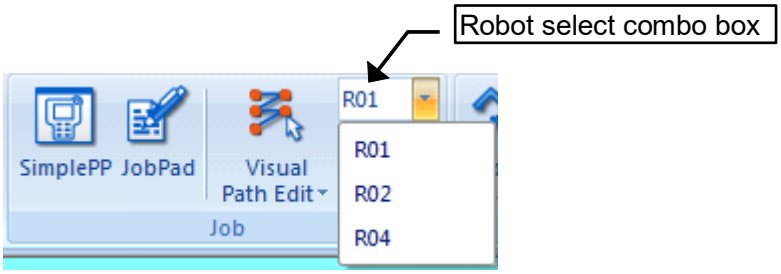
Auto	The color of paint section is selected automatically. The color is selected by the paint condition file number. The color setting is loaded from the "vpecolor.ini" in the controller folder.
Manual	The color of paint section is the selected color.
Opacity	Sets the opacity of path.
Aux Instruction	
Enable	Shows/Hides the aux instruction marker.
Marker size (mm)	Sets the size of aux instruction marker.
Opacity	Sets the opacity of aux instruction marker.
Max display number	Sets the max number of aux marker between steps. When the number of aux instruction is over the max number, the display is skipped. 
User Definition	
Instruction	Inputs the instruction.
Color	Sets the color of the aux instruction marker.
Add	Register the instruction name and color.
Upd	Updates the selected line of the list to the instruction and color.
Del	Delete the selected line in the list.
Paint Instruction	
Enable	Shows/Hides the paint instruction marker. Target instruction are SPYON, SPYOF, PAINTSET, and PAINTEND.
SPYON/SPYOF	
Marker size (mm)	Sets the size of SPYON/SPYOF instruction marker.
Opacity	Sets the opacity of SPYON/SPYOF instruction marker.
Color	Sets the color of SPYON/SPYOF instruction marker. It can be set every gun number.
PAINTSET/PAINTEND	
Marker size (mm)	Sets the size of PAINTSET/PAINTEND instruction marker.

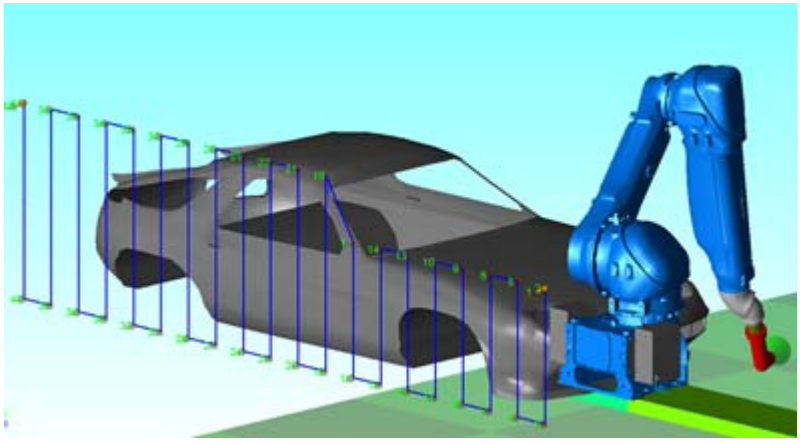
	Opacity	Sets the opacity of PAINTSET/PAINTEND instruction marker.
	Color	Sets the color of PAINTSET/PAINTEND instruction marker. It can be set every gun number.
Step		Sets the step of spin box.
OK		The setting is saved and this dialog is closed.
Cancel		The setting is not saved and this dialog is closed.

■ Show/Hide the Visual Path

On the [Controller] tab, in the [Job] group, click the [Visual Path Edit] button, the visual path is displayed.

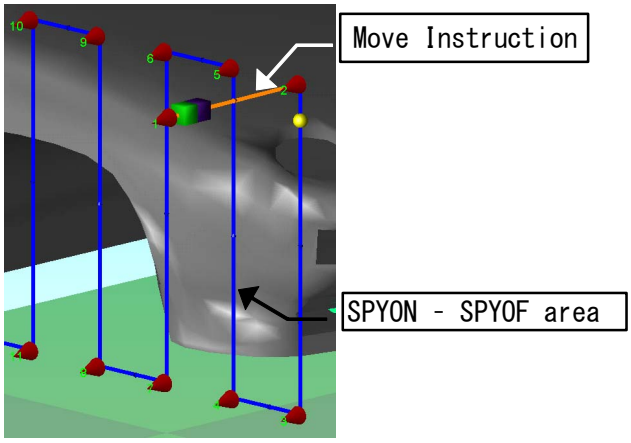
Visual path of the current job of current controller is displayed. Click this button again, visual path is hidden.
In the combo box to the right of the [Visual Path Edit] button, robots included in the current job are listed. The path of the selected robot is displayed.

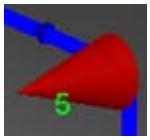
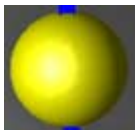
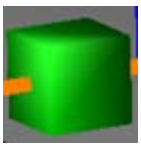




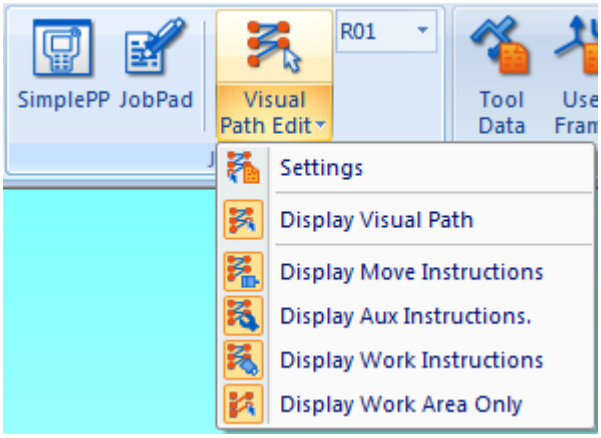
Step position is displayed as cone. Each step position is connected with a line or a curve sim-

ply. The color of move instruction is changed into the work area between SPYON and SPYOF.



	This marker means move instruction position. Step number is displayed.
	This marker means SPYON/SPYOF instruction.
	This marker means PAINTSET/PAINTEND instruction. Selected instruction can be displayed.

Show/Hide setting of marker is can be changed in the ribbon menu. When the marker is displayed, the menu is highlighted.

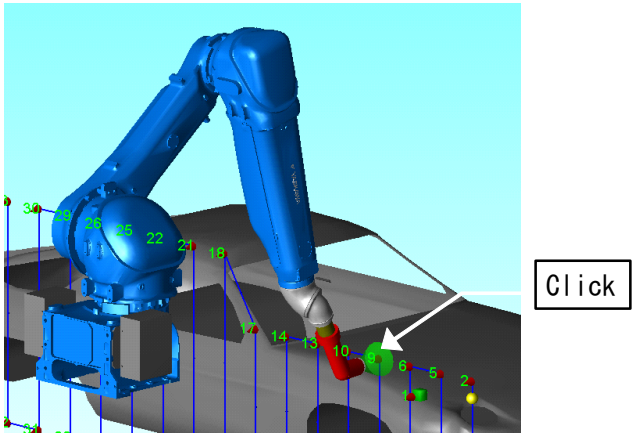


Display Visual Path	Shows/Hides the visual path.

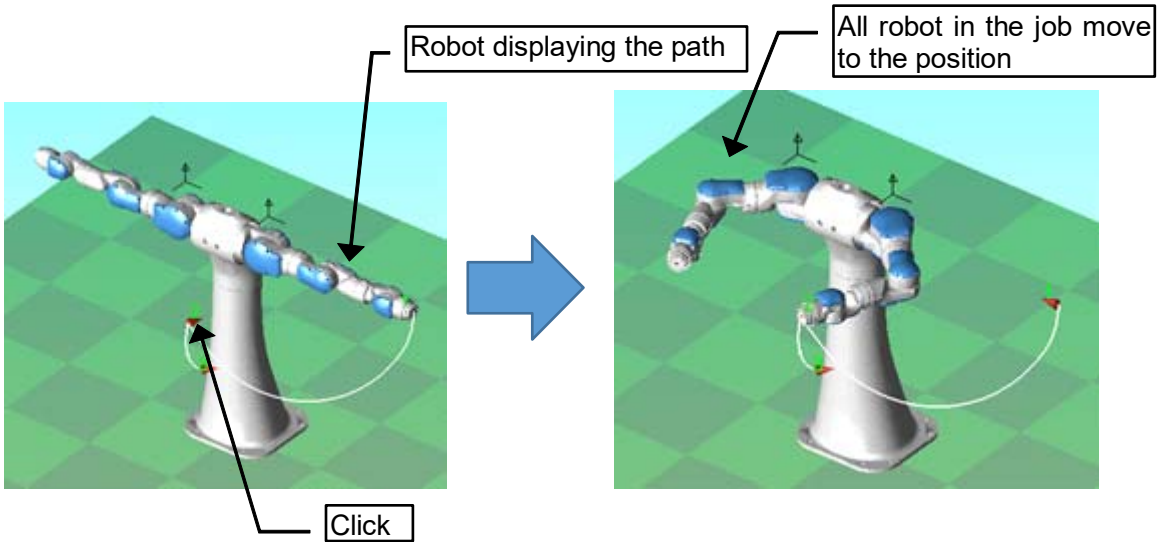
Display Move Instructions	hows/Hides the move instruction marker.
Display Aux Instructions	Shows/Hides the aux instruction marker.
Display Work Instructions	Shows/Hides the paint instruction marker. Target instruction are SPYON, SPYOF, PAINTSET, and PAINTEND. This item is paint use only.
Display Work Area Only	Selects whether the path of work area is displayed only or not. This item is paint use only.

NOTE In the case of coordinated job, even paint use, "Display Work Instructions" menu and "Display Work Area Only" menu cannot be used.

Click the move instruction marker, robot moves to the step positio.



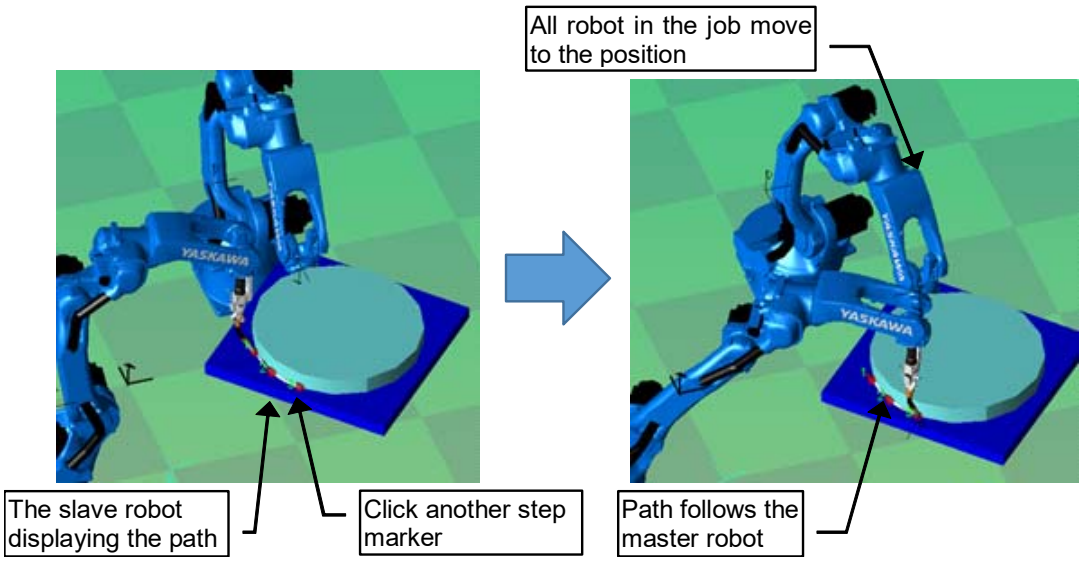
In the case of coordinated job, the path of the selected robot in the combo box is displayed. But, when click a marker of move instruction marker, all robot in the job move to the each position of the step.



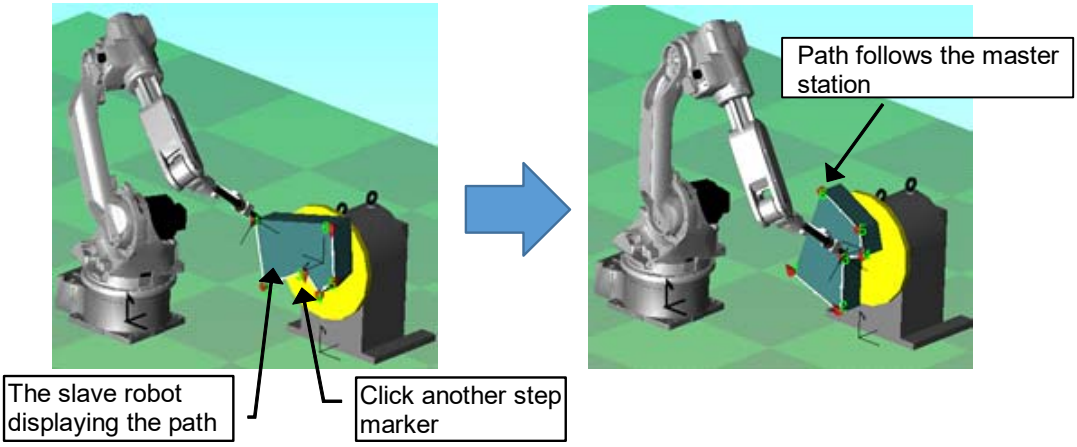
When use the coordinated move instruction (SMOVL, SMOVC and SMOVS), the slave robot moves coordinated with the master robot, the path is drawn based on the TCP of the master

robot (e.g. the master robot is station, the path is drawn on the station-axis).

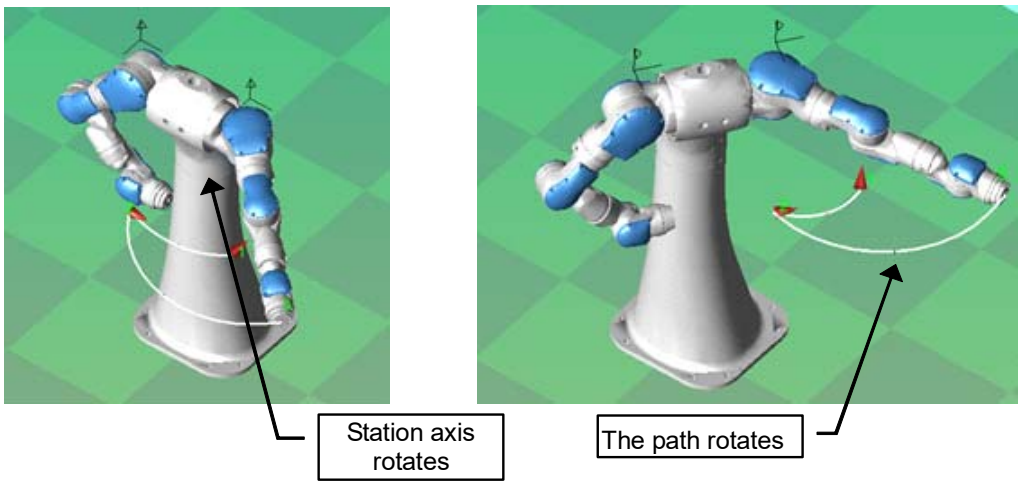
• When the case is the master is robot:



• When the case is the master is station:

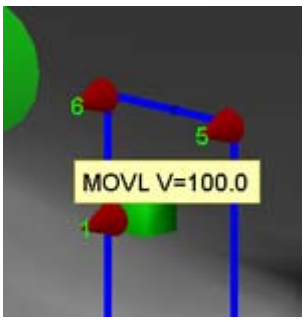


When the rotation axis of the dual-arm robot is the station axis and the path of the job which doesn't have station control group is displayed, the path is displayed on the station axis. When the station axis rotates, the path rotates too. If the station axis is included in the control group of the job, it becomes a regular display.



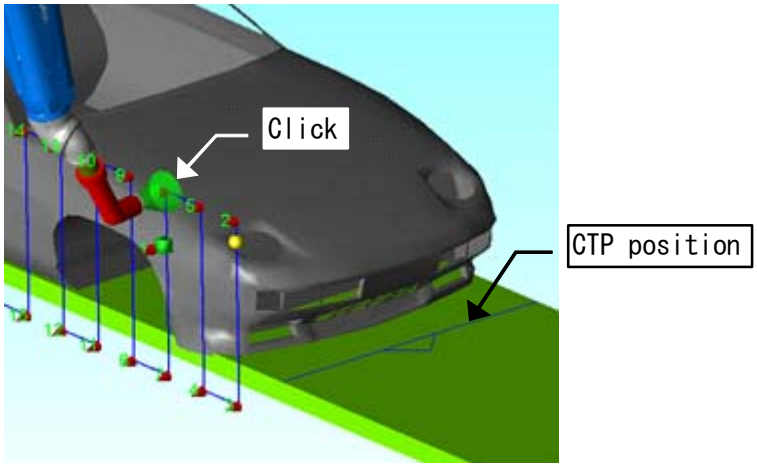
NOTE This operation cannot be used in PLAY mode.

When the mouse cursor is on the move instruction marker, the instruction is displayed.



When the job is conveyor synchronization job, the visual path is displayed with CTP and LS value. Click the move instruction marker, robot moves to the step position and conveyor moves to the CTP position.

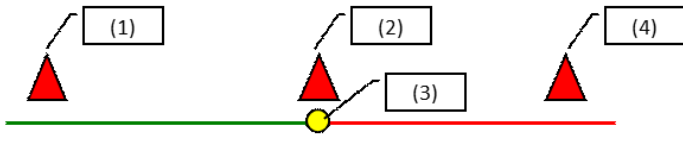
NOTE When the CTP is set by variable, visual path is not supported.



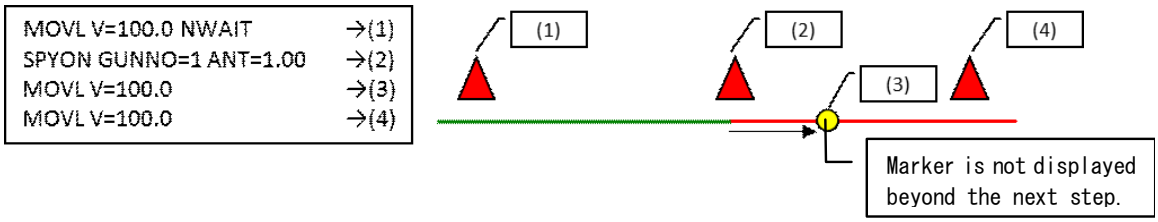
When the SPYON/SPYOF instruction has "ANT=" tag or "ANTDIS=" tag and last move instruction has "NWAIT" tag, the SPYON/SPYOF marker is positioned defined time or defined distance away.

[Example]
Anticipation is not set

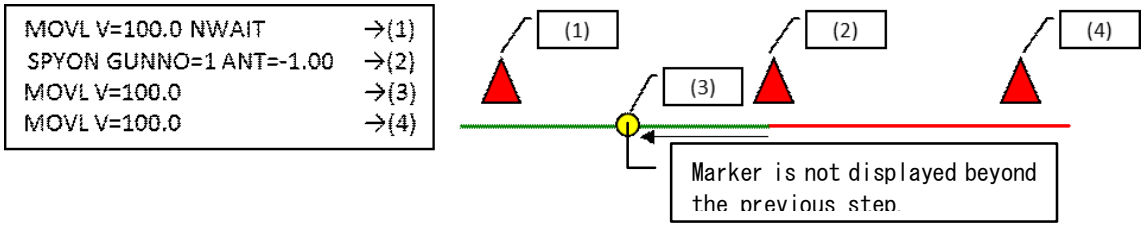
```
MOVL V=100.0          →(1)
SPYON GUNNO=1         →(2)
MOVL V=100.0          →(3)
MOVL V=100.0          →(4)
```



Anticipation is set (Positive)



Anticipation is set (Negative)



NOTE

- This operation cannot be used in PLAY mode.
- MOVJ and SYMOVJ is not supported.
- Acceleration and deceleration of a robot aren't considered.

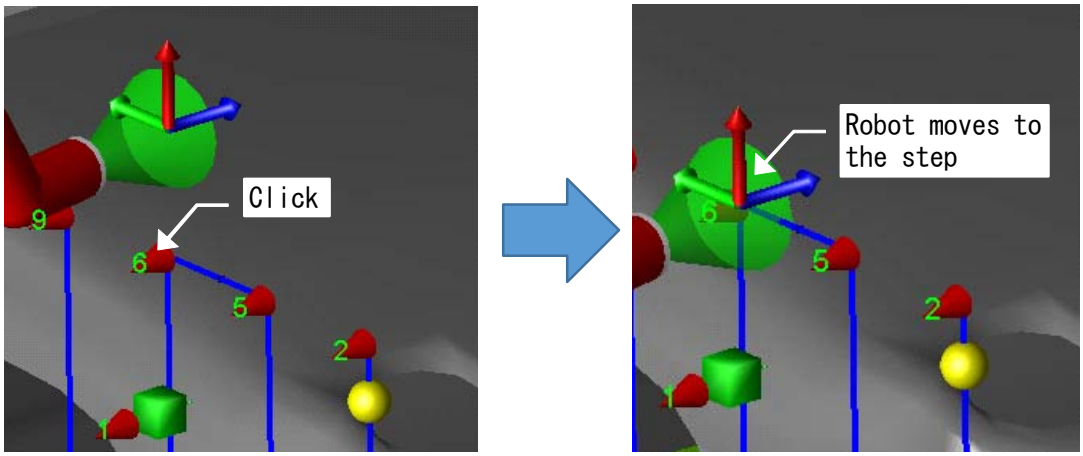
■ Edit the Teaching Position

Uses the visual path edit function and Operation handle, the job can be edited easily.

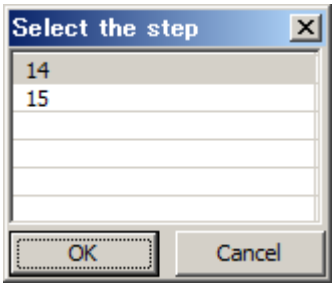
Procedure

1. On the [Controller] tab, in the [Job] group, click the [Visual Path Edit] button, the visual path is displayed.
2. On the [Home] tab, in the [Operation Handle] group, click the [Handle Display] button, the operation handle bar is displayed. Select the Handle.

3. Click the move instruction marker. Robot moves to the step.



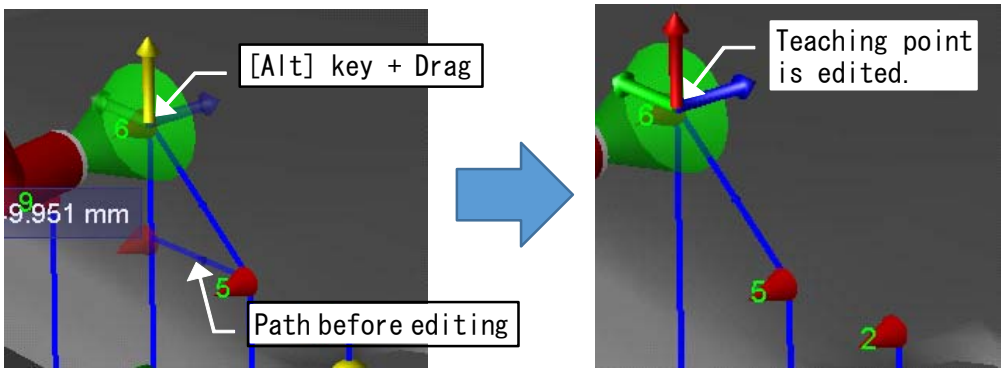
When multi step is registered the same position, Select dialog is displayed



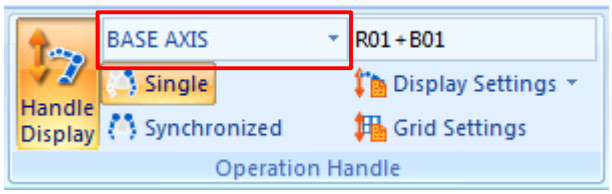
4. Drag the operation handle while the keyboard key is pressed. When release the mouse button, the job is edited. When drag the operation handle without pressing the key, Robot moves but the job is not edited. To edit the job, click the move instruction marker again.

   Following the keyboard assignment is available.

[Alt] key	Modify the teaching point
[Ctrl] key	Add the move instruction after the step.
[Alt] + [Ctrl] key	Add the move instruction before the step.



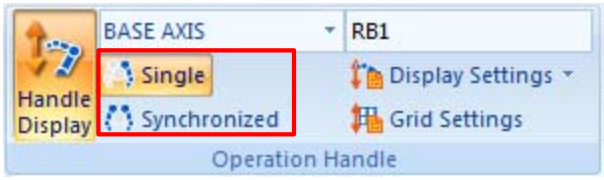
The operating coordinates of Operation handle is selected coordinates in the combo box in the [Operation Handle] group on the [Home] tab.



When the robot cannot moves to the handle position, the teaching point is changed.

In the case of coordinated job, by the selection of [Single] - [Synchronized] menu of the

operation handle, it works as follows.



• Modifying teaching position according to the "[Alt] key + drag"

Single	Teaching position of the robot displaying the path is updated only. Teaching positions of the other robots in the job are not changed.
Synchronized	Movement of all robot by the synchronized operation is reflected in the teaching position.

• Adding teaching position according to the "[Ctrl] key + drag" or "[Alt] + [Ctrl] key + drag"

Single	Teaching position of the robot displaying the path is reflected only. Teaching positions of the other robots are registered in the same location of the step selected at the time of start of operation.
Synchronized	Movement of all robot by the synchronized operation is reflected in the new teaching position.

NOTE This operation cannot be used in PLAY mode.

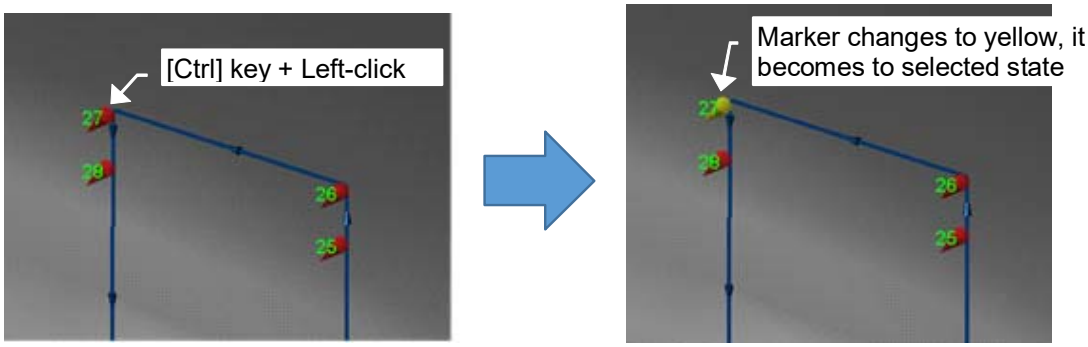
■ Edit Multiple Teaching Points

Multiple teaching points can be selected. Selected multiple teaching points can be moved in the same direction.

Procedure

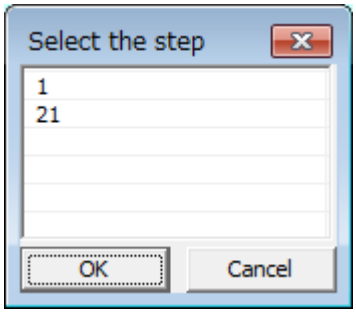
1. Proceeds the step 1 to 3 of "Edit the Teaching Position".
2. Select the move instruction marker to move at the same time by the following operation.
   [Operation 1: [Ctrl] key + Left-click]
   Left-click by holding down the [Ctrl] key on the marker of the move instruction, selection state of the marker is switched.

e.g. When select a non-selected state marker

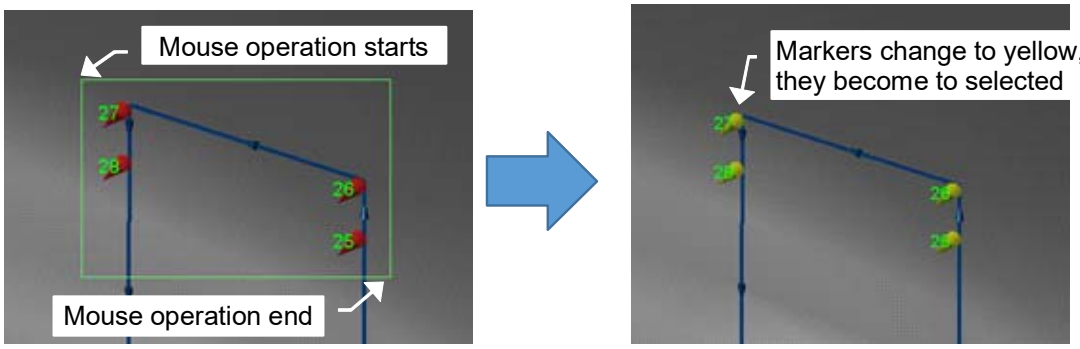


When execute the same operation on the marker in the selected state, it becomes to non-selected state.

When selecting one of the teaching points which are teaching the same position, dialog to specify whether to switch the selection state of any step is displayed.

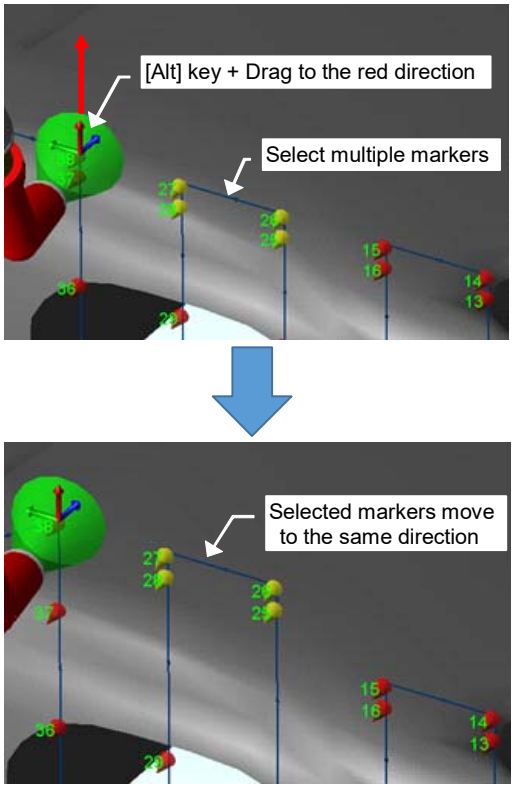


[Operation 2: [Shift] key + drag (Rectangle)]
Left-click and drag by holding down the [Shift] key, green rectangle appears. Move instruction markers displayed within the rectangle are selected.



NOTE When any of move instruction markers is selected and left-click anywhere on the cell screen, all of the selection is canceled.

3. Proceeds the step 4 of "Edit the Teaching Position".



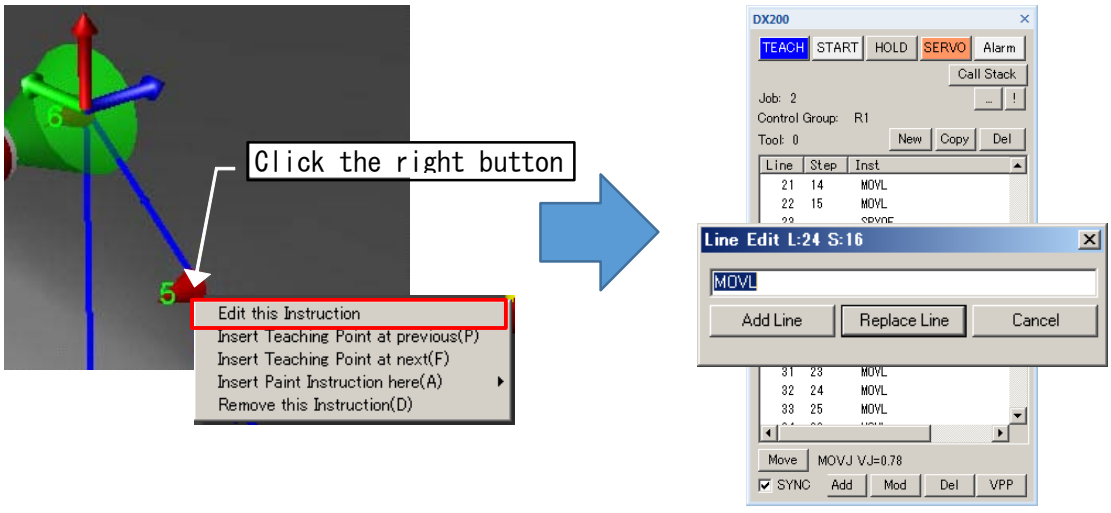
When any of the teaching point is out of operating range, the operation is canceled.

NOTE

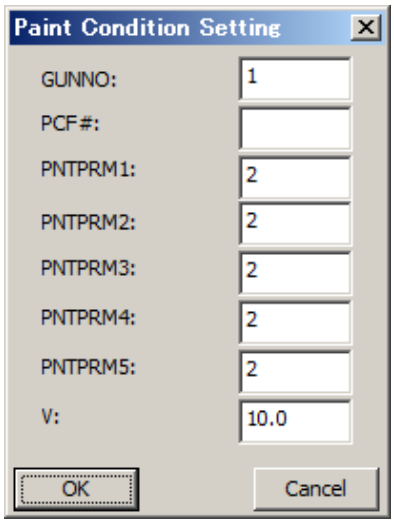
- When multiple selections, move instruction cannot be added by the "[Ctrl] key + drag" operation or "[Alt] key + [Ctrl] key + drag" operation.
- For multiple selected teaching point, axial rotation handle of the operation handle cannot be used.
- Teaching points that the tool number is different cannot be selected at the same time.

■ Edit the contents of instruction

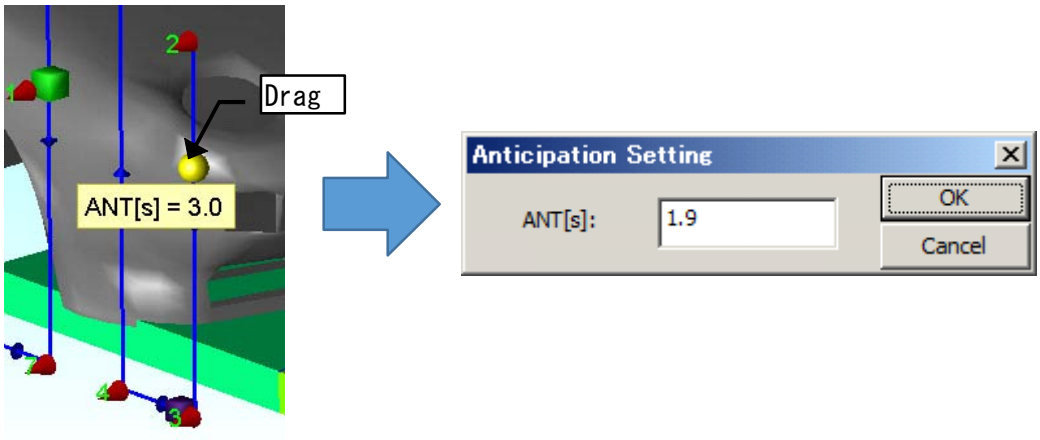
Click the right button on the move instruction marker and select the [Edit this Instruction] in the right-button menu, Edit function of the simple pendant is executed.



Double-click the PAINTSET marker, Paint Condition Setting dialog is displayed. When click the [OK] button, the setting is saved. When click the [Cancel] button, the setting is not saved.



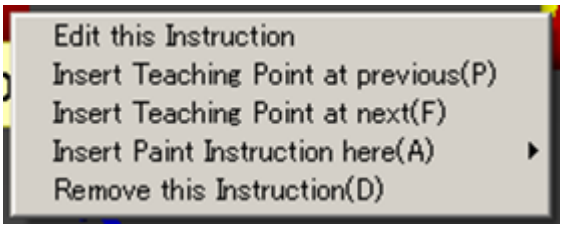
When the SPYON/SPYOF instruction has "ANT=" tag or "ANTDIS=" tag and last move instruction has "NWAIT" tag and drag the SPYON/SPYOF marker, the anticipation setting can be edited. When release the button, the setting dialog is displayed. When click the [OK] button, the setting is saved. When click the [Cancel] button, the setting is not saved.



NOTE This operation cannot be used in PLAY mode.

■ Right-button menu

Click the right button on the move instruction marker, right-buttom menu is displayed. Following operation is available.



Edit this Instruction	Edit this move instruction (Execute the edit function of simple pendant.)
Insert Teaching Point at previous	Insert teaching point at previous
Insert Teaching Point at next	Insert teaching point at next
Insert Paint Instruction here	Insert SPYON/SPYOF instruction
Remove this Instruction	Delete the move instruction or SPYON/SPYOF instruction

When delete the instruction, the following dialog is displayed. When click the [OK] button, the instruction is deleted. When click the [Cancel] button, the instruction is not deleted.

NOTE This operation cannot be used in PLAY mode.

8.11 Collision Detection

This function displays the collision between some models.
When the collision is detected, the model is displayed in red, and the robot pulse data and the executing job name is displayed in the collision log.

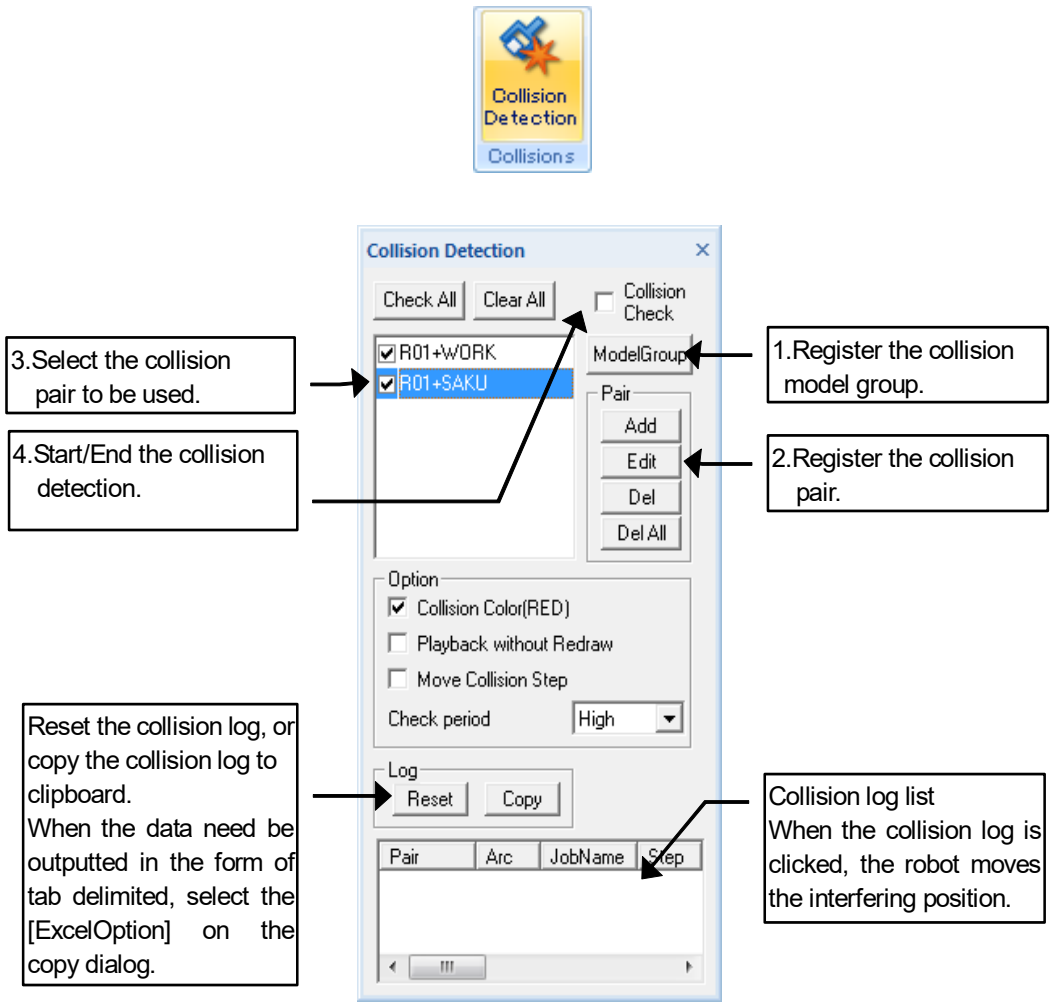
To use the Collision detection, the following settings are needed.

1. The model (work, robot, etc.) group is registered as "Collision model group".
2. To detect collision, the model group pairing is registered as "Collision pair".
3. Select the Collision pair, and start the Collision Detection.

For details, please refer to section " 13.3 Collision Detection Setting ".

8.11.1 Collision Detection Dialog

In this dialog, set up to detect collision, and operate the start/end the collision detection.
On the [Simulation] tab, in the [Collisions] group, click the [Collision Detection] button, the [Collision Detection] dialog appears.



Collision Detection dialog option

Item	Description
Collision Color (RED)	The interfering model is displayed in red.
Playback without Redraw	To reduce the time to check collision, Redraw is skipped on playback.
Move Collision Step	When the collision log is clicked, the robot moves the interfering position, and the cursor location in the virtual pendant moves to the step number position recorded in that log. When this operation is used, set the teach mode.
Check period	MotoSim EG-VRC detects the collision per checking period on playback. High: Collision detection is executed per 1 segment of controller. Medium: Collision detection is executed per 50msec. Low: Collision detection is executed per 100msec.

SUPPLE-MENT

By using the simplified model creation function and the collision detection function, near miss check is possible.
For details of the simplified model creation function, please refer to "11.17 Creating Simplified Model".

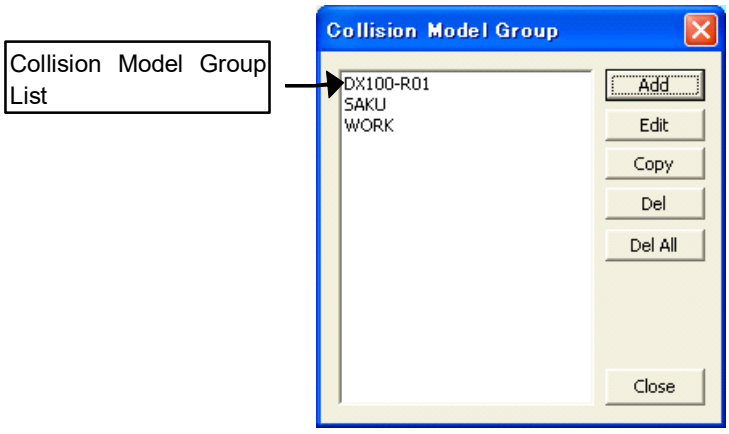
NOTE

- The function is not available for hidden model.
- Near miss check option may need time to process.
- Default setting of check period is "High". If "Medium" or "Low" is selected, the time required to execute playback is shorten, but collision cannot be detected when the robot moves fast. Please select the check period according to the robot speed.
- [Playback without Redraw] and [Move Collision Step] can not use depending on the system version of controller. Please refer to section " 15.8 List of Function depending on the system version of controller ".

8.11.2 Collision Model Group Setting

■ Collision Model Group Display

The model (work, robot, etc.) group is registered as "Collision model group".
To display the Collision Model Group dialog box, click the [ModelGroup] button on the Collision setting dialog box.



Collision Model Group

Item	Description
Collision Model Group List	The registered collision model group is displayed. When the collision model group is selected, the models of the collision model group are highlighted.
Add	The new collision model group is created.
Edit	The collision model group selected in the list is edited. When the collision model group in the list is double-clicked, that can be edited.
Copy	The new collision model group is created based on the collision model group selected in the list.
Del	The collision model group selected in the list is deleted.
Del All	All collision model group selected in the list are deleted.

■ Auto-registration of the collision model group

The collision model group of robot is registered automatically in following case. Edit it if needed.

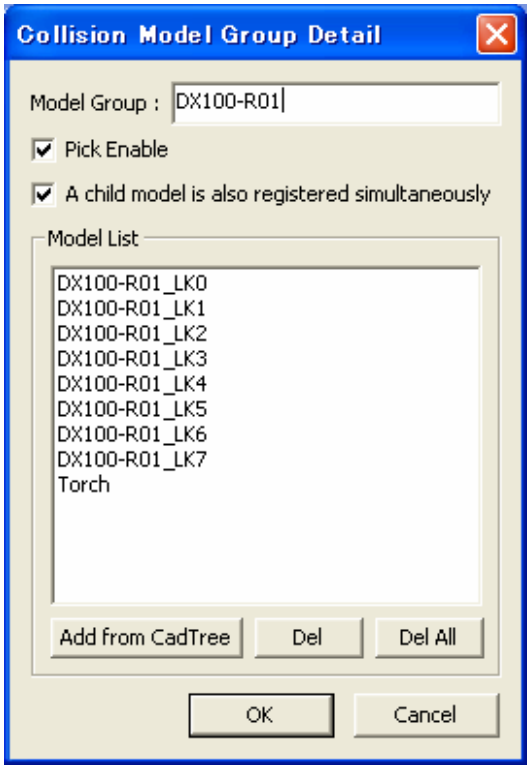
- When the new controller is created
- When the old cell (before MotoSim EG-VRC ver2.60) is opened.

NOTE

- The tool model is not added. Click the [Edit] button, and add the tool model if needed.
- The time to check collision depends on the number of model and the complexity of model.
  All robot models are registered by Auto-registration. If some robot models need not be checked, narrow down the models of the collision model group at the Collision Model Group Detail Dialog Box.

■ Collision Model Group Detail Display

The models (work, robot, etc.) are registered/deleted to the collision model group.
To display the Collision Model Group Detail dialog box, click the [Add] button, the [Edit] button, or the [Copy] button on the Collision Model Group dialog box



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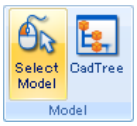
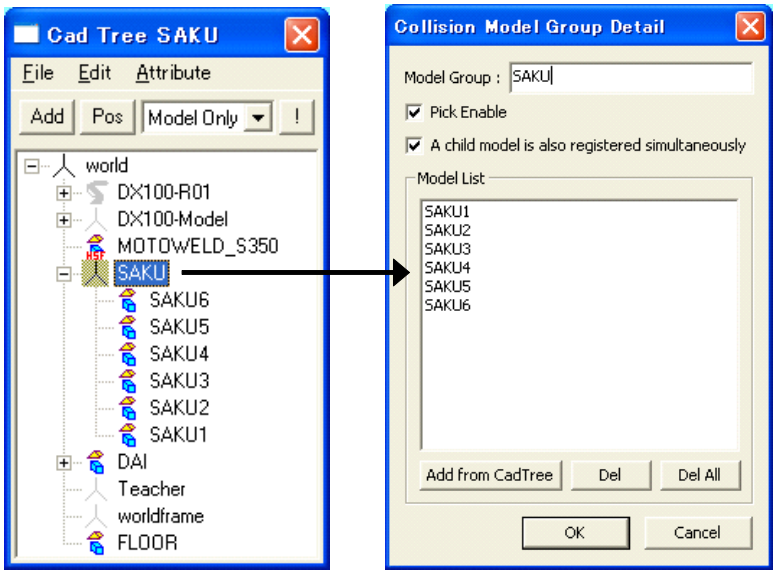
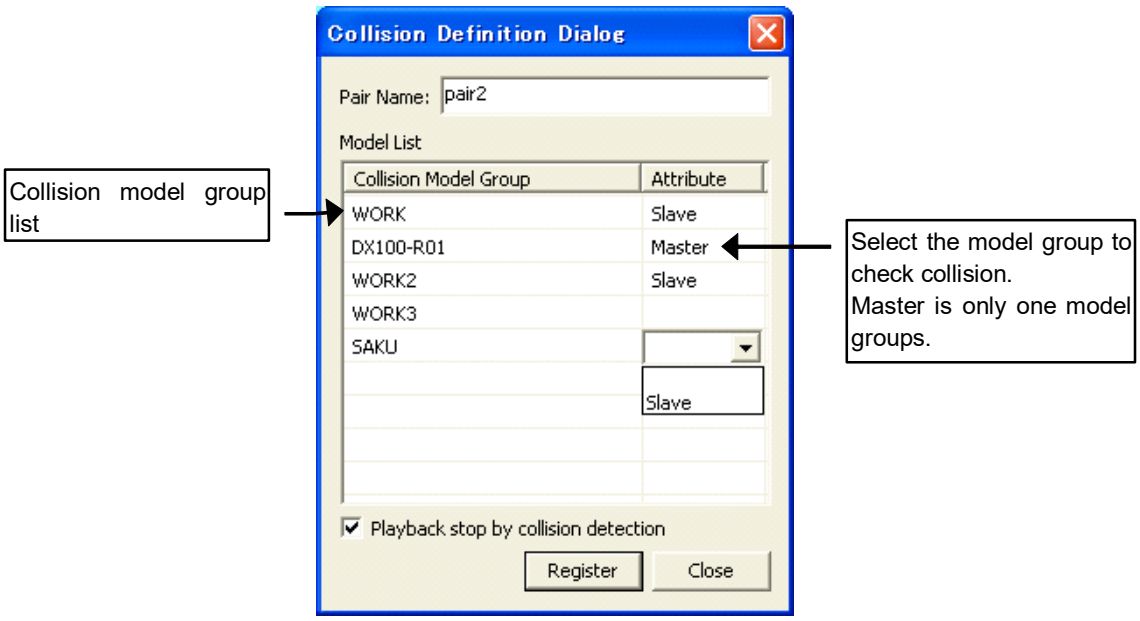
Collision Model Group Detail

Item	Description
Pick Enable	On the [Home] tab, in the [Model] group, click the [Select Model] button. Select the model in the MotoSim EG-VRC, that model is added to the [Model List]. 
Add from CadTree	Select the model on the CadTree, and click the [Add from CadTree] button, that model is added to the [Model List].
A child model is also registered simultaneously	When the model is added, the child model of that is also registered simultaneously. For example, If the "SAKU" is selected in the CadTree and the [Add from CadTree] button is clicked, the child models "SAKU1", "SAKU2", "SAKU3", "SAKU4", "SAKU5", and "SAKU6" are also added. ("SAKU" is dummy model, so it is not added.) 
Del	The selected model in the [Model List] is deleted.
Del All	All models in the [Model List] are deleted.

8.11.3 Collision Definition Setting

■ Collision Definition Dialog

To detect collision, the model group pairing is registered as "Collision pair".
To display the Collision Definition dialog box, click the [Add] button, and the [Edit] button on the Collision Detection dialog box.
Collision Detection function check if master interfere slaves. So, select one model group as Master, and Select one or more model group(s) as Slave.



Collision Definition

Item	Description
Collision model group list	The registered collision model group is displayed in the list. When the collision model group is selected, the models of the collision model group are highlighted. To check the collision model group, set the Attribute items "Master" or "Slave".
Playback stop by collision detection	Set the robot action when collision occurs. If this is checked, playback is stopped when collision is detected in playback. When the playback is continued without interruption, do not check this, and register the collision definition.

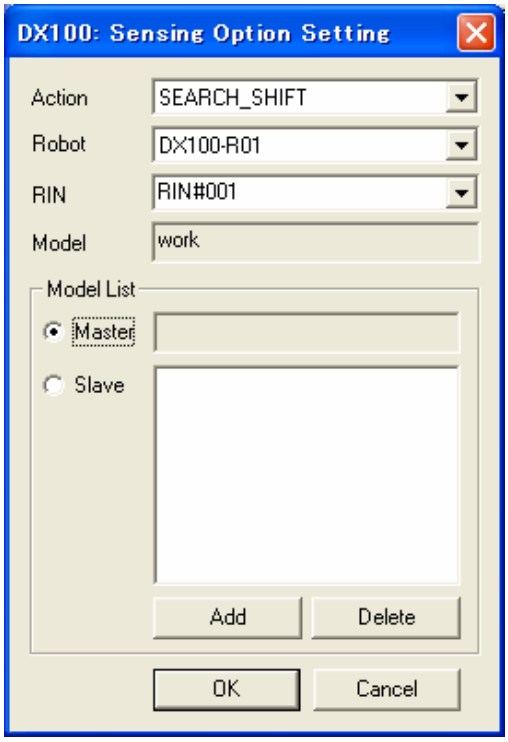
8.12 Sensing Option Setting

When the Sensing option is used, to detect the point where the wire of robot has contact with the work, the searching operation (Staring Point Detection function / Search function) is available.
Please refer to "INSTRUCTIONS FOR BASIC OPERATION OF STARTING POINT DETECTION FUNCTION" / "INSTRUCTIONS FOR SEARCH FUNCTION" of each the controller for details.

NOTE

- This function can not be used for the FS100 controller.
- When this function is used, "Starting point detecting function" of option function in maintenance mode need be checked "use".
- When this function is used, turn off the servo simulation.On the [Simulation] tab, in the [Playback] group, click the [Servo Emulation] button.

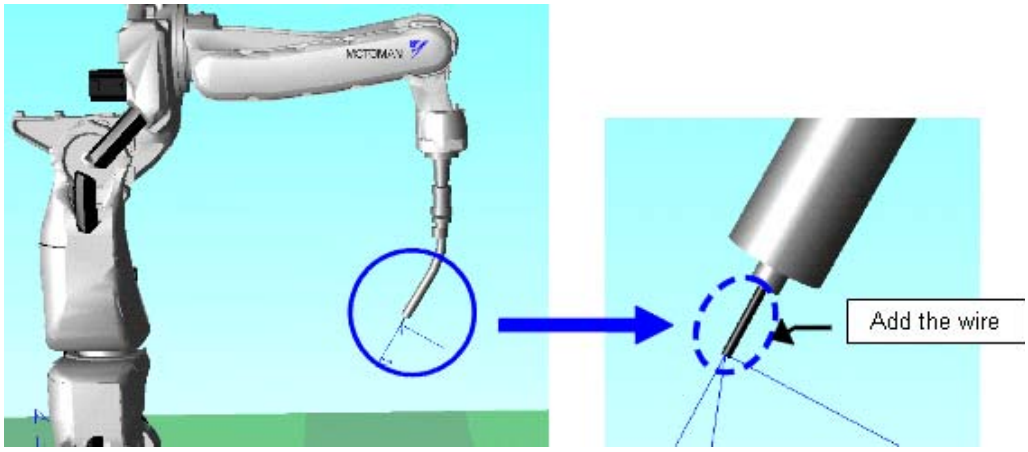
- Sensing function (SRCH tag of MOV* instruction) can be simulated, but sensing result is not the real one.
- The master model of sensing gets deeply into the slave one depending on the moving speed of sensing.



Procedure

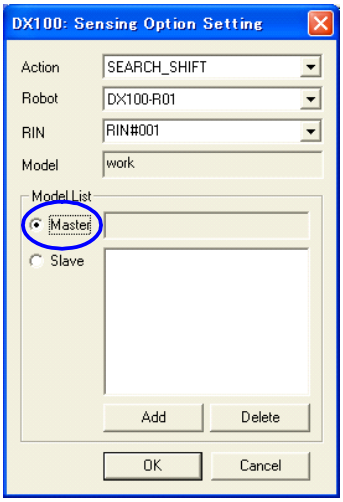
It explains the procedure for setting the sensing option between the wire of robot (Model name: wire) and the work (Model name: work).

1. The wire (Model name: wire) is added at the torch head of robot.
   In this case, the "CYLINDER" is used for the parts of wire.

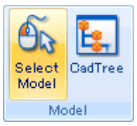


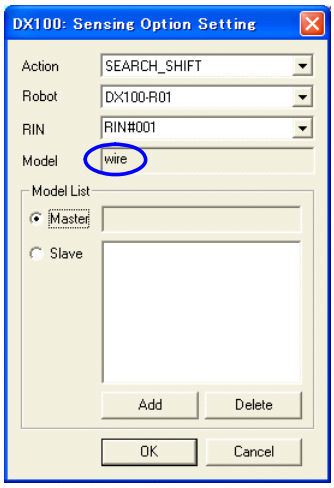
2. On the [Simulation] tab, in the [Settings] group, click the [Sensing Setting] button, the [Sensing Option Setting] dialog appears.

3. Select [Master] in the [Model List] group.

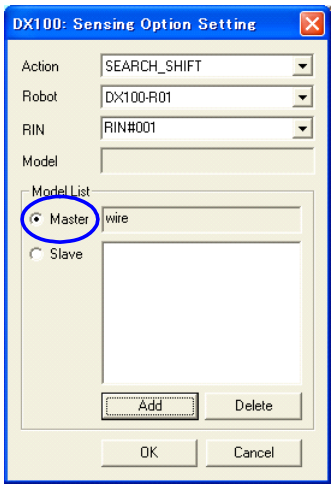


4. On the [Home] tab, in the [Model] group, click the [Select Model] button. Click the "wire" model, "wire" is displayed at [Model].

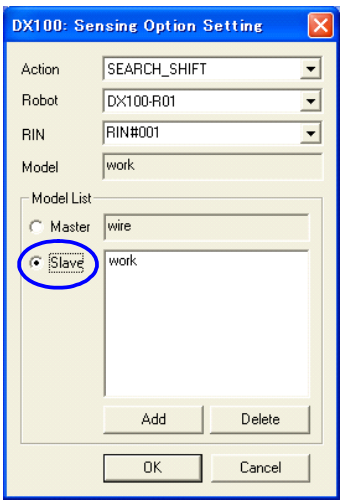




5. Click the [Add] button, the "wire" is set to the [Master] in the [Model List] group.



6. Select [Slave] in the [Model List] group, and set the "work" to the [Slave] as Step 4 and 5.

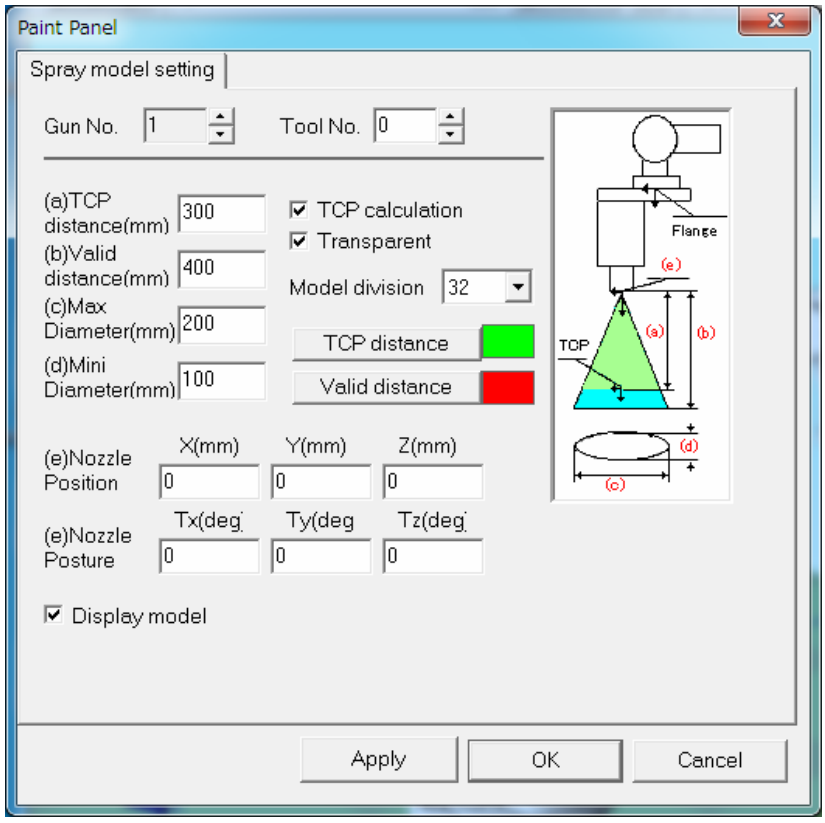


7. Click the [OK] button.

8.13 Spray Model for Paint

8.13.1 Spray Model

The Spray Model for Paint function allows creating the spray model easily. The spray model is displayed and hidden automatically, when the SPYON or SPYOF instruction is executed.



Paint Panel

Item	Description
[Gun No.] spin box (1 to 3)	Paint gun number.
[Tool No.] spin box	Specifies the tool number to set the paint gun number.
"(a)TCP distance" edit box	Distance from the paint spray outlet (nozzle).
"(b)Valid distance" edit box	Effective range to apply paint from the nozzle.
"(c)Max Diameter" edit box	Maximum width of the paint spray face.
"(d)Mini Diameter" edit box	Minimum width of the paint spray face.

Paint Panel

Item	Description
"(e)Nozzle Position" edit boxes	Nozzle position viewed from the flange.
"(e)Nozzle Posture" edit boxes	Nozzle posture viewed from the flange.
[TCP calculation] check box	Automatically calculates tool dimensions according to the input information.
[Transparent] check box	Displays paint model in translucent color.
"Model division" combo box	Number of divided paint spray faces.
[TCP distance] button	Paint color from nozzle to TCP.
[Valid distance] button	Paint color from nozzle to the end of the valid painting distance.
[Display model] check box	Displays the created spray model.

Procedure

1. Select the controller for the spray model setting.
2. On the [Simulation] tab, in the [Settings] group, click the [Paint Setting] button, the [Paint Panel] dialog appears.
   Set the Gun No. and Tool No. to according to the job.

3. Click the [OK] button or the [Apply] button, and then the spray model is created.
4. When the playback is executed, the spray model related to the Gun No. of SPYON or SPYOF instruction is displayed and hidden automatically.

NOTE This function can not used with two or more robot system.

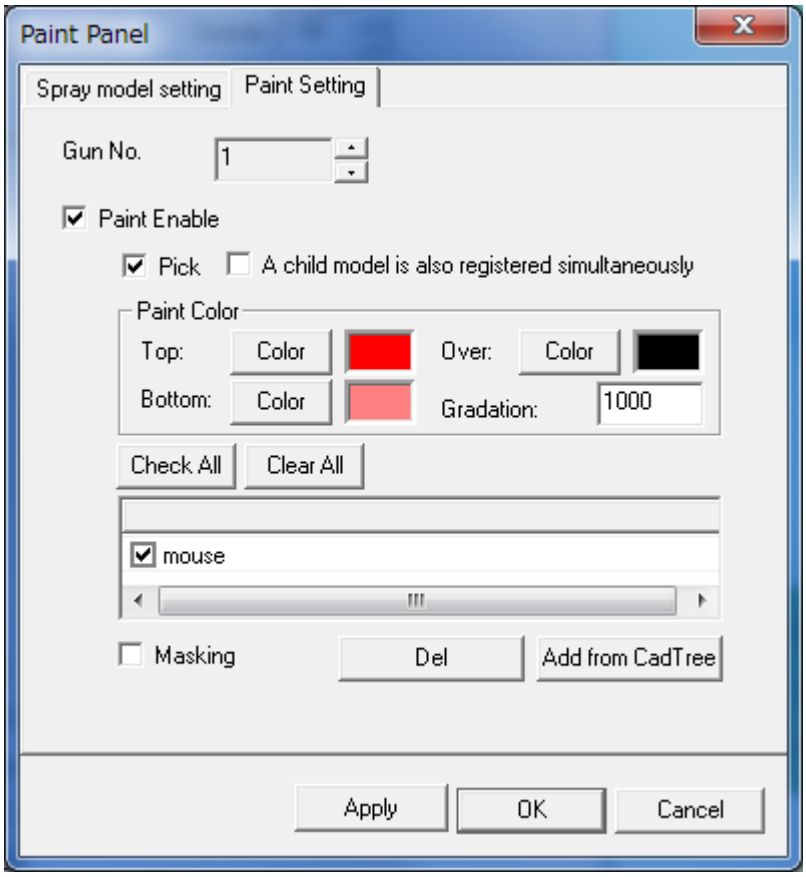
8.13.2 Paint Simulation

It can be checked visually whether the spray model has arrived at the workpiece.
Color is displayed in SPYON ~ SPYOF section during playback.

■ Restriction

- Paint Simulation is not available when multiple robots exist in one controller.
- It is not possible to output the state of painting to 3DPDF file or AVI file.

- It is not possible to simulate overcoating with multiple guns.
- When using the masking function, the playback speed will be slow.



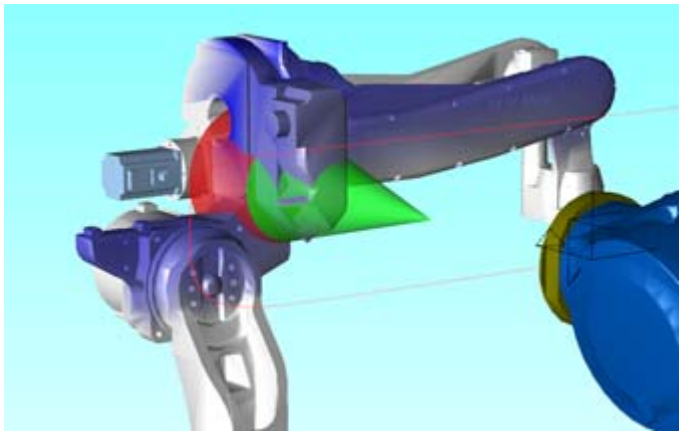
Item	Description
Gun No. (1-3)	Sets painting gun number.
Paint Enable	When enabled, It is displayed visually whether the spray model has arrived at the workpiece.
Pick	When enabled, the target model can be picked.
A child model is also registered simultaneously	When the model is added, the child model of that is also registered simultaneously.
Top	Sets the color when painting the maximum.
Bottom	Sets the color immediately after start of painting.
Over	Sets the color when painting over the top.
Gradation	Specify the stage from the bottom to the top.

Item	Description
Check All	All target models are checked.
Clear All	All target models are unchecked.
Model List	Displays a list of target models. Check ON: painting target Check OFF: Not target
Masking	When enabled, color is not applied to the target model when there is an obstacle between the application target model and the paint gun tip.
Del	Deletes the selected model from the list.
Add from CadTree	Adds the model selected in CadTree.

Procedure

1. Select the controller for which paint settings are set.
2. On the [Simulation] tab, in the [Settings] group, click the [Paint Setting] button, the Paint Panel dialog appears. Select the [Paint Setting] tab.

3. Sets the each items.
   Please set the painting gun number regarding to the job.
4. Press the [Apply] button or the [OK] button to complete the paint settings.
5. When playback, the target model is colored with the painting contents linked to the painting gun number of SPYON, SPYOF command.



8.14 Speed Graph Function

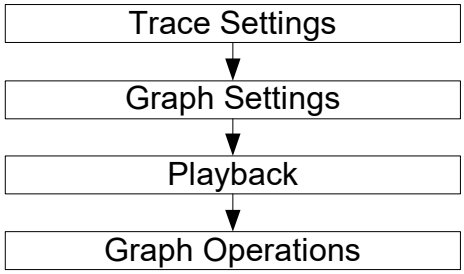
This function displays on a graph the robot TCP speed during playback.

NOTE

- This function cannot be used in conjunction with the High-Speed Playback function. For details on the High-Speed Playback function, please refer to section " 7.5.4 Refresh Interval " of the MotoSimEG-VRC Operation Manual.
- This function doesn't support multiple controllers or a controller with multiple robots.
- The speed displayed in this function is the speed of the TCP of the R1 robot of the current controller selected at the time the Speed Graph dialog was displayed.

8.14.1 Basic usage

The procedure for using the Speed Graph function is as follows.

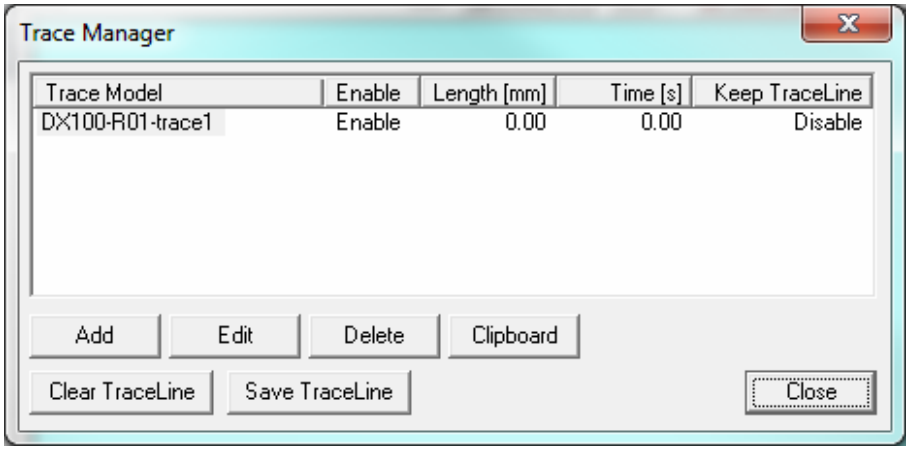


8.14.2 Trace Settings

To display the speed in the graph, this function uses the data from the robot TCP trace. Therefore, the Trace function must be enabled and set to the robot TCP in order to use this function.For more details about the Trace function, please refer to section " 13.2 Trace Function " of the MotoSimEG-VRC Operation Manual.

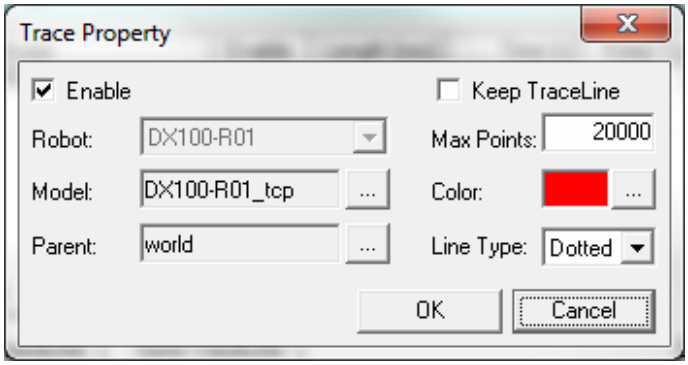
Procedure

1. On the [Simulation] tab, in the [Monitor] group, click the [Trace] button, the [Trace Manager] dialog appears. To use the speed graph, you will need to set the trace to the TCP model: <ControllerName>-R01_tcp (example: DX100-R01_tcp). By default, the trace <ControllerName>-trace1 is already set to the TCP of the controller's R1 robot.



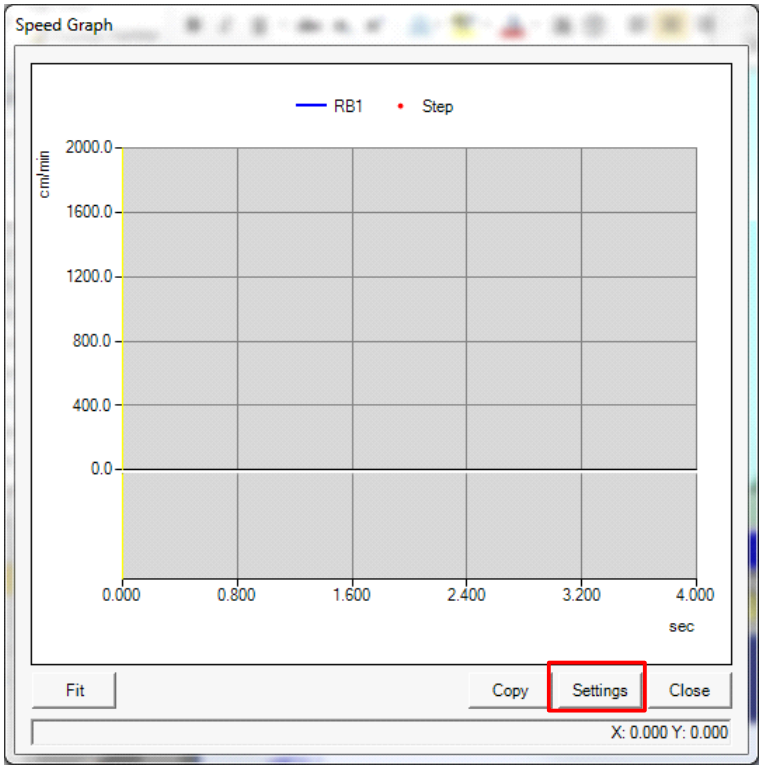
If it does not exist or was changed, please create a trace for the model "[controller name]-R01_tcp".

2. To verify the settings, double-click on the trace "<ControllerName>-trace1" or select it and press the [Edit] button. In the "Trace Property" dialog, if it not already set, select the "<Controller_Name>-R01_tcp" model in the "Model" field.
   To display the speed relative to a moving work piece, change the "Parent" field from "world" to the model representing the work piece.



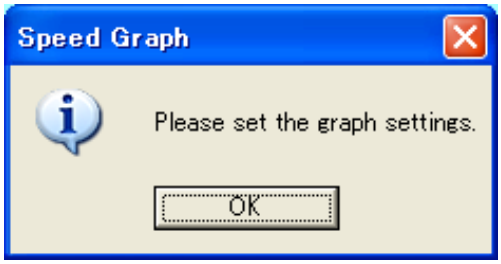
8.14.3 Graph Settings

Set the graph settings before displaying the graph.
On the [Simulation] tab, in the [Monitor] group, click the [Speed Graph] button, the [Speed Graph] dialog appears.



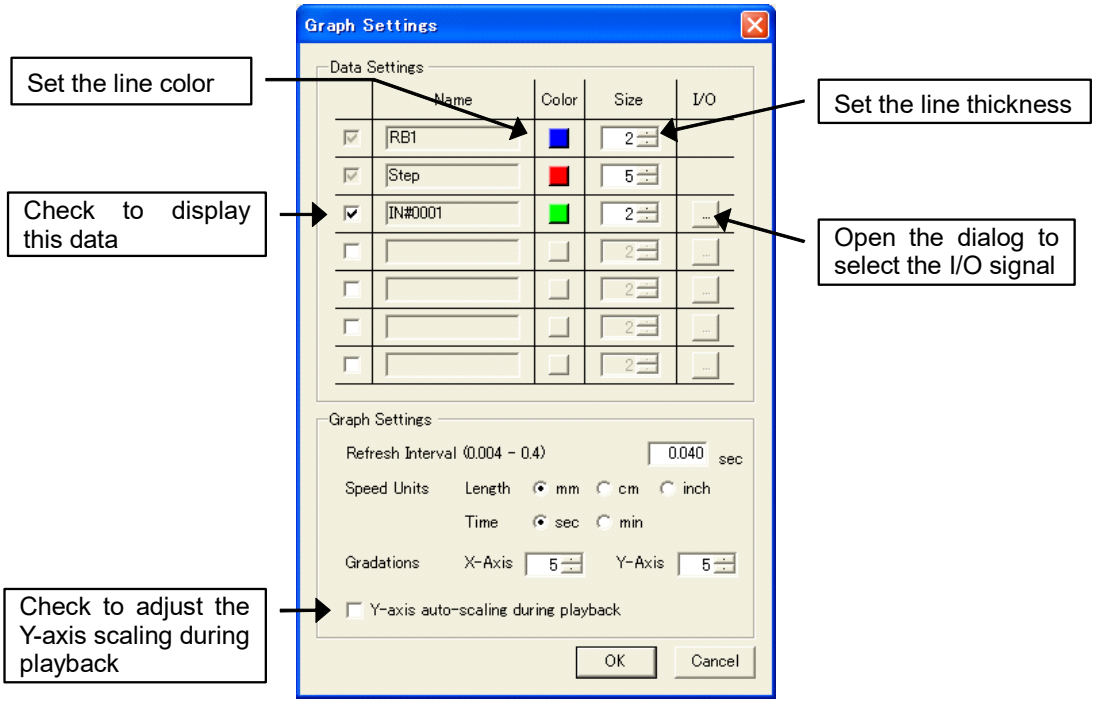
Press the [Settings] button to display the "Graph Settings" dialog.

NOTE If the following message displays, the settings for the current controller are not set properly. Please verify the graph settings.



■ Graph Settings Dialog

In this dialog, display parameters such as I/O signals, line color, line thickness, scale, etc. can be set. Up to 5 I/O signals can be displayed. The same I/O signal cannot be set multiple times.

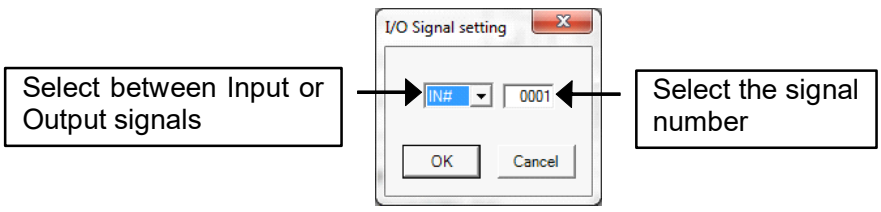


Graph Settings [Graph Settings]

Item	Description
Refresh Interval	Sets the rate at which the Speed Graph is updated. (0.004 to 0.4 sec)
Speed Units	Sets the speed units for the Y-axis.
Gradations	Sets the number of gradation lines along the X and Y axes.
Y-axis auto-scaling during playback	When checked, the Y-axis scaling is automatically adjusted during playback to display the full range of the speed.

■ I/O Signal Setting Dialog

The "I/O Signal Setting" dialog is used to select the I/O signal to plot on the speed graph.

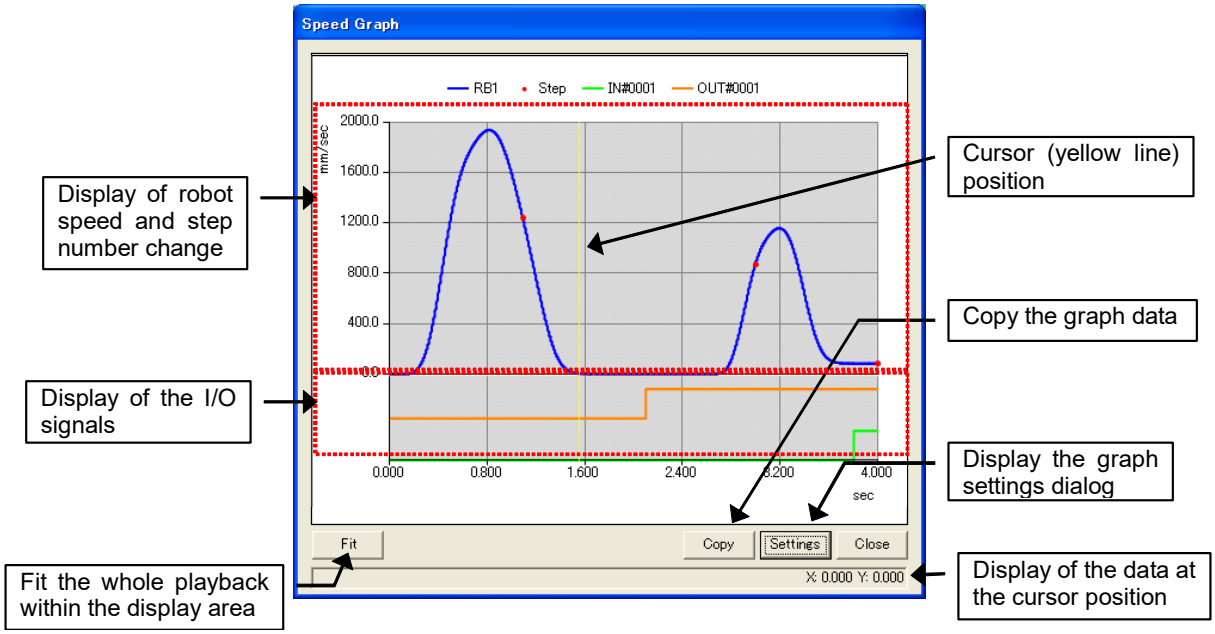


8.14.4 Playback

During playback, the speed is plotted on the speed graph. The graph can display up to 200.0 seconds of data. Playback data beyond 200.0 seconds will not be displayed. Also note that graph operations cannot be done during playback.

8.14.5 Graph Operations

After playback is complete, various operations can be done with the speed graph.



Mouse Operations

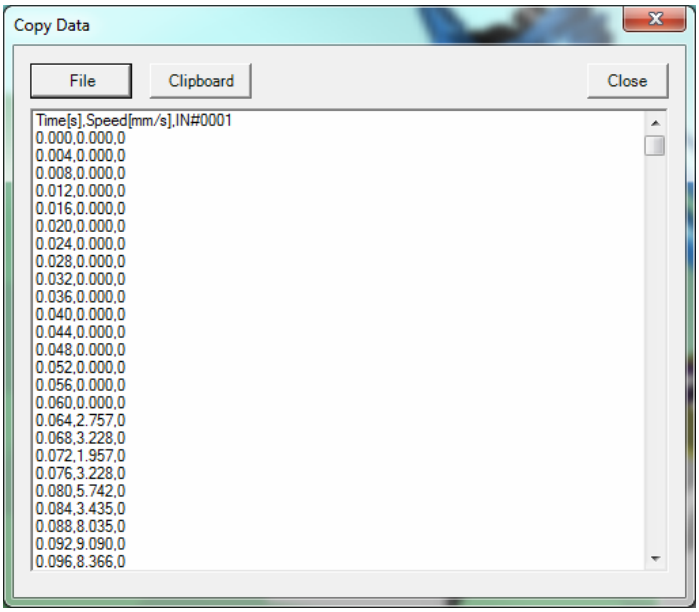
Click on the graph	Move the cursor position (yellow line) to the clicked position. The robot in the MotoSimEG-VRC window will also move to the position corresponding to the cursor position.
Mouse Wheel	Roll the mouse wheel to change the X-axis scaling factor.
[Ctrl] key + Mouse Wheel	Roll the mouse wheel to change the Y-axis scaling factor.
Drag the scrollbar	Drag the bottom scrollbar to horizontally pan (X-axis) the graph in the display area.

Keyboard Operations

[←] [→] keys	Move the cursor position by one segment.
[Ctrl] + [←] [→] keys	Move the cursor position rapidly.
[Home] key	Move the cursor and the display area to X=0.0
[End] key	Move the cursor and the display area to X=Max.

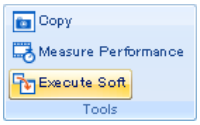
■ Graph Data Copy

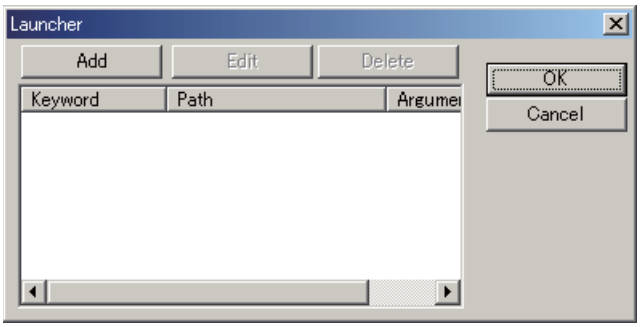
When the [Copy] button from the "Speed Graph" dialog is pressed, the "Copy Data" dialog displays. Press the [File] button to save the data to a text file. Press the [Clipboard] button to copy the data to the Windows clipboard so that the data can be paste in another application.



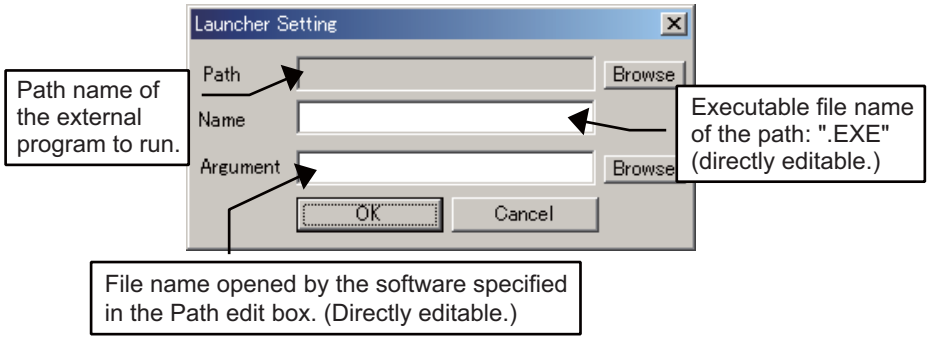
8.15 Running an External Software

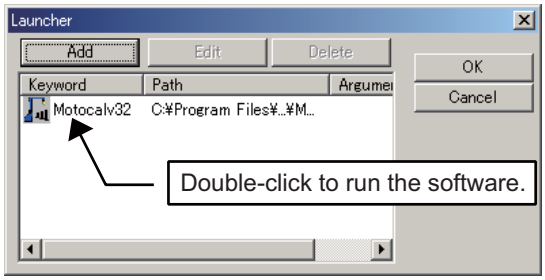
To run an external software with MotoSim EG. On the [Home] tab, in the [Tools] group, click the [External Software] button, the [Launcher] dialog appears and perform the settings explained in the list below.





Launcher Dialog Box

Item	Description
[Add] button	Select [Add] to register the software to run; the Launcher Setting dialog box appears. Press the [Browse] button on the right of the Path edit box. Select the desired program (executable file), and press [OK]. (The file name will be automatically entered in the Name edit box.) 
[Edit] button	Edits the settings of the registered software.
[Delete] button	Deletes the registered software.

Launcher Dialog Box	
Item	Description
“Keyword” column	Double-click the desired software in the “Keyword” column to run the external software. 

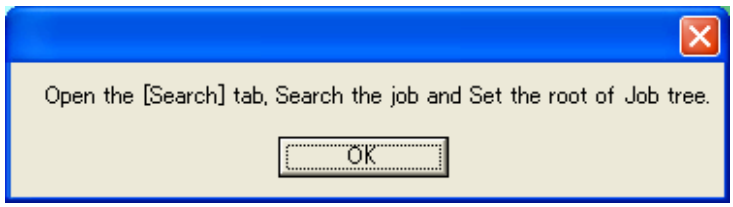
8.16 Job Browser

Job Browser supported the selection the job. Job Browser is available for the NX100, DX100, FS100, DX200, YRC1000 and YRC1000micro.
On the [Home] tab, in the [Teching] group, click the [Job Browser] button, the [Job Browser] dialog appears.

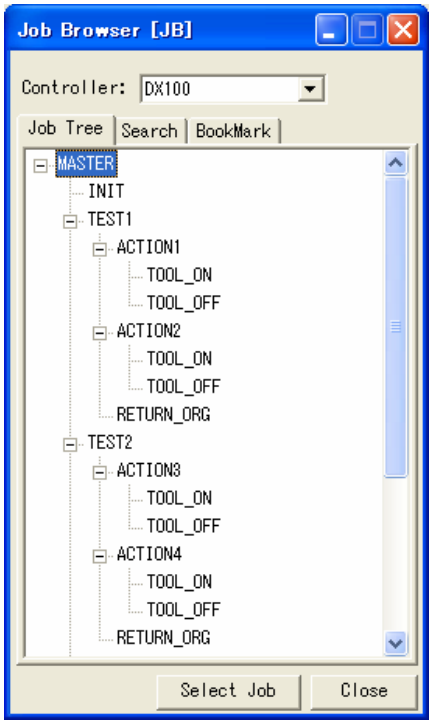
NOTE This function can not use depending on the system version of controller. Please refer to section " 15.8 List of Function depending on the system version of controller ".

■ When starting Job Browser for the first time

When starting Job Browser for the first time, the bellow dialog appears. Open the Search tab in the Job Browser, search the job, and set the job to the root of the job tree.



■ Main Window



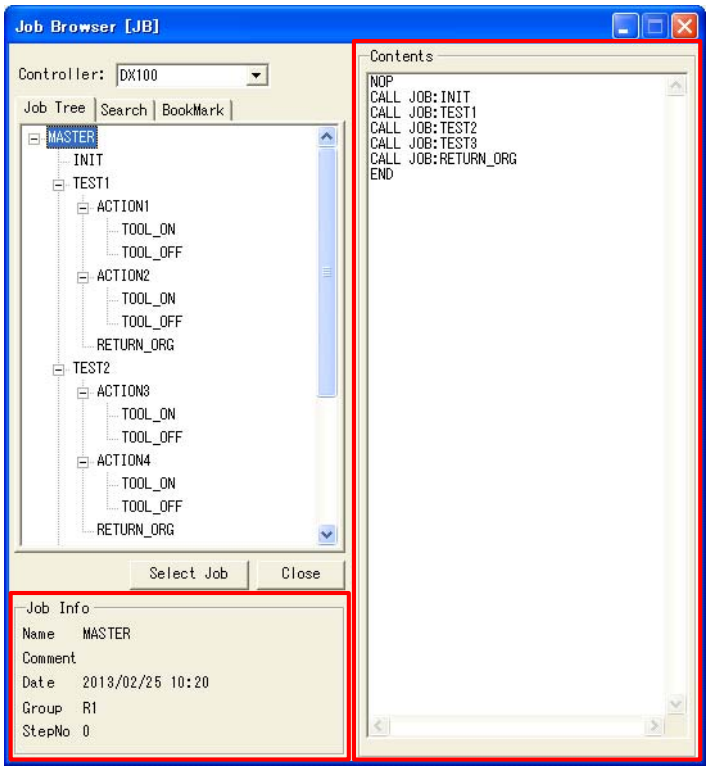
Job Browser

Item	Description
Controller	Select the controller.
Job Tree tab	Job Tree tab shows the job hierarchy as a tree.
Search tab	Search the job in the controller on the Search tab.
Bookmark tab	Bookmark tab shows the registered jobs as bookmark.
Select Job	Set the selected job in the tree or list to the virtual pendant.
Close	Close the Job Browser.

■ Sub Window

Job information and contents are displayed at the sub window. Job Browser enables the user

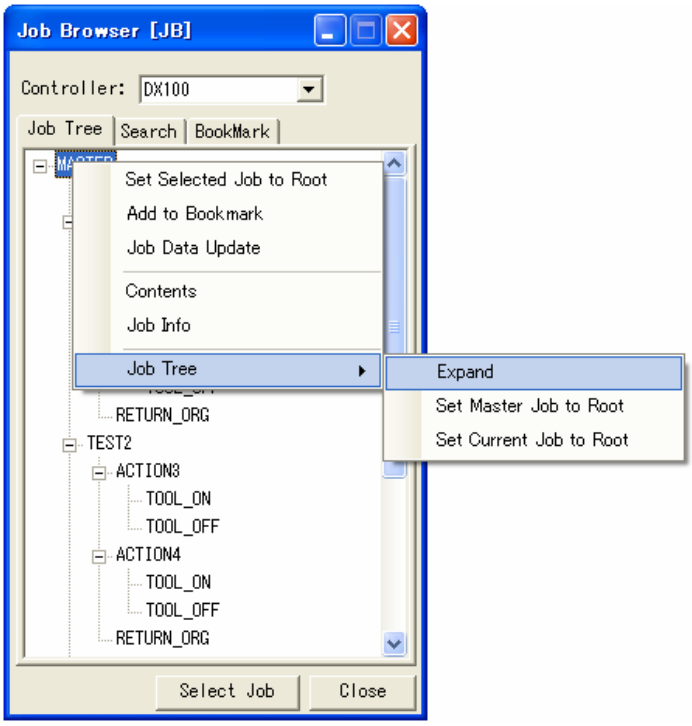
to selectively hide and display the sub window.



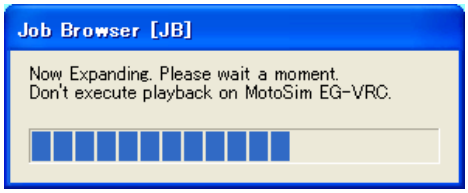
Sub window

Item	Description
Contents	Display the contents of the selected job. The line of the Contents list can be selected. When set the job to the virtual pendant, the cursor is set to the selected line. Double-click the line, the job can be set to the virtual pendant. (The cursor is set to the selected line.)
Job Info	The job header of the selected job is displayed.
Name	The name of selected job is displayed.
Comment	The comment of selected job is displayed.
Date	The date of selected job is displayed.
Group	The control group of selected job is displayed.
StepNo	The steps number of selected job is displayed.

■ Right-click menu



Right-click menu

Item	Description
Set Selected Job to Root	The selected job is set to the root of Job tree. The current job tree is cleared.
Add to Bookmark / Remove from Bookmark	The selected job is added to (removed from) the Bookmark.
Job Data Update	The selected job data is updated. The node is closed.
Contents	Display/Hide the Contents window.
Job Info	Display/Hide the Job Info window.
Expand	The Job tree is expanded from the selected node. NOTE During the expansion, the follow dialog box is displayed. Do not execute the playback. 
Set Master Job to Root	Set the master job set in the virtual pendant to the root of Job tree. If the master job is not set, The root of Job tree is not set.

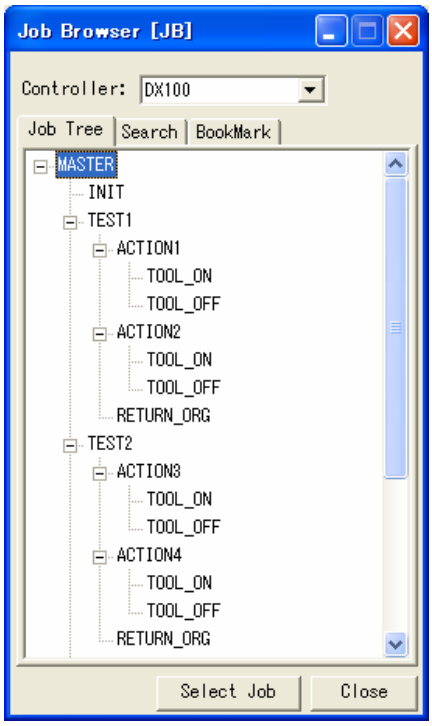
Right-click menu

Item	Description
Set Current Job to Root	Set the current job set in the virtual pendant to the root of Job tree. If the current job is not set, The root of Job tree is not set.

■ Job Tree Tab

Display the hierarchy structure of jobs as tree structure. The target instructions are CALL JOB, JUMP JOB and PSTART JOB. The tree is displayed until eight-level. And the tree can be expanded. The root of tree is set the follow jobs.

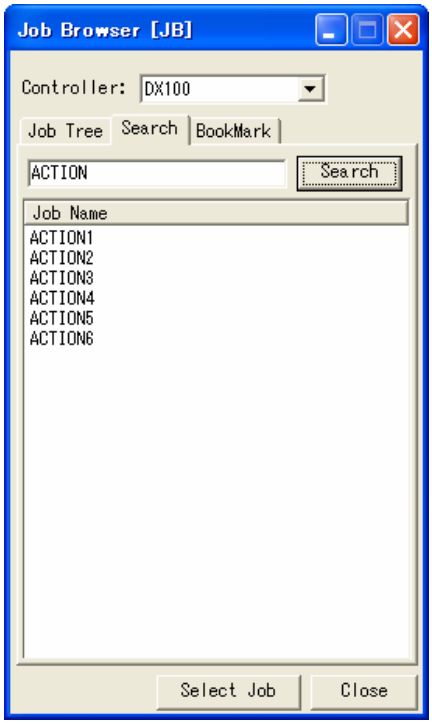
- The selected job on the Job tree
- The selected job in the list (Search tab/Bookmark tab)
- Master job in the virtual pendant
- Current job in the virtual pendant



■ Search Tab

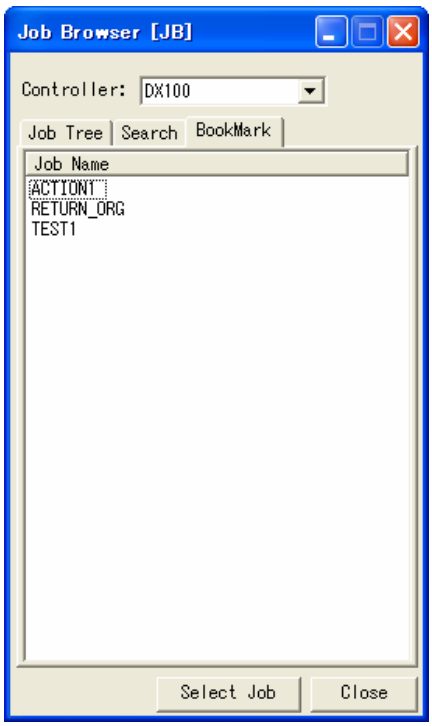
Press the [Search] button, jobs in the virtual controller is searched and the appropriate jobs are displayed in the list. A keyboard search is available. When the text box is empty, All jobs

are displayed.



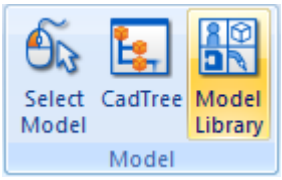
■ Bookmark Tab

The selected job in the tree/list can be registered as bookmark.
It is useful for registering jobs with much reference number of times.



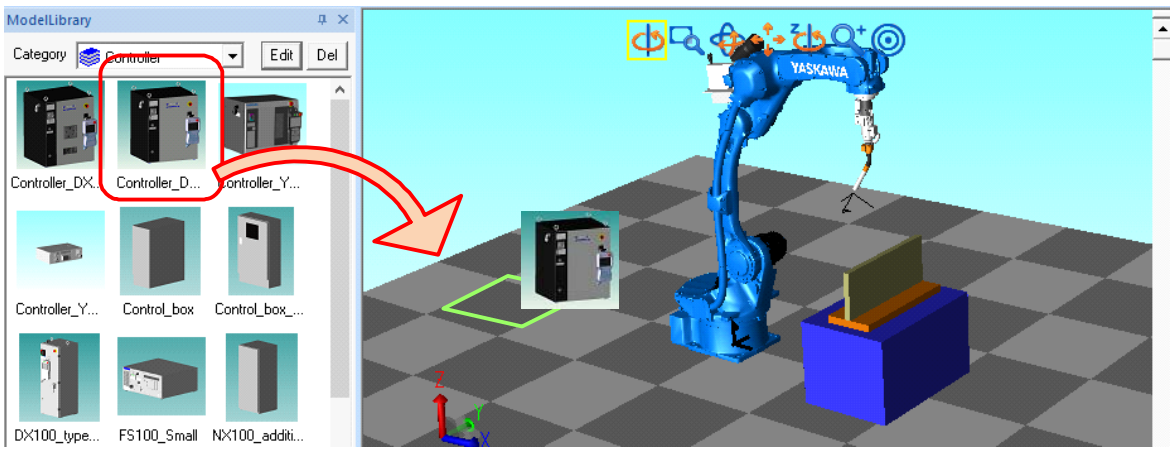
8.17 Model Library

Model Library supports the model importing. Model Library dialog shows the preview of model registered with a library.
On the [Home] tab, in the [Model] group, click the [Model Library] button, the [Model Library] dialog appears.



8.17.1 Introduction

To import the model, drag and drop the model icon, or double-click the model icon. The type of model are "Work" and "Tool". It is different in the behavior when importing the model.
And, it's possible to add a model of a cell to the model library from the [CadTree] dialog.



Model Library

Category	Changes the category of the models.
Edit	Edits the information of model (e.g. arrangement information) registered with the model library. For details, refer to section " 8.17.7 Edit Model of Model Library ".
Del	Deletes the model from the model library. For details, refer to section " 8.17.8 Delete Model of Model Library ".

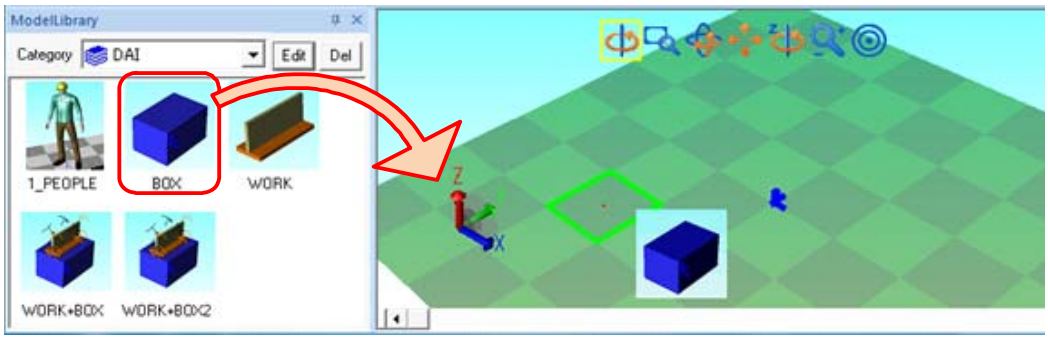
SUPPLE -MENT When the model icon is dragged to the cell screen, the model in the mouse location is highlighted. For highlighting object, refer to section " 6.4 Pick Settings ".

8.17.2 Model Import (Work Type)

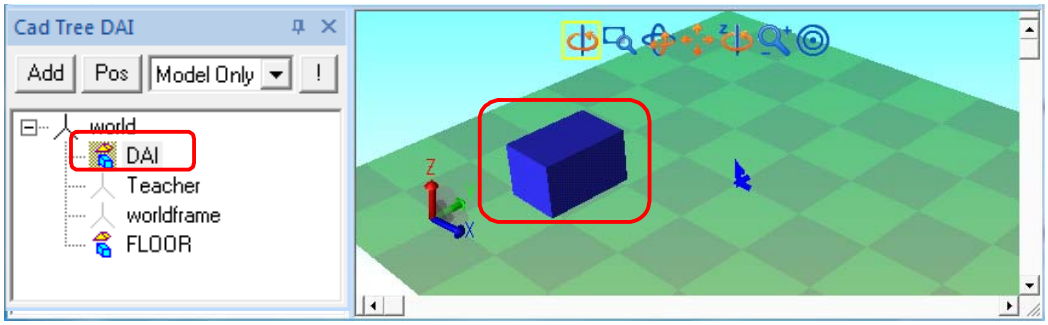
The model of peripheral equipment (e.g. Work, work table, controller and etc.) becomes "Work Type". When the model icon is dragged and dropped, the model is added at the highlighted position in the mouse location. And, the highlighted model becomes the parent model (in an exceptional case, when the FLOOR is highlighted, "world" becomes the parent model).?When the model icon is double-clicked, the model is added at the origin of world coordinates.

Procedure

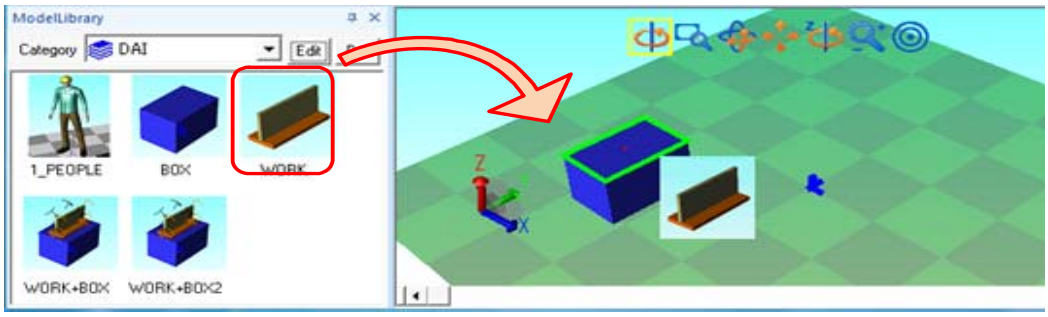
1. Drag and drop the model.



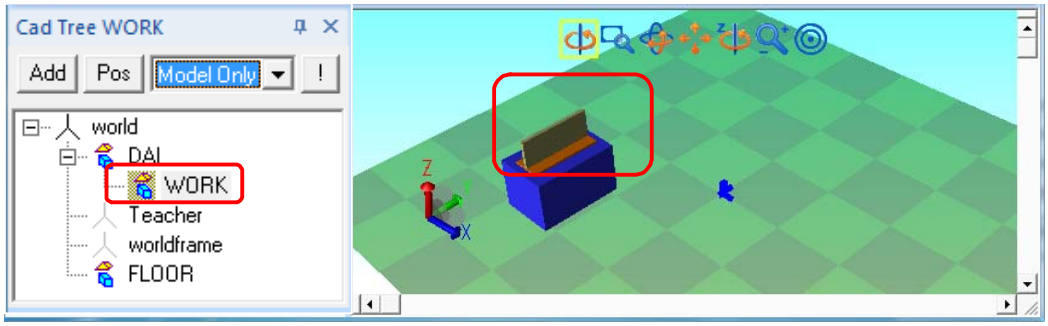
2. When the FLOOR is highlighted, the parent model is "world".



3. Drag and drop the new model on the added model.



4. The new model is added and the selected becomes the parent model.

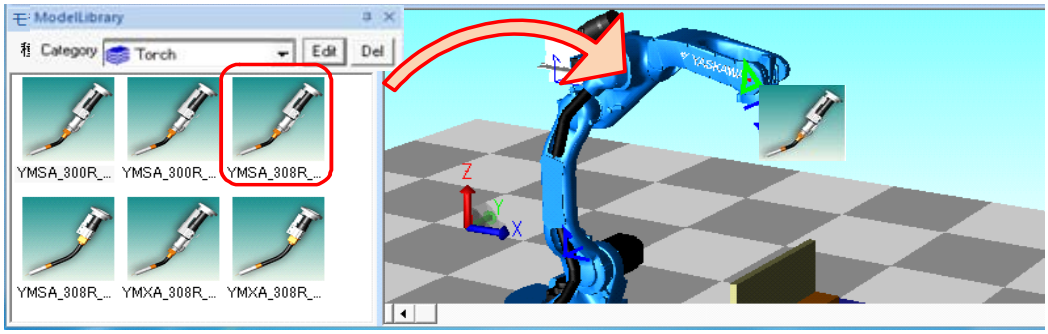


8.17.3 Model Import (Tool Type)

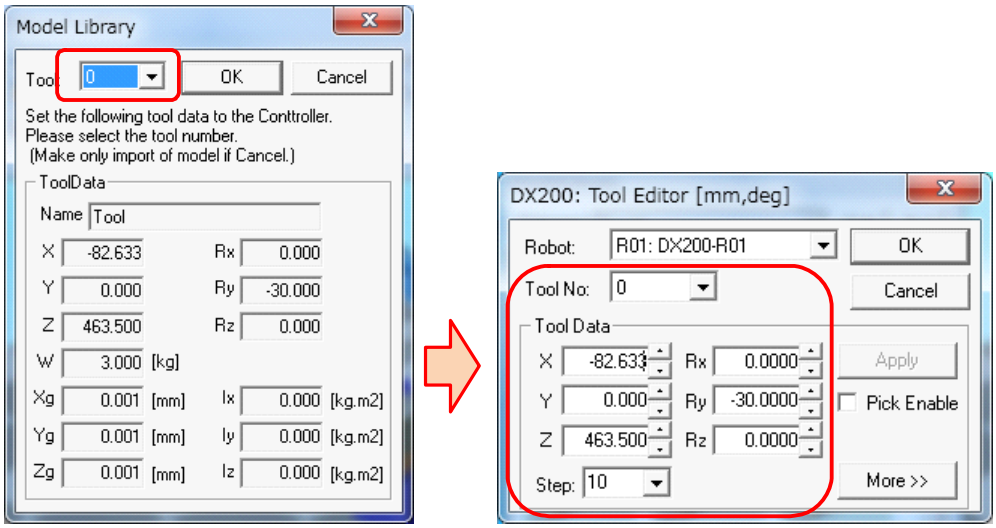
The model of tool (e.g. torch, servo gun and etc.) becomes "Tool Type". When the "Tool Type" model is dragged and dropped to the robot, the model is added at flange or TCP automatically. When the model icon is double-clicked, the tool model is added to the first robot of the cell.
And, when the "Tool Type" model is imported, the tool setting dialog is displayed. When the tool number is selected, the tool data registered with the model library is reflected to the controller.

Procedure

1. Drag and drop the model icon at the robot.



2. Tool setting dialog appears. When select the tool number and press the [OK] button, the tool data is reflected to the controller. When press the [Cancel] button, the tool data is not reflected.

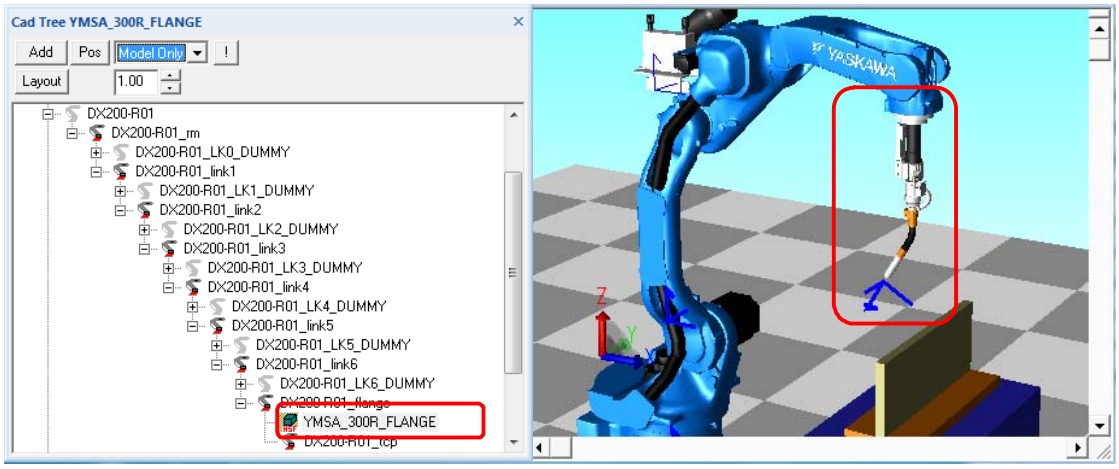


Tool data setting dialog

Tool	Selects the tool number.
ToolData	The tool data of model is displayed.
OK	The tool data is reflected to the selected number.
Cancel	The tool data is not reflected.

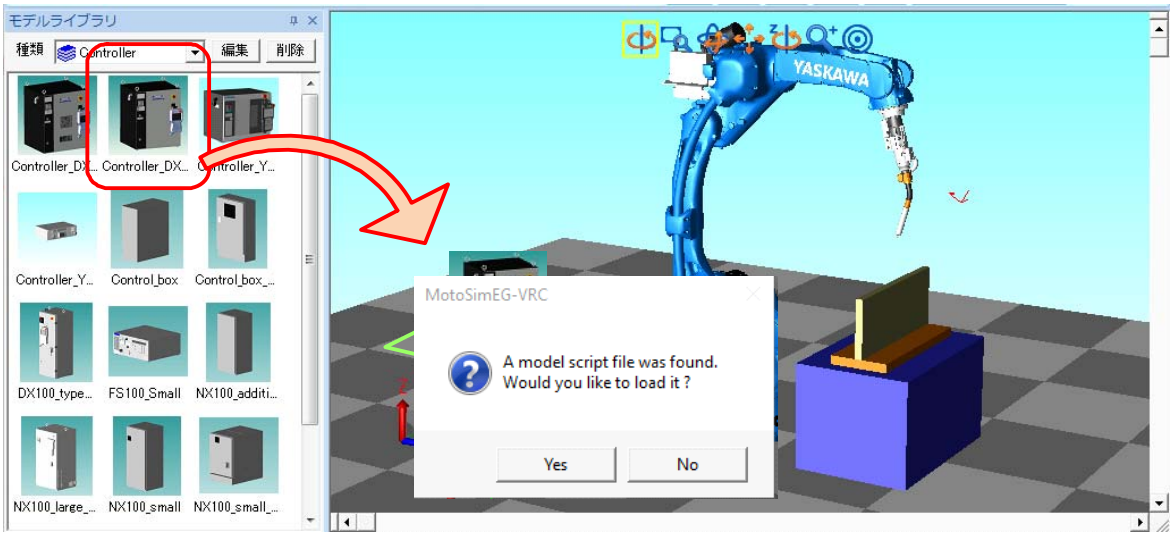
SUPPLE-MENT When importing a model in which more than one tool data is registered, the setting dialog is displayed as many times as the number of tool data registered.

3. The tool model is displayed. When the tool data is set, TCP flame moves to the tip of tool.



8.17.4 Model Script Data Import

If model script data is attached to the model data when importing from the model library, MotoSim EG-VRC imports the model script.



The imported model script is changed and saved as follows depending on the situation.

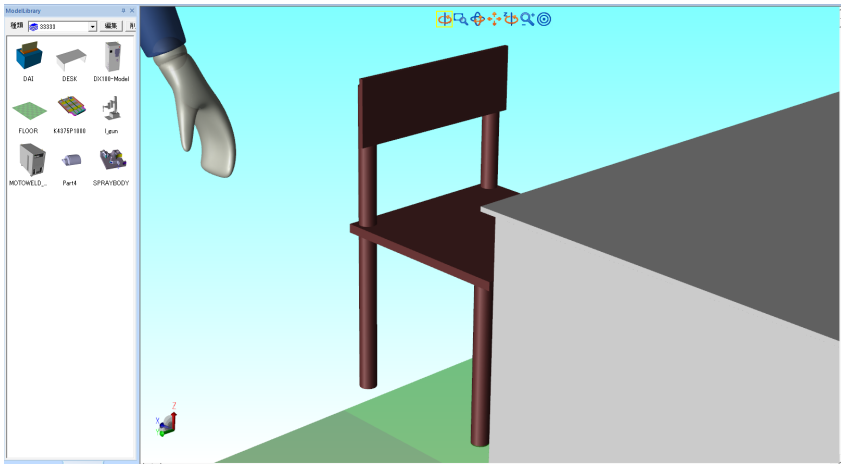
Situation	Edited contents
Contains controller name	Controller name is changed to the name of the target controller.
Script name with the same name exists	"_<n>" (n is a sequential number from 1) is added to the current script name and it is set to a name which does not duplicate.

8.17.5 Add the model to the model library

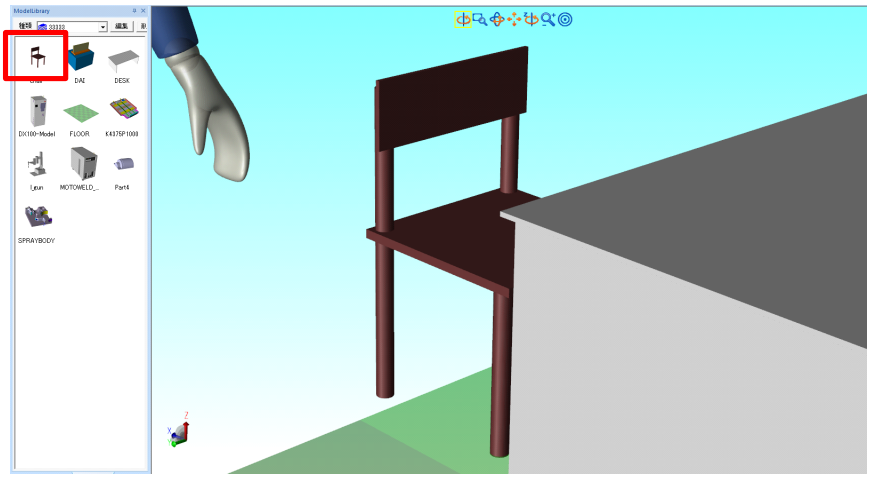
The model of cell can be added to the model library.?Select the model in the [CadTree] dialog, display the right-click menu and select the [Add ModelLibrary...].
The image of the model library is automatically created with the current state of the target model. You can save the image by setecting the [Add ModelLibrary…] after adjusting the viewpoint.

Example:

1. Adjust viewpoint.



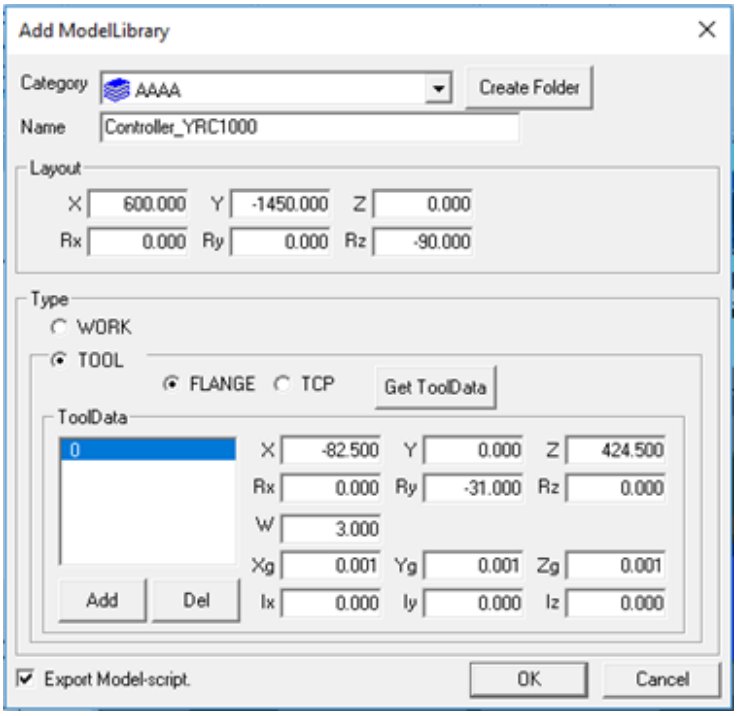
2. When registering to the model library, the image of the target model is automatically created with the current viewpoint.



NOTE

Some models, such as the following items, may remaine in the image.
Please disable these items before using this function.

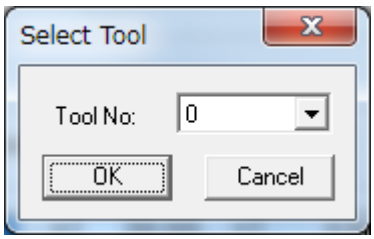
- Operation Handle
- Cutting Plane
- CAM Function
- Cable Simulation
- Position Panel (Work Angles)
- Memo, MarkUp
- Model Name

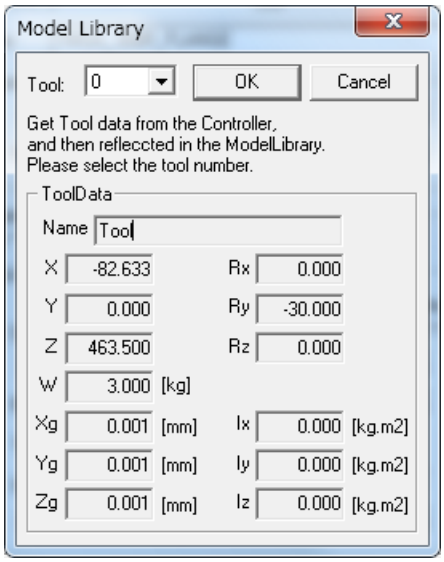


Add Model Library

Category	Selects the model category. When the category does not exist, the new model category can be made by inputting directly.
Name	Selects the model name displayed on the model library.
Create Folder	Displays the model library folder creation dialog.
Layout	Sets the model layout data. When there is the origin point of the model in a center, please input the data. (e.g. BOX model) Layout data is used as the value of the offset. The model is located at the offset position from the mouse pick position.
Type	Chooses the type, "WORK" or "TOOL". It is different in the behavior when importing the model. For details, refer to section "8.16.2 Model Import (Work Type)" and "8.16.3 Model Import (Tool Type)".
FLANGE / TCP	Selects which is the parent model, a flange of a robot or TCP. When the model origin point is on the foundation side of the tool, choose "FLANGE". When it is on the tip of tool, choose "TCP".
ToolData	Sets the tool data. This values are reflected to the controller when the model is imported. When the parent of the model is a flange of a robot or TCP, MotoSim EG-VRC judges as the "TOOL" type and the No.0 tool data of the controller is displayed. If you click on the list, the tool data corresponding to the tool number is displayed.

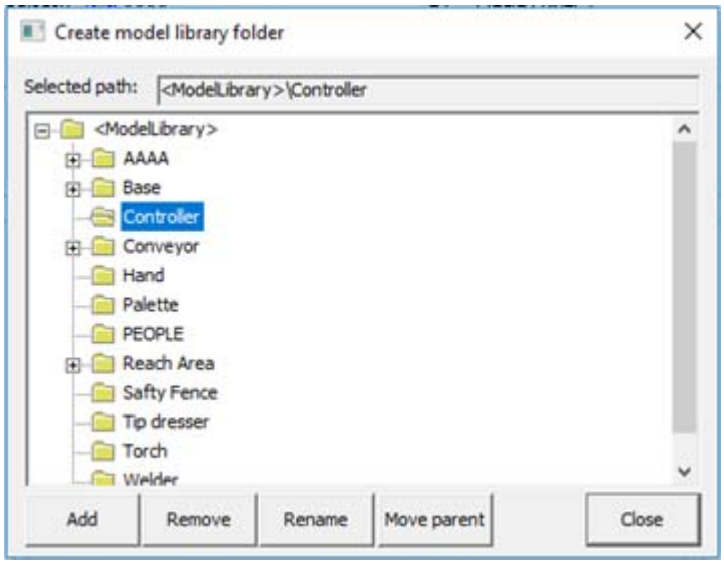
Add Model Library

Add	Adds tool data. When the [Add] button is clicked, the select tool dialog box is displayed.  Select the tool number to want to add and press the [OK] button, the tool number is added to the list. Up to 8 tool data can be added.
Del	Deletes tool data. When [Del] button is clicked, the tool data selected in the list is deleted.
Get ToolData	When the parent of the model is a flange of a robot or TCP, this button is enable. When the button is pressed, tool number select dialog is displayed. When select the tool number, the tool data of selected number is set to the ToolData.
Export Model script	When there is a model script that uses the model to be registered, also save the script in the model library folder.

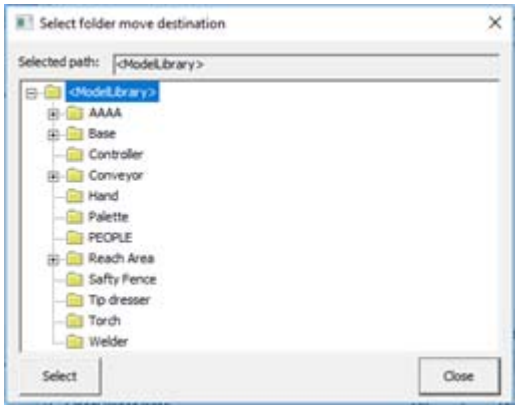


Tool Number Select Dialog

Tool	Selects the tool number of the controller.
ToolData	The tool data of selected number is displayed.
OK	Tool data is reflected to the Add Model Library dialog.
Cancel	Tool data is not reflected and this dialog is closed.



Create model library folder

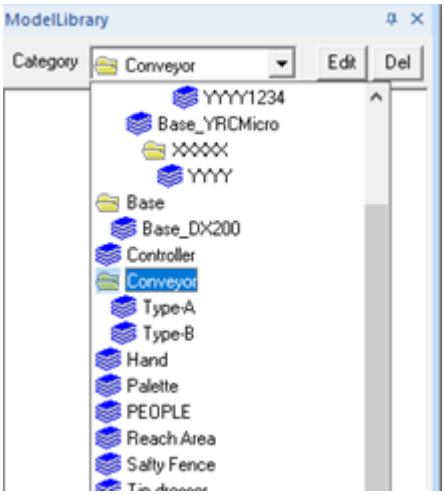
Selected path	The folder path of the model library selected on the tree is displayed.
Add	The folder name input dialog is displayed, and a new subfolder is added under the folder selected in the tree.
Remove	Deletes the folder selected in the tree.
Rename	The folder name input dialog is displayed, and the name of the folder selected in the tree is changed.
Move parent	The dialog for selecting the destination of the folder is displayed, and the folder selected on the tree is moved under the selected folder. 
Close	Closes the create model library folder dialog.

Each folder in the model library folder is divided into subfolders and content folders.
Subfolder .... Folder without model library data
Content folder .... Folder where model library data is stored

By arranging subfolders according to the purpose, the model library data can be organized as in the example below.
e.g.)

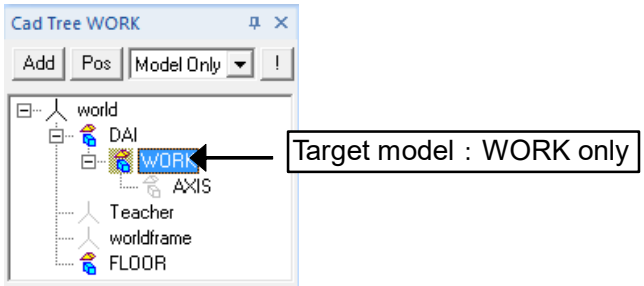
```
Conveyor/
  |--Type-A/
  |    |--CV_123/
  |         |--ITEM.bmp
  |         |--ITEM.ini
  |         |--Controller_DX200_MediumLarge.hsf
  |
  |--Type-B/
  |    |--CV_456/
  |         |--ITEM.bmp
  |         |--ITEM.ini
  |         |--Controller_YRC1000_MediumSmall.hsf
```

Hierarchical model library folders are hierarchically displayed in the combo box on the model library screen as follows.



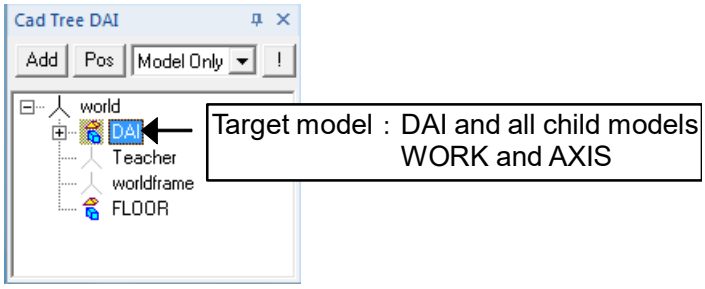
Procedure

1. Selects the target model from [CadTree] dialog.
   - One Model
     Selects the target model in the state "open".

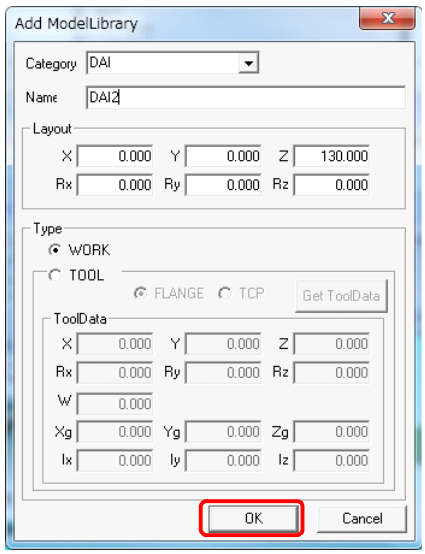


   - Multi Models

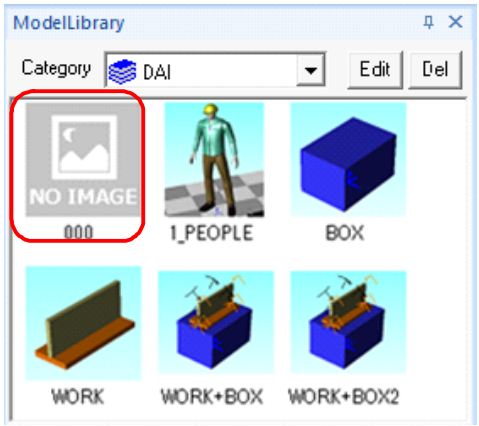
Selects the target model in the state "close". All child models are included.



2. Displays the right-click menu on the [CadTree] dialog and select the [Add ModelLibrary...].
3. Sets the Category, Name, Layout and Type on the [Add ModelLibrary] dialog and presses the [OK] button.

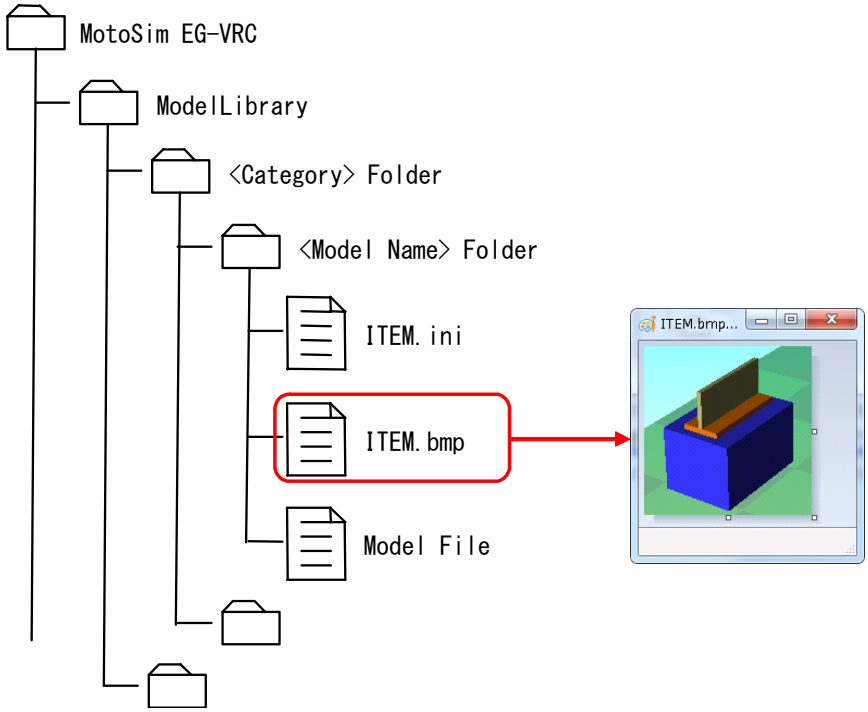


4. Added model is displayed on the Model Library. The model icon is "NO IMAGE".

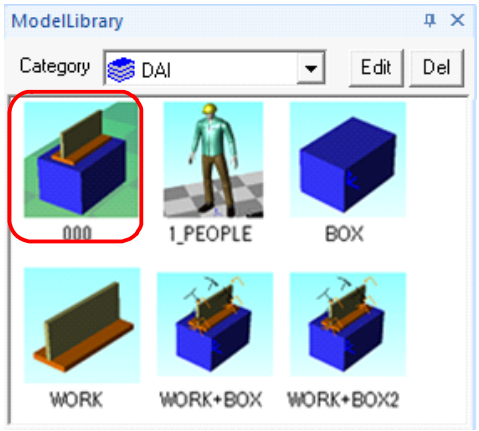


5. Adds the model icon image. Saves an icon picture of the bitmap file format in a <Model Name> folder of ModelLibrary. The file name is made ITEM.bmp. For location of Mod-

elLibrary folder, refer to the section " 1.7 Folder Configuration ".



6. When Model Library dialog is refreshed, the new model icon is displayed.



8.17.6 Model Script Output

When the "Export Model script" check box on the model library registration dialog is checked, model script containing the target model name is output.

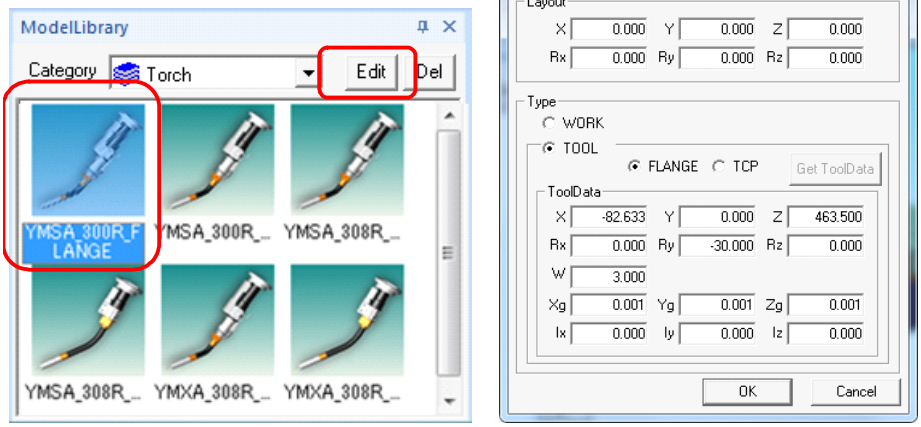
When MOV, DUP, REF, and DEL commands are included in the output model script, a confirmation dialog as to whether to exclude or include these commands is displayed. Please select one.

When the output target model is a model that does not belong to the controller, such as conveyor or pallet, model scripts are searched for all controllers in the current cell and outputs model script data with output target model name specified.
When the output target model name is used for the model script of multiple controllers, the

selection dialog of the target controller is displayed, so select the appropriate controller.
As described in Procedure 1, Multi Models, in " 8.17.5 Add the model to the model library ", you can register multiple models, but if the model to be registered has a parent-child relationship and the model script is set only for the child model, the model script cannnot be output.

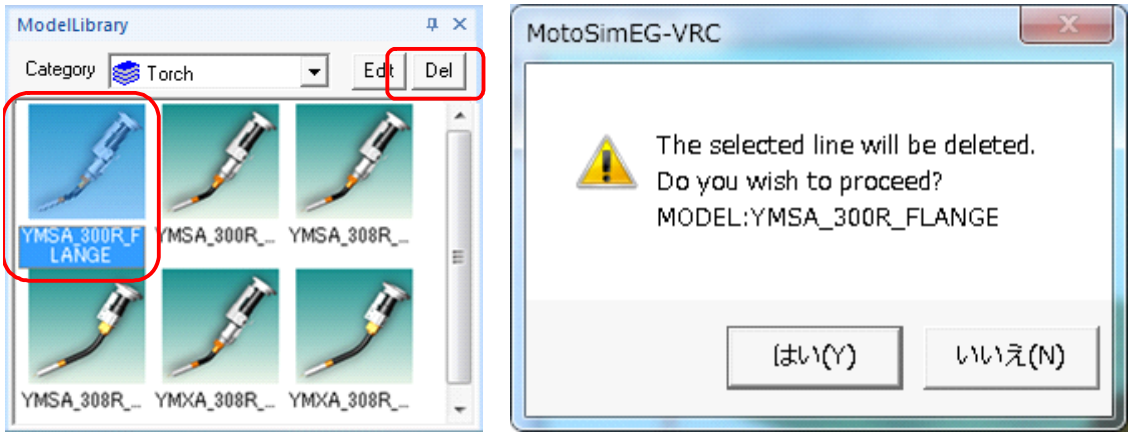
8.17.7 Edit Model of Model Library

Selects the model icon and press the [Edit] button, the model data can be edited.
For detail of the edit dialog, refer to " 8.17.5 Add the model to the model library ".



8.17.8 Delete Model of Model Library

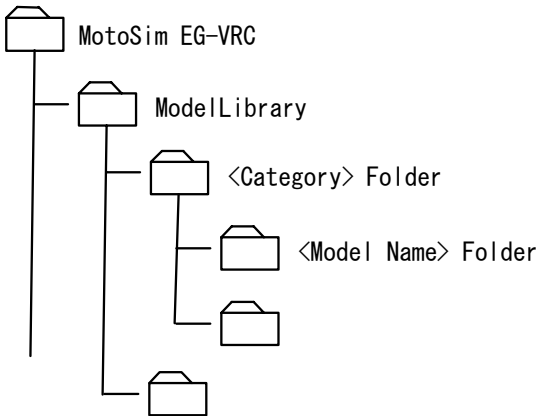
Selects the model icon and press the [Del] button, the model data can be deleted.



NOTE This operation cannot be undone.

8.17.9 Export the Model of Model Library to Other PC

The model of model library can be used on other PC.
The model of model library is managed the following <Model Name> Folder.

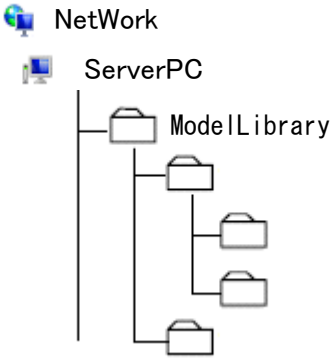


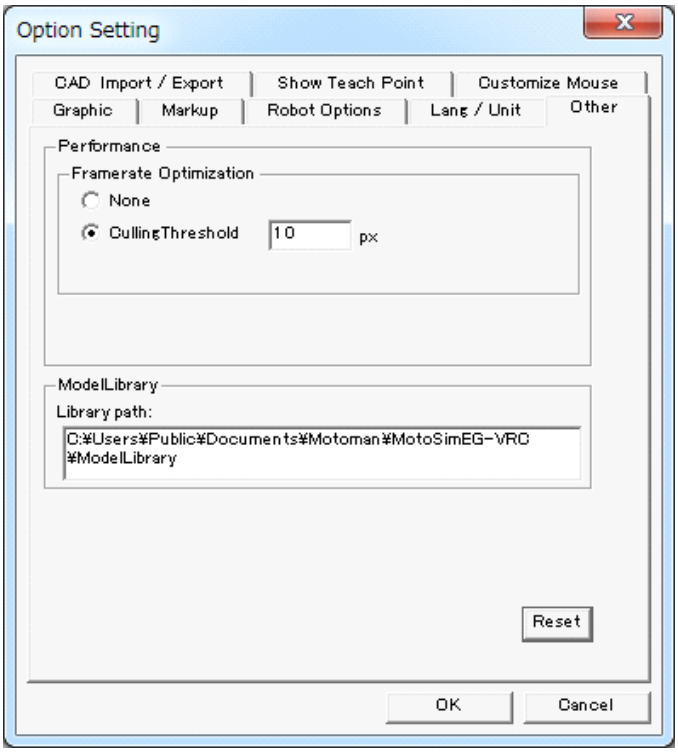
When <Model Name> folder of one PC is copied to <Category> folder of other PC, the model can be used on the other PC. For the location of [ModelLibrary] folder, refer to " 1.7 Folder Configuration ".

8.17.10 Way to Use Model Library on Local Area Network

To create the model library folder on the local area network (LAN), models are shared by multiple PC.

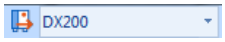
Click the MotoSim EG-VRC button ( ), and select the [Option] menu. Option Setting dialogbox is displayed. Select the "Other" tab of the Option dialog box. Input the model library folder path in the "Library Path" edit box of "Model Library".



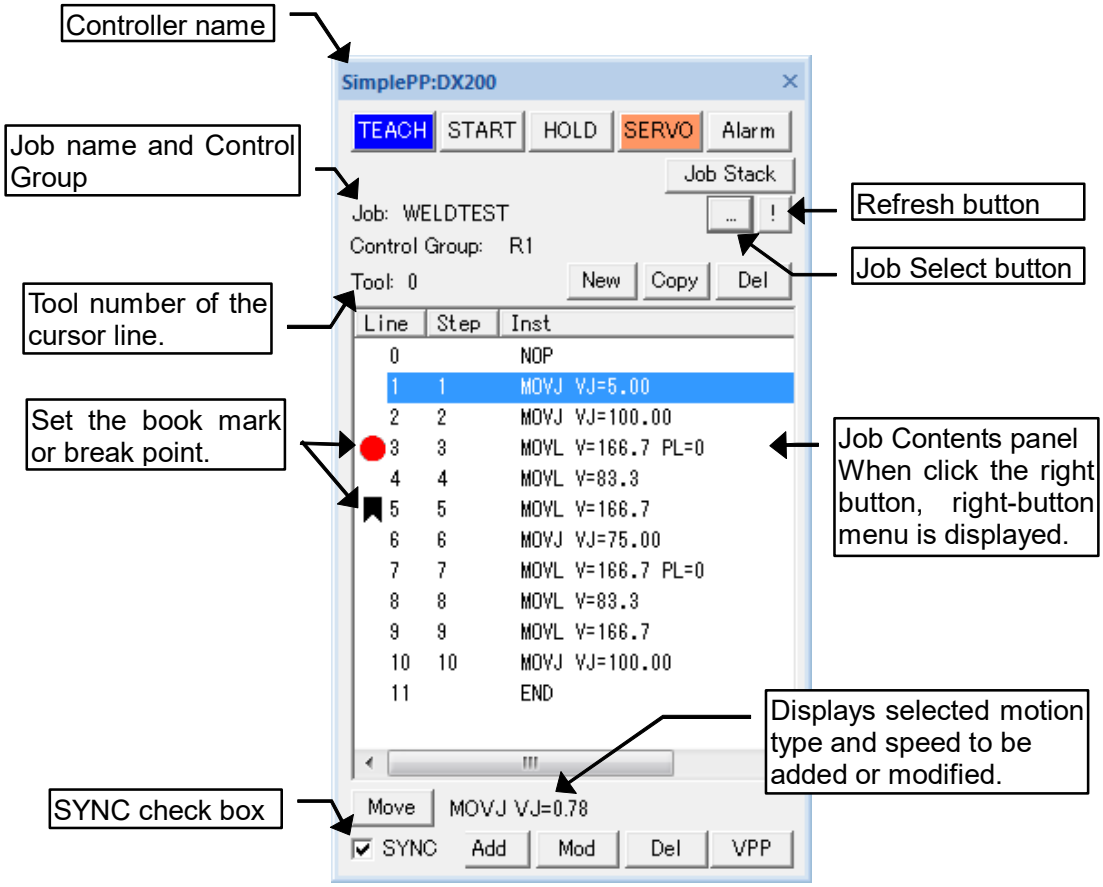


8.18 Simple PP

Simple PP dialog is the simple version of virtual pendant for teaching and playback.
On the [Controller] tab, in the [Job] group, click the [SimplePP] button, the [Simple PP] dialog appears.

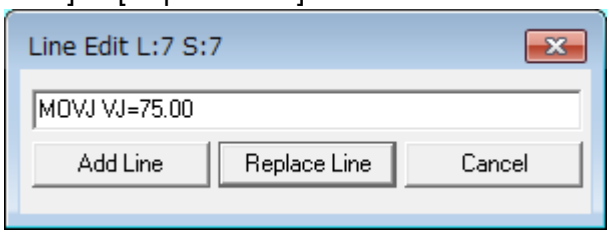
NOTE In a cell with multiple controllers, it is necessary to select the controller to edit with the ribbon  before operating the Simple PP dialog box.

■ Main Display



TEACH/PLAY button	Changes the mode (TEACH / PLAY) of the controller.

START button	Starts the playback. This button is highlighted during playback.
HOLD button	Interrupts the playback.
SERVO button	Turns the servo ON. This button is highlighted while servo power is ON.
Alarm button	Resets the alarms. This button is highlighted while alarms occur.
Job Stack	Display the Call Stack display. For details, please refer to the section " Fig. 10.4) Job Stack ".
Job Select button	When click this button or press the [ALT] + [W] key, displays the Job Select dialog. For details, refer to the section " 8.18.1 Job Select ".
Refresh button	When the job is edited on the virtual pendant, click this button to refresh the job contents.
New button	Displays the Job Create dialog. For details, refer to the section " 8.18.2 Job Create ".
Copy button	Displays the Job Copy dialog. For details, refer to the section " 8.18.3 Job Copy ".
Delete button	Displays the Job Delete dialog. For details, refer to the section " 8.18.4 Job Delete ".

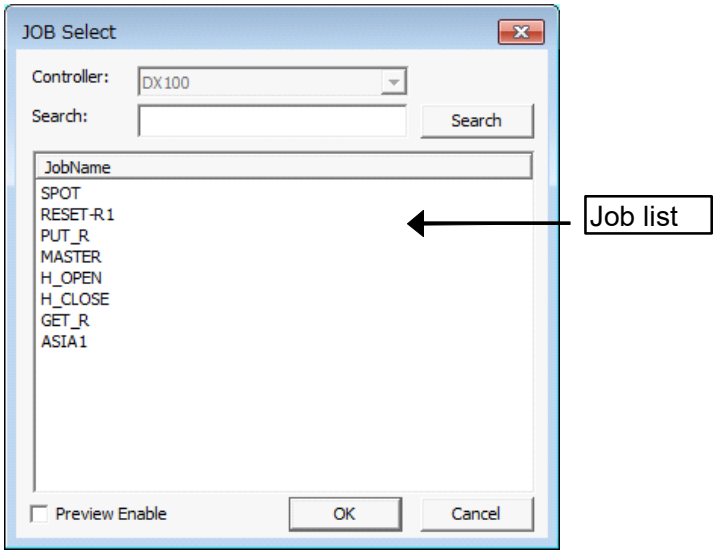
Job Contents panel	The robot moves to the step selected in the job contents panel if the [SYNC] check box (SYNC) is selected. When the cursor is on the CALL JOB: or JOMP JOB: instruction, and press the [Alt] + [Down] key, the called job is displayed.?When press the [Alt] + [Up] key, the previous job is displayed.Job Edit dialog box appears by double-clicking the selected job. [Job Edit] Modify the instruction in the edit box. Select either the [Add Line] or [Replace Line] button.  Add Line: Adds the new instruction under the cursor line. Replace Line: Replaces the instruction of the cursor line.
Move button	Displays the Interpolation dialog box. Please refer to the section " 8.18.12 Interpolation Setting ".
Add button	Adds the new move instruction under the cursor line. And, same operation is available with operation handle. Please refer to the section " 8.18.8 Teaching with Operation Handle ".
Mod button	Replaces the teaching position of the cursor line to current position.
Del button	Deletes the cursor line.
VPP button	Displays the virtual pendant if the virtual pendant is not shown.

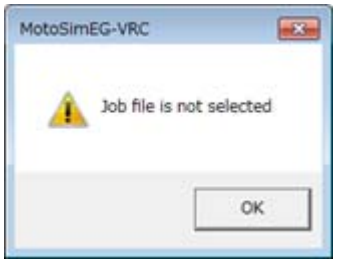
■ Right-button menu

Search	Display the Search dialog. (Short cut key: [Ctrl] + [F])
Cut	Selected area is cut. (Short cut key: [Ctrl] + [X])
Copy	Selected area is copied. (Short cut key: [Ctrl] + [C])
Paste	Cut area or copied area is pasted. (Short cut key: [Ctrl] + [V])
Reverse Paste	Cut area or copied area is pasted in reverse. (Short cut key: [Ctrl] + [Shift] + [V])
Delete	Selected area is deleted. (Short cut key: [Delete])
Replace Inform	Informs of the selected area are replaced. For details, please refer to the section " 8.18.7 Replace Inform ".
Set Default Inform	Changes the content of the "Interpolation method" used by adding instructions as the contents of the selected line.
Setting BreakPoint	Set/Delete the break point to the selected line. (Short cut key: [F9]) For details, please refer to the section " 10 Debug Function ".
Del All BreakPoint	Delete all break point of the target controller. For details, please refer to the section " 10 Debug Function ".
Disable All BreakPoint	Disable all break point of the target controller. For details, please refer to the section " 10 Debug Function ".
Enable All BreakPoint	Enable all break point of the target controller. For details, please refer to the section " 10 Debug Function ".
TeachPoint Tool	Creates a teach point model and update or add steps from the teach point model. For details, please refer to " 8.18.10 Making Teach-Point Model " or " 8.18.11 Create the Job from Teach-Point Model ".
Shortcut List	Display the shortcut list dialog.

8.18.1 Job Select

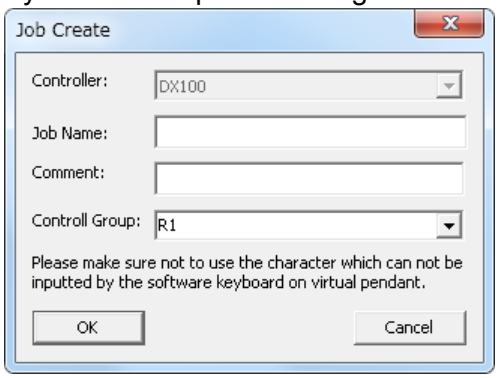
Selects a job from job list, the job is displayed on the Simple PP dialog box.



Search	A keyword search is available. In the above dialog, input the "SE" on the edit box and click the [Search] button, "RESET-R1" and "H_CLOSE" is displayed on the job list. When the edit box is empty, All jobs are displayed.
Job list	Select a job in this list to set to the simple PP dialog.
Preview Enable	When enabled, the contents of the selected job is displayed. NOTE When the job is not selected and check this item, the following message is displayed. 
OK button	Sets the selected job to the simple PP dialog.
Cancel button	Closes this dialog without job selection.

8.18.2 Job Create

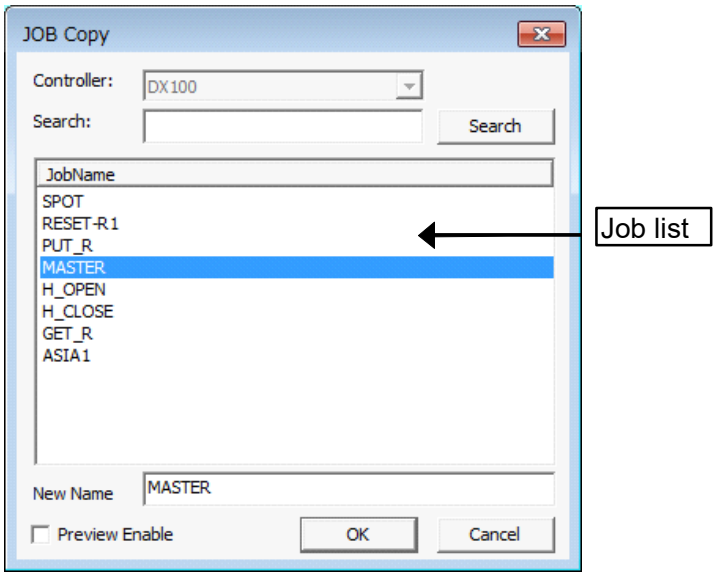
Creates a new job and displays on the simple PP dialog.

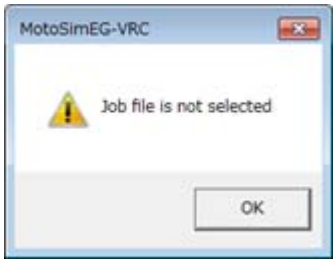


Job Name	Inputs the job name.
Comment	Inputs the comment of the job.
Control Group	Select the control group from drop down list box.
OK button	Creates the new job and displays on the simple PP dialog.
Cancel button	Closes this dialog without creating a job.

8.18.3 Job Copy

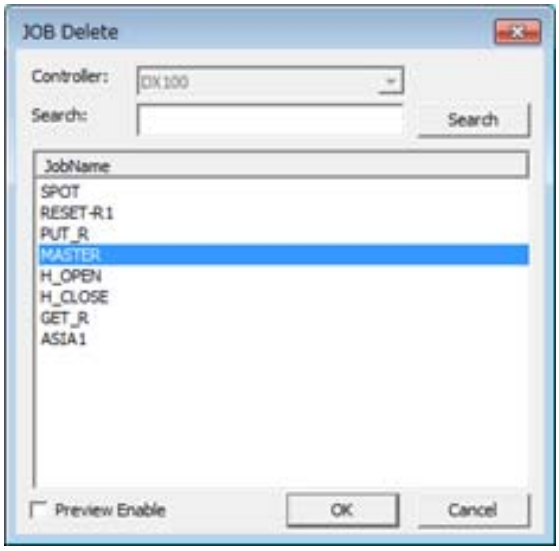
Copies the selected job and displays the new job on the simple PP dialog.

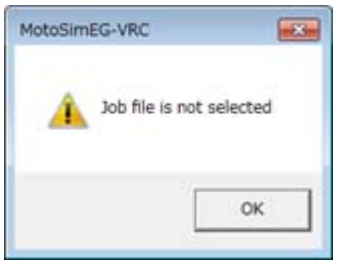


Search	A keyword search is available. In the above dialog, input the "SE" on the edit box and click the [Search] button, "RESET-R1" and "H_CLOSE" is displayed on the job list. When the edit box is empty, All jobs are displayed.
Job list	Select a job in this list to be copied.
New Name	Inputs the new job name.
Preview Enable	When enabled, the contents of the selected job is displayed. NOTE When the job is not selected and check this item, the following message is displayed. 
OK button	Copies the selected job and displays the new job on the simple PP dialog.
Cancel button	Closes this dialog without copying a job.

8.18.4 Job Delete

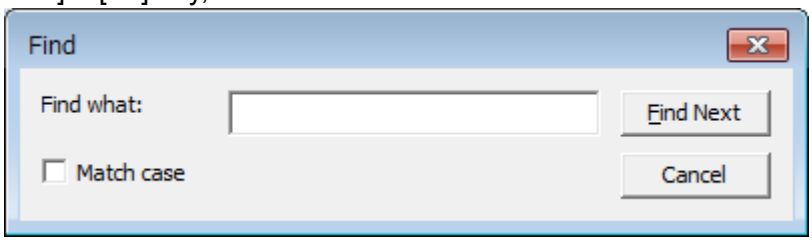
Deletes the selected job.



Search	A keyword search is available. In the above dialog, input the "SE" on the edit box and click the [Search] button, "RESET-R1" and "H_CLOSE" is displayed on the job list. When the edit box is empty, All jobs are displayed.
Job list	Select a job in this list to be deleted.
Preview Enable	When enabled, the contents of the selected job is displayed. NOTE 1.When the job is not selected and check this item, the following message is displayed.  2.When the multiple jobs are selected and check this item, the following message is displayed. 
OK button	Deletes the selected job.
Cancel button	Closes this dialog without deleting a job.

8.18.5 Search

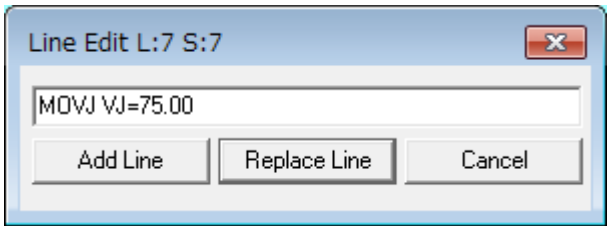
Search the keyword in the job.
When the cursor in the job contents panel, select the "Search" in the right-button menu or press the [Ctrl] key and [F] key, Search dialog is displayed.
When the cursor in the job contents panel and press the [F3] key, forward search is available. And press the [Shift] + [F3] key, back search is available.



Find what	Inputs a keyword.
[Match case] check box	When this is enabled, the large character is separated from the small character.
[Find Next] button	The keyword is searched from current cursor position.
[Cancel] button	This dialog is closed.

8.18.6 Job Edit

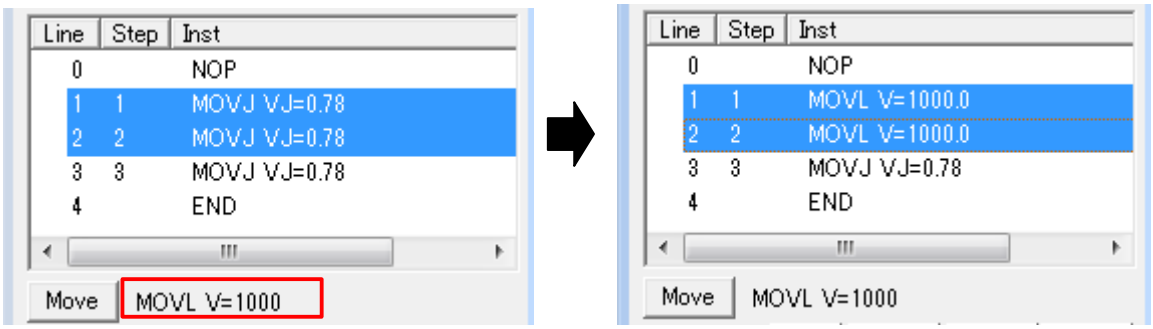
When the line is selected and double-click or press the [Space] button, Job Edit dialog box is displayed. Modify the instruction in the edit box and select either the [Add Line] button or [Replace Line] button



[Add Line] button	Adds the new instruction under the cursor line. (Short cut key: [Shift] + [Enter] key)
[Replace Line] button	Replaces the instruction of the cursor line. When the instruction of the cursor line is move instruction, teaching point is not changed. (Short cut key: [Enter] key)
[Cancel] button	Close this display.

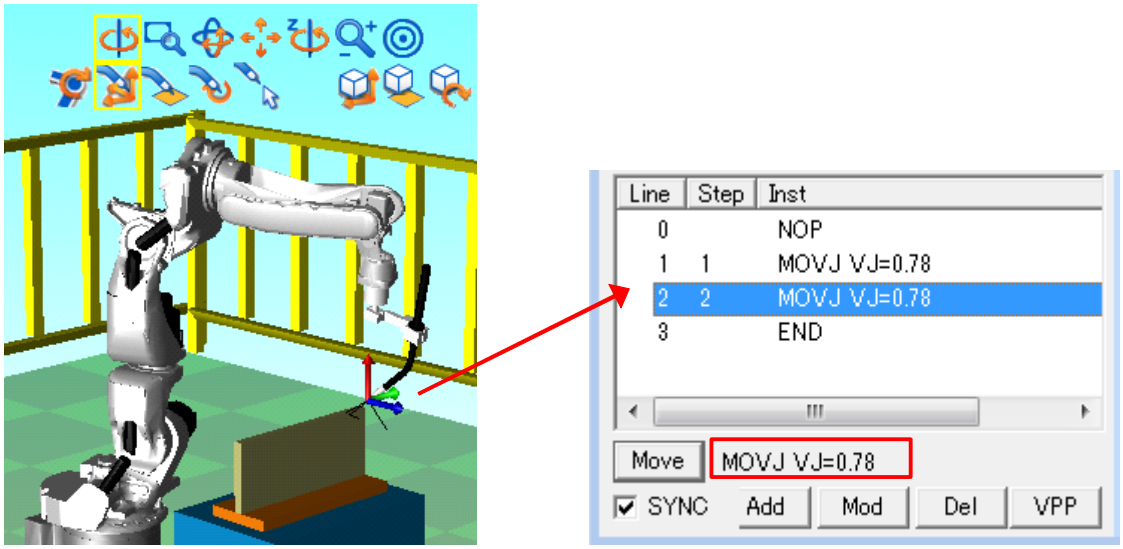
8.18.7 Replace Inform

Informs of the selected area are replaced to the [Move] instruction.
When the lines are selected, select the "Replace Inform" in the right-button menu.



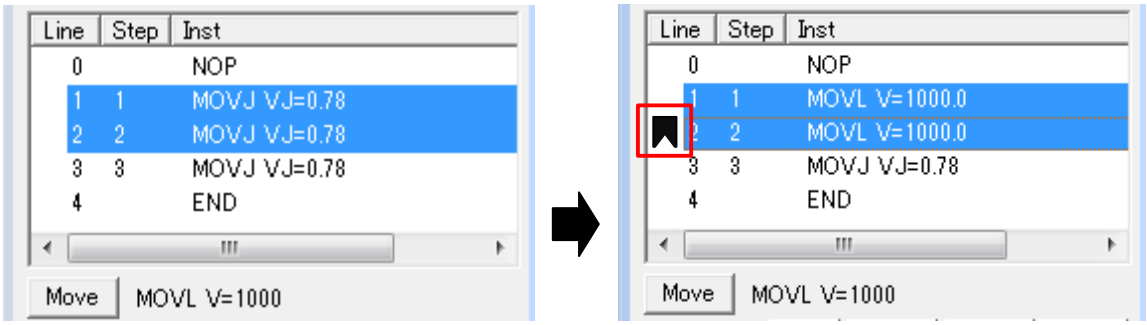
8.18.8 Teaching with Operation Handle

When the Simple PP and TCP handle of operation handle are displayed and double-click the TCP handle with pressing [Ctrl] key, teaching point is added. The instruction of Simple PP is reflected.

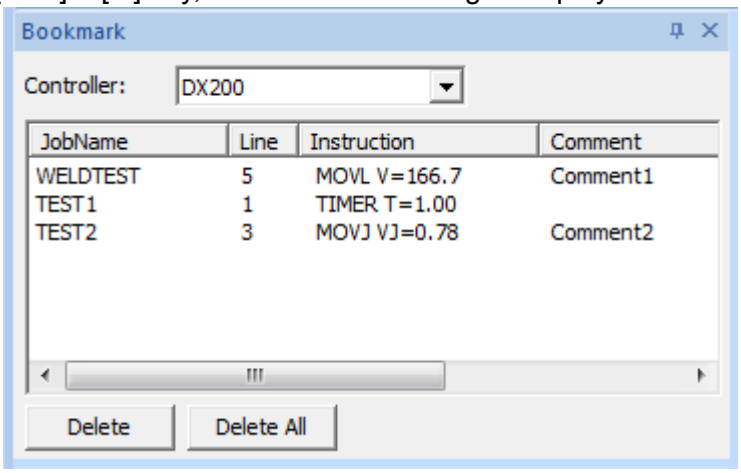


8.18.9 Book Mark

Sets the book mark to the selected line. And, Jump to the book mark in the book mark dialog.
When the line is selected and press the [Ctrl] + [M] key, set/delete the book mark.



Press the [Ctrl] + [Shift] + [M] key, the book mark dialog is displayed.



Controller	Select the controller to display the book mark.
Bookmark List	When double-click the bookmark, the job and current line of simple PP and virtual pendant are changed to the book mark. When double-click the Comment area, Set the Comment to the bookmark.
[Delete] button	Delete the selected book mark.
[Delete All] button	Delete all book marks.

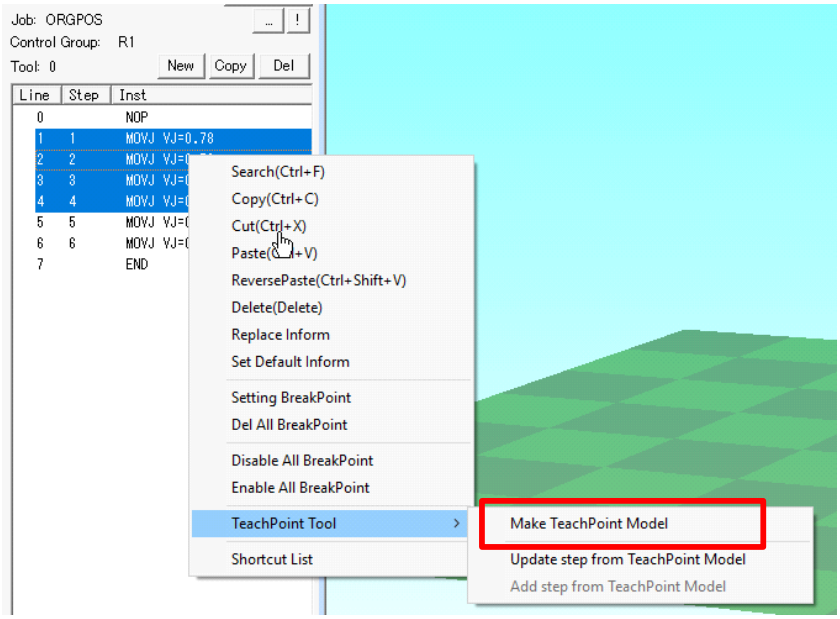
8.18.10 Making TeachPoint Model

Create an AXIS6 model showing the teaching point position of each selected line of the job display area.

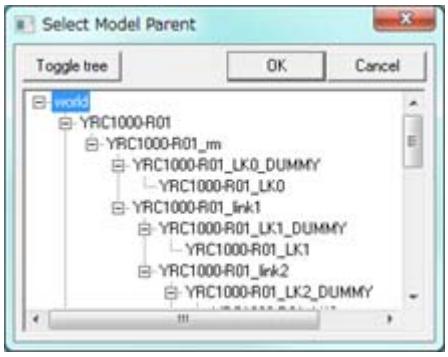
Select "Make TeachPoint Model" in the right-click menu in the job display area.

NOTE

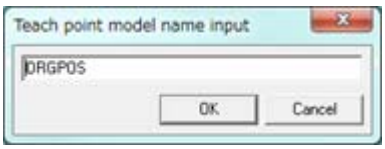
- Only the teaching points of the robot axis are target to create the teaching point model.
- The teaching points of the traveling axis and the station axis are out of the target of creating the teaching point model.



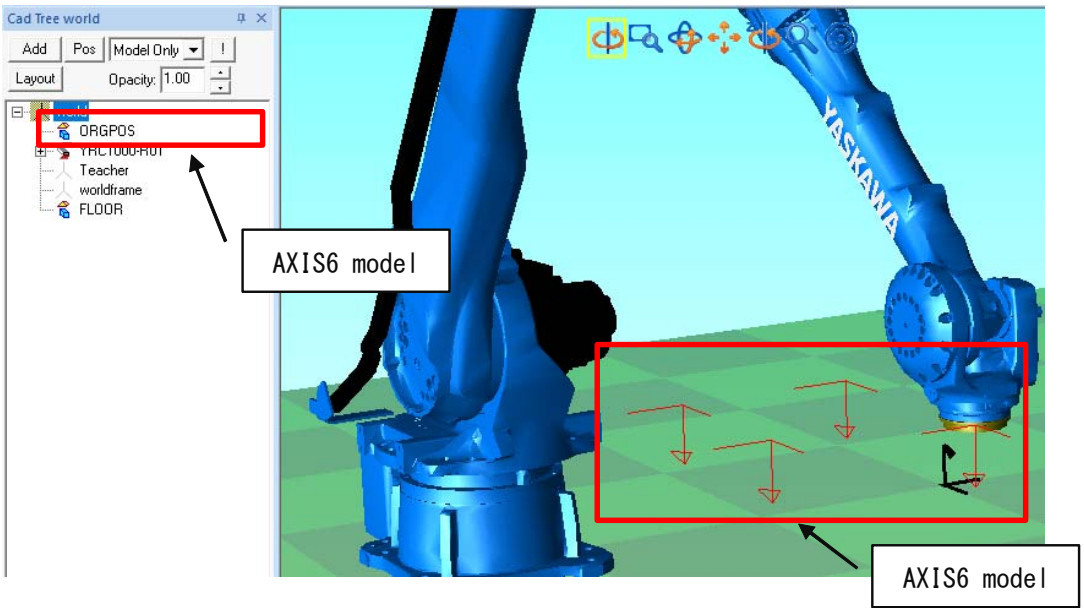
Select the parent model to register the teach point model.



Set the name of the teach point model to be created.

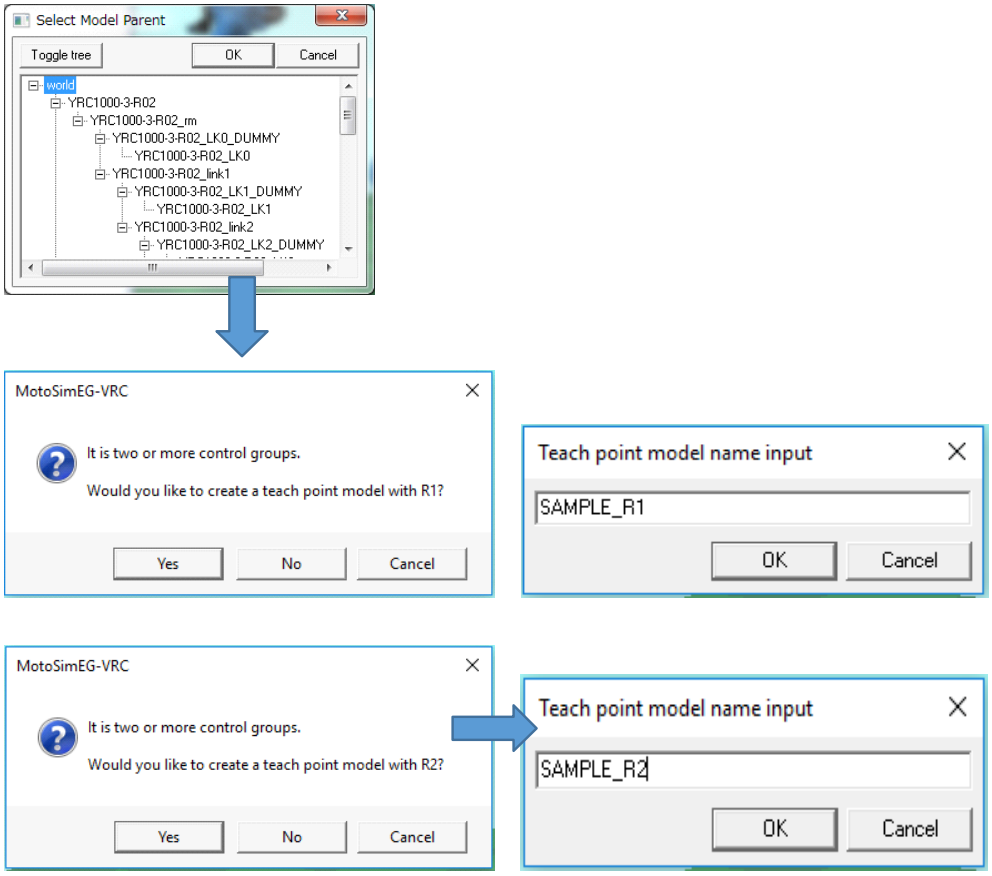


A teach point model is created and registered in CadTree.



■ Create TeachPoint Model from Cooperative Job

After selecting the parent model, the selection dialog of the robot that creates the teaching point model is displayed.



When to create the teaching model, select "Yes". If not, select "No".
When select "Cancel", processing is aborted.

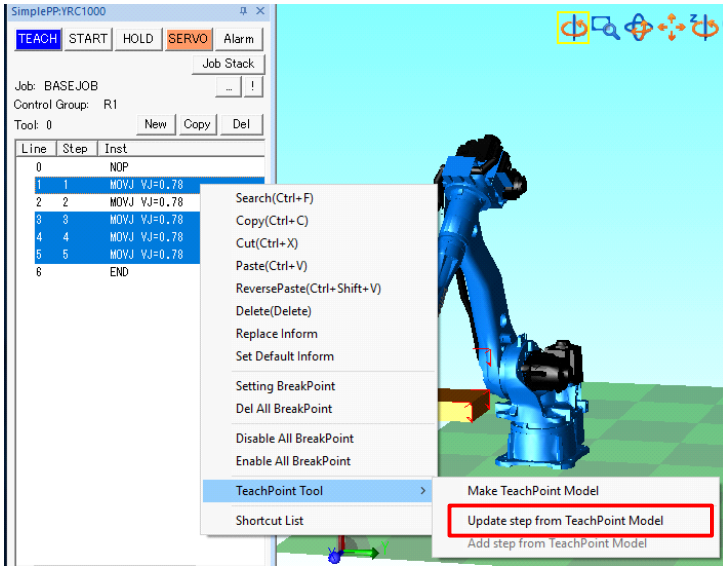
8.18.11 Create the Job from TeachPoint Model

Based on the coordinate information of the registered teaching point model, the following two operations are possible.

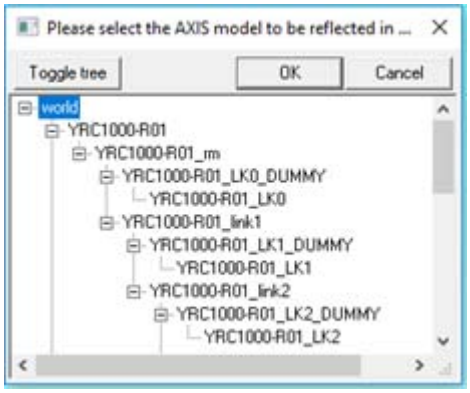
1. Update arbitrary step of job from teach point model
2. Add the teach point from teach point model to arbitrary line of the job

■ Update Step from TeachPoint Model

Select the step to update on the simple PP dialog and select [Teach point tool] - [Step update from teach point model] from the popup menu.

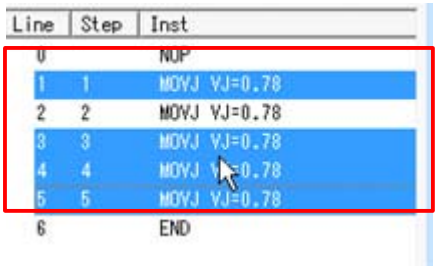


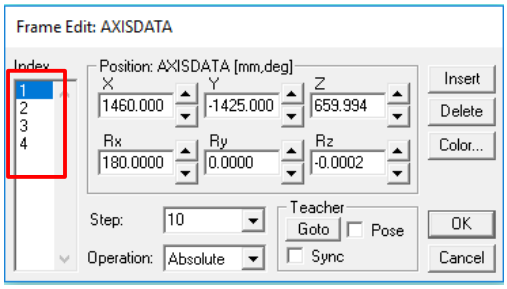
Since the teach point model selection dialog is displayed, select the teach point model to reflect.



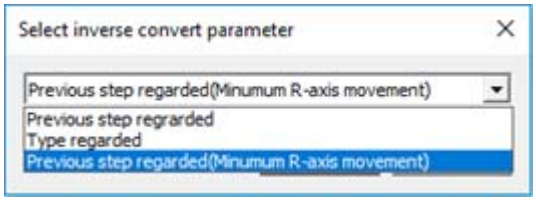
NOTE

- Model cannot be selected that does not include a teach point model or includes two or more teach point models.
- It cannot be selected if the number of teaching points selected for the teach point model is different from the number of steps selected by simple PP.



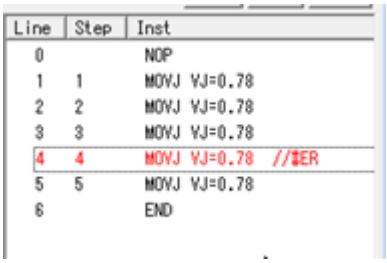


Select the inverse convert parameter to reflect the teaching point of the selected teach point model.



After confirming the inverse convert parameter, the teaching point information of the teach point model is reflected in the selected step. And, the tool number of the selected step reflects the source tool number.

When the teaching points registered from the teach point model are out of the range of the robot, the "#ER" comment tag is added as shown below and it is displayed in red.

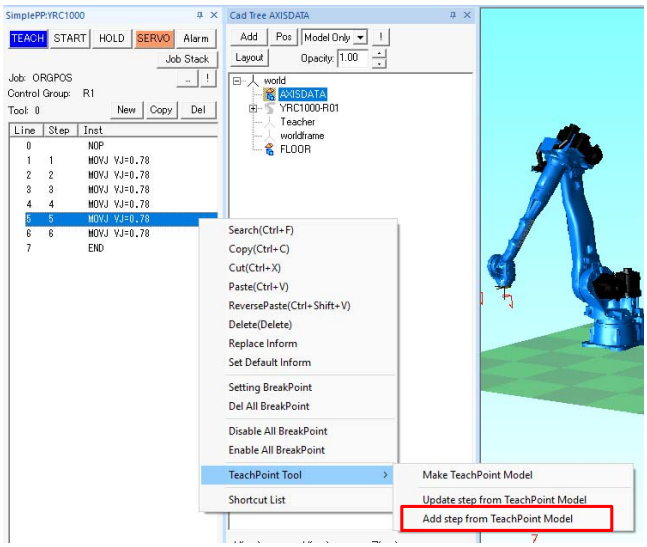


In the step that could not be reflected, the previous position information is retained.

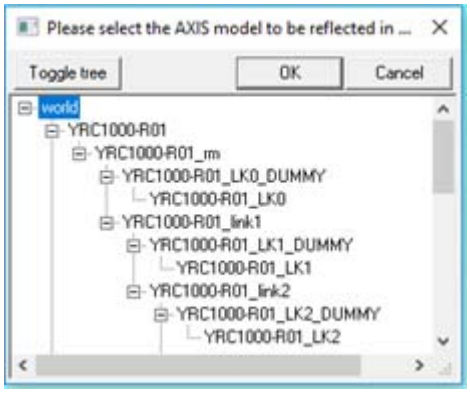
■ Add Step from TeachPoint Model

Select the step to add on the simple PP dialog and select [TeachPoint tool] - [Add step from

TeachPoint Model] from the popup menu.

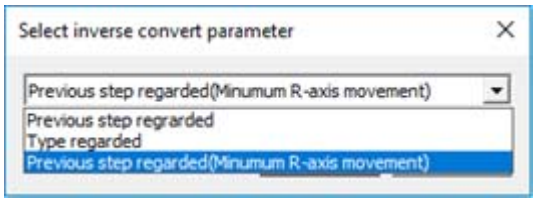


Since the teach point model selection dialog is displayed, select the teach point model to reflect.



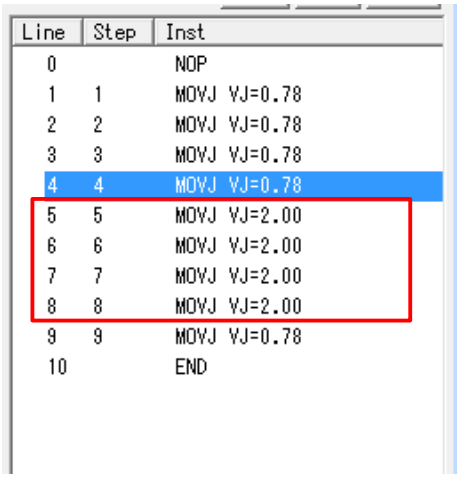
NOTE Model cannot be selected that does not include a teach point model or includes two or more teach point models.

Select the inverse convert parameter to reflect the teaching point of the selected teach point model.

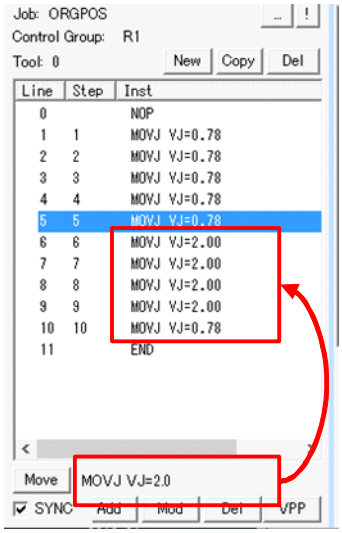


After confirming the inverse convert parameter, the teaching point information of the teach

point model is additionally inserted into the line after the selected line.



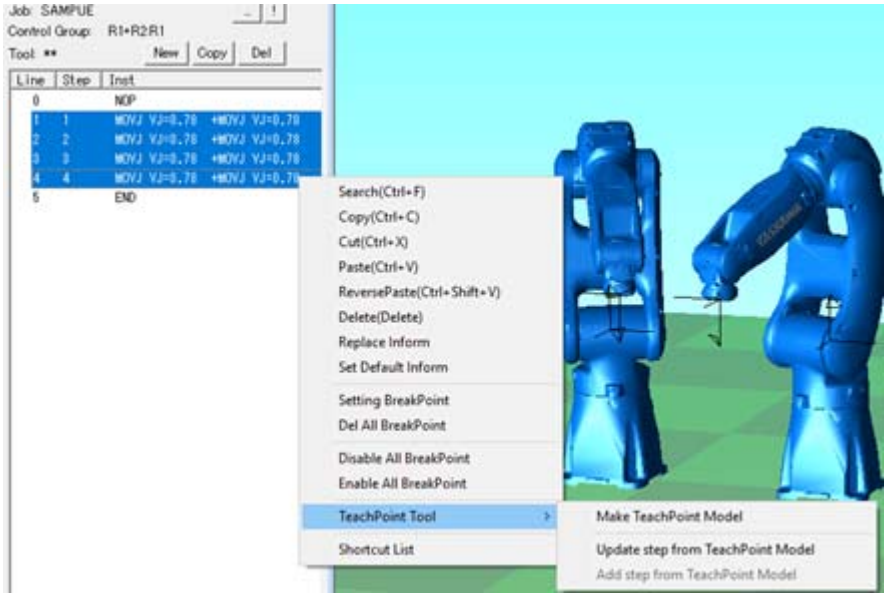
Instructions set in the Move field of simple PP are added for instructions to be additionally inserted.



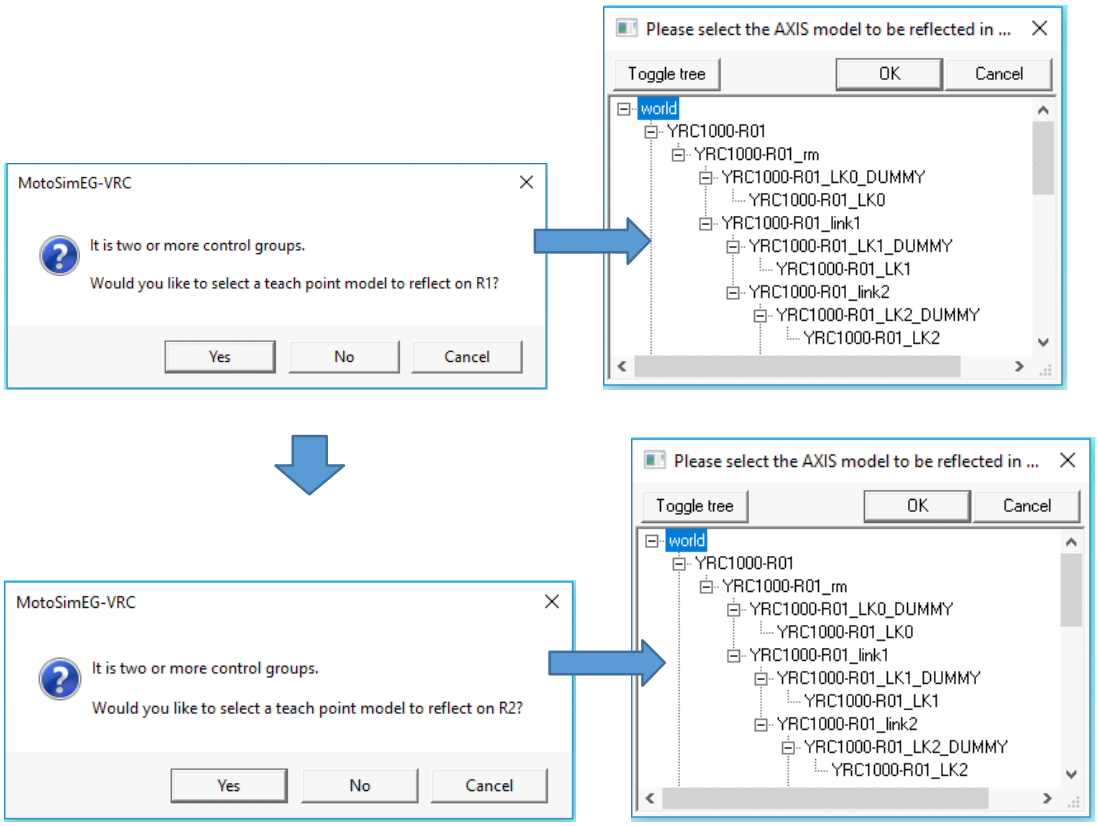
■ Update Job or Add Line for Cooperative Job

In step update job or addition line from teach point model to cooperative job, it is possible to

select whether to update (or add) for each robot targeted by the job.



Before teach point model selection, a confirmation dialog is displayed asking whether to reflect teach points for each robot.



When to reflect, select "Yes". If not, select "No".
When select "Cancel", processing is aborted.

As for the robot that selected "No", the step is updated (or additionally inserted) at the current position of the robot.

8.18.12 Interpolation Setting

When [Move] button is clicked, the Interpolation Setting dialog is displayed.

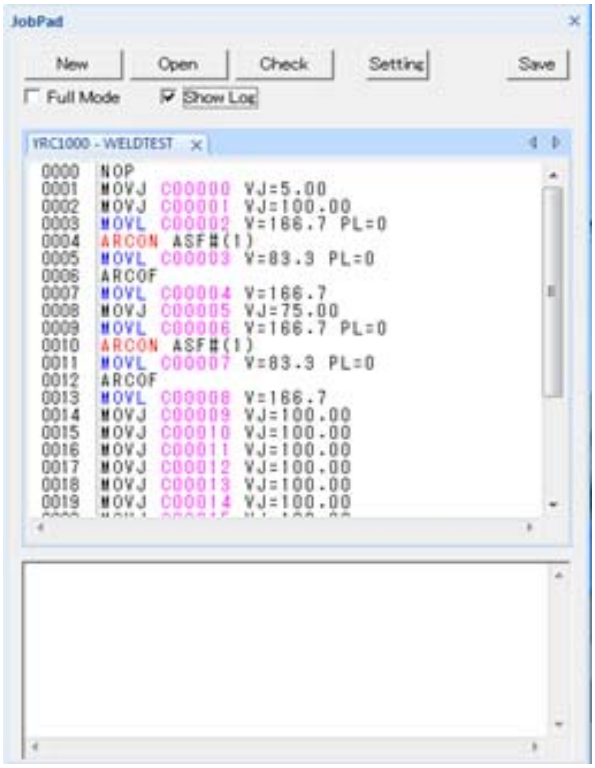
Interpolation	Displays a sample list of interpolation instructions for a job opened with simple PP. NOTE • NS4.69-A5 Controller is not supported. • Six types of interpolation instructions can be used: standard instruction, cooperative instruction, + MOV, EIMOV, SYMOV, and SVSPOTMOV. • It is not supported for jobs of three or more robots. • In cooperative jobs with two robots, interpolation instructions including EIMOV can not be selected.
Text Data	Sets the content of the "Interpolation method" used by adding instructions. It is possible to rewrite speed tags, moving tag and etc. based on the template selected by interpolation selection.
OK button	Replaces the content of the "Interpolation method" used by adding instructions to the contents of "Text Data" and this dialog is closed.
Cancel button	The content of the "Interpolation method" used by adding instructions is not replaced and this dialog is closed.

8.19 JobPad

JobPad shows the saved jobs from VRC and these job can be edited. the edited job can be loaded to VRC.
On the [Controller] tab, in the [Job] group, click the [JobPad] button. The [JobPad] dialog appears.

NOTE The displayed format is the text data saved in ex. memory. So, this format is different from that of virtual pendant and real pendant.

■ Main Window

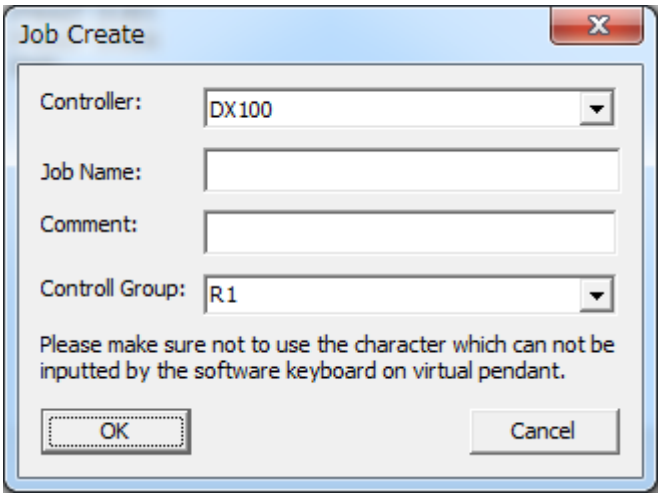


[New] button	To create a new job, the [Job Crate] dialog is displayed.
[Open] button	To select a job, the [Select Job] dialog is displayed.
[Check] button	The displayed job is checked to load to VRC.
[Setting] button	The [JobPad Setting] setting dialog is displayed.

[Save] button	The displayed job is loaded to VRC.
[Full Mode] check box	To show the area before "NOP", turns this check box enabled.
[Show Log] check box	To display the result of checking or loading, turns this check box enabled. The log area is displayed automatically when click the [Check] button or [Save] button.

■ Job Create

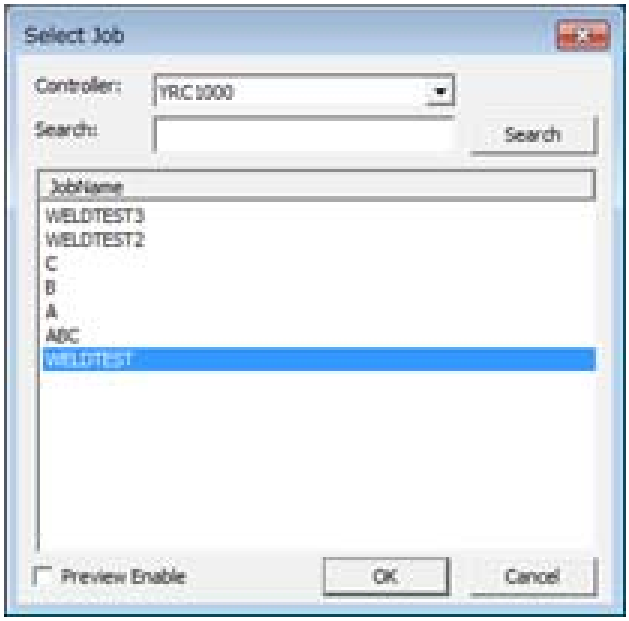
When the [Create] button is clicked, the [Job Crate] dialog is displayed.

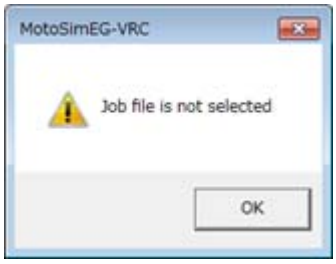


Controller	Selects the VRC controller from drop down list.
Job Name	Inputs the new job name. NOTE Use only the character which can be input by a software keyboard for job name.
Comment	Inputs the comment of job.
Control Group	Select the control group from drop down list.
[OK] button	Create the new job and this dialog is closed.
[Cancel] button	This dialog is closed.

■ Select Job

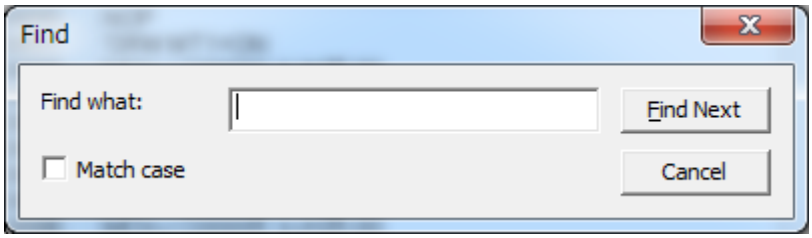
When the [Open] button is clicked, the [Select Job] dialog is displayed.



Controller	Selects the VRC controller from drop down list.
Search	Click the [Search] button after inputting the keyword, The job names including the keyword are displayed on the list. When the edit box is empty, all job names are displayed.
Preview Enable	When enabled, the contents of the selected job is displayed. NOTE When the job is not selected and check this item, the following message is displayed. 
[OK] button	Open the selected jobs and this dialog is closed. Multiple jobs can be opened.
[Cancel] button	This dialog is closed.

■ Find

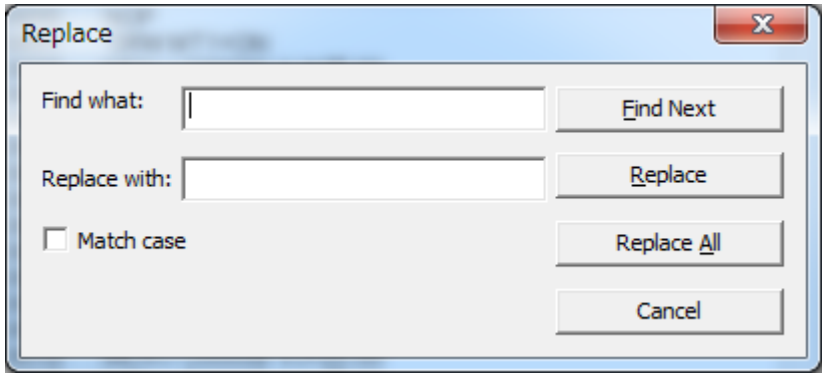
Press the [Ctrl] + [F] key of the keyboard when the cursor is in the job contents area of main window, the [Find] dialog is displayed. Keyword search is available.



Find what	Inputs a keyword.
[Match case] check box	When this is enabled, the large character is separated from the small character.
[Find Next] button	The keyword is searched from current cursor position.
[Cancel] button	This dialog is closed.

■ Replace

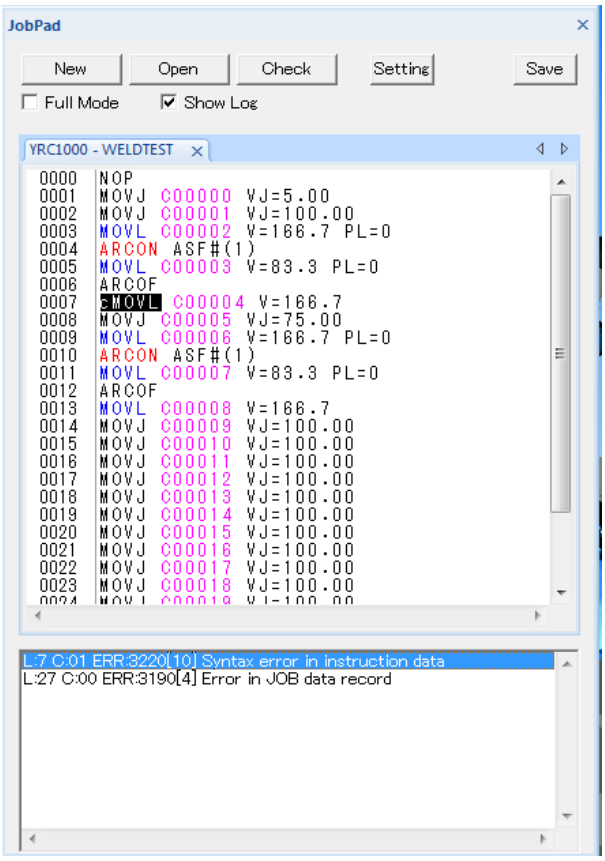
Press the [Ctrl] + [H] key of the keyboard when the cursor is in the job contents area of main window, the [Replace] dialog is displayed. Keyword replacing is available.



Find what	Inputs a target keyword.
Replace with	Input a replacing keyword.
[Find Next] button	The keyword is searched from current cursor position.
Replace	The selected keyword is replaced and next keyword is searched from current cursor position.
Replace All	All target keyword are replaced.
[Match case] check box	When this is enabled, the large character is separated from the small character.
[Cancel] button	This dialog is closed.

■ Error String

When double-click the line of the log window, string around the error occurrence part is reversed.

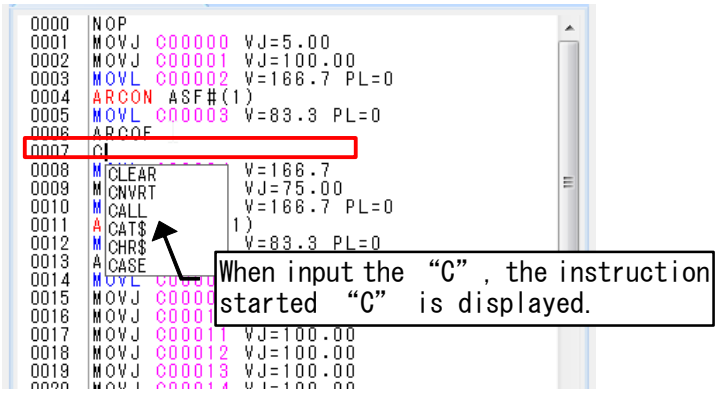


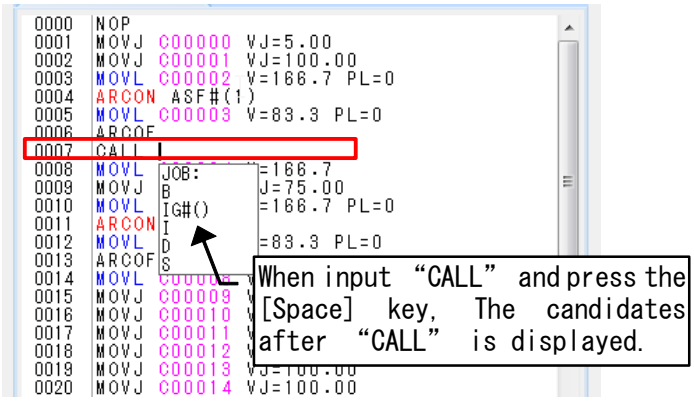
■ Input Support

To use the input support, job can be created easier. When input the initial character of instruction, the candidates are displayed on the popup list.

NOTE

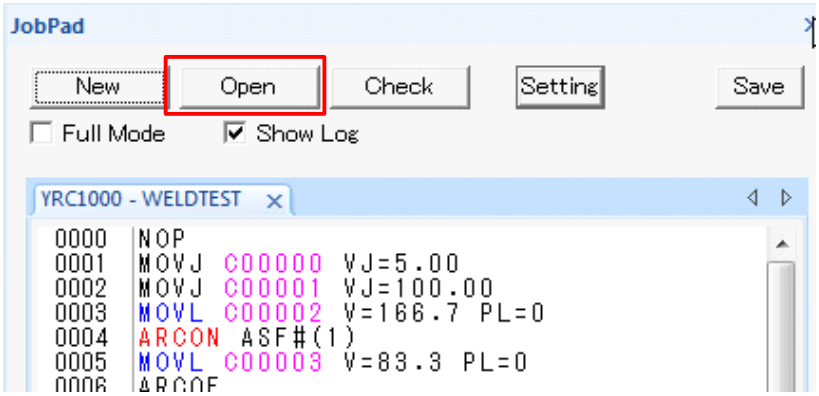
- Input support is case-sensitive.
- The candidates display depends on the language level of the virtual controller.
- About the structured language, the candidates (AND or OR) after the conditional statement is not available.
- About the structured language, the candidates of the conditional statement is not available.
- The displayed format is the text data saved in ex. memory. So, WHILE, IFTHEN, AND and OR are displayed as WHILEEXP, IFTHENEXP, ANDEXP and OREXP by YRC1000, YRC1000micro, DX200 controller.
- The candidates after the EXPRESS of SET instruction is not available.
- ON/OFF and CONSTANT is not displayed.



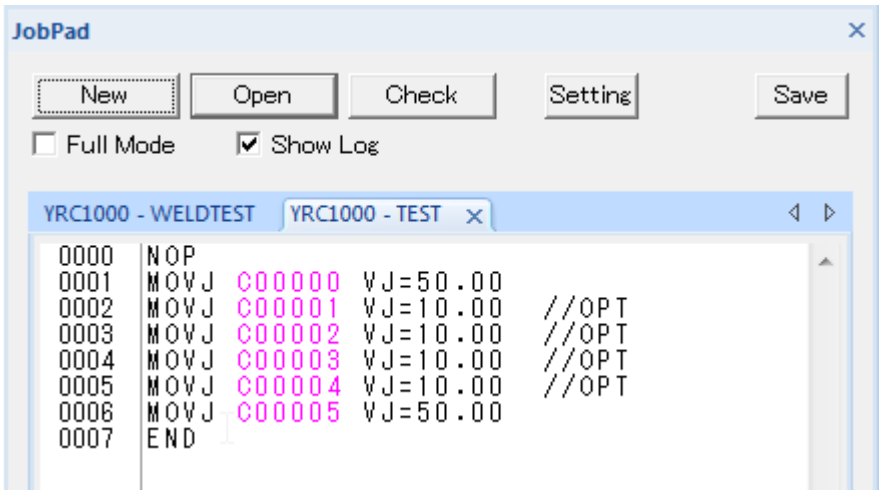


■ Moultiple Jobs Editing

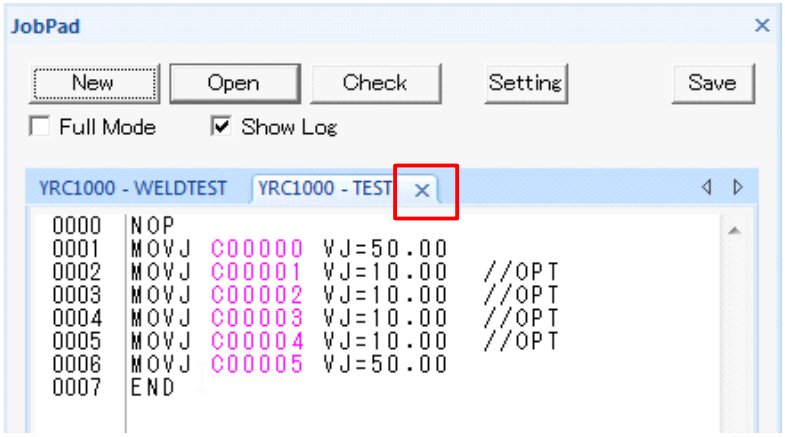
In the JobPad, multiple jobs can be opened to edit.
When the [Open] button is clicked the [Select job] dialog is displayed.



When multiple jobs are opened, displayed job is changed with the tab.

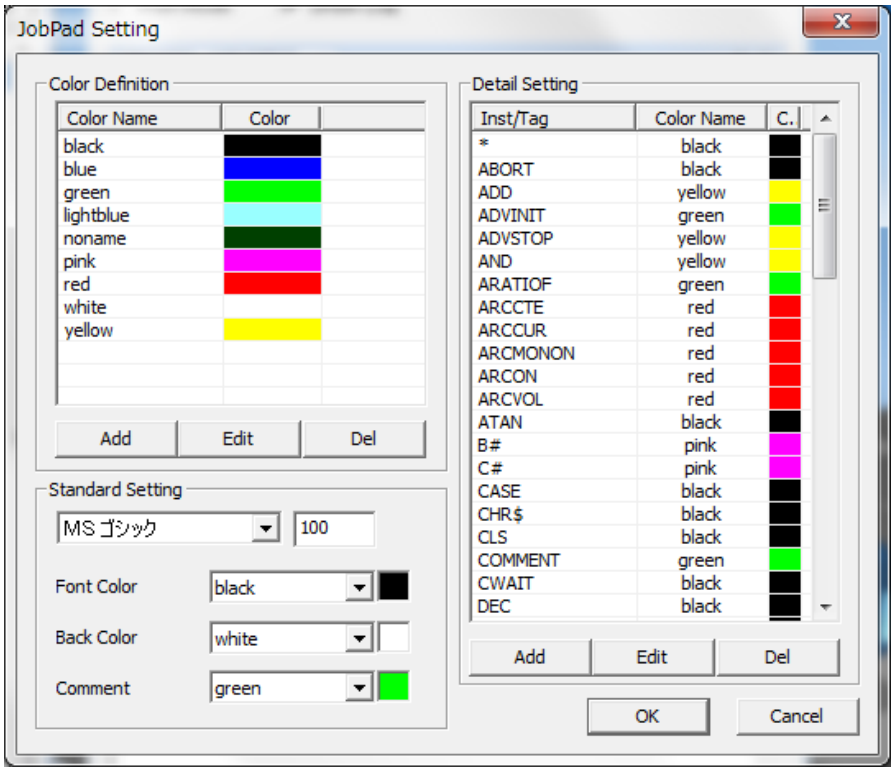


When job is closed, click the [x] button on the tab.



■ Setting

To make it easy for an analysis of a job, it's possible to change the font and change the color of the instruction.



NOTE

To pick a keyword out by a space end, coloring is as follows.

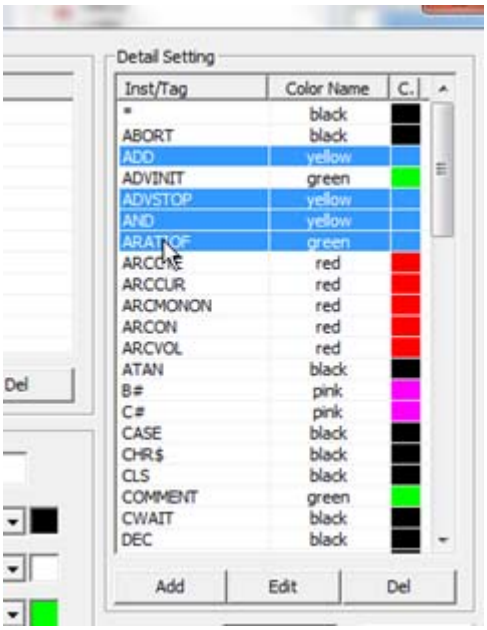
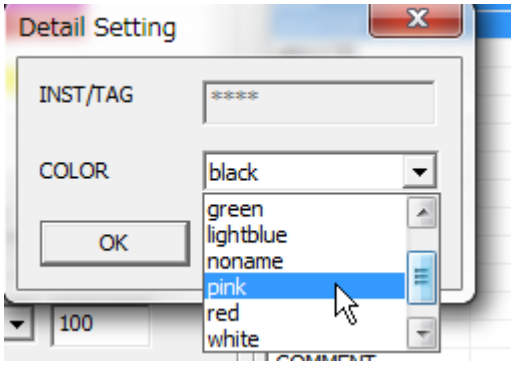
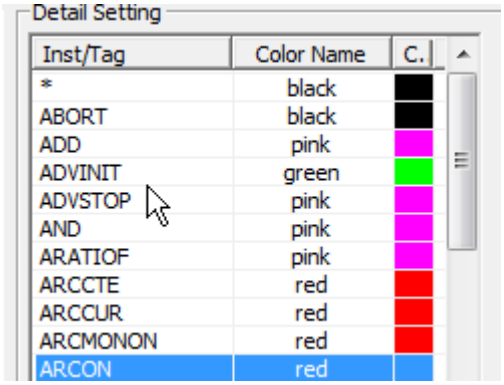
MOVJ C0001 EC0001 VJ=5.00 ○

MOVJ C0001 EC0001 VJ=5.00 ×

A comment line is one color.

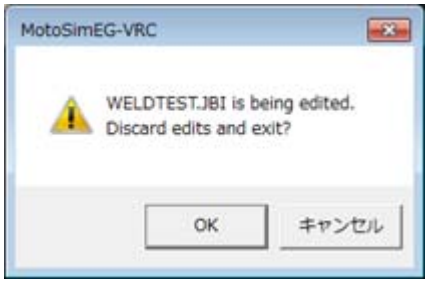
String of the log window is not colored.

Color Definition	Defines the color. Sets the standard setting and detail setting use this definition.
Standard Setting	Defines the font, back color and comment color used in standard. Keyword not defined in the detail setting is used this setting.

Detail Setting	Defines the color each keyword. On the Detail Setting, the color of multiple Inst/Tag can be changed at once. Selects the item of Inst/Tag to change color with [Ctrl] key and mouse click.  Click the [Edit] button, and change the color on the Detail Setting dialog.  

■ Check unsaved jobs

After editing the job, When close the Jobpad without saving with the [Save] button, the following confirmation message is displayed.

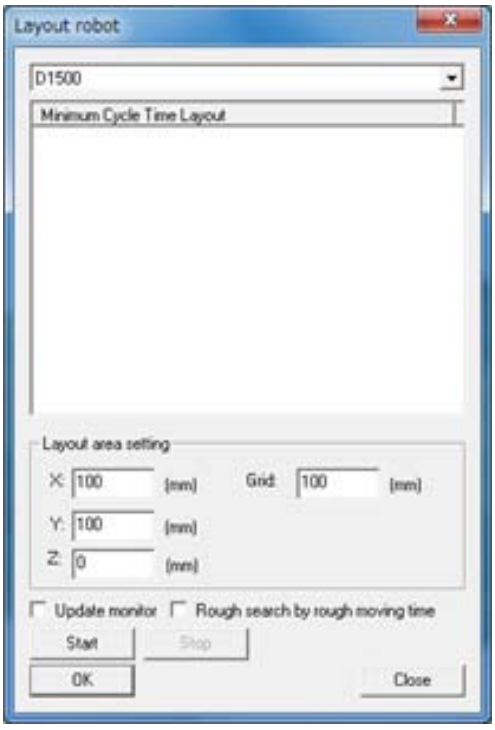


When there are multiple jobs that have not been saved, multiple confirmation messages are displayed. The Job Pad is finished only when press all [OK] button only. When press [Cancel] button, the display of the Job Pad is maintained and you can perform the save operation by pressing the [Save] button.

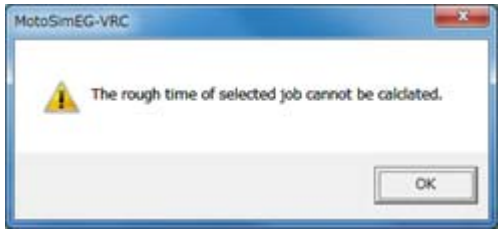
8.20 Layout Robot Function

The Layout Robot function automatically searches the robot position where the cycle time is minimalized.
On the [Tool] tab, in the [Teaching Assistance] group, click the [Layout Robot] button, Layout robot Dialog is displayed.

NOTE
- This function does not support jobs using position type variables.
- This function is VRC controller function only.
- This function is one robot system only.
- This function is not supported to the mechanical mirror robot.



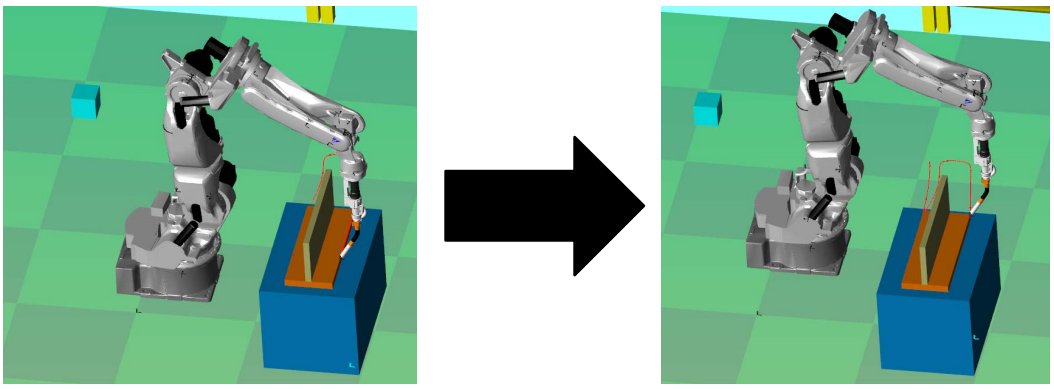
Job Select list box	Selects the job to consider the placement.
Placement Consideration Result Display list	Valid placements are displayed in ascending order of cycle time.

X	Sets the X direction of the search range of the world coordinates. Search is executed in plus and minus direction of the specified value from the current position of the robot.
Y	Sets the Y direction of the search range of the world coordinates. Search is executed in plus and minus direction of the specified value from the current position of the robot.
Z	Sets the Z direction of the search range of the world coordinates. Search is executed in plus and minus direction of the specified value from the current position of the robot.
Grid	Sets the pitch to execute a search.
Update monitor check box	When enabled, robot is moved at the time of playback. When disabled, placement consideration is possible in high speed.
Rough search by rough moving time	When planning layout, the moving time is calculated by simple calculation instead of playback. When the following dialog is displayed, simple calculation cannot be used. (e.g. CALL JOB instruction) In this case, please turn off the check.  When the check is turned on, the displayed travel time is approximate. After change layout, please play back and check it.
Start button	When clicked, the placement consideration is started.
Stop button	When clicked, the placement consideration is stopped.
OK button	When clicked, the robot is moved to the selected placement in the Placement Consideration Result Display list, and the selected job is shifted.
Close button	When clicked, the layout robot dialog is closed.

■ Placement Consideration

When press the start button, robot placement consideration starts.
As shown in the figure below, the placement change and playback of the robot are repeated, and the results are displayed in the Placement Consideration Result Display list.

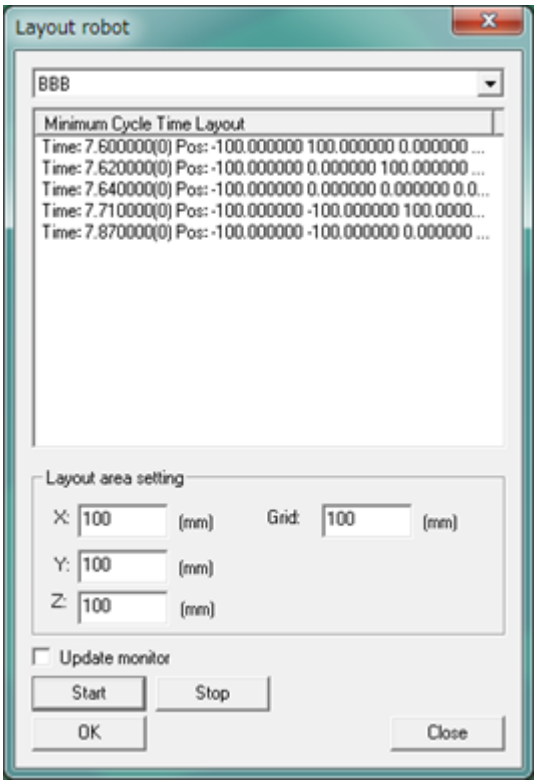
Valid placements are displayed in ascending order of cycle time.
When an alarm occurs during the play back, without the display in the Placement Consideration Result Display list, consideration the following placement will start.



The arrangement is changed, robot goes through the same teaching points.

■ Application of the Placement

When select a line of Placement Consideration Result Display list, the robot will move to the position. When click the [OK] button, confirm the position of the robot.



8.21 Cable Simulation

This function is a function to simulate the cable by registering cables in the cell.

NOTE

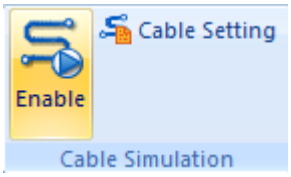
- This function does not guarantee the same behavior as the actual cable because it cannot completely reproduce the characteristics and bending tendency of the actual cable with physical parameters. This function is only a guide.
- The cable deterioration due to friction cannot be simulated.
- It is not possible to simulate the load on the robot due to cable entrainment, etc.
- The disconnection detection function detects as a disconnection when it extends from the length of the initial cable over the threshold value. Disconnection detection due to other factors such as pinching is not carried out.
- This function is very computationally expensive, so the operation of MotoSim EG - VRC will be slow.

■ RESTRICTION

- In teach mode, move robot only with VPP JOG operation. (OLP, position panel, operation handle, and job synchronization, etc. cannot be used. Because this function simulates inertia and centrifugal force, the function that the robot moves momentarily cannot be used.)
- When the cable simulation is started, the cable is displayed at the position when the cable is registered. If connected to the robot, the robot will be in position when registering the cable.
- The model to be subjected to cable simulation is the model displayed on the screen at the start of cable simulation. After the simulation is started, models that have been edited (added, deleted, switched hide / see, etc.) are not reflected in the cable simulation. If editing is done, please disable the cable simulation once and then re-enable it.
- If the robot is replaced after cable registration, the arrangement of registered cables will not be changed. Please re-register the cable.
- When the robot moves at high speed, the cable may penetrate other models. Please adjust interpolation granularity.
- This function cannot be used simultaneously with online function.
- Cable model cannot be subjected to collision detection.
- 3DPDF and AVI output cannot be performed during cable simulation.

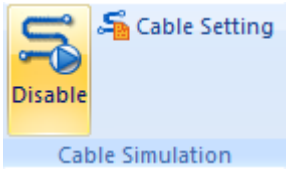
8.21.1 Start Cable Simulation

To start cable simulation, on the [Simulation] tab, in the [Cable Simulation] group, click the [Enable] button. When the [Enable] button is clicked, the button changes [Disable] button.



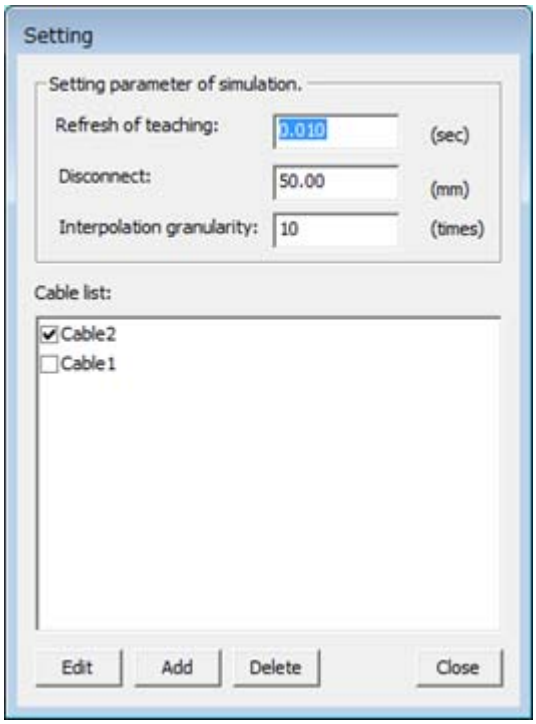
8.21.2 End Cable Simulation

To end cable simulation, on the [Simulation] tab, in the [Cable Simulation] group, click the [Disable] button. When the [Disable] button is clicked, the button changes [Enable] button.



8.21.3 Cable Setting

On the [Simulation] tab, in the [Cable Simulation] group, click the [Cable Setting] button to display setting dialog.



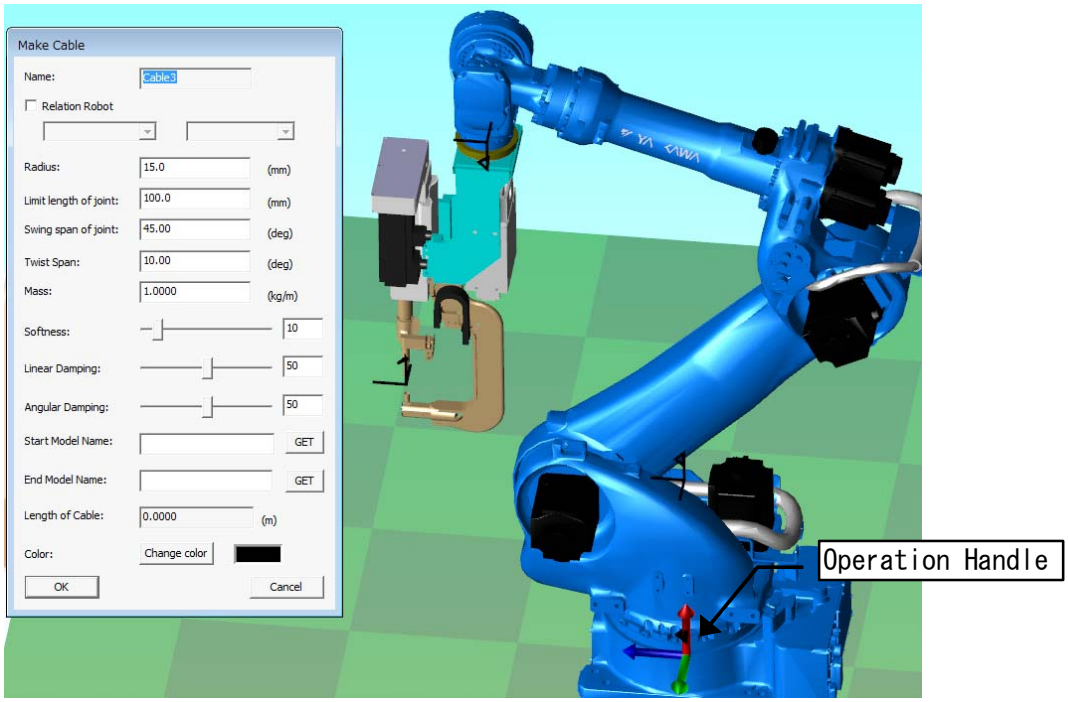
Refresh of teaching	Sets screen update interval during cable simulation except during playback.
Disconnect	If the amount of misalignment between the joints of the cable exceeds the input value, it is judged to be broken.
Interpolation granularity	Sets the number of calculations performed during screen update. The higher the number of times, the higher the simulation accuracy, but the slower the operation.
Cable list	The registered cable list is displayed. By checking the check box, it becomes the cable subject to cable simulation.

Add	A new cable is registered.
Edit	The selected cable is edited.
Delete	The selected cable is deleted.
Close	This dialog is closed.

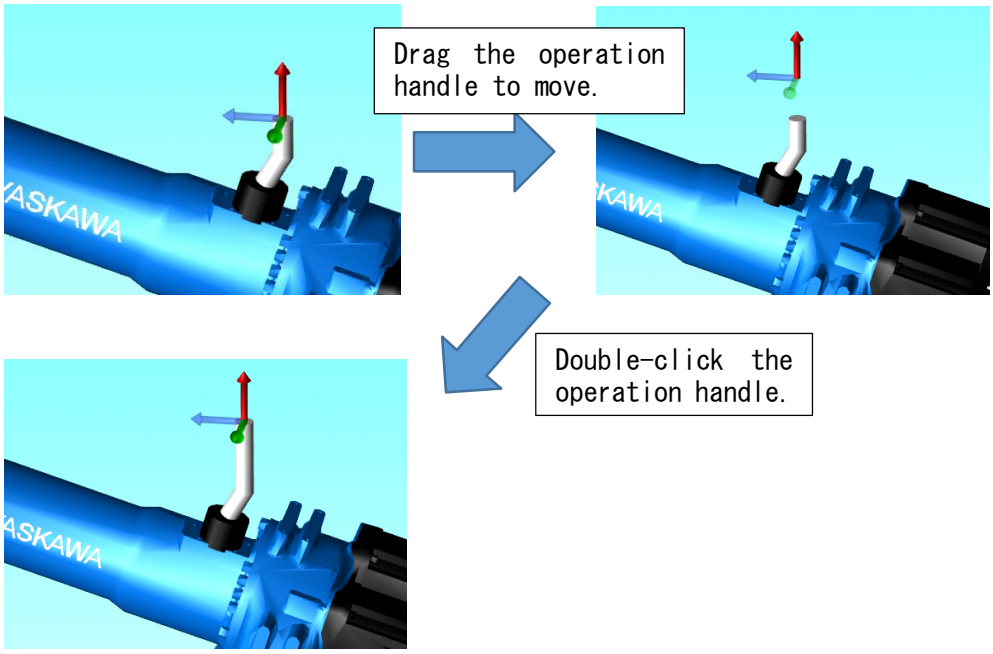
■ Cable Registration

Procedure

1. Click the [Add] button on the setting dialog.
2. "Make Cable" dialog and operation handle is displayed.

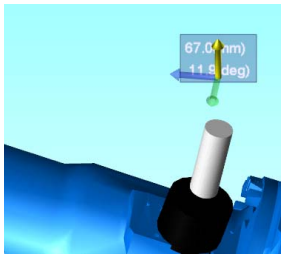


3. Operate the operation handle to create a section of the cable.

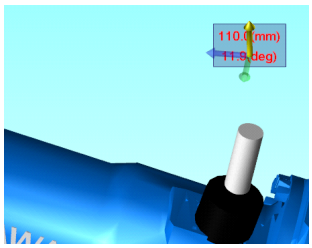


Double-click on the mouse to add a joint of the cable.
When dragging the operation handle, the distance and angle from the previous joint are displayed. Joint registration is possible when the display is white letters, but joint registration is not possible if the display is red.

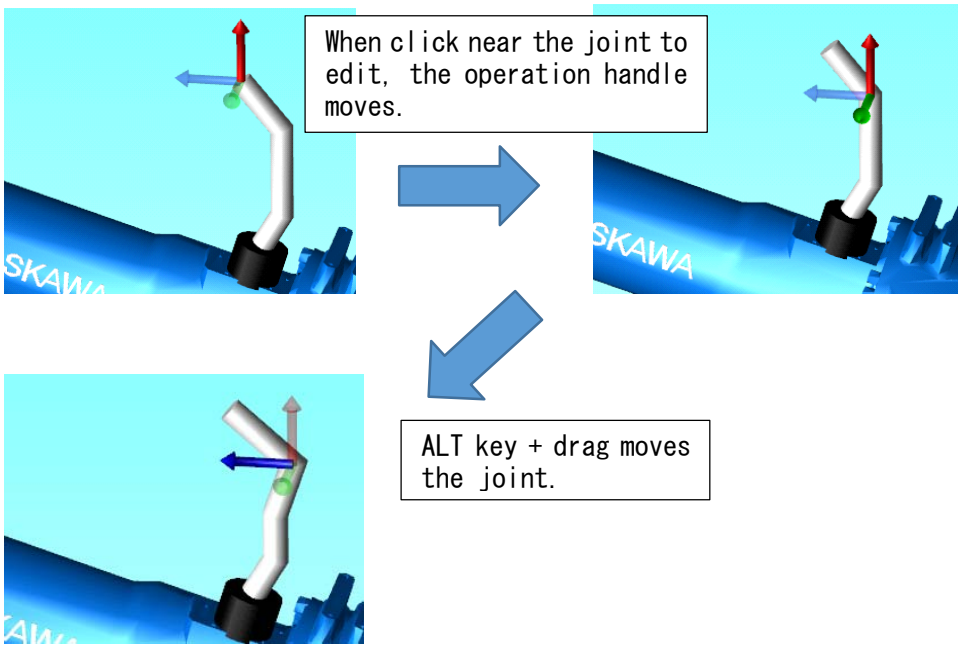
[Possible]



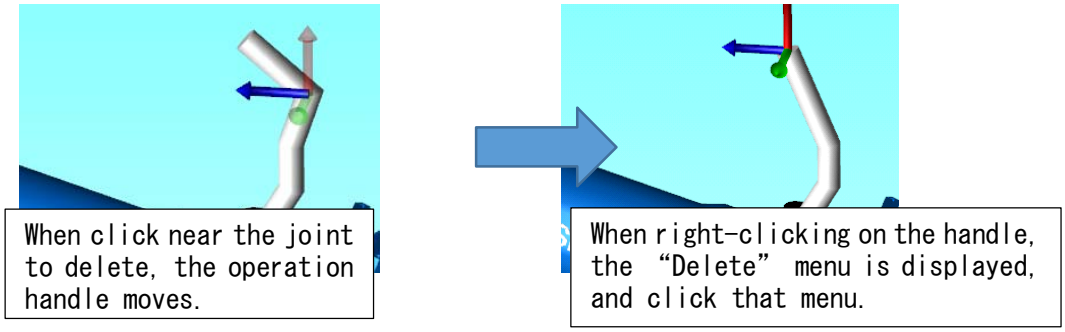
[Impossible]



4. It is also possible to change the position of the created joint by operating the operation handle.



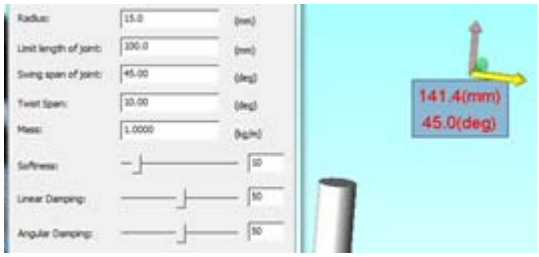
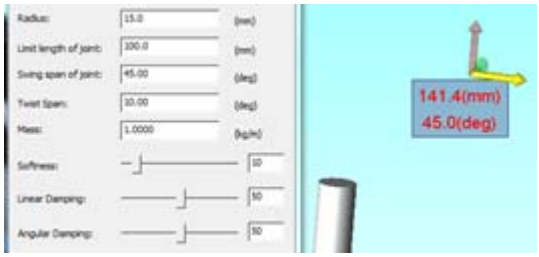
5. The joint can be deleted by operating the operation handle.



NOTE When registering cables, please be sure not to cross with other models.

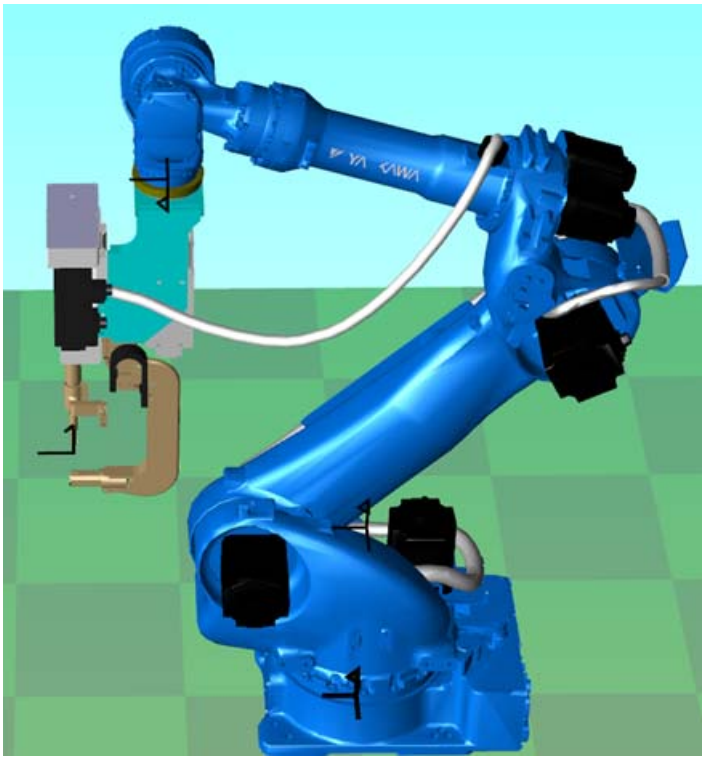
6. Sets the items of "Make Cable" dialog.

Name	It is automatically entered.
Relation Robot	At the start of cable simulation, move the robot's position to the posture of cable registration. Be sure to check this when the cable is connected to the robot.
Controller	To specify the target robot, select the controller name.
Robot	To identify the target robot, select the robot name.
Radius	Enter the radius of the cable.

Limit length of joint	Sets the maximum pitch between cable joints. When operating operation handle and operation handle moves over this pitch, characters are displayed in red. 
Swing span of joint	Sets the maximum joint angle between cable joints. When operating operation handle and operation handle moves over this angle, characters are displayed in red. 
Twist Span	Sets the angle of the maximum articulation twist direction between cable joints.
Mass	Sets the weight of cable per one meter. (Units: kg)
Softness	Sets the softness of the cable.
Linear Damping	Sets the attenuation value of translational motion.
Angular Damping	Sets the attenuation value of the rotary motion.
Start Model Name	Sets the model name of the starting point to which the cable is connected. Click the [GET] button to set the current model of the CadTree dialog.
End Model Name	Sets the model name of the end point to which the cable is connected. Click the [GET] button to set the current model of the CadTree dialog.
Length of Cable	The length of the cable is displayed.
Color	Sets the cable color during cable simulation.

7. When click the [OK] button, cable registration is completed.

8. After cable registration, when enable cable simulation, the cable will be displayed.



■ Cable Editing

Procedure

1. On the "Setting" dialog, select the cable to edit from the cable list.
2. Click the [Edit] button.
3. After clicking the [Edit] button, it will be the same operation as registration.

■ Cable Deleting

Procedure

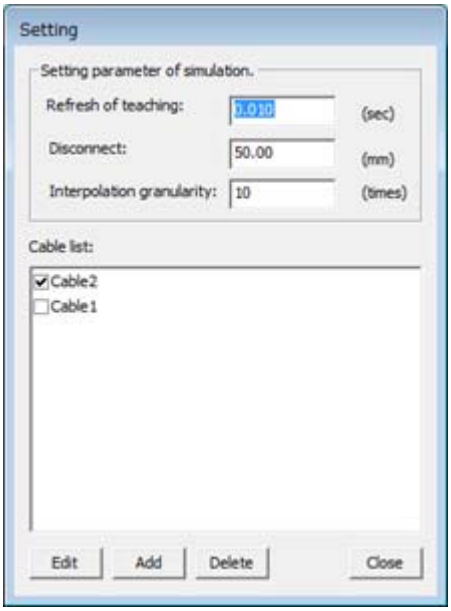
1. On the "Setting" dialog, select the cable to delete from the cable list.
1. Click the [Delete] button.

■ Enable/Disable the Simulation of Cable

At the start of the cable simulation, set the simulation target.

Procedure

When checking cable of the list box on the setting dialog, it will be subject to simulation. When unchecking cable, it will be out of simulation.



8.22 Path Planning

This function is to automatically generate a path that avoids work and obstacles between two teach points.
On the [Tool] tab, in the [Teaching Assistance] group, click the [Path Planning] button, the [Create Paths] dialog is displayed.

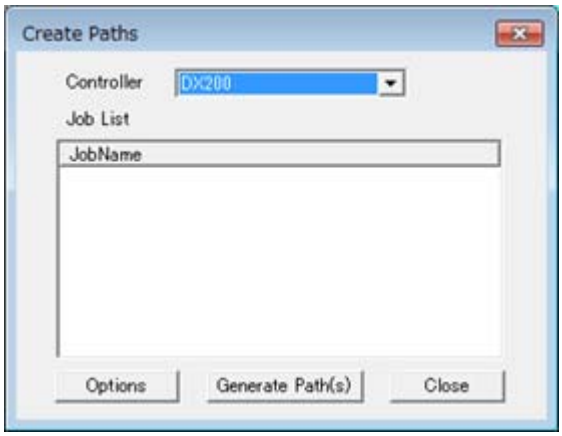
NOTE

- This function performs random search.
  - Different paths are generated each time it is executed.
  - The path obtained by this function is not an optimal solution.
- When using the generated path on the actual machine, please play back with MotoSim EG-VRC beforehand to confirm that there is no problem.
- Under the following circumstances, paths that do not avoid interfering objects may be generated.
  - Works including thin-shaped models may slip through.
  - Because it does not consider internal turning, it may interfere during playback.
    By using the simplified model creation function, it is possible to generate a path to automatically avoid work and obstacles. For details of the simplified model creation function, refer to " 11.17 Creating Simplified Model ".
- When interpolation is performed with MOVL, when play back the generated job, the segment over alarm may be generated.
-

■ RESTRICTION

- The supported controllers are YRC 1000, YRC 1000micro, DX 200 and FS 100.
- Only one robot configuration per controller is supported. It does not correspond to the configuration with the traveling axis or the station axis.
- Only 6 axis robots are supported.
- If there is a CALL or JUMP instruction between the start and end points of the planning, the teaching point at the called job is out of planning.

■ Main Dialog

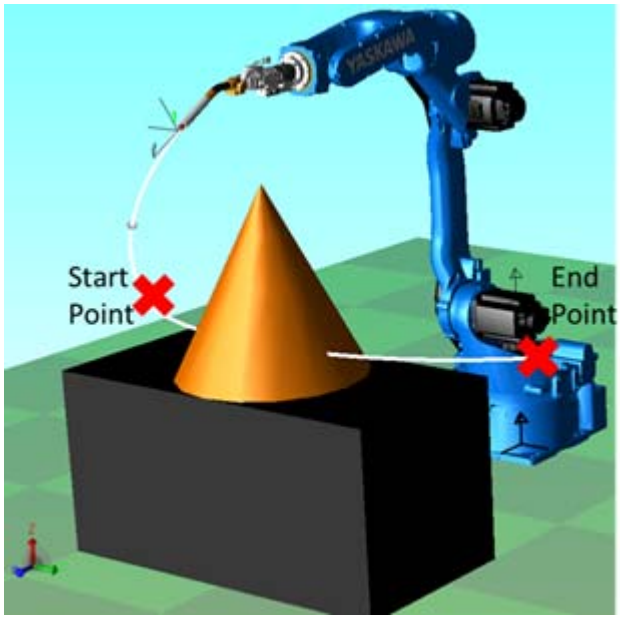


Controller	Select the controller registered in the cell.
Job List	The list of jobs registered in the controller is displayed.
Options	Change the path generation setting (PPF). For details, refer to " 8.22.1 Option Setting ".
Generate Path(s)	Execute path generation.
Close	Close the dialog.

■ Procedure

This explains the procedure to do path planning.
Various setting items can be changed by option setting. (" 8.22.1 Option Setting ")
(Path generation can also be performed with the default value)

1. Prepare a cell with a robot and interfering objects and, a job (e.g. TEST) having two teaching points, the start point and the end point.

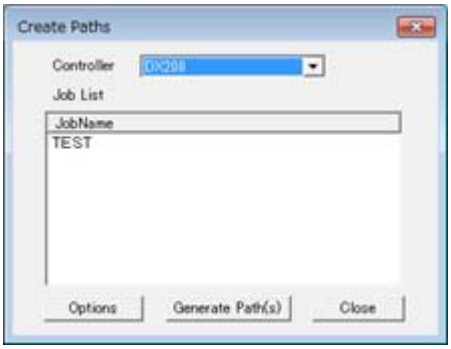


2. Add PPF # (1) to the line comment of the move instruction is the start point of path gen-

eration.

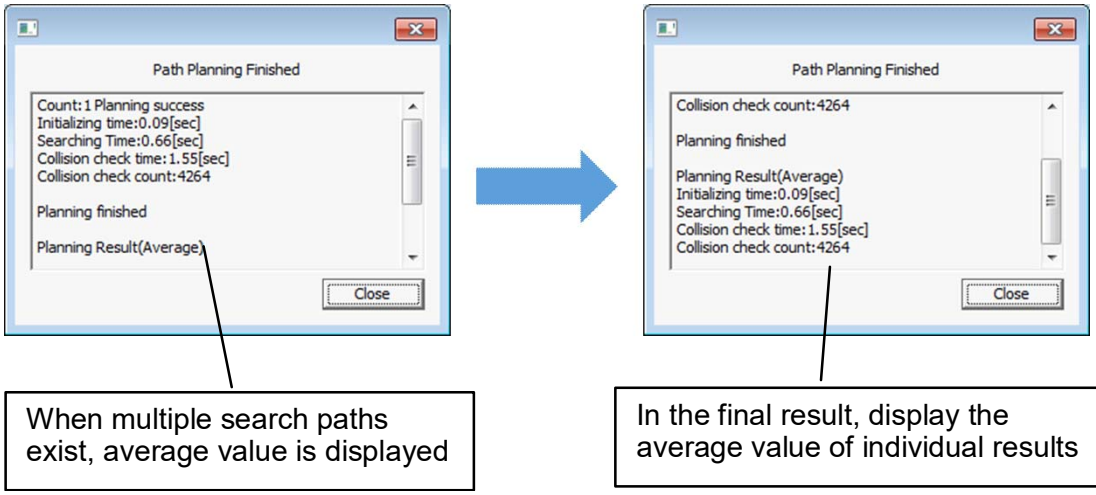
- Multiple paths can be specified.
- It is also possible to change the type of setting (PPF) to be used for each start point where path generation is performed.

3. In order to perform efficient collision check in path planning, enable collision model group and collision pair setting for robot and work subject to collision check in advance. For details, refer to " 8.11 Collision Detection ".
4. Open the [Create Paths] dialog, select the job, and click the [Generate Path(s)] button.

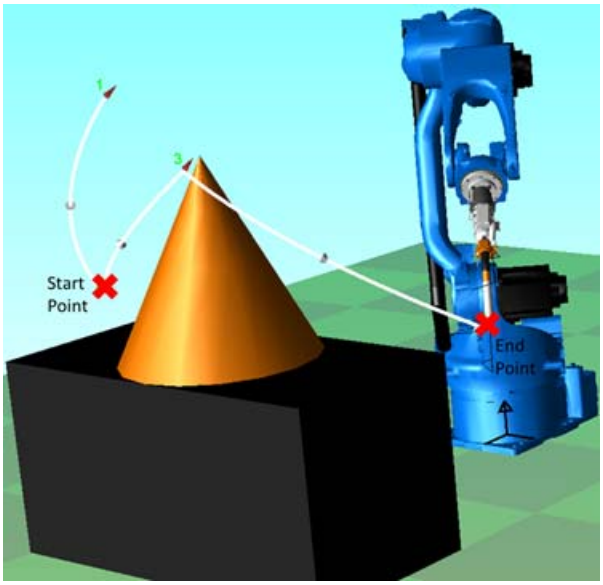


While executing path generation, the following result display dialog is displayed. In addition to checking the time required for path creation, it is also possible to abort planning by clicking the [Abort] button.

Abort	Interrupt path generation at that point in the middle. After the path generation is completed, it changes to "Close" button.



5. When the path generation is completed, a job is created in which a teaching point for avoiding interfering objects is added as follows.
   (Refer to " 8.10.3 Visual Path Edit Function " for details to show the trajectory).



   The generated job will be named PPEG_yyyymmdd_hhmmss.

6. f the path generation fails, "NG" is added next to the line comment PPF # (number) of the job.
   If the situation is as follows, a message is displayed in the result display dialog.

In that case, review the settings and generate the path again.

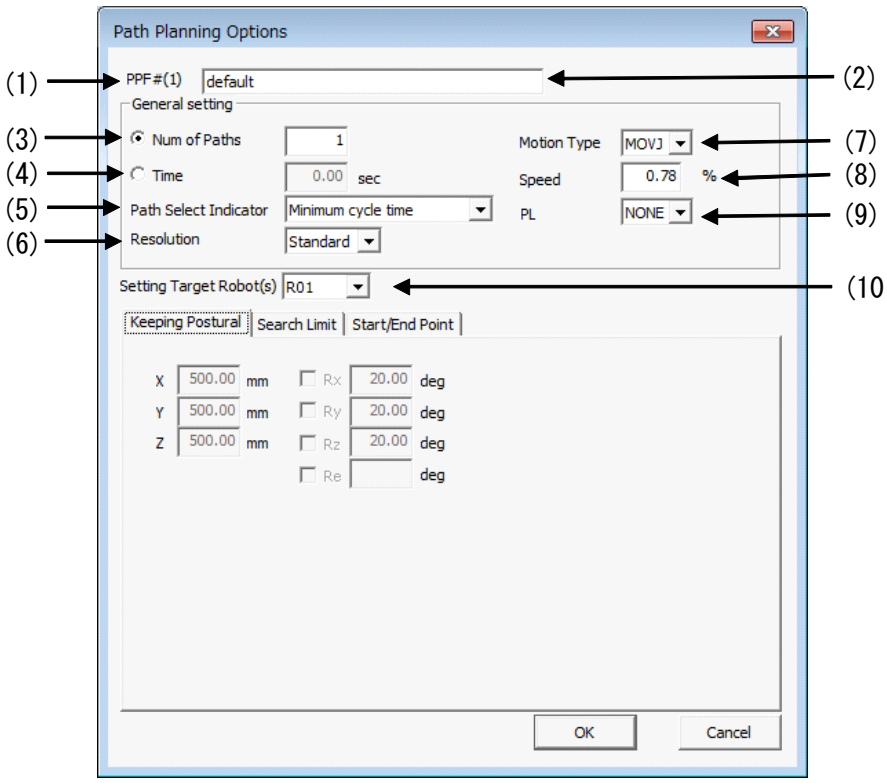
- Failed to generate the path
- The start point or end point interferes with the work
  (If both the start point and the end point interfere with work, a message indicating that the start point is interfering is displayed)
- When using search range limitation to be described later, the start point or end point is outside the set range

8.22.1 Option Setting

■ Setting Option(s) dialog

PPF list	The list of PPF # (numbers) registered in the controller is displayed. If select one from the list and double-click it, the path planning options dialog is displayed.
Edit	Select one from the PPF list and open the path planning options dialog.
Add	Add a new PPF # (number) with the default value and open the path planning options dialog so that items can be edited.
Delete	Deletes the PPF # (number) selected from the PPF list.
Copy	Copy the contents of the selected PPF # (number) from the PPF list and open the path planning options dialog so that items can be edited.
Close	This dialog is closed.

■ Path Planning Options dialog

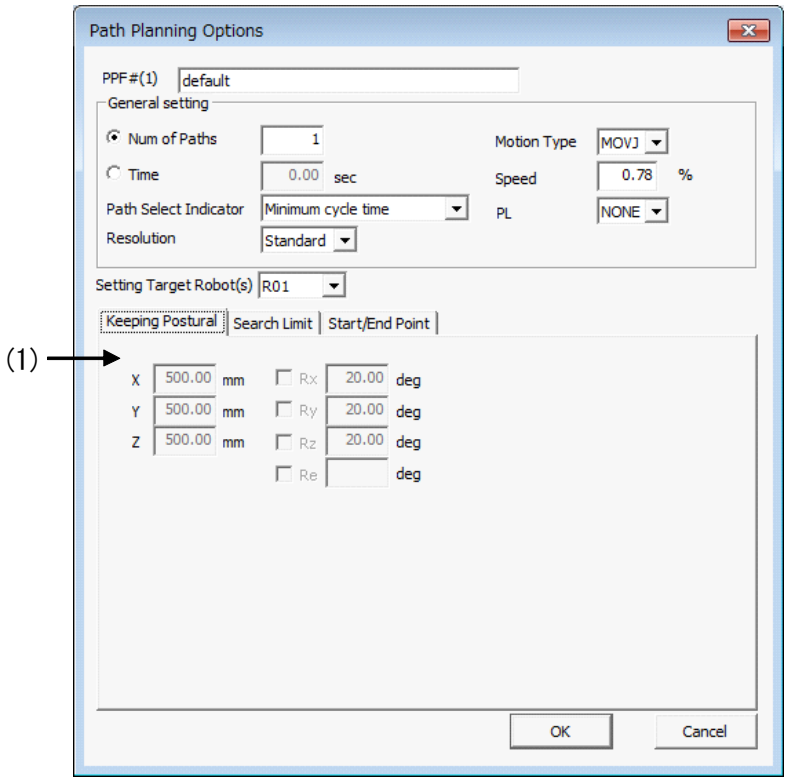


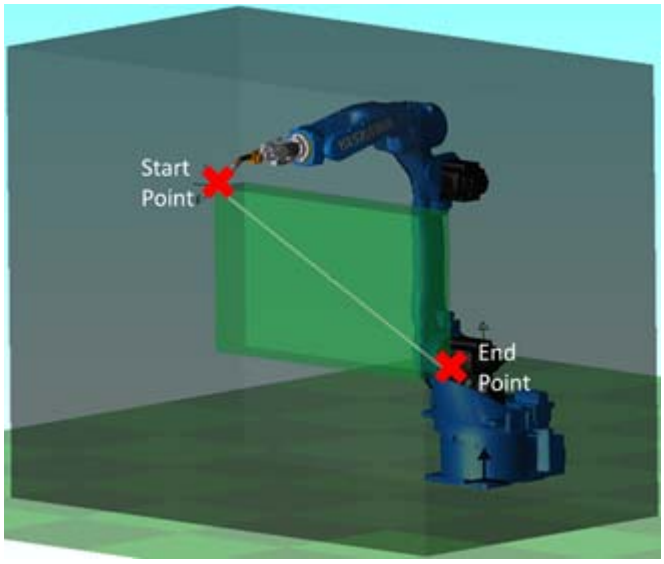
(1)PPF name	The name of the PPF currently being set is displayed.
(2)Comment	Arbitrary comments can be set, such as the purpose of setting contents. The comment is displayed on the Setting Option(s) dialog.
(3)Num of Paths	Specify how many paths are searched as the condition for finishing path creation.
(4)Time	Specify how many seconds to search as the end condition of path generation. NOTE If no path has been found when the specified time has elapsed, the search will be done until one is found.

(5)Path Select Indicator	From the multiple paths found, specify the criteria for selecting which path to select. Select from the following three items. [Minimum cycle time]: When operating at 90% of the maximum speed of each axis of the robot, a path that minimizes cycle time is selected. [Minimum distance of joints]: a path that minimizes the movement amount of the joint angle is selected. [Minimum num of points]: a path that minimizes the number of teach points to be inserted in the job is selected.
(6)Resolution	Sets the resolution of collision detection performed at path planning. It is adjustable in three levels of Low, Standard and High.
(7)Motion Type	Specifies the motion type to be inserted in the job. MOVL or MOVJ can be specified.
(8)Speed	Specify the speed of the move instruction to be inserted in the job.
(9)PL	Specifies the positioning level of the move instruction to be inserted in the job. If do not specify it, select NONE.
(10)Setting Target Robot(s)	Select a robot to set for Keeping Postural, Search Limit and Start / End Point.

Keeping Postural tab

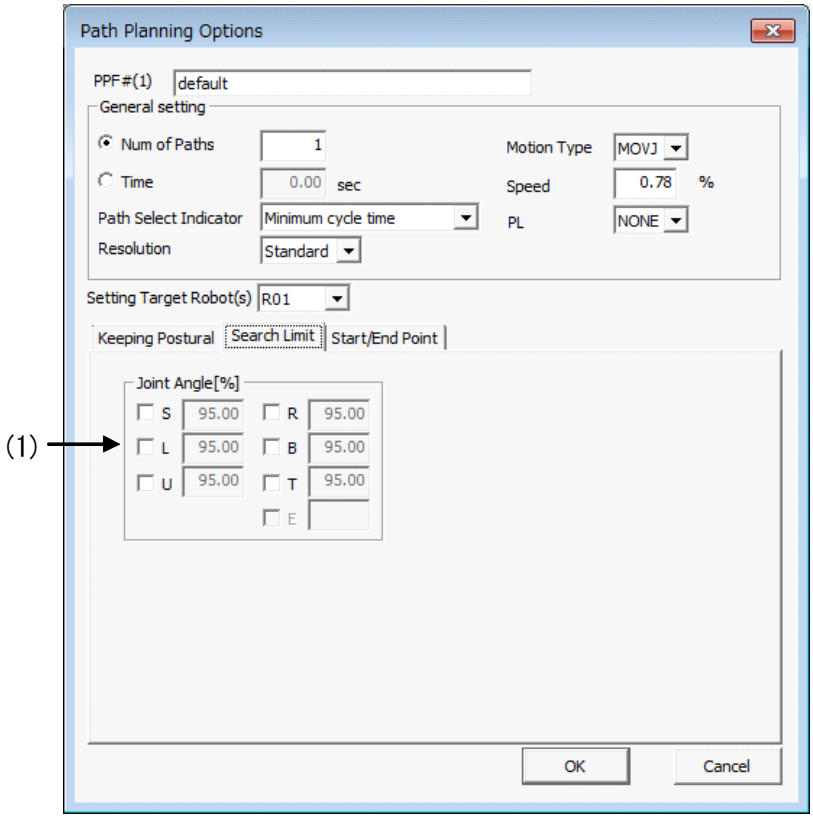
When MOVL is selected with the Motion Type of general setting, specify the range where the posture is maintained from the start point to the end point for the teaching point to be added by path planning.



(1)Keeping Postural	The search range of path generation is based on a rectangular parallelepiped with a starting point and an end point diagonal. (Base coordinate system) XYZ specifies whether to search within the range obtained by adding the margin amount to the reference. The minimum value is 500 mm. The following figure shows the search range imitated by the BOX model. It is created so that the inner green BOX is within the difference between the start point and the end point. The user specifies how much to enlarge the range of this green BOX. When the default values XYZ are set to 500 respectively, the outer black BOX becomes the search range.  To set the movable range of RxRyRzRe, put a check and activate it. RxRyRzRe specifies whether to search within the range obtained by adding the margin amount to the difference between the start point and the end point. The minimum value is 20 deg.

Search Limit tab

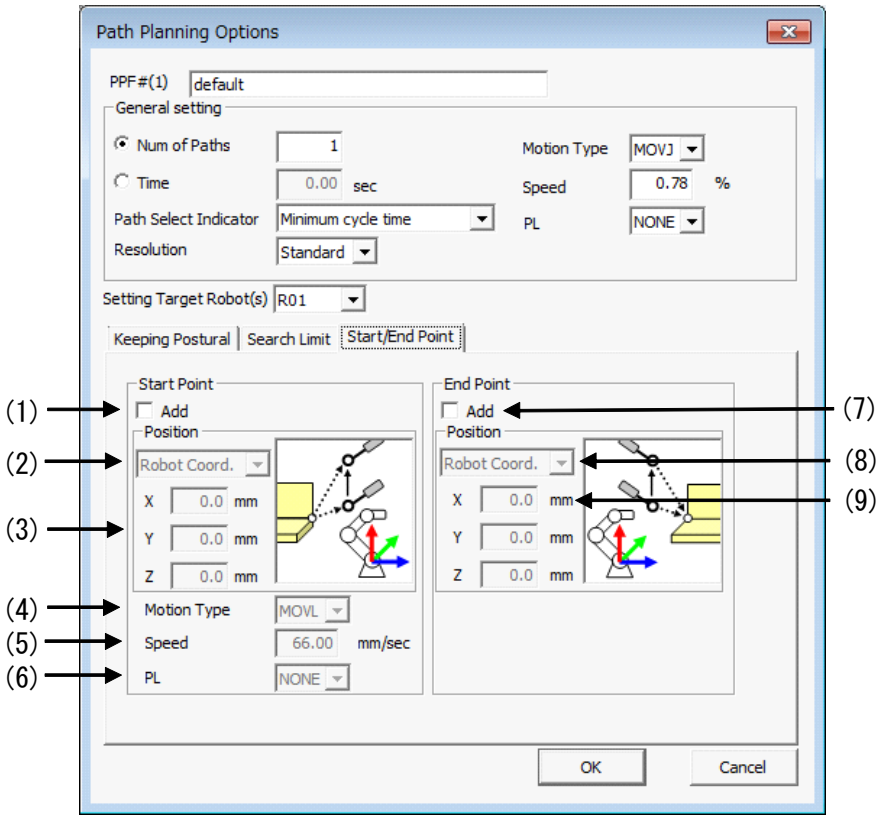
For the teach point generated by path planning, specify the search range of the joint angle.



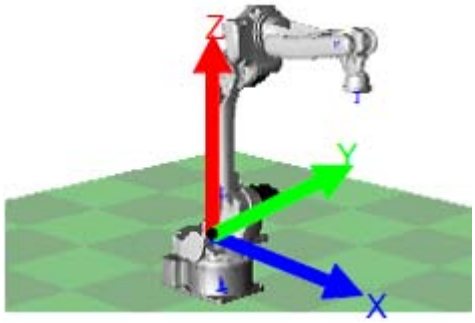
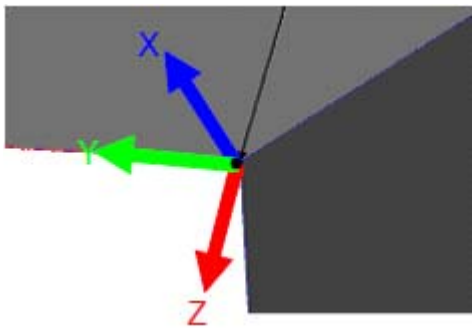
(1)Joint Angle	If change the setting from the default value, put a check and activate it. Specify the movable range of the joint angle in %. The initial value is 95%. Up to 100% can be specified.

Start / End Point tab

When the start point or the end point used in path planning is already in contact with the interferer, the path can be generated using the start / end point shifted by the specified shift amount.



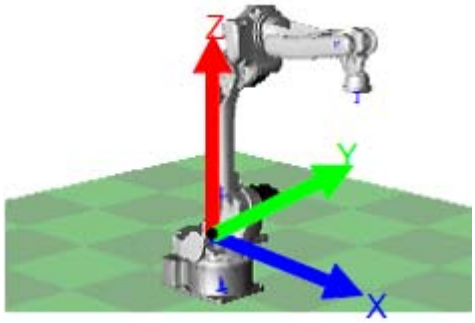
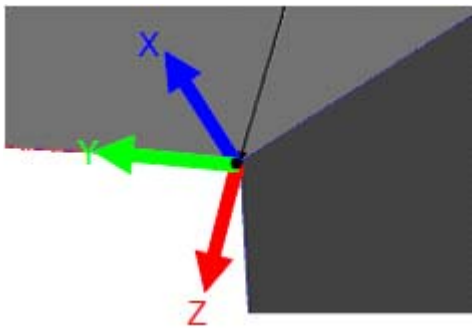
Start Point	
(1)Add	Check the box to create a start point.

(2)Coordinates	Select the coordinate system that specifies the shift amount. In the robot coordinates, set the shift amount in the following coordinates.  In the target coordinates, set the shift amount at AXIS 6 at the start point. 
(3)Shift Amount	Set the shift amount in the X, Y, and Z axis directions from the start point on the coordinate base of (2). (Units: mm)
(4)Motion Type	Specify motion type of move instruction. MOVL or MOVJ can be specified.
(5)Speed	Set the moving speed.
(6)PL	Specifies the positioning level of the move instruction to be inserted in the job. If do not specify it, select NONE.

End Point

NOTE The end point is added to the job at motion type and speed set in the general setting.

(7)Add	Check the box to create an end point.

(8)Coordinate	Select the coordinate system that specifies the shift amount. In the robot coordinates, set the shift amount in the following coordinates.  In the target coordinates, set the shift amount at AXIS 6 at the end point. 
(9)Shift Amount	Set the shift amount in the X, Y, and Z axis directions from the end point on the coordinate base of (8). (Units: mm)

9 Online Function

When PC is connected to a real controller by Ethernet, the following operation becomes possible.

- Reconstructs a system configuration of a real controller in VRC
- Monitor the condition of a real controller
- Receive the files from a real controller and load to the VRC
- Save the files of VRC and send them to a real controller.

NOTE

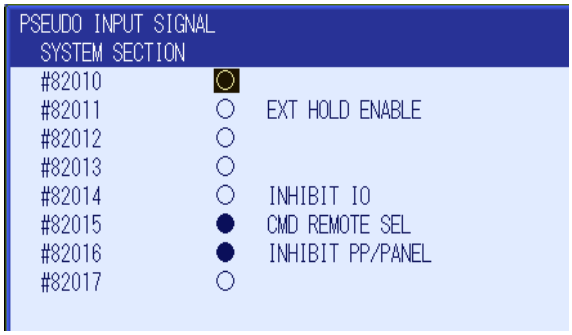
- The "High-speed Ethernet Server Function" option of a real controller is required.
- This function is not available by NX100.
- For details on how to setup the network, refer to the following manuals.
  "DX200 Options: Instructions for High-speed Ethernet Server Function"
  "DX100 Options: Instructions for High-speed Ethernet Server Function"
  "FS100 Options: Instructions for High-speed Ethernet Server Function"

9.1 Automatic Construction

A system configuration of a real controller is reconstructed in VRC.

NOTE

In Order to transmit with the host control function, the command remote must be set to valid. Using the programming pendant, under [IN/OUT] a [PSEUDO INPUT] menu set the [CMD REMOTE SEL] to enable. And, the mode of the programming pendant needs to be "REMOTE".



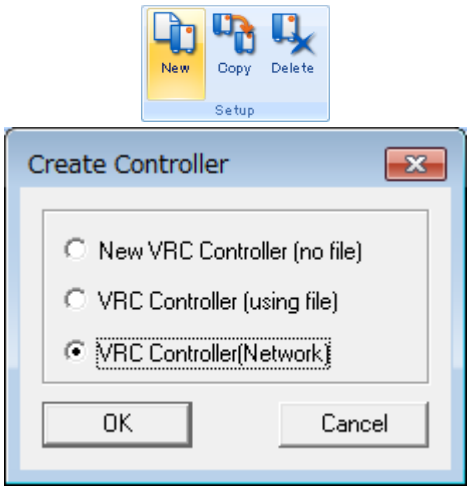
9.1.1 Create a New VRC Controller (Network)

When PC is connected to a real controller by Ethernet, a system configuration of a real controller is reconstructed in VRC.

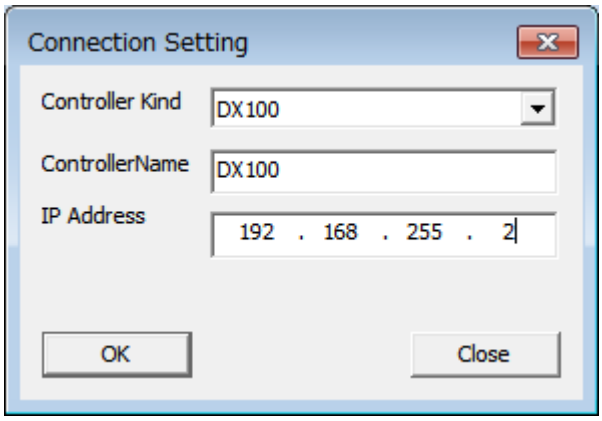
Procedure

1. On the [Controller] tab, in the [Setup] group, click the [New] button. To display the "Create

Controller" dialog. Select "New VRC Controller (Network)" and press the [OK] button.

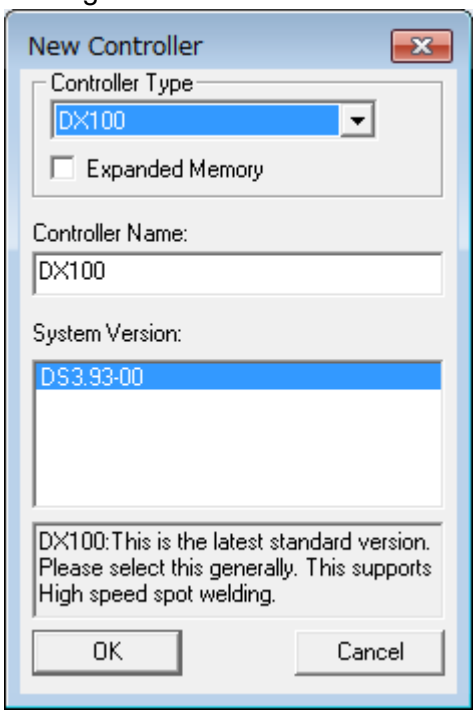


2. The "Connection Setting" dialog box appears. Select the controller kind and input the IP address of a real controller connected with PC. If desired you may change the default name for the controller.
Click the [OK] button, the files needed to construction are downloaded from a real controller.



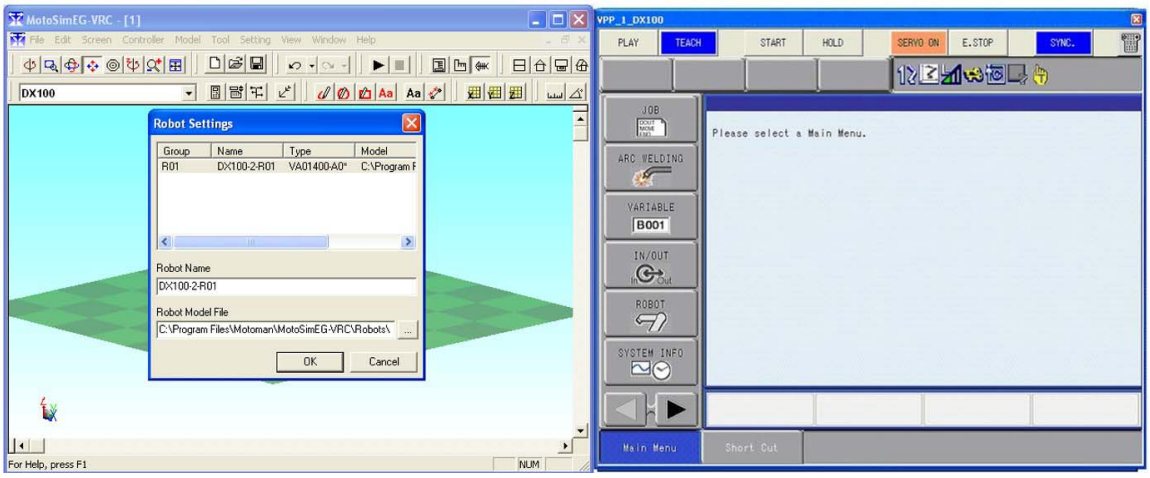
NOTE In Order to transmit with the host control function, the command remote must be set to valid. Using the programming pendant, under [IN/OUT] a [PSEUDO INPUT] menu set the [CMD REMOTE SEL] to enable. And, the mode of the programming pendant needs to be "REMOTE".

3. The "New Controller" dialog box appears. Select the system version from the list and click the "OK" button. Then the configuration will be executed automatically.

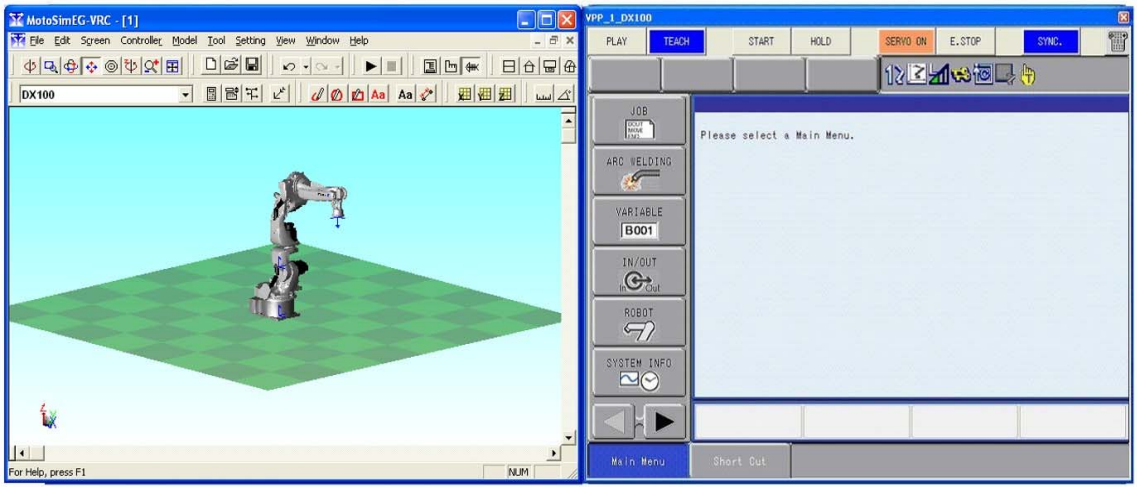


NOTE When there are no system versions corresponded with that of a real controller in a list, please choose the close system version.

4. The Virtual Pendant will close and reboot in normal mode. (This may take a few moments.) The “Robot Setting” dialog will display. A default robot name and model file should be pre-entered. If required, enter a name for the robot and select a robot model file corresponding to the robot type. (In the example below, the robot model is “VA01400-A00” the corresponding model is “VA01400-A00.mdl”.) Robot models are found in the “Robot” folder under MotoSimEG-VRC install folder. Click the [OK] button.



5. The robot will display with the selected model file.



NOTE When initialized the robot controller, MotoSim EG-VRC set the absolute data automatically. So absolute setting is not needed in MotoSim EG-VRC.
Refer to " 7.1.4 Initializing the Controller (FS100) " for details.

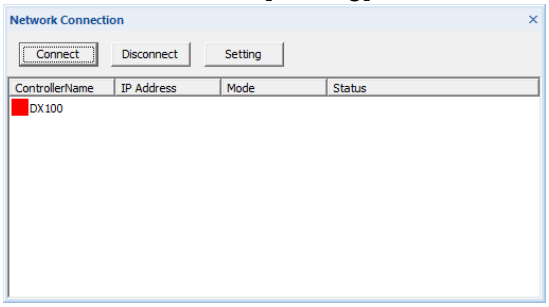
9.2 Network Function

To connect PC to a real controller by Ethernet, execute the setting with this function.

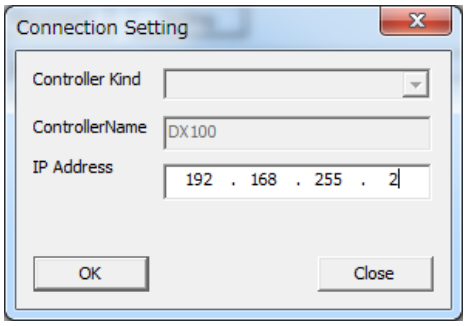
Procedure

1. On the [Online] tab, in the [Connect] group, click the [Network] button.

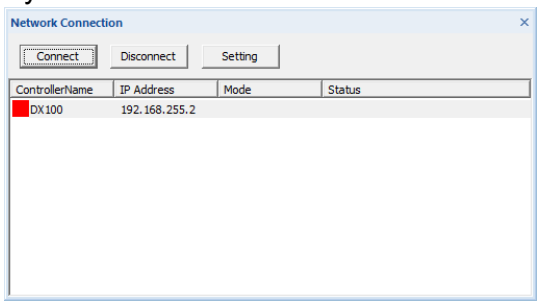
2. Select the controller from the list, click the [Setting] button.



3. The "Connection Setting" dialog box appears. Input the IP address and click the [OK] button.



4. The IP address is displayed on the list.



9.3 Monitor Function

The condition of a real controller is monitored. The mode, status, positions of the robots of the controller are displayed. During monitoring, the dialog beside [Simple PP], [Position Panel], [View Manager] and [Light Manager] cannot be displayed.

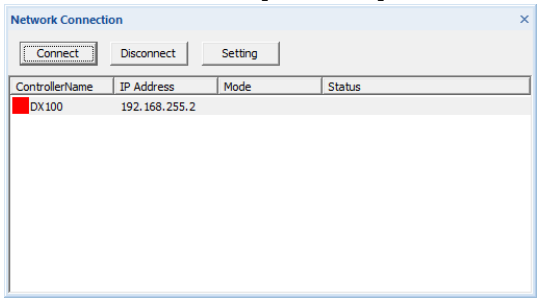
9.3.1 Connect

Connects PC to a real controller.

Procedure

1. On the [Online] tab, in the [Connect] group, click the [Network] button.

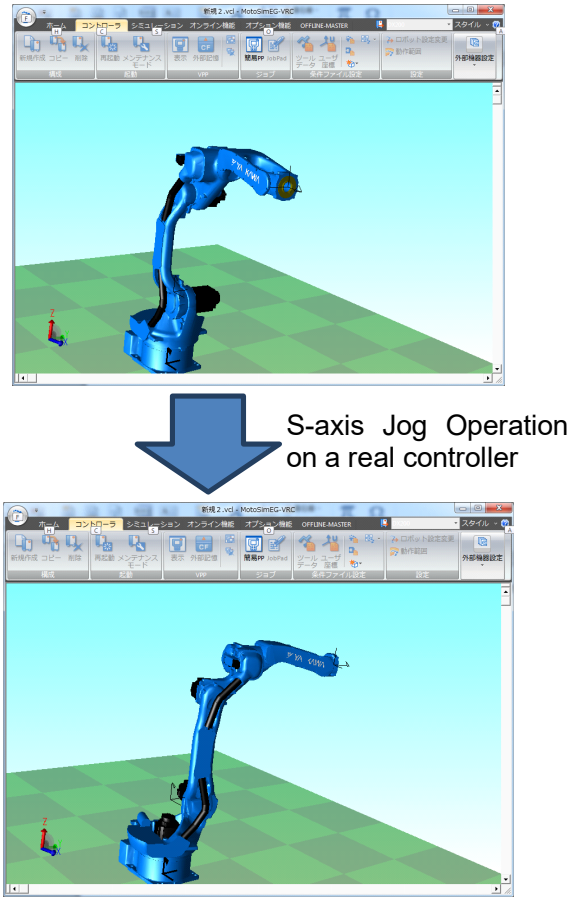
2. Select the controller from the list, click the [Connect] button.



3. MotoSim EG-VRC starts to connect to IP address. When the icon turns to green, connection is completed.

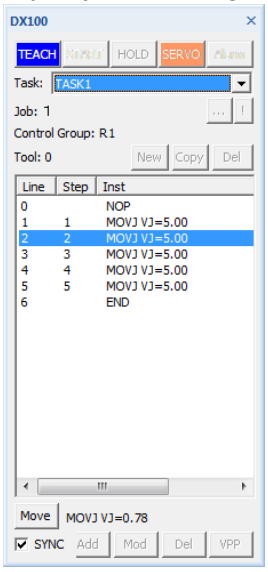
Item	Description
ControllerName	The controller name of VRC is displayed.
IP Address	The IP address of a real controller is displayed.
Mode	The mode of a real controller is displayed. ([TEACH] or [PLAY])
Status	The status of a real controller are displayed. (Auto operation, Alarm occurred, etc.)

4. When jog operation or playback is executed on a real controller, the robot position on the MotoSim EG-VRC is updated.



During the playback on a real controller, the current line is displayed on a [Simple PP] dia-

log. When changed task, the displayed job is changed.



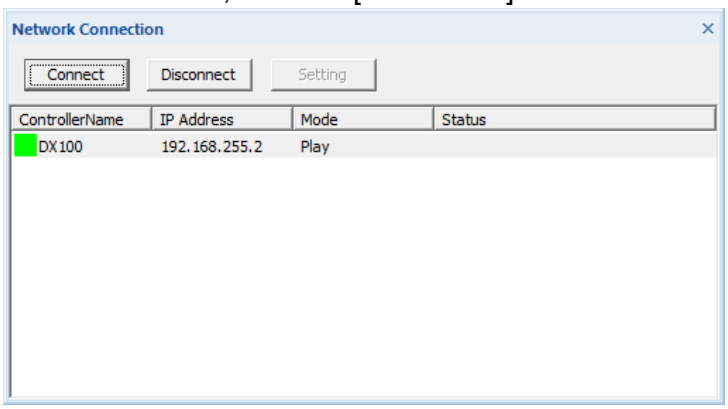
9.3.2 Disconnect

Disconnects PC to a real controller.

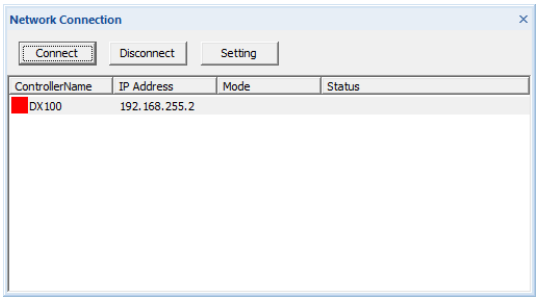
Procedure

1. On the [Online] tab, in the [Connect] group, click the [Network] button.

2. Select the controller from the list, click the [Disconnect] button.



3. MotoSim EG-VRC starts to disconnect to IP address. When the icon turns to red, disconnection is completed.



9.4 File Manager

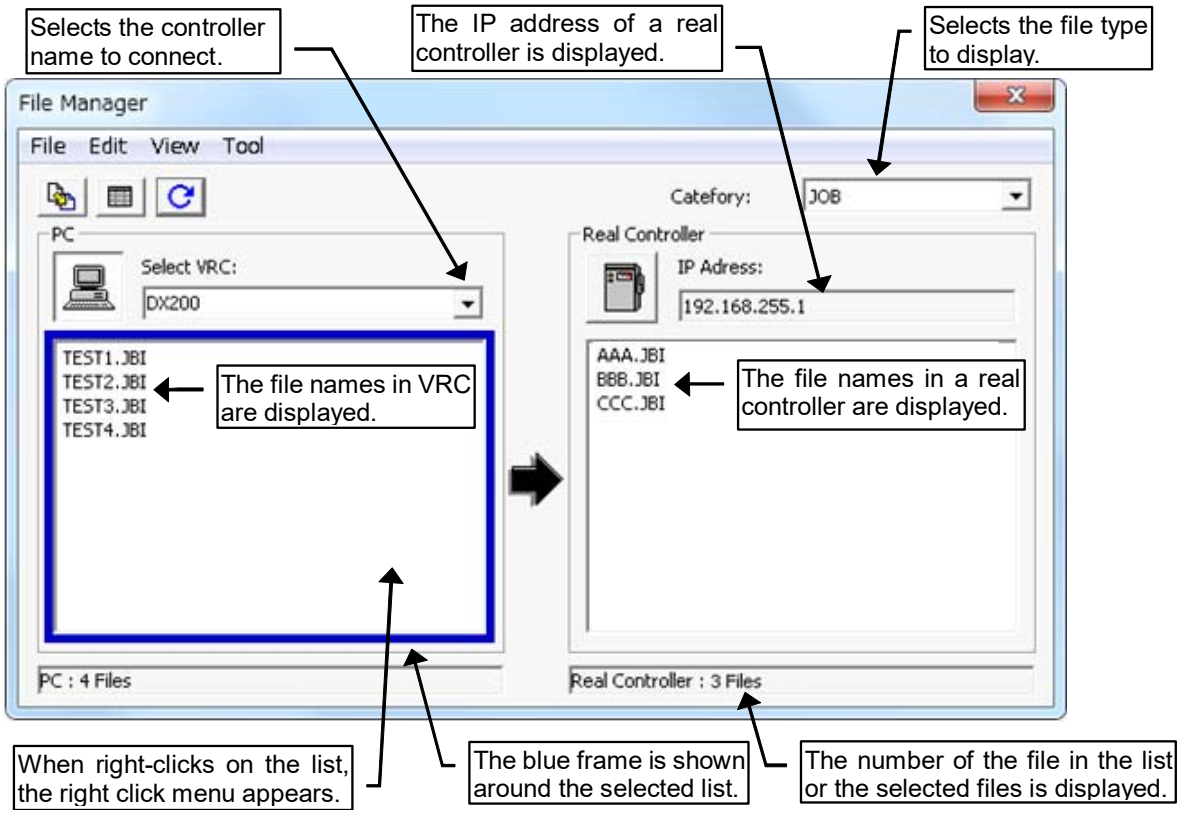
The jobs and condition files of VRC and a real controller are displayed on the File Manager.
The following operation becomes possible on File Manager.

- Opens the file by a text editor.
- Compares the files of VRC and a real controller
- Receive the files from a real controller and load to the VRC
- Save the files of VRC and send them to a real controller

NOTE In Order to transmit with the host control function, the command remote must be set to valid. Using the programming pendant, under [IN/OUT] a [PSEUDO INPUT] menu set the [CMD REMOTE SEL] to enable. And, the mode of the programming pendant needs to be "REMOTE".

9.4.1 File Manager Dialog

On the [Online] tab, in the [Connect] group, click the [File Manager] button. The [File Manager] dialog appears.



■ Menu

File	
Copy	The file selected by a list is copied to the other. When multiple file name are selected, batch-copying is executed. For details, refer to the section " 9.4.6 File Copy ".
Close	The file manager dialog is closed.
Edit	
File open	The selected file is opened by an external application. For details, refer to the section " 9.4.4 File Open ".
Select all	The all files on the list are selected.
View	
Refresh	The list of VRC and a real controller are refreshed. When a new job is created, a job is copied or a job is deleted on a real controller after the file manager dialog is opened, click this menu to refresh the list.
Tool	
File comparison	The selected file is opened by an external application to file comparison. For details, refer to the section " 9.4.5 File Compare "".
Option	The option dialog is displayed. For details, refer to the section " 9.4.2 Option ".

■ Tool Button

	The file selected by a list is copied to the other. Menu: {File} - {Copy}
	The all files on the list are selected. Menu: {Edit} - {Select all}
	The list of VRC and a real controller are refreshed. Menu: {View} - {Refresh}

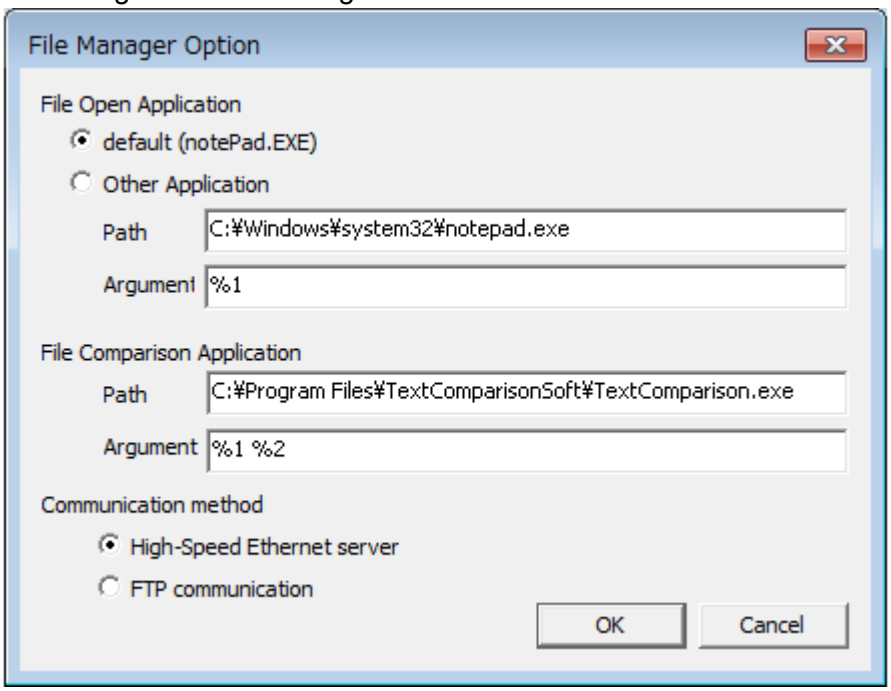
■ Right-button Click Menu

Copy	The file selected by a list is copied to the other. Menu: {File} - {Copy}
File open	The selected file is opened by an external application. Menu: {Edit} - {File open}
File comparison	The selected file is opened by an external application to file comparison. Menu: {Tool} - {File comparison}
Select all	The all files on the list are selected. Menu: {Edit} - {Select all}

Refresh	The list of VRC and a real controller are refreshed. Menu: {View} - {Refresh}

9.4.2 Option

Sets the option setting of the file manager.



File Manager Option

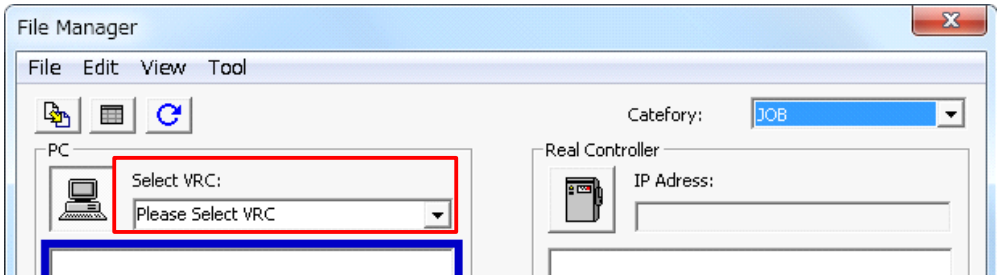
File Open Application	Sets the external application to open the file. NotoPad.exe is default setting. To set other application, set the full path of the external application and arguments of starting. A full path of a displayed file is substituted for "%1".
File Comparison Application	Sets the external application to compare the files. If the setting is not set, file comparison cannot be executed. Sets the full path of the external application and arguments of starting. A full path of a compared file of VRC is substituted for "%1". A full path of a compared file of a real controller is substituted for "%2".
Communication method	Sets the method of communication to a real controller. High-Speed Ethernet server is default. The "FTP Function" option of a real controller is required. For Details, please refer to the following manulals. "Instructions for FTP Function".

9.4.3 Connect to a Real Controller

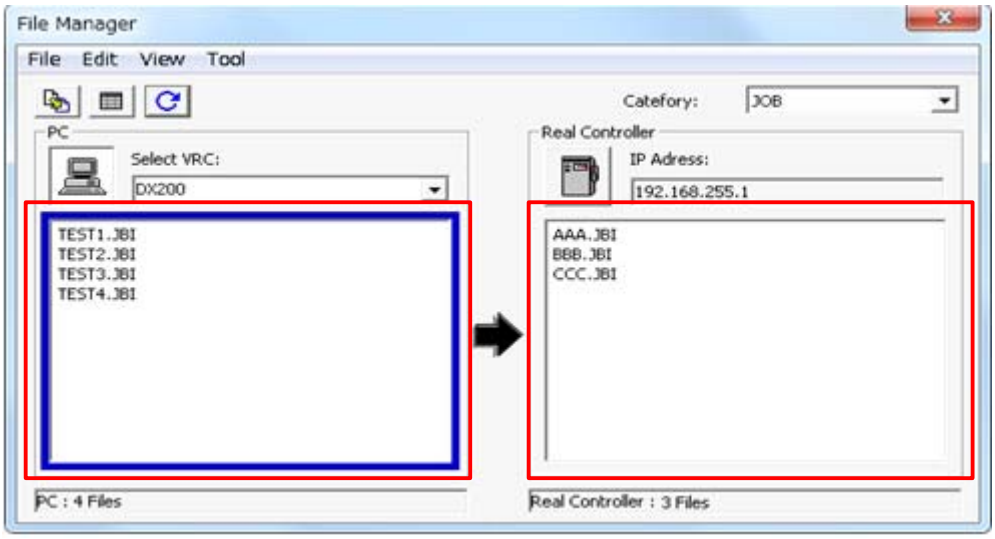
Connects to a real controller and displays the file list.

Procedure

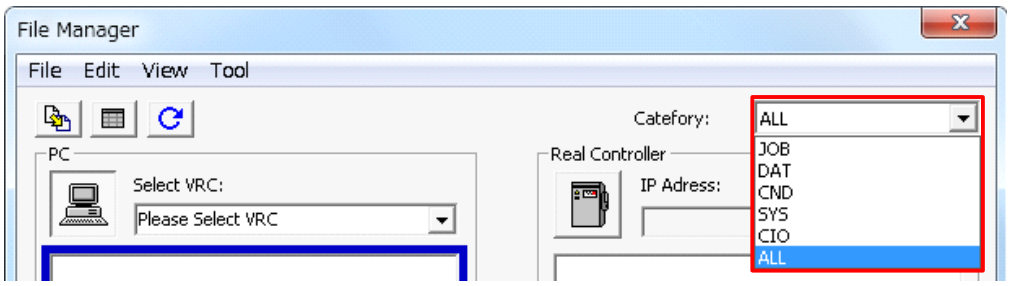
1. Network setting is completed on the network connection dialog beforehand.
   For details, refer to the section " 9.2 Network Function ".
2. On the [Online] tab, in the [Connect] group, click the [File Manager] button, the [File Manager] dialog appears. Selects the target controller from the [Select VRC].



3. The file list is displayed.



4. The file category can be changed.



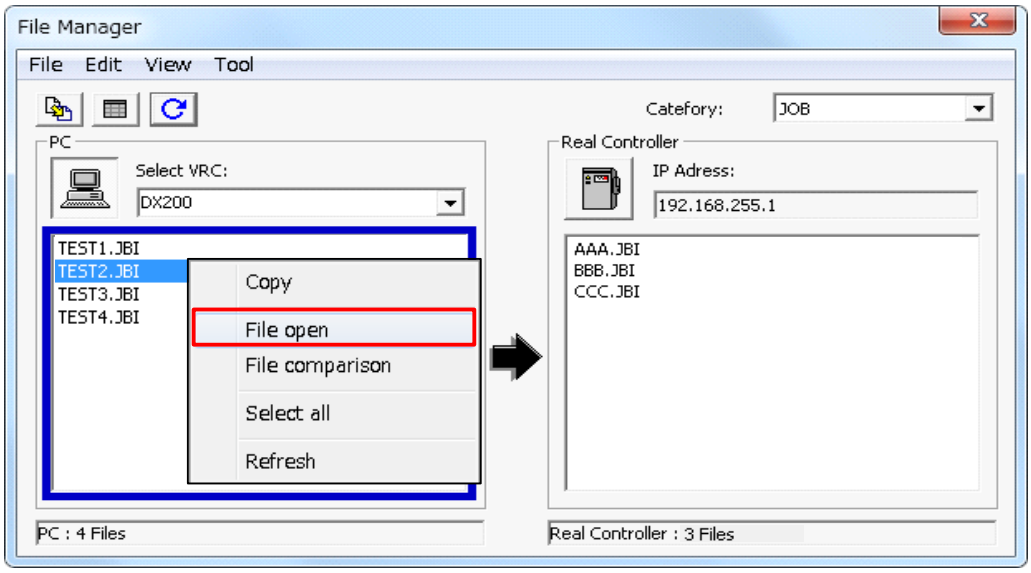
9.4.4 File Open

The selected file is opened by an external application.

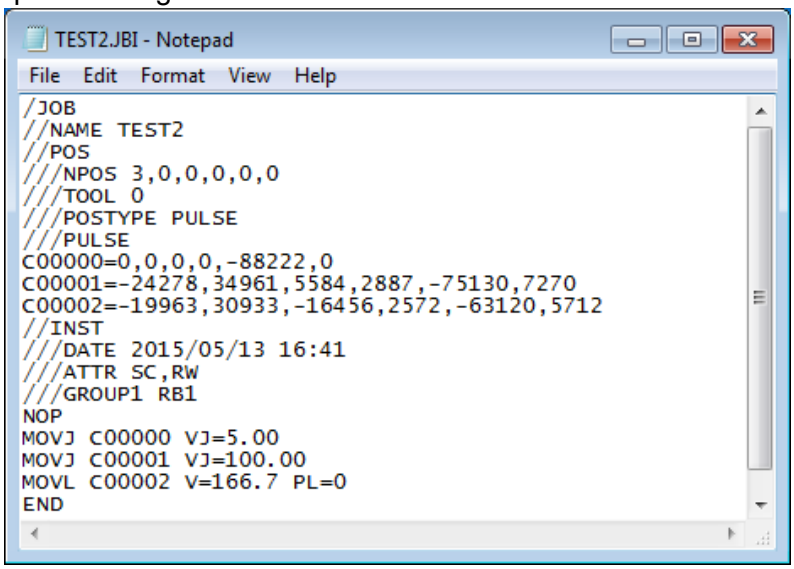
NOTE The selected file is downloaded to the temporary folder and opened. So, when the opened file is edited, that file is not loaded to VRC or a real controller.

Procedure

1. Select a file from the file list of VRC or a real controller, click the right-button and select {File open} menu of the right-button click menu, or select the {Edit} - {File open} menu.



2. The selected file is opened by an external application. The executed application can be changed by option setting.



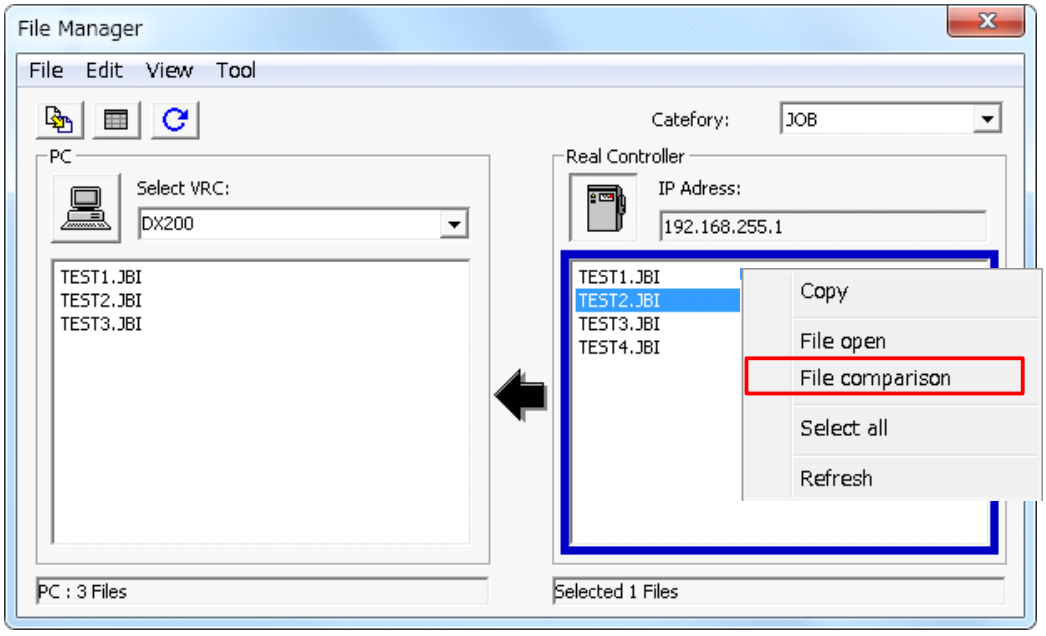
9.4.5 File Compare

The selected file is opened by an external application to file comparison.

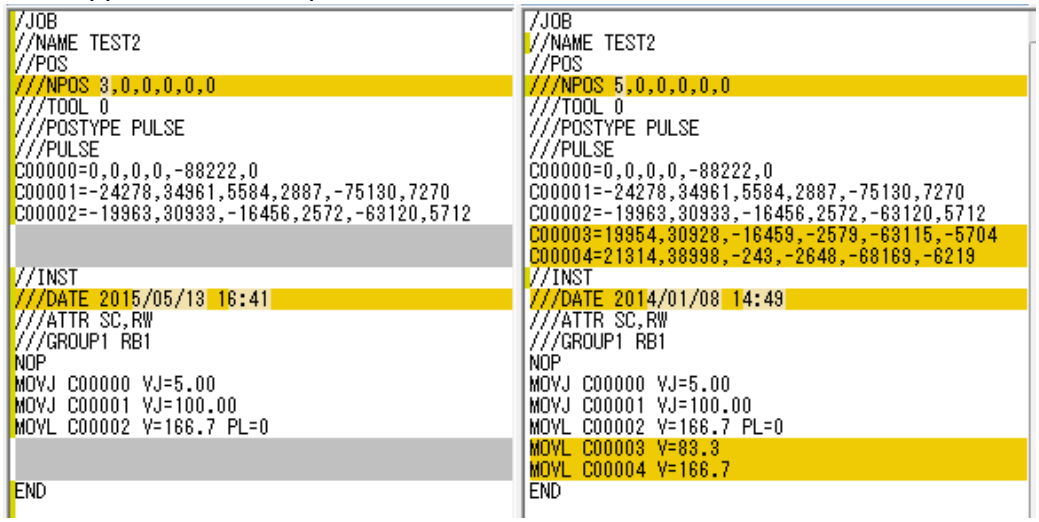
NOTE To use this function, sets the setting of the external application to compare. For details, refer to the section " 9.4.2 Option ".

Procedure

1. Selects the file from the file list of VRC or a real controller, click the right-button and select {File comparison} menu of the right-button click menu, or select the {Tool} - {File open} menu.



2. The selected file of VRC and a real controller are saved, and these files are opened by an external application to compare.



9.4.6 File Copy

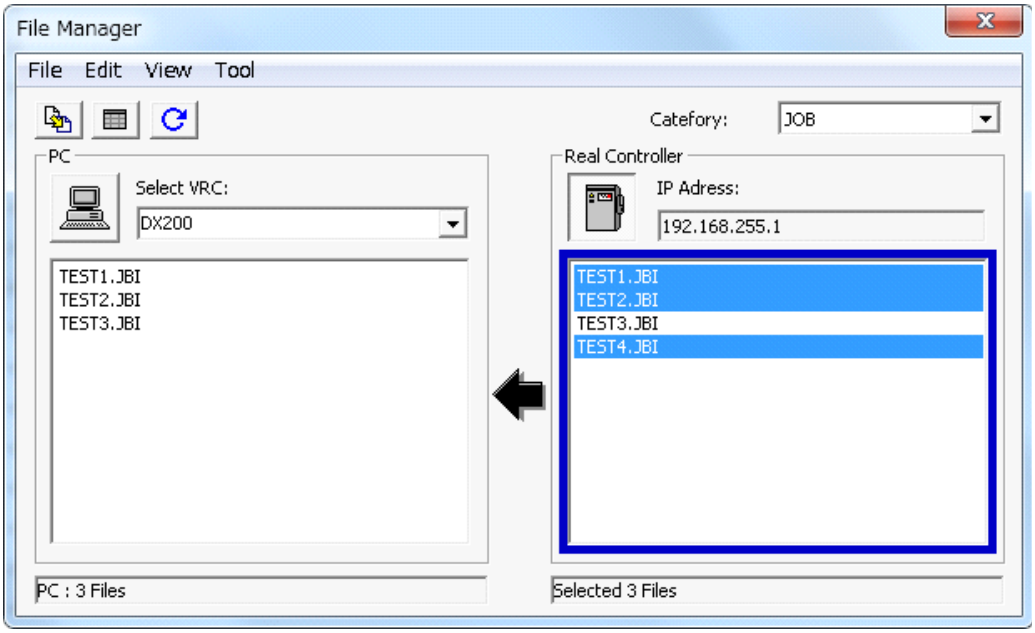
The file selected by a list is copied to the other. When multiple file name are selected, batch-copying is executed.

NOTE

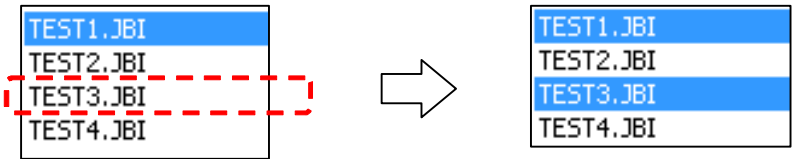
- When the file is copied, the file is overwritten. The file cannot be restored.
- Transferable files to real controllers are following 8 types.
  - JBI files
  - TOOL.CND
  - VAR.DAT
  - UFRAME.CND
  - VARNAME.DAT
  - IONAME.DAT
  - IOMNAME.DAT
  - EXIONAME.DAT

Procedure

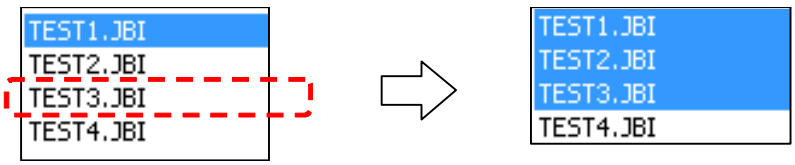
1. Selects the file from the file list of VRC or a real controller.



- When click the file name with [Ctrl] key of the keyboard, multiple files are selected.



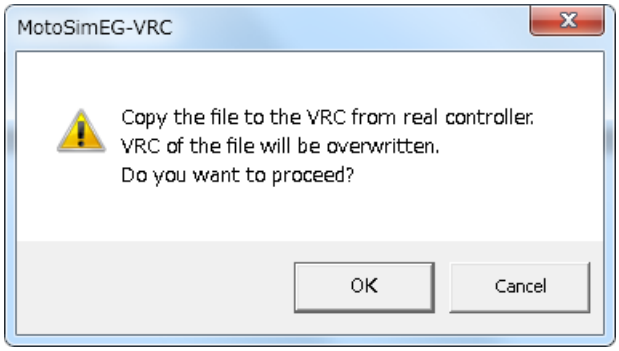
- When click the file name with [Shift] key of the keyboard, multiple files from first cursor to second cursor are selected.



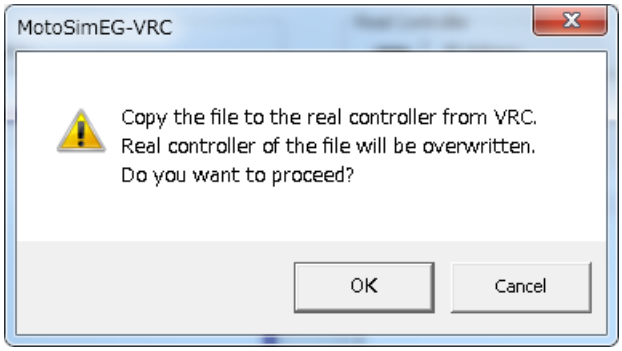
• click the right-button and select {Select all} menu of the right-button click menu, or select the {Edit} - {Select all} menu, or click the button, all files of the list are selected.

2. Click the right-button and select {Copy} menu of the right-button click menu, or select the {File} - {Copy} menu, or click the button.

(1) When the file is copied from a real controller to VRC, the following dialog is displayed.

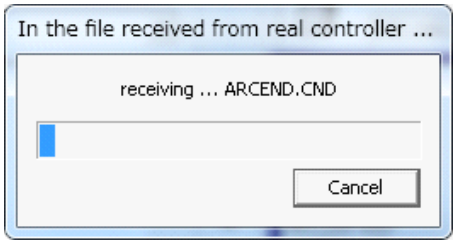


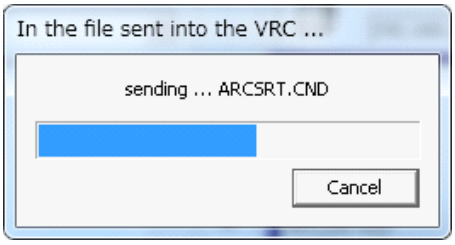
(2) When the file is copied from VRC to a real controller, the following dialog is displayed.



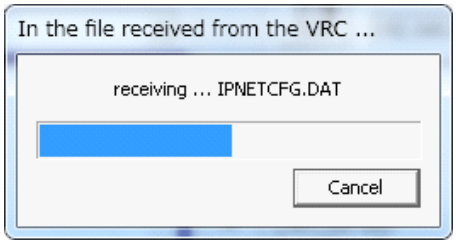
3. Click the [OK] button, file copy is executed. The progress dialog appears. When click the [Cancel] button, file copy is canceled.

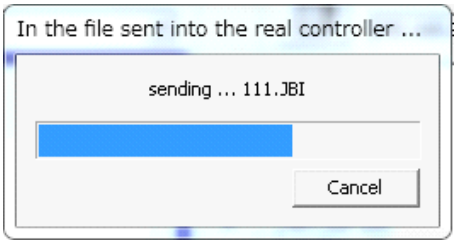
(1) Copy the file from a real controller to VRC





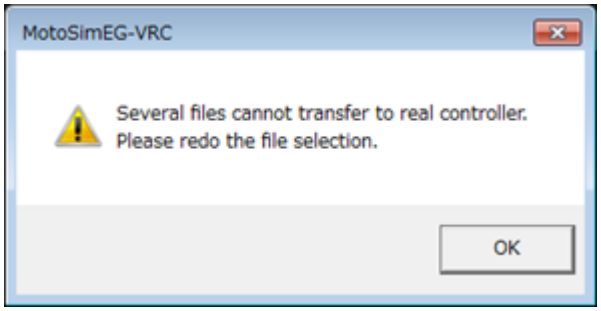
(2) Copy the file from VRC to a real controller



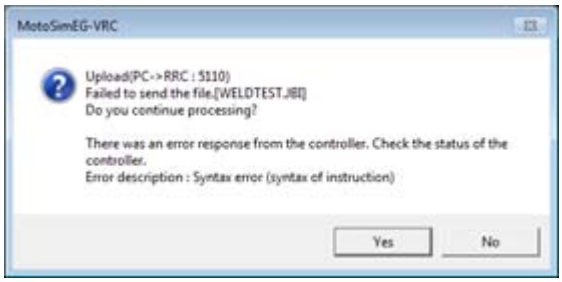


In consideration of safety, copying to real controllers is possible only permitted files.MotoSim EG-VRC abort copying process if file list includes no permitted

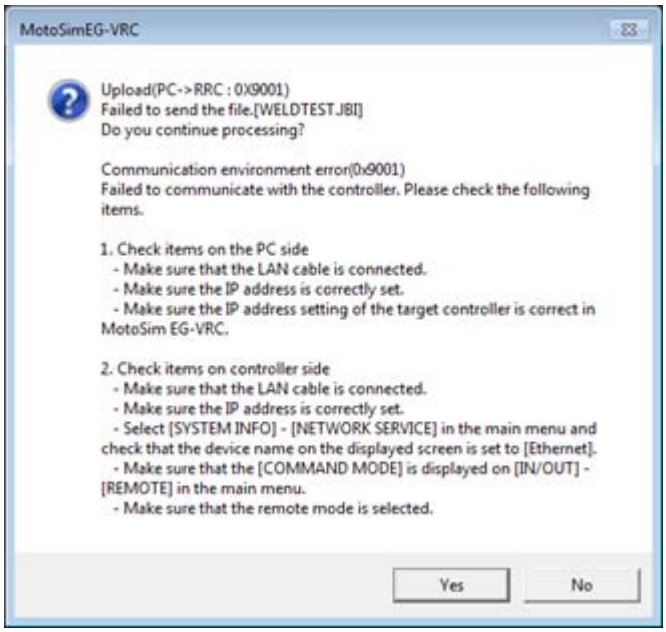
files.Please redo the file selection, and try again copying process.



4. When the selected file cannot be saved or loaded, the following error dialog is displayed.
When click the [Yes] button, the error file is ignored and the copy process is continued.
When click the [No] button, the copy process is canceled.



5. When file copy can not be performed due to communication environment problem, the following error dialog is displayed.
When click the [Yes] button, the error file is ignored and the copy process is continued.
When click the [No] button, the copy process is canceled.



10 Debug Function

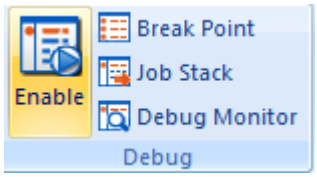
Sets a break point to the job, it's possible to suspend job execution by the optional line and confirm the state of variable or IO.

NOTE

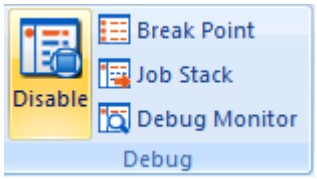
- When use the debug function, the cycle time and trajectory is different from those in usual mode.
- Debug function is available only with VRC controller.
- Debug function is not available with external device.

10.1 Change to Debug Mode

To change to debug mode, on the [Simulation] tab, in the [Debug] group, click the [Enable] button.

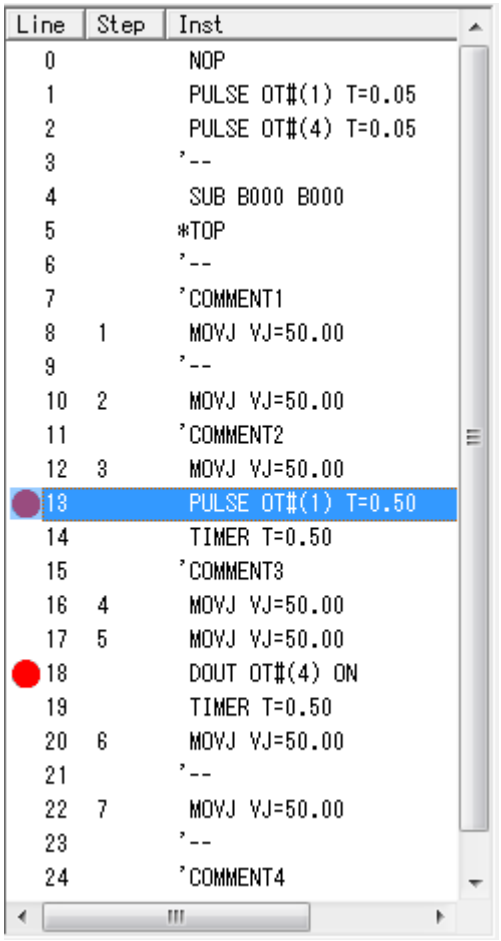


The button is changed to "Disable".
To change to usual mode, on the [Simulation] tab, in the [Debug] group, click the [Disable] button.



10.2 Set/Release the break point

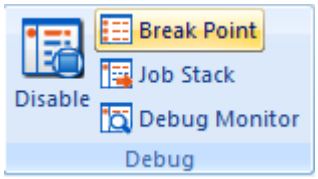
To set/release the break point, the simple pendant is used.

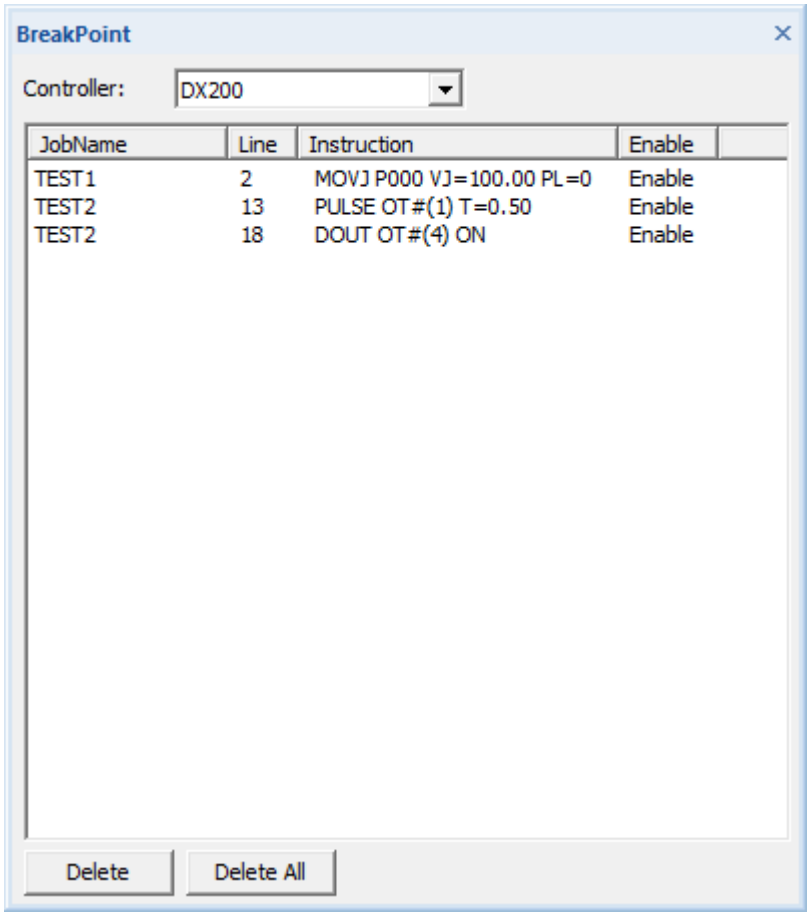


To set/release the break point, select the line to set the break point and press the [F9] key or "Setting BreakPoint" of the right-button menu.

10.3 BreakPoint List

On the [Simulation] tab, in the [Debug] group, click the [Enable] button, break point list dialog is displayed.

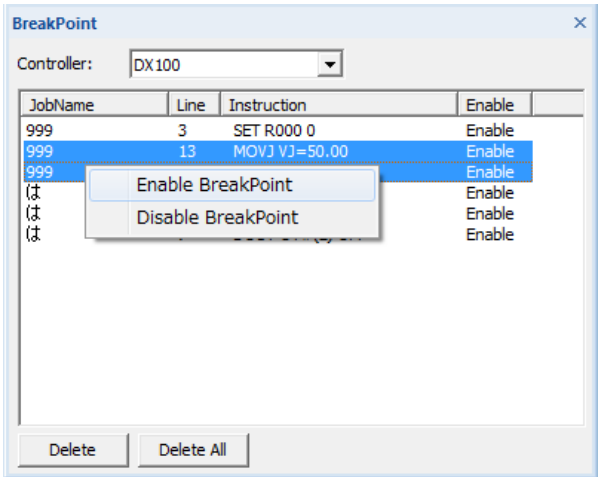




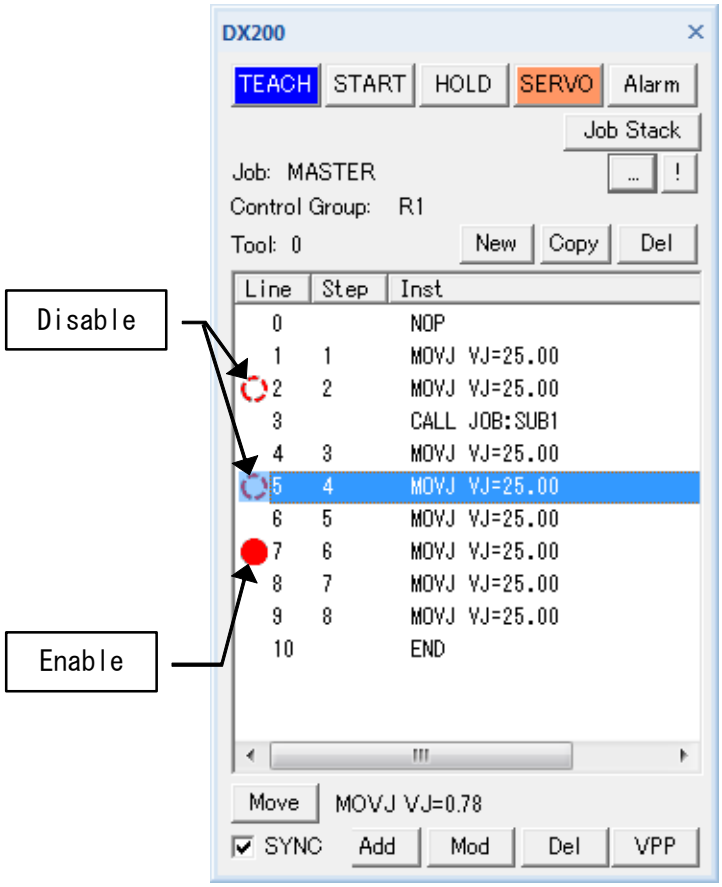
Controller	Selects the controller. The break point of the selected controller is displayed in the list.
JobName	Job name is displayed.
Line	Line number set the break point is displayed.
Instruction	Instruction of the line number is displayed.
Enable	The condition of break point is displayed. (Enable or Disable)
[Delete] button	Deletes the selected breakpoint.

[Delete All] button	Deletes all break points of the selected controller.

When right-button click on the list, changes the condition of break point in the right-button menu.

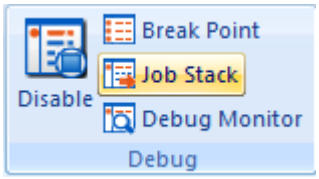


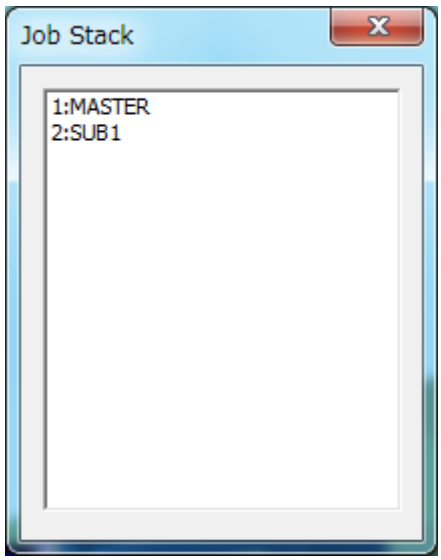
The condition of break point can be checked by the icon in the simple pendant.



10.4 Job Stack

On the [Simulation] tab, in the [Debug] group, click the [Job Stack] button, break point list dialog is displayed.

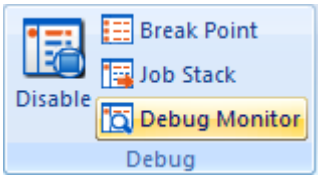


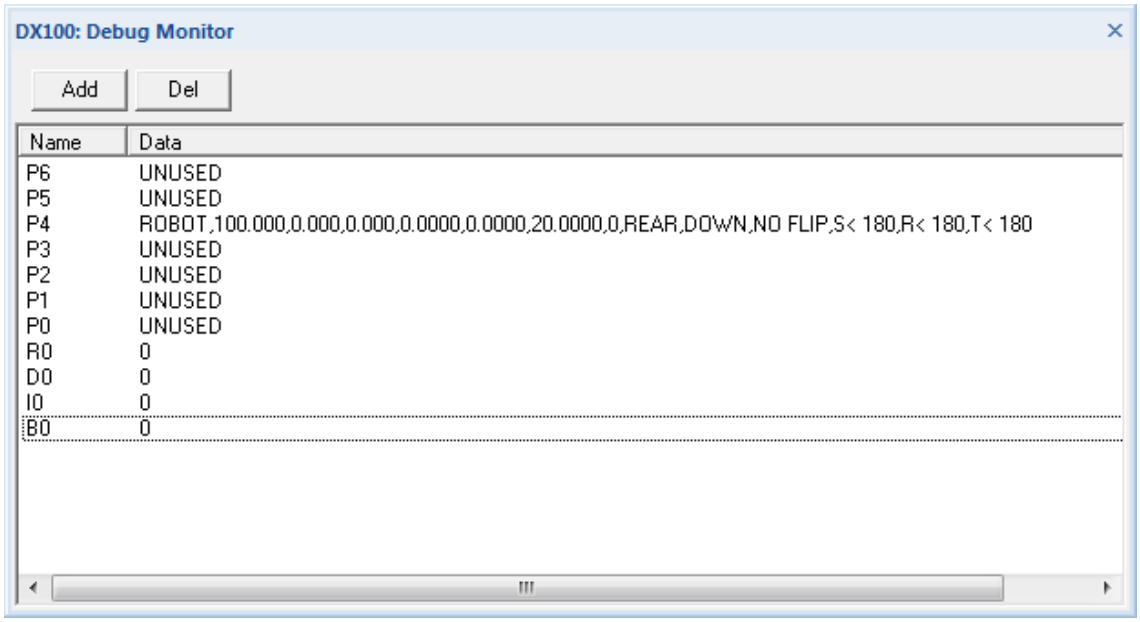


Only when the playback is stopped by break point, the caller job is displayed in the job stack dialog.

10.5 Debug Monitor

On the [Simulation] tab, in the [Debug] group, click the [Debug Monitor] button, debug monitor dialog is displayed.





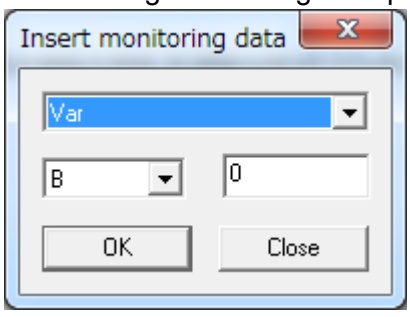
The status of variables or IO can be checked in the debug monitor dialog.
To add the monitored data, click the [Add] button.

To change the monitored data, double-click or press the [F2] key.

[Add] button	Displays the insert monitoring data dialog.
[Del] button	Deletes the selected line.

10.5.1 Insert Monitoring Data

Click the [Add] button, the insert monitoring data dialog is displayed. Set the data to monitor.



Following variable and IO can be monitored.

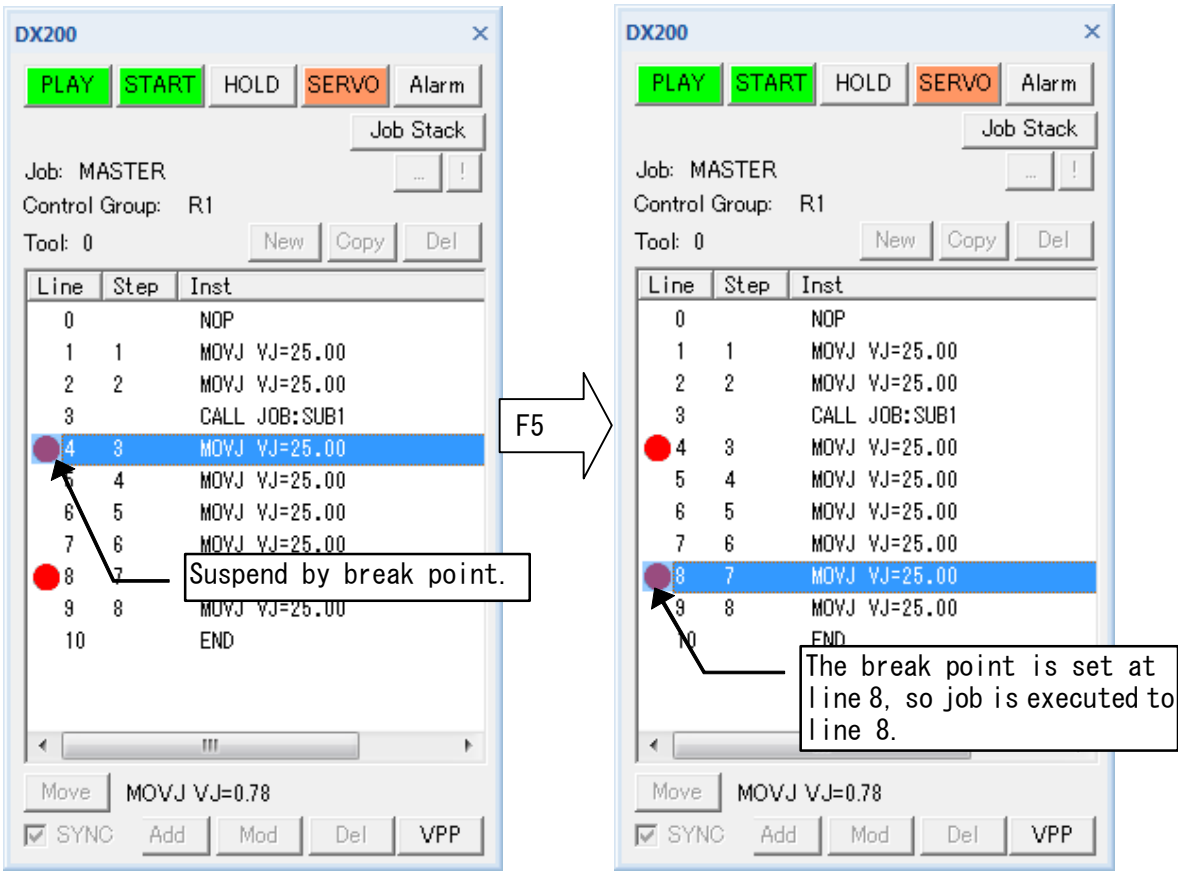
Variable:	B, I, D, R, P, BP, EX
IO:	IN, OT

10.6 Operation in Break

Following operation on the simple pendant is available in break.

10.6.1 Execution

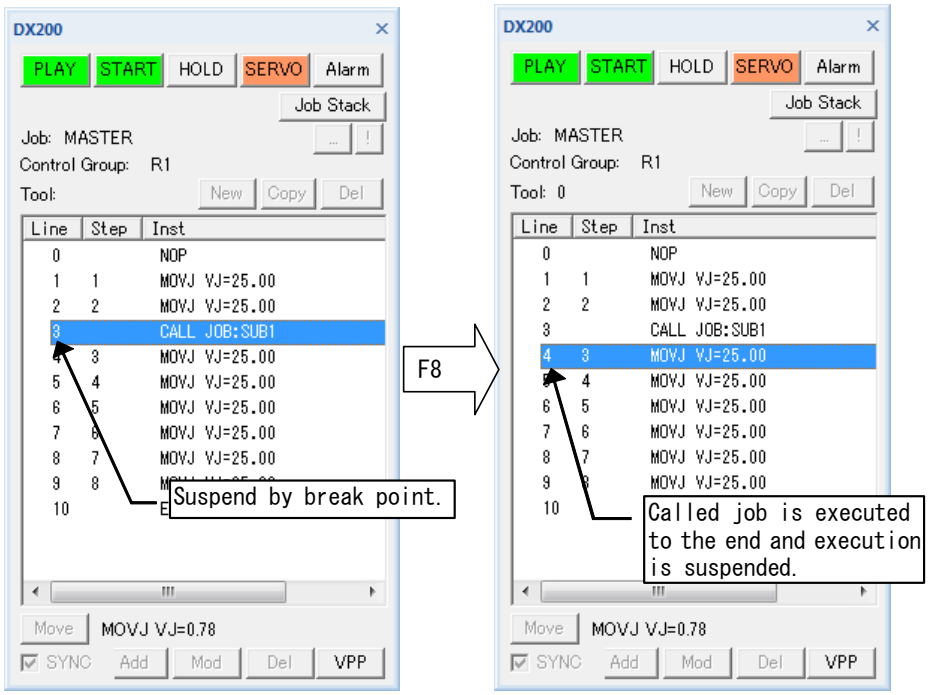
Press the [F5] key, the job is executed to next break point. If next break point is not set, the job is executed to the end.



And, when the job is executed by PSTART, the suspended task is restarted.
When the multi task is suspended, all suspended task are restarted.

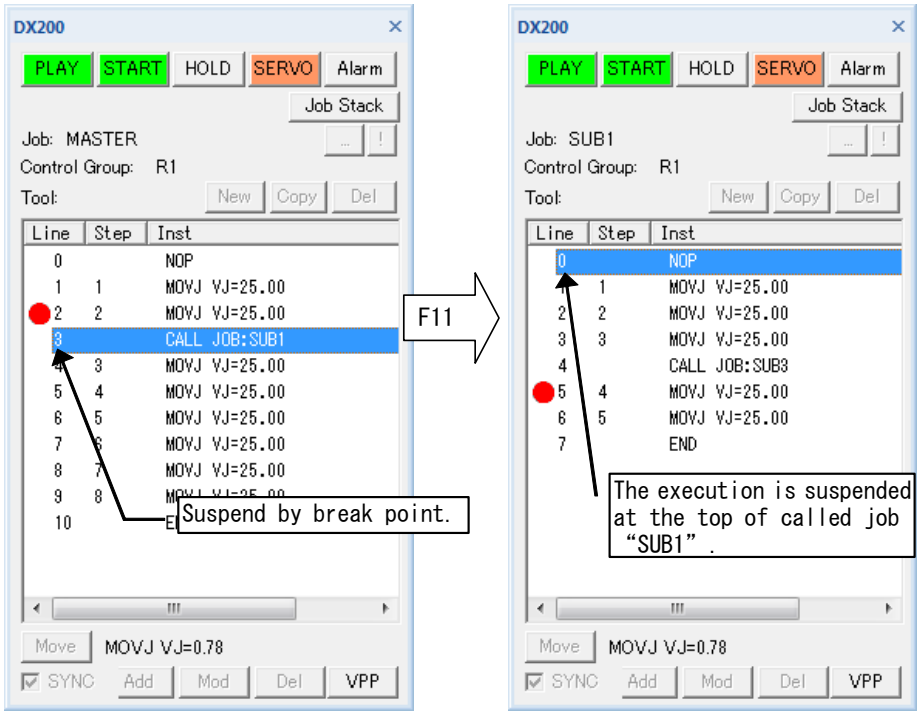
10.6.2 Step Over

Press the [F8] key, the job is executed to next line. When the stopped line is "CALL JOB", the called job is executed to the end. If the called job has break point, the execution is suspended by break point.



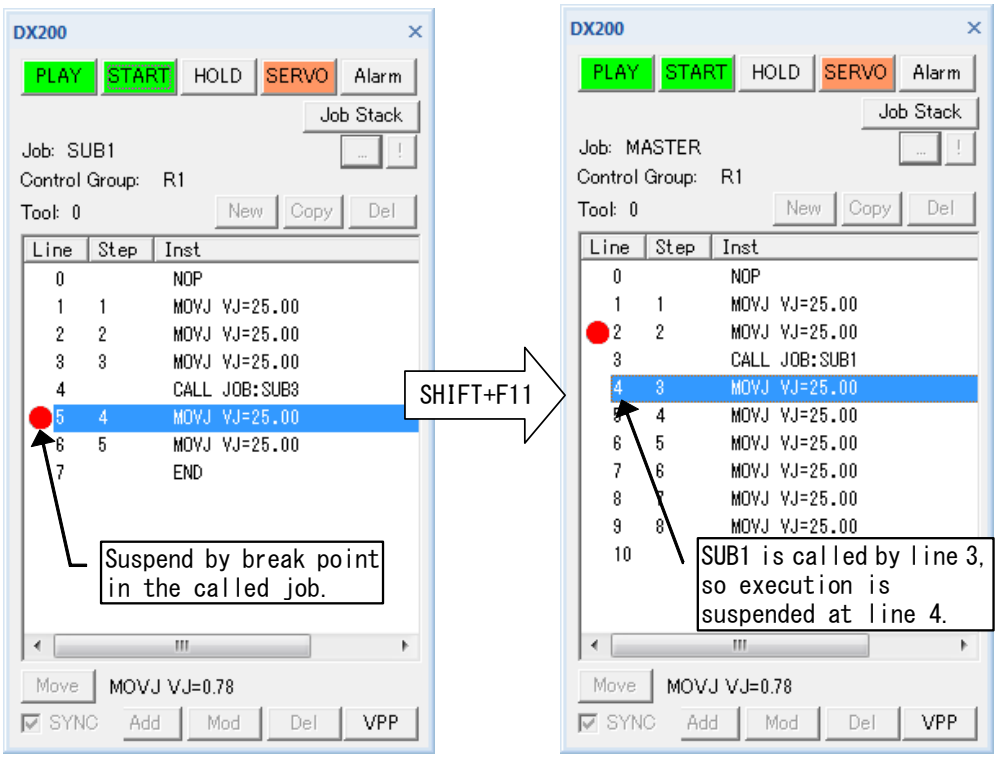
10.6.3 Step In

Press the [F11] key, the playback is executed to the top of the called job.



10.6.4 Step Out

Press the [SHIFT] + [F11] key, the playback is executed to the end of the called job.
If the called job has break point, the execution is suspended by break point.



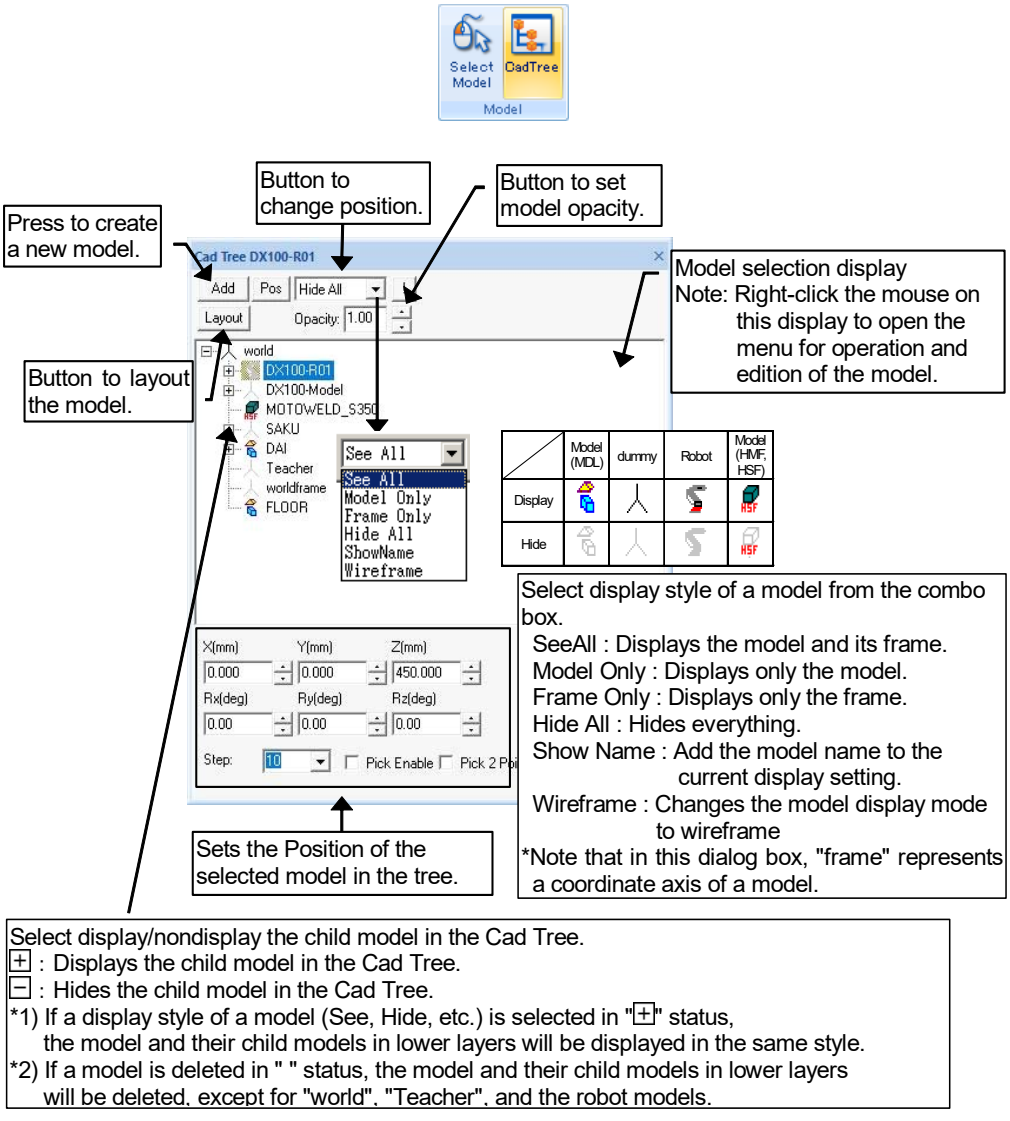
11 Model Editings

This chapter explains the operations for creating and editing the workpiece and tool models using the CAD functions.
A model is generally created by combining basic figures, such as cubes and cylinders; in addition to the general method, MotoSim EG-VRC supports the model creation by reading HSF and HMF data.

11.1 Cad Tree

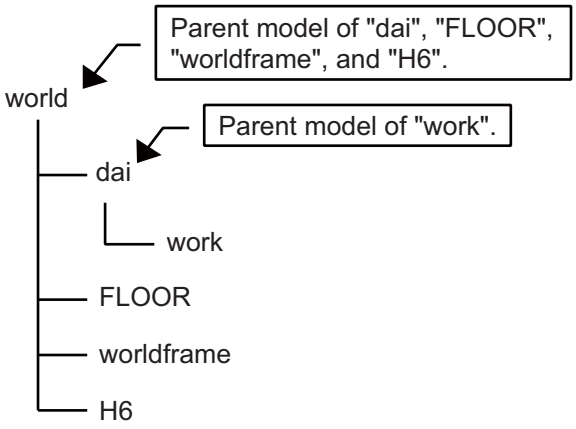
11.1.1 Outline of the Cad Tree

On the [Home] tab, in the [Model] group, click the [CadTree] button, the [Cad Tree] dialog appears.



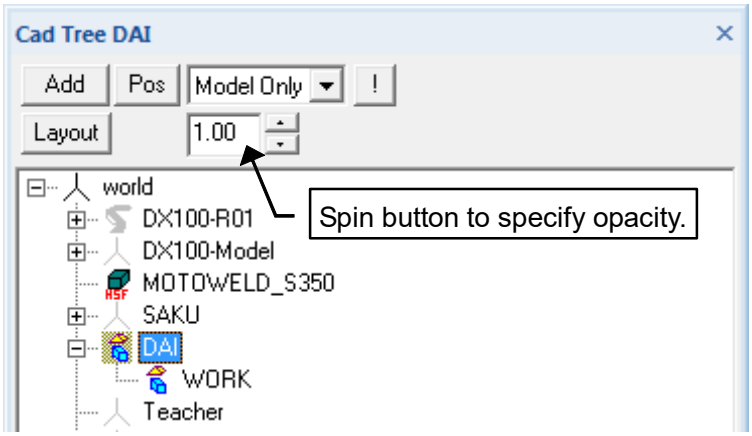
11.1.2 Tree Structure

The Cad Tree displays a column of models in a tree structure.
As shown in the following diagram, a model in the level immediately above the subject model is the parent model of the subject model.



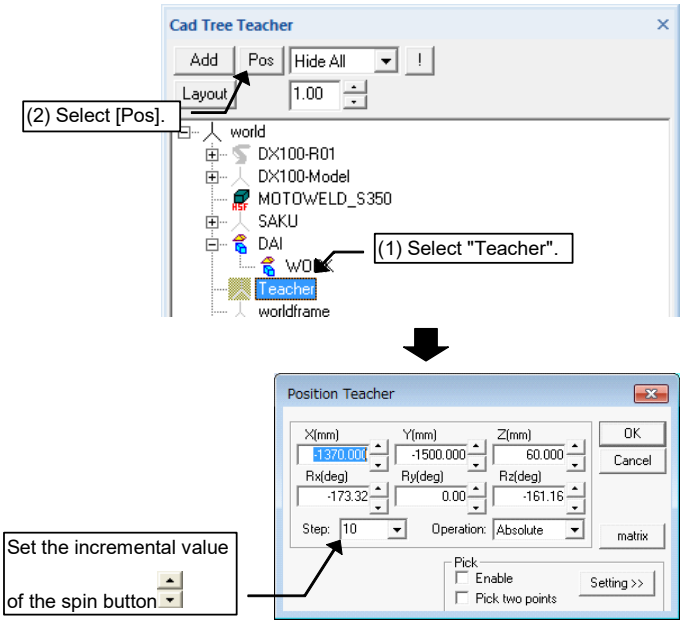
11.1.3 Opacity Settings

To set the model opacity, select the model in the Cad Tree and set the value using the spin button indicated in the following figure.
The maximum value of opacity is “1.00”. Decreasing the value below the maximum value reduces the opacity, the model becomes translucent enabling to see other models through it. If the value is set to “0”, the model becomes completely transparent and can no longer be seen.



11.1.4 Teacher

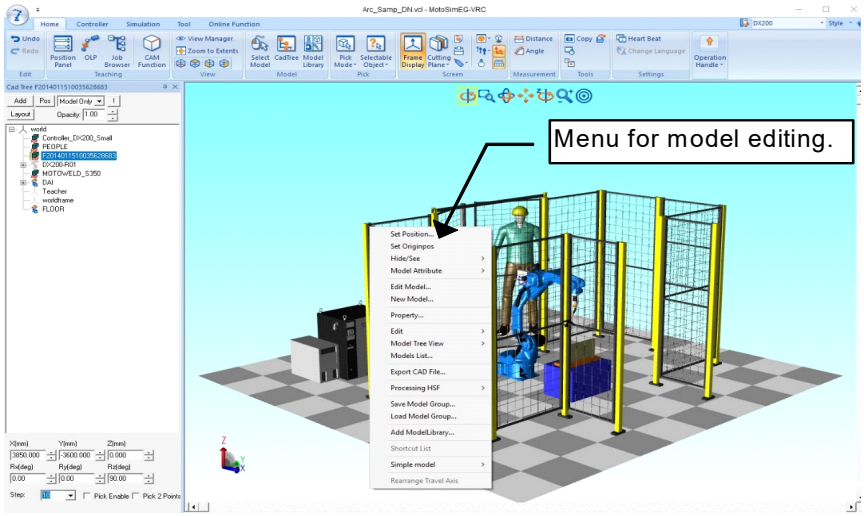
"Teacher" is a tool to create a target point (coordinate) at an arbitrary position, and is displayed as an AXIS6 frame on the screen. It simplifies the use of OLP-related function and the relocation of parts.
To enable the Teacher, point the cursor to "Teacher" in the Cad Tree, and click on [Pos] to display the “Position Teacher” dialog box. Specify the values in this dialog box. (For further detail on the "Position" dialog box, please refer to " 11.5 Positioning a Model ").



11.1.5 Mouse-Driven Model Editing

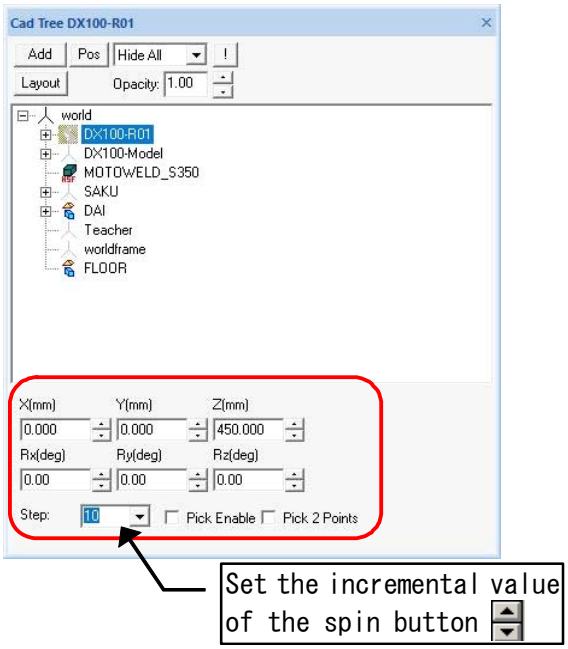
■ Right Mouse Button Operation

A pop-up menu for model editing operation appears by clicking the right mouse button at a location where a model is displayed.
However, note that the viewpoint operation menu appears when clicking the right mouse button where there is no model displayed or when the Cad Tree is not on the screen.



11.1.6 Position Input Area

Select the model in the tree, the position of model is displayed in the Position Input Area.
When input the value, it is set to the position of model.

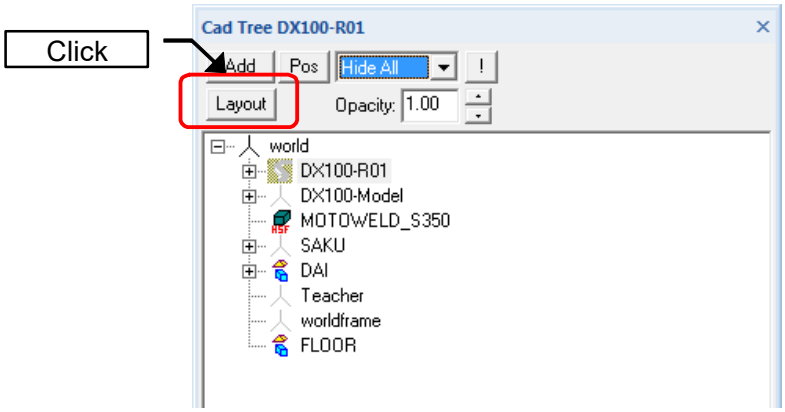


NOTE When the model whose position cannot be set is selected, the input area cannot be set the value.

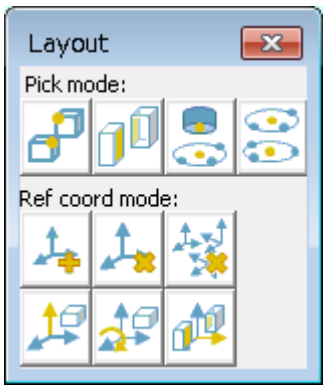
[Pick Enable] check box	Enables the mouse picking operation.
[Pick 2 Points] check box	The chosen model is parallel-shifted so that the 1st point of the model adjust with the 2nd picked position.

11.1.7 Layout function

The layout function is to arrange a model.
To use the layout function, click the [Layout] button of the [CadTree] dialog.



The layout dialog is displayed.



When each button of the layout panel is clicked, its function becomes effective. Its function is released by clicking again. But, the button  (Remove all reference coordinates) is executed only when clicking the button.

NOTE This function cannot be operated during the playback

Layout function is two modes as follows.

- Pick mode … The model is moved as fitting between the chosen points or faces.
- Ref coord mode … The model is moved or rotated depending on the reference coordinate.

Each mode has the function as follows.

- Pick mode

 Mate the two points	The model is moved so that the selected two points become same position.
 Mate the two faces	The model is moved so that the selected two faces become same position.
 Mate the point and the center of circle (passing through 3 points)	The model is moved so that the selected the point and the center of circle (passing through the selected three points) become same position.
 Mate the center of two circle (each circle passing through 3 points)	The model is moved so that the center of two circle (each circle passing through the selected three points) become same position.

NOTE
- The model to which the point or face selected first is the target model.
- To specify the center of the circle, select the three point on the circumference of circle.
- When clicking in an area the selected point depends on the current "Pick Mode" settings. Please refer to " 6.4 Pick Settings " for details.

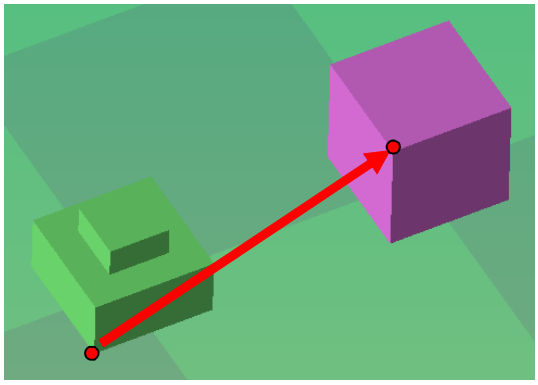
• Ref coord mode

 Create a reference coordinates	The reference coordinates is created.
 Remove the reference coordinates	The reference coordinates is removed.
 Remove all reference coordinates	All reference coordinates are removed.
 Move model in the selected axial direction	The model is moved to the selected axial direction of the reference coordinates.
 Rotate model about the selected axis	The model is rotated about the selected axis of the reference coordinates.
 Mate the two faces by selected axis	The model is rotated about the selected axis of the reference coordinates so that the selected two faces become same position.

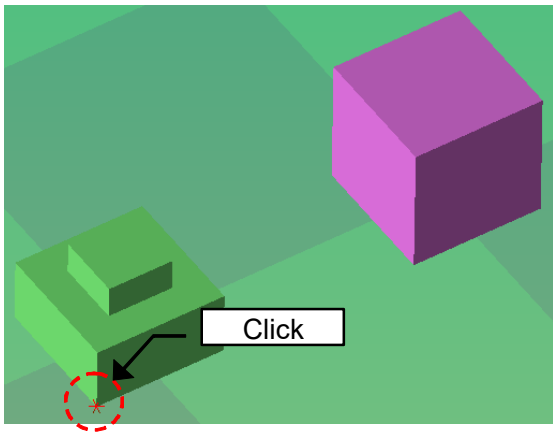
NOTE
- The reference coordinate is temporary and is not saved to the cell. When the cell is closed, all reference coordinates are removed.
- On the [Home] tab, in the [Screen] group, click the [Frame Display] button to show/hide the reference coordinates.

Procedure

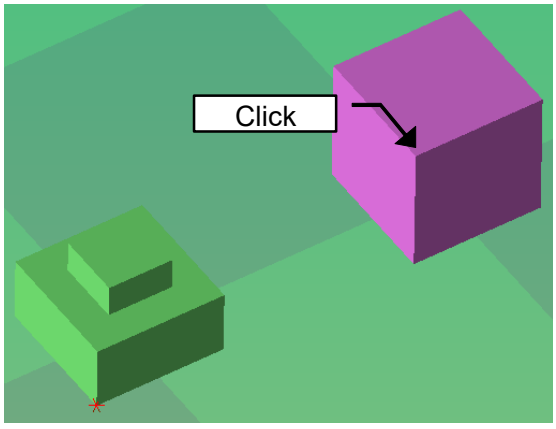
- Mate the two points
  The model is moved so that the selected two points become same position. For example, the two corner of two cuboid are matched as follows.



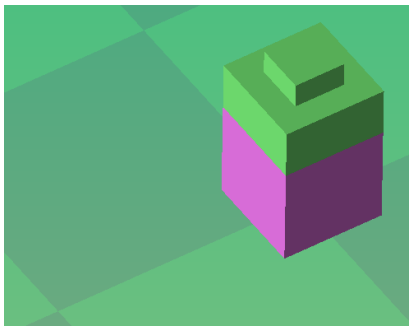
1) Click the button  (When the button has been clicked, it isn't necessary to click.).
2) Click the first point. The model to which the point clicked first is the target model. A red marker is shown to the location of the selected point.



3) Click the second point.



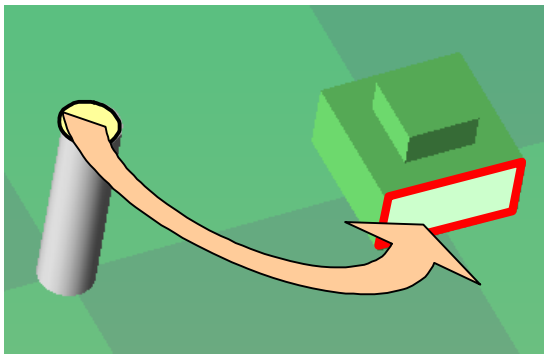
4) The model moves at the same time as a mouse button is released.



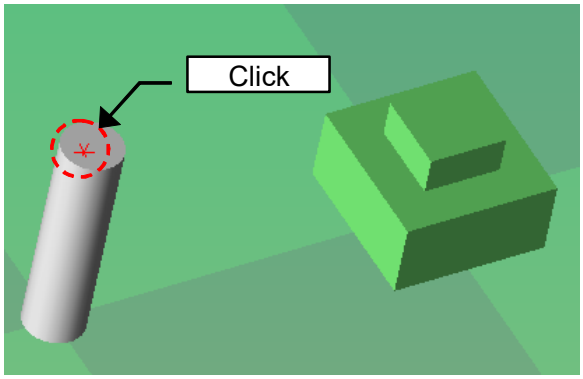
SUPPLE -MENT The picked point is shown the red point like OLP function and the point is fixed at the same time as a mouse button is released. And, when moves the mouse during a mouse click, the pick target is moved.

• Mate the two faces

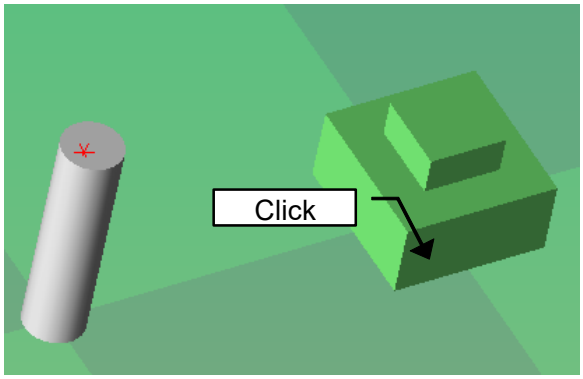
The model is moved so that the selected two faces become same position. For example, the two faces of two model are matched as follows.



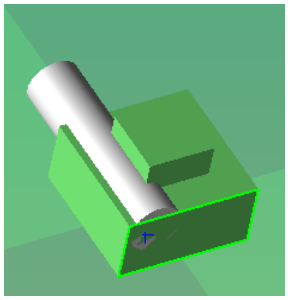
1) Click the button  (When the button has been clicked, it isn't necessary to click.).
2) Click the first point of the face. The model to which the point clicked first is the target model. A red marker is shown to the location of the selected point.

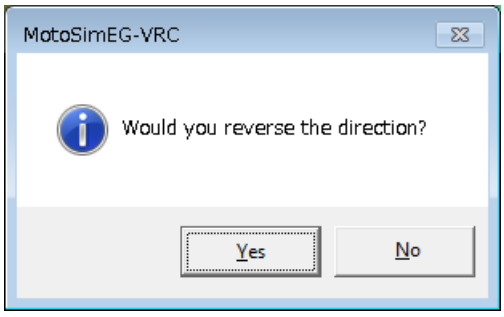


3) Click the second point.

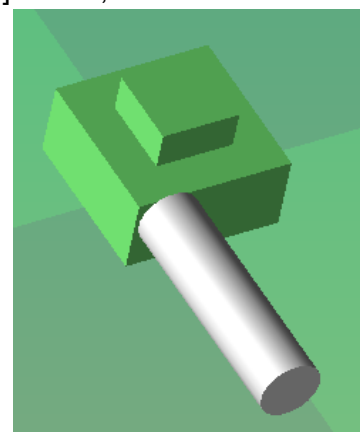


The model moves at the same time as a mouse button is released and the following dialog is displayed.



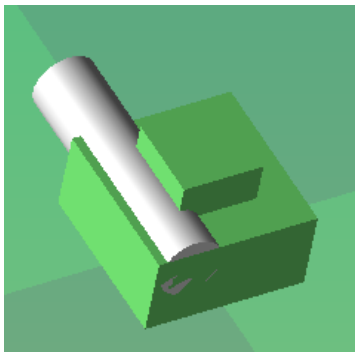


4) When click the [Yes] button, the model is reversed and the operation is finished.



When click the [No] button, the model is not reversed and the operation is fin-

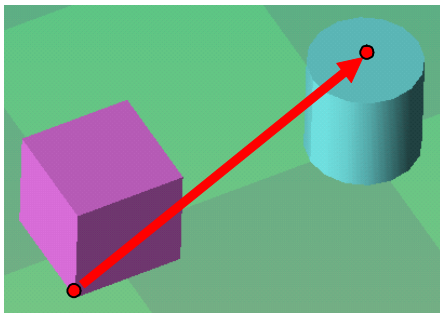
ished.



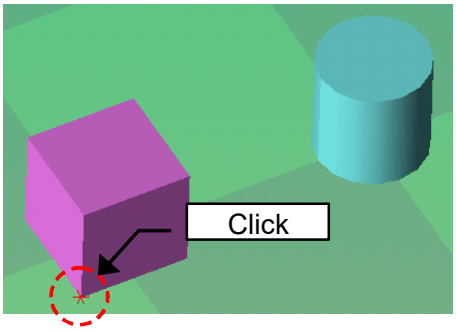
SUPPLE -MENT

The picked face is surrounded by the yellow-green frame like OLP function and the face is fixed at the same time as a mouse button is released. And, when moves the mouse during a mouse click, the pick target is moved.

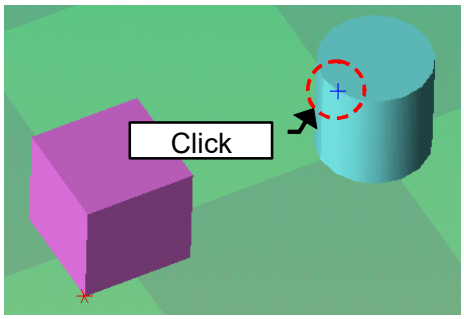
• Mate the point and the center of circle (passing through 3 points)
The model is moved so that the selected the point and the center of circle (passing through the selected three points) become same position. For example, the corner of the cuboid and the center of the upper face of the cylinder are matched as follows.



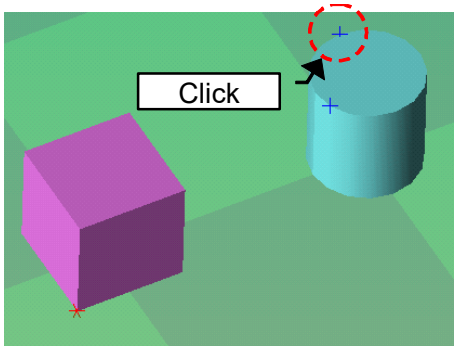
1) Click the button  (When the button has been clicked, it isn't necessary to click.).
2) Click the first point. The model to which the point clicked first is the target model. A red marker is shown to the location of the selected point.



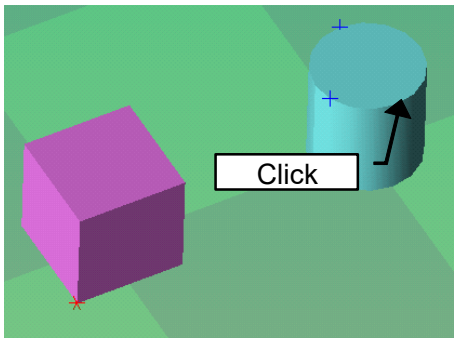
3) To specify the center of the circle, click the first point on the circumference of circle. A blue marker is shown to the location of the selected point.



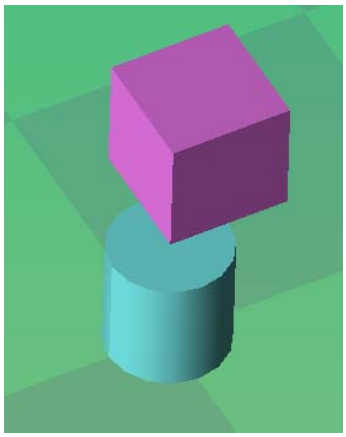
4) Click the second point on the circumference of circle. A blue marker is shown to the location of the selected point.



5) Click the third point on the circumference of circle.



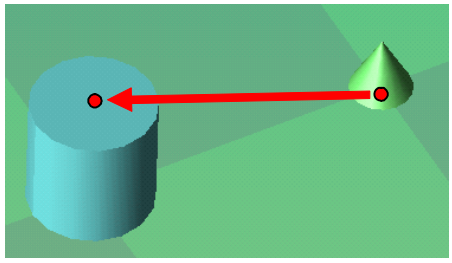
The model moves at the same time as a mouse button is released.



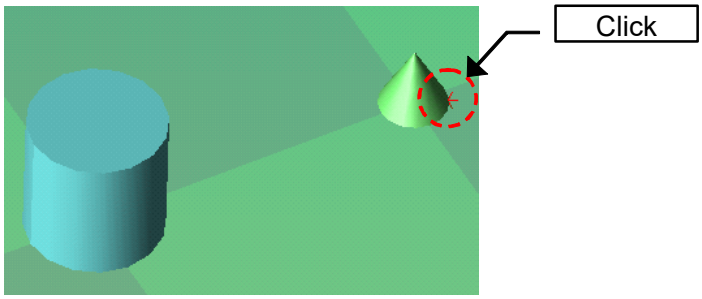
SUPPLE -MENT

The picked point is shown the red point like OLP function and the point is fixed at the same time as a mouse button is released. And, when moves the mouse during a mouse click, the pick target is moved.

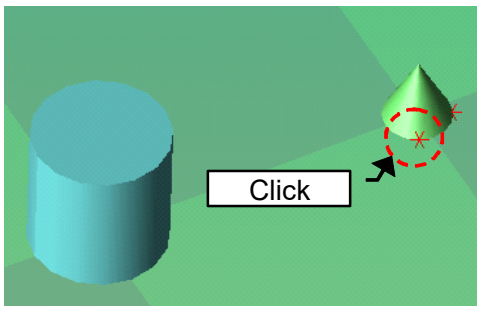
• Mate the center of two circle (each circle passing through 3 points)
The model is moved so that the center of two circle (each circle passing through the selected three points) become same position. For example, the center of the bottom face of the cone and the center of the upper face of the cylinder are matched as follows.



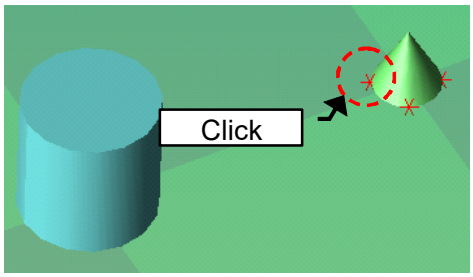
1) Click the button  (When the button has been clicked, it isn't necessary to click.).
2) To specify the center of the first circle (target of operation), click the first point on the circumference of circle. A red marker is shown to the location of the selected point.



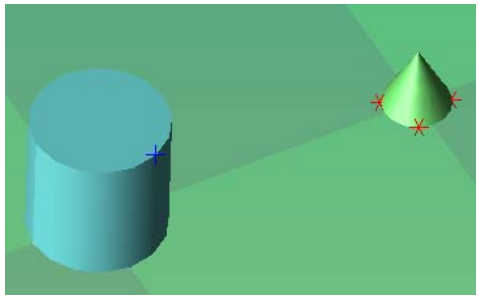
3) Click the second point on the circumference of circle. A red marker is shown to the location of the selected point.



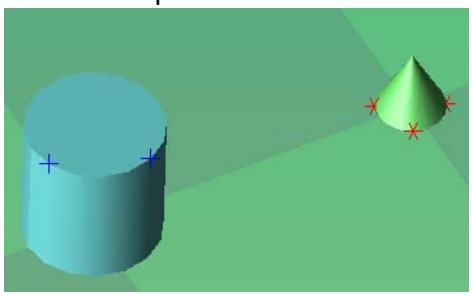
4) Click the third point on the circumference of circle. A red marker is shown to the location of the selected point.



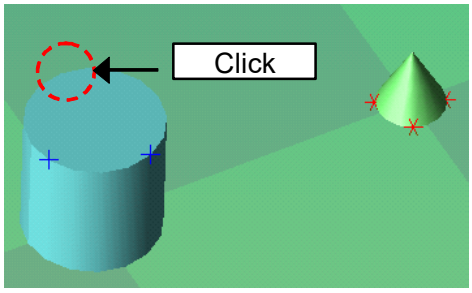
5) To specify the center of the second circle, click the first point on the circumference of circle. A blue marker is shown to the location of the selected point.



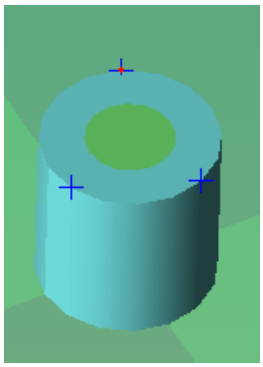
6) Click the second point on the circumference of circle. A blue marker is shown to the location of the selected point.

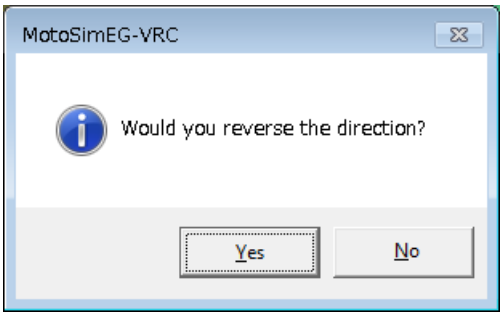


7) Click the third point on the circumference of circle.



The model moves at the same time as a mouse button is released.





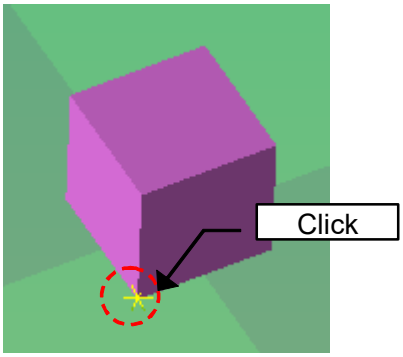
8) When click the [Yes] button, the model is reversed and the operation is finished.

When click the [No] button, the model is not reversed and the operation is finished.

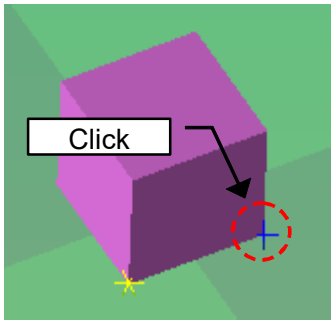
SUPPLE-MENT The picked point is shown the red point like OLP function and the point is fixed at the same time as a mouse button is released. And, when moves the mouse during a mouse click, the pick target is moved.

• Create a reference coordinates
The reference coordinates is created.

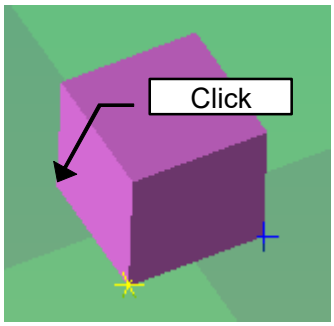
1) Click the  button (When the button has been clicked, it isn't necessary to click.).
2) Click the first point. This point becomes the origin of the reference coordinates. A yellow marker is shown to the location of the selected point.



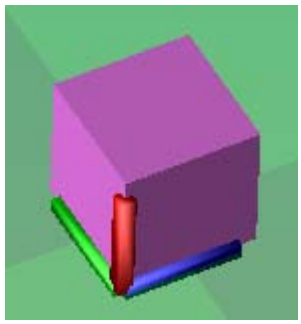
3) Click the second point. This point means the X-axis direction of the reference coordinates. A blue marker is shown to the location of the selected point.



4) Click the third point. This point means the XY-plane of the reference coordinates.



The reference coordinates is created.

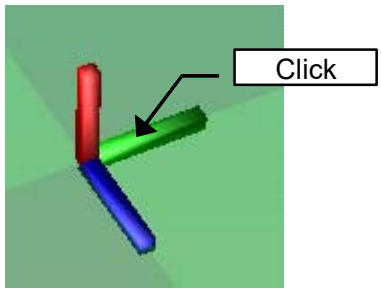


SUPPLE -MENT

The picked point is shown the red point like OLP function and the point is fixed at the same time as a mouse button is released. And, when moves the mouse during a mouse click, the pick target is moved.

• Remove the reference coordinates
The reference coordinates is removed.

1) Click the button  (When the button has been clicked, it isn't necessary to click.).

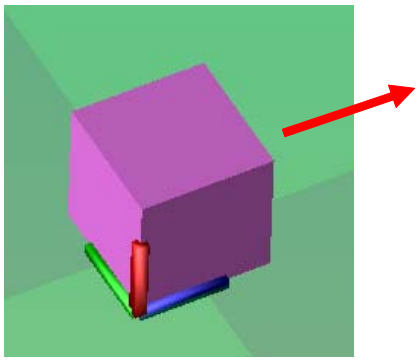


2) Click the reference coordinates to delete.
3) The reference coordinates is removed.

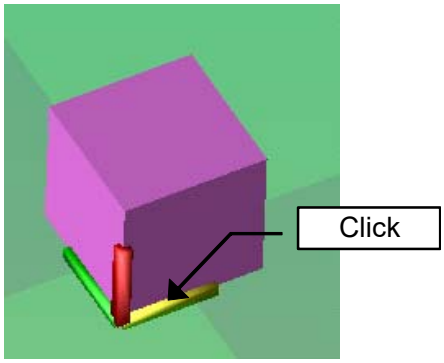
• Remove all reference coordinates
All reference coordinates are removed.

1) Click the button  .
2) All reference coordinates are removed.

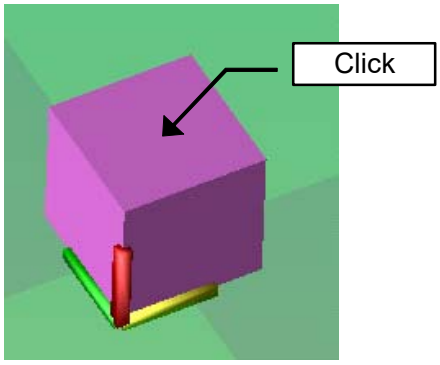
• Move model in the selected axial direction
The model is moved to the selected axial direction of the reference coordinates. For example, the model is moved to the X-axis direction of the reference coordinates as follows.



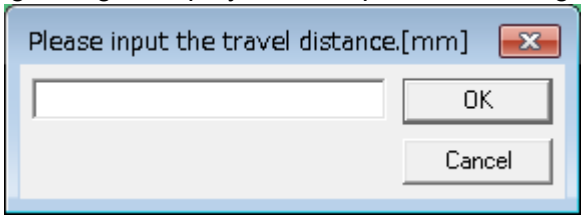
1) Click the button  (When the button has been clicked, it isn't necessary to click.).
2) Click the blue arrow of the reference coordinates. The selected arrow is highlighted.



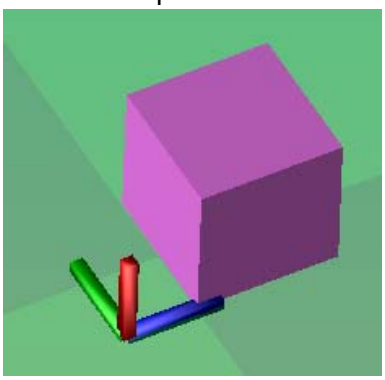
3) Click the model to move.



The following dialog is displayed and input the traveling distance manually.



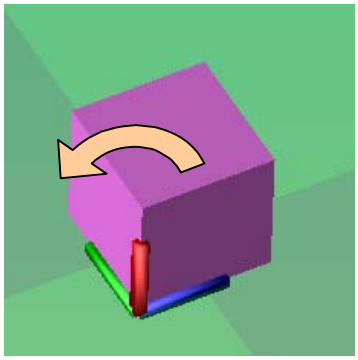
4) When the [OK] button is clicked, the model is moved to the X-axis direction of the reference coordinates as the inputted travel distance.



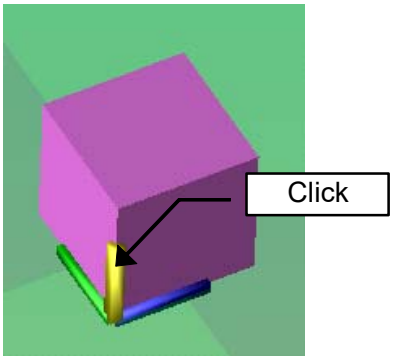
When the [Cancel] button is clicked, the operation is canceled.

• Rotate model about the selected axis

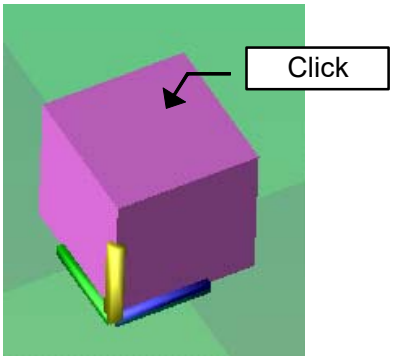
The model is rotated about the selected axis of the reference coordinates. For example, the model is rotated about the Z-axis of the reference coordinates as follows.



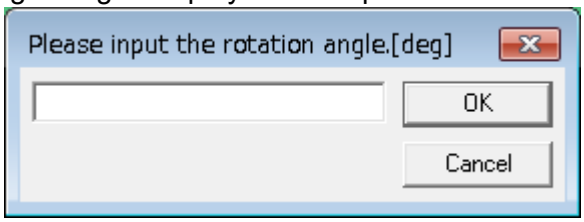
1) Click the button  (When the button has been clicked, it isn't necessary to click.).
2) Click the red arrow of the reference coordinates. The selected arrow is high-lighted.



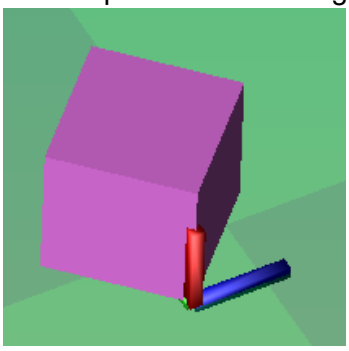
3) Click the model to rotate.



The following dialog is displayed and input the rotation angle manually.



4) When the [OK] button is clicked, the model is rotated about the Z-axis of the reference coordinates as the inputted rotation angle.

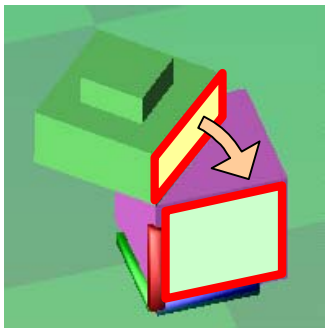


When the [Cancel] button is clicked, the operation is canceled.

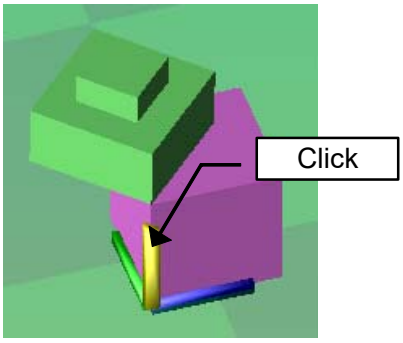
NOTE The plane perpendicular to the selected axis of the reference coordinates cannot be selected.

• Mate the two faces by selected axis
The model is rotated about the selected axis of the reference coordinates so that the selected two faces become same position. The two normal vector is projected on the plane made by the selected axis of the reference coordinates and the model is rotated so that the direction of two projected vectors is matched.

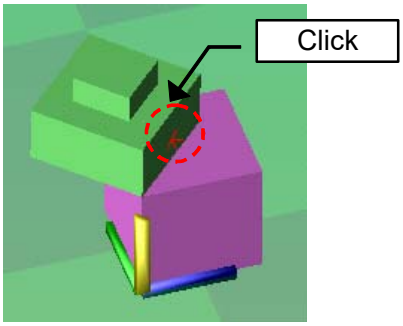
For example, The model is rotated so that two faces of two model is matched about the Z-axis of the reference coordinates as follows.



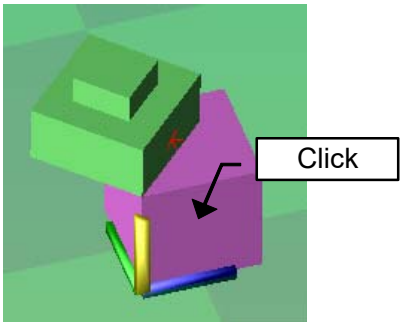
1) Click the button  (When the button has been clicked, it isn't necessary to click.).
2) Click the red arrow of the reference coordinates. The selected arrow is high-lighted.



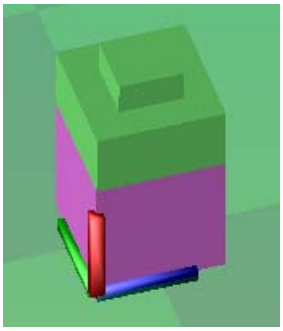
3) Click the first face. The model which this face belongs is the target.



4) Click the second face.



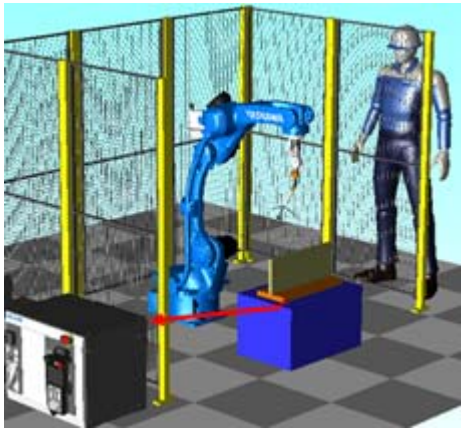
The model is rotated so that two faces of two model is matched about the Z-axis of the reference coordinates.



NOTE The plane perpendicular to the selected axis of the reference coordinates cannot be selected.

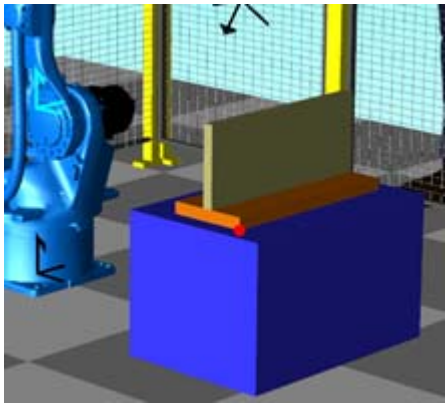
• Reflecting pick movement amount to parent model

The procedure is explained by using "Arc_Sample_YAS.vcl"as an example. In this case, consider using a Mate the two points function to move the welding work in the direction of the red line in the figure below for each installation base.

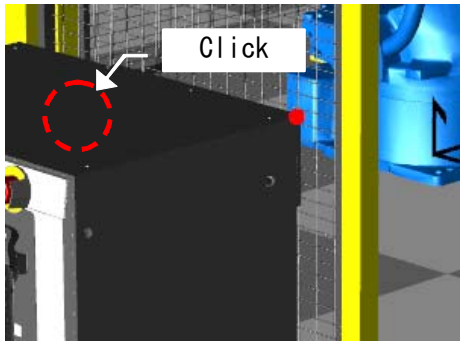


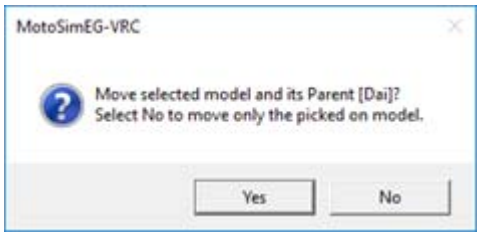
1) Click the button  (When the button has been clicked, it isn't necessary to click.).
2) Click the first point. The model to which the point clicked first is the target model.

A red marker is shown to the location of the selected point.

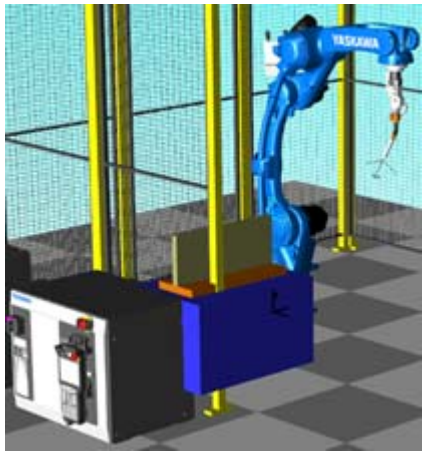


3) Click the second point. The following dialog is displayed.



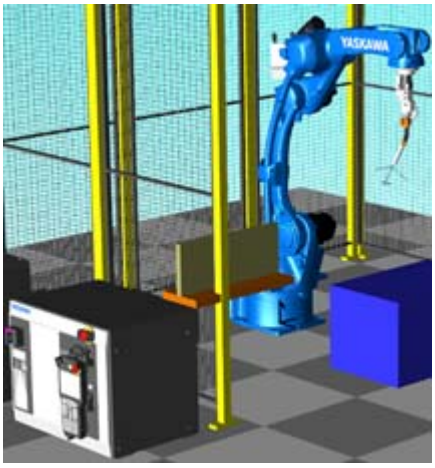


When click the [Yes] button, the parent model of the movement target model also moves to the specified destination and the operation is completed.



When click the [No] button, only the movement target model is moved to the

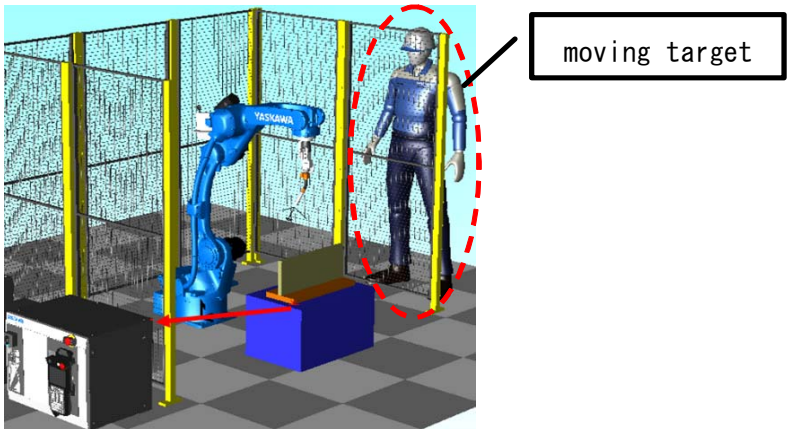
specified destination and the operation is completed.



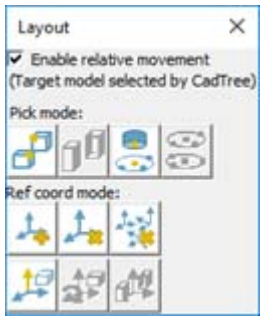
• Relative movement

NOTE This function can be used only for Mate the two points, Mate the point and the center of circle, and Move model in the selected axial direction.

This function moves the model currently selected by CadTree by the amount of movement of pick operation.
The procedure is explained by using "Arc_Sample_YAS.vcl"as an example. In this case, consider using the point alignment function to move the selected Human model relative to CadTree.

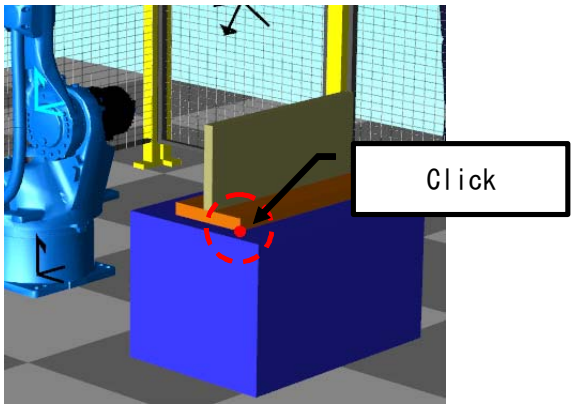


1. Turn ON the [Pick Enable] check in the layout panel.

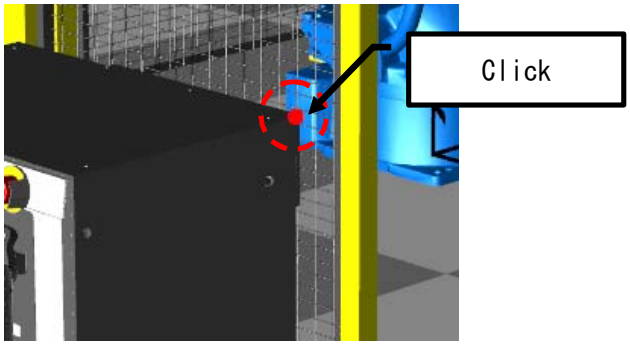


2. Click the button  (When the button has been clicked, it isn't necessary to click.).

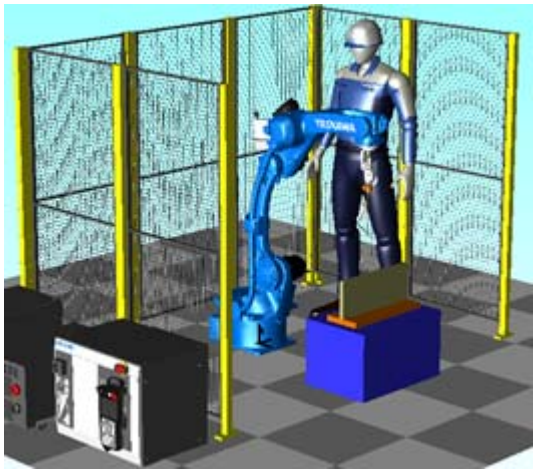
3. The model to which the point clicked first is the target model. A red marker is shown to the location of the selected point.



4. Click the second point.

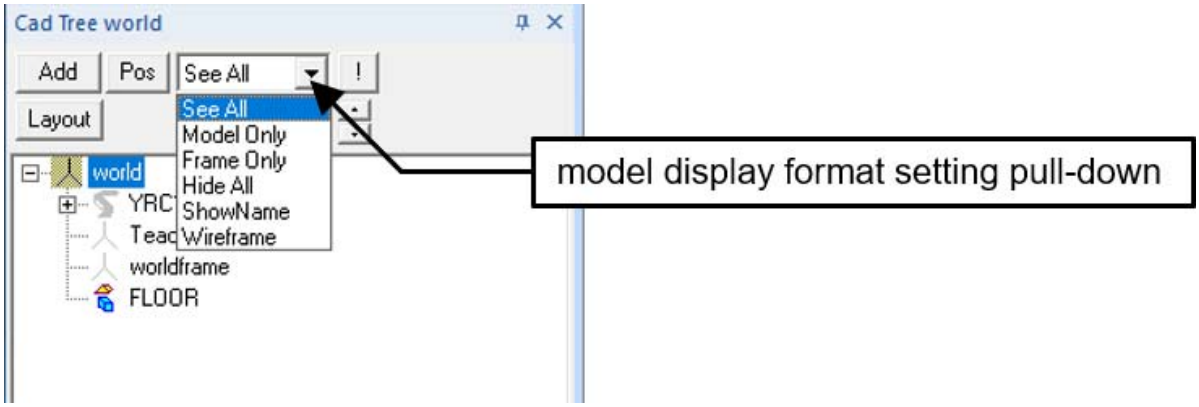


5. As shown below, the Human model moves relative to the distance between the first and second points.



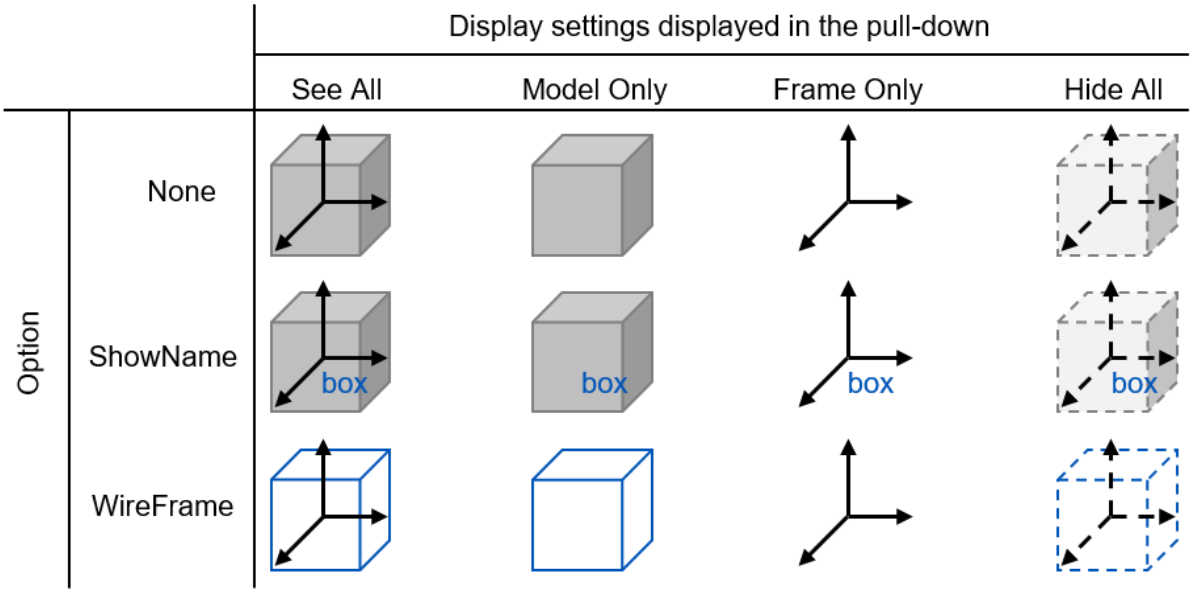
11.1.8 Model display format

Set the display format of the model.



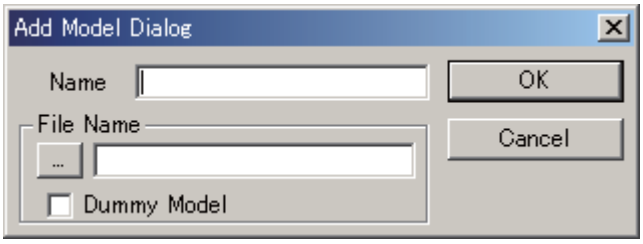
In the model display format setting pull-down, you can set “Display settings” and “Option to display additional model name or wireframe for display settings”.
The display settings can be selected from See All, Model Only, Frame Only, and Hide All.
Options can be selected from ShowName and WireFrame.

The following is an example of the display status depending on the combination of display settings and options.



11.2 Creating a New Model

To start creating a new model, click on [Add] of the Cad Tree menu to display the Add Model dialog box.

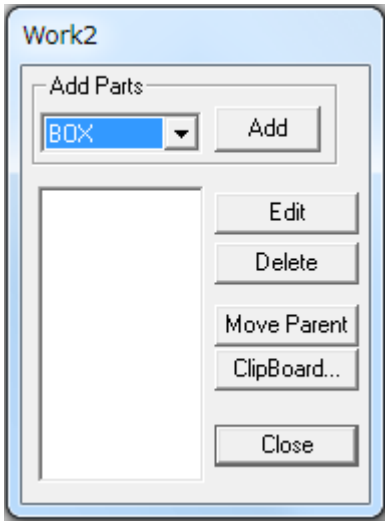


Procedure

1. Enter a name of the new model to be created in the Name edit box of the Add Model dialog box.
   (By default, the model name and the model file name are the same: the model file is created with the model name.)

2. Click [OK] in the Add Model dialog box.
   A newly created model is displayed in the Cad Tree. (Note that new model file does not contain any data at this point.)

3. Double-click the new model name in the Cad Tree to edit the model.
   The file data editing dialog box (as shown below) appears; refer to " 11.3 Editing a Part " to edit the file data.



4. When the creation of the model is completed, click [Close] to complete the file data editing.

■ Creating a Model from an Existing Model

A new model creation can be achieved not only by creating parts with the CAD function, but also with an existing model file. In addition to those methods, a new model can also be added with the method explained in " 11.11 Reading a Model ".

Procedure

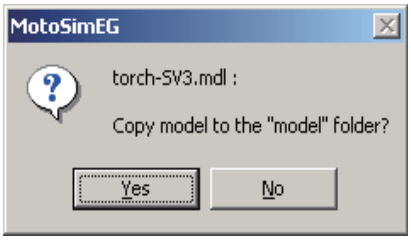
1. Click [Add] of the Cad Tree, or select {File} - {New Model} from the right-click menu of the Cad Tree.

2. The Add Model dialog box appears. Press the [...] button on the left of the File Name edit box to select a file.

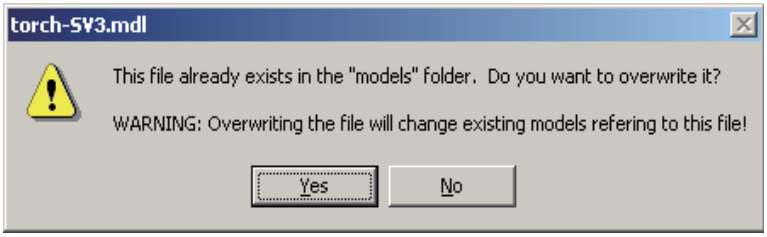
3. Enter a new model name in the Name edit box of the Add Model dialog box.

4. Click [OK].

5. If the model file path doesn't correspond to the "models" folder under the cell folder, the following dialog box will display and offer to copied model file to the "models" folder of the cell.



If the "Yes" button is clicked and a file with the same name already exists in the cell "models" folder. The following dialog will display to ask for overwrite confirmation.



NOTE When adding LINE data (wire frame), it is recommended to use LINE data in the HMF format: adding LINE data in other format may take some time.
If the LINE data is in a format other than HMF, convert the LINE data with “MDL2HMF.EXE” before adding the model. (The MDL2HMF.EXE is located in a folder where MotoSim EG-VRC was installed).

■ Creating a Dummy Model

Dummy model is a model with only the position and direction data and no modeling data (model file). Normally, external servo track or rotation axis have a reference position that is fixed and unchangeable (even if it is changed, it returns to the original position when opening the cell next time).
To avoid such problem, use a dummy model: create a dummy model, then register the external axis as a child model of the dummy model. This way, the reference position of the external axis or rotating axis can be moved by changing the reference position of the dummy model.

Procedure

1. Click [Add] on the Cad Tree dialog box, or select {File} - {New Model} from the right-click menu of the Cad Tree.

2. The Add Model dialog box appears; enter a new model name in the Name edit box.

3. Check the [Dummy Model] check box.

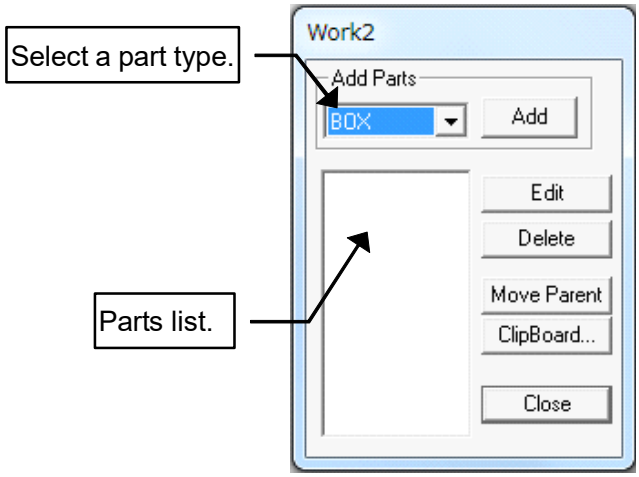
4. Click [OK].

11.3 Editing a Part

MotoSim creates a model data file by combining basic figures such as cubes and cylinders: such figures are called "parts" in this manual.
The following sections explain on how to edit the parts using the file data editing dialog box of the Cad Tree.

11.3.1 Displaying the File Data Editing Dialog Box

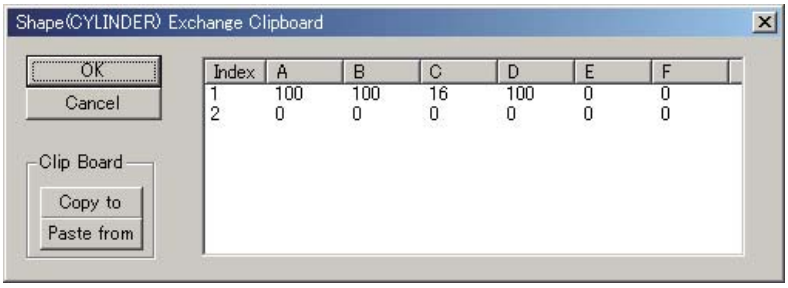
In the Cad Tree, double-click the model to be edited, or select {Attribute} - {Edit File Data} to display the file data editing dialog box as follows:



File data editing dialog box

Item	Description
[Add] button	Displays a dialog box to edit the part selected in [Add Parts] combo box. Also displays the added part on the cell window.
[Edit] button	Displays a dialog box to edit the part selected in the parts list. (Multiple selection is not possible.)
[Delete] button	Deletes the part selected in the parts list. (Multiple selection is not possible.)
[Move Parent] button	Changes the parent of the part selected in the parts list. Refer to " 11.9.1 Changing the Parent Model " for details.

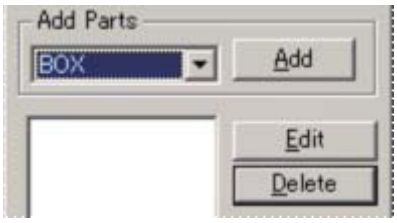
File data editing dialog box

Item	Description
[ClipBoard...] button	Stores/Retrieves the data of the part selected in the parts list on the clipboard. 
[Close] button	Closes the file data editing dialog box.

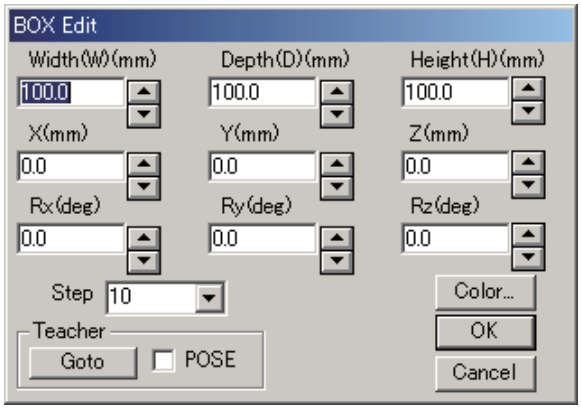
11.3.2 Registering a Part

Procedure

1. Select a type of parts to be added in [Add Parts] combo box in the file data editing dialog box.



2. Click [Add] to display the part on the cell window; the parts editing dialog box appears.



3. See descriptions below to edit the part in the parts editing dialog box:

   • Enter the values for model size, position, etc. with the spin buttons or key-strokes. (The incremental value of the spin buttons is specified in the Step combo box.)
   • Click [Color...] to display the Color dialog box, and specify the color.
   • To move the part to an arbitrary point with the Teacher, set the Teacher to the target position; click [Goto] in the "Teacher" section to move the part to the teacher coordinate. To move the part including the posture to the teacher, check the [POSE] check box and then click [Goto]. (For the details of the Teacher, refer to " 11.1.4 Teacher ".)

4. When all the settings for the model are completed in the parts editing dialog box, click [OK] to add the part to the model data file.

5. Create a model by repeating the steps 1 to 4 to register additional parts.

11.3.3 Part Types

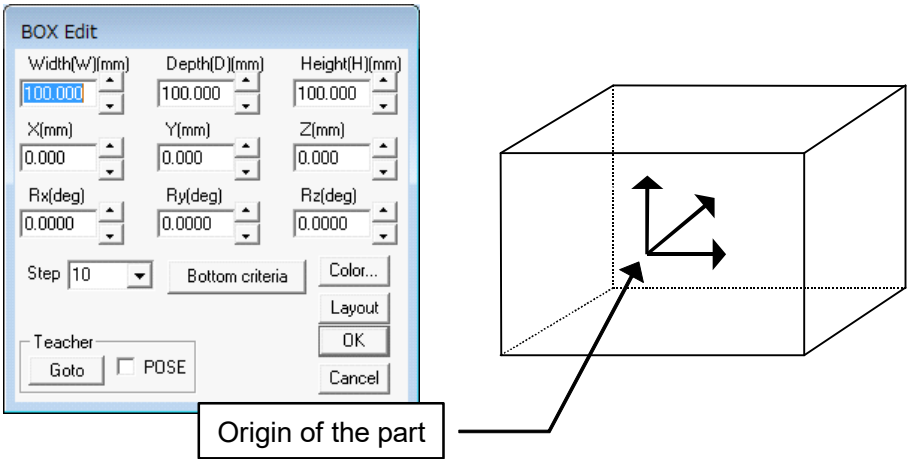
This section explains on how to edit the parts according to the part type.
BOX, BOX 2, CYLINDER, CONE 2, SPHERE, PIPE 2 can use the layout function. It is possible to use four function: "Mate the two points", "Mate the two faces", "Mate the point and the center of circle" and "Mate the center of two circle". (For usage, please refer to the section " 11.1.7 Layout function ".)

NOTE When use "Mate the two points", "Mate the two faces", "Mate the point and the center of circle" and "Mate the center of two circle", the red marker is not displayed if the part selected with the first point is not the part opened in the edit dialog.

■ BOX

The BOX is a rectangular parallelepiped part, which can be edited in the BOX Edit dialog box.

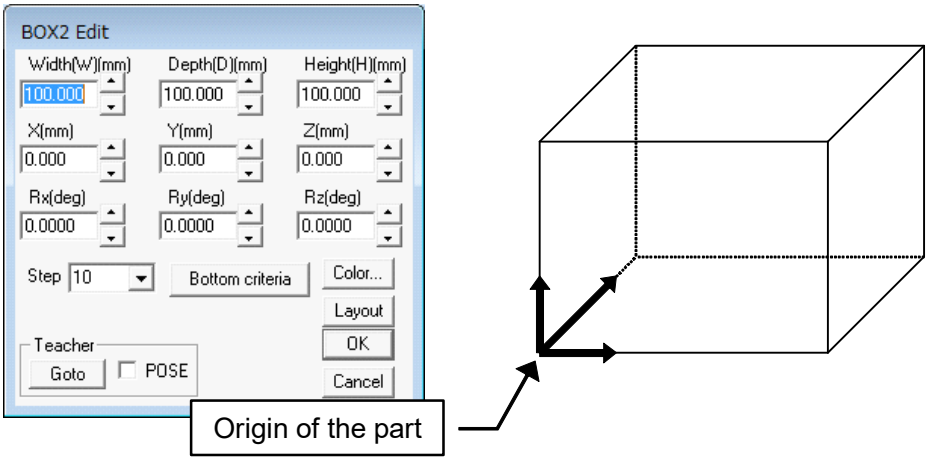
• The origin of the part is the center of the BOX part model.



■ BOX2

The BOX2 is a rectangular parallelepiped part, which can be edited in the BOX2 Edit dialog box.

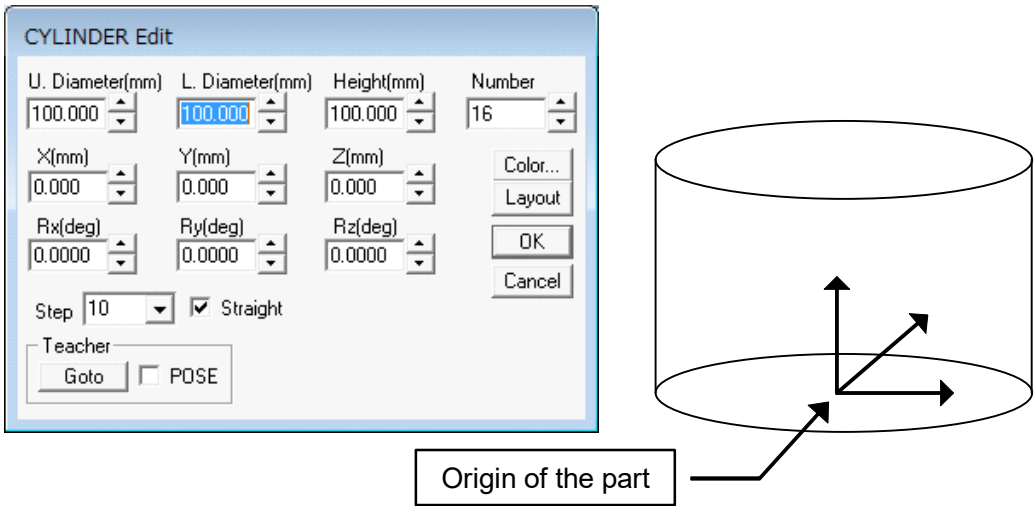
- The origin of the part is the vertex of the BOX2 part model.



■ CYLINDER

The CYLINDER is a cylindrical part, which can be edited in the CYLINDER Edit dialog box.

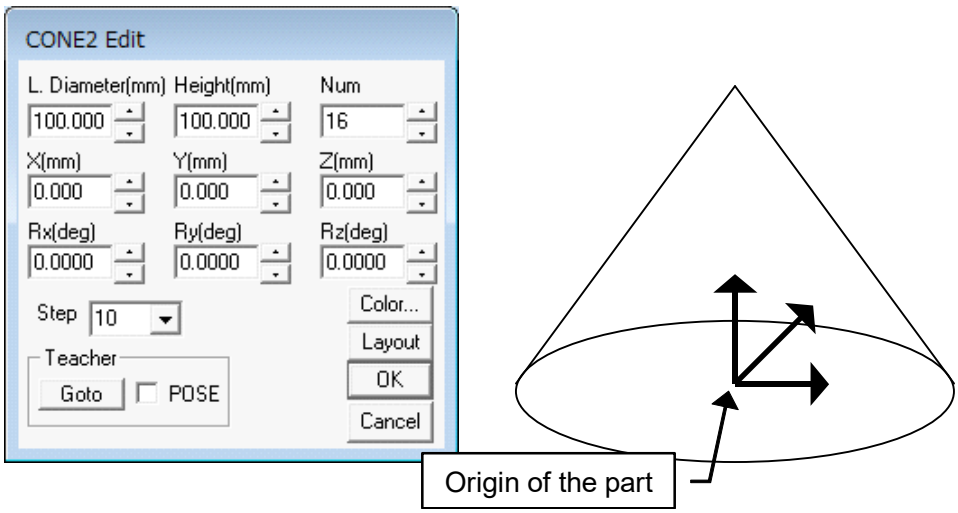
- Selecting the [Straight] check box links the values of the upper and lower diameters ("U. Diameter" and "L. Diameter", respectively).
- The value in "Number" edit box represents the number of sides to form a cylinder: the larger the number becomes, the more perfect the cylinder becomes. Therefore, when "3" is input, the number of side faces becomes three, forming a triangular cylinder.
- The origin of the part is the center of the CYLINDER bottom.



■ CONE2

The CONE2 is a conic part, which can be edited in the CONE2 Edit dialog box.

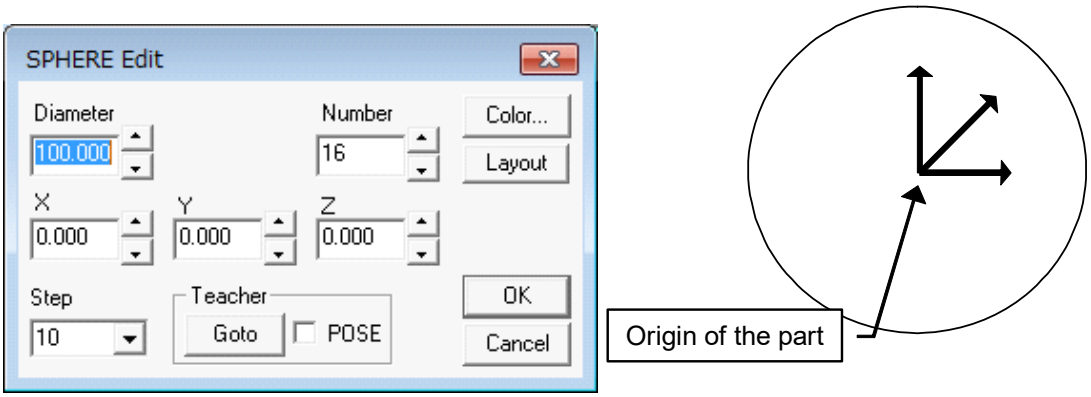
• The origin of the part is the center of the CONE2 bottom.



■ SPHERE

The SPHERE is a spherical part, which can be edited with the "SPHERE Edit" dialog box.

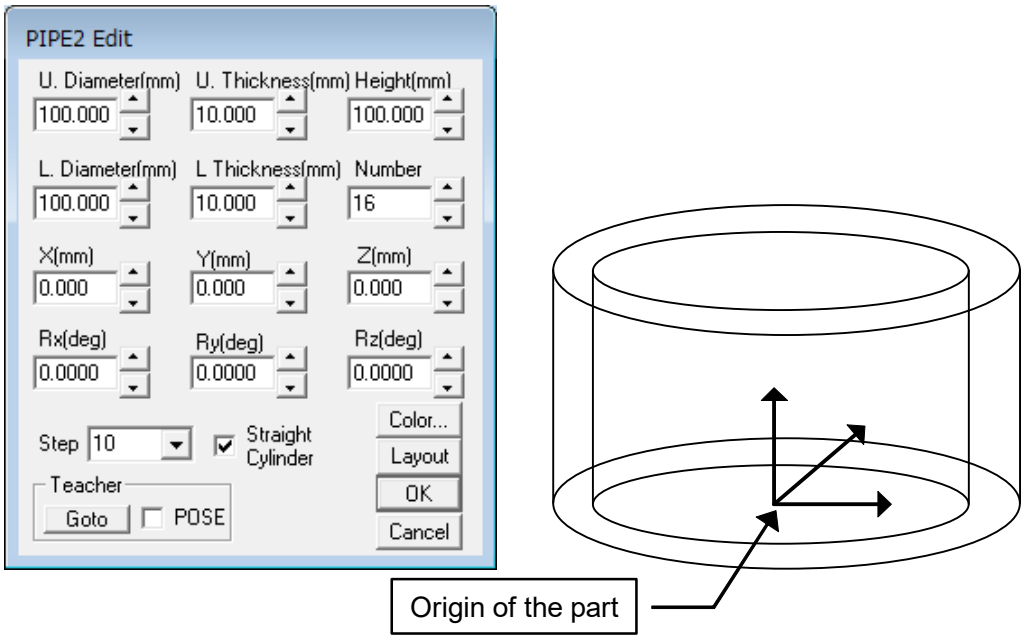
• The origin of the part is the center of the sphere.



■ PIPE2

The PIPE2 is a pipe part, which can be edited in the PIPE2 Edit dialog box.

- The values in "U. Thickness" and "L. Thickness" edit boxes respectively represent the thickness of upper and bottom faces of the pipe.
- Selecting the [Straight Cylinder] check box links the upper and lower diameters ("U. Diameter" and "L. Diameter", respectively), and the upper and bottom face thickness.
- The origin of the part is the center of the PIPE2 bottom.



■ AXIS6

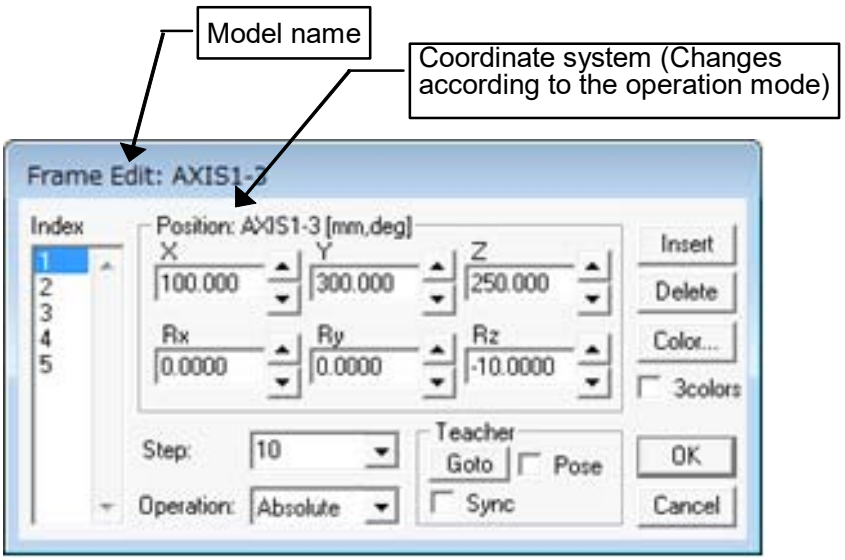
The AXIS6 is a part that may contain multiple frames (position and orientation data). The frames can be used as a target point or for external axis setting. In addition, press [Color…] to change the color, check "3 colors" to display in each color for X,Y,Z axis. The AXIS6 can be edited in the Frame Edit dialog box.

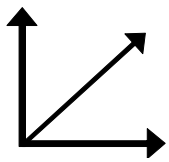
- To add a frames, press [Insert]. The frames are added to the "Index" list box.
- To delete a frame, select the frame number in the "Index" list box, and press [Delete].
- To edit a frame, select the frame number in the "Index" list box and modify the values in the "Position" section. The position can be displayed and modified relative to various coordinated system depending on the "Operation" mode.

  "Operation" combo box settings

"Absolute"	Displays the position with reference to the model frame.
"Relative"	Displays the position with reference to the frame original position when initially selected in the "Index" list box.
"SelModel"	Displays the position with reference to a selected model. When this mode is first selected the "Select Model" dialog will display to allow selection of the reference model.

NOTE The frame corresponding to the selected "Index" of the list box is highlighted in red in the main view.

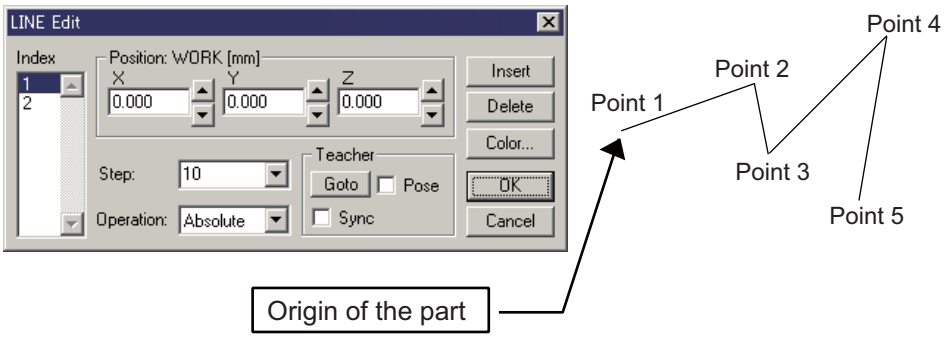




AXIS6 model

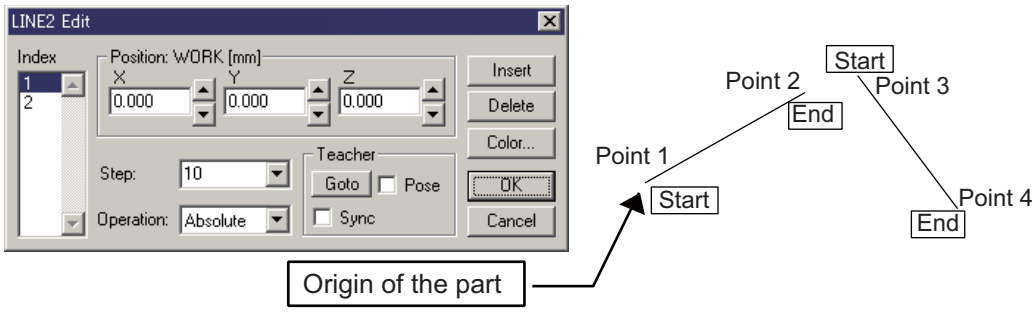
■ LINE

The LINE is a part that contains multiple points. The points are links together by straight-line segments to form a continuous line. It can be edited with the "LINE Edit" dialog box. A minimum of 2 points must be defined for the line to display. Points can be inserted, edited or deleted in the same manner as the "FRAME Edit" dialog box. (Please refer to the " AXIS6 " section for details).



■ LINE2

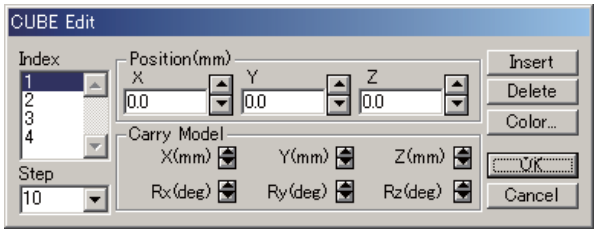
The LINE2 is a part that may contains multiple lines each made of 2 points. It can be edited with the "LINE2 Edit" dialog box. The points with an odd index number are the starting points and those with an even index number are the end points. The total number of defined points must be even to display all the segments. Points can be inserted, edited or deleted in the same manner as the "FRAME Edit" dialog box. (Please refer to the " AXIS6 " section for details).

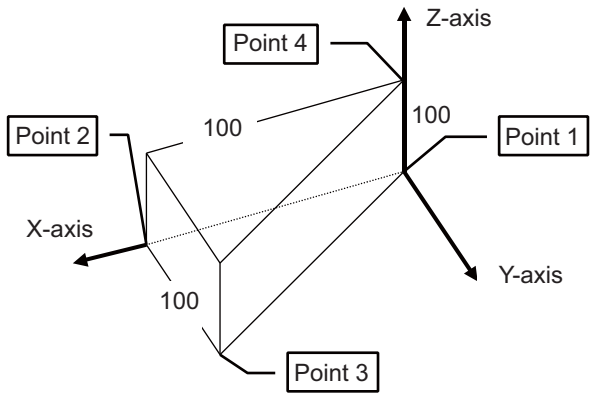


■ CUBE

The CUBE is a polyhedron part, which can be edited in the CUBE Edit dialog box.

- When a CUBE model is added, a model with four points appears on the screen, with the four points already registered in the CUBE Edit dialog box as shown below.
- The apex of the figure at the bottom is registered as a point from No. 1, the point in the height direction is the last registered point in the model file form.
  The points at the apex of the bottom figure are arranged as follows:
  -When the height is set to Z-axis positive (+) direction: counterclockwise to Z-axis positive (+) direction.
  -When the height is set to Z-axis negavite (-) direction: clockwise to Z-axis positive (+) direction.

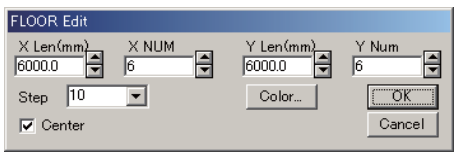




■ FLOOR

The FLOOR is a floor part, which can be edited in the FLOOR Edit dialog box.

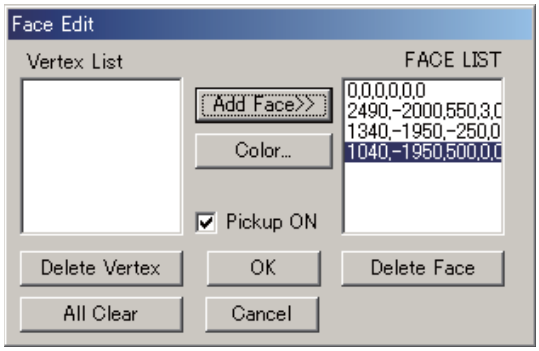
- The values "X Num" and "Y Num" edit boxes respectively represent the numbers of dividing lines that divide the face in the X-direction and Y-direction.
- The origin of the part is the center of the FLOOR model.

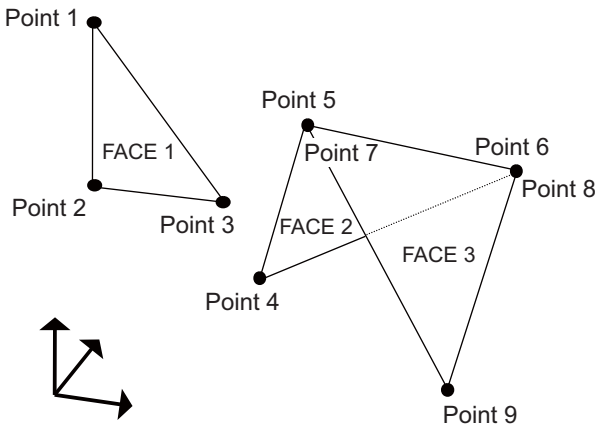


■ FACE

The FACE is a face part, which can be edited in the Face Edit dialog box.

- Register apexes to create faces.
  Several faces can be created in one FACE part, however, there must be three or more points to create each face. If the points are not in the same plane, the face will be divided into some triangles. Therefore, unless these points are clearly on the same plane, create the FACE with units of three points.





Procedure

1. Select the [Pickup ON] check box.
   (Clear the check box to change the viewpoint on the screen.)

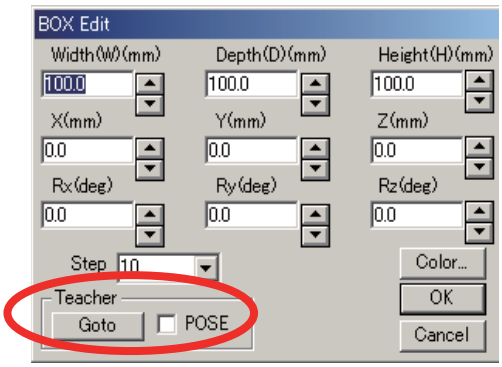
2. Click the points 1, 2 and 3 as shown in the above figure.
   The frame of the clicked point is displayed in "Vertex List" box. Click [Add Face>>] to create the FACE 1 defined by three points.

3. Click the points 4 to 6, and click [Add FACE>>] to create FACE 2.

4. Click the points 7 to 9, and click [Add FACE>>] to create FACE 3.

■ “Teacher” Section of the Parts Editing Dialog Box

The parts BOX, CYLINDER, CONE2, PIPE2, AXIS6, SPHERE, LINE, LINE2 can be relocated by using the "Teacher" section of each editing dialog box.
When using the Teacher, it has to be previously set: refer to " 11.1.4 Teacher " for details.



“Teacher” section of the parts editing dialog box

Item	Description
[Goto] button	Moves the part to the Teacher position.
[POSE] check box	Moves the part including the posture to the Teacher position.

11.4 Editing a Model

A model can be cut, copied, pasted, etc. with commands under {Edit} of the Cad Tree.
Select a model from the Cad Tree, and edit the model with the commands described below:

■ Cut

Cuts the selected model.

■ Copy

Copies the selected model.

■ Paste

Pastes the cut or copied model in an arbitrary place.Referred model file is same as pasted model.
When selecting {Copy} - {Paste} within the same cell, enter the model name to be copied.

■ PasteFile

Pastes the cut or copied model in an arbitrary place. Then, the model file is pasted, and pasted model file is referred.
When selecting {Copy} - {Paste} within the same cell, enter the model name to be copied.

■ Delete

Deletes the selected model. However, the model file will not be deleted though the model is deleted from the Cad Tree and the cell window.
When deleting the currently selected model including its child models are to be deleted, set the display/nondisplay status (⊞ or ⊟) on the left of the model name to ⊞ in the Cad Tree, then select [Delete]. Note, however, that the "world", "Teacher", and robot model will not be deleted even if they are in the ⊞ status.

■ DeleteFile

Deletes the selected model and referred model file. The model is deleted from the Cad Tree and the cell window and the model file. When the target model file is referred by another model, the target model file will be not deleted.

■ Add

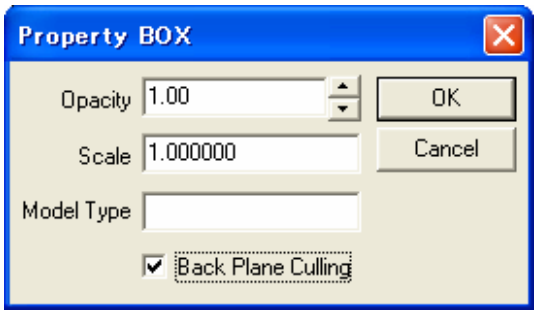
Creates a new model.
Refer to " 11.1 Cad Tree " for details.

■ Rename

Changes the model name.
Note, however, that the names of "world", "Teacher", and the robot model names cannot be changed.

■ Property

Specifies opacity, scale, and model type. (The command {Property} is located under {Attribute}.)

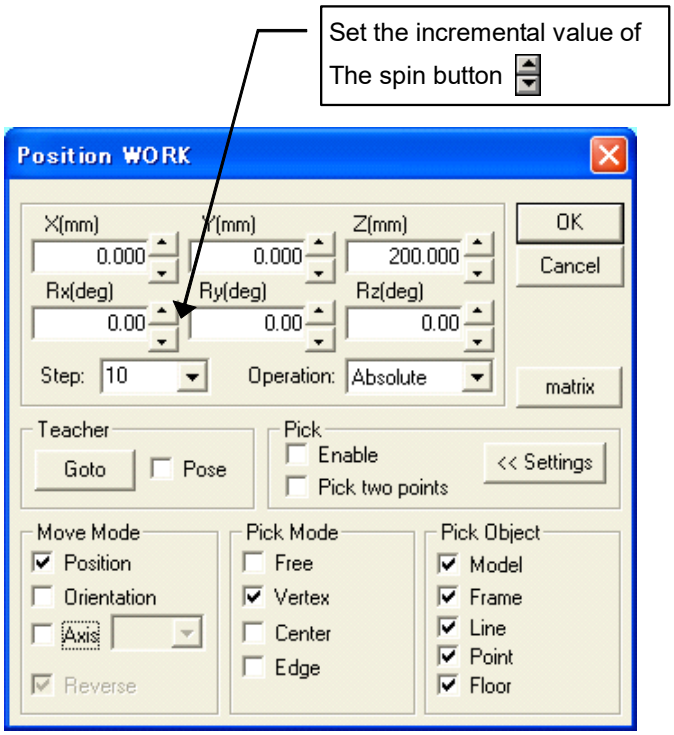


Property dialog box

Item	Description
[Opacity] edit box	Specifies the opacity of the model.
[Scale] edit box	Specifies the scale of the model.
[Model Type] edit box	Specifies a character string in the model.
[Back Plane Culling] check box	Set up whether the back plane of CAD data is shown or hidden. When the back plane is shown, the CAD data is displayed according to that data. When the back plane is hidden, display speed is faster. NOTE When the back plane is hidden, some parts of the CAD data may be lost. When the CAD data need be displayed collect, check off the Back Plane Culling.
[OK] button	Applies the modifications, and closes the Property dialog box.
[Cancel] button	Closes the Property dialog box without applying the modifications.

11.5 Positioning a Model

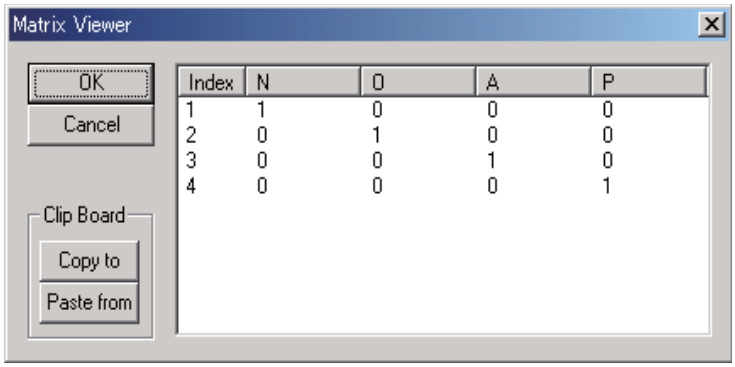
Position a model by specifying the values in the Position dialog box.
To display the Position dialog box, click on [Pos] button or select {Attribute} - {Set Position} menu item of the Cad Tree.



Position dialog box

Item	Description
"Operation" combo box	“Absolute” Displays the position with reference to the parent model, and moves the model. “Relative” Displays the position with reference to the selected model, and moves the model. “SelModel” Displays the Select Object dialog box; displays the position with reference to the model specified in the Select Object dialog box, and moves the model.

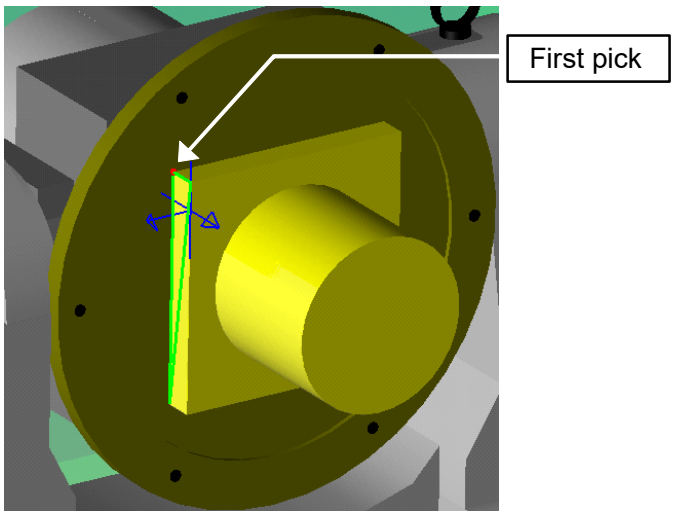
Position dialog box

Item	Description
[matrix] button	Allows to store or retrieve the data of the Position dialog box in the clip-board. 
“Teacher” section	Move the model to the Teacher current position. [Goto] button Moves the model to the Teacher position. [POSE] check box When checked and the [Goto] button is used, the model also moves to match the Teacher orientation. When using the Teacher, it has to be previously set: refer to " 11.1.4 Teacher " for details.
“Pick” section	[Enable] check box Enables the mouse picking operation. Pressing the [Shift] key enables or disables the "Pick Enable" mode. [Pick two points] check box The chosen model is parallel-shifted so that the specified point of the model may unite with the pick position of the 2nd point. [Settings >>] or [<< Settings] buttons Displays or hides the pick setting section.
“Move Mode” section	Determines the method to move to the picked point. [Position] check box The model is moved to the position (XYZ) of the picked point. [Orientation] check box The model is turned to match the orientation (Rx, Ry, Rz) of the picked point frame. [Axis] check box The model axis specified in the combobox is turned so that it matches the picked face normal. [Reverse] check box This setting is enable with [Orientation] or [Axis] mode. It can be use to change the direction of the picked face normal.
“Pick Mode” section	Sets conditions determining the selected point in the clicked area. Please refer to " Pick Mode Setting " for details.
“Pick Object” section	Sets the type of the object to be selected when clicking on the cell view. (Multiple items can be selected) Please refer to " Pick Object Setting " for details.
[OK] button	Applies the modifications, and closes the Position dialog box.

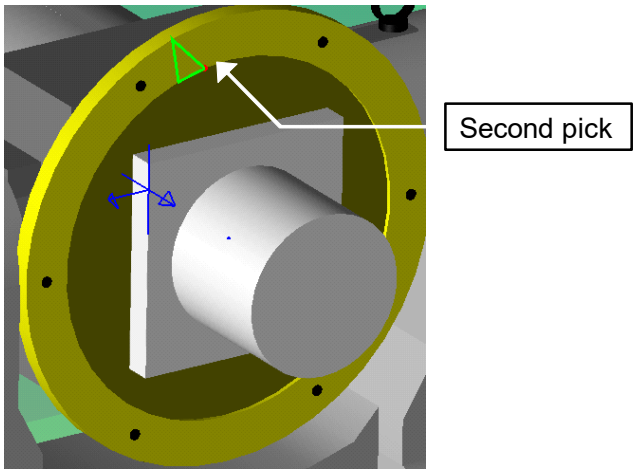
Position dialog box	
Item	Description
[Cancel] button	Closes the Position dialog box without applying the modifications.

The operating procedure of a two-point pick is explained concretely below.

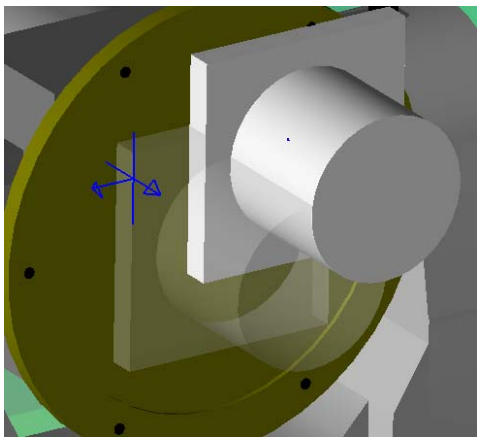
1. With the first pick, the point to align is specified.



2. With the second pick, the movement place is specified.

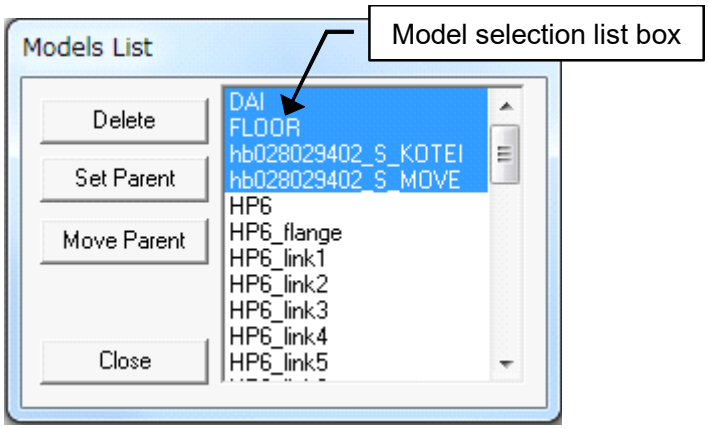


3. The point specified as the first point moves to the position of the second point.



11.6 Editing Multiple Models (Model List)

Multiple models can be edited in the Model List dialog box. To open the dialog box, select {Edit} - {Models List} of the Cad Tree right-click menu.

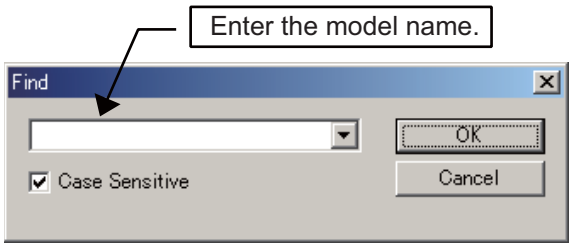


Model List dialog box

Item	Description
Model selection list box	Displays the models registered in the cell. The selected models are highlighted. (Multiple selection is possible.)
[Delete] button	Deletes the models selected in the model selection list box. The models on the cell window are also deleted, however, their model files still exist.
[Set Parent] button	Changes the parents of the models selected in the model selection list box. Refer to " 11.9.1 Changing the Parent Model " for details.
[Move Parent] button	Moves the parents of the models selected in the model selection list box. Refer to " 11.9.2 Moving the Parent Model " for details.
[Close] button	Closes the Model List dialog box.

11.7 Searching a Model

Search for a desired model with the Find dialog box. To open the dialog box, select {Edit} - {Find} from the Cad Tree right-click menu.
If the entered name exists, the model is selected in the Cad Tree.



11.8 Saving and Reading a Model Group

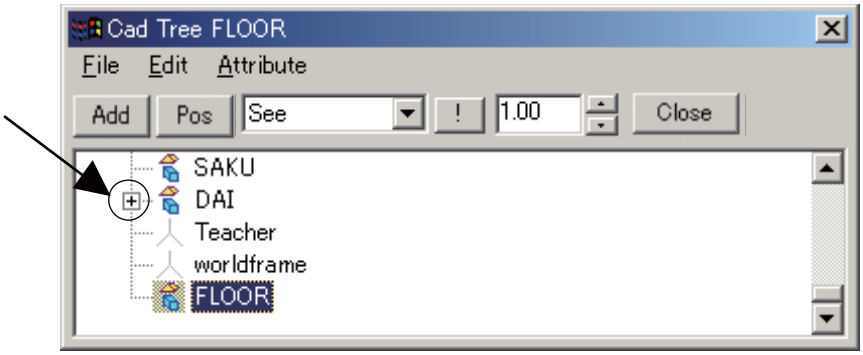
A model and its parent-child relevant information can be saved as a set.
This can be done by creating a folder under [cell folder name\models] and naming it with the same name as the subject model, then by saving the following files in the new folder:

- The parent-child relevant information of the model (ModelInfo.dat).
- Subject model and its all the child models (*.mdl, *.hsf).

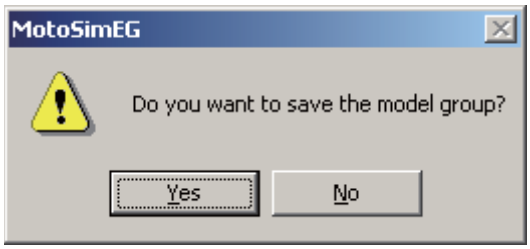
■ Saving a Model Group

Procedure

1. Select a model with the status symbol (on the left of the selected model name) in the Cad Tree set to ⊞.



2. Select {Edit} - {Save Model Group] from the Cad Tree right-click menu.
   Select [Yes] to create a folder with the same name as the model selected in the step 1.
   The files of the model (selected in the step 1) and its child models are copied to the folder, and a parent-child relevant information file "ModelInfo.dat" is generated.



■ Reading a Model Group

Select {Edit} - {Load Model Group] from the Cad Tree right-click menu. Select a “ModelInfo.dat” file to read the saved model including its child models.

NOTE If there is a model with the same name in the current cell, the second one will automatically be numbered. (The number will be added after the name.)

■ Syntax of the ModelInfo.dat

```
MODEL
    {
    NAME=Camera_Dummy     //Logical name of the model
    PARENT=world          //Parent model name
    FILENAME=dummy          //File name
    COLOR=RGB (0,0,255)   //Color of the model
    HIDESEE=1             //Display/nondisplay information
    OPACITY=0.25            //Opacity
    AXIS6=4000.000,5500.000,2000.000,-1.57,0.00,-0.35     // Position of the model
    }
```

11.9 Changing and Moving the Parent Model

11.9.1 Changing the Parent Model

The parent model of an arbitrary model can be changed with {Set Parent} under {Attribute} of the Cad Tree menu.
With this function, the relation (coordinate) between the selected model and its parent model is automatically changed, and the model position does not change. Use this function in case of changing the parent model while keeping the model in the same position.

To use this function, select the desired model in the Cad Tree, then select {Attribute} - {Set Parent} from the Cad Tree right-click menu.

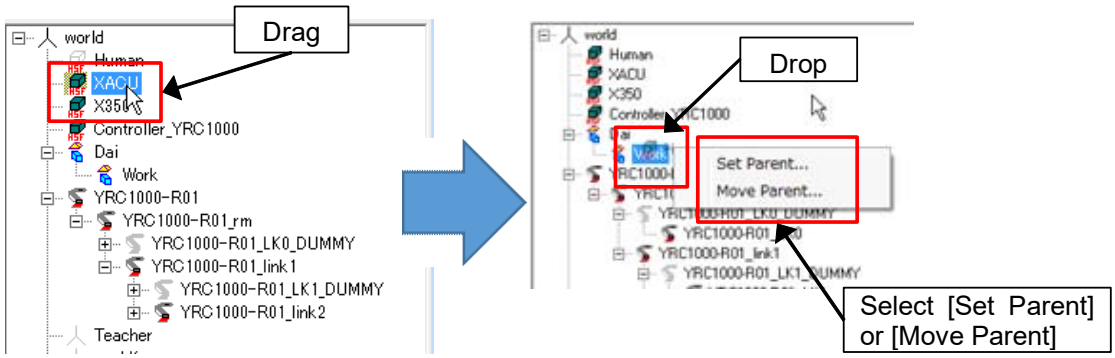
11.9.2 Moving the Parent Model

The parent model of an arbitrary model can be moved with {Move Parent} under {Attribute} of the Cad Tree menu.
Since the relation (coordinate) between the selected model and its parent model does not change with this function, the selected model position changes when it is moved to its new parent model with {Parent Move}.

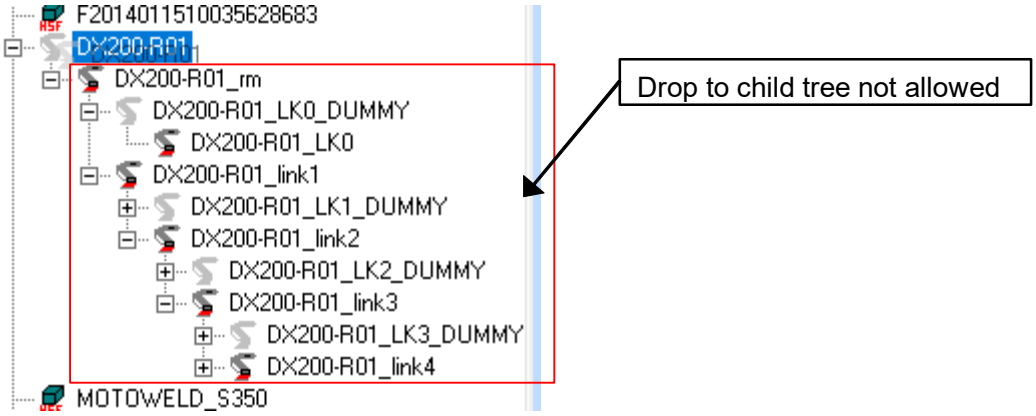
To use this function, select the desired model in the Cad Tree, then select {Attribute} - {Move Parent} from the Cad Tree right-click menu.

11.9.3 Changing or Moving the parent model by dragging and dropping a mouse

Drag the target model with [CadTree] and drop it onto the new parent model, pop-up menu appears. Select [Set parent] or [Move parent] from the displayed pop-up menu, Changing parent or Moving parent is possible.



With mouse drag and drop operation, dropping to child tree not allowed.



11.10 Changing a Model File

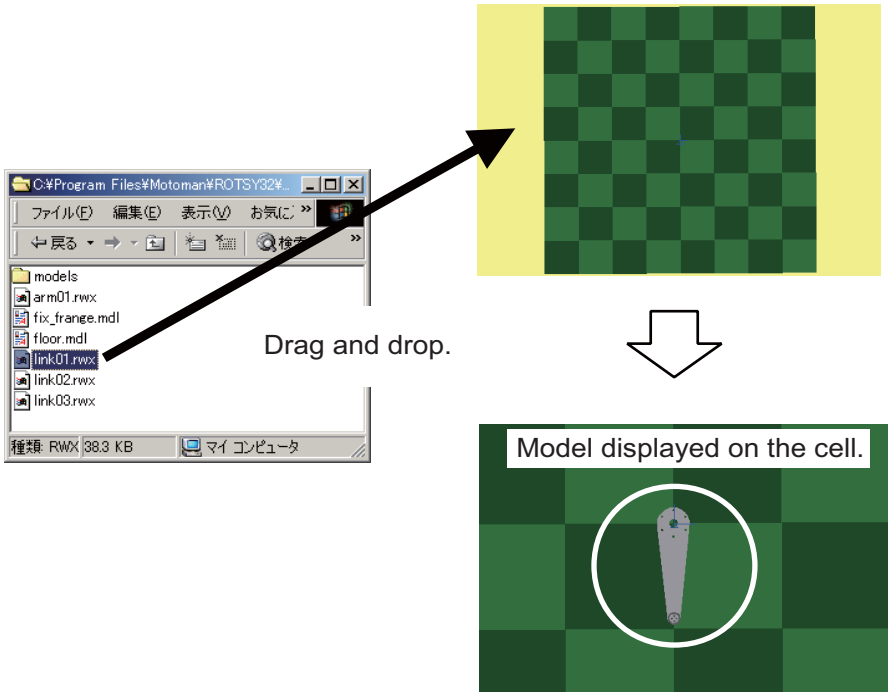
The model file of an existing model can be changed with {ChangeFilePath} under {Attribute} of the Cad Tree menu.

To use this function, select a model to be changed in the Cad Tree, then select {Attribute} - {ChangeFilePath} from the Cad Tree menu. Select the desired model file in a file selection dialog box to change the model file.
Note that the change will only take effect the next time the cell is open.

NOTE The model files for "world", "Teacher", and robot models cannot be changed.

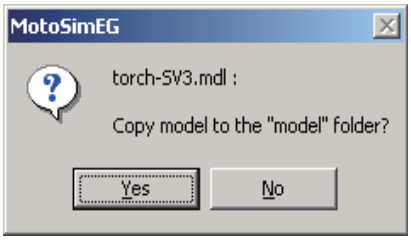
11.11 Reading a Model

A model appears on the cell by dragging and dropping its model file (in the HSF, HMF, MDL, 3DS, or RWX format) to the cell window, and the model file is copied to the "models" folder. In this operation, a parent model can also be selected.

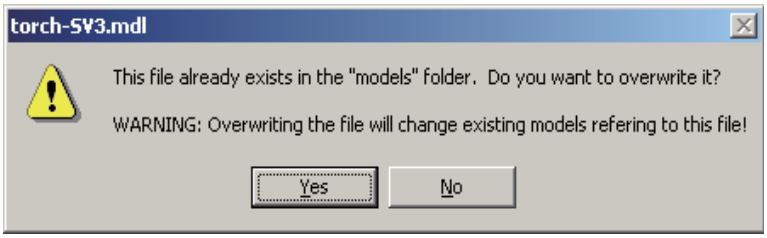


Procedure

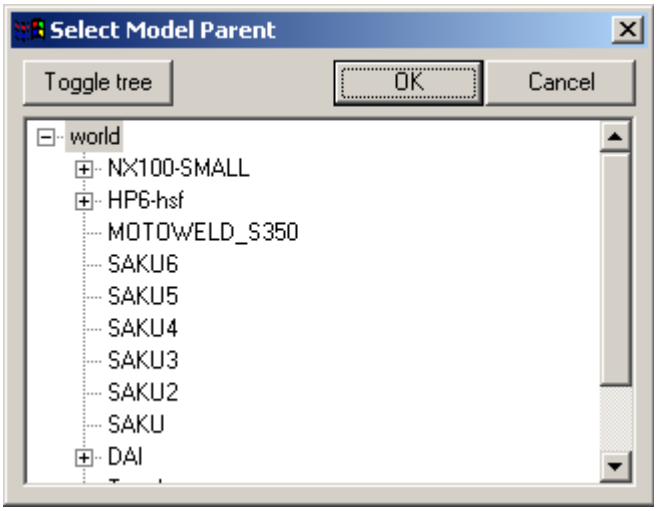
1. Drag and drop an arbitrary model to the cell window; If the model file path doesn't correspond to the "models" folder under the cell folder, the following dialog box will display and offer to copied model file to the "models" folder of the cell.



If the "Yes" button is clicked and a file with the same name already exists in the cell "models" folder. The following dialog will display to ask for overwrite confirmation.



2. The Select Model Parent dialog will display. Select the model that will become the parent of the new model and press the [OK] button. (By default the "world" model is selected.)



NOTE

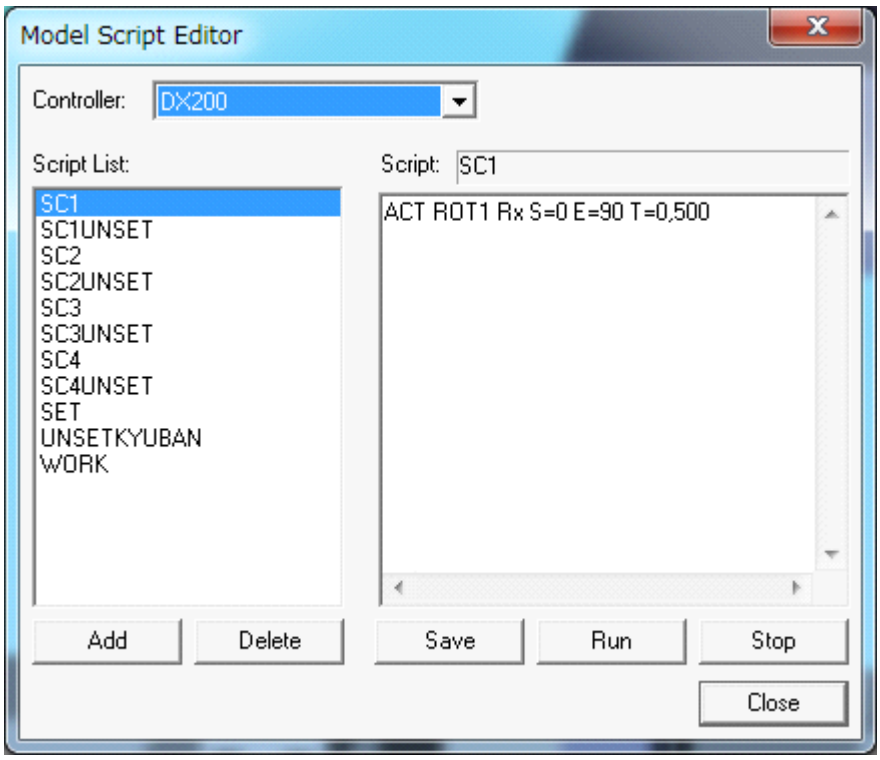
When adding LINE data (wire frame), it is recommended to use LINE data in the HMF format: adding LINE data in other format may take some time.
If the LINE data is in a format other than HMF, convert the LINE data with “MDL2HMF.EXE” before adding the model. (The MDL2HMF.EXE is located in a folder where MotoSim EG-VRC was installed).

11.12Model Script

Model script allows manipulate models by the execution of a series of model commands. The model script editor allows to write and manage the model script of the specified controller. The model script can be executed from the Model Script Editor or from an I/O Event during playback. (For details on I/O Events refer to section " 8.3 I/O Events ").

11.12.1 Model Script Editor

To display the Model Script Editor select {Model} - {Model Script Editor} from the main menu.



Model Script Editor Dialog Box

Item	Description
Controller	Select the controller for which the scripts are to be edited.
Script List	Displays the list of scripts for the selected controller. Select a script to display/edit its content in the right section of the dialog.
Script	Displays the name of the selected script. The script content in displayed in edit box below where the model commands can be added or modified.

Model Script Editor Dialog Box

Item	Description
[Add] button	Adds a new script to the list. A dialog will display to enter the script name. Enter a name and press OK. The new script will be added to the list.
[Delete] button	Deletes the script currently selected in the script list.
[Save]button	Save the script content to file. Note: Scripts are saved to the “ModelScript.txt” file under each controller folder.
[Run]button	Execute the script selected.
[Stop] button	Stop the script selected.
[Close]button	Closes the Model Script Editor dialog.

11.12.2 Model Commands

Model commands can be used in model script to manipulate models in the cell. Note that model names are case sensitive. Make sure that the names are typed exactly like the name of the model appearing in the Cad Tree.

◆ Model Display

Notation SEE M1

Meaning Displays the model M1.

◆ Model Non-display

Notation HID M1

Meaning Hides the model M1.

◆ Model Move 1 (Set Model Parent)

Notation MOV M1 M2

Meaning Moves the model M1 in the Cad Tree to change its parent to M2. Without changing the model location on the display, the model relative position from its new parent (M2) is changed automatically.

◆ Model Move 2

Notation AXIS6 M1=10,20,30,0,0,0

Meaning Moves the model M1. The position from the parent is changed to (10,20,30,0,0,0).

◆ Model Move 3

Notation ADDX6 M1=10,20,30,0,0,0

Meaning Moves the model M1. The position from the parent is changed by adding (10,20,30,0,0,0) to the current position.

◆ Model Copy 1

Notation DUP M1 M2

Meaning Copies (duplicates) the model M1 to create M2.

Note If MotoSim EG-VRC is saved without deleting the copied model, the description (information on arrangement, etc.) is written in to the cell. The copied model will reference the same model data file (.mdl) as the original model.

◆ Model Copy 2

Notation REF M1 M2

Meaning Copies (references) the model M1 to create M2.

Note Even if MotoSim EG is saved without deleting the copied model, the description (information on arrangement, etc.) is not written in to the cell.

◆ Model Deletion

Notation DEL M1

Meaning Deletes the model M1.

◆ Model Action

Notation ACT M1 D S=P1 E=P2 T=T1,T2

Meaning Meaning?Model M1 moves from P1 to P2 in D direction between T1 and T2.
D : One of the character X, Y, Z, Rx, Ry or Rz
P1 : Movement start position (units:mm or deg.)
P2 : Movement end position (units:mm or deg.)
T1 : Movement starting time after this model script executed(units:msec)
T2 : Movement ending time after this model script executed(units:msec)

(E.G.) ACT M1 X S=0 E=1000 T=0,1000
Model M1 moves from 0mm to 1000mm in X-axis direction between 0ms and 1000ms

Note Only while a controller is moving, ACT command is executed.
If the time of ACT command is over the playback time, ACT command also stops at the time of a playback finishing. And, ACT command is not executed by RCS controller.

◆ I/O signal Output

Notation1 OUT C1 #(20030)=ON

Meaning IO signal 20030 (Logical Name) of controller C1 turns ON

Notation2 OUT C1 IN#(1)=ON

Meaning General Input IO signal IN#(1) of controller C1 turns ON

Note Only while a controller is moving, ACT command is executed.
If the time of ACT command is over the playback time, ACT command also stops at the time of a playback finishing. And, ACT command is not executed by RCS controller.
General Input and External Input are supported only.

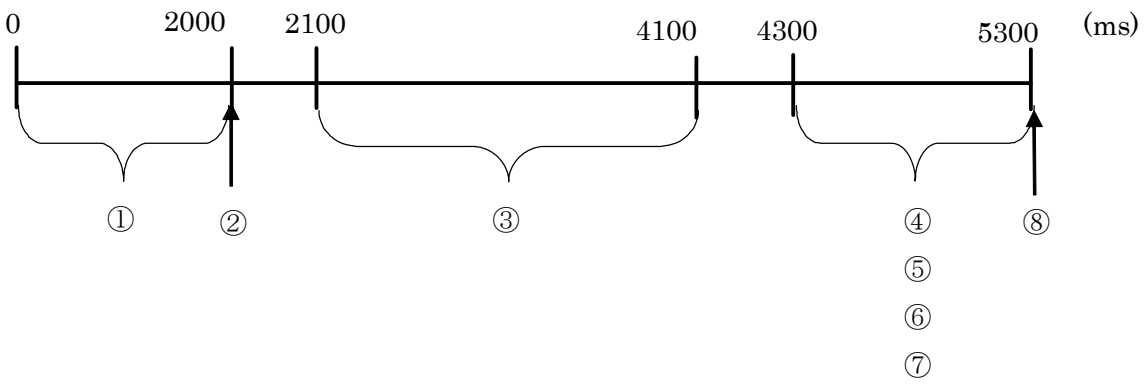
■ Starting Time of Each Command in Model Script

To specify the timing of executing each command, add "T=T1 ,T2" at the end of each command. Because commands besides ACT move momentarily, make T1 and T2 the same value.
(E.G.) MOV WORK world T=1000 ,1000

(Example for Executing Timing)

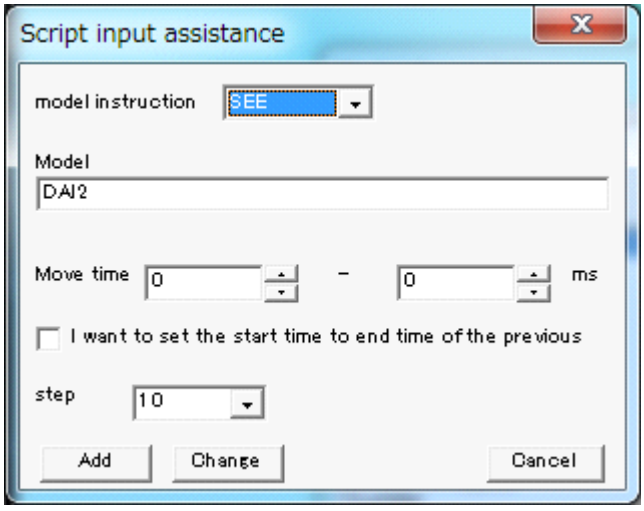
```
ACT KYUBAN Z S=0.000 E=-1150.000 T=0 ,2000          ①
MOV WORK world T=2000,2000                          ②
ACT KYUBAN Z S=-1150.000 E=0.000 T=2100 ,4100       ③
ACT ROT1 Rx S=0.00 E=90.00 T=4300 ,5300             ④
ACT ROT2 Rx S=0.00 E=90.00 T=4300 ,5300             ⑤
ACT ROT3 Rx S=0.00 E=90.00 T=4300 ,5300             ⑥
ACT ROT4 Rx S=0.00 E=90.00 T=4300 ,5300             ⑦
OUT DX200 IN#(1)=ON T=5300 ,5300                    ⑧
```

The executing timing of starting each command of above model script is as follows.



11.12.3 Display of script input assistance

As for the script, the edit that uses the manual edit and the “Script input assistance” dialog box can be done.
The “Script input assistance” dialog box opens when the line edited in the “Model Script Editor” dialog box is double-clicked.



Model Script Editor Dialog Box

Item	Description
Model instruction	The model instruction is selected. (The input item changes by the selected model instruction.)Please refer to the explanation of the following each model instructions for details.
Move time	Set the execution starting time and ending time of the model command.(units:msec) In case of ACT command, the model moves smoothly between starting time and ending time.
I want to set the start time to end time of the previous	When enabled, the ending time of the latest line is set to the starting time automatically.
step	Set the increment value of the spin control.
[Add] button	The edited model instruction is added to a selected line. (Former model instruction moves below by one line.)
[Change] button	A selected line is changed by the edited model instruction.
[Cancel]button	The script input assistance is closed without changing the edited content.

It explains the input item of each model instruction.

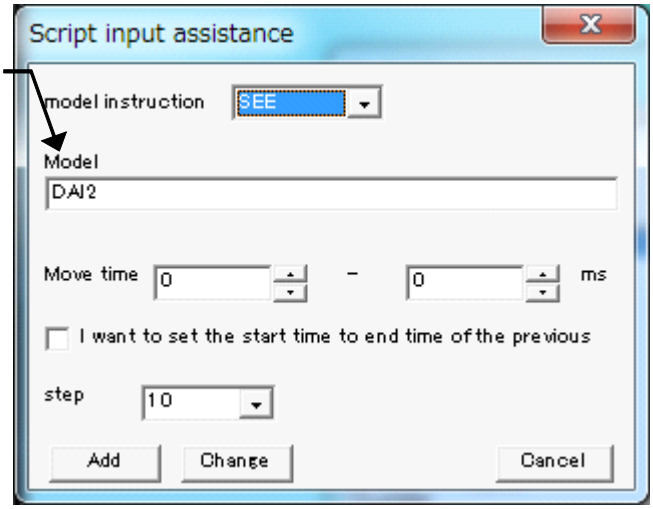
◆The model's display (SEE), the model's non-display (HID), and the model's deletion (DEL)
The [model] is input.

The [model] is input by either the selection with the direct input or Cad Tree or 

.

The [Move time] is set by either the direct input or  . The increment value of  can be changed by step.

The model name is input.



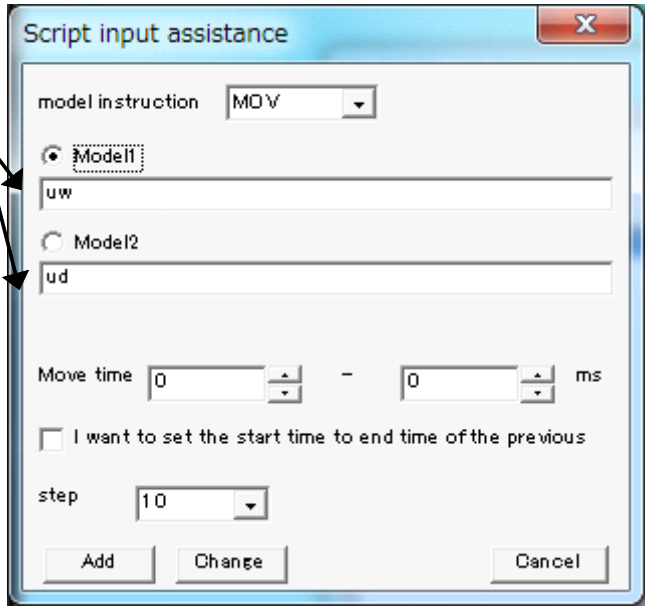
◆ The model's movement 1(MOV), the model's copy 1(DUP), and the model's copy 2(REF) [Model1] and [Model2] are input.

The [Model] is input by either the selection with the direct input or Cad Tree or 

.

The [Move time] is set by either the direct input or  . The increment value of  can be changed by step.

Model 1 and model 2 are input.



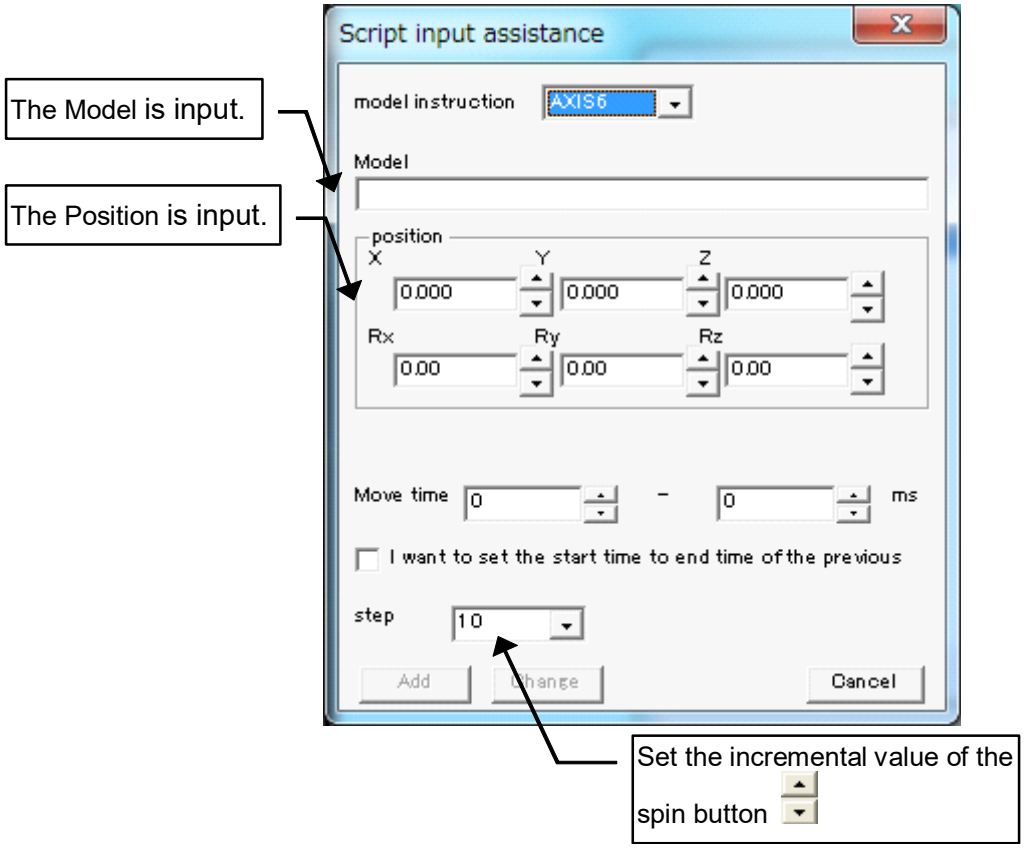
◆ The model's movement 2(AXIS6) and the model's movement 3(ADDX)
The [Model] and the [Position] are input.

The [Model] is input by either the selection with the direct input or Cad Tree or 

.

The [position] and the [Move time] are set by either the direct input or  .

The incremental value of  can be changed by step.



◆ The model's action (ACT)

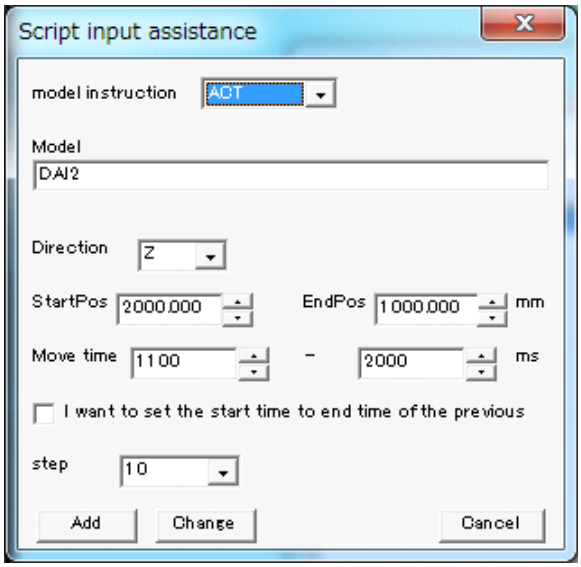
[Model], [Direction], [StartPos], [EndPos] and [Move time] are input.

The [Model] is input by either the section with the direct input or CAD Tree or 

.

The [StartPos], [EndPos] and [Move time] are set by direct input or spin box  .

The increment value of spin box  can be changed by step.



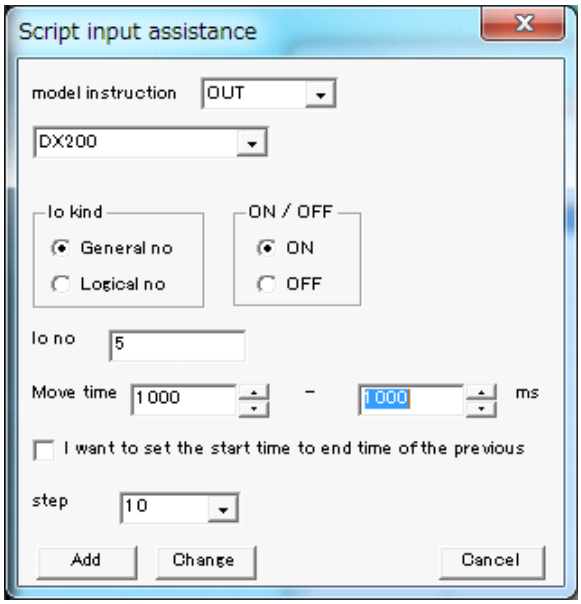
◆ The I/O output (OUT)

The target controller of I/O output is selected by the drop down list.

The [Io kind], [ON/OFF], [Io no] and [Move time] are input.

The [Move time] is set by either the direct input or  .

The increment value of  can be changed by step.



11.12.4 Execute Model Script while playback

To execute the model script while playback, Set one of the following.

- I/O Event
  For details, refer to the section ." Fig. 8.3) I/O Events "
- Comment of Job
  Enter the following comment at the point where the model script is to be started.

  'MDS:[Model Script Name]
  (E.G.)

```
0000 NOP
0001 DOUT OT#(1) OFF
0002 MOVJ VJ=10.00
0003'MDS:SET
0004 WAIT IN#(1)=ON
0005 MOVJ VJ=20.00
0006'MDS:SC1UNSET
0007 MOVL V=100.0
0008'MDS:SC2UNSET
0009'MDS:SC1
```

  And, when enter the following comment in a job, the model script execution after this comment waits for the previous model script completion. But job execution keeps.

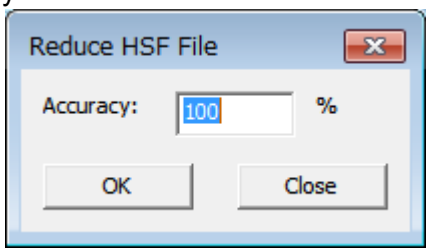
  'MDSWAIT
  (E.G.)

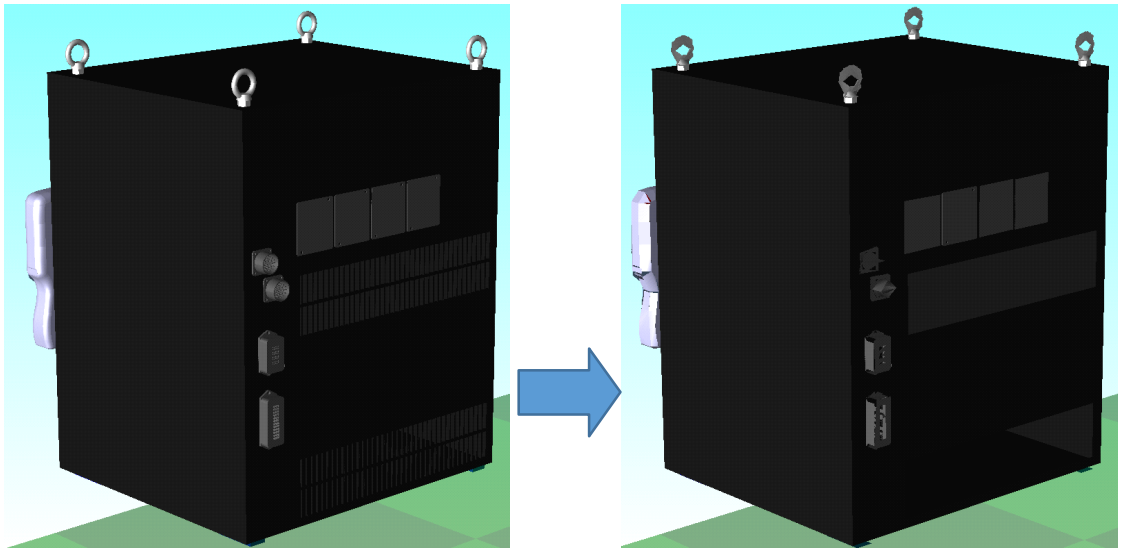
```
0014 MOVL V=100.0
0015 MOVL V=100.0
0016'MDS:SC1UNSET
0017'MDS:SC2UNSET
0018'MDSWAIT
0019'MDS:SC4UNSET
0020 MOVJ VJ=20.00
0021'MDS:UNSETKYUBAN
```

Model script “SC4UNSET” execution waits for the previous model script “SC1UNSET” and “SC2UNSET” completion.

11.13Reduce HSF File

The number of polygons of the HSF file can be reduced.
On the [CadTree] dialog, select a model to reduce the polygon number. And, right-click on the model and select the [HSF Reduce] menu, the [Reduce HSF File] dialog is displayed. Input the Accuracy and click the [OK] button, the number of polygons of the HSF file is reduced. When the accuracy is set to 100%, a model will be an original model. The number of polygons is reduced so that the accuracy is set as the small value.





NOTE This function is available only with the HSF data. When a file size is big, it takes time for reducing process.

11.14CAD Data Import <CadPack Option>

NOTE To use this function (CadPack option), the MotoSim EG-VRC-CadPack is required. (The MotoSim EG-VRC-CadPack is separate product from MotoSim EG-VRC.)

Loads the following CAD data format to the cell directly.

Format	Extension	Version	Availability of CAM function	Scale conversion
IGES	igs,iges	-5.3	○	○
STEP	stp,step	203,214,242	○	○
Inventor	ipt	V11-2020	○	○
ProE / Creo	prt, prt.*, asm, asm.*	16-Creo 6.0	○	○
SolidWorks	sldprt,sldasm	2003-2019	○	○
CATIA V5	CATPart,CATProduct	R8-R29(V5 – 6R2019)	○	○
SAT	sat	R1-R29(2019 1.0)	○	○
Parasolid	x_t,x_b	9.0.* - 31.1.*	○	○
DXF	dxf	2.5-2020	○	×
HSF	hsf	-20.80	×	×
HMF	hmf	-20.80	×	×
VRML	wrl	2.0	×	×
STL	stl	—	×	×
3DS	3ds	—	×	×
RWX	rwx	—	×	×
PLY	ply	—	×	×

This function is accessible by:

a)The Add Model dialog of the [Cad Tree]
(For details, please refer to section " Creating a Model from an Existing Model ".)

b)Dragging and dropping the file over the cell display area.
(For details, please refer to section " 11.11 Reading a Model ".)

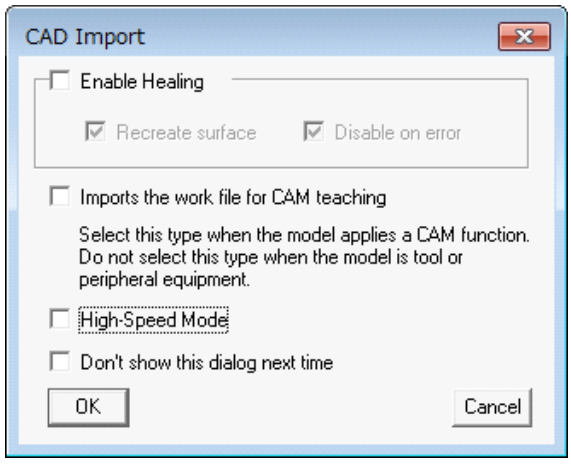
NOTE When adding a model with method a) Add Model dialog, it is necessary to select "All (*.*)" in the "File Type" section, in order to display all the file types and be able to select the IGES or SAT files.

■ CAD Data Import

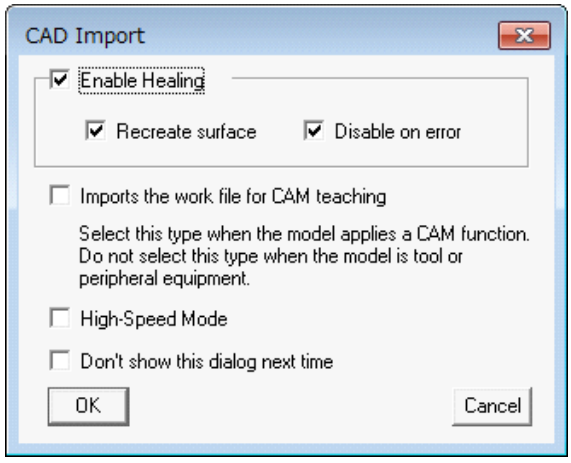
Before importing CAD data, the "CAD Import" dialog will display. The healing settings in the dialog can be changed if required. (This dialog doesn't display when importing SAT file.)

To change the default settings related to the CAD Import, please refer to section " 12.7 CAD Import/Export <CadPack Option> ".

The figure below shows, the "CAD Import" dialog when the IGES data healing is disabled.
This is the default setting.



The "CAD Import" dialog with the IGES data healing enabled.



CAD Import

“Enable Healing” section	When enabled, a healing algorithm is applied to the imported CAD data. [Recreate surface] check box The [Recreate surface] option is normally selected. The [Recreate surface] is part of the normal healing process. If it is unselected, this step will be skipped in the healing process. If the surface regeneration doesn't give the intended results, unselect the "Recreate Surface" may improve the healing results. [Disable on error] check box The [Disable on error] option is normally selected. When the [Disable on error] is selected, the healing will be disabled if an error occurs during the healing process.
Imports the work file for CAM teaching	Select this type when the model applies a CAM function. Do not select this type when the model is tool or peripheral equipment. General CAD data are displayed in the CadTree dialog, and the model for CAM teaching are displayed .

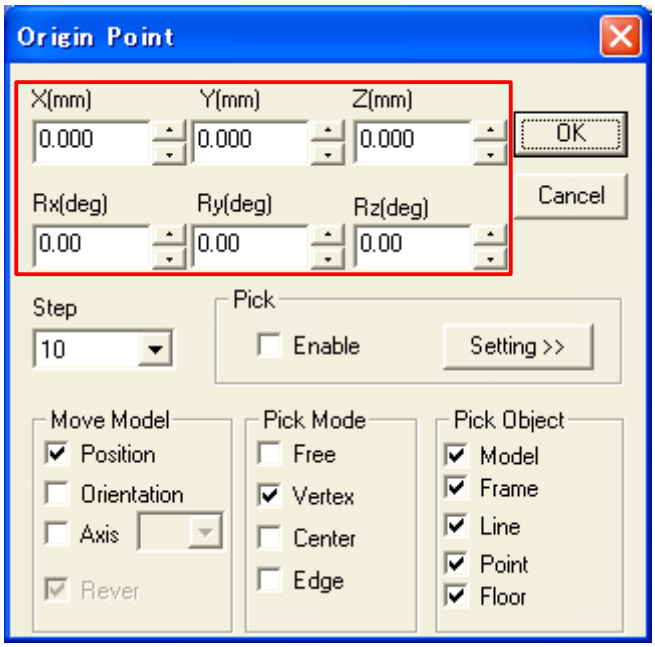
CAD Import

[High-Speed Mode] check box	When enabled, MotoSim EG-VRC reads only data necessary to drawing from CAD data, so it may takes higher. But, When "Imports the work file for CAM teaching" is enabled, this is disabled. NOTE IGES and STEP assembly format files are not supported High-Speed mode.
[Don't show this dialog next time] check box	If checked, the "IGES Import" dialog will no longer be displayed when an IGES file is imported. The "IGES Import" dialog display can be re-enable in the "Option Setting" dialog under the "CAD Import/Export" tab. Please refer to section " 12.7 CAD Import/Export <CadPack Option> ".
[OK]button	The IGES file import will proceed with the options set in the dialog.
[Cancel]button	Cancel the IGES file import

NOTE The healing process attempts to repair any corrupted data of the imported CAD files. However, the processing time to import a file may increase significantly when healing is used. The performance may also vary depending on the extent and nature of the errors in the original CAD file. In some cases, result with healing may be worst than reading the file without healing.

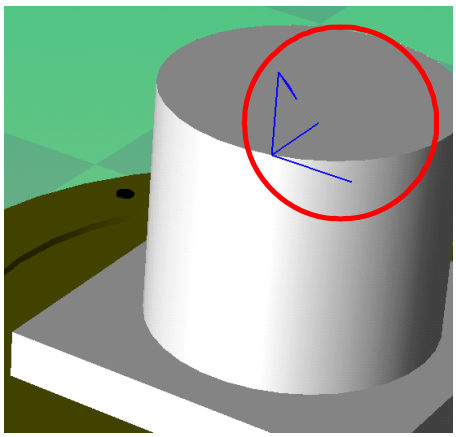
11.15Changing the Coordinate Origin of CAD Data <CADPack Option>

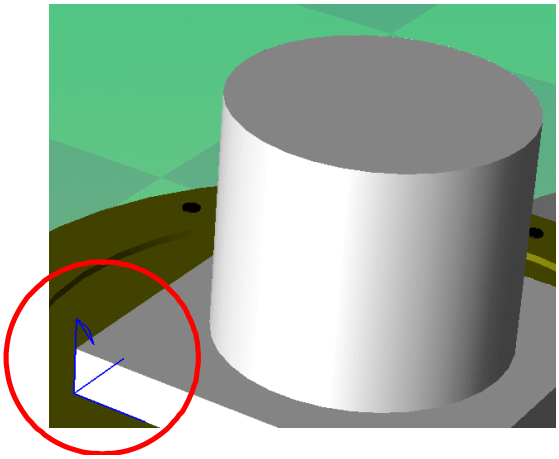
Change the coordinate origin of external CAD data.
After [Cad Tree] is displayed, right-click on the work to change the coordinate origin and select the [set Originpos] menu. Then the [Origin Point] dialog is displayed, change the value of position.



NOTE This function is available only with the data which enabled [Imports the work file for CAM teaching] at the time of reading of the following external CAD data.
CATIA, SOLIDWORKS, Pro/E, INVENTOR, IGES, STEP, SAT, Parasolid, DXF

It is possible to change the coordinate origin of external CAD data as follows.





11.16CAD Data Export

Exports in IGES,SAT or HSF format the data of MDL models with their relative position from a selected base point.

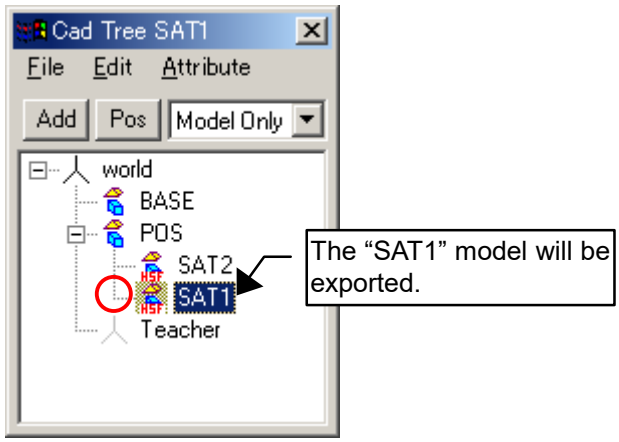
NOTE

- When IGES or SAT data are exported (CadPack option), the MotoSim EG-VRC-Cad-Pack is required. (The MotoSim EG-VRC-CadPack is separate product from MotoSim EG-VRC.)
- Only the model referring to
  - .mdl files composed of BOX, BOX2, CYLINDER, CONE2, SPHERE, PIPE2, AXIS6, LINE, LINE2 parts;

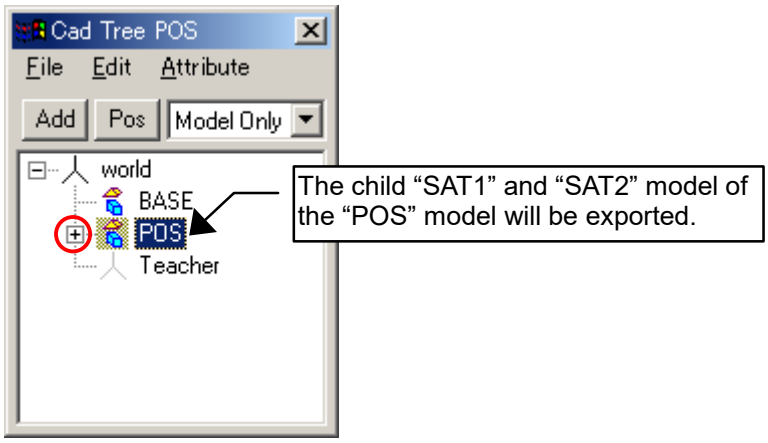
can be exported.

■ Procedure

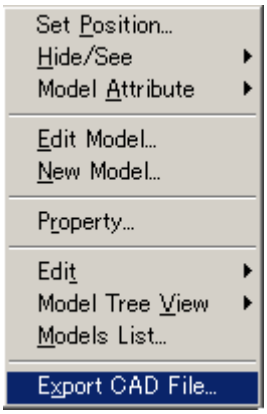
1. Select in the Cad Tree the models to export.
   - To select a single model:
     Expand the model node so that there is no "+" icon on the left of the model name and select the model.



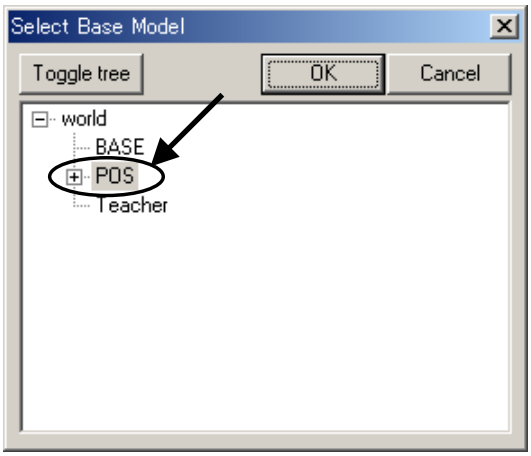
   - To select multiple models
     Collapse the node containing the desired models so that there is a "+" icon on the left of the model name. All the child models in the collapsed branch will also be exported.



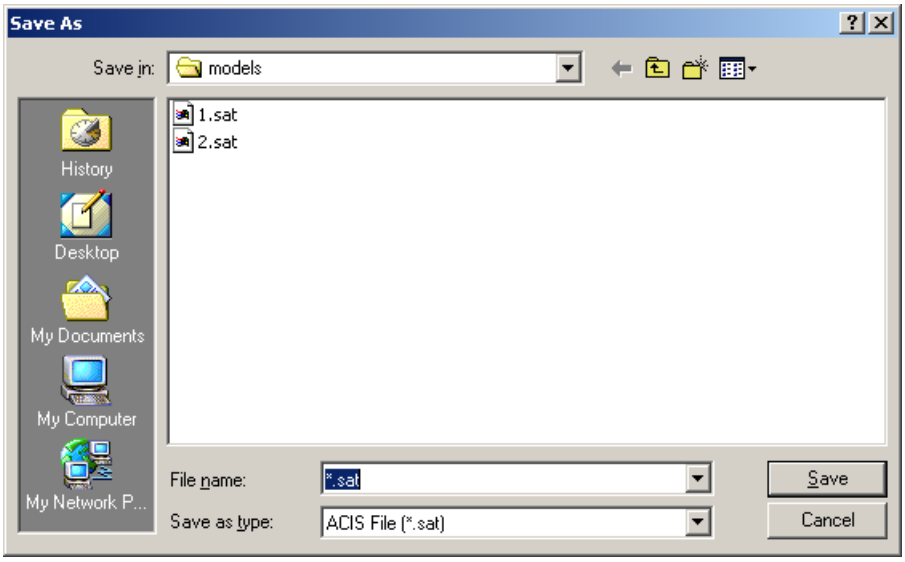
2. Right click on the CadTree to display the popup menu. Then select "Export CAD File..."



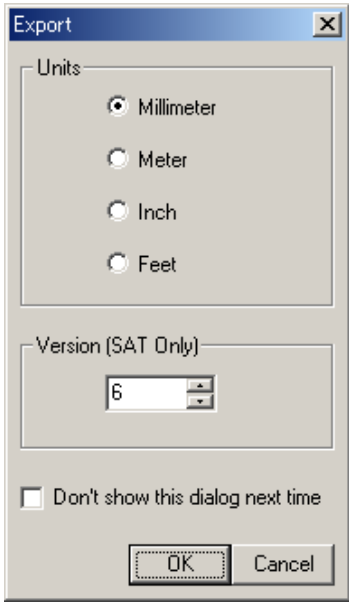
3. In "Select Base Model" dialog, select the model to be used as the base point (origin) of the exported model and press the [OK] button.



4. In the "Save As" dialog, select the file type (IGES,SAT or HSF). Enter a filename and press the [Save] button.



5. If the "Export" dialog is set to display, the "Export" dialog will display to confirm the IGES/SAT export settings. Change the settings as required, and then press [OK]. For more details please refer to the " Export " section above.

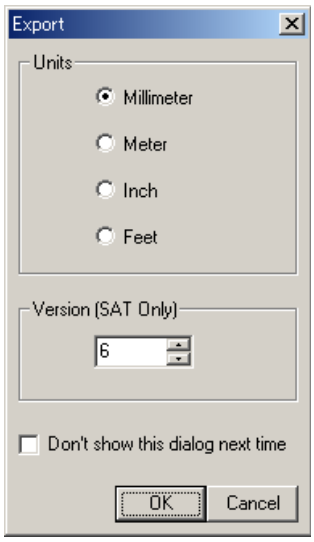


6. When the export is completed the following message will display.

■ Export

Before the CAD data of IGES or SAT format is exported, the "Export" dialog is displayed. The export settings in the dialog can be changed if required.
To change the default settings related to the export, please refer to section " 12.7 CAD Import/Export <CadPack Option> ".

NOTE The settings selected in the "Export" dialog will not change the settings in the "Option Setting" dialog under the "CAD Import/Export" tab.



Export

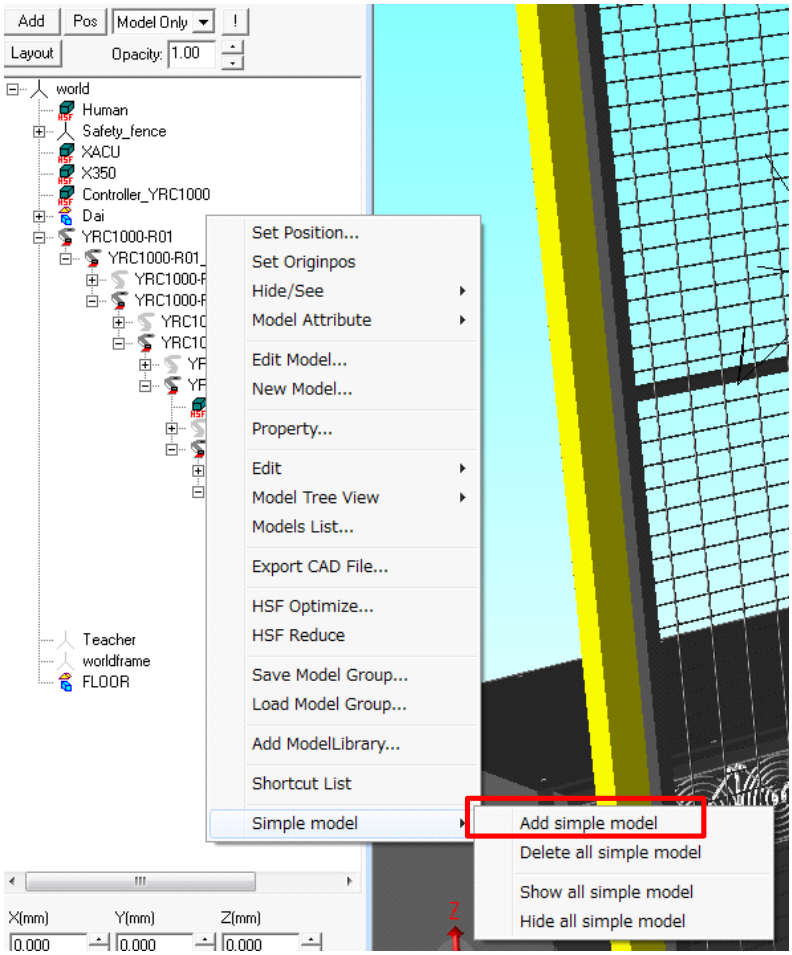
[Units] radio button	Sets the measuring units of the exported SAT or IGES files.
“Version (SAT Only)” section	Sets the SAT file version used in the exported file.Recommended value: 6 (Setting range: 4 to 29)
[Don't show this dialog next time] check box	If checked, the "IGES Import" dialog will no longer be displayed when an IGES file is imported. The "IGES Import" dialog display can be re-enable in the "Option Setting" dialog under the "CAD Import/Export" tab. Please refer to section " 12.7 CAD Import/Export <CadPack Option> ".
[OK]button	The CAD export will proceed with the options set in the dialog.
[Cancel]button	Cancel the CAD export.

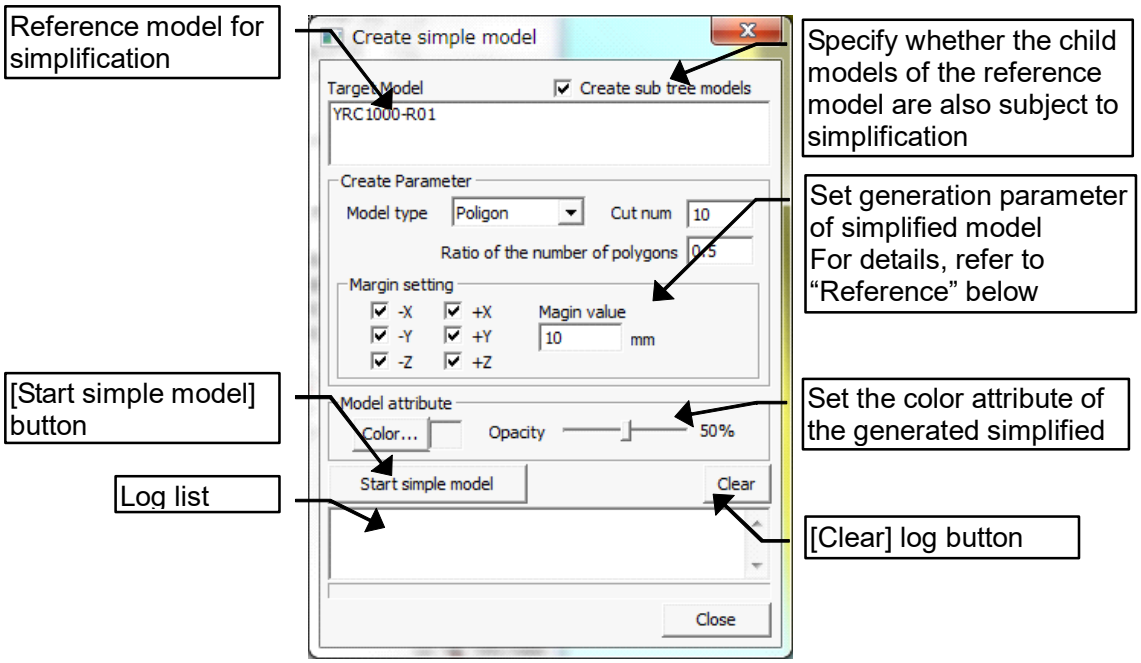
11.17 Creating Simplified Model

The simplified model creation function creates a simplified model with reduced polygon count. Specifying a simplified model for the target of interference check, performance can be improved.

■ Creating Simplified Model from CadTree

To create a simplified model, click the right mouse button on the model of the [CadTree] dialog or on the model displayed on the screen, and select "Add simple model" from the pop-up menu. The "Create simple model" dialog is displayed.



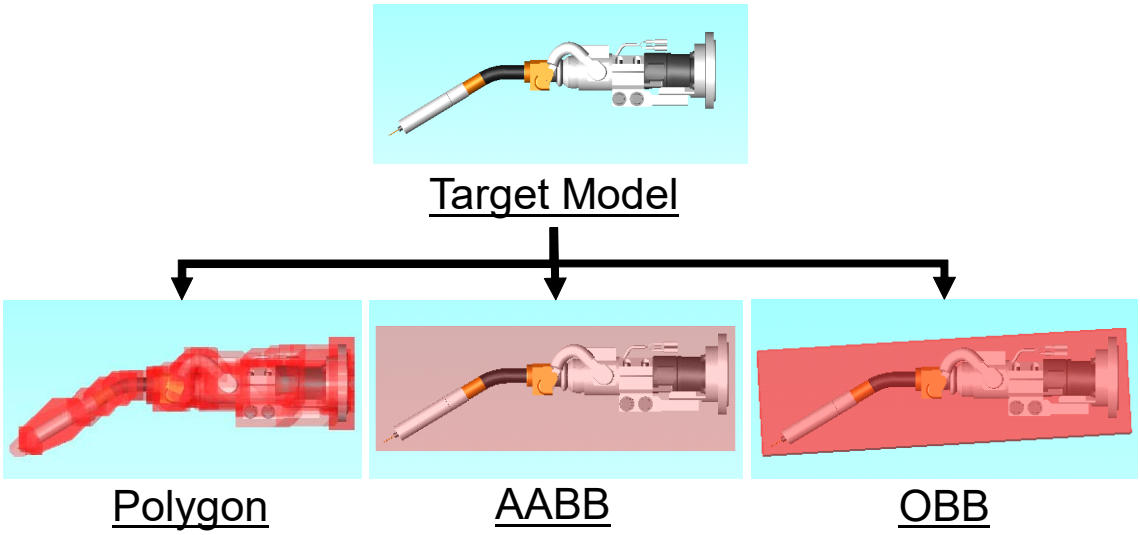


■ Generation Parameter

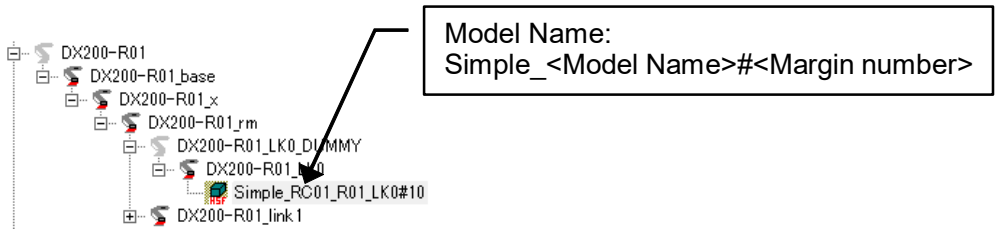
Model Type	Sets one of the model types. Poligon : convex polyhedron (default) AABB : A rectangular parallelepiped with the same orientation OAB : Rectangular parallelepiped whose orientation was adjusted according to inclusion model
Cut num	Sets the number of cuts of the model's face in simplification model generation. The smaller the value, the rough model is generated.
Ratio of the number of polygons	Sets the ratio of the number of polygons in the simplification model to the number of polygons of the reference model. Because it is the reference of model generation, it is not guaranteed that it will always be proportionate to it. NOTE When this is a small value, simplification may fail if a number of polygons of the reference model is small.
+X, -X, +Y, -Y, +Z, -Z	Sets whether to reflect the margin amount in the plus or minus direction of each axis.
Margin value	Sets the margin amount between the simplified model and the reference model. If 0 is specified, a simplified model with the same size as the reference model is generated.
Color	Sets the color of the simplified model.

Opacity	Sets the opacity of the simplified model. [Transparent] 0%<------>100% [Opaque]

■ Reference



- About the reference model for generating simplified models
  The target models of this function are only the model displayed in the main screen. Hidden models are excluded.
- About name of the simplified models
  The simplified model is added as a subtree item of the reference model.

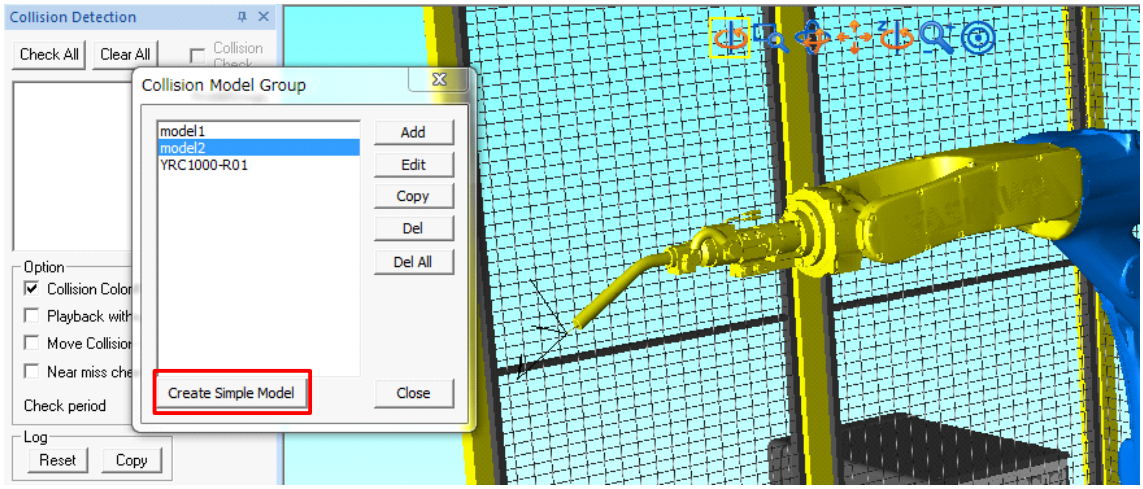


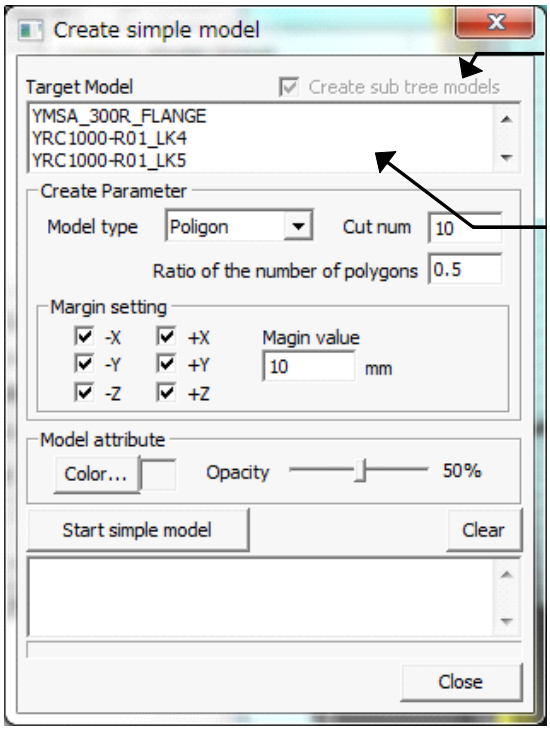
NOTE The <model name> used for the simplified model name is as follows.
"Simple_XXXXXXXX [Margin number]"
Use the part of "XXXXXXXX" excluding the controller name "<model name> _XXXXXXX" of the reference model.

■ Simplified model creation of collision model group

Simplified models can be created for interference model groups registered as targets.

On the "Collision Model Group" dialog displayed from the "Collision Detection" dialog, select the group for which simple models are created and select the [Create Simple Model] button.

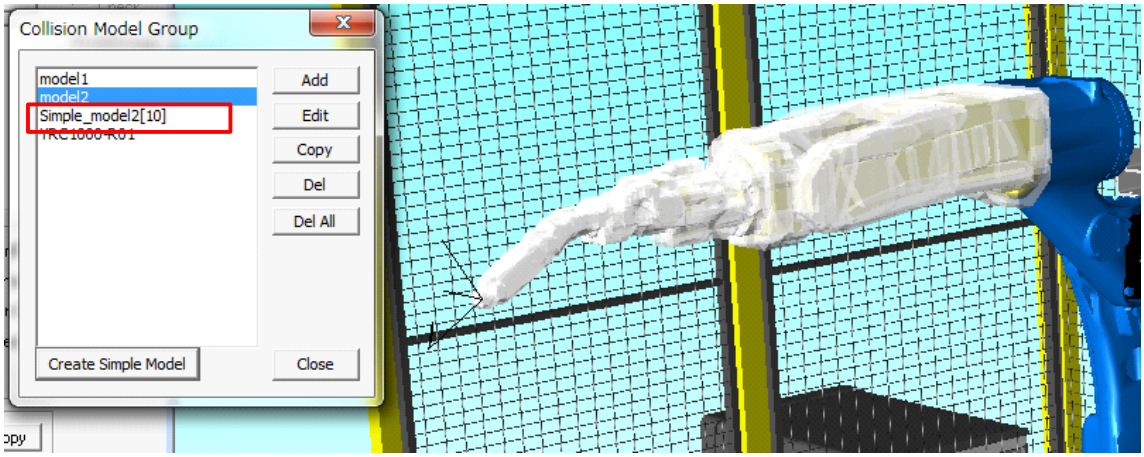




"Create sub tree models" check box is unavailable.

The models registered in the collision model group are displayed in a list.

When generation of the simplified model is completed, the process returns to the collision model group dialog. And, the collision model group composed of the created simplified model is registered as "Simple_ <collision model group name>".

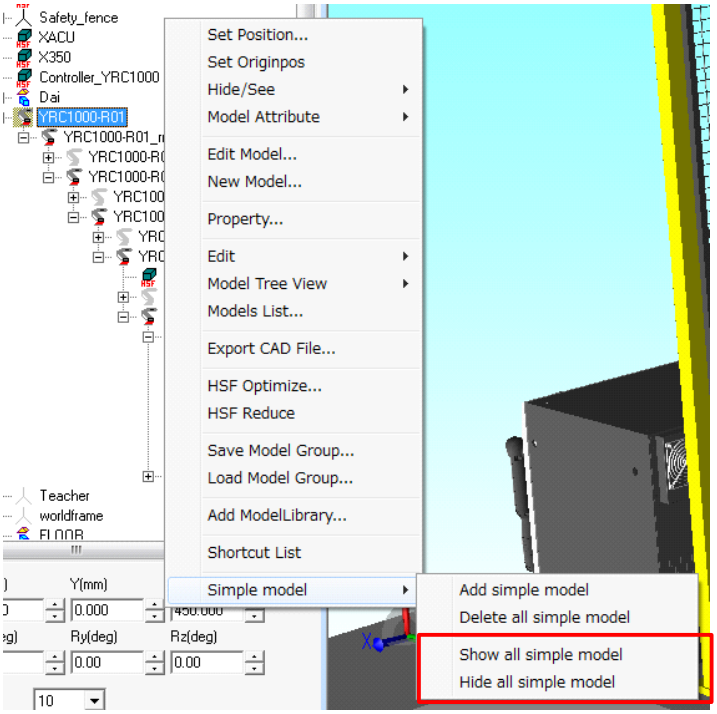


By using the model group of the created simplified model for the collision pair, it is possible to improve the performance of collision check processing.

■ Show / hide simplified model

To show / hide the created simplified model, select the target simplified model from the CadTree dialog, right-click and select the "Hide/See" menu in popup menu.

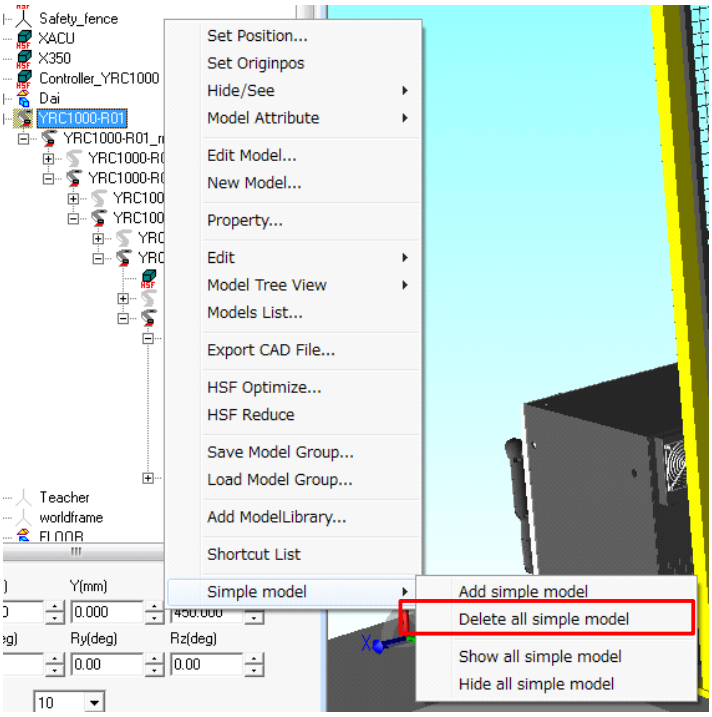
Also, select "Simple model" - "Show all simple model" or "Simple model" - "Hide all simple model" in the pop-up menu, all simplified models that exist in the subtree of the currently selected model are shown / hidden.



■ Delete simplified model

To delete a created simplified model, select the target simplified model from the CadTree dialog, right-click and select the "Edit" - "Delete" menu in popup menu.

Also, select "Simple model" - "Delete all simple models" in the popup menu, all simplified models that exist in the subtree of the selected model are deleted.



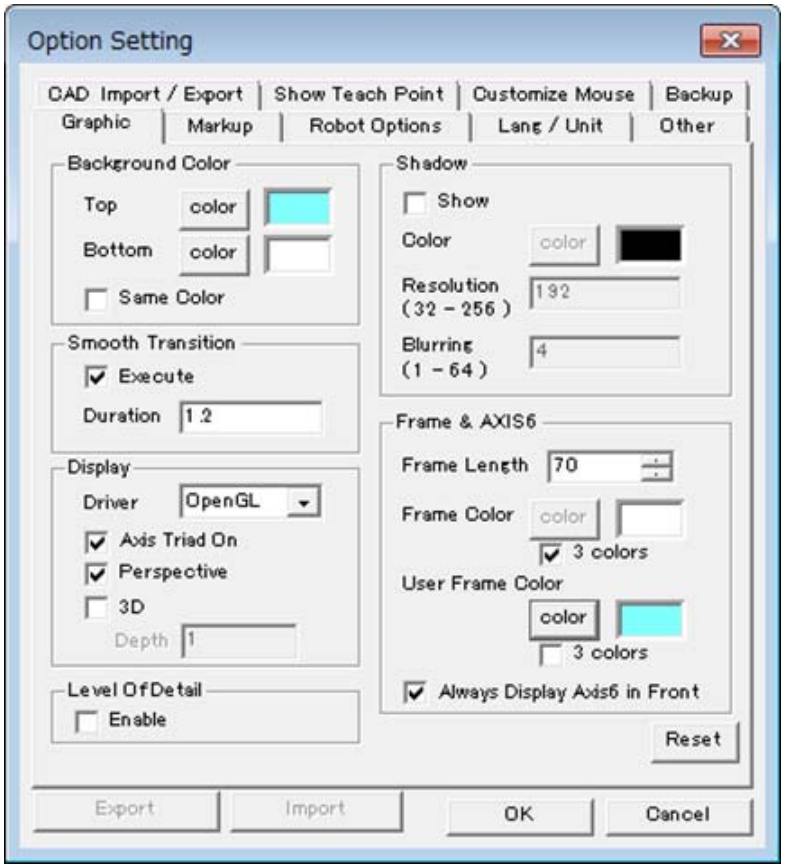
12 Configuration Settings

Various configuration settings can be made in the Option Setting dialog box.

Click the MotoSim EG-VRC button ( ), and select the [Options] menu.

12.1 Graphical Settings

For the graphical settings, select the “Graphic” tab of the Option Setting dialog box.



Graphic tab

Item	Description
[Reset] button	Restores all the values to the default setting.
[OK] button	Applies the modifications, and closes the dialog box.
[Cancel] button	Closes the dialog box without applying the modifications.

12.1.1 Background Color

Specify the background color of the cell window in the “Background Color” section.

Item	Description
"Top" color indication box	Displays the current color of the upper part of the background. Press [color] to display the Color dialog box, and select the desired color.
"Bottom" color indication box	Displays the current color of the bottom part of the background. Press [color] to display the Color dialog box, and select the desired color.
[Same Color] check box	Check this check box to set the “Bottom” background color to the same color as the “Top” background.

12.1.2 Smooth Transition

Specify if a smooth transition is executed when changing viewpoint in the “Smooth Transition” section.

Item	Description
[Execute] check box	Select to execute the smooth transition function when changing the viewpoint.
"Duration" edit box	Specify the duration of the smooth transition. (Editable when the [Execute] check box is selected.)

12.1.3 Display

Configure the graphic driver in the "Display" section.

Item	Description
"Driver" combo box	Select a graphic driver from the list: "OpenGL2" is selected by default. The graphic drivers currently available are "OpenGL", "OpenGL2" and "WinGDI". NOTE To apply the change of graphic driver, reload the cell.
[Axis Triad On] check box	Displays the coordinate axis below on the lower left of the cell window. 
[Perspective] check box	Check this check box to display the cell in perspective.

12.1.4 Shadow

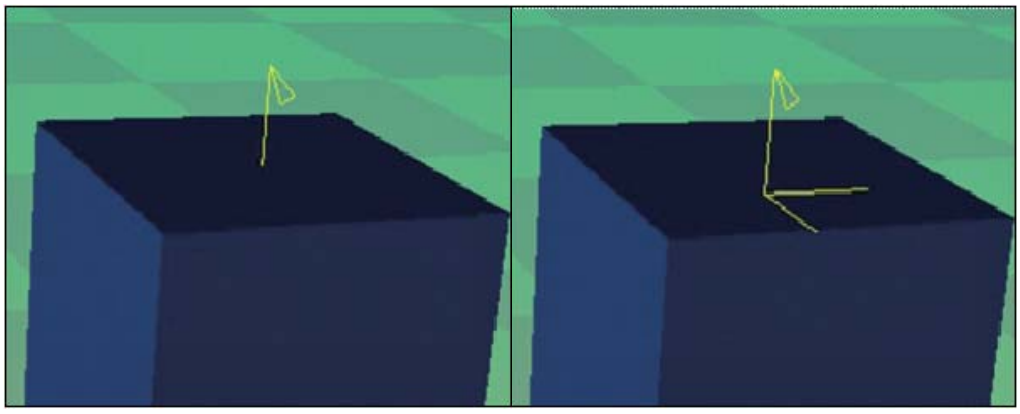
Set the following items for shadow display in the “Shadow” section.

Item	Description
[Show] check box	Select to display shadows on the cell window.
"Color" indication box	Displays the current color of the shadows. Press [color] to display the Color dialog box, and select a desired color. (The [color] button is enabled when the [Show] check box is selected.)
"Resolution" edit box	Enter the resolution value. (Editable when the [Show] check box is selected.)
"Blurring" edit box	Enter the value for the gradation effect. (Editable when the [Show] check box is selected.)

12.1.5 Frame & AXIS6

Specify the Frame and Axis6 display property.

Item	Description
“Frame Length” spin box	Enter the value of the frame and Axis6 length with the spin button.
Frame Color	Press [color] to display the Color dialog box, and select a desired color for Frame. Check "3 colors" checkbox to display in each color for X,Y,Z axis.
User Frame Color	Press [color] to display the Color dialog box, and select a desired color for User Frame. Check "3 colors" checkbox to display in each color for X,Y,Z axis.
"Always Display Axis6 in Front" checkbox	When checked, the Axis6 are displayed in front of all the other parts.



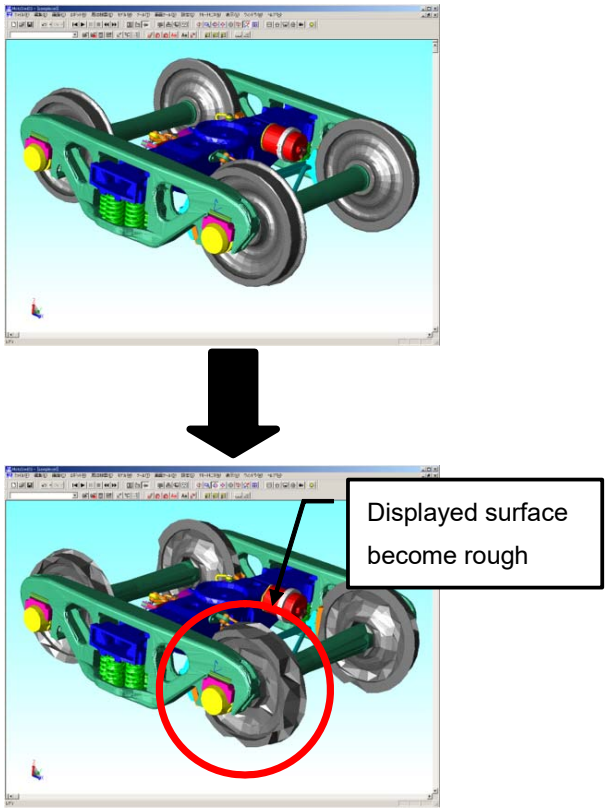
Regular Display　　Axis6 Displayed in Front

12.1.6 Level of Detail

When changing the scene viewpoint or during playback the level of detail can be decrease in order to obtain a smoother animation. This function is useful to improve display performance of cell containing a large amount of data such as very detailed HSF model.

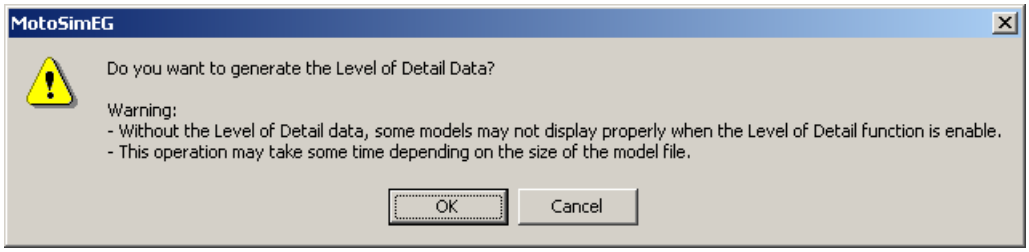
Item	Description
Enable	When this item is checked, the level of detail will be reduced during viewpoint change and playback. The level of detail data will also be generated for the HSF models when required. NOTE • When the function is enabled, a message offers to generate the level of detail data for the currently opened cell. If the data was previously generated for this cell, it is not necessary to regenerate the data and you may press "Cancel". • The generation of the level of detail data may take some time depending on the size of the model file.

NOTE
- When the displayed surface becomes rougher during viewpoint change or playback, depending on the data some model elements may not display.
- It is easier to distinguish the discrepancies between levels of detail when displaying the cell in "Flat Shading"（refer to section " 6.11 Changing the Rendering Mode ").



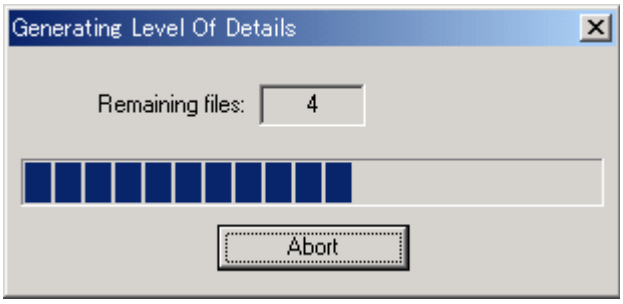
■ Generating the Level of Detail Data

When the Level of Detail function is enabled, the level of detail data need to be generate for the function to work properly. If an opened cell doesn't contain the level of detail data, a message will prompt the user to confirm that the data should be generated at this time.



While generating the level of detail data, the "Generating Level of Detail" dialog will display the generation progress. To stop the data generation, click on the "Abort" button. Note that when aborting the generation, the current file processing will continue until completed, and then the generation will stop and data for the remaining file will not be created

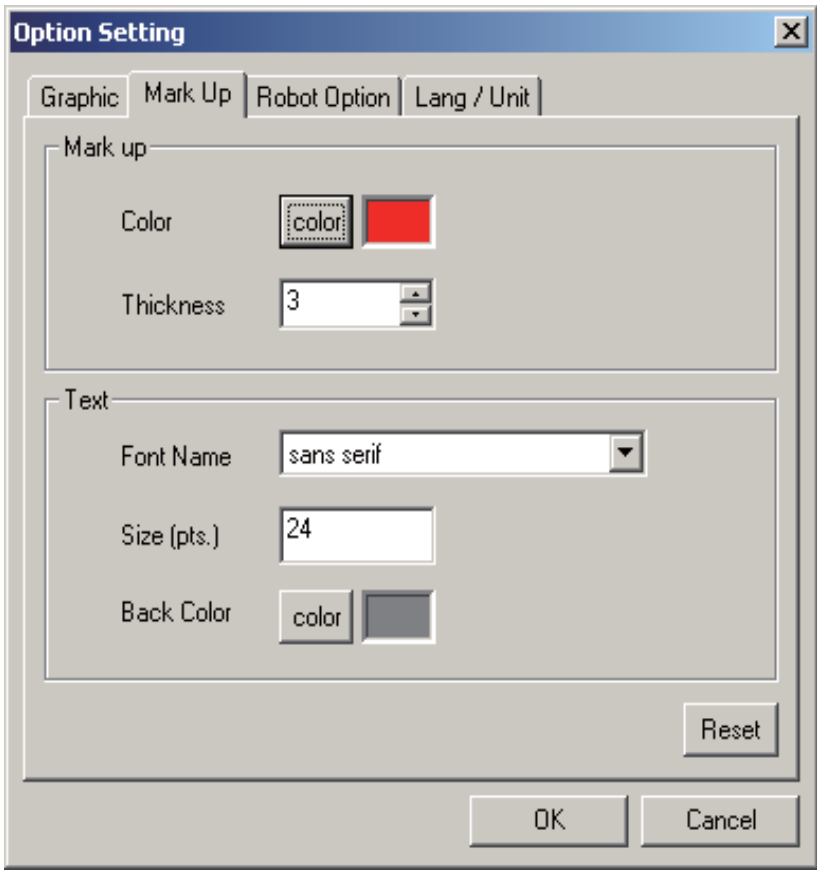
.



When adding HSF model and the Level of Detail is enable, the level of detail data will automatically be generated for the new model. The "Generating Level of Detail" progress dialog will display but the process cannot be aborted.

12.2 Markup Settings

To configure the lines and texts on the cell window, select the "Mark Up" tab of the Option Setting dialog box.



Mark Up tab

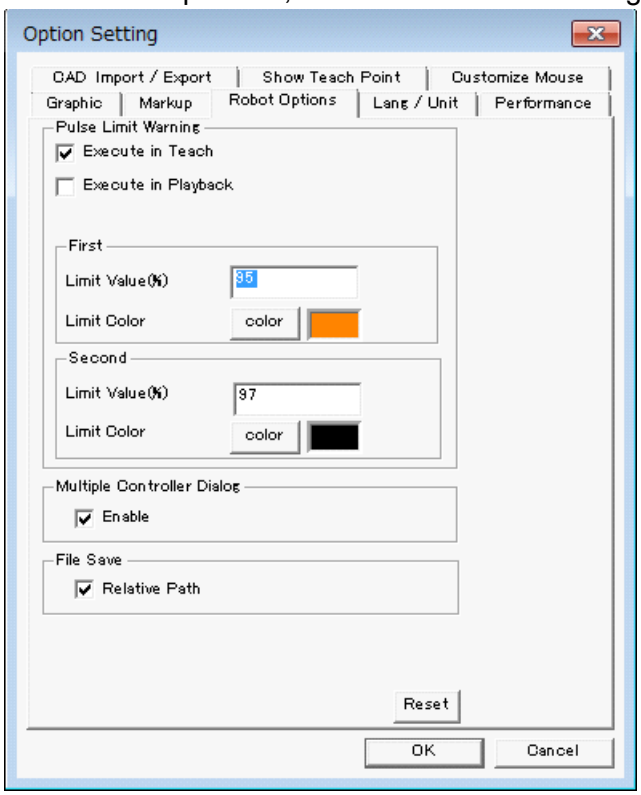
Item	Description
"Mark up" section	"Color" indication box Displays the current color of the markup object (line and text). Press [color] to display the Color dialog box, and select the desired color. "Thickness" spin box Directly enter the value or specify the value with the spin button to specify the thickness of the markup line.

Mark Up tab

Item	Description
"Text" section	"Font Name" combo box Select a desired font for the text. NOTE When using two-byte characters for the text, make sure to select a font which can be displayed properly. "Size (pts.)" edit box Specify the size of the font. "Back Color" indication box The color indication box displays the current markup text background color. Press [color] to display the Color dialog box. And select the desired background color.
[Reset] button	Restores all the values to the default setting.
[OK] button	Applies the modifications, and closes the dialog box.
[Cancel] button	Closes the dialog box without applying the modifications.

12.3 Robot Option Settings

When a robot axis reaches its limit position, the color of the axis changes.



Robot Option tab

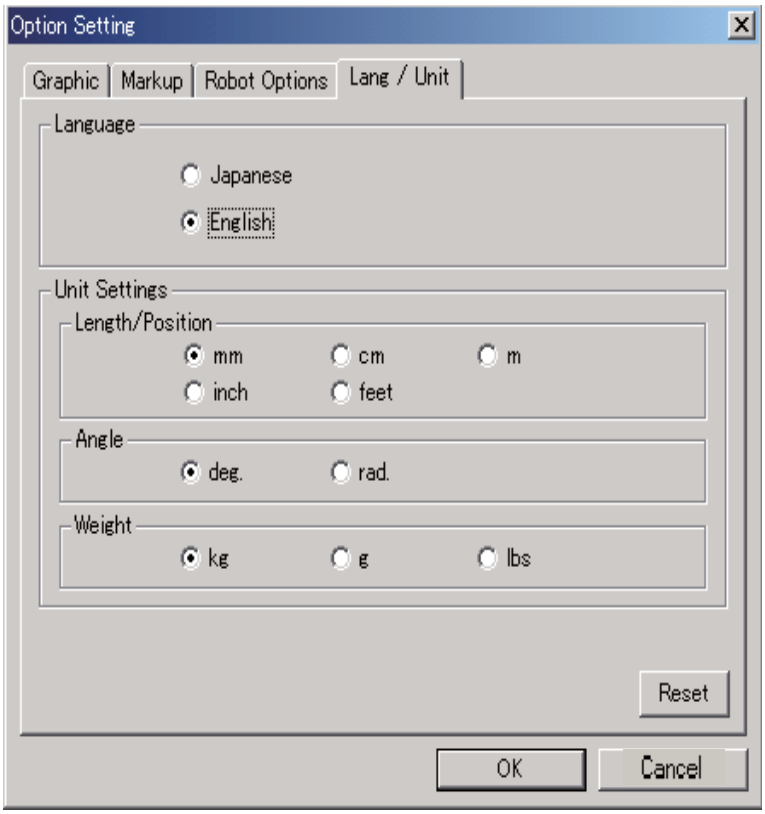
Item	Description
"Pulse limit warning" section	[Execute in Teach] check box Select to display the axis reaching its limit in a reverse color or a limit color in a teaching operation. [Execute in Play] check box Select to display the axis reaching its limit in a reverse color or a limit color in a playback operation. First "Limit Value (%)" edit box Directly enter the value to specify the limit value for the first limit axis check. "Limit Color" indicaiton box Displays the current first limit color. Press [color] to display the Color dialog box, and select the desired color. Second "Limit Value (%)" edit box Directly enter the value to specify the limit value for the second limit axis check. "Limit Color" indicaiton box Displays the current second limit color. Press [color] to display the Color dialog box, and select the desired color.

Robot Option tab

Item	Description
"Multiple Controller Dialog" section	When enabled MotoSim EG-VRC will display a separate copy of controller related dialog or panel for each controller in the cell. When a dialog is initially displayed, it is set to the currently selected controller. Once displayed the dialog will always display the information for the same controller, even if the current controller is changed. To display multiple copy of a same dialog, display a first copy of the dialog, then change the current controller and display the dialog again.
File Save	When checked, the path information stored in the cell file are relative to the cell file folder. If unchecked, the full path starting from the driver root is stored in the cell file. A cell saved with relative path is easier to transfer to another computer. (To store the file refer to " 4.3 Storing a Cell ".)
[Reset] button	Restores all the values to the default setting.
[OK] button	Applies the modifications, and closes the dialog box.
[Cancel] button	Closes the dialog box without applying the modifications.

12.4 Language and Unit Settings

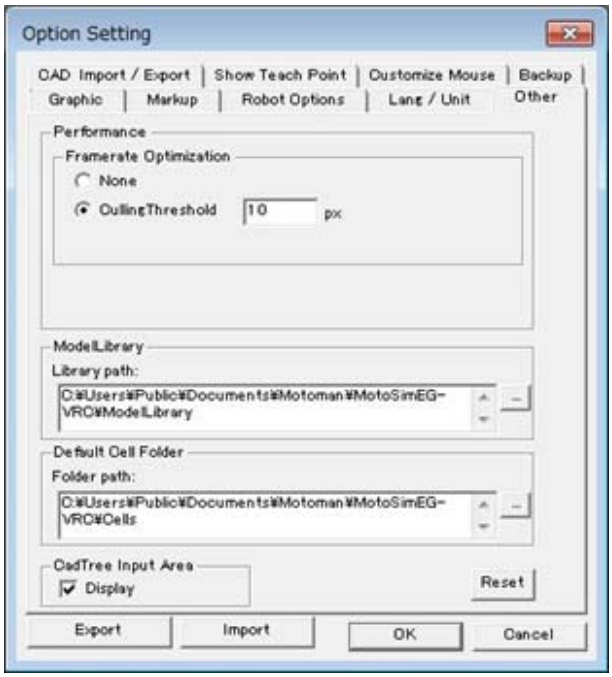
To configure the language and unit, select the "Lang / Unit" tab of the Option Setting dialog box.



Lang / Unit tab

Item	Description
"Language" section	Select the [Japanese] or [English] radio button to configure the language. To set from the main menu, select {View} - {English} or {Japanese}.
"Unit Settings" section	Select the units for each type of values. "Length/Position" edit box Indicates the unit of the length. "Angle" edit box Indicates the unit of the angle. "Weight" edit box Indicates the unit of the weight.
[Reset] button	Restores all the values to the default setting.
[OK] button	Applies the modifications, and closes the dialog box.
[Cancel] button	Closes the dialog box without applying the modifications.

12.5 Other



Other tab

Item	Description
[Reset] button	Restores all the values to the default setting.
[OK] button	Applies the modifications, and closes the dialog box.
[Cancel] button	Closes the dialog box without applying the modifications.

12.5.1 Performance Settings

To configure the performance, set items of "Performance" .

Item	Description
"Framerate Optimization" section	"None" radio button All model data are displayed. "Culling Threshold" radio button Model data which displayed size is smaller than the selected pixel on the display are not displayed. NOTE If the threshold is large, performance is improved. But, if the threshold is overlarge, the necessary model data are not displayed. Set up the threshold in accordance with the model data.

12.5.2 Model Library

To configure the model library, set items of "Model Library".

Item	Description
"Model Library" section	"Library Path" edit box Sets the folder path of model library. You can select a folder with the [...] button.

12.5.3 Default Cell Folder

To configure the model library, sets items of "Default Cell Folder".

Item	Description
"Folder Path" section	"FolderPath" edit box Sets the default folder path of cell. You can select a folder with the [...] button.

12.5.4 CadTree Input Area

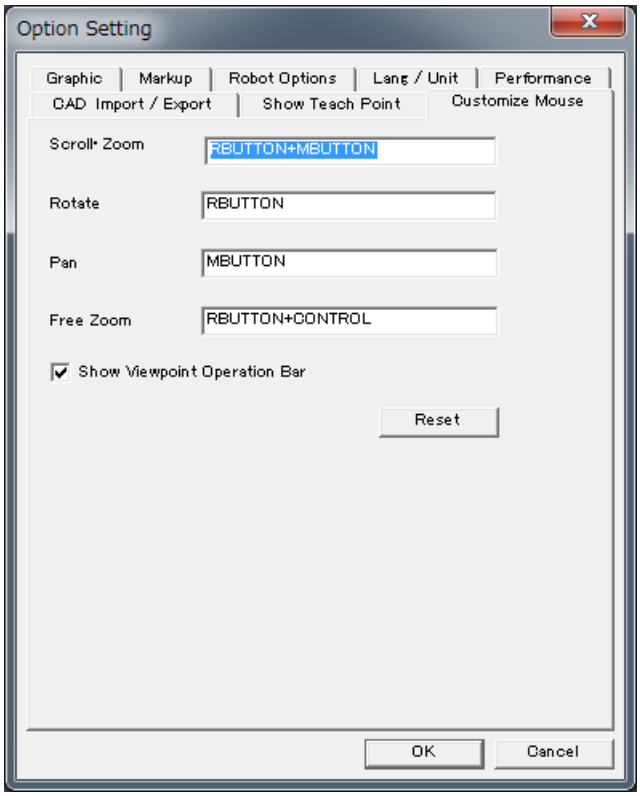
To configure the CadTree Position Input Area..

Item	Description
CadTree Input Area section	"Display" check box Sets whether to display the position input area.

12.6 Mouse Customization

The mouse button allocation of viewpoint operation can be changed.
Presses the allocable mouse button and key in the edit box, the mouse button allocation of viewpoint operation is changed.
The allocable mouse button and key are as follows.

- Middle button(mouse)
- Right button(mouse)
- [CTRL] key
- [SHIFT] key



Mouse Customization

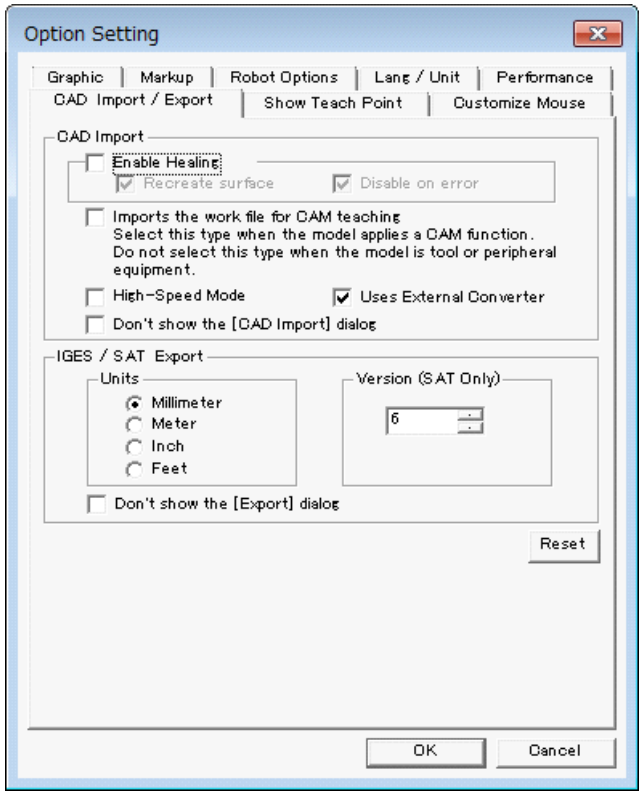
Scroll・Zoom	Presses the allocable mouse button and key in the edit box, the allocated key to Scroll?Zoom is displayed.
Rotate	Presses the allocable mouse button and key in the edit box, the allocated key to Rotate is displayed.
Pan	Presses the allocable mouse button and key in the edit box, the allocated key to Pan is displayed.
Free Zoom	Presses the allocable mouse button and key in the edit box, the allocated key to Free Zoom is displayed.

Mouse Customization

Show Viewpoint Operation Bar	When enabled, viewpoint operation bar is displayed.  Click the above button, viewpoint operation by right button is changed. If unchecked, viewpoint operation bar is hidden.
[Reset] button	Setting is changed into default.
[OK] button	Setting is saved and this dialog is closed.
[Cancel] button	Setting is canceled and this dialog is closed.

12.7 CAD Import/Export <CadPack Option>

NOTE To use this function (CadPack option), the MotoSim EG-CadPack is required. (The MotoSim EG-CadPack is separate product from MotoSim EG.)



12.7.1 CAD Import

Option settings related to reading CAD format files.

“Enable Healing” section	When enabled, a healing algorithm is applied to the importedCAD data.
[Recreate surface] check box	The [Recreate surface] option is normally selected. The [Recreate surface] is part of the normal healing process. If it is unselected, this step will be skipped in the healing process. If the surface regeneration doesn't give the intended results, unselect the "Recreate Surface" may improve the healing results.
[Disable on error] check box	The [Disable on error] option is normally selected. When the [Disable on error] is selected, the healing will be disabled if an error occurs during the healing process.

Imports the work file for CAM teaching	Select this type when the model applies a CAM function. Do not select this type when the model is tool or peripheral equipment. General CAD data are displayed  in the CadTree dialog, and the model for CAM teaching are displayed  .
[High-Speed Mode] check box	When enabled, MotoSim EG-VRC reads only data necessary to drawing from CAD data, so it may takes higher. But, When "Imports the work file for CAM teaching" is enabled, this is disabled. NOTE IGES and STEP assembly format files are not supported High-Speed mode.
[Uses External Converter] check box	When enabled, CAD data is converted by outside CAD converter software and MotoSim EG-VRC imports the converted CAD data. When not enabled, MotoSim EG-VRC converts the CAD data.
[Don't show the [CAD Import] dialog] check box	When this option is selected, the "CAD Import" dialog will not display when an IGES file is read. NOTE For details on the CAD data import, please refer to section " 11.13 Reduce HSF File ".

NOTE The healing process attempts to repair any corrupted data of the imported CAD files. However, the processing time to import a file may increase significantly when healing is used. The performance may also vary depending on the extent and nature of the errors in the original CAD file. In some cases, result with healing may be worst than reading the file without healing.

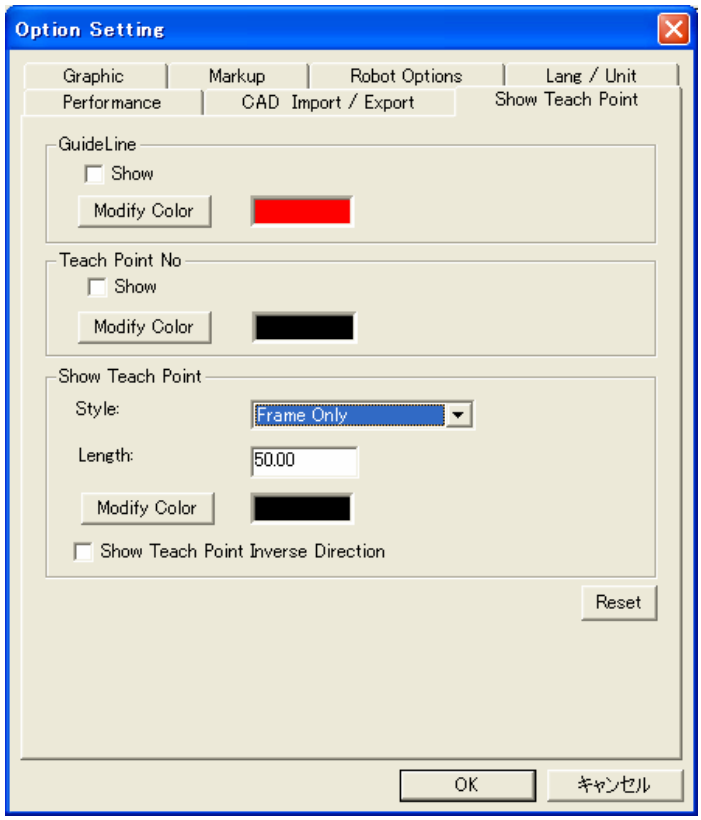
12.7.2 IGES/SAT Export

Units	Sets the measuring units of the exported SAT or IGES files.
Version (SAT Only)	Sets the SAT file version used in the exported file. Recommended value: 6 (Setting range: 4 to 29)
[Don't show the [Export] dialog] check box	When this option is selected, the "Export" dialog will not display when the "Export CAD file" function is used. NOTE For details on the IGES, SAT data export, please refer to section " 11.15 Changing the Coordinate Origin of CAD Data <CADPack Option> ".

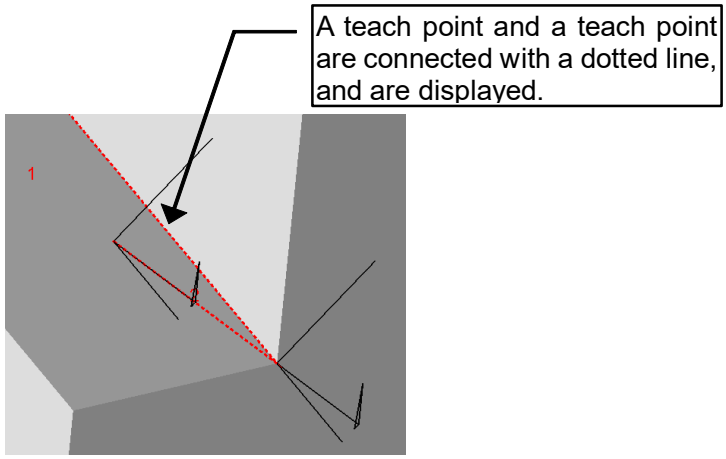
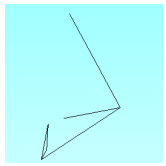
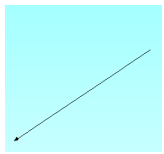
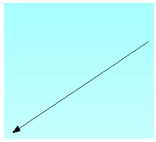
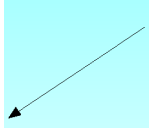
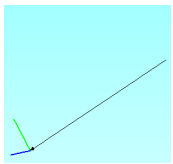
12.8 Show Teach Point <CadPack Option>

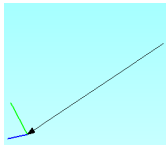
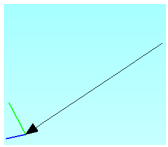
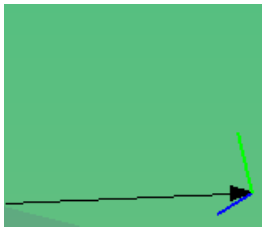
NOTE To use this function (CadPack option), the MotoSim EG-VRC-CadPack is required. (The MotoSim EG-VRC-CadPack is separate product from MotoSim EG-VRC.)

To configure the Teach Point, the "Show Teach Point" tab of the Option Setting dialog box.



GuideLine	
[Show] check box	Select displaying the guide lines or not.

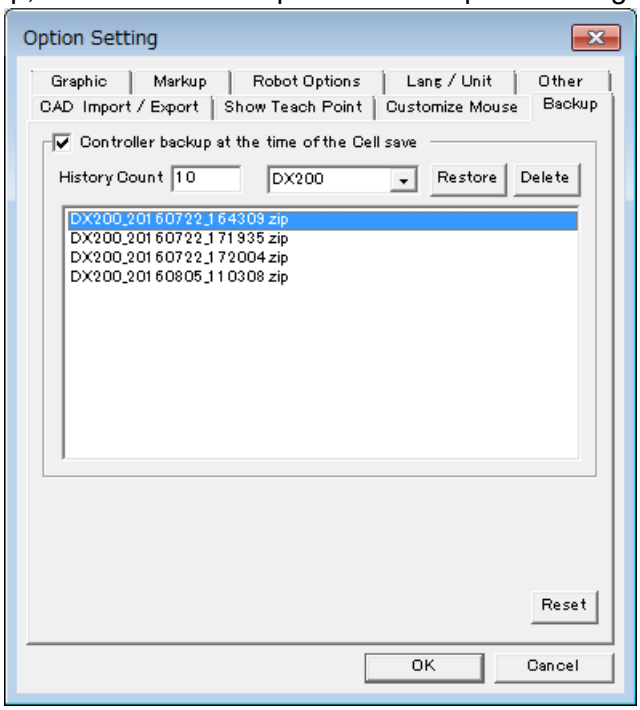
[Modify Color] button	Select the color of the guide line. 
Teach Point No	
[Show] check box	Select displaying the teach point no. or not.
[Modify Color] button	Select the color of the teach point no.
Show Teach Point	
Style	Frame only  Arrow Only (S)  Arrow Only (M)  Arrow Only (L)  Frame and Arrow (S) 

Style	Frame and Arrow (M)  Frame and Arrow (L)  None
Length	Change the frame length (Z-Axis) of teach point.
[Modify Color] button	Select the color of the frame length (Z-Axis)
[Show Teach Point Inverse Direction] check box	Select reversing the frame length (Z-Axis)or not. 
[Reset] button	Initialize the settings.
[OK] button	The settings are saved and the dialog is closed.
[Cancel] button	The settings are canceled and the dialog is closed.

12.9 Backup

NOTE This function is enabled by default as MotoSimEG-VRC Ver2018 or later.

To configure the backup, select the "Back up" tab of the Option Setting dialog box.



12.9.1 Controller backup at the time of the Cell save

Sets whether to execute automatic backups of the controller at the time of cell saving.
When this function is enabled, the controller data is saved automatically as "[controller name]_[date and time]" at the time of cell saving.
Saved backup files are listed in the dialog. When the backup file is selected and the [Restore] button is clicked, the target controller is restored to a previous status.

Item	Description
Controller backup at the time of the Cell save	When this item is enabled, the controller data is saved automatically at the time of cell saving.
History Count	Sets the maximum number of backup files. When the number of backup files reach this items, the oldest file is deleted and the newest file is saved.
Controller	Selects the target controller to restore.
File List	The backup files of the target controller are displayed.

Item	Description
Restore	The target controller is restored with the selected backup file.
Delete	The selected backup file is deleted. When clicks the backup files on pressing the [CTRL] key or [SHIFT] key, multiple backup files are selected, then click [Delete] button, multiple backup files are deleted.

12.10 Import and Export setting contents

You can output the setting contents to the INI file and read the setting contents recorded in the INI file.

NOTE This function is available only when the cell is not opened.

Item	Description
Export	Output the setting contents to the INI file. The default output destination is as follows. C:\Users\Public\Documents\MOTOMAN\MotoSimEG-VRC\Settings
Import	Read the setting contents recorded in the INI file.

13 Applied Operation

13.1 Teaching Using OLP Function

■ What is OLP Function?

Normally, teaching operation uses the programming pendant to move the robot model to the target position. The OLP (Off-Line Programming) function is a quick and efficient way to move the robot to a target position. When the desired destination is located on a model, by using the OLP panel, the end of the tool (TCP) can conveniently be moved to the target position by simply clicking on the screen (for example, any point of a workpiece, etc.).

SUPPLE -MENT

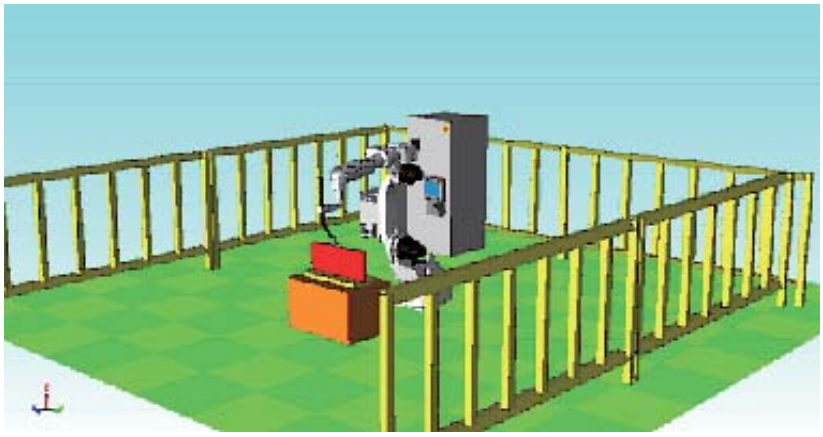
- When moving the robot tool end with the OLP function, the message "Cannot reach this point" may appear even if the robot is not too far from the target point. This may happen when the tool end cannot be moved to the target point due to the shape or current posture of the robot.
- A point other than the target point may be selected depending on the point clicked and the view position. When this occurs, use the programming pendant to move the robot or change the camera scope of the screen to click on the proper model.

13.1.1 Teaching Operation Setup

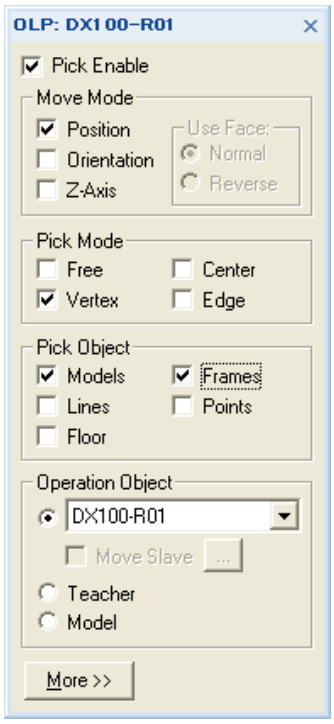
The teaching operation is explained by using “Arc_Sample.vcl” as an example.

Procedure

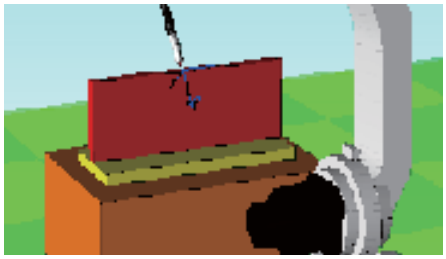
1. Open “Arc_Sample.vcl”.
   (If it is difficult to perform the teaching operation, hide the displayed models such as fence, controller, etc. by selecting the obstructing model and then setting its display property to “Hide All” in the combo box on the Cad Tree dialog box.)



2. On the [Home] tab, in the [Teaching] group, click the [OLP] button, the [OLP] dialog appears.



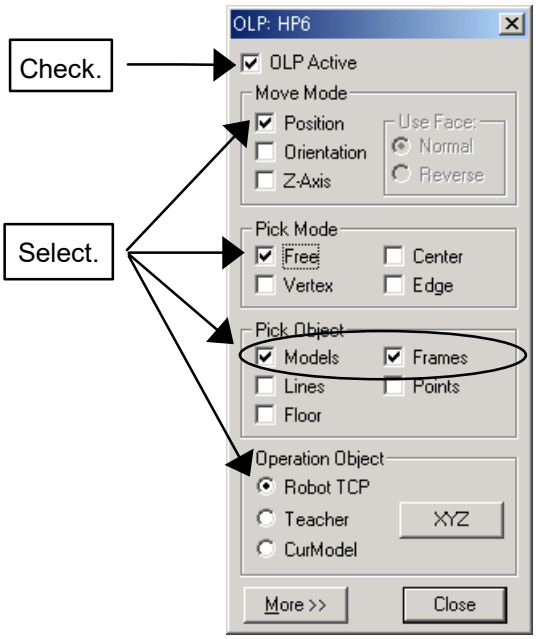
3. Display the cell window so that the workpiece is visible as shown in the figure below.



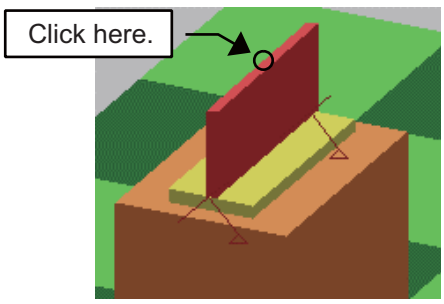
13.1.2 Position Designation in Free Mode

In "Free" mode, the tool end (TCP) moves to the point of the model corresponding to the clicked position.

1. Set each item in the OLP dialog box as shown in the following figure.

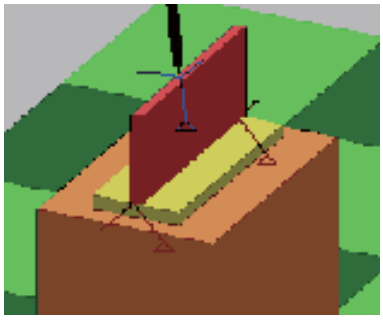


2. Click on the following position of the workpiece model displayed in the cell window.



3. The tool end moves to the clicked position.

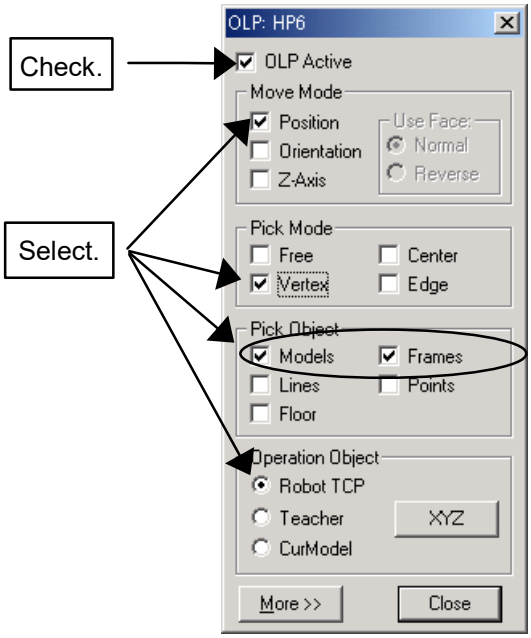
Click on another point, and the tool end moves to the clicked position.



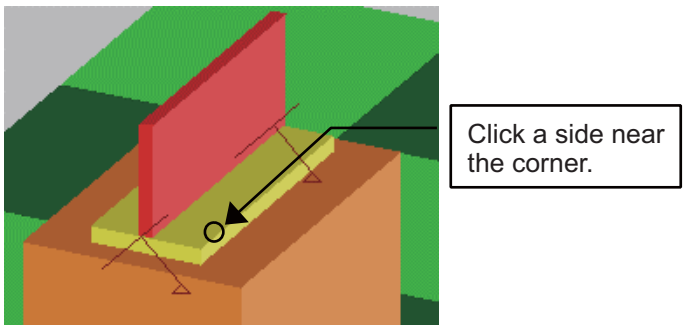
13.1.3 Position Designation in Vertex Mode

In "Vertex" mode, the tool end (TCP) moves to the model vertex nearest to the clicked position.

1. Set each item in the OLP dialog box as shown in the following figure.

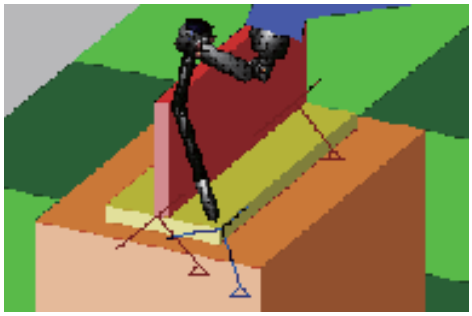


2. Click on the following position of the workpiece model displayed in the cell window.



3. The tool end moves to the nearest vertex.
   Click on a point near another vertex to check if the tool end moves to the nearest ver-

tex.

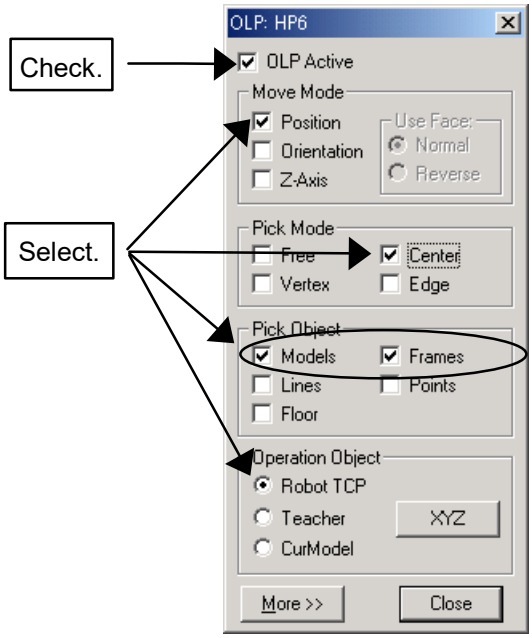


13.1.4 Position Designation in Center Mode

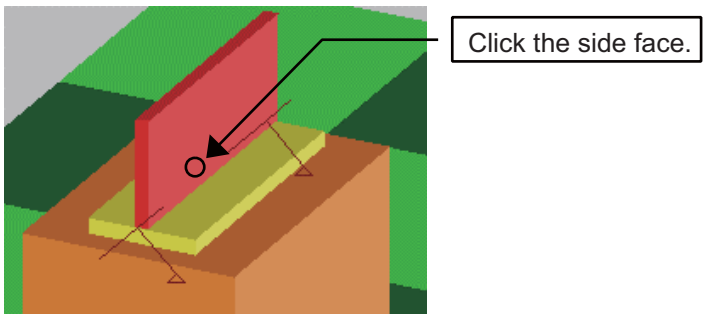
In "Center" mode, the tool end (TCP) moves to the face or edge center nearest to the clicked position.

.

1. Set each item in the OLP dialog box as shown in the following figure.

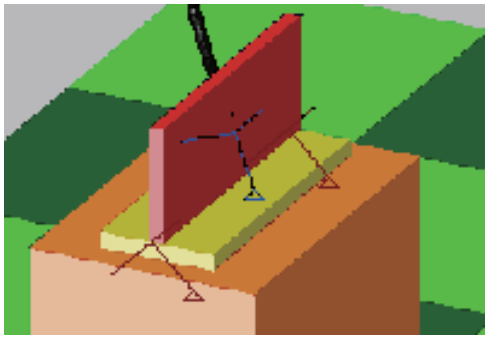


2. Click on the following position of the workpiece model displayed in the cell window.



3. The tool end moves to the center point of the designated model face or edge.
   If the tool overlaps on the model, the tool direction is improper. Use the programming pendant to correct the position afterward.
   Click on another face to check if the tool end moves to the center of the designated

model face.

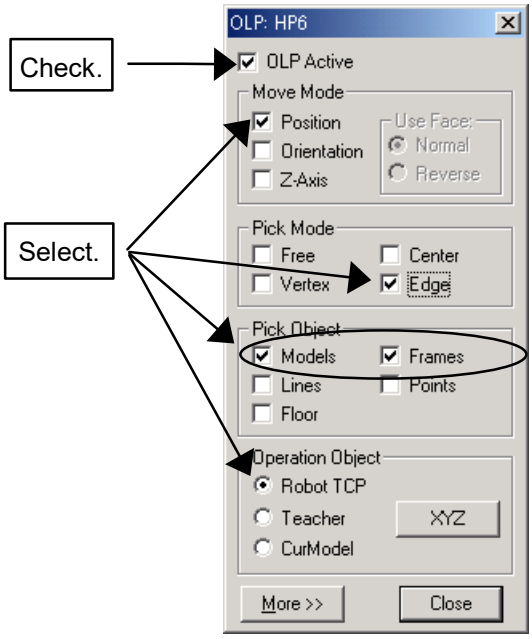


13.1.5 Position Designation in Edge Mode

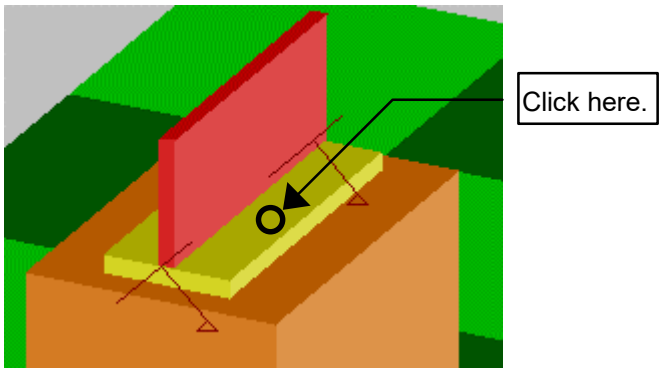
IIn "Edge" mode, the tool end (TCP) moves to the edge point nearest to the clicked position.

.

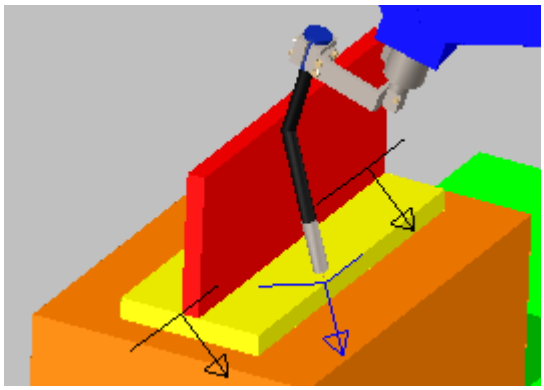
1. Set each item in the OLP dialog box as shown in the following figure.



2. Cick on the following position of the workpiece model displayed in the cell window.



3. The tool end moves to the edge point nearest to the clicked position. Click on another face point to check if the tool end moves to the closest edge.



13.1.6 Designation with Orientation Mode

Orientation Move Mode can be used by itself or in combination with the Position Mode. Checking the [Orientation] checkbox rotates the tool end frame to align it with the target point frame. If the [Position] mode is also check, the tool end will also move overlap the target frame. Therefore, if you only want to change the orientation of the tool without moving it, make sure to uncheck the [Position] checkbox.

The target point frame appears when the left mouse button is pressed down on a model and is represented by 3 colored arrows. The red arrow is the Z-axis and corresponds to the normal (or reversed normal) of the face where lies target point; the blue arrow is the X-axis and is defined by the face edge closest to the point; and the green arrow is the Y-axis and is orthogonal to the two other axis.

NOTE

- That some geometries, such as lines or points, do not have sufficient information to generate a frame information. In such cases, the tool end will maintain its original orientation.
- The direction of the Z-axis can be changed by selecting [Normal] or [Reverse] mode in the "Use Face:" section.

Procedure

1. Hide the T-shape workpiece and the stand to make it easier to create a new workpiece. On the [Home] tab, in the [Model] group, click the [CadTree] button, the [CadTree] dialog appears. To hide the lower hierarchy of the “DAI” tree. Confirm that the cursor is on the “DAI” model, then select “Hide All” in the Cad Tree dialog combobox to hide the model.

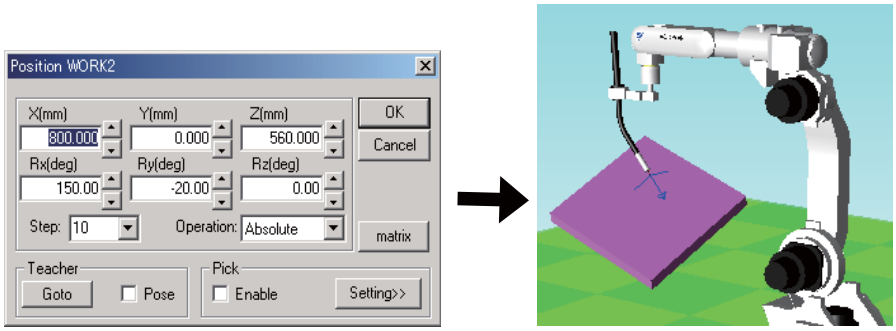
2. Select “world” in the Cad Tree and click on the [Add] button to add the BOX of the following specifications.
Model: WORK2

Width (W)	500	Depth (D)	500	Height (H)	50

X (mm)	0	Y (mm)	0	Z (mm)	0
Rx (degree)	0	Ry (degree)	0	Rz (degree)	0

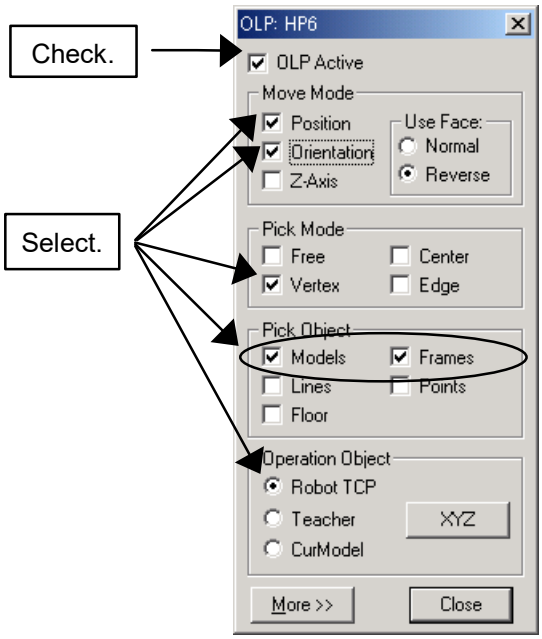
3. Click on the [Pos] button in the Cad Tree to set the position as shown in the table below.

X (mm)	800	Y (mm)	0	Z (mm)	560
Rx (degree)	150	Ry (degree)	-20	Rz (degree)	0

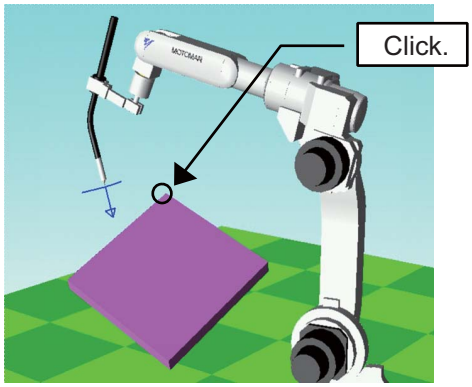


4. To see and understand the coordinate axis of “WORK2”, select “WORK2” in the Cad Tree, then select “SeeAll” to display the Frame of the coordinate axis on the “WORK2”.

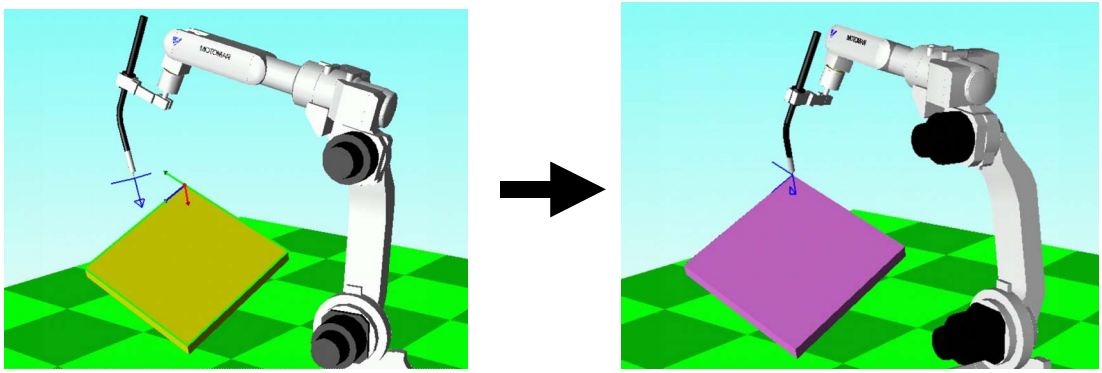
5. Set each item in the OLP dialog box as shown in the following figure.



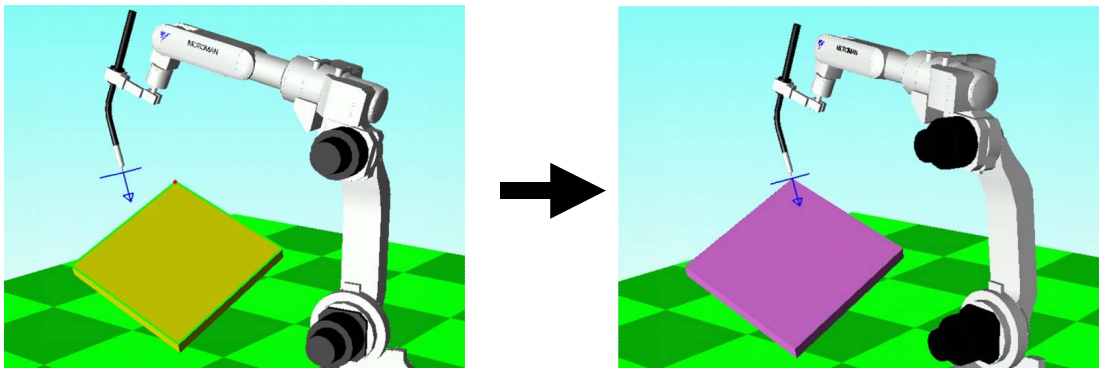
6. Click on the position of the “WORK2” as shown below.



7. The tool end moves to the model vertex and the tool coordinate axis is aligned in the same direction as the target point frame that was displayed when the point was clicked.



If the [Orientation] checkbox is not checked, the direction of the tool coordinate axis will not be changed as shown below.



■ Designation with Z-Axis Mode

Z-Axis Move Mode can be used by itself or in combination with the Position Mode. Checking the [Z-Axis] checkbox rotates the tool end frame to align its Z-axis with the target point Z-axis. If the [Position] mode is also check, the tool end will also move overlap the target frame. Therefore, if you only want to change the orientation of the tool without moving it, make sure to uncheck the [Position] checkbox.

The target point Z-Axis appears when the left mouse button is pressed down on a model and is represented by a red arrows. For a solid, the Z-axis corresponds to the normal (or reversed

normal) of the face where lies target point. For a line, it corresponds to the line direction to the next closest point.

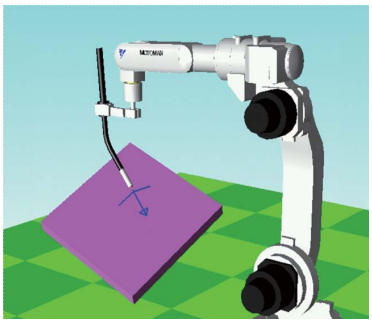
NOTE

- Points do not have sufficient information to generate Z-axis information. In such cases, the tool end will maintain its original orientation. .
- The direction of the Z-axis can be changed by selecting [Normal] or [Reverse] mode in the "Use Face:" section.

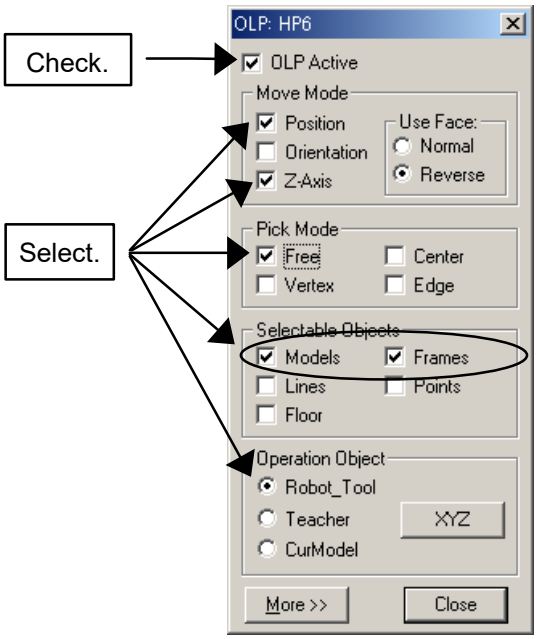
Procedure

The procedure is explained by using "WORK2", which has been used in "Designation with Orientation Mode", as an example.

1. Move the robot to its home position.

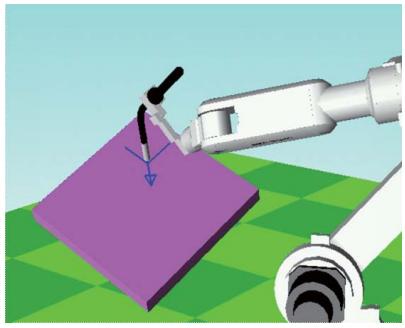


2. Set each item in the OLP dialog box as shown in the following figure.



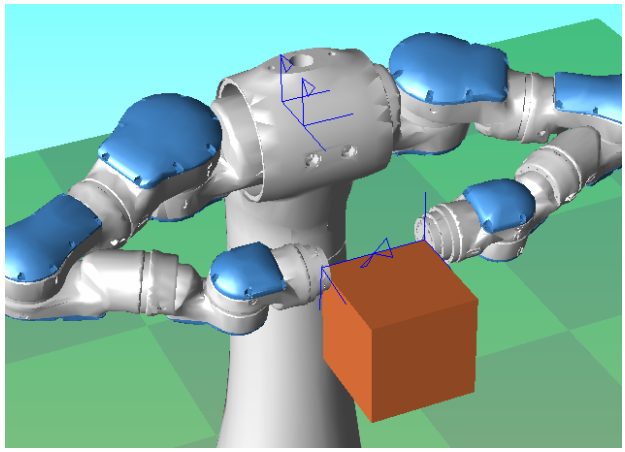
3. Click on the face of the "Work2", and the tool Z-axis will turn so that the tool end is per-

pendicular to the clicked face of the model.

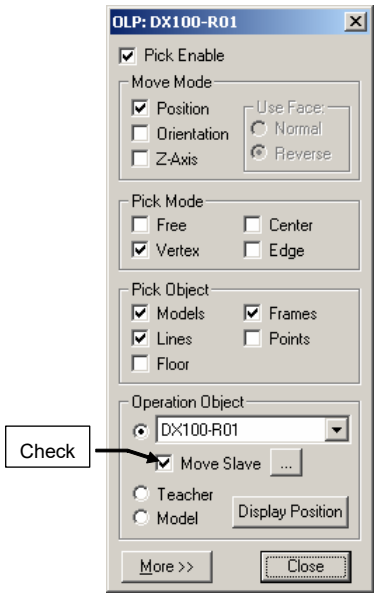


13.1.7 Position Designation with move slave function

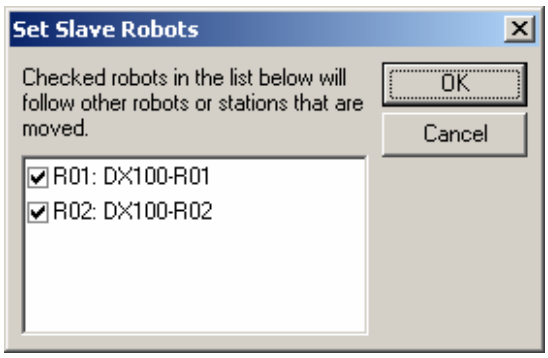
When the [move slave] checkbox is checked, the [Move Slave] function is enabled. When a robot or station is moved, other slave robots from the same controller are moved with it so that their TCP maintain the same relative position to the moved robot or station. For example, this section describes the move slave function with SDA10D-A00.



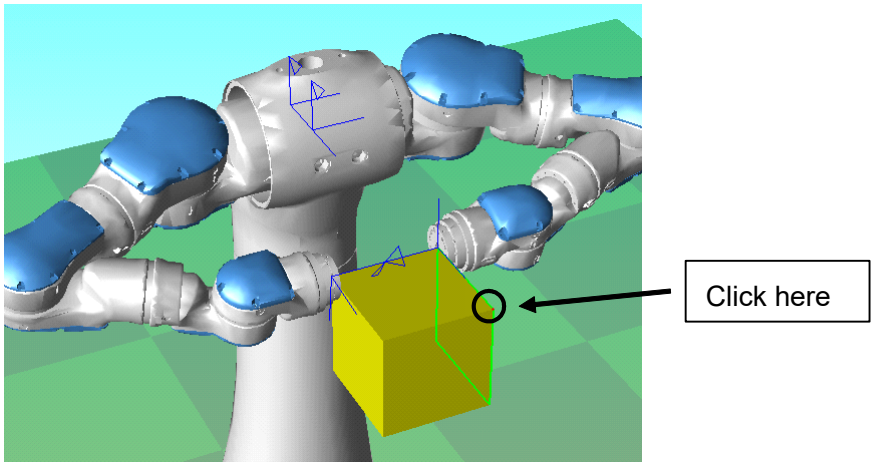
1. Display the OLP dialog box and check the [Move Slave] checkbox.



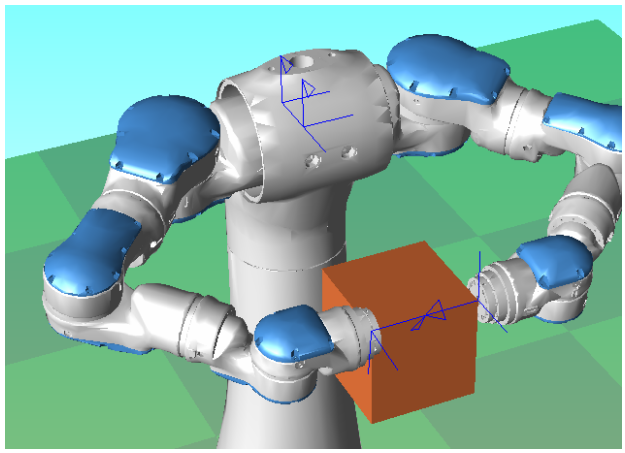
2. To display the "Set Slave Robots" dialog, click the […] button. Then set which robot are slave robots.



3. Click the arbitrary points of works in the MotoSim EG-VRC.



4. Then, slave robots are moved with it so that their TCP maintain the same relative position to the moved robot or station.



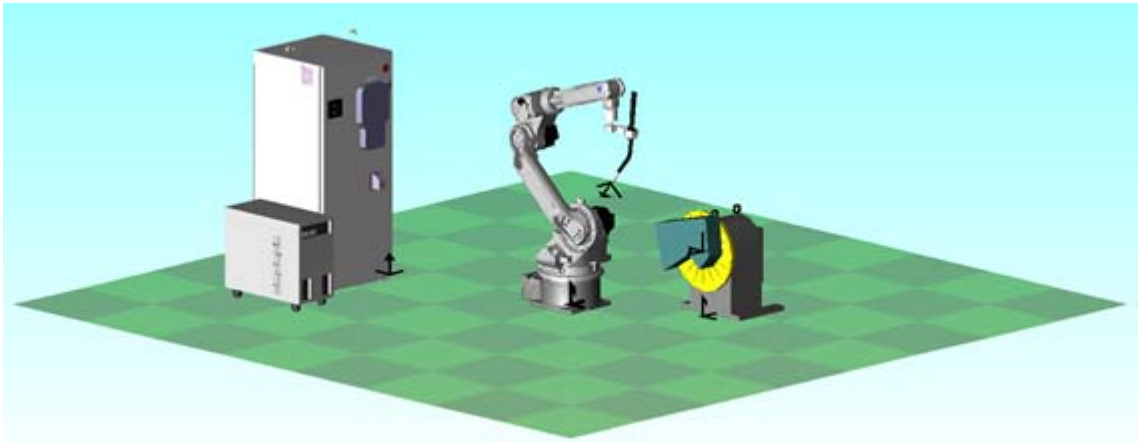
NOTE When the function is enable, if one of the robot can not reach the proper position, all the robots are prevented from moving.

13.1.8 Position Designation with Tool Child to Model Move

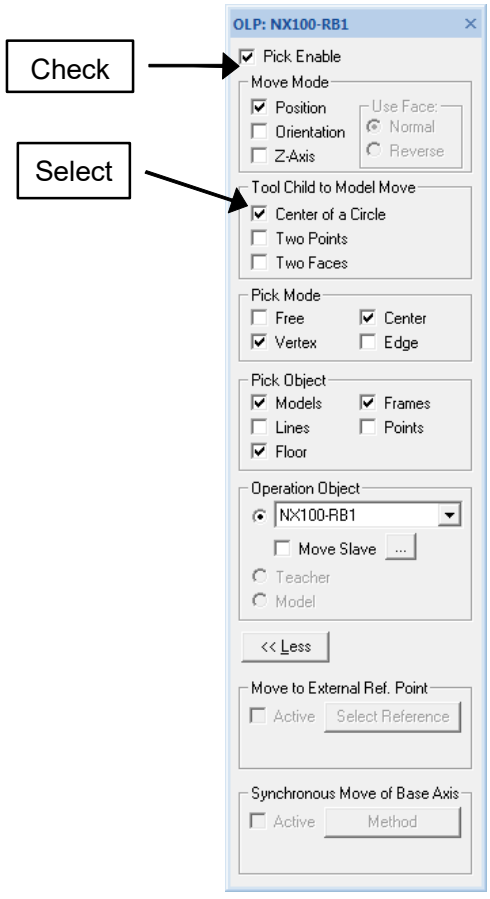
■ Center of a Circle

Procedure

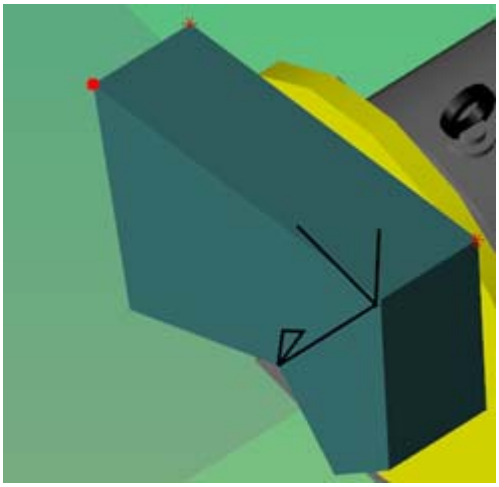
The procedure is explained by using "Robot+Station.vcl" as an example.



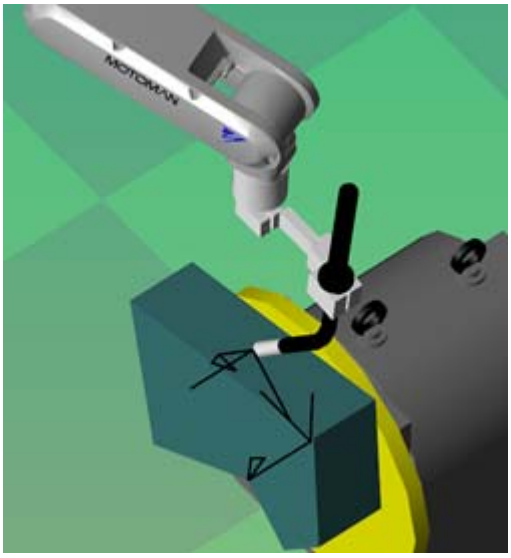
1. Sets each item of [OLP] as follows. Regardless of the setting status of the [Move Mode], by checking the [Pick Enable] with [Center of a Circle] selected, this mode is available.



2. Pick three points of the work model by mouse.



3. The robot's TCP moves to the center of the circle obtained from 3 points.

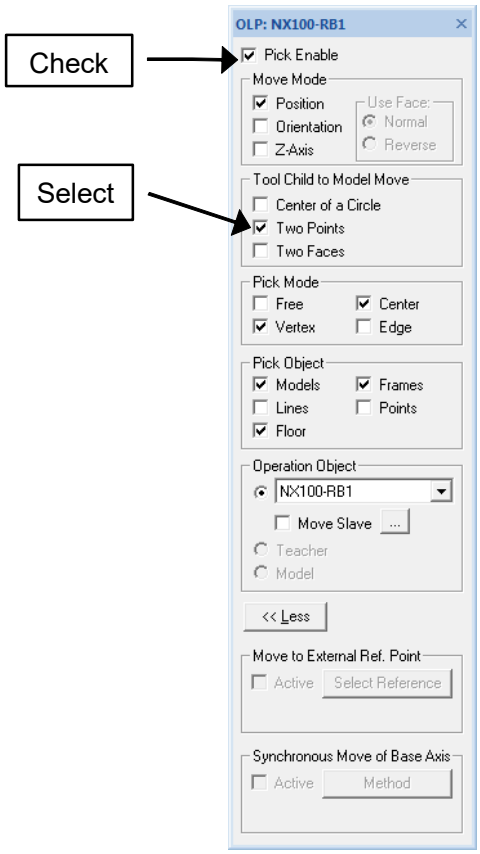


■ Two Points

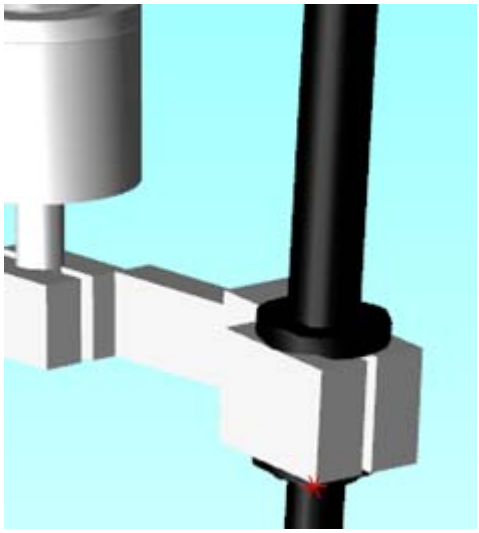
Procedure

The procedure is explained by using "Robot+Station.vcl" as an example.

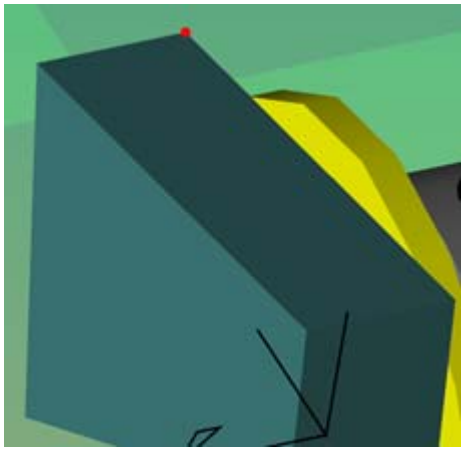
1. Sets each item of [OLP] as follows. Regardless of the setting status of the [Move Mode], by checking the [Pick Enable] with [Two Points] selected, this mode is available.



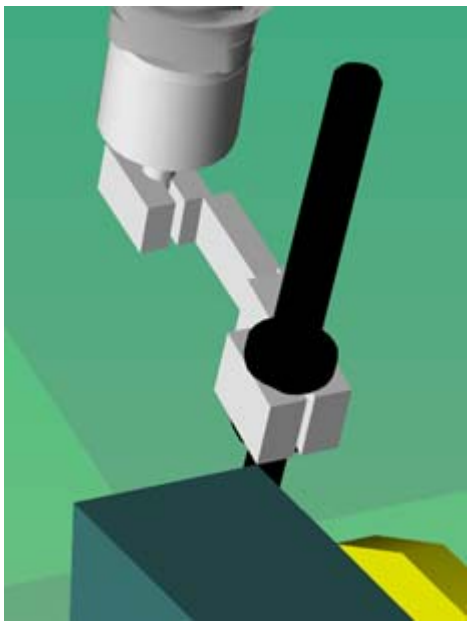
2. Pick the following point of the torch model by mouse.



3. Pick the following point of the work model by mouse.



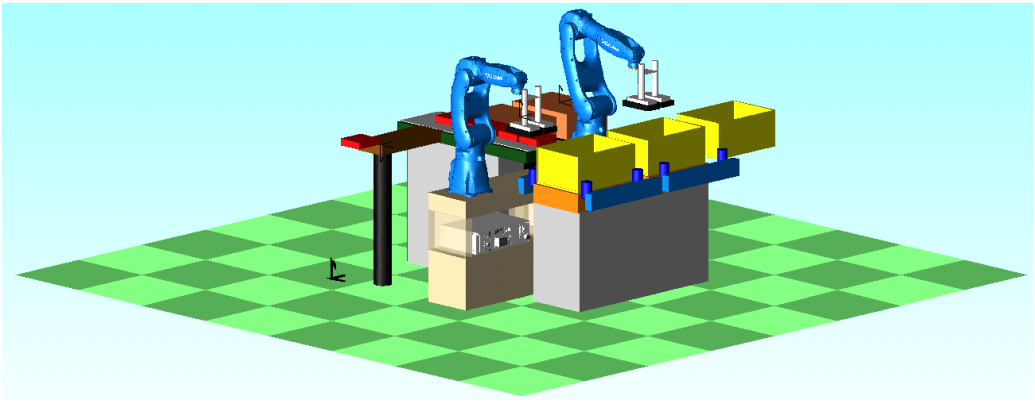
4. The robot's TCP moves so that the points picked in step 2 and step 3 are matched.



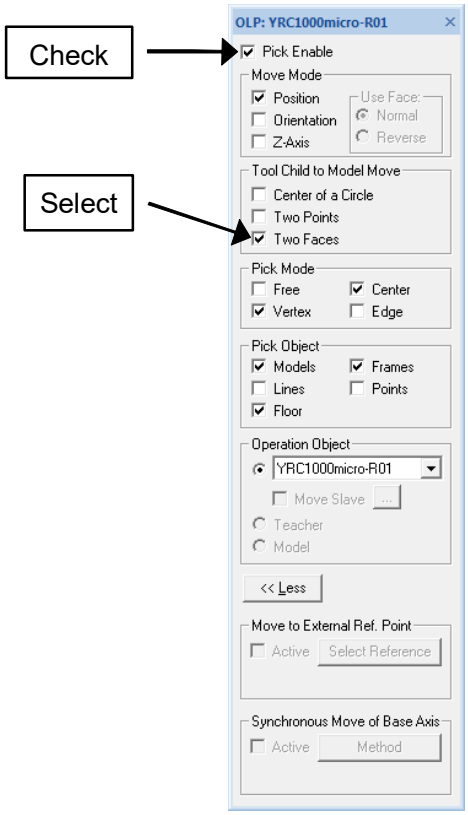
■ Two Faces

Procedure

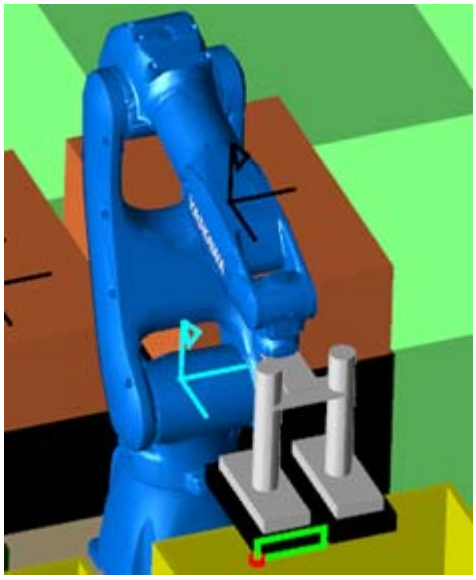
The procedure is explained by using "Hand.vcl" as an example.



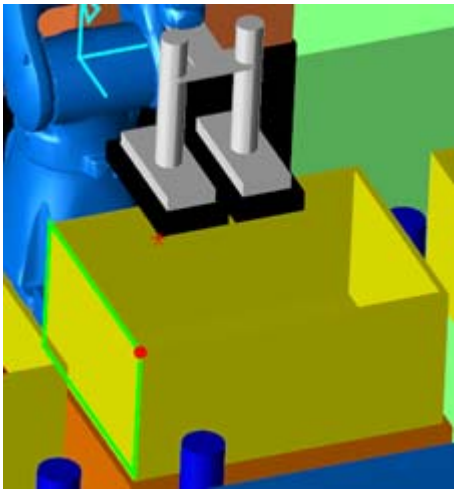
1. Sets each item of [OLP] as follows. Regardless of the setting status of the [Move Mode], by checking the [Pick Enable] with [Two Faces] selected, this mode is available.



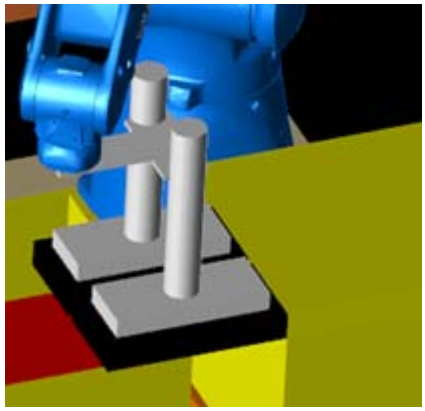
2. Pick the following point of the hand model by mouse.



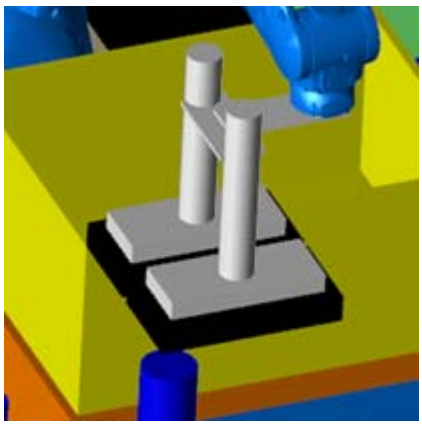
3. Pick the following point of the hako-2 model by mouse.



4. The TCP of the robot moves so that the surfaces to which the picked point is attached at step 2 and step 3. After moving, the "Would you reverse the direction?" message box is displayed, so select whether to reverse. When [No] is selected, the result is as follows.



5. When [Yes] is selected, the result is as follows.



13.1.9 Pick Object Filter

The "Pick Object" section allows setting the type of model that can be selected with mouse. Use this section when pick operation cannot be executed properly because the objects overlap each other. This setting filters which object types can be selected and enables proper pick operation.

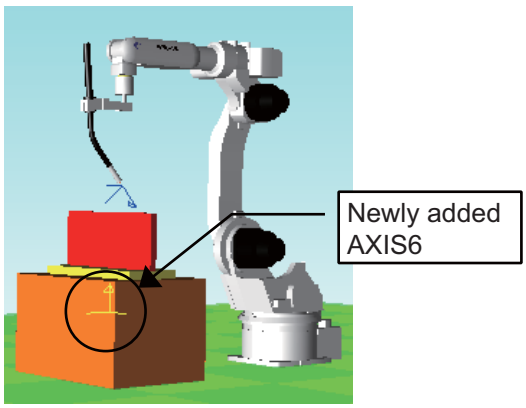
Procedure

The procedure is explained by using “WORK2”, which has been used in " What is OLP Function? ", as an example.

1. Display the Cad Tree; hide the “WORK2” and display the “DAI”.

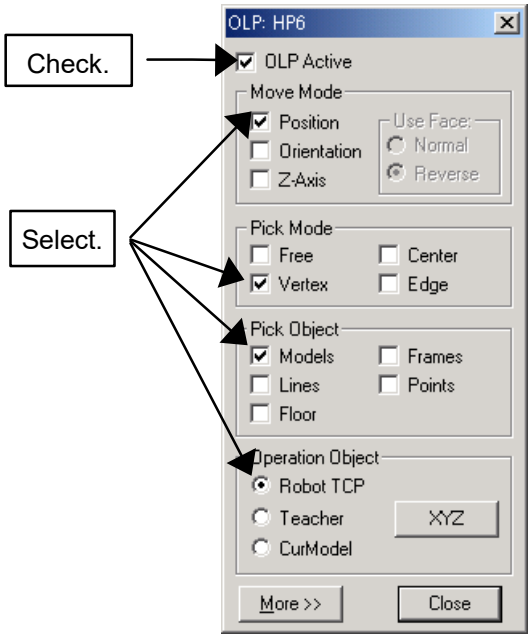
2. Select “DAI” in the Cad Tree to add the AXIS6 of the following specifications.
   Model: DAI (AXIS6) Frame No.: 0

X (mm)	0	Y (mm)	0	Z (mm)	-100
Rx (degree)	0	Ry (degree)	0	Rz (degree)	0

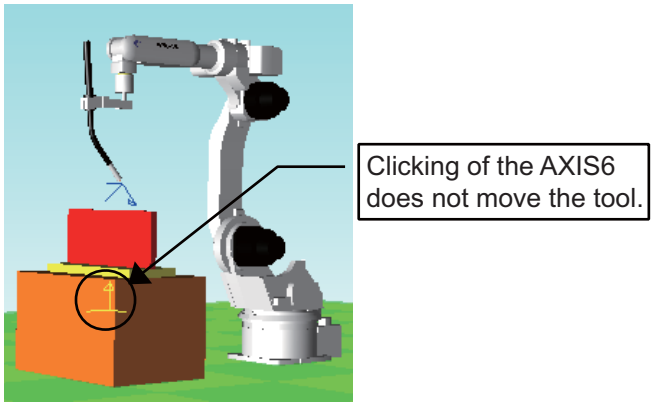


The AXIS6 is inside the BOX. (To see AXIS6 make sure that the Axis6 are always displayed in front in the "Options" dialog. Please refer to section " 12.1.5 Frame & AXIS6 "

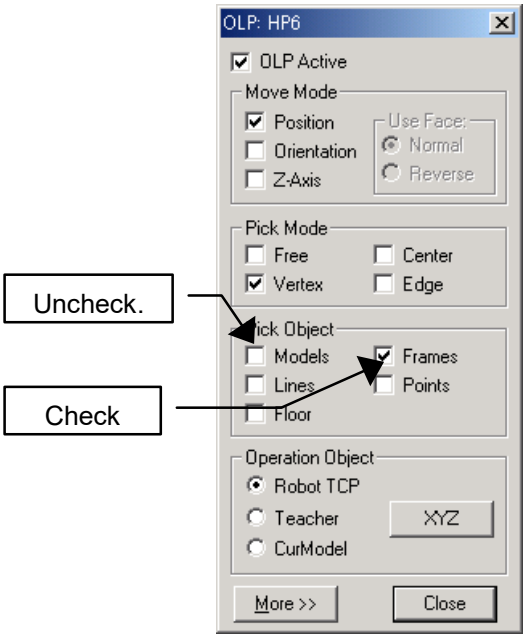
3. Set each item in the OLP dialog box as shown in the following figure.



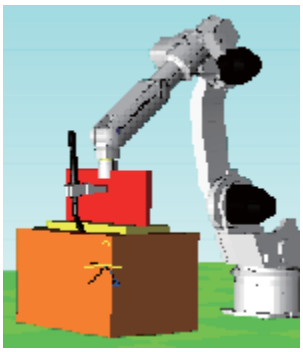
4. The tool does not move even though the “AXIS6” on the cell window is clicked. If you click around the vertex of the BOX, however, the tool moves to the vertex. This is because the [Frame] check box in the OLP dialog box has been cleared and only models are considered for selection.



5. Check the [Frame] check box for the “Pick Object” and clear the [Model] check box.



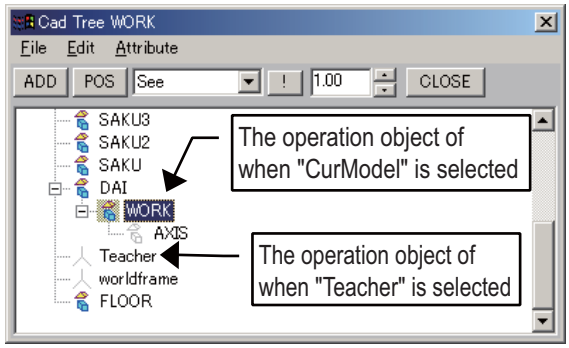
6. Click on the AXIS6, and the tool moves to the vertex of the AXIS6.



SUPPLE -MENT It is recommended to use this function with both [Frame] and [Parts] checked for normal operation.

13.1.10 Changing of Operation Object

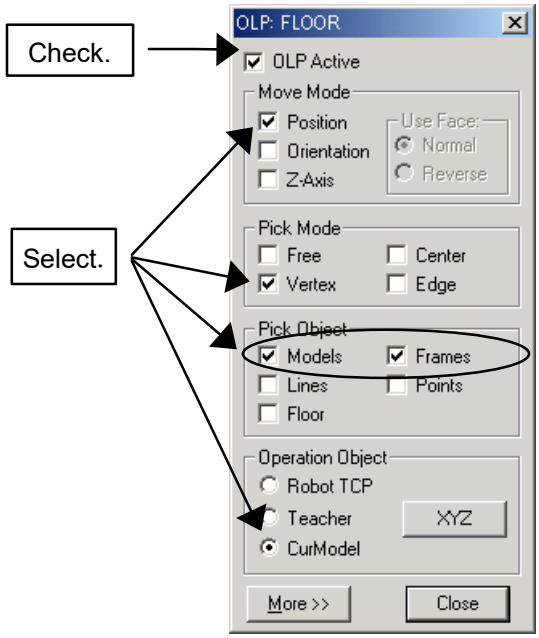
Setting the "Operation Object" section in the OLP dialog box allows changing the object moved by the pick operation. The "Operation Object" can be changed among.



Procedure

The procedure is explained by taking “CurModel” as an example.

1. Set each item in the OLP dialog box as shown in the following figure.

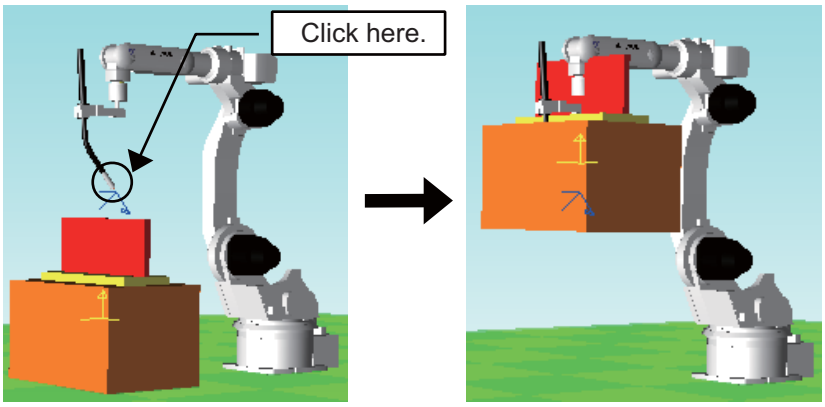


2. Display the Cad Tree to select “DAI”, or click on the 

button to select the “DAI” model in the cell window.

3. Select a model for the operation object.
   - When the current model was selected with the Cad Tree
     Click on the tool end in the cell window with the mouse, and the “DAI” moves to the tool end.
   - When the current mode was selected with the 

button
     Check the [OLP Pick] check box, then click on the tool end on the cell window, and the “DAI” moves to the tool end.



SUPPLE-MENT Perform the same operation when the [Teacher] radio button is selected for the “Operation Obj” section.

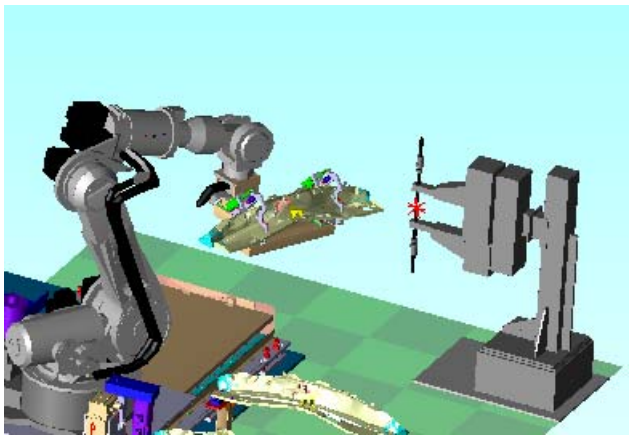
13.1.11 Move to External Reference Point

When the Move to External Reference Point function is active, the robot will move so that the point clicked on a model (carried by the robot) is brought to the external reference point.
This is useful for applications like sealing and spot welding where the parts are handled by the robot and brought to a fix point (distribution nozzle, spot gun) for processing.

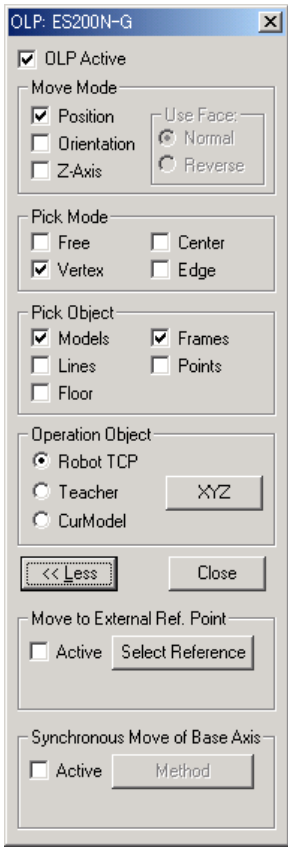
Procedure

The procedure is explained by using the "SpotWeld.vcl" as an example.

1. Open the "SpotWeld.vcl" located in the "Example" folder. The cell display should look like the one shown below.



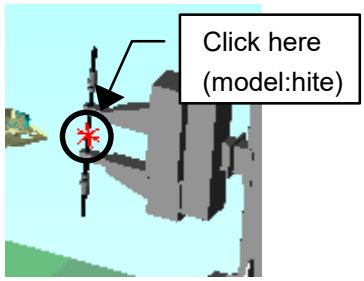
2. On the [Home] tab, in the [Teaching] group, click the [OLP] button, the [OLP] dialog appears. Click on the [More >>] button.



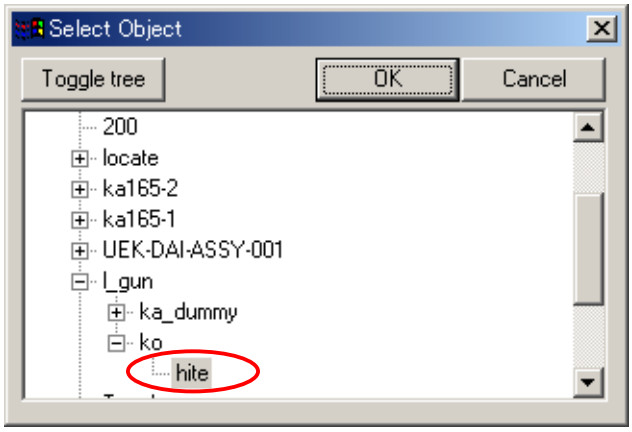
3. Set the external reference point.

With the "Select Model" mode 

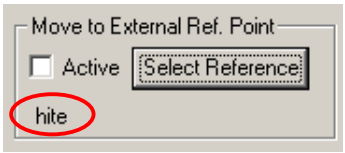
, select the "hite" model by clicking on it.



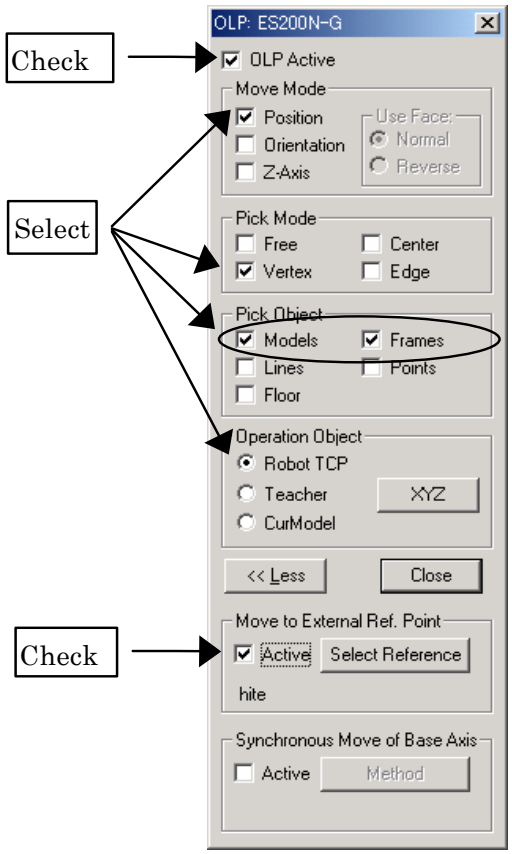
To set the external reference point, click on the [Select Reference] button, the [Select Model] dialog will display, select the "hite" model and press [OK].



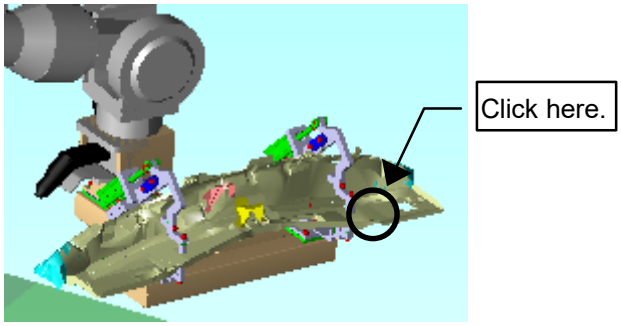
The name of the selected reference model is displayed in the "Move to External Ref. Point" section. Confirm that the "hite" model is selected.



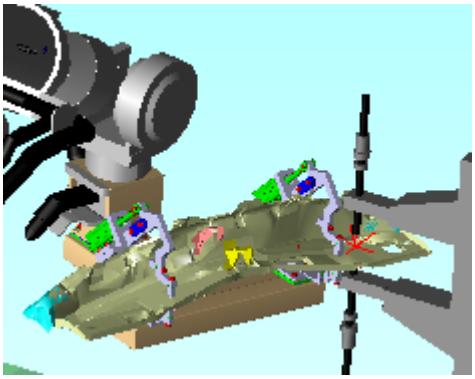
4. Set each item in the OLP dialog box as shown in the following figure.



5. Click on the work piece at the shown position.



6. The robot will move the work piece target point to the external reference point.



NOTE To use the "Move to External Reference Point" mode, the "Operation Object" needs to be set to robot.

13.1.12 Synchronous Base Axis Move to Target Point

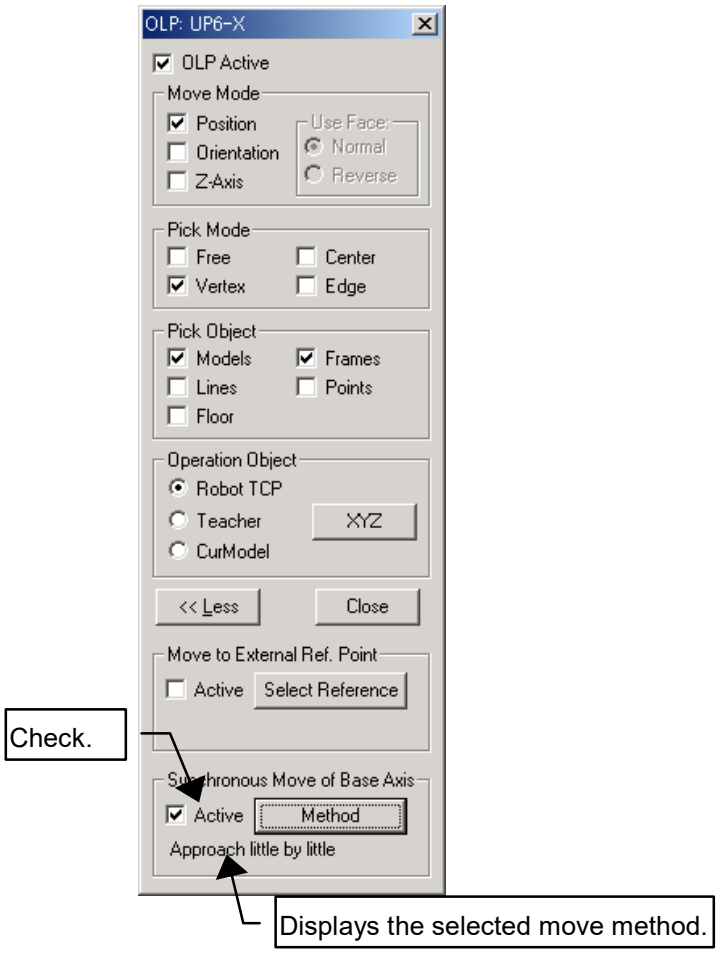
When a robot with servotrack/servotracks is moved with the OLP, the synchronous base axis move function allows the tool end (TCP) to move to the target point with the servotrack motion.
This operation function procedure is explained separately for robots with a single servotrack and robots with multiple servotracks.

■ Robot with Single Servotrack

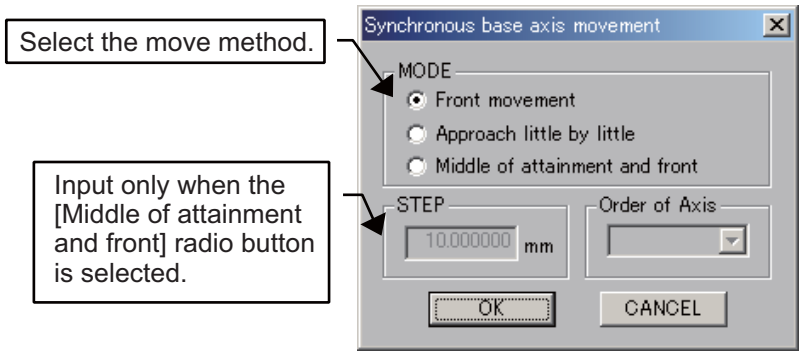
Procedure

1. For the robot with a single servotrack, the move method can be selected among:
   - Front movement;
   - Approach little by little; and
   - Middle of attainment and front.

2. Select the [Active] check box in the “Synchronous base axis move” .

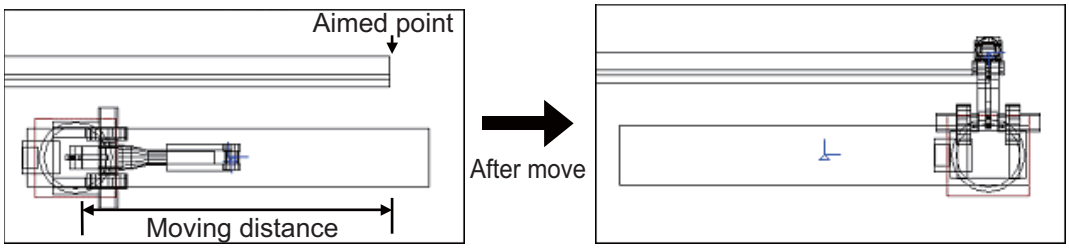


3. Click on the [Method] in the OLP dialog box to display the “Synchronous base axis movement” dialog box, and set the move method.



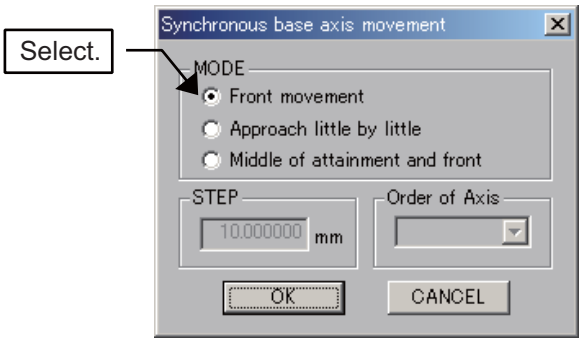
Front Movement

The function enabled with the [Front movement] radio button allows the tool end to move to the target point after the servotrack moves in front of the target point.



Procedure

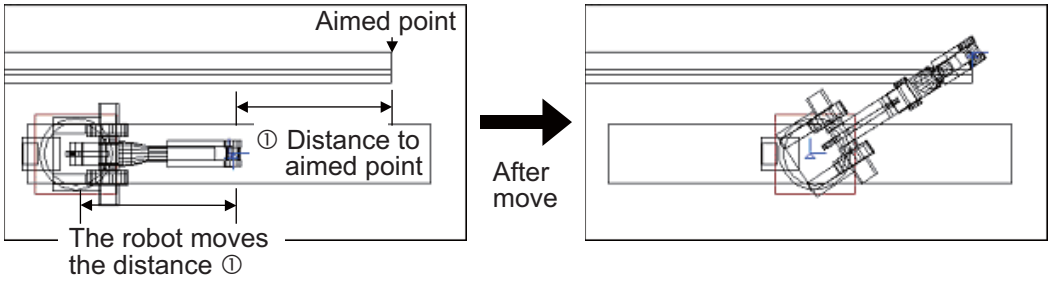
1. Select the [Front movement] radio button in the “Synchronous base axis movement” dialog box.



2. Click on the target point.
   - If the target point exceeds the servotrack soft limit, a message is displayed and the servotrack moves to the soft limit.
   - If the tool end (TCP) does not reach the target point, an error message is displayed but the servotrack moves in front of the target point.

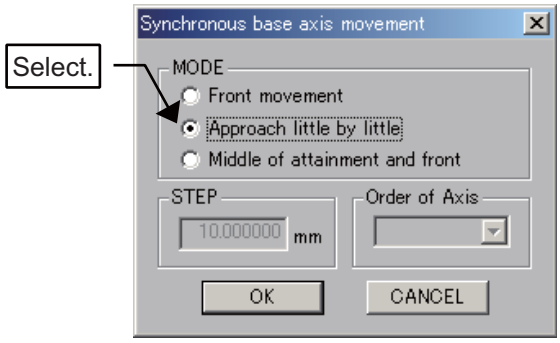
Approach Little by Little

The function enabled with the [Approach little by little] radio button allows the servotrack to move only the distance between the target point and the position of the current tool end (TCP), then the tool end (TCP) moves to the target point. In short, the servotrack and the tool end (TCP) move so that the current robot posture is maintained as much as possible.



Procedure

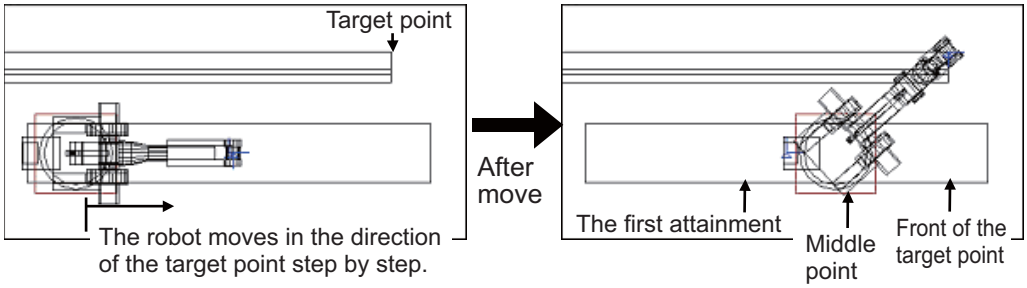
1. Select the [Approach little by little] radio button in the “Synchronous base axis movement” dialog box.



2. Click on the target point.
   - If the target point exceeds the servotrack soft limit, a message is displayed and the servotrack moves to the soft limit.
   - If the tool end (TCP) does not reach the target point, an error message is displayed but the servotrack moves in front of the target point.

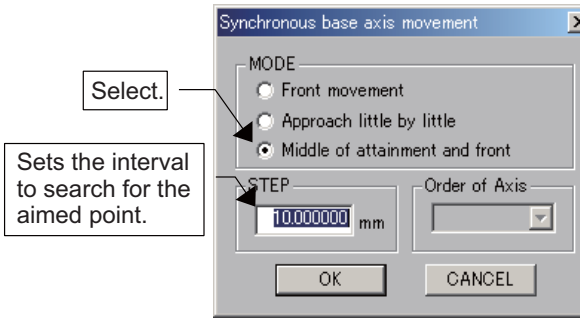
Middle of Attainment and Front

The function enabled with the [Middle of attainment and front] radio button allows the servotrack to move toward the target point step by step to search for the first position where the tool end (TCP) can attain the target point. The servotrack then moves to the middle point between the first attainment and the front of the target point, and the tool end (TCP) moves to the target point.

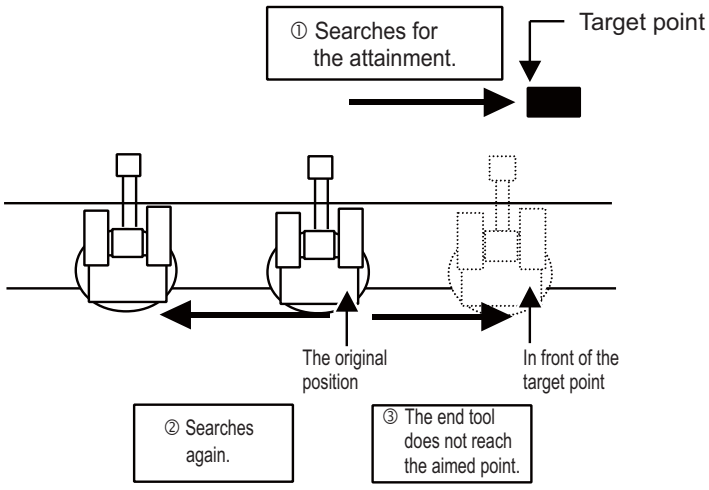


Procedure

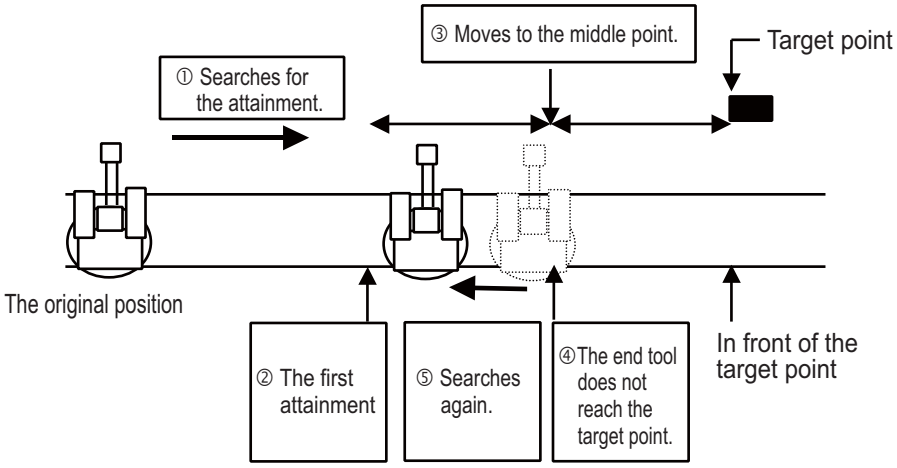
1. Select the [Middle of attainment and front] radio button in the “Synchronous base axis movement” dialog box. In the “STEP” edit box, set the moving amount for each step taken toward the target point.



2. Click on the target point.
   - If the tool end (TCP) does not reach the target point even though the servotrack moves in front of the target point, the attainment is searched with the servotrack moving in such a direction that the target point will be further (up to the maximum soft limit) than the servotrack position before moving.

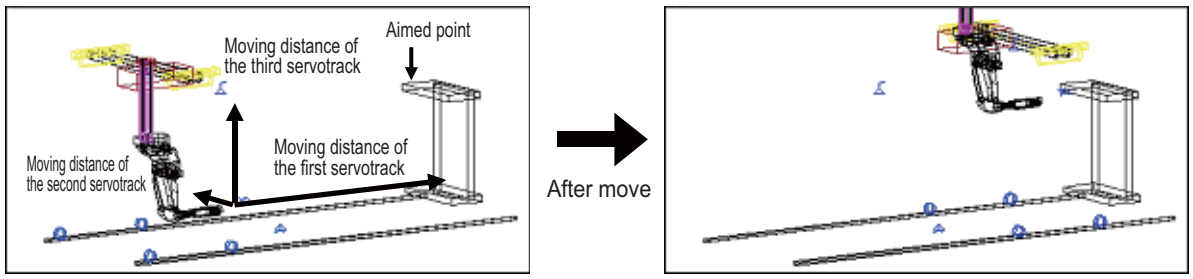


- If the tool end (TCP) does not reach the target point, an error message is displayed and the servotrack returns to the original position before moving.
- If the tool end (TCP) does not reach the target point because the servotrack moves to the middle point between the first attainment and the front of the target point, the attainment is searched again with the servotrack moving in such a direction that the target point will be further than the middle point.



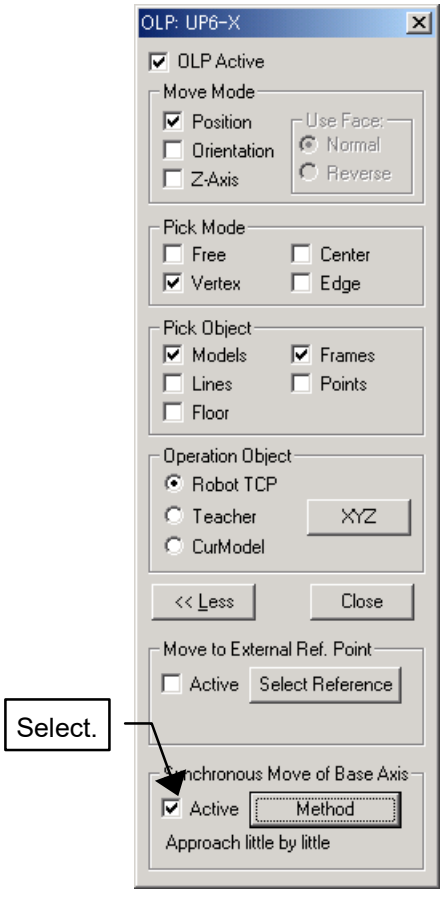
■ Robot with Multiple Servotracks

For the robot with multiple servotracks, each servotrack moves the distance between the current tool end (TCP) position and the target point, and the tool end (TCP) moves to the target point.



Procedure

1. Select the [Active] check box in the “Synchronous base axis move”. For the multiple servotracks, the servotrack move methods cannot be selected since only one method is available.



2. Click on the target point.
   - If the target point exceeds the servotrack soft limit, a message is displayed and the servotrack moves to the soft limit.
   - If the tool end (TCP) does not reach the target point, a message is displayed but the servotracks move the distance to the target point.

13.2 Trace Function

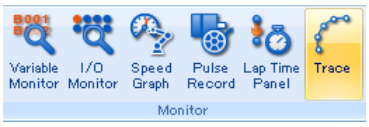
13.2.1 Changing Trace Object

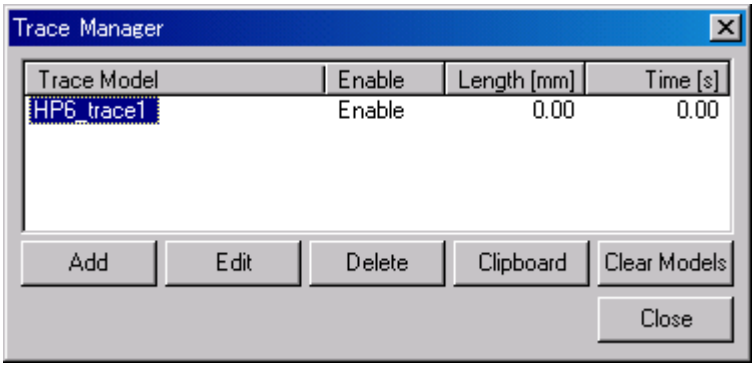
The object normally traced is the tool end, however, the trace object can be changed.
The trace object is changed to the flange in the following explanation.

Procedure

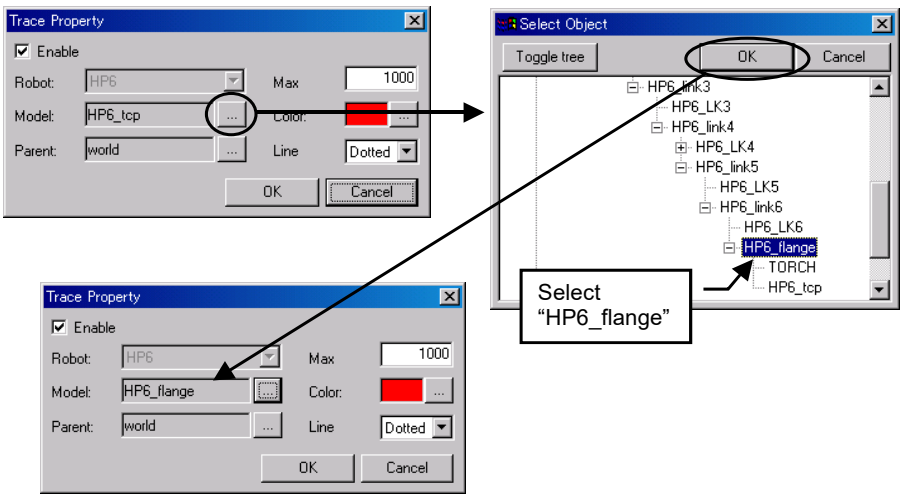
The procedure is explained with the “Arc_Sample.vcl” example.

1. On the [Simulation] tab, in the [Monitor] group, click the [Trace] button, the [Trace] dialog appears.
   The “Trace Manager” dialog will appear. Trace can be added, edited or deleted. For this exemple, the default trace will be edited.

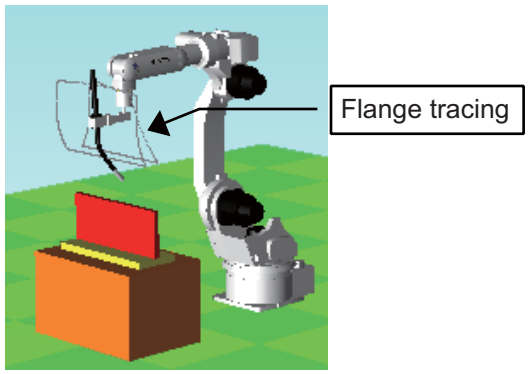




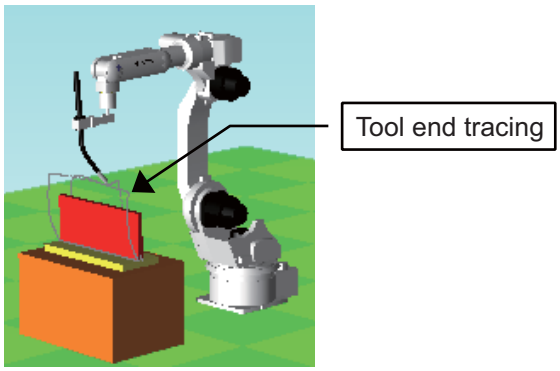
2. Display the trace property by double clicking on the “HP6_trace1” or by pressing the “Edit” button. Press the [...] next to the “Model” field to display the “Select Model” dialog and select the model to be traced. For this example, select the “HP6_flange” model. Then click on the [OK] button. Make sure that the “Model” edit box shows the selected model name and click on the [OK] button.



3. Execute an job.
   On the [Simulation] tab, in the [Playback] group, click the [Start] button.



The following figure shows when the tracing point is a tool.



13.2.2 Changing Trace Parent

The tracking drawn by the trace function is normally created and drawn as a model having "world" as the parent. Therefore, changing the name of the “Parent” in the Trace Configuration dialog box will change the parent of the tracking. This parent changing function is useful in the following cases:

- Tracing welding point positions when the robot holds and moves a workpiece to a fixed welding points.
- Points to be traced are set to welding points.

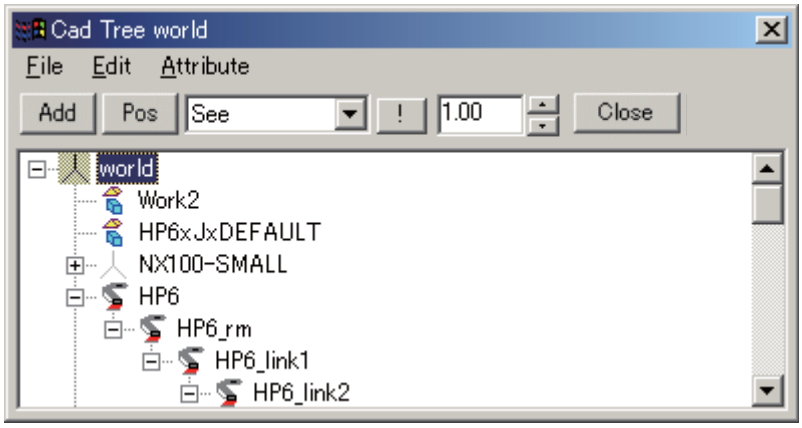
Procedure

The procedure is explained with the “Arc_Sample.vcl” example.

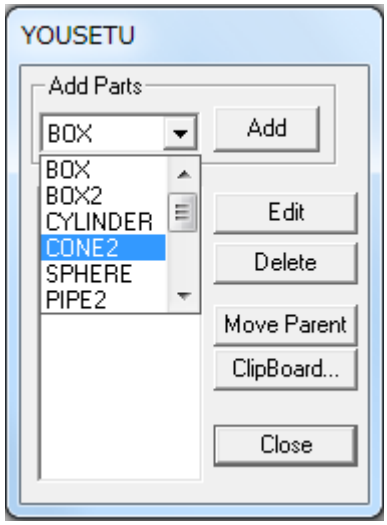
1. On the [Home] tab, in the [Model] group, click the [CadTree] button, the [Cad Tree] dialog appears.

To hide the “WORK” which is located on “DAI”, select “WORK” to set it to “Hide”.

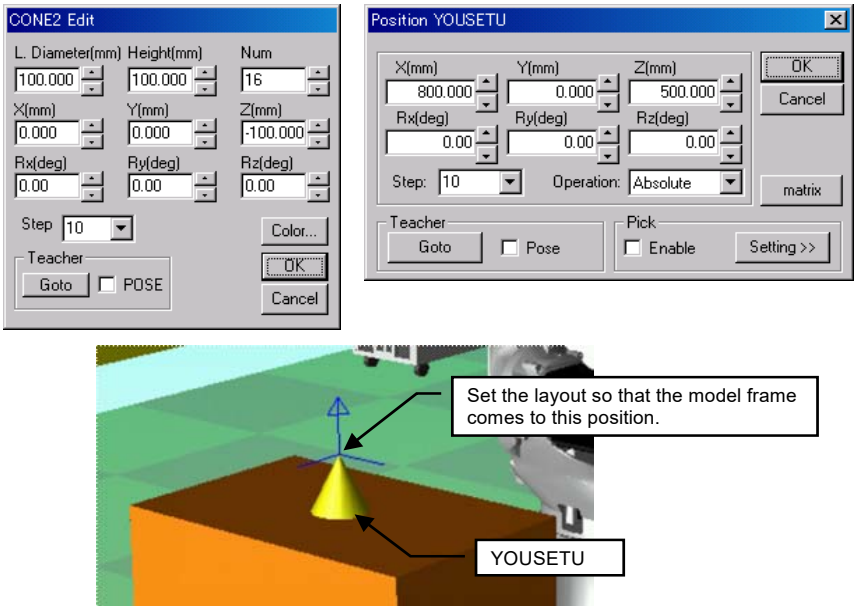
2. Select “world” from the Cad Tree and click on the [Add] button to create the “YOU-SETU” model.



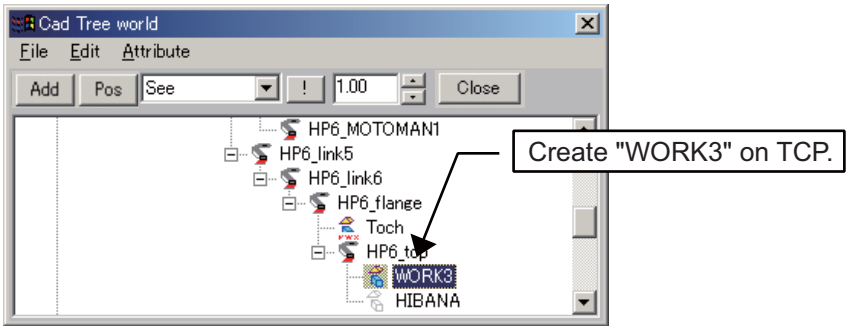
3. Add the “CONE2” model to “YOUSETU”.



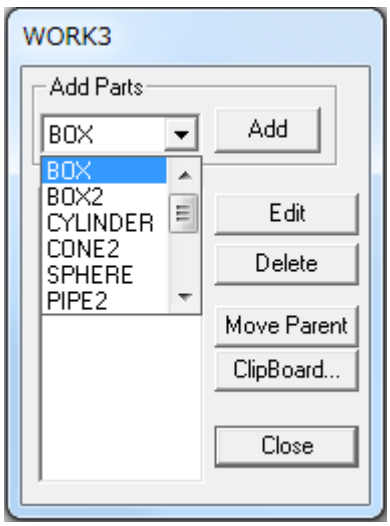
The following figures show “CONE2” and the layout setting.



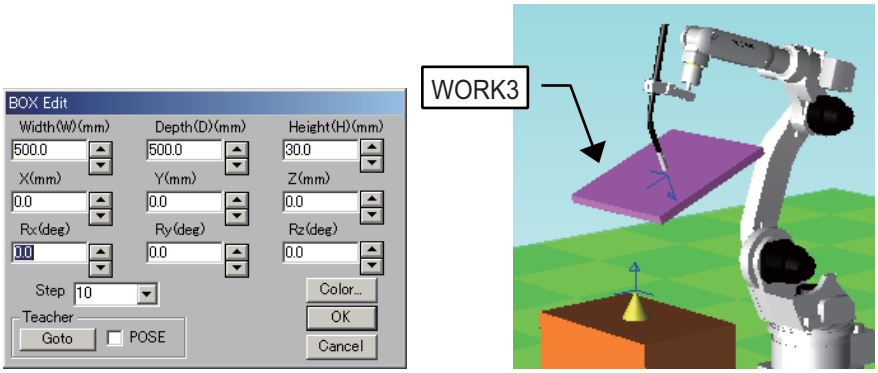
4. Create the “WORK3” model that has “TCP” as the parent.
   Select “HP6_tcp” from the Cad Tree, then click on the [Add] button.



5. Add the “BOX” model to “WORK3”.

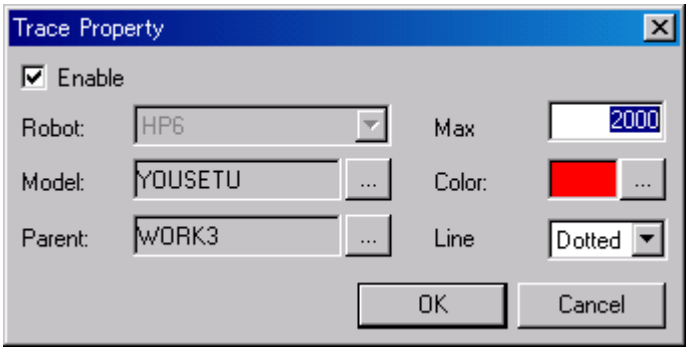


Set the BOX as follows.



6. On the [Simulation] tab, in the [Monitor] group, click the [Trace] button, the [Trace] dialog appears.

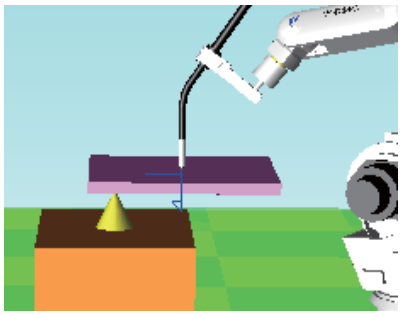
7. Display the trace property by double clicking on the “HP6_trace1” or by pressing the “Edit” button. Press the [...] next to the “Model” field to display the “Select Model” dialog and select the model to be traced. For this example, select the “YOUSETU” model. Then click on the [OK] button. Make sure that the “Model” edit box shows the selected model name.
8. Press the [...] next to the “Parent” field to display the “Select Model” dialog and select the model that will become the parent (and the reference coordinate frame) of the trace. For this example, select the “WORK3” model. Then click on the [OK] button. Make sure that the “Parent” edit box shows the selected model name.
9. The “Max. Points” field defines the maximum number of points that will be used by the trace, this affect the length of the trace. (If the number of tracing points exceeds the set value, tracing points are deleted in order from the oldest.)
   In this example, set the value to 2000.



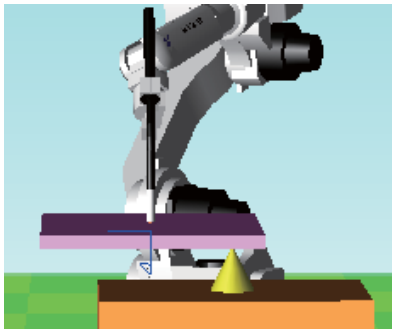
10. The “Color” field displays the color of the trace. Set any desired color by pressing the [...] button next to the color.

11. Click on the [OK] button to save the setting.

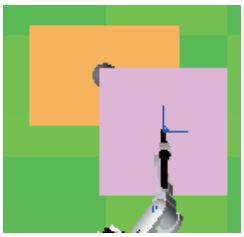
12. Using the Virtual Pendant, create a new job which welds four corners of a workpiece as shown in the following figure. Teach the positions of each STEP with MOVL instructions.



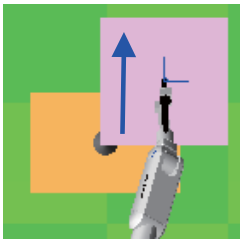
Initial State Viewed from Side



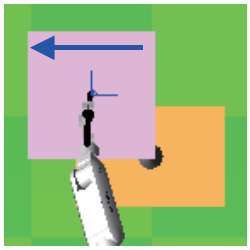
Initial State Viewed from Front



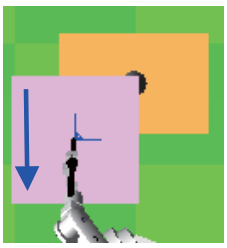
STEP 1



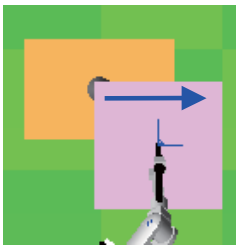
STEP 2



STEP 3

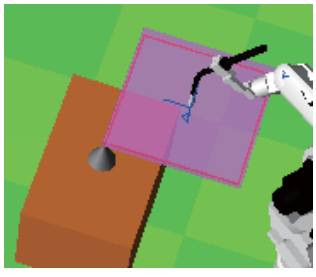


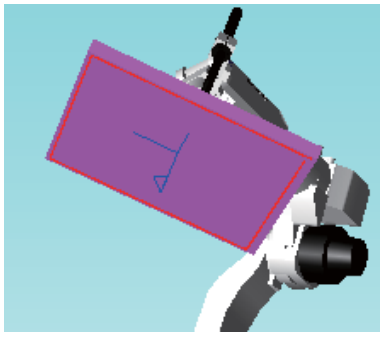
STEP 4



STEP 5

13. Execute the job and the tracing track attached to “WORK3” will be displayed. This helps to see which positions on the workpiece are to be welded.

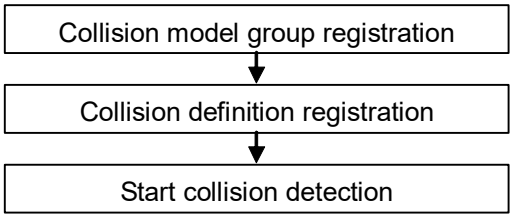




As described above, changing the trace object and the parent with the Trace Configuration dialog box can leave the moving track of the target point that can be easily read.

13.3 Collision Detection Setting

This section explains to set up the collision detection and check the collision on the playback. Follow the flowchart below to set up the collision detection.

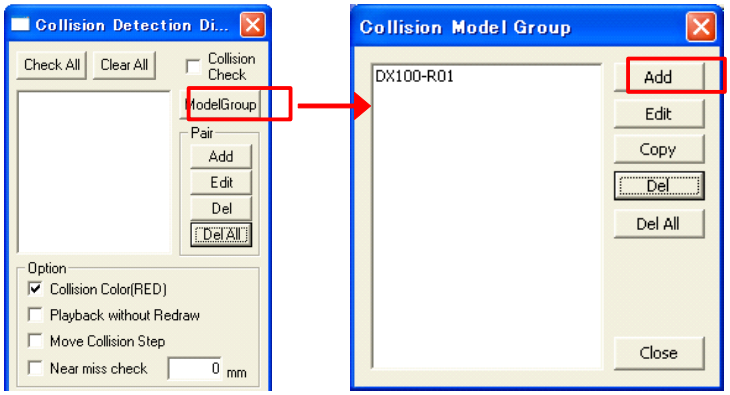


■ Collision model group registration

Procedure

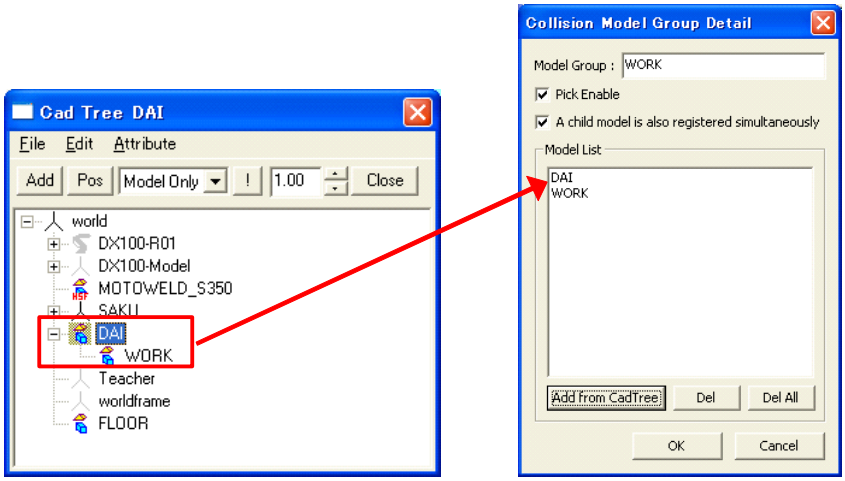
1. On the [Simulation] tab, in the [Collision] group, click the [Collision Detection] button, the [Collision Detection] dialog appears.

2. Click the [ModelGroup] button on the Collision Detection dialog box, the Collision Model Group dialog box is displayed.
3. Click the [Add] button on the Collision Model Group dialog box, the Collision Model Group Detail dialog box is displayed.



By creating a simplified model of the model registered in the collision model group and using that model as the collision pair, the performance of collision check processing can be improved. The models registered in the collision model group can be easily created from the [Create Simple model] button on the "Collision Model Group" dialog.

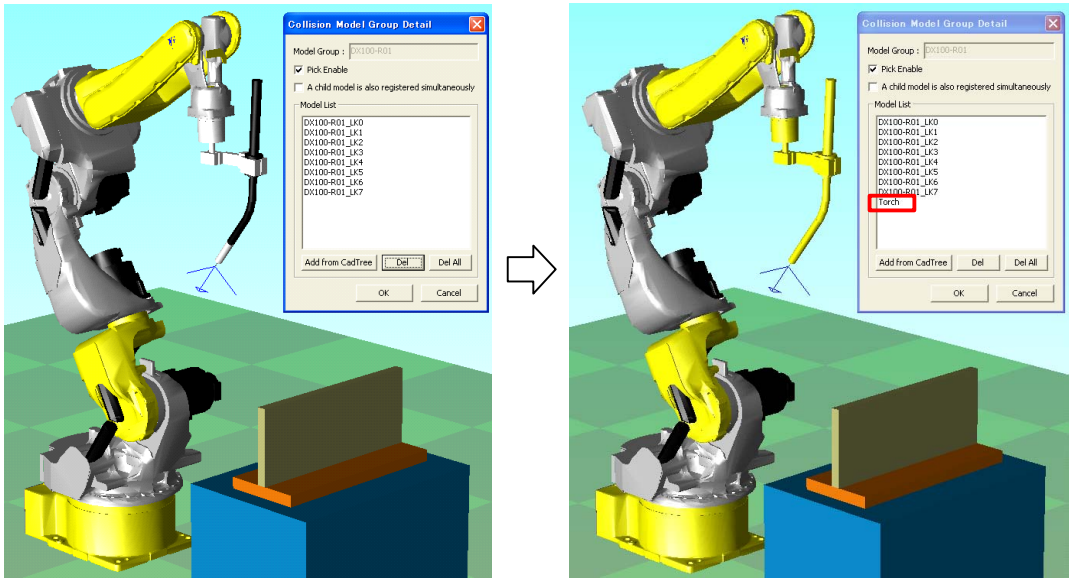
4. Enter the collision model group name to [Model Group], display the [CadTree] dialog box, and select the "DAI" in the CadTee dialog box.
   Check the [A child model is also registered simultaneously] and click the [Add from CadTree] button, "DAI" and "WORK" is added to the model list. Click the [OK] button to save.



5. To edit the collision model group of robot, Double-click "DX100-R01" on the Collision Model Group dialog box. The Collision Model Group Detail dialog box is displayed.

   Delete the unnecessary model from model list. Click the 

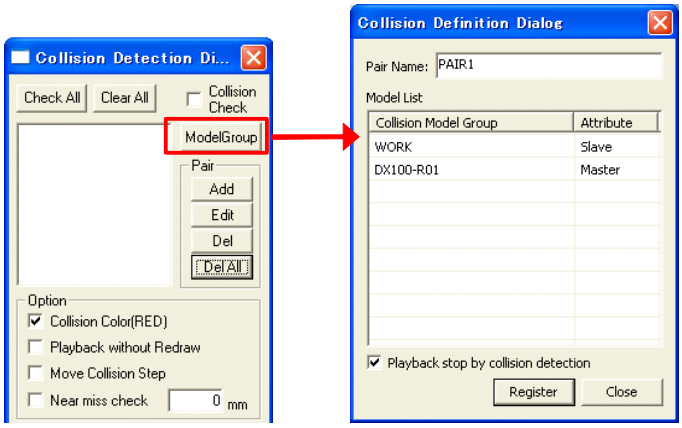
button and click the tool model on the MotoSim EG-VRC window. "Torch" is added. Click the [OK] button to save.



■ Collision definition registration

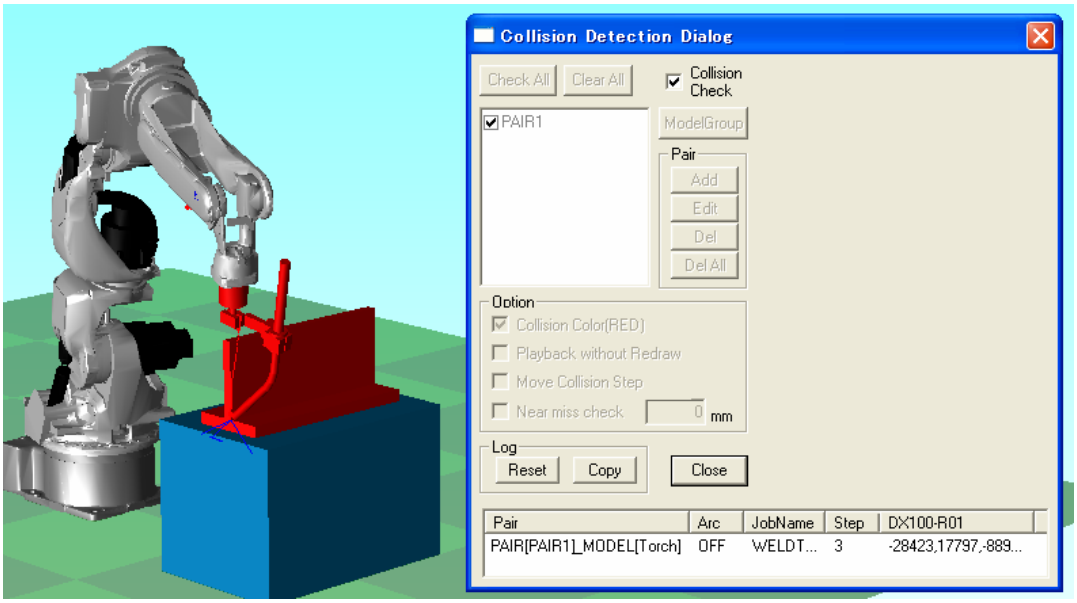
1. Click the [Add] button on the Collision Detection dialog box, the Collision Definition dialog box is displayed.

2. Enter "PAIR1" to the [Pair Name], Set Attribute of "DX100-R01" as "Master" and set Attribute of "WORK" as "Slave".



■ Start collision detection

1. Check the "PAIR1" check box on the Collision Detection dialog box, and check the [Collision Check] check box.
2. To execute the job, on the [Simulation] tab, in the [Playback] group, click the [Start] button. When the collision occurs, the models turn red, and playback is stopped.



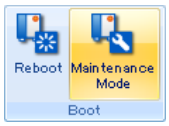
13.4 Option Function Setting

The particular operation is available by setting option function.

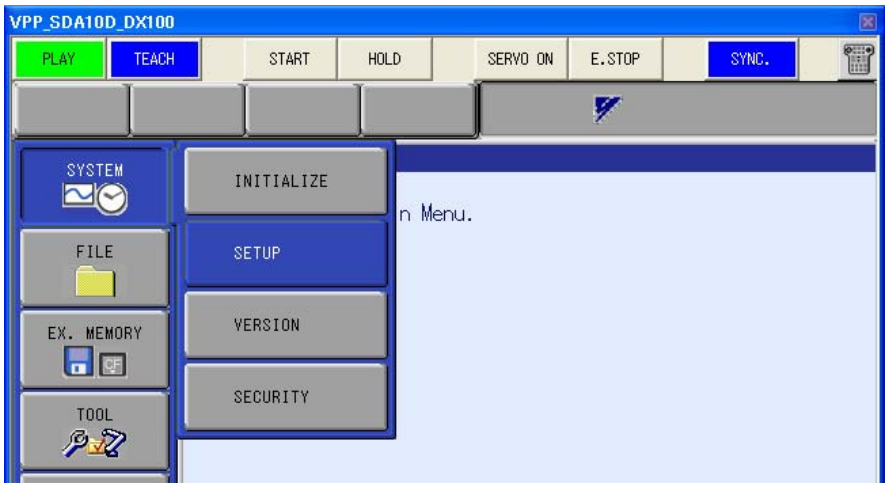
NOTE MotoSim EG-VRC supports the function in the " 1.2.1 Optional Functionof controller " only.

Procedure

1. Start the controller in maintenance mode. On the [Controller] tab, in the [Boot] group, click the [Maintenance mode] button, the [Maintenance mode] dialog appears. For details refer to section "7.10 VRC Maintenance Mode".

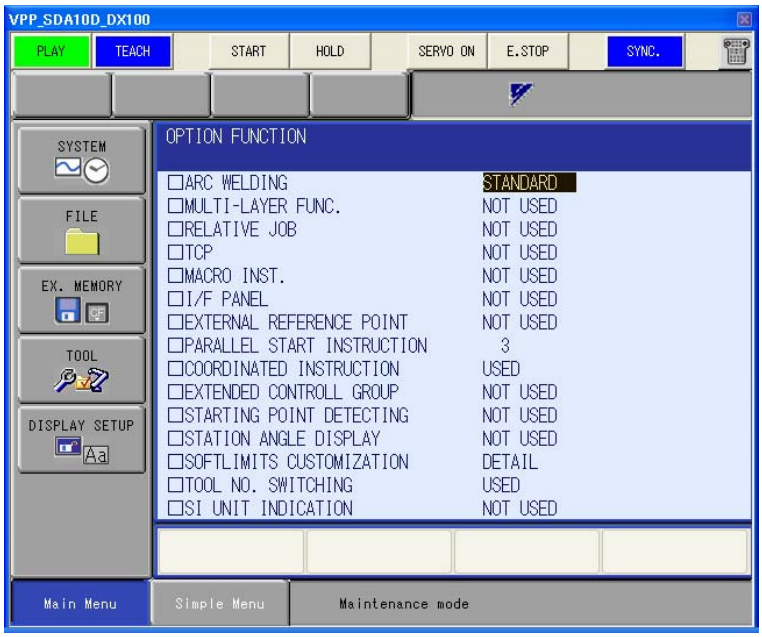


2. Select {SYSTEM} - {SETUP} in the virtual pendant.



3. Select [OPTION FUNCTION] in the {SETUP} display.

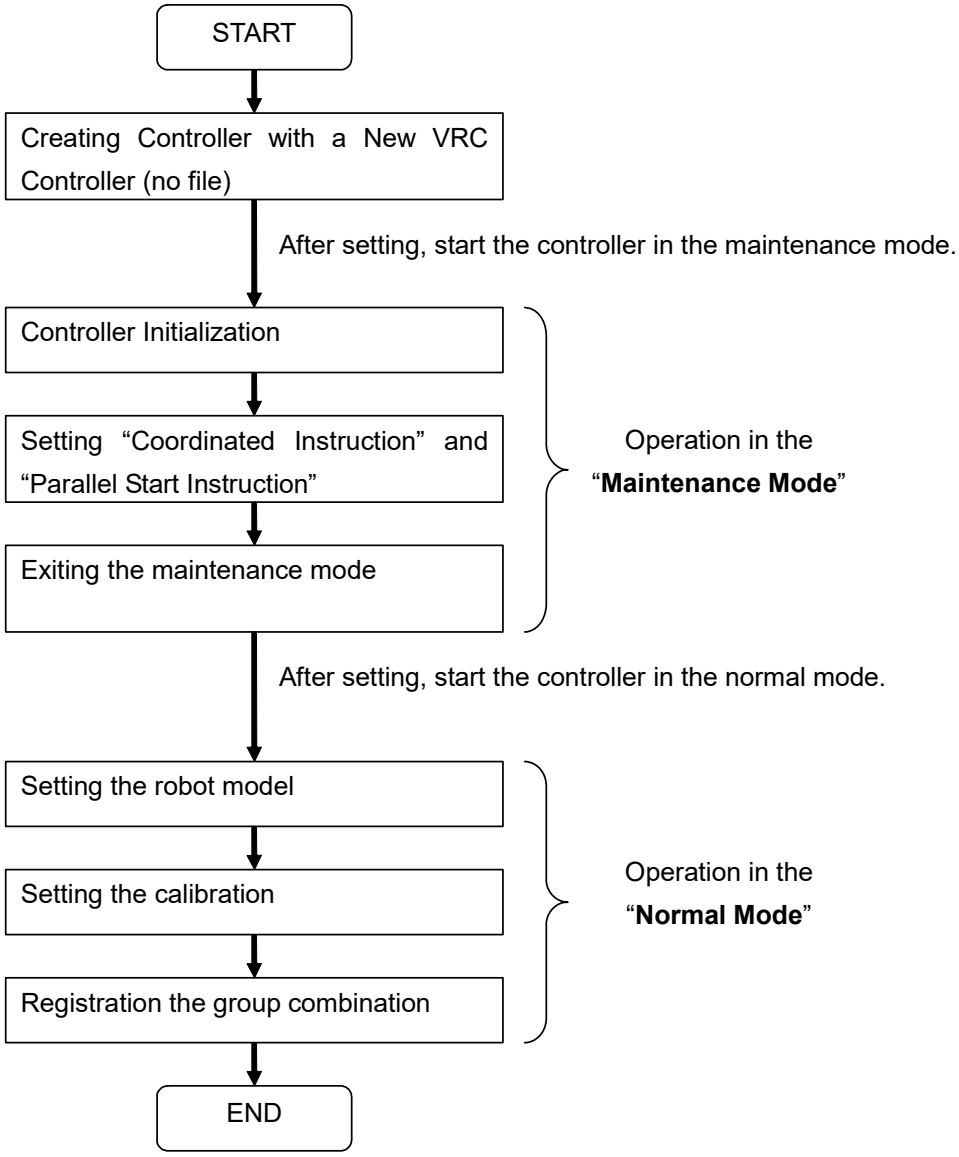
4. Set the function used to "USED".
   For detail of each function, please refer to the controller "Operator's Manual".



13.5 Dual-Arm robot Setting

When the Dual-Arm robot (ex. SDA10-A00) is used, the job used "Coordinated Instruction" and "Parallel Start Instruction" can be created in MotoSim EG-VRC. This section describes how to setup Dual-Arm robots and how to activate optional functions such as "Coordinated Instruction" or "Parallel Start Instruction" of each controller.

Follow the flowchart below to setup Dual-Arm robots.



13.5.1 Dual-Arm robot Setting (DX100)

Dual-Arms are composed of right arm, left arm and one torso. When defining the control group of the controller during the initialization, three control groups need to be set. There are two robot groups (R1 and R2) for the arms and one station group (S1) for the rotation of the torso.

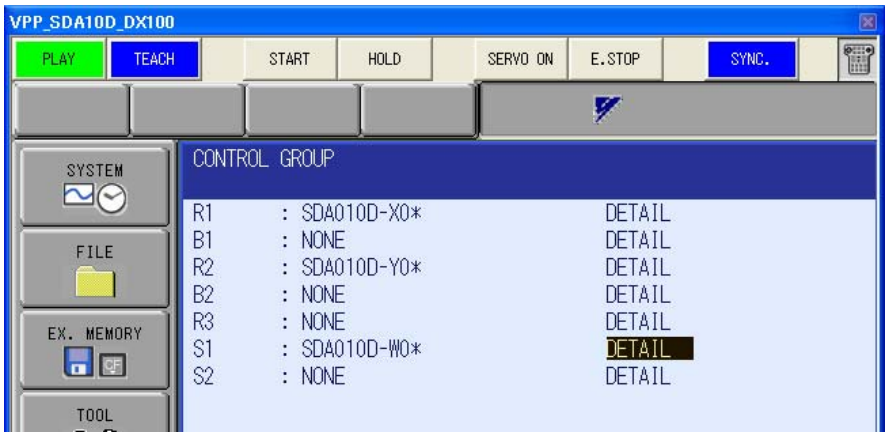
To determine the robot model to select from the robot list, remove the "A00" part of the robot type and replace it by:

- X0* for the left arm robot (R1)
- Y0* for the right arm robot (R2)
- W0* for the torso rotation (S1)

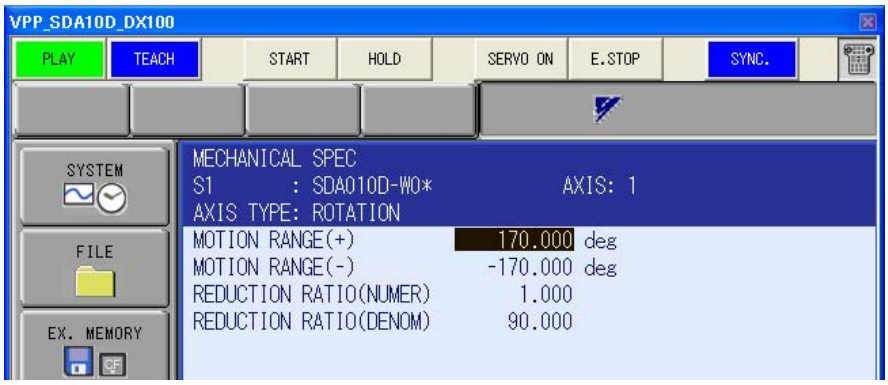
For example for a SDA010D-A00 robot, the control groups should be set to SDA010D-X00, SDA010D-Y00 and SDA010D-W00.

Procedure

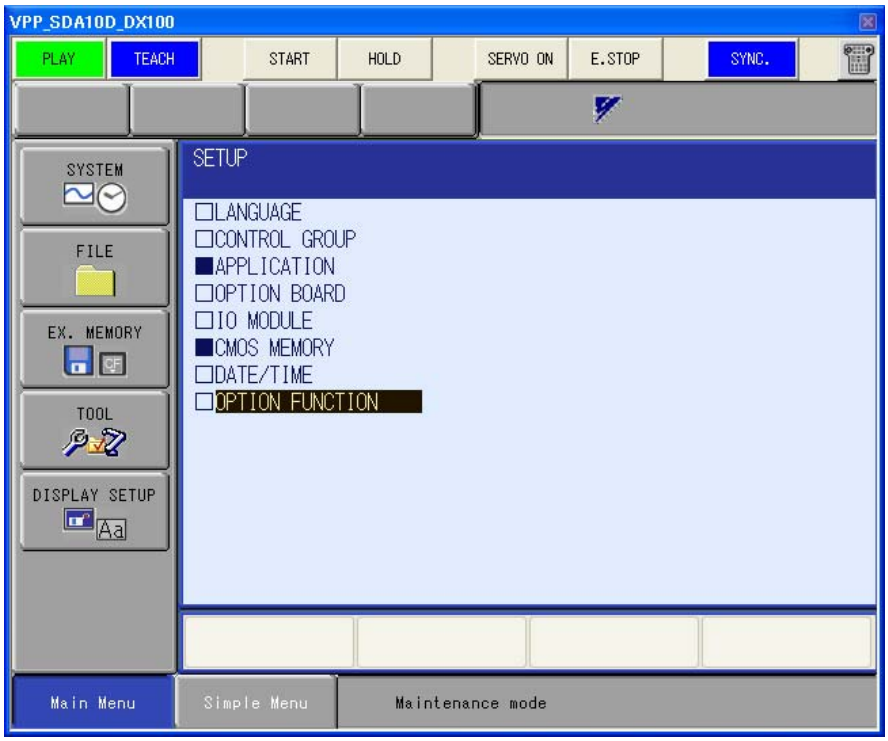
1. Proceed the step 1 and 2 of " 7.1.1 Create a New VRC Controller (no file) ". Select some system version of the "DX100". When the operation is finished, the controller starts in the maintenance mode.
2. Proceed all steps of " 7.1.3 Initializing the Controller (YRC1000, YRC1000micro, DX200, DX100, NX100) ". At the Step 3, set the control group to the following settings.



The "MECHANICAL SPEC" screen and "MOTOR SPEC" don't need any change. Press [ENTER] to go to the next screen.

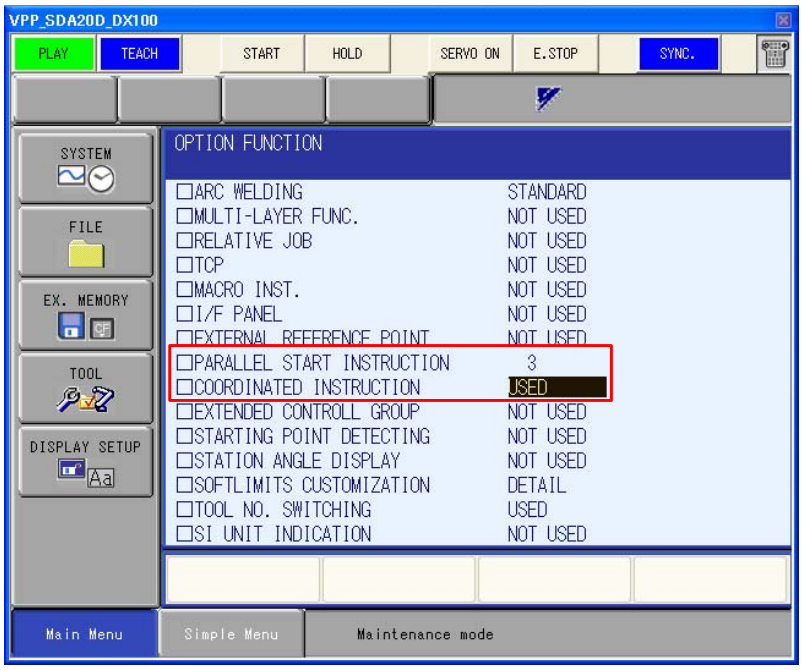


3. From the main menu, select {SYSTEM} - {SETUP}.
4. From the setup list, select {OPTION FUNCTION}.



5. Select the "Parallel Start Instruction" and set its value to "4 Tasks". When the confirmation message displays, select "Yes" to make the change.

6. Select the "Coordinated Instruction" and set its value to "Used". When the confirmation message displays, select "Yes" to make the change.



7. Close the controller "Maintenance Mode" by clicking the [Finish] button of the MotoSim EG-VRC "Instruction Guide" dialog.
8. To set the robot models , proceed the step 4 of " 7.1.1 Create a New VRC Controller (no file) ".
9. To set the calibration data of the controller, proceed "Set calibration data base on robot model layout" of " 7.6.3 Robot Calibration Setting ".
10. Change the security mode to "MANAGEMENT MODE" in the virtual pendant.
11. Select {SETUP} - {GRP COMBINATION}, add the group combination (ex. "R1+R2", "R1+R2",…)
    For detail of group combination, please refer to the "Controller Options: Instructions for Independent/Coordinated control function" manual.

13.5.2 Dual-Arm robot Setting (FS100)

Dual-Arms are composed of right arm, base axis of right arm, left arm and base axis of left arm. When defining the control group of the controller during the initialization, four control groups need to be set. There are two robot groups (R1 and R2) for the arms and two base axis group (B1, B2).

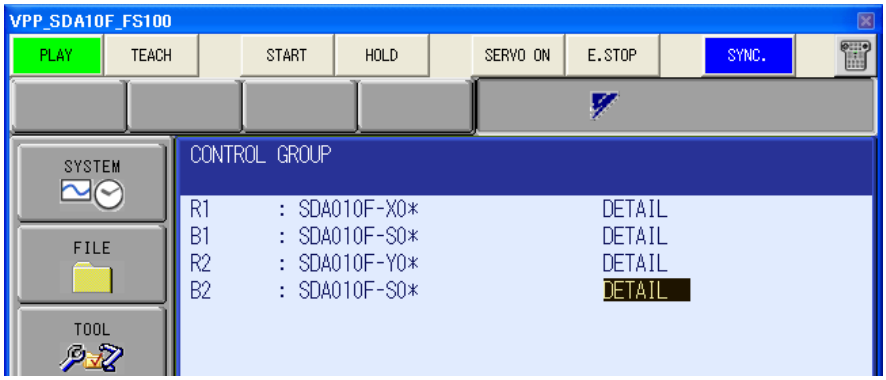
To determine the robot model to select from the robot list, remove the "A00" part of the robot type and replace it by:

- X0* for the left arm robot (R1)
- S0* for the base axis of the left arm robot (B1)
- Y0* for the right arm robot (R2)
- S0* for the base axis of the right arm robot (B2)

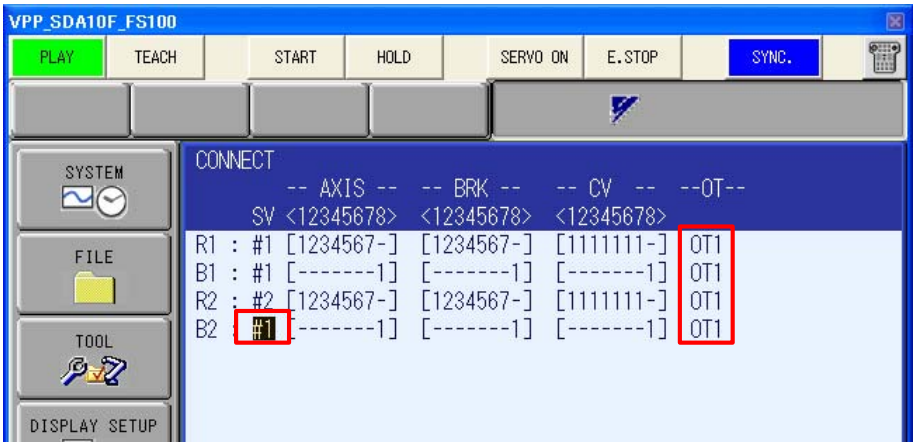
For example for a SDA010F-A00 robot, the control groups should be set to SDA010F-X00, SDA010F-S00, SDA010F-Y00 and SDA010F-S00.

Procedure

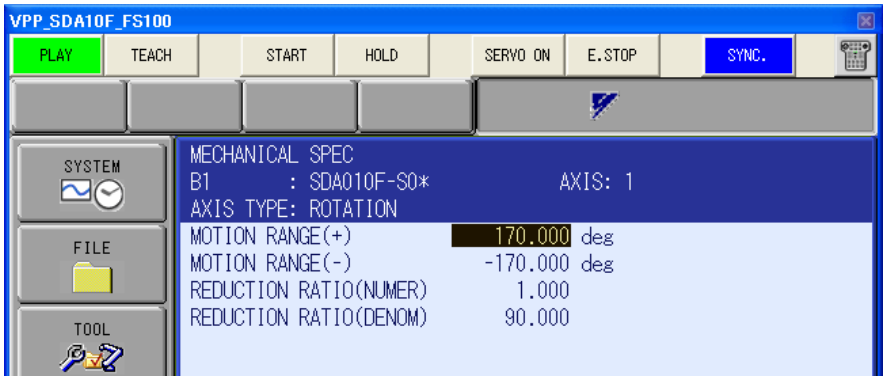
1. Proceed the step 1 and 2 of " 7.1.1 Create a New VRC Controller (no file) ". Select some system version of the "FS100". When the operation is finished, the controller starts in the maintenance mode.
2. Proceed all steps of " 7.1.4 Initializing the Controller (FS100) ". At the Step 3, set the control group to the following settings.

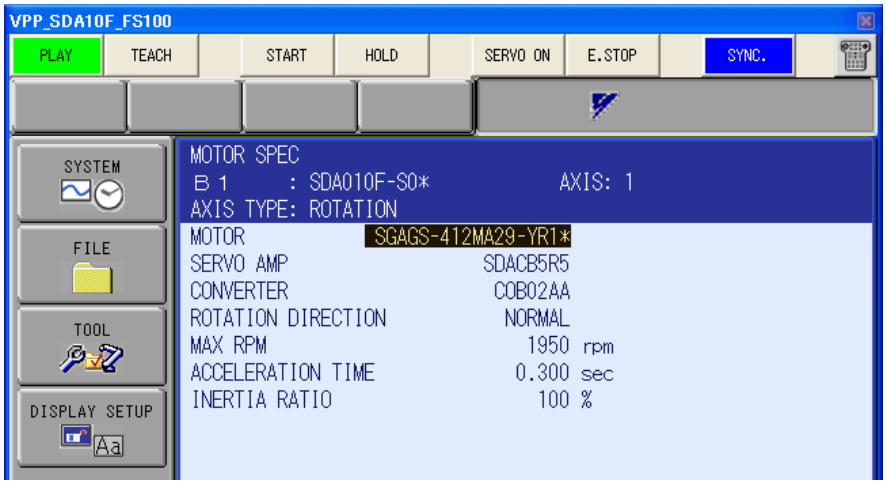


Then at the Step 4, set the connection to the following settings.



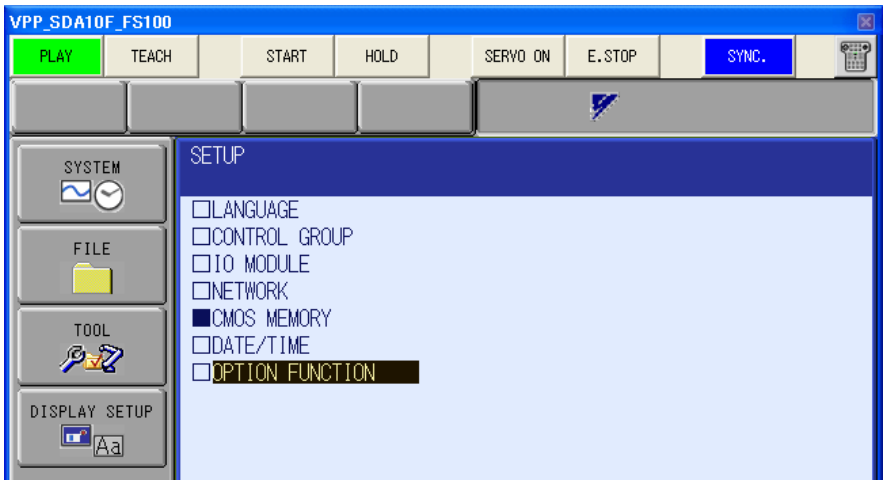
The "MECHANICAL SPEC" screen and "MOTOR SPEC" don't need any change. Press [ENTER] to go to the next screen.



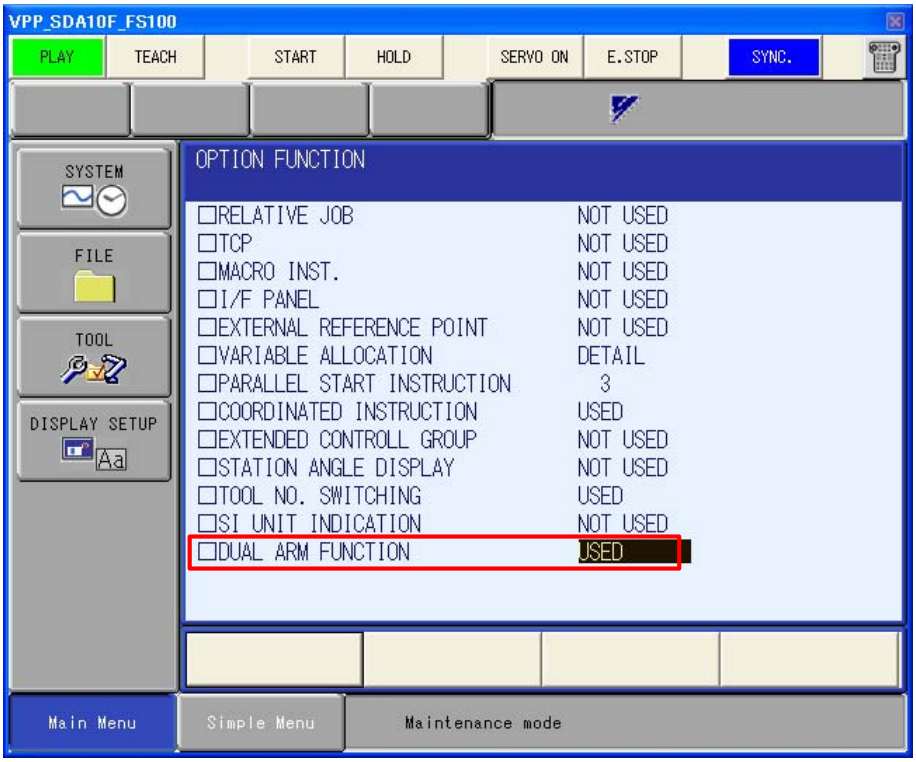


3. From the main menu, select {SYSTEM} - {SETUP}.

4. From the setup list, select {OPTION FUNCTION}.

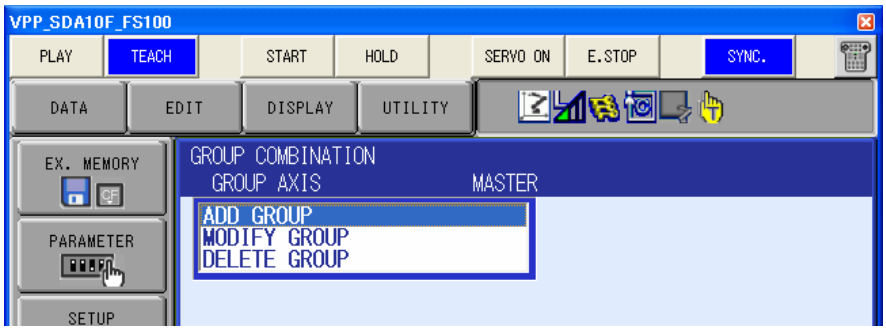


5. Select the "DUAL ARM FUNCTION" and set its value to "Used". When the confirmation message displays, select "Yes" to make the change.

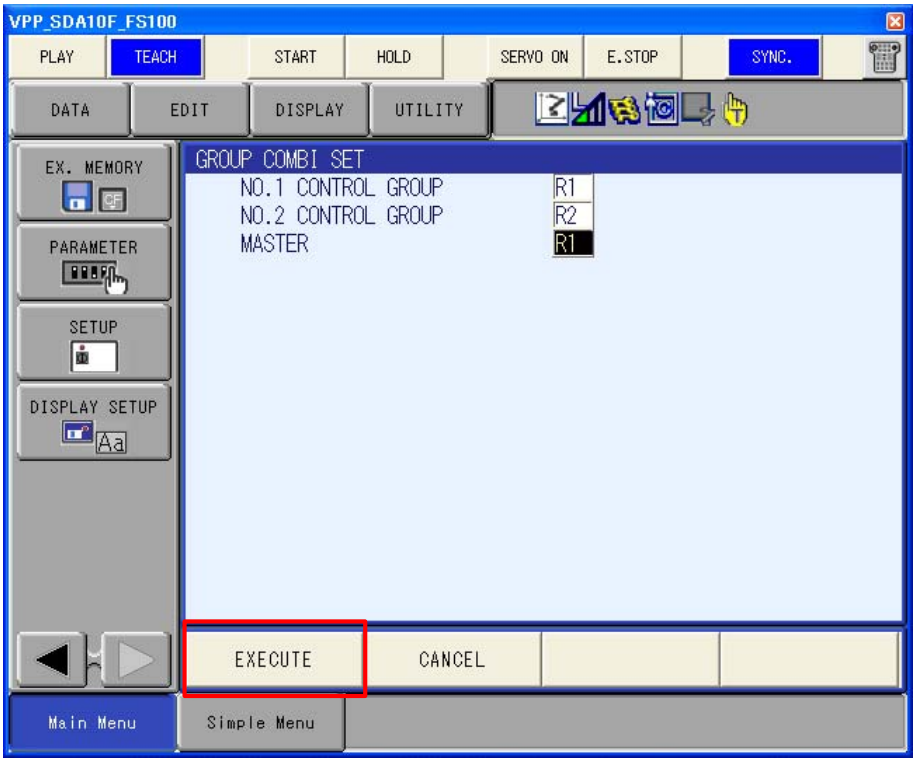


6. Close the controller "Maintenance Mode" by clicking the [Finish] button of the MotoSim EG-VRC "Instruction Guide" dialog.
7. To set the robot models , proceed the step 4 of " 7.1.1 Create a New VRC Controller (no file) ".
8. To set the calibration data of the controller, proceed "Set calibration data base on robot model layout" of " 7.6.3 Robot Calibration Setting ".
9. Change the security mode to "MANAGEMENT MODE" in the virtual pendant.
10. Select the {SETUP} - {GRP COMBINATION} menu in the virtual pendant.

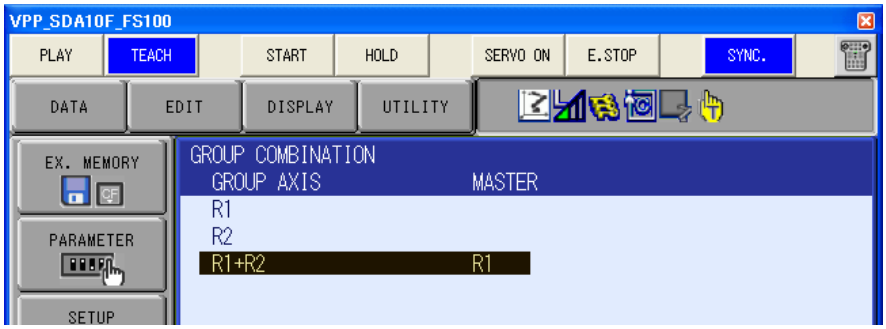
11. Press [SELECT], and select "ADD GROUP".



12. Set the "NO.1 CONTROL GROUP" to "R1", "NO.2 CONTROL GROUP" to R2 and "MASTER" to R1. Then click the [EXECUTE] button.



13. If the "R1+R2:R1" group combination set is created, the setting is finished.



13.5.3 Dual-Arm robot Setting (NX100)

Dual-Arms are composed of right arm, left arm and one torso. When defining the control group of the controller during the initialization, three control groups need to be set. There are two robot groups (R1 and R2) for the arms and one station group (S1) for the rotation of the torso.

To determine the robot model to select from the robot list, remove the "A00" part of the robot type and replace it by:

- X0* for the left arm robot (R1)
- Y0* for the right arm robot (R2)
- W0* for the torso rotation (S1)

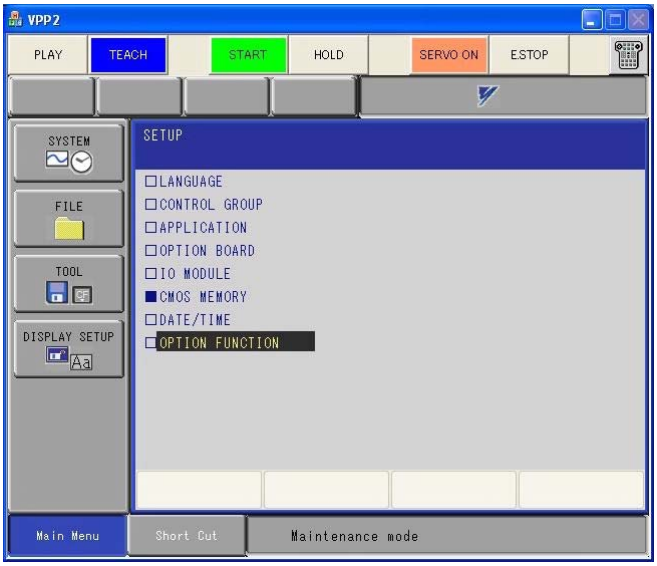
For example for a SDA10-A00 robot, the control groups should be set to SDA10-X00, SDA10-Y00 and SDA10-W00.

Procedure

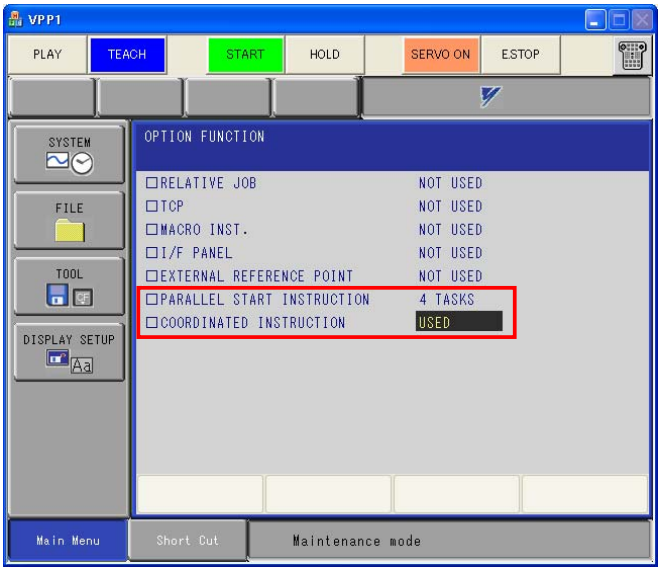
1. Proceed the step 1 and 2 of " 7.1.1 Create a New VRC Controller (no file) ". Select some system version of the "NX100". When the operation is finished, the controller starts in the maintenance mode.
2. Proceed all steps of " 7.1.3 Initializing the Controller (YRC1000, YRC1000micro, DX200, DX100, NX100) ". At the Step 3, set the control group to the following settings.

3. From the main menu, select {SYSTEM} - {SETUP}.

4. From the setup list, select {OPTION FUNCTION}.



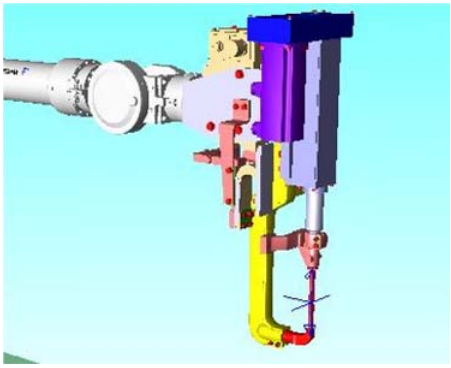
5. Select the "Parallel Start Instruction" and set its value to "4 Tasks". When the confirmation message displays, select "Yes" to make the change.
6. Select the "Coordinated Instruction" and set its value to "Used". When the confirmation message displays, select "Yes" to make the change.



7. Close the controller "Maintenance Mode" by clicking the [Finish] button of the MotoSim EG-VRC "Instruction Guide" dialog.
8. To set the robot models , proceed the step 4 of " 7.1.1 Create a New VRC Controller (no file) ".
9. To set the calibration data of the controller, proceed "Set calibration data base on robot model layout" of " 7.6.3 Robot Calibration Setting ".
10. Change the security mode to "MANAGEMENT MODE" in the virtual pendant.
11. Select {SETUP} - {GRP COMBINATION}, add the group combination (ex. "R1+R2", "R1+R2",…)
    For detail of group combination, please refer to the "Controller Options: Instructions for Independent/Coordinated control function" manual.

13.6 External Axes Setting (Motor Gun)

The following example shows how to setup an external axis as a Motor Gun on a ES165N robot. By default external axis are setup to rotate around the Z-axis. This example explains how to change the default behavior of the external axis to make the Motor Gun model move linearly along the Z-axis.

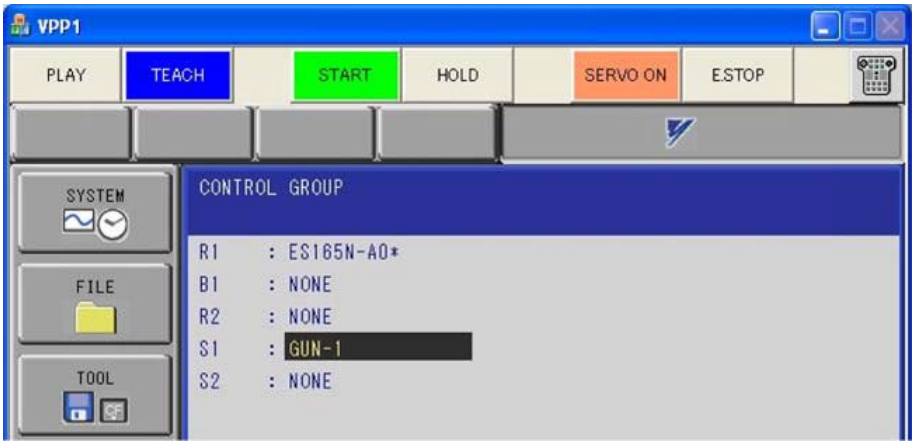


13.6.1 Initialization

Procedure:

Add a new controller with no CMOS.BIN according to the precedure of section 7.1.2 Create Controller with no CMOS.

1. When initializing the controller with the procedure of section 7.1.5 Initializing the Controller, at the “CONTROL GROUP” screen (step 4), enter the information as follows:



   Press [ENTER] to go to the next screen.
2. The “CONNECT” screen doesn’t need any change. Press [ENTER] to continue to the external axis setup screens.
3. The “AXIS CONFIG” defines the external axis mechanism type between “BALL-SCREW”, “RACK&PINION” or “ROTATION“. The available types depends on the machine type selected in the “CONTROL GROUP” screen. In the case of “GUN”, the only choice is “BALL-SCREW”. Press [ENTER] to go to the next screen.

4. In the “MECHANICAL SPEC” screen, define the “MOTION RANGE” (+ and -) of the axis. The values are the soft limit of the external axis and will prevent the axis from moving outside of this range.
   The “REDUCTION RATIO” is used to enter the ratio of the speed reducer. Usually in the case of a Motor Gun there are none, so both values are set to 1.
   The “BALL-SCREW PITCH” is the linear motion for one full revolution of the screw. As a reference, most motors encoder have a resolution of 4096 pulses per revolution. So in this example, a value of 4.096 mm/r means that the gun shaft will travel 0.001 mm for every pulse.
   Press [ENTER] to go to the next screen.

5. In the “MOTOR SPEC” screen, if you know which hardware will be used, you may enter it. Otherwise, leave the default value. For the “MOTOR” field, the choice will affect the encoder resolution. The “SGMRS” motor series are fairly standard and have a encoder resolution of 4096 pulses/revolution.
   Press [ENTER] to go to the next screen.

6. In the “APPLICATION” screen, select “MOTOR GUN” as the application.
7. Continue the regular initialization procedure as per section 7.1.5 Initializing the Controller. To use the equipment model, follow the procedure in " 13.7 Registering the Equipment Model " to initialize settings. When the equipment model is not used, Press the “Finish” button of the “Instruction Guide” window to reboot the controller in normal mode.

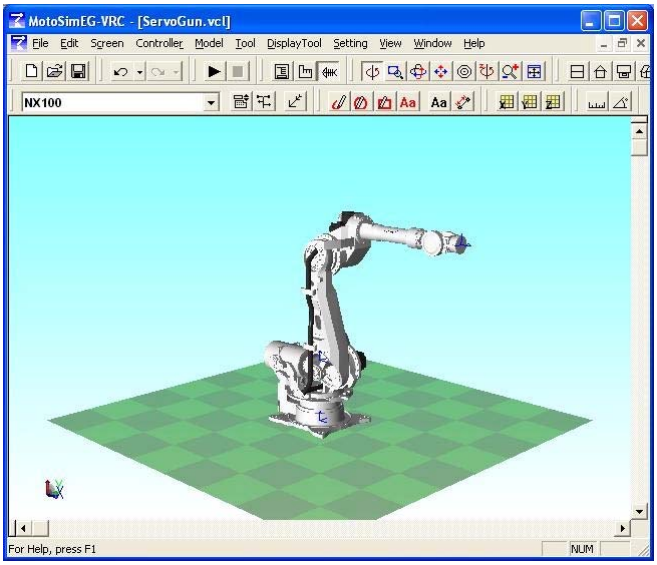
13.6.2 Model setup and motion

By default in MotoSim EG-VRC, the external axis are setup with the “world” model as a parent and the axis will rotate around the Z-axis. In the case of a Motor Gun the external axis need to be moved to the end of the robot and the motor motion change to move the model linearly along the Z-axis.

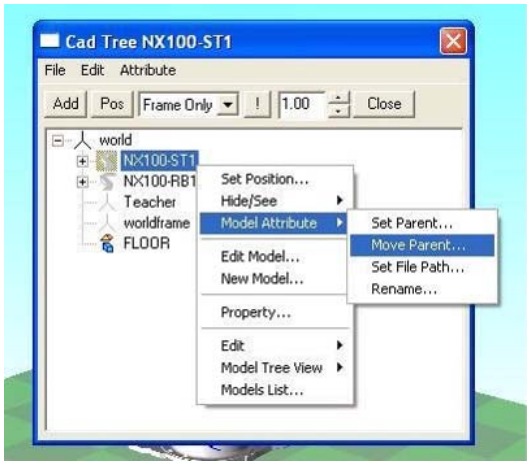
Procedure:

1. Once the controller has been added to the cell. The robot model will be displayed in the middle of the cell. The external axis will not have any model attached to it and will

only be visible in the CADtree dialog.

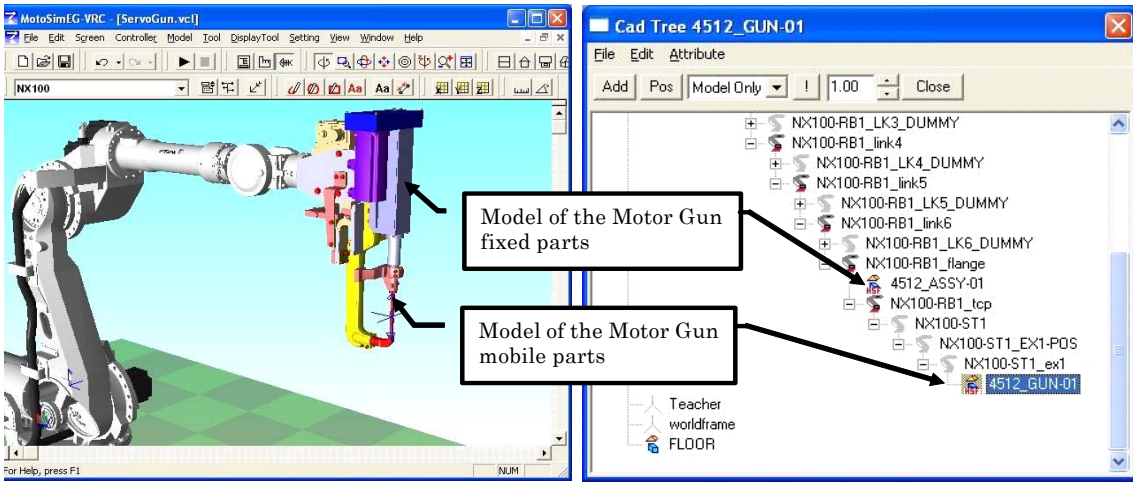


2. Display the CADTree dialog, then select the controller station (e.i. NX100-ST1). Move this model to the robot TCP model (e.i. NX100-RB1_tcp) with the “Move Parent” function.



3. With the Virtual Pendant, define the robot TOOL. This will change the robot TCP model (e.i. NX100-RB1_tcp) in MotoSim EG-VRC.
4. Add or create a model for the Motor Gun fixed part with the robot flange (NX100-RB1_-flange) as the parent.
5. Add or create a model for the Motor Gun mobile part with the station axis model

(NX100-ST1_ex1) as a parent.



6. At this point, if the station axis is moved, the model will rotate around the Z-axis instead of moving along it. To change this, save and close the cell.
7. With a text editor (such as “Notepad”), open the cell file (*.vcl).
   In the controller section, under the station (ST1) section add the following line:

   AXIS1=(TYPE=Z);.

NOTE Note that the ratio and offset can also be modified in this manner. This maybe useful if the Motor Gun specific hardware is unknown.

AXIS1=(TYPE=Z)(RATIO=1.0)(OFFSET=0.0);

where:

AXIS* : Axis No. of the robot (begins with 1.)
TYPE: Direction to move (X, Y, Z, Rx, Ry or Rz)
RATIO: The distance moved (mm or rad) for each pulse
OFFSET: The initial move amount (mm or rad)

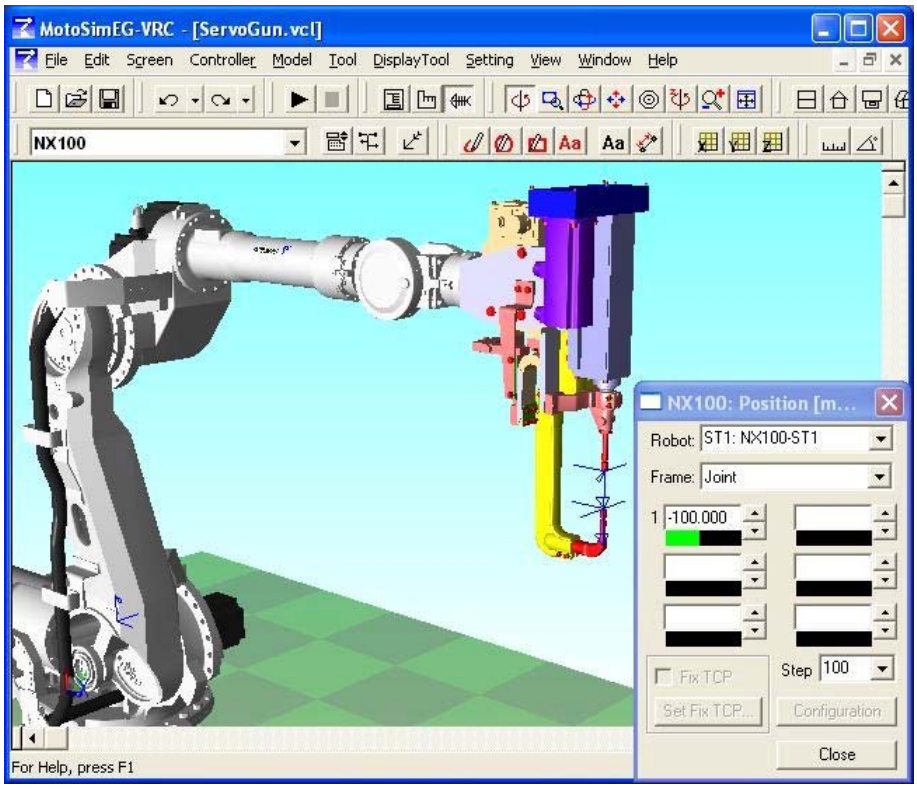
```
CELL_INIT
{
VERSION=1, 1, 0, 0

CONTROLLER(0)
{
PATH=%CELPATH%¥NX100;
NAME=NX100;
RB1
        {
        NAME=NX100-RB1;
        FILE=%CELPATH%¥NX100¥RB1¥ES165N-A00.mdl;
        }
ST1
        {
        NAME=NX100-ST1;
        FILE=dummy;
        AXIS1=(TYPE=Z);
        }
TRACE
        {
        ROBOT=NX100-RB1;
        }
}
...
```

Add this line

8. Save the text file and then reopen the cell file with MotoSim EG-VRC. Confirm that the

Motor Gun axis is working properly.



If the model doesn't move in the proper direction, you may need to adjust the orientation of the station axis 1 location frame (e.i. NX100-ST1_EX1-POS) and then readjust the Motor Gun mobile part model.

13.7 Registering the Equipment Model

This section explains the setting of the preset motion range according to the equipment and the registration procedure of the robot model with equipment.

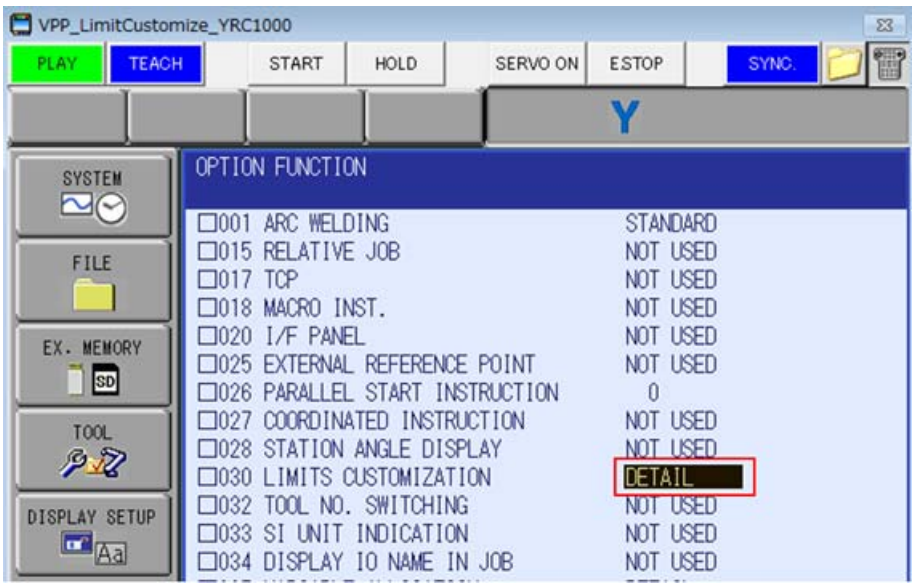
NOTE
- The equipment model is YASKAWA standard equipment.
- Equipment models are available only on some models.
- The preset operation range according to the equipment model can be used only the model provided with the YASKAWA standard equipment for the DX200 and YRC1000 controllers.

13.7.1 Operating Range Setting

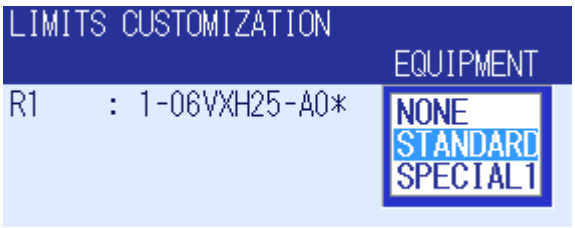
With the maintenance mode of the virtual pendant, the preset range of motion can be set.

Procedure

1. Selects the virtual pendant main menu {SYSTEM} - {SETUP} - {OPTION FUNCTION}.
2. Selects {LIMITS CUSTOMIZATION} of {OPTION FUNCTION}.



3. Select the item according to purpose. For Yaskawa standard equipment operating range, select [STANDARD].

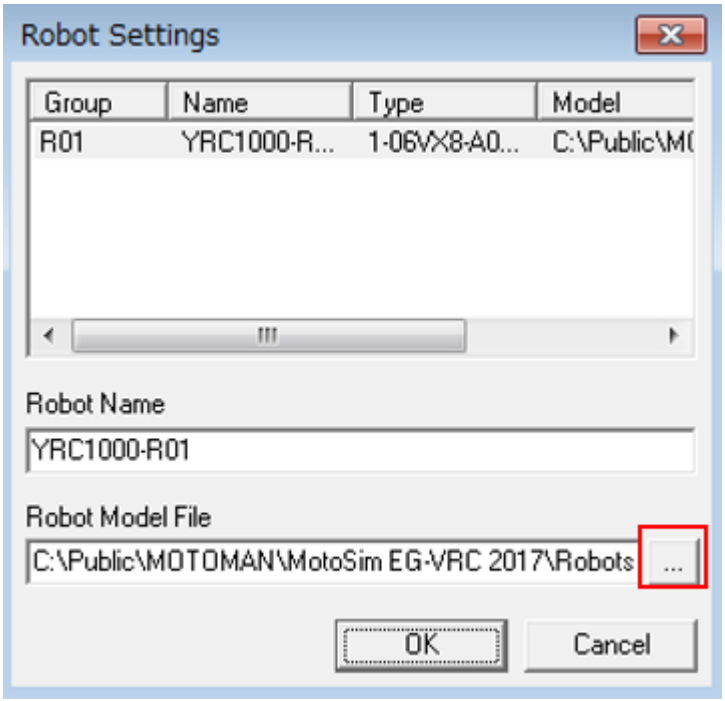


13.7.2 Equipment Registration

[Robot Settings] is displayed after initializing the controller.
When use an equipment model instead of the standard robot model appearance, change the model file of the corresponding group.

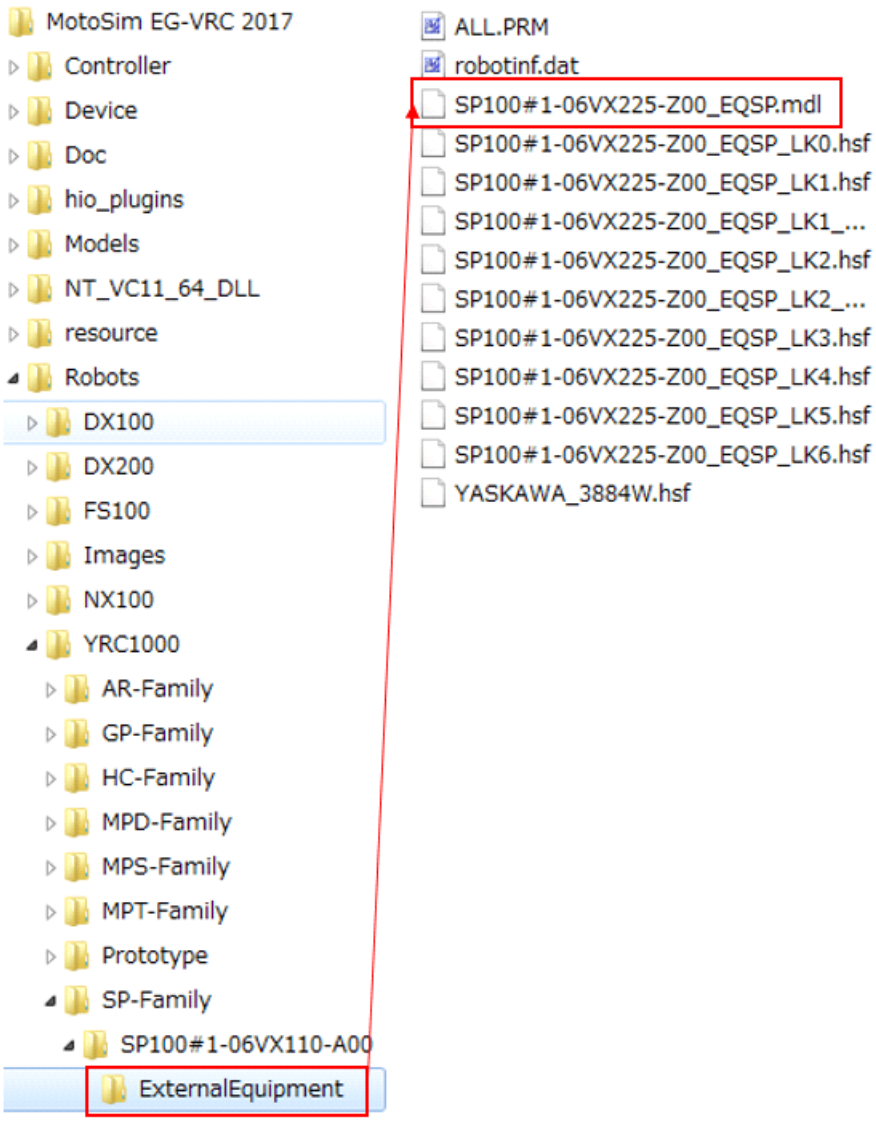
Procedure

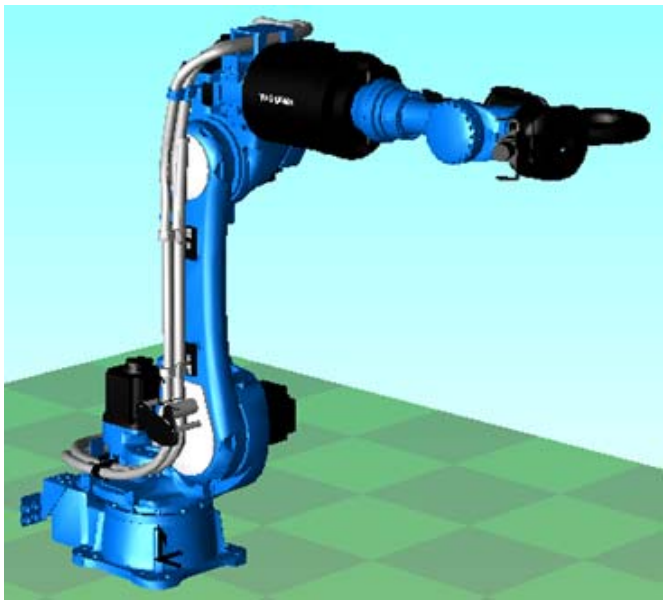
1. Selects the group of models used the equipment model in [Robot setting] dialog, and press the […] button of the model file.



2. Select the model file from the [ExternalEquipment] folder of the robot model folder of

the corresponding model and press the [OK] button.





13.8 Setting of spot welding simulation

Electric gun of an external axis is set to the robot, and it explains the procedure for simulating the spot welding.

NOTE
- The simulation of the spot welding is a function that can be used only with YRC1000/ DX200/DX100.
  It doesn't deal with other controllers.
- The simulation of spot gun change system is not supported.
- The following function keys for spot welding using motor gun are not supported.
  Manual spot welding ([INTERLOCK] + [./SPOT])
  Manual dry spot welding ([INTERLOCK] + [2/GUN CLOSE])
  Pressurizing ([INTERLOCK] +[8/PRESSURE])
  Releasing ([INTERLOCK] +[9/RELEASE])

13.8.1 Initialize

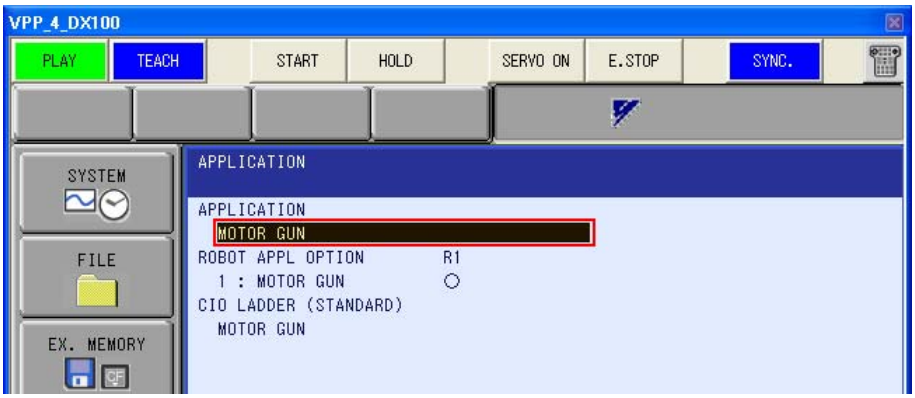
Procedure:

A new controller is registered by the operational procedure of " 7.1.1 Create a New VRC Controller (no file) ".

1. When initializing the controller with the procedure of section 7.1.3 Initializing the Controller, at the “CONTROL GROUP“ screen (Step3), enter the information as follows: Please refer to " 7.1.3 Initializing the Controller (YRC1000, YRC1000micro, DX200, DX100, NX100) " for details of the controller's initialization.

NOTE
When the spot welding simulation is done with two or more robots, it is necessary to set gun according to the robot.
Please select "GUN-1" each S1 and S2 when systems are two robots.

2. Each item of the connection etc. keeps not changing, either [enter] being pushed, and it advancing to the function specification of a set screen of an external axis. Each item of the “MECHANICAL SPEC“and the “MOTOR SPEC“ is set, [enter] is pushed, and it advances to the following screen.
   Please refer to procedures 4 and 5 of " 13.6.1 Initialization " for the setting of each item.
3. "MOTOR GUN" is selected by the usage.



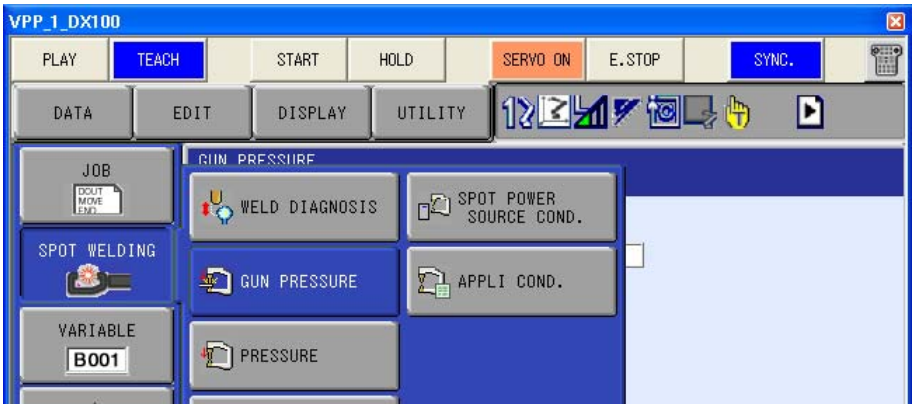
4. The initialization setting is done according to procedure of " 7.1.3 Initializing the Controller (YRC1000, YRC1000micro, DX200, DX100, NX100) ". The completion button of the “Controller Maintenance Mode Instructions ” is pushed. A virtual pendant is restarted in the normal mode.

13.8.2 Setting of welded condition

It is variously set to simulate the spot welding.

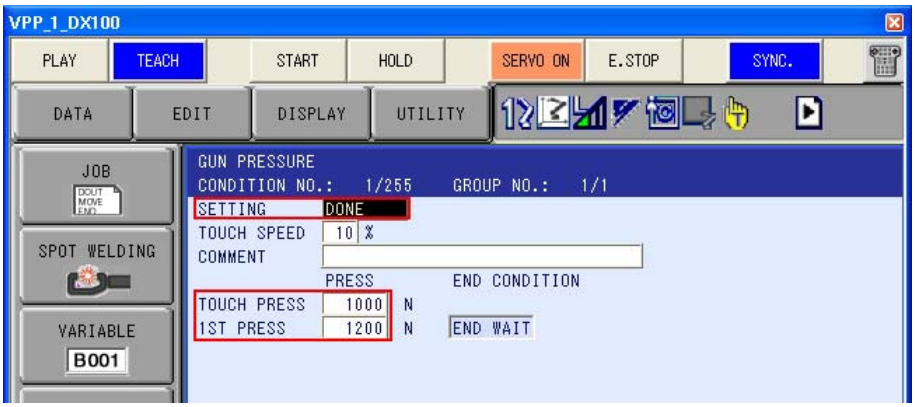
Procedure:

1. To change the setting of the spot welding, the security mode is changed to "MANAGEMENT MODE".
2. The main menu {SPOT WELDING} - {GUN PRESSURE} of a virtual pendant is selected.

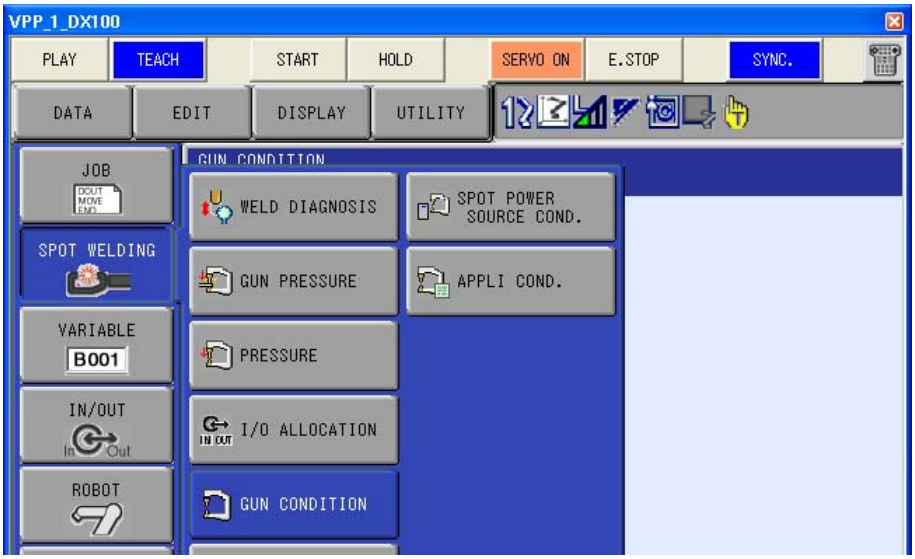


3. The setting of the gun pressurizing power is changed.
   An appropriate value is input to this “TOUCH PRESS“ and “1ST PRESS“, the cursor is matched to the item of the “SETTING”, the [SELECT] or the [Space] key is pushed, and the “SETTING” is changed to "DONE".

NOTE This procedure does only necessary minimum setting.
For detailed setting, please refer to each controller's “OPERATOR’S MANUAL (FOR SPOT WELDING USING MOTOR GUN)“.

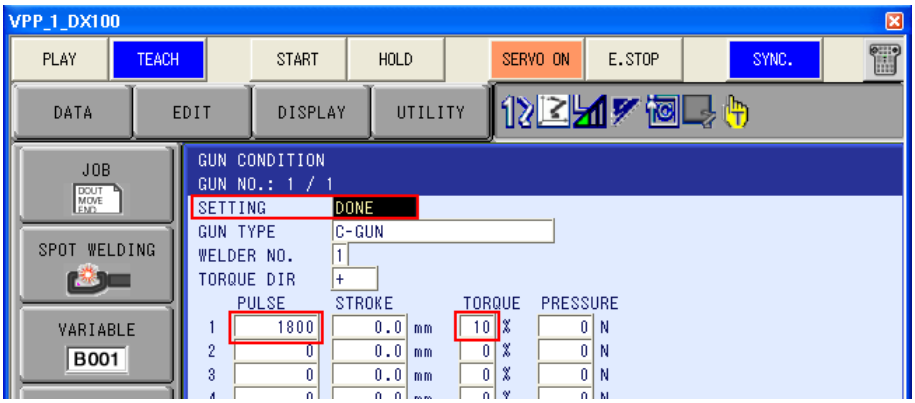


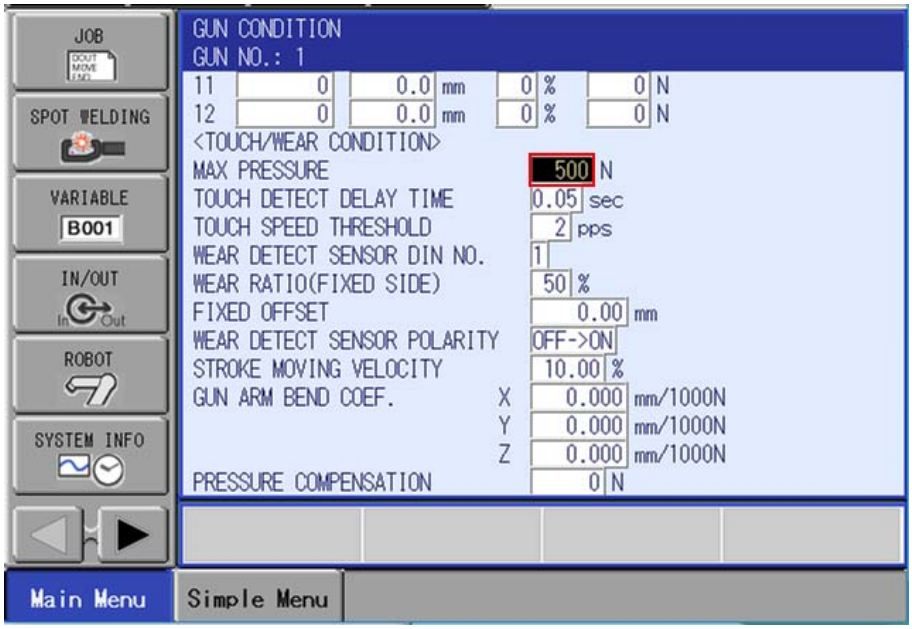
4. The main menu {SPOT WELDING} - {GUN CONDITION} of a virtual pendant is selected.



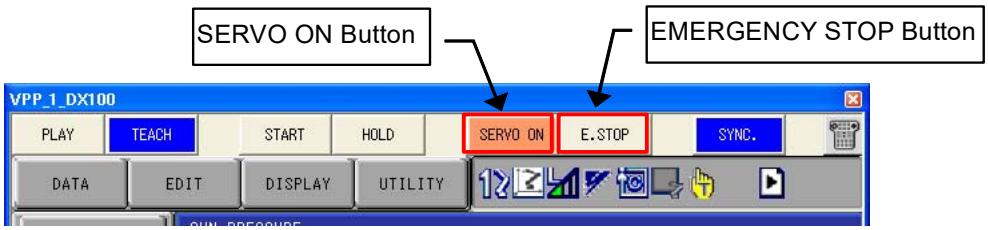
5. The setting of the gun characteristic is changed.
   An appropriate value is input to this “PUSLE“ and “TORQUE“, the cursor is adjusted to the item of the “SETTING”, the [SELECT] or the [Space] key is pushed, and the “SETTING” is changed to "DONE".

NOTE This procedure does only necessary minimum setting.
For detailed setting, please refer to each controller's “OPERATOR’S MANUAL (FOR SPOT WELDING USING MOTOR GUN)“.





6. To make changed gun pressurizing power and gun characteristic effective, the servo is turned off once. After that, it comes to be able to execute the simulation of the spot welding by turning on the servo again.

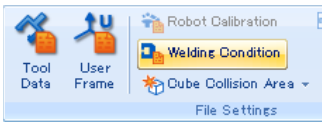


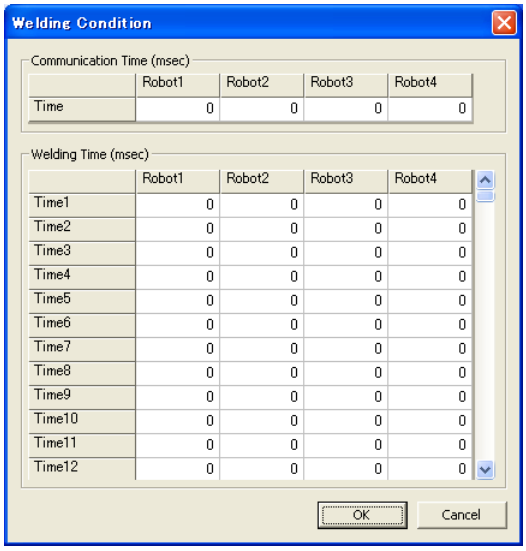
1) The emergency stop button is pushed, it puts into the emergency halt condition, and the servo is turned off.
2) The emergency stop button is pushed, and the emergency halt condition is released.
3) The servo is turned on pushing servo ON button.

NOTE It becomes impossible to do the playback of the welding job normally if the setting is not reflected.
Please execute the procedure of servo OFF and turning on when you change the setting.

13.8.3 Setting of welding machine

The welding machine can be simulated in MotoSim EG-VRC.
It is necessary to set the communication time and the welding time with the welding machine to simulate the welding machine.
On the [Controller] tab, in the [File Settings] group, click the [Welding Condition] button, the [Welding Condition]] dialog appears.





"Welding Condition" Dialog Box

Item	Description
[Communication Time (msec)] edit box	A fixed value of each welding machine is set
[Welding Time (msec)] edit box	The welding time of each welding condition number specified by the welding instruction is set.

13.8.4 Making and control group setting of job

The control group of the job sets and it is necessary to set the group combination before making the job is started.
Please refer to each controller's "OPERATOR'S MANUAL (FOR SPOT WELDING USING MOTOR GUN)" for details.

13.8.5 Setting of simulation of electric gun

Please refer to " 13.5 Dual-Arm robot Setting " for the setting to simulate electric gun.

13.9 Setting of Conveyor Synchronization

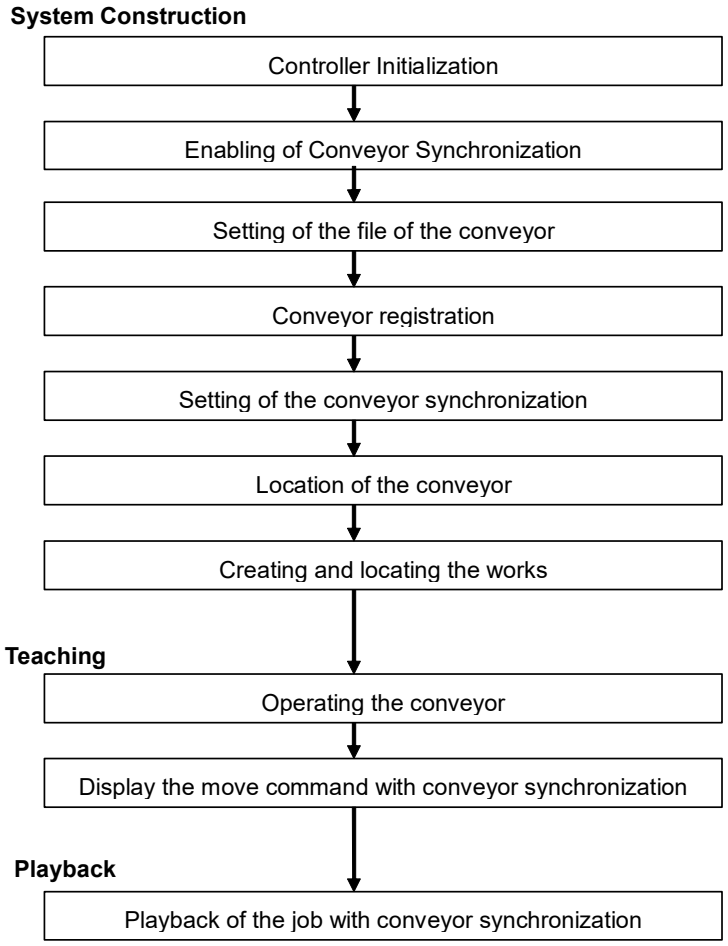
Set the conveyor synchronization for the robot, and it explains the procedure for the simulation of conveyor synchronization.

NOTE

- This function can not use depending on the system version of controller. Please refer to section " 15.8 List of Function depending on the system version of controller ".
- This function is available for 1 axis conveyor only. (2 axes and 3 axes conveyor can not be set conveyor synchronization.)
- This function can not use CMOS.BIN of a real robot.
- This function can not be used with high-speed playback function.Refer to section " 7.5.4 Refresh Interval " about high-speed playback function.
- To simulate the job with high-speed picking, use the template function.
  Refer to section " 4.1.1 Template Function " about template function.

13.9.1 Overview Flowchart

Follow the flowchart below to create the environment.



13.9.2 System Construction

It explains the procedure from the new cell creation to creation the environment for creating the job with conveyor synchronization.

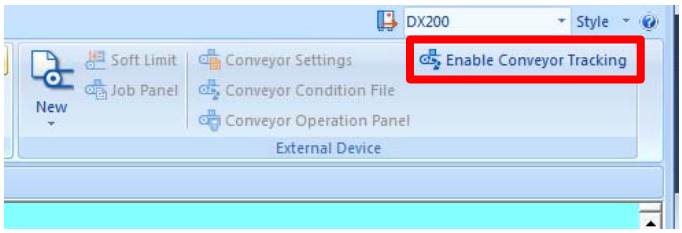
■ Controller Initialization

Follow the procedure of section " 7.1.1 Create a New VRC Controller (no file) " to create a new VRC controller. After Creation, the cell is saved and closed.

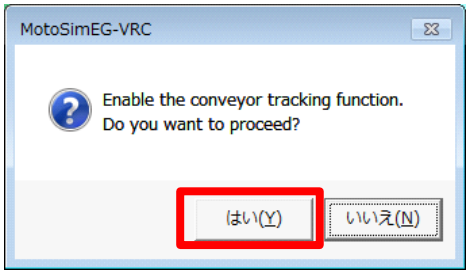
■ Enabling of Conveyor Synchronization

Procedure

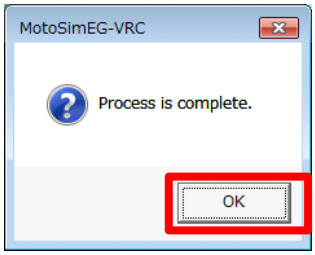
1. On the [Controller] tab, in the [External Device] group, click the [Enable Conveyor Tracking] button.



2. When the confirmation dialog box appears, click the [Yes] button.



3. When the process is complete, the confirmation dialog box appears. Click the [OK] button.



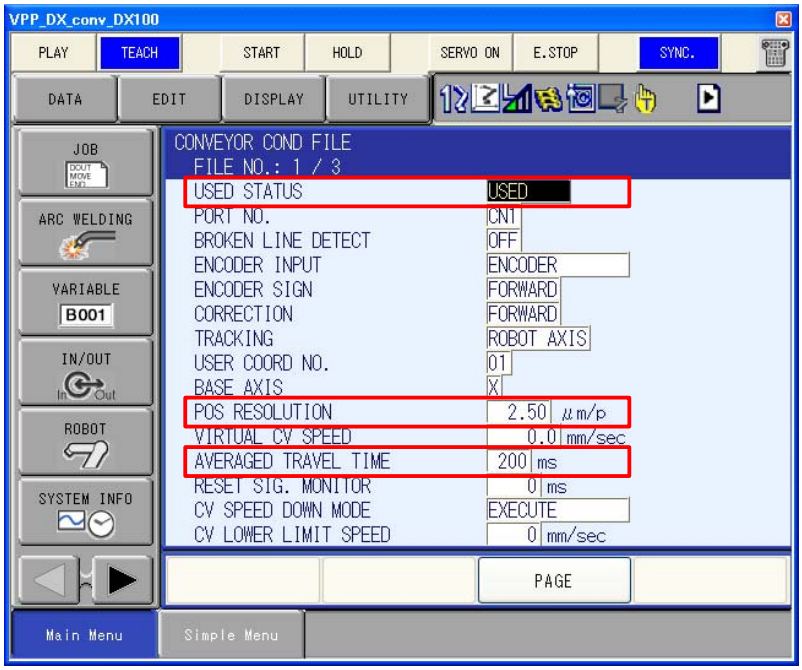
■ Setting of the file of the conveyor

Procedure

1. Open the Cell, and Change the security mode to "MANAGEMENT MODE".
2. From the Virtual Pendant main menu select {ROBOT} - {SETUP}.

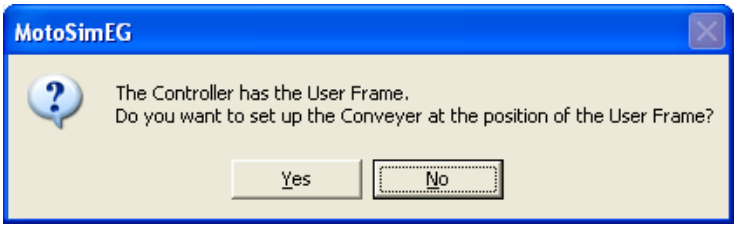
3. The setting of the conveyor condition is changed.
   - Set the value depending on the real robot to [POS RESOLUTION] and [AVERAGED TRAVEL TIME], and Set [USED STATUS] to [USED].
   - If the value of [POS RESOLUTION] is not set, [VERIFY ERROR (SENSOR PARAMETER)] alarm is occurred when [USED STATUS] is set to [USED].
   - When [SEGMENT OVER] alarm is occurred during playback, change [AVERAGED TRAVEL TIME] to the value such as 200ms.

NOTE This procedure does only necessary minimum setting.
For detailed setting, please refer to each controller's "INSTRUCTIONS FOR CONVEYOR SYNCHRONIZED FUNCTION".



■ Conveyor registration

Refer to section " 7.7.1 Adding a Conveyor " about conveyor registration.
If there is the user coordinates corresponding to the conveyor in the controller, the following dialog box appears. Click [Yes] button, the conveyor is located corresponding to the user frame position.



■ Setting of the conveyor synchronization

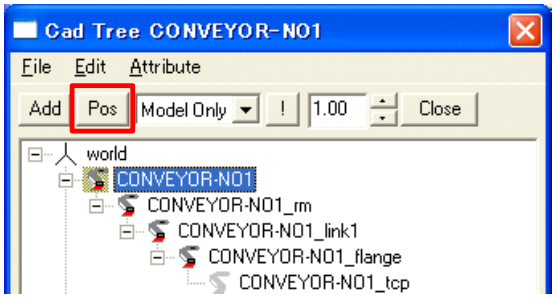
Refer to section " 7.7.9 Conveyor Synchronization " about setting the conveyor synchronization. Then, robots with conveyor synchronization function made automatically the user coordinates at the target conveyor position with the user coordinates number corresponding to the conveyor number.

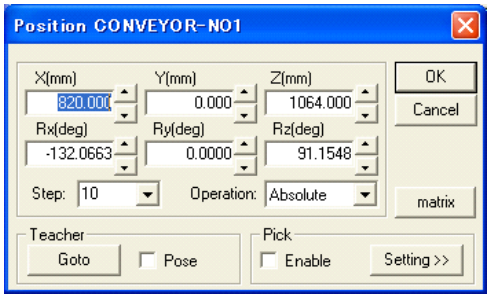
■ Location of the conveyor

Procedure

1. On the [Home] tab, in the [Model] group, click the [CadTree] button, the [CadTree] dialog appears. Select the conveyor model "CONVEYOR-NO [Conveyor Number] (ex. CONVEYOR-NO1) ".

2. Click the [Pos] button. Set the location of the conveyor, and click the [OK] button. Then, robots with conveyor synchronization function made automatically the user coordinates location corresponding to the conveyor location.



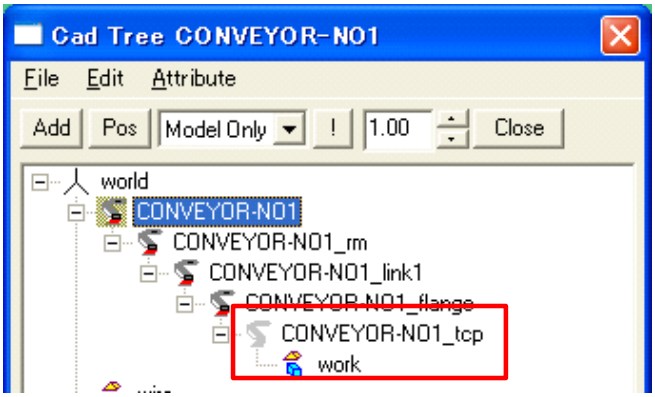


■ Creating and locating the works

Works are set on the conveyor.

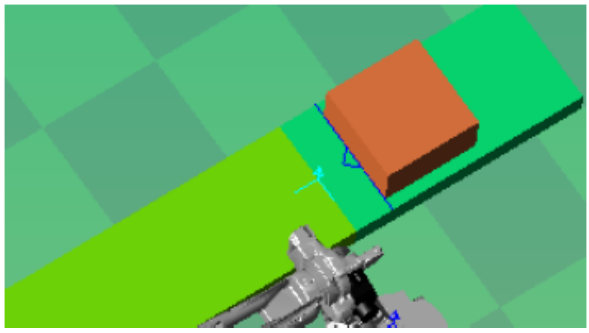
Procedure

1. Set "[Conveyor Name]_TCP" as the parent model by pointing the cursor to "[Conveyor Name]_TCP" in the Cad Tree, and the work models are created.



2. Works are set opposite the mark of the conveyor traveling direction (the triangle on the conveyor). When the line passes through the conveyor origin position (If STP is set other than zero by SYSTART command, when the line passes through the position set

by STP), conveyor synchronization gets start running.



13.9.3 Teaching

■ Operating the conveyor

The ways of operating the conveyor are Operation by conveyor operation panel or operation by position panel.

Refer to section " 7.7.8 Conveyor Operation Panel " and " 7.7.5 Moving a Device " for detail.

NOTE The position of conveyor in [Position] is reflected LS offset value of the each robot. When the other robot is selected, the position of conveyor in [Position] is changed, without the displayed conveyor is not operating.

■ Teaching the conveyor synchronized move instructions (SYSTART, SYEND, SYMOV*)

Teach the conveyor synchronized move instructions by the virtual pendant. Please refer to "INSTRUCTIONS FOR CONVEYOR SYNCHRONIZED FUNCTION" of each the controller for details.

- Click the [INFORM LIST] button of the virtual pendant, the command list dialog is displayed. Click the [SENSOR] button in the displayed dialog, SYSTART command and SYEND command are available.

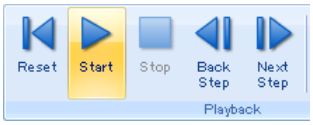
• Click the [SHIFT] button and the [MOTION TYPE] button of the virtual pendant, MOV* command is changed to SYMOV* command. Then, click the [MOTION TYPE] button, the motion type is changed (SYMOVJ-> SYMOVL->SYMOVC). And, set the details.

13.9.4 Playback

■ Playback of the job with conveyor synchronization

Procedure

1. On the virtual pendant, move the cursor in the job to the first step. Set the robot position to the position of starting the job.
2. On the job panel of the conveyor, move the cursor in the job to the first step. Set the conveyor position to the position of starting the job.
3. On the [Simulation] tab, in the [Playback] group, click the [Start] button



NOTE The [START] button of the virtual pendant can not use the conveyor synchronization. Please execute the job with the above procedure.

13.10 High-Speed Picking Simulation Function

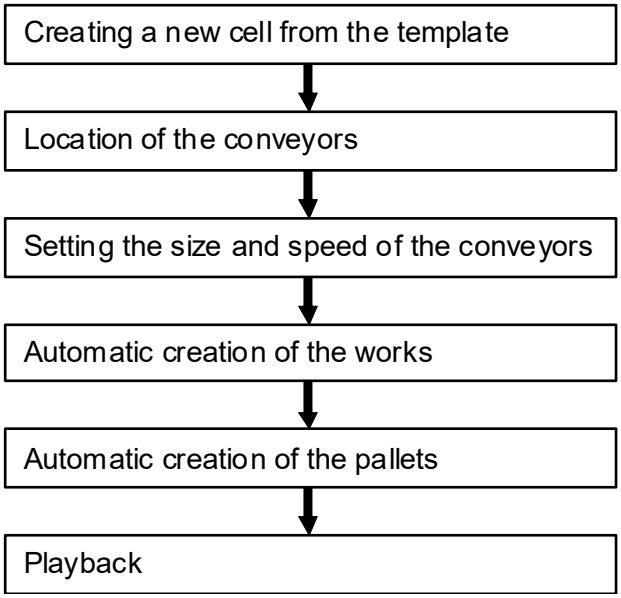
This function is able to easily simulate "Conveyor Synchronized Function", "Conveyor Synchronized Function with Shift Functions" and "Continuous Operation Conveyor Synchronized Function".

NOTE

- This function can be only used with the cells created from the template cell "MPP3_PICKING", "MPP3H_PICKING" and "MPK2_PICKING". This function can not be used with the other cells.
- This function can not be used with high-speed playback function.
  Refer to section " 7.5.4 Refresh Interval " about high-speed playback function.
- Please do not modify the master job of a template cell.
- High-Speed picking cell before Ver5.10 can not be used.

13.10.1 Overview Flowchart

Follow the flowchart below to create the environment.The procedure is explained with the template cell "MPP3 S_PICKING".



■ Creating a new cell from the template

Follow the procedure of section " 4.1.1 Template Function " to create a new VRC controller.
Select the "MPP3S_PICKING" in the template list, and create a new cell.
A cell available to the high-speed picking simulation is created automatically.

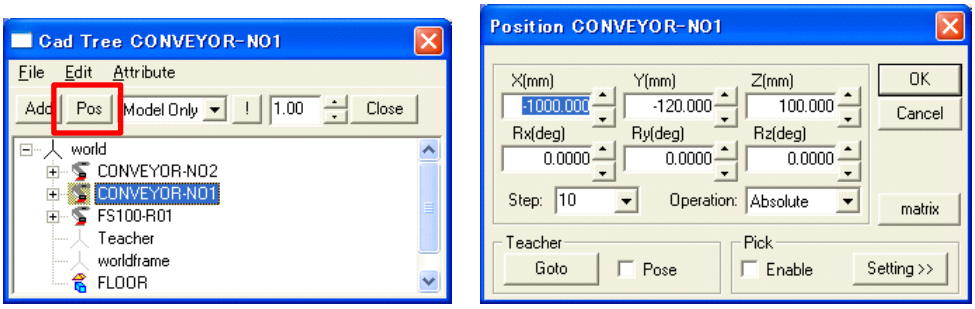
■ Location of the conveyors

If needed, the location of the conveyors is changed.
In the high-speed picking simulation function, the MPP3 robot picks the works from CONVEYOR-NO1, and places the works on the CONVEYOR-NO2.

Procedure

1. On the [Home] tab, in the [Model] group, click the [CadTree] button, the [CadTree] dialog appears.
   Select the conveyor model "CONVEYOR-NO [Conveyor Number] (ex. CONVEYOR-NO1) ".

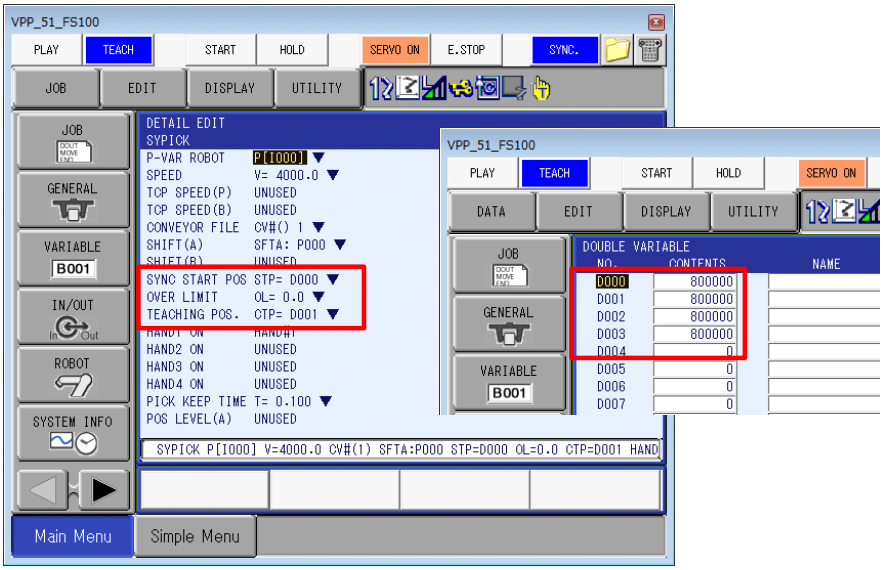
2. Click the [Pos] button. Set the location of the conveyor, and click the [OK] button. Then, the user coordinates location of MPP3 robot (a light blue FRAME) is changed automatically corresponding to the conveyor location.

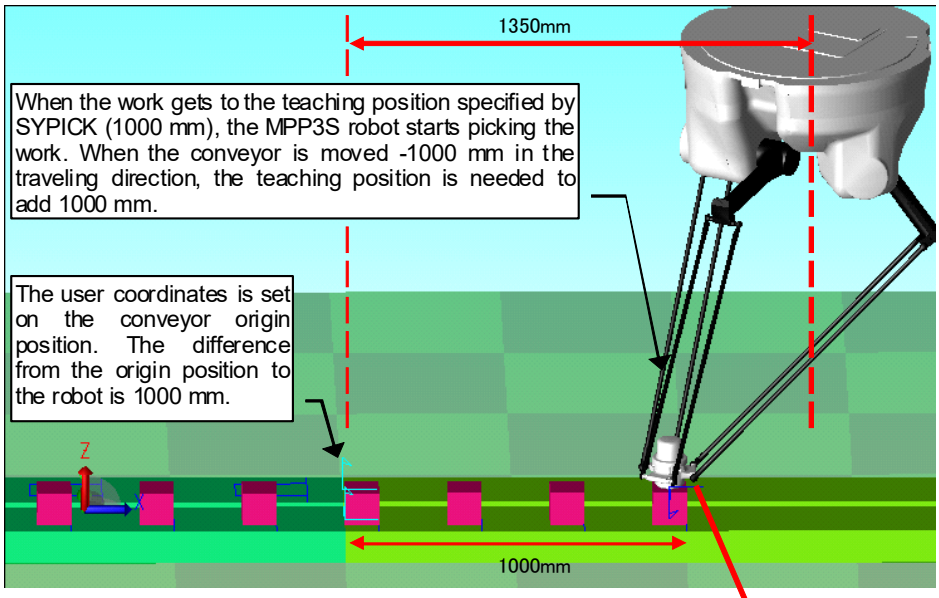


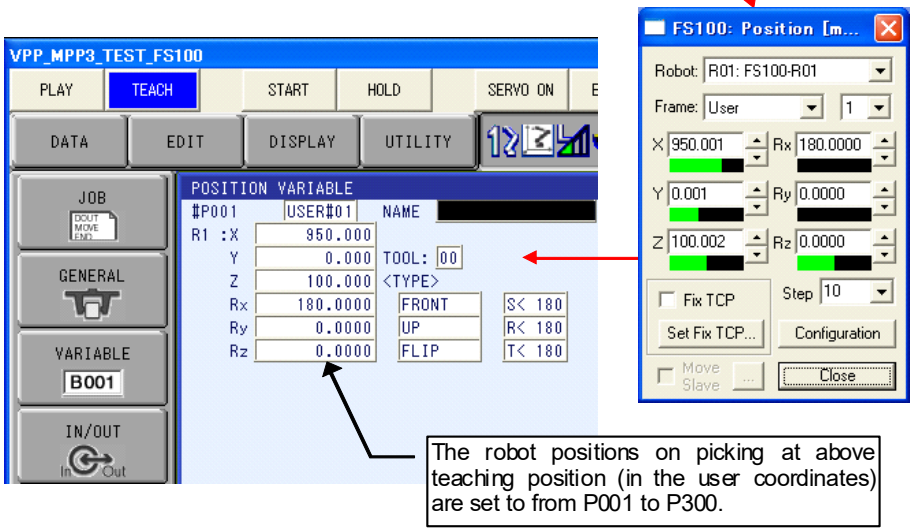
3. When the location about X direction of the conveyors is changed, the following setting is needed.
   The synchronous starting position and the teaching position of a SYPICK/SYPLACE command are changed to suit a conveyor position. The synchronous starting position and the teaching position are specified with the following user variables.
   D000 : The synchronous starting position of SYPICK (STP)
   D001 : The teaching position of SYPICK (CTP)
   D002 : The synchronous starting position of SYPLACE (STP)
   D003 : The teaching position of SYPLACE (CTP)

   For example, when the conveyor for pick is moved -1000 mm in the X direction, the synchronous starting position and the teaching position of SYPICK are added 1000 mm.
   1) Select the {VARIABLE} - {DOUBLE} menu on the virtual pendant.
   2) Add 1000000 to the value of D000 and D001.

> NOTE D000, D001, D002 and D003 are set by the micrometer.


VPP_51_FS100
PLAY
TEACH
START
HOLD
SERVO ON
E.STOP
SYNC.
JOB
EDIT
DISPLAY
UTILITY
DETAIL EDIT
SYPICK
P-VAR ROBOT P[1000]
SPEED V= 4000.0
TCP SPEED(P) UNUSED
TCP SPEED(B) UNUSED
CONVEYOR FILE CV#() 1
SHIFT(A) SFTA: P000
SHIFT(B) UNUSED
SYNC START POS STP= D000
OVER LIMIT OL= 0.0
TEACHING POS. CTP= D001
HAND2 ON UNUSED
HAND3 ON UNUSED
HAND4 ON UNUSED
PICK KEEP TIME T= 0.100
POS LEVEL(A) UNUSED
SYPICK P[1000] V=4000.0 CV#(1) SFTA:P000 STP=D000 OL=0.0 CTP=D001 HAND
GENERAL
VARIABLE
B001
IN/OUT
ROBOT
SYSTEM INFO
Main Menu
Simple Menu
DATA
DOUBLE VARIABLE
NO.
CONTENTS
NAME
D000 800000
D001 800000
D002 800000
D003 800000
D004 0
D005 0
D006 0
D007 0


1350mm
When the work gets to the teaching position specified by SYPICK (1000 mm), the MPP3S robot starts picking the work. When the conveyor is moved -1000 mm in the traveling direction, the teaching position is needed to add 1000 mm.
The user coordinates is set on the conveyor origin position. The difference from the origin position to the robot is 1000 mm.
Z
1000mm


VPP_MPP3_TEST_FS100
PLAY
TEACH
START
HOLD
SERVO ON
DATA
EDIT
DISPLAY
UTILITY
JOB
GENERAL
VARIABLE
B001
IN/OUT
POSITION VARIABLE
#P001 USER#01 NAME
R1 :X 950.000
Y 0.000
Z 100.000
Rx 180.0000
Ry 0.0000
Rz 0.0000
TOOL: 00
<TYPE>
FRONT
UP
FLIP
S< 180
R< 180
T< 180
FS100: Position [m...
Robot: R01: FS100-R01
Frame: User 1
X 950.001 Rx 180.0000
Y 0.001 Ry 0.0000
Z 100.002 Rz 0.0000
Fix TCP
Step 10
Set Fix TCP...
Configuration
Move Slave
Close
The robot positions on picking at above teaching position (in the user coordinates) are set to from P001 to P300.

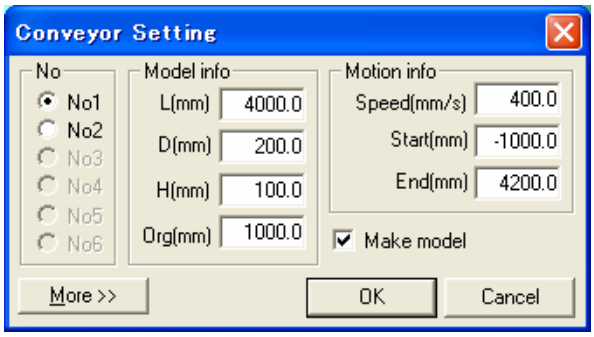
■ Setting the size and speed of the conveyors

If needed, the location of the conveyors is changed.
For details of the Conveyor Setting dialog, refer to section " 7.7.1 Adding a Conveyor " about conveyor registration.

Procedure

1. On the [Contoller] tab, in the [External Device] group, click the [Conveyor Settings] button, the [Conveyor Setting] dialog appears.

2. Select the conveyor number to change.
3. Set the [L(mm)], [D(mm)], [H(mm)] of Model info.
4. Set the [Speed (mm/s)] of Motion info, and click the [OK] button.

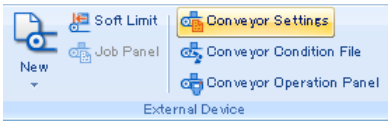


■ Location of the works

Set the information (ex. size of work, work interval on the conveyor, ...) , and models are created automatically.

Procedure

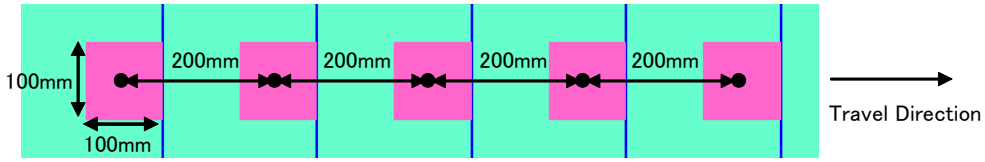
1. On the [Contoller] tab, in the [External Device] group, click the [Conveyor Settings] button, the [Conveyor Setting] dialog appears.



2. Select the conveyor No.1, and click the [More] button to display [Model Creation for High-Speed Picking] section.
3. Set the work size to the [Width(mm)] and [Height(mm)].
4. Set the works position on the conveyor in the [Pick Position] list.
5. Click the [Make] button, the work models are added on the CONVEYOR-NO1.

   For example, to set the works on the conveyor as below, the following procedure is operated.
   - Works size : Width 100mm × Height 100mm
   - The number of works : 5

• Work interval : 200mm



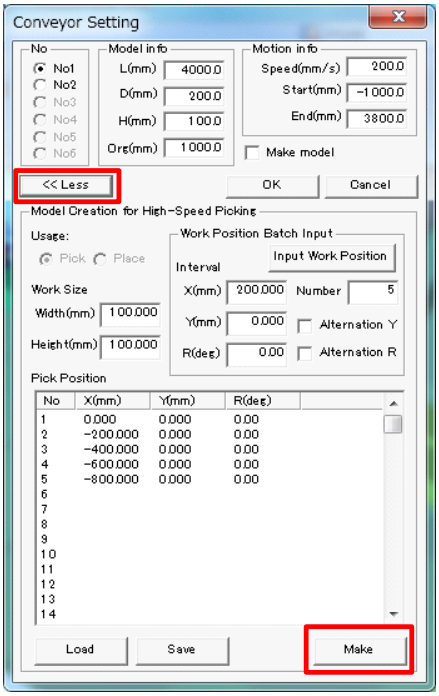
(1) Set the [Work] as below,
[Width(mm)] 100.000
[Height(mm)] 100.000

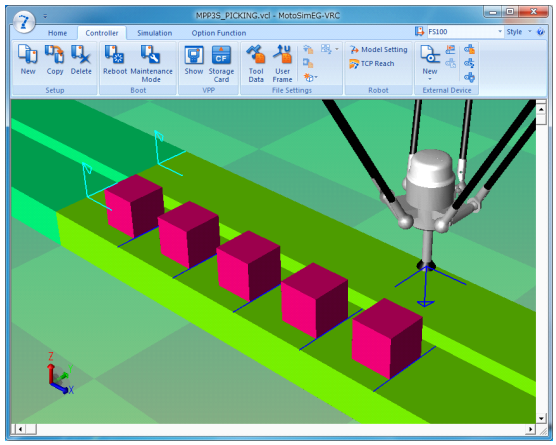
(2) Set the [Work Position Batch Input] as below,
[X(mm)] 200.000
[Y(mm)] 0.000
[R(deg)] 0.000
[Number] 5
Uncheck the [Alternation Y] checkbox and the [Alternation R] checkbox.

(3) Click the [Input Work Position] button, and click the [OK] button in the displayed confirmation dialog box. The work locations are set in the [Pick Position] list.

(4) Click the [Make] button.

For detail of the dialog, refer to " Location of the works " in the section "11.9.2 Advanced Setting".





■ Location of the pallets

Set the information (ex. size of pallet, work interval on the pallet, ...) , and models are created automatically.

Procedure

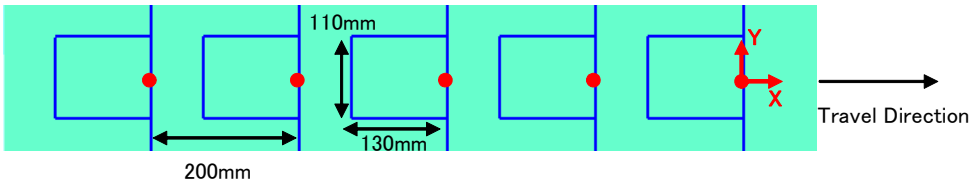
1. On the [Contoller] tab, in the [External Device] group, click the [Conveyor Settings] but-

ton, the [Conveyor Setting] dialog appears.

2. Select the conveyor No.2, and click the [More] button to display [Model Creation for High-Speed Picking] section.
3. Set the pallet size to the [W(mm)] and [L(mm)].
4. Set the works position on the conveyor in the [Pick Position] list.
5. Set the pallet interval on the conveyor and the number of interval to the [X(mm)] and [Number].
6. Click the [Make] button, the pallet models are added on the CONVEYOR-NO2.

For example, to set the pallets on the conveyor as below, the following procedure is operated.

- Pallet size : Width 110mm × Length 130mm
- The number of pallets : 5
- Pallet interval : 200mm
- 1 work per pallet



(1) Set the [Pallet] as below,
[W(mm)] 110.000
[L(mm)] 130.000

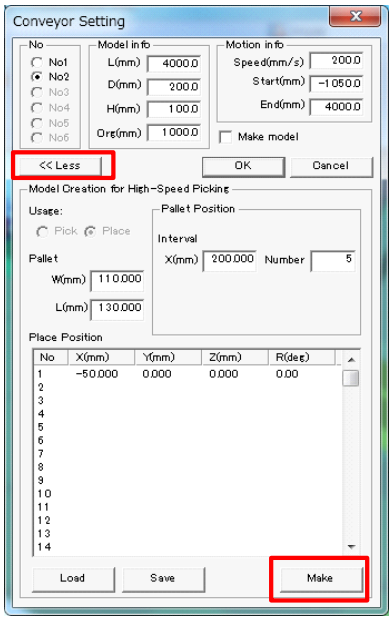
(2) Set the first line of [Place Position] list as below,
[X(mm)] -50.000
[Y(mm)] 0.000
[Z(mm)] 0.000
[R(deg)] 0.00

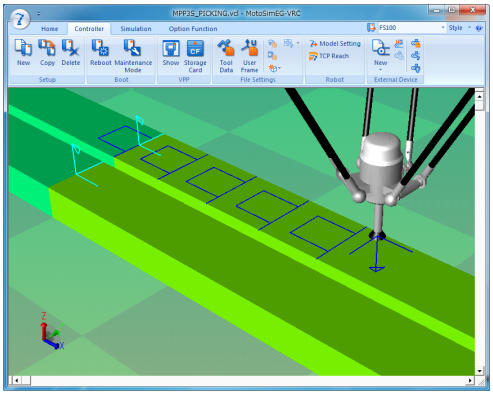
(3) Set the [Interval] in the [Pallet Position] section as below,
[X(mm)] 200.000
[Number] 5

(4) Click the [Make] button.

For detail of the dialog, refer to " Location of the pallets " in the section "11.9.2 Advanced

Setting".

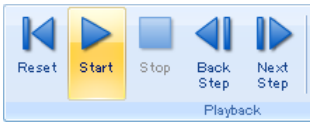




■ Playback

1. On the [Simulation] tab, in the [Playback] group, click the [Reset] button.

2. On the [Simulation] tab, in the [Playback] group, click the [Start] button.



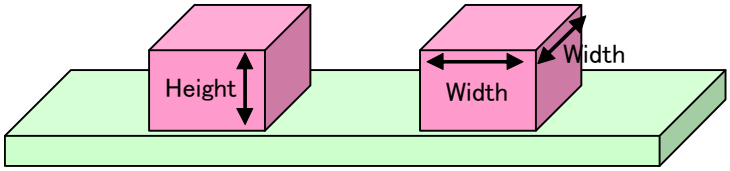
NOTE The [START] button of the virtual pendant can not use high-speed picking simulation function. Please execute the job with the above procedure.

13.10.2 Advanced Setting

This section describes other settings used by high-speed picking simulation function.

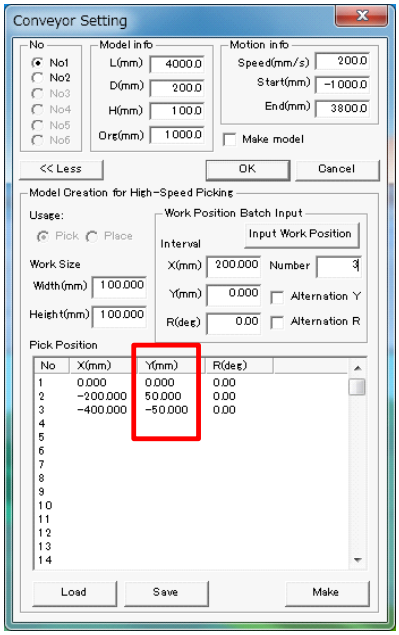
■ Location of the works

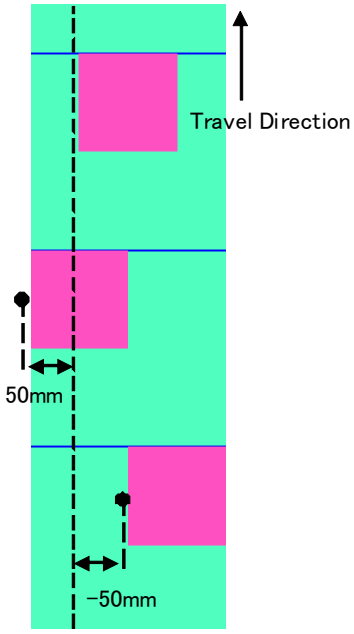
1. In the [Conveyor setting] dialog, the width and height is set to [Work].



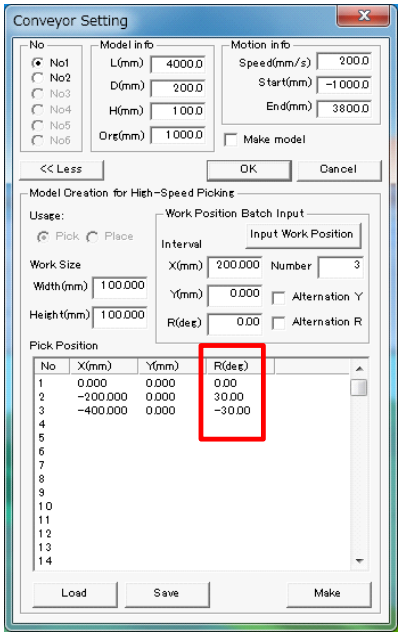
2. In the [Conveyor setting] dialog, to edit the [Pick Position] list, various work locations are enabled. The works are located on the conveyor, as many as of the number of lines in the [Pick Position] list.

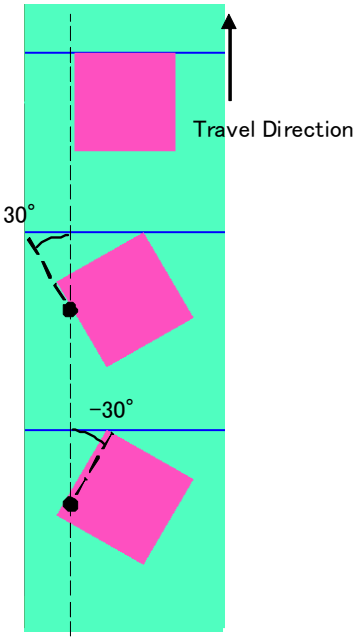
• When the value is set to the [Y(mm)] in the [Pick Position] list as below, the works are located from side to side.





• When the value is set to the [R(deg)] in the [Pick Position] list as below, the rotated works are located.

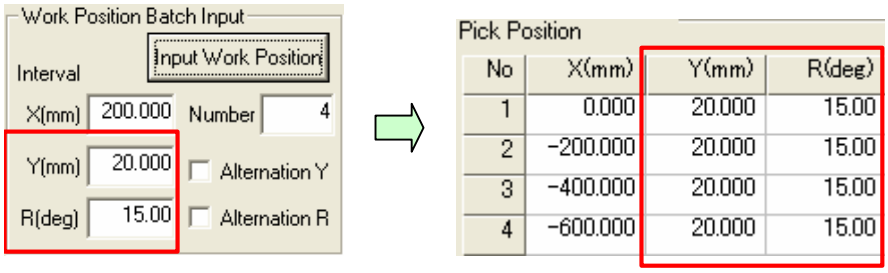




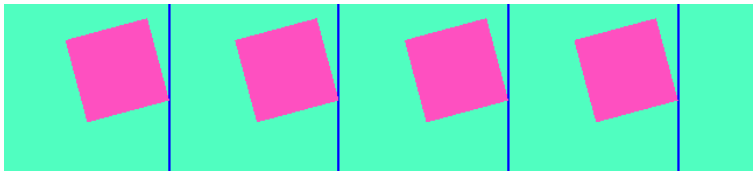
3. The [Pick Position] list can be set automatically with [Work Position Batch Input].

NOTE
• The upper limit of the number of works is 300.
• Once works increases, the playback might be slower.

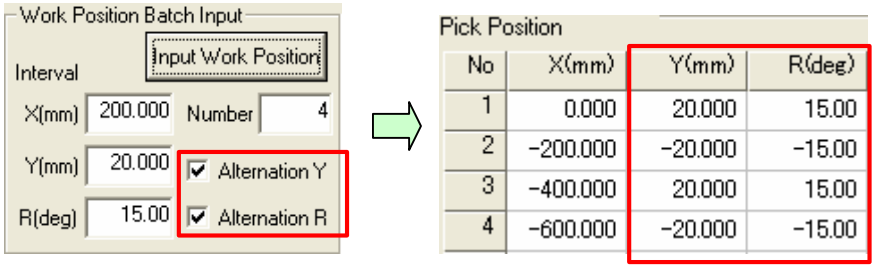
• When the values are set to the [Y(mm)] and [R(deg)] of the [Interval] and the [Input Work Position] button is clicked, that values are set to the [Y(mm)] and [R(deg)] of all lines in the [Pick Position] list.



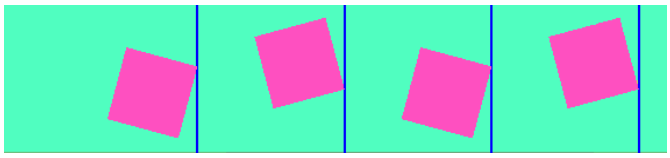
If the [Input Work Position] button is clicked with the above setting, the works are located as below.



• When the [Alternation Y] checkbox and the [Alternation R] checkbox are checked and the [Input Work Position] button is clicked, the values are set to the [Y(mm)] and [R(deg)] of all lines in the [Pick Position] list with alternating positive and negative values.

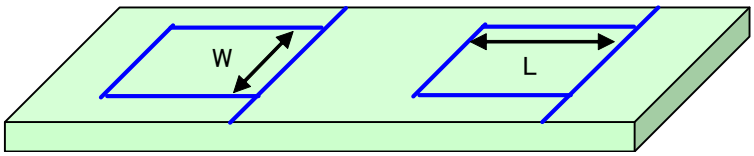


If the [Input Work Position] button is clicked with the above setting, the works are located as below.

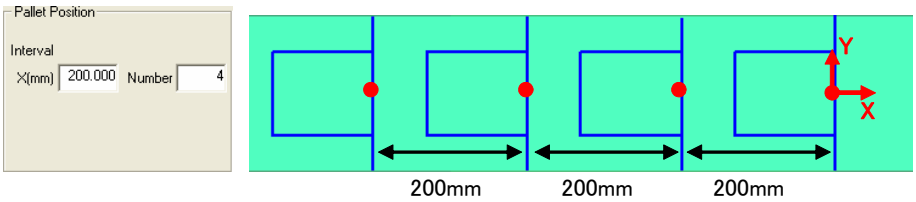


■ Location of the pallets

1. In the [Conveyor setting] dialog, the length of W direction and L direction are set to [Pallet].



2. In the [Conveyor setting] dialog, the number of pallets and the intervals are set to [Pallet].

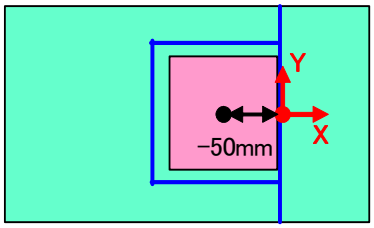


3. In the [Conveyor setting] dialog, the work locations on a pallet are set to the [Place Position] list. This setting is applied to the all pallets. Set the locations of the center of works from pallet origin position to the [Place Position] list.

• When one work is placed on the pallet, set the value to the [Place Position] list as below.
Set the value "width of work × (-0.5)" to the [X(mm)] of the first line.

Place Position

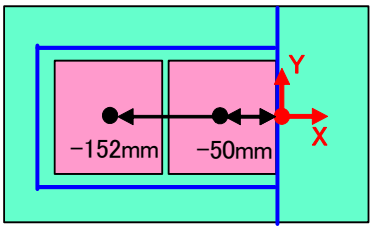
No	X(mm)	Y(mm)	Z(mm)	R(deg)
1	-50.000	0.000	0.000	0.00
2				
3				
4				



• When two works are placed on the pallet back and forth, set the values to the [Place Position] list as below.
Set the value "width of work × (-0.5)" to the [X(mm)] of the first line, and set the value "width of work × (-1.5) - the width of clearance" to the [X(mm)] of the second line. In the below setting, the width of clearance is 1mm.

Place Position

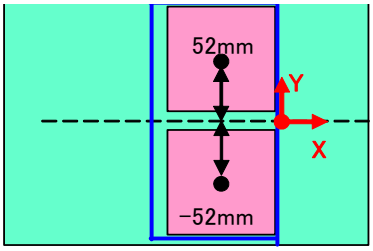
No	X(mm)	Y(mm)	Z(mm)	R(deg)
1	-50.000	0.000	0.000	0.00
2	-152.000	0.000	0.000	0.00
3				
4				



• When two works are placed on the pallet right and left, set the values to the [Place Position] list as below.
Set the value "width of work × 0.5 + the width of clearance" to the [Y(mm)] of the first line, and set the value "width of work × (-0.5) - the width of clearance" to the [Y(mm)] of the second line.

Place Position

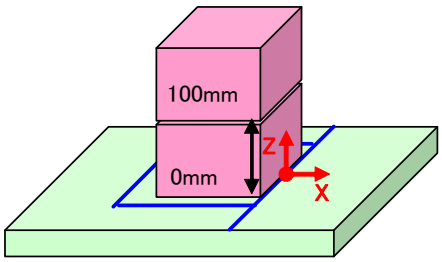
No	X(mm)	Y(mm)	Z(mm)	R(deg)
1	-50.000	52.000	0.000	0.00
2	-50.000	-52.000	0.000	0.00
3				
4				



• When two works are placed on the pallet one above the other, set the values to the [Place Position] list as below.
Set 0 to the [Z(mm)] of the first line, and set "height of work" to the [Z(mm)] of the second line.

Place Position

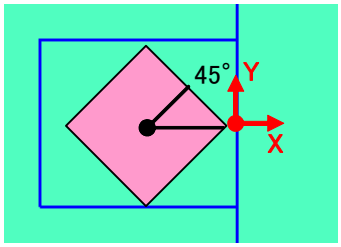
No	X(mm)	Y(mm)	Z(mm)	R(deg)
1	-50.000	0.000	0.000	0.00
2	-50.000	0.000	100.000	0.00
3				
4				



• When one work are rotated and placed on the pallet, set the values to the [R(deg)] in the [Place Position] list as below.

Place Position

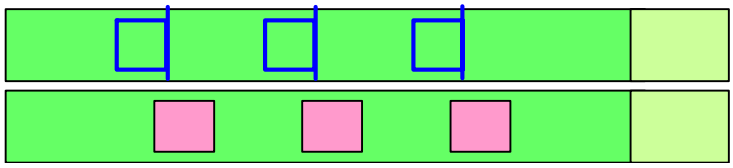
No	X(mm)	Y(mm)	Z(mm)	R(deg)
1	-35.356	0.000	0.000	45.00
2				
3				
4				



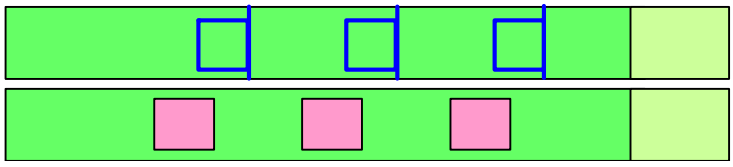
■ Changing the timing of stream

If the [Start(mm)] in the [Conveyor Setting] dialog is changed, the timing of stream of works (CONVEYOR-NO1) or pallets (CONVEYOR-NO2) can be changed.
To set the timing of pallets slower than that of works, shift the [Start(mm)] of the CONVEYOR-NO2 to the minus direction. To set the timing of pallets faster than that of works, shift the [Start(mm)] of the CONVEYOR-NO2 to the plus direction. Note that the [Start(mm)] of the conveyors is set the negative value certainly. And, the same setting is enabled in setting the [Start(mm)] of the CONVEYOR-NO1.

• When the [Start(mm)] of the CONVEYOR-NO2 is shifted to the minus direction, the timing is as below.



• When the [Start(mm)] of the CONVEYOR-NO2 is shifted to the plus direction, the timing is as below.



Procedure

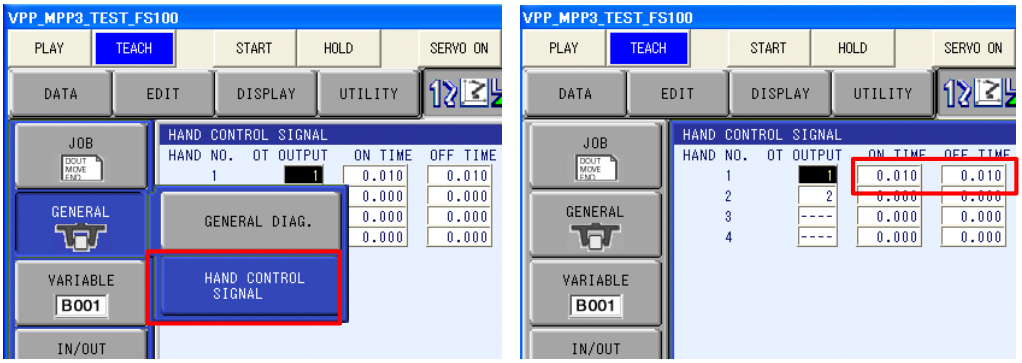
1. On the [Contoller] tab, in the [External Device] group, click the [Conveyor Settings] button, the [Conveyor Setting] dialog appears.

2. Set the [Start(mm)] of the [Motion info], and click the [OK] button.

■ Hand control signal setting

When the SYPICK/SYPLACE instructions are used, it needs that the general output signals are allocated for hand #1 to #4, to turn the hand (ex. vacuum pads) ON/OFF. That allocation is set in the [HAND CONTROL SIGNAL] display of the virtual pendant.

In the template "MPP3S_PICKING", OT OUTPUT 1 is allocated for Hand #1.
If needed, set the values to the [ON TIME] and the [OFF TIME].
For details, please refer to "FS100 OPTIONS INSTRUCTIONS SUPPLEMENTARY FOR CONVEYOR SYNCHRONIZED FUNCTION CONTINUOUS OPERATION CONVEYOR SYNCHRONIZED FUNCTION".

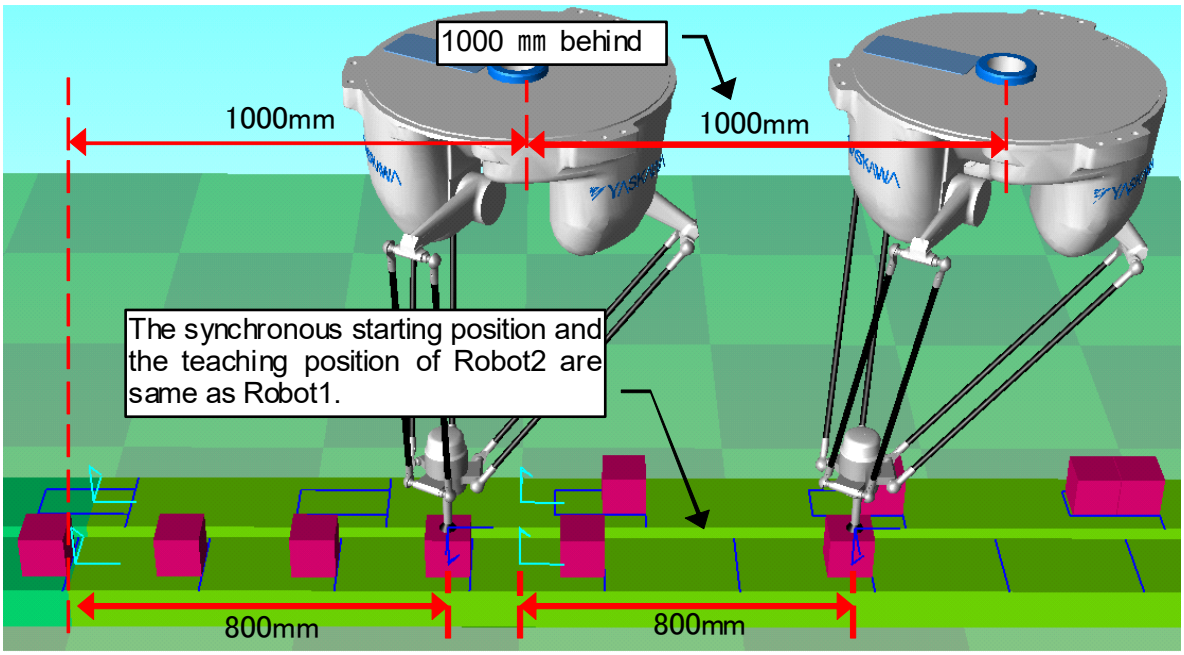


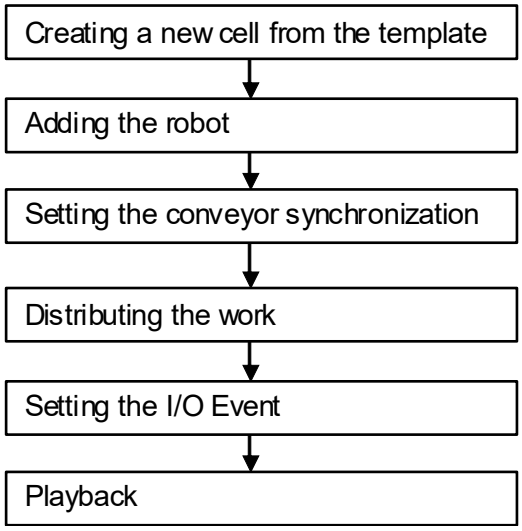
13.10.3 High-Speed Picking Simulation for Multiple Controllers

High-Speed Picking Simulation for Multiple Controllers
This section explains to add the controller to the high-speed picking simulation cell.
This section uses the following cell to explain the environment setting.

■ Sample

- Two MPP3S and two conveyors
- Ten works
- Five pallets (Two works per one pallet)





■ Creating a new cell from the template

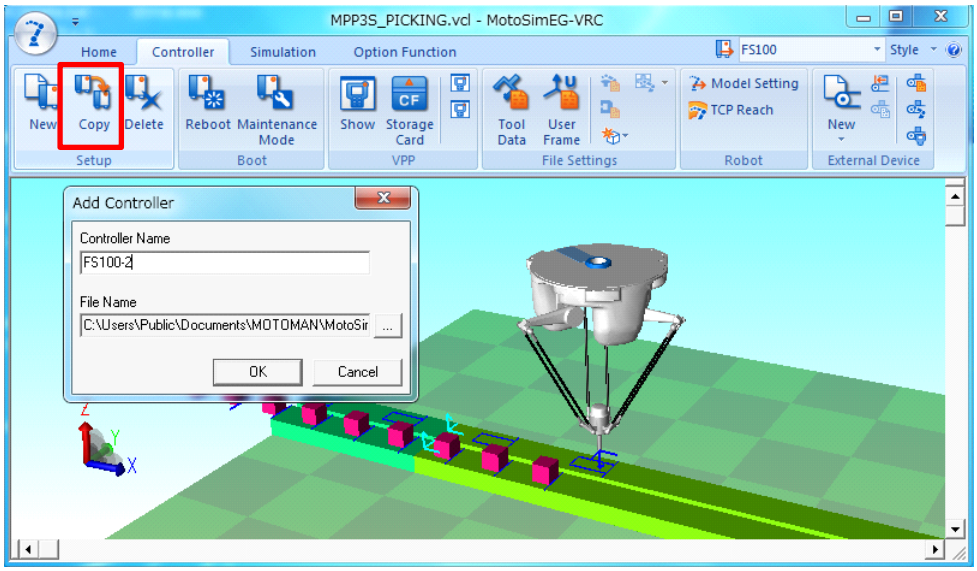
Follow the procedure of section " 13.10.1 Overview Flowchart " to create a new cell from the template "MPP3S_PICKING". In this case, the position, size and speed of the conveyor are default.

■ Adding the robot

Copy the controller and change the location of robot.

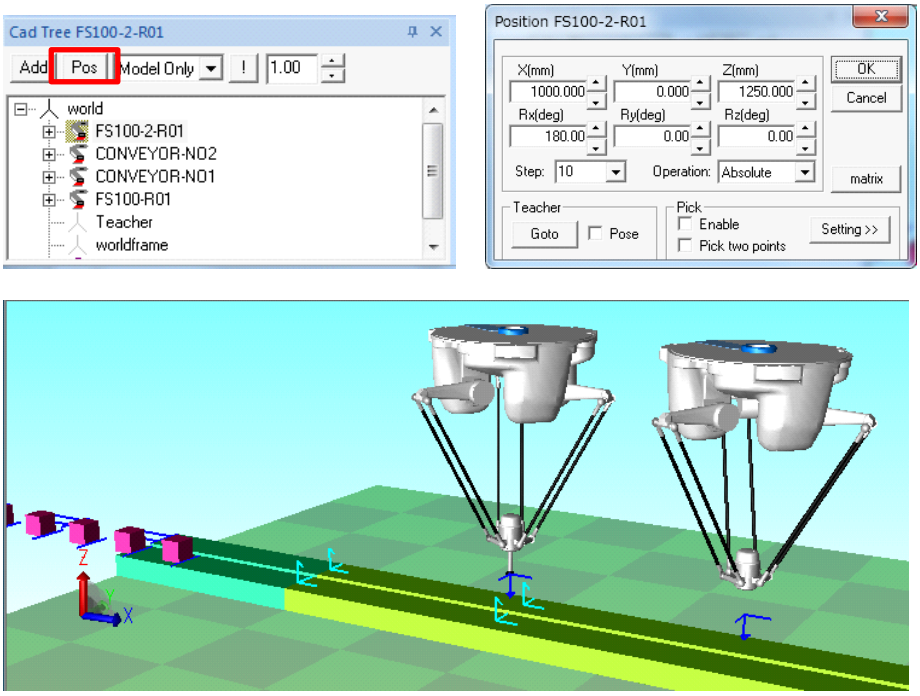
Procedure

1. Follow the procedure of section " 7.2 Copying a Controller " to copy the "FS100-1" controller.



2. On the [Home] tab, in the [Model] group, click the [CadTree] button, the [CadTree] dialog appears.
   Select the added robot (ex. FS100-2-R01).

3. Click the [Pos] button. Set the location of the robot, and click the [OK] button.



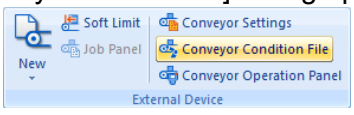
NOTE Be sure to locate the added robot to become the downstream side to the flow direction of a conveyor.

■ Setting the conveyor synchronization

Set the conveyor synchronization of the added robot for CONVEYOR-NO1 and CONVEYOR-NO2.

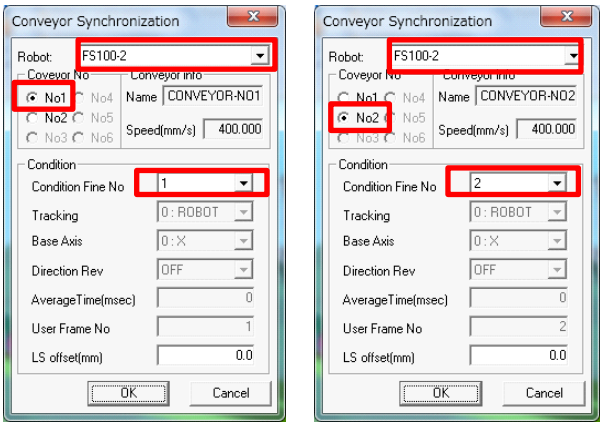
Procedure

1. On the [Controller] tab, in the [External Device] group, click the [Conveyor Condition File] button, the [Conveyor Synchronization] dialog appears.



2. Select the added controller name.
3. Set the Condition File No.1 to the CONVEYOR-NO1 and the Condition File No.2 to the

CONVEYOR-NO2, and click the [OK] button.

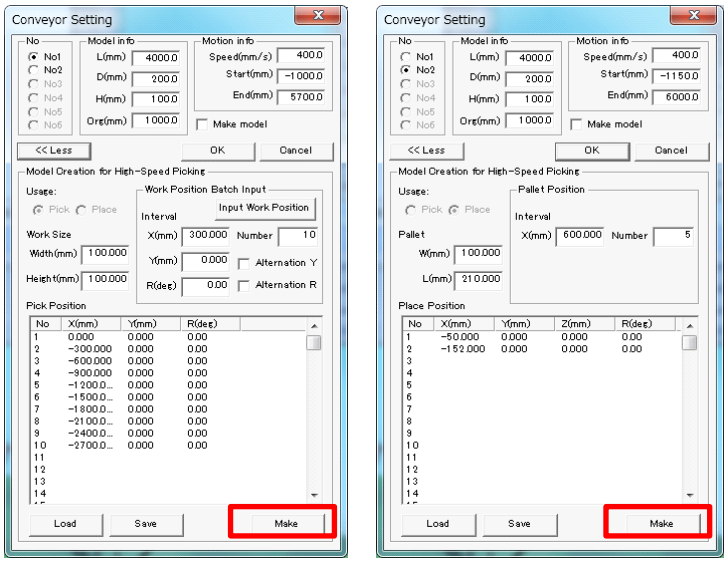


■ Distributing the work

Set the distributing sequence of works for the added controller.
Distributing sequence is finished by re-executing the auto-creation the works and pallets.

Procedure

1. On the [Controller] tab, in the [External Device] group, click the [Conveyor Setting] button, the [Conveyor Setting] dialog appears.
2. Click the [More] button, to display [Model Creation for High-Speed Picking] section.
3. Select the conveyor No.1, and click the [Make] button.
4. Select the conveyor No.2, and click the [Make] button.



■ Setting the I/O Event

To change the parent of work model with the action of picking, the I/O event is registered to the added controller. For details of the I/O event, refer to section " 8.3 I/O Events ".

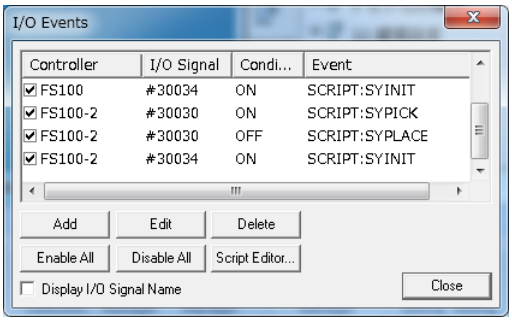
Procedure

1. On the [Simulation] tab, in the [I/O Settings] group, click the [I/O Event Manager] but-

ton, the [I/O Events] dialog appears.

2. The following I/O events are registered to the added controller.

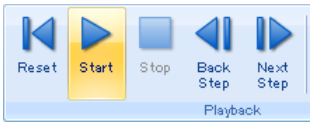
Controller	I/O Signal	Condition	Event
FS100-2	OUT#0001 (#30030)	ON	SCRIPT : SYPICK
FS100-2	OUT#0001 (#30030)	OFF	SCRIPT : SYPLACE
FS100-2	OUT#0005 (#30034)	ON	SCRIPT : SYINIT



■ Playback

1. On the [Simulation] tab, in the [Playback] group, click the [Reset] button.

2. On the [Simulation] tab, in the [Playback] group, click the [Start] button.



NOTE The [START] button of the virtual pendant can not use high-speed picking simulation function. Please execute the job with the above procedure.

13.10.4 Advanced Setting for Multiple Controllers

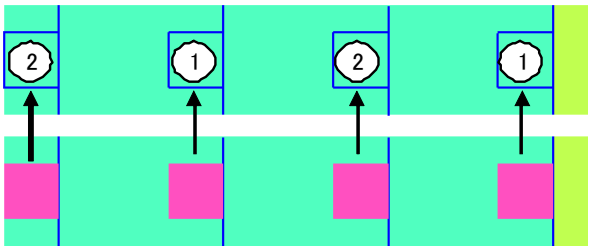
■ Distributing the work

For multiple controllers, distributing sequence is finished by re-executing the auto-creation the works and pallets. Then, the number of picked works becomes equal by each robot.
For example, when two controllers exist, robot1 and robot2 pick by turns.

Ex.) One work is picked per one pallet by two controllers.(1 and 2 mean robot number)

置き位置

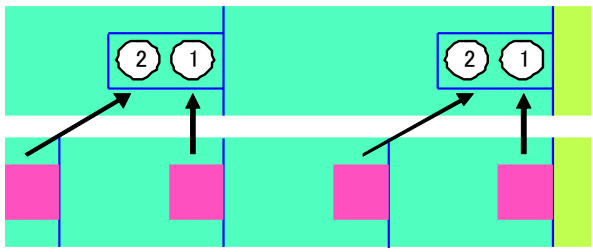
No	X(mm)	Y(mm)	Z(mm)	R(deg)
1	-50.000	0.000	0.000	0.00
2				
3				



Ex.) Two works are picked per one pallet by two controllers.(1 and 2 mean robot number)

置き位置

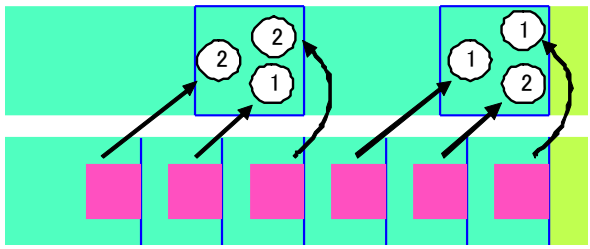
No	X(mm)	Y(mm)	Z(mm)	R(deg)
1	-50.000	0.000	0.000	0.00
2	-150.000	0.000	0.000	0.00
3				



Ex.) Three works are picked per one pallet by two controllers.(1 and 2 mean robot number)

置き位置

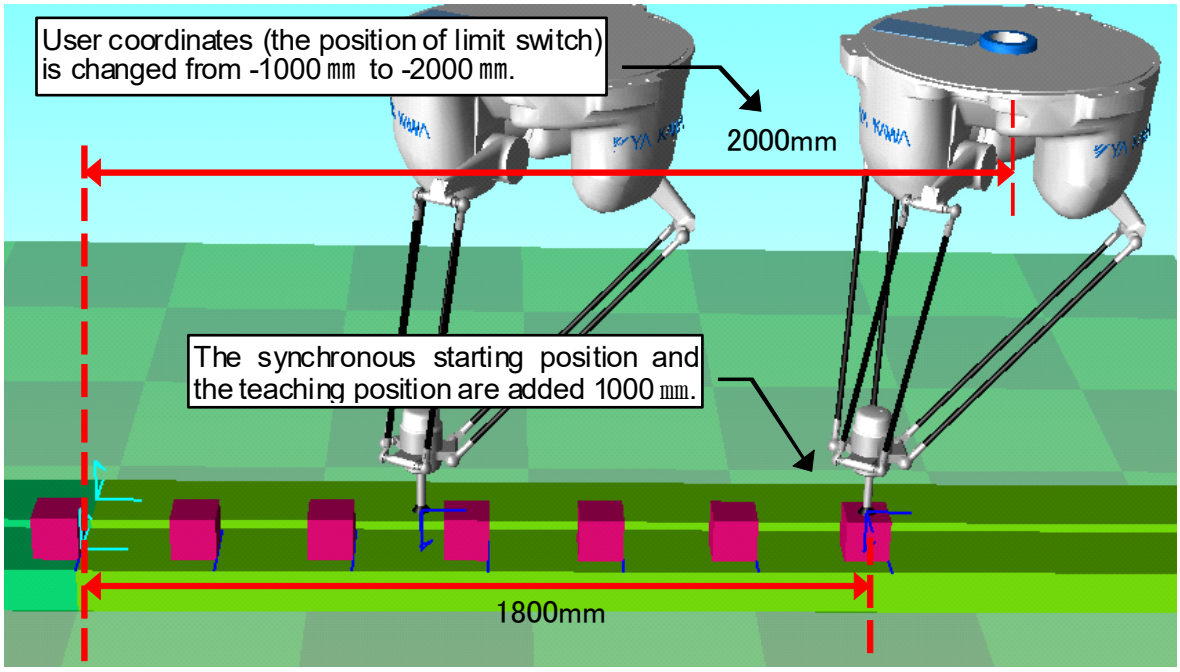
No	X(mm)	Y(mm)	Z(mm)	R(deg)
1	-50.000	50.000	0.000	0.00
2	-50.000	-50.000	0.000	0.00
3	-150.000	0.000	0.000	0.00



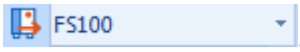
■ Changing the position of the limit switch

The synchronous starting position and the teaching position of a SYPICK/SYPLACE command are based on the limit switch of the conveyor.
In the high-speed picking simulation, the user coordinates of the controller are treated as a limit switch. UF#1 is for the conveyor 1 and UF#2 is for the conveyor 2. So, the position of the limit switch is changed by editing the user coordinates.
This section explains the procedure of changing the limit switch of robots2 into the conveyor starting point position with the cell created in the section " 13.10.3 High-Speed Picking Simu-

lation for Multiple Controllers ".



Procedure

1. Seletct "FS100-2" with the ribbon 

.
2. On the [Controller] tab, in the [File Settings] group, click the [User Frame] button, the [Set User Frame] dialog appear.
3. Change the X value of UF#1 and UF#2 into -2000mm.
4. Adjust the synchronous starting position and the teaching position of a SYPICK/ SYPLACE command. Then, user coordinates were changed into -2000 mm, so the synchronous starting position and the teaching position of a SYPICK/SYPLACE command are added 1000 mm.
   (1) Select the {VARIABLE} - {DOUBLE} menu on the virtual pendant.
   (2) Change the value of D000, D001, D002 and D003 into 1800000.
5. Execute the distributing works.
   (1) On the [Controller] tab, in the [External Device] group, click the [Conveyor Setting] button, the [Conveyor Setting] dialog appears.
   (2) Click the [More] button, to display [Model Creation for High-Speed Picking] section.
   (3) Select the conveyor No.1, and click the [Make] button.
   (4) Select the conveyor No.2, and click the [Make] button.
6. Execute the playback.

13.10.5 Specifications of template cell "MPP3S_PICKING"

■ Job for high-speed picking simulation

To simulate high-speed picking, the "SYPICK-SYPLACE" job is used.

```
0000 NOP
0001 DOUT OT#(1) OFF
0002 DOUT OT#(5) OFF
0003 TIMER T=0.010
0004 DOUT OT#(5) ON                    //initialize of work model location
0005 SET I000 1                        //initialize of work counter
0006 SET I001 301                      //initialize of pallet counter
0007 SET I003 1                        //initialize of counter for B variable
0008 CVQUE CV#(1)                      //clear conveyor queue (pick)
0009 CVQUE CV#(2)                      //clear conveyor queue (place)
0010 SYEND CV#(1)
0011 SYEND CV#(2)
0012 MOVL C00000 V=1000.0              //move to the standby position
0013 *LOOP
0014 SYPICK P[I000] V=4000.0 CV#(1) SFTA:P000 STP=800.000 OL=0.0
 CTP=D000 HAND#1 T=0.100 FLAG:B000
0015 CVQUE CV#(1)                      //clear the queue per picking
0016 SYPLACE P[I001] V=4000.0 CV#(2) SFTA:P000 STP=800.000 OL=0.0
 CTP=D001 HAND#1 T=0.100 FLAG:B000
0017 JUMP *CONTINUE IF B[I003]=0   //clear the queue per pallets
0018 CVQUE CV#(2)
0019 *CONTINUE
0020 INC I000                          //add 1 to work counter
0021 INC I001                          //add 1 to pallet counter
0022 INC I003                          //add 1 to B variable counter
0023 JUMP *LOOP IF I000<=I002        //determine if SYPICK continues
0024 MOVL C00001 V=1000.0            //move to the standby position
0025 END
```

■ Variable allocation list

In this template cell, the below variables are used.

Variable	Default	Description
I000	1	I000 is used to the counter to access P001 to P300. It is initialized to 1 at the beginning of job, and be added 1 with each execution of SYPICK.
I001	301	I001 is used to the counter to access P301 to P600. It is initialized to 301 at the beginning of job, and be added 1 with each execution of SYPLACE.
I002	10	I002 is compared with I000 for loop condition for the job. In creating the work models, it is set the number of works.
I003	1	I003 is used to the counter to access B001 to B300. It is initialized to 1 at the beginning of job, and be added 1 with each execution of SYPLACE.
D000	800000	D000 is set the teaching position of SYPICK instruction (unit: micrometer). Edit it if needed.
D001	800000	D001 is set the teaching position of SYPLACE instruction (unit: micrometer). Edit it if needed.
P000	X0, Y0, Z-150 Rx0, Ry0, Rz0	P000 is set the value of [SHIFT(A)] of SYPICK/SYPLACE instruction. Edit it if needed.
P001 - P300	—	From P001 to P300 are used for [P-VAR ROBOT] of SYPICK instruction. In creating the work models, it is set the picking position based on the user frame #1.
P301 - P600	—	From P301 to P600 are used for [P-VAR ROBOT] of SYPLACE instruction. In creating the pallet models, it is set the picking position based on the user frame #2.
B001 - B300	—	From B001 to B300 are used for determining if clear the queue of conveyor after the SYPLACE instruction. Conveyor queue is cleared at the timing of changing the place position to the next pallet. The timing is calculated by the number of robot and the number of works per one pallet. When the pallet model is created, the above timing is calculated and stored.

■ IO allocation list

In this template cell, the below IO signals are used.

Variable	Default	Description

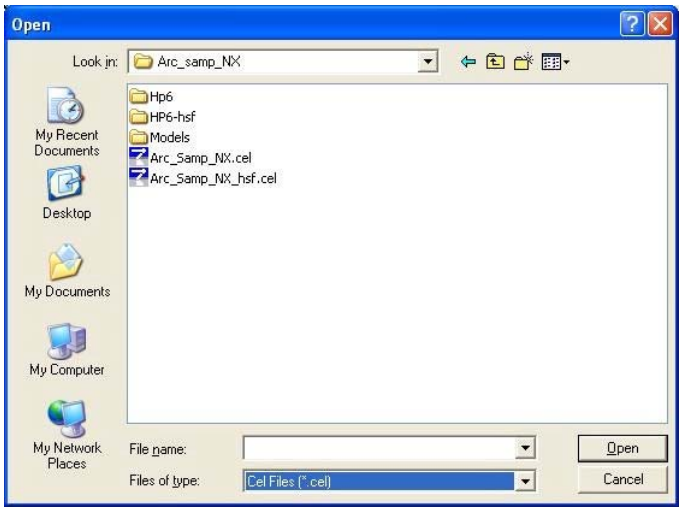
OT1	OFF	OT1 is used to turn the hand ON/OFF with SYPICK?SYPLACE instruction. It outputs ON with SYPICK instruction, and outputs OFF with SYPLACE instruction. Then the model script [SYPICK] or [SYPLACE] is called by IO event, the work model is replaced.
OT5	OFF	OT5 outputs ON at the beginning of the job. Then the model script [SYINIT] is called by IO event, the work models locations are initialized.

13.11 Converting a MotoSim EG cell to MotoSim EG-VRC

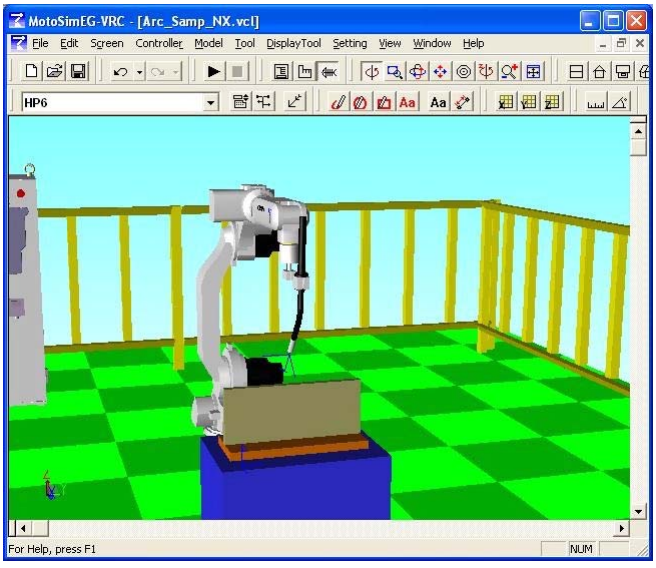
MotoSim EG-VRC can convert and load files created by MotoSim EG but cannot playback the job and the robot operations are limited. The MotoSim EG robot should be replace by the VRC corresponding robot type. You can transfer the robot tooling and jobs to the new controller.

Procedure

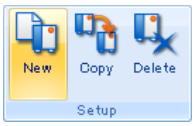
1. Click the MotoSim EG-VRC button ( ), and select the [Open] - [Open] menu.
2. In the “File Type” field select “MotoSim EG cell (*.cel)”. And then select the MotoSim EG cell to be converted. Press [Open].



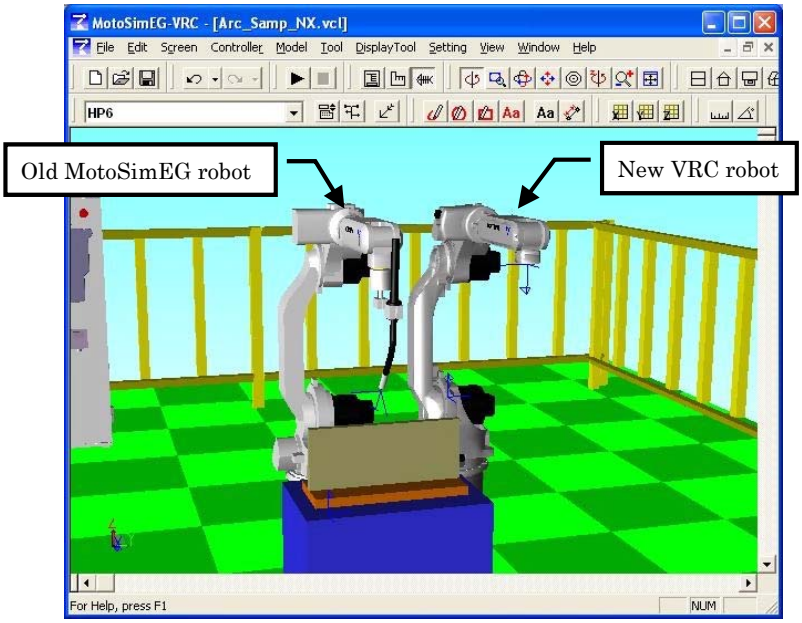
3. When the convertion confirmation message below appears, select “Yes” to convert the file to a “MotoSim EG-VRC (*.vcl)” file. The cell will display normally but the robot is still a “MotoSim EG” robot and will have limited operation.



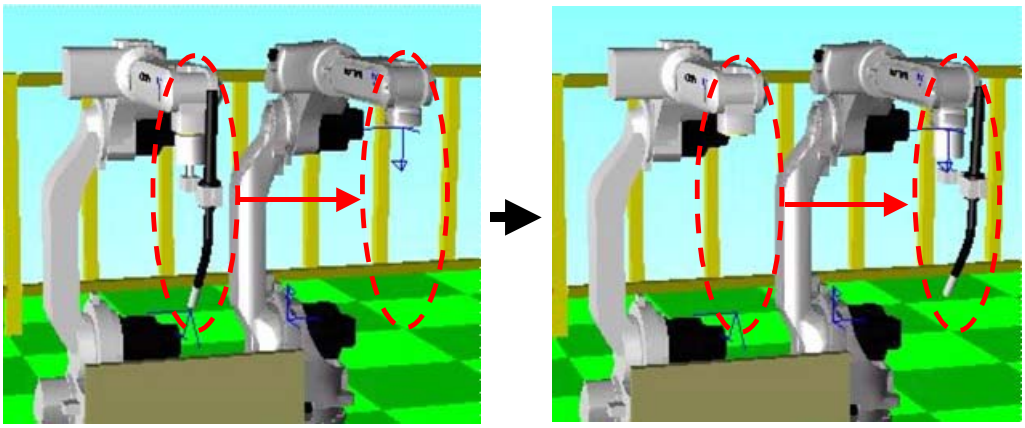
4. On the [Controller] tab, in the [Setup] group, click the [New] button, the new controller can be created.



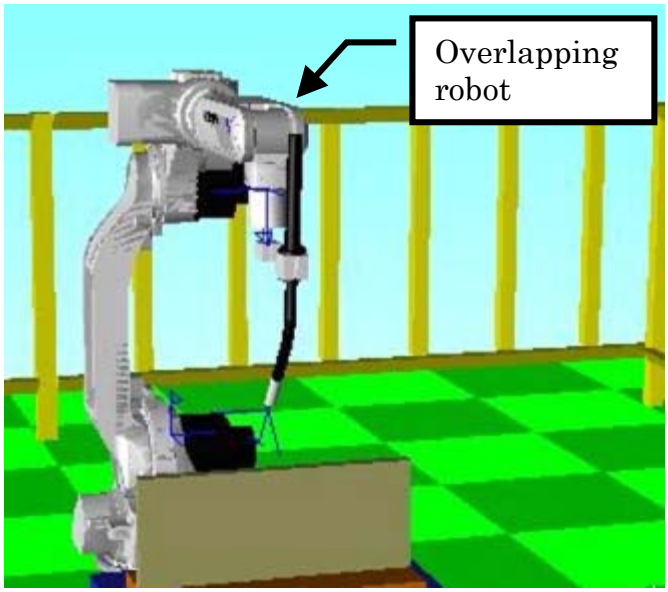
In the “Create Controller with...” dialog select “No CMOS.BIN file”. Proceed to add the controller as per the procedure of section 7.1.2 “Create Controller without CMOS.BIN file”.
In the initialization step at the “CONTROL GROUP” screen, select the robot type that matches the “MotoSim EG” robot of the cell.
Complet the procedure.



5. Once the VRC controller and robot has been added, transfer all robot tooling model from the MotoSim EG robot to the VRC robot using the models “Set Parent” function from the CAD tree. (For details, refer to section " 11.9.2 Moving the Parent Model ".)



6. You can set the location of the VRC robot to overlap the MotoSim EG robot. (For details, refer to section " 11.5 Positioning a Model ".)



7. Delete the “MotoSim EG” robot from the cell. (For details, refer to section " 7.3 Deleting a Controller ".) Save the cell.
8. Using “Windows Explorer”, copy the job files (.JBI) and condition files (TOOL.CND, UFRAME.CND...) from the MotoSim EG robot folder to the VRC controller “Storage Card” folder.
9. Load the transfered files into the VRC controller. (For details, refer to section " 15.3.3 Load controller data to MotoSim EG-VRC ")

NOTE

Unlike Windows, the VRC controller is case sensitive for the file names. Condition file names need to be entered with all capital letters or they will not be detected in the “Storage Card” folder. If this is not the case, rename the file name with Windows Explorer so that the names are written in capital letters.

13.12Spot High Speed Spec Function

Set the spot high speed spec function for the robot, and it explains the procedure for the simulation of spot high speed spec function

NOTE

- This simulation of the spot high speed spec function is a function that can be used only with the following controller.

  Controller Types : YRC1000/DX200/DX100
  System Version : DX200 : Since DN1.40-00
  DX100 : Since DS3.93-00

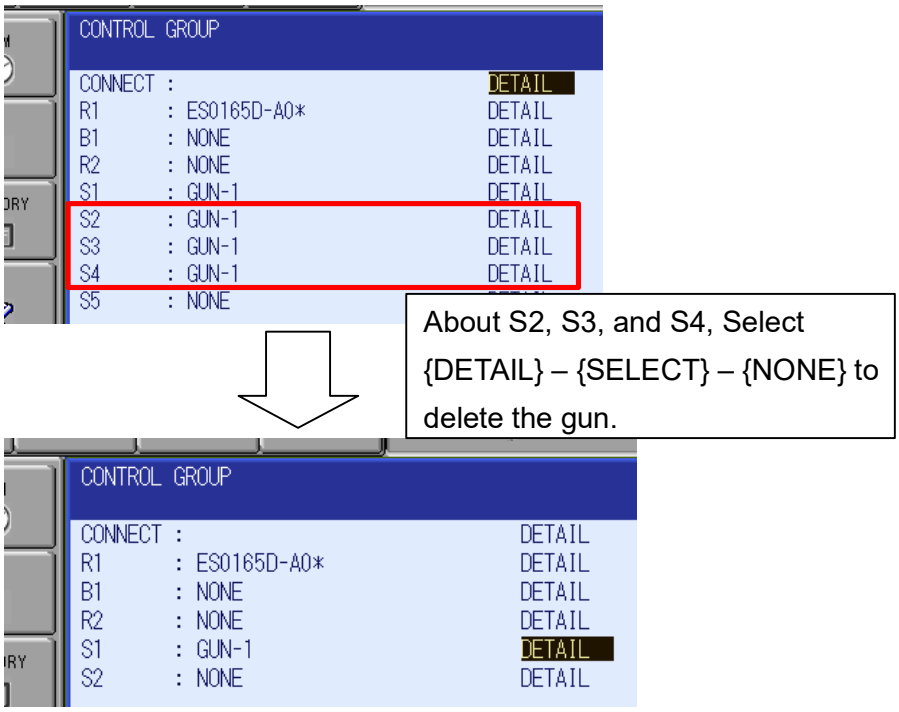
- This simulation of the spot high speed spec function is a function that can be used only with the following robots

  YRC1000/DX200 Only spot welding model.
  DX100.

ES0165D-A0*	ES0165D-A2*	ES0165D-B0*
ES0165D-C0*	ES0165D-E0*	ES0165D-F0*
ES0165D-X0*	ES0200D-A0*	ES0200D-A2*
ES0200D-B0*	ES0200D-C0*	ES0200D-X0*
MS0080W-A0*	MS0080W-A2*	MS0080W-B0*

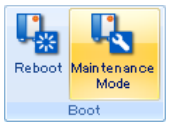
- The simulation of spot gun change system is not supported.
  When the CMOS.BIN of the real controller is used to create the environment, delete the guns other than S1 by the Maintenance Mode of the virtual pendant.

  Ex.) When the gun change system has S1, S2, S3, and S4, S2, S3, and S4 have to be deleted. To delete the guns other than S1, select the {SYSTEM} - {SETTING} - {CONTROL GROUP} with the Maintenance Mode of the virtual pendant.

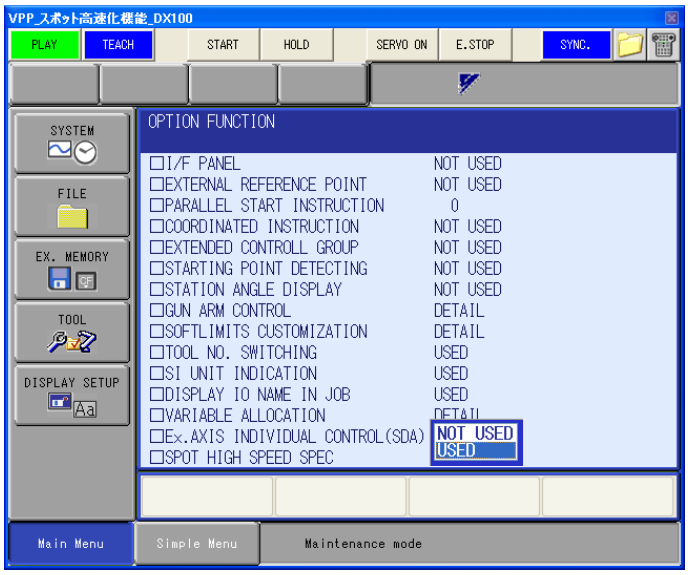


Procedure

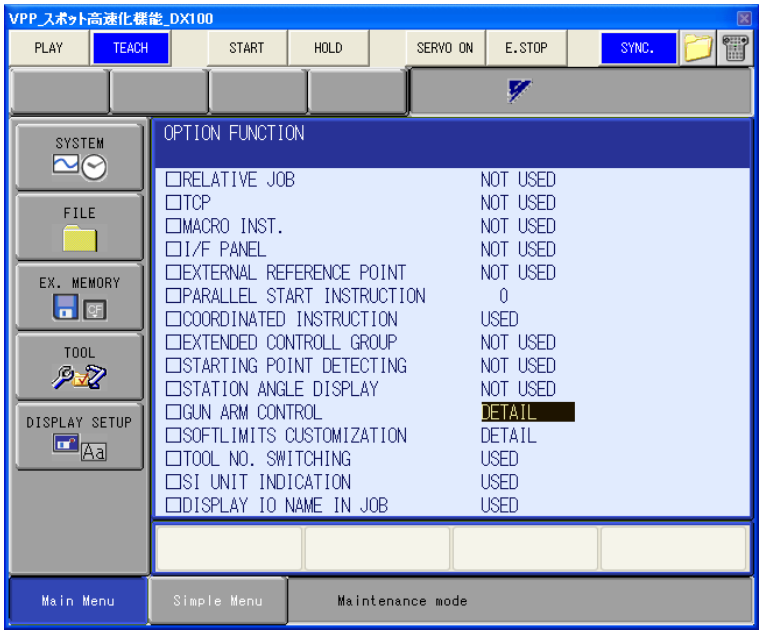
1. A new controller for the simulation of the spot welding is registered by the operational procedure of " 13.7 Registering the Equipment Model ". In this case, select the controller and robot as the above NOTE.
2. On the [Controller] tab, in the [Boot] group, click the [Maintenance mode] button, the [Maintenance mode] dialog appears.



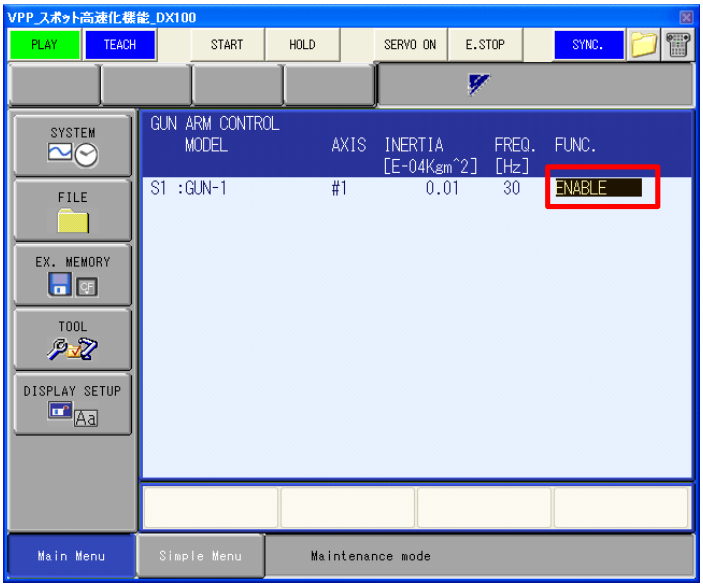
3. From the Virtual Pendant main menu select {SYSTEM} - {SETUP} - {OPTION FUNCTION}.
4. In the case of YRC1000, proceed the step 7 next.
   In the case of DX200/DX100, Select the "Spot High Speed Spec" and set its value to "Used". When the confirmation message displays, select "Yes" to make the change



5. In the case of DX200, proceed the step 7 next.
   In the case of DX100, Select the "Detail" of "Gun Arm Control".



6. Select the "Func." and set its value to "Enable". When the confirmation message displays, select "Yes" to make the change.



7. Click the "End" button of the "VRC Maintenance Mode" dialog.

13.13Setting of Paint workpiece supplying system "MOTOFEEDER"(NX100)

The MOTOFEEDER is the turntable-typed workpiece supplying equipment with the external 2-axis structure.
The operation including the paint operation can be performed by setting the initial settings, and creating paint programs.
This section describes the procedure from the initial settings to the playback.

NOTE
- MOTOFEEDER can be used only with the bellow controller.
  Controller : NX100
  System Version : NS5.35-45
- Only one MOTOFEEDER can be registered per controller.

The procedure of MOTOFEEDER registration is as below.

System Construction

Controller Initialization

↓

MOTOFEEDER model setting

↓

Relocation of robot and MOTOFEEDER

↓

Master job Registration

Teaching

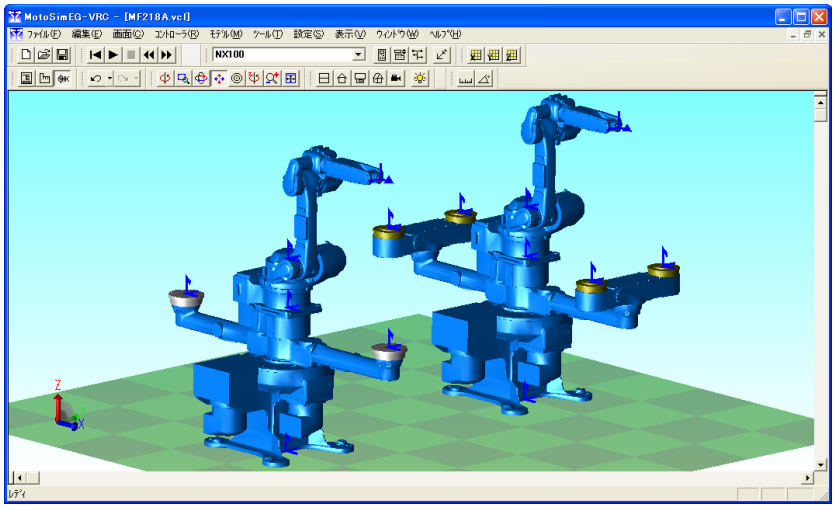
↓

Paint job creating and registering

Playback

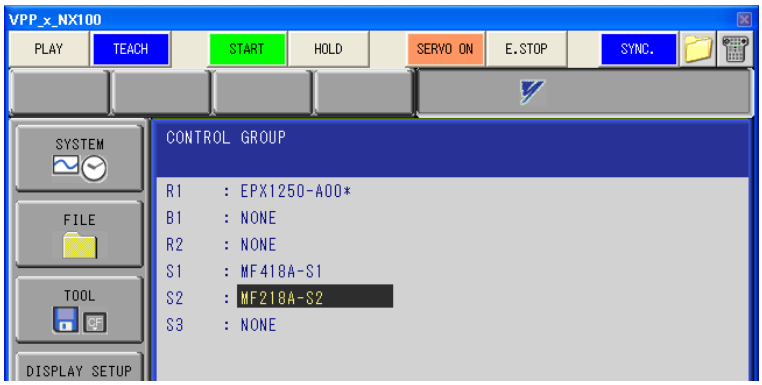
↓

Playback the paint job



13.13.1 Controller Initialization

The large rotary axis S1 and small rotary axis S2 are set as station axes.
When the controller is initialized, the control group is set as one robot (R1) and two station axes (S1, S2).



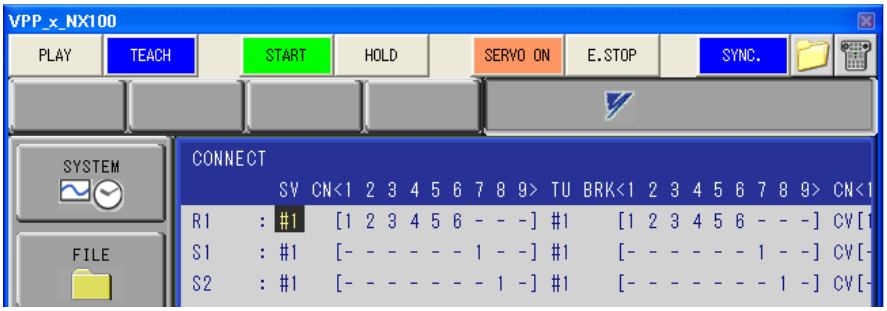
Procedure

1. Proceed to the step 1and 2 of " 7.1.1 Create a New VRC Controller (no file) " to create a new VRC controller".
   Select "NS5.35-45" system version from "NX100". Then, Proceed to the step 3 and press the [Maintenance Mode Startup] button, the controller starts up in maintenance mode.
2. Follow the procedure of section " 7.1.3 Initializing the Controller (YRC1000, YRC1000micro, DX200, DX100, NX100) ".
   When asked for the "Control Group", select the model to suit the actual robot system as a guide for the following table.

Actual robot system	Model registration on the VRC controller		
	R1	S1	S2
Arm Length: 1600mm, With Manipulator, High-Speed Rotation Specification	EPX1250	MF418A-S1	MF218A-S2
Arm Length: 1800mm, With Manipulator, High-Speed Rotation Specification	EPX1250		
Arm Length: 1400mm, Without Manipulator, High-Speed Rotation Specification	EPX1250 / EPX2050		
Arm Length: 1600mm, Without Manipulator, High-Speed Rotation Specification	EPX1250 / EPX2050		
Arm Length: 1800mm, Without Manipulator, High-Speed Rotation Specification	EPX1250 / EPX2050		
Arm Length: 1600mm, With Manipulator, Heavy Load Specification	EPX1250		MF418A-S2
Arm Length: 1800mm, With Manipulator, Heavy Load Specification	EPX1250		
Arm Length: 1400mm, Without Manipulator, Heavy Load Specification	EPX1250 / EPX2050		
Arm Length: 1600mm, Without Manipulator, Heavy Load Specification	EPX1250 /EPX2050		
Arm Length: 1800mm, Without Manipulator, Heavy Load Specification	EPX1250 / EPX2050		

- Registration of R1
  MOTOFEEDER is registered in combination with EPX1250 or EPX2050, so select "EPX1250-A00*" or "EPX2050-A3**", "EPX2050-A5**", or "EPX2050-B5**". For With-Manipulator Specification, EPX1250 is available only.
- Registration of S1
  Select "MF418A-S1".
- Registration of S2
  For High-Speed Rotation Specification, select "MF218A-S2". For Heavy Load Specification, select "MF418A-S2".

3. Set the value in the Connect display as a guide for the following table.



• EPX1250

	SV	CN	1	2	3	4	5	6	7	8	9
R1	#1		–	1	2	3	4	5	6	–	–
S1	#1		1	–	–	–	–	–	–	–	–
S2	#1		–		–	–	–	–	–	1	–

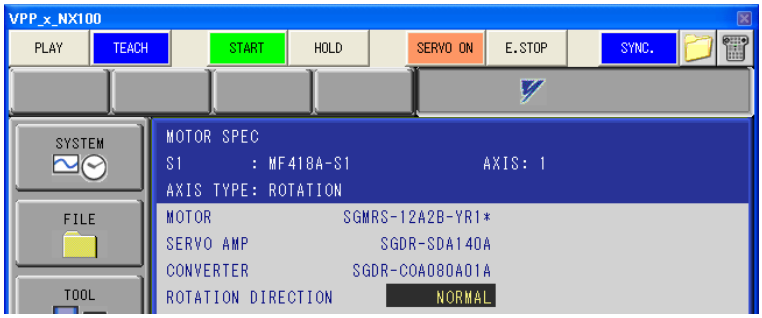
TU	BRK	1	2	3	4	5	6	7	8	9	CN	1	2	3	4	5	6	7	8	9
#1		–	1	2	3	4	5	6	–	–	CV	–	1	1	1	1	1	1	–	–
#1		1	–	–	–	–	–	–	–	–	CV	1	–	–	–	–	–	–	–	–
#1		1		–	–	–	–	–	–	–	CV	–		–	–	–	–	–	1	–

• EPX2050

	SV	CN	1	2	3	4	5	6	7	8	9
R1	#1		1	2	3	4	5	6	–	–	–
S1	#1		–	–	–	–	–	–	1	–	–
S2	#1		–		–	–	–	–	–	1	–

TU	BRK	1	2	3	4	5	6	7	8	9	CN	1	2	3	4	5	6	7	8	9
#1		1	2	3	4	5	6	–	–	–	CV	1	1	1	1	1	1	–	–	–
#1		–	–	–	–	–	–	1	–	–	CV	–	–	–	–	–	–	2	–	–
#1		–		–	–	–	–	–	1	–	CV	–		–	–	–	–	–	3	–

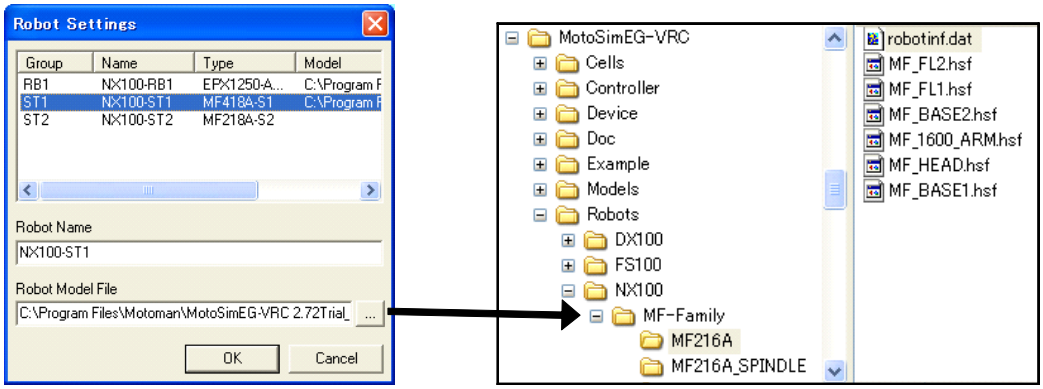
4. Set "ROTATION DIRECTION" of S1 and S2 to "REVERSE" in the motor spec display.



5. Set "APPLICATION" to "PAINT" in the application display. Then, press the [ENTER] button as default setting again, until controller initializing is finished.

13.13.2 MOTOFEEDER model setting

After controller setting is finished, the Robot Settings dialog box is displayed. Set the MOTOFEEDER model to "Robot Model File" of ST1.



Procedure

1. Robots\NX100\MF-Family" folder under the MotoSim EG-VRC install folder contains Robot models of MOTOFEEDER. Select the model file (robotinf.dat) to "Robot Model File" of ST1 as a guide for the following table.

Model registration on the VRC controller	Model File Folder
Arm Length: 1600mm, With Manipulator, High-Speed Rotation Specification	MF216A
Arm Length: 1600mm, With Manipulator, High-Speed Rotation Specification (with spindle unit)	MF216A_SPINDLE
Arm Length: 1800mm, With Manipulator, High-Speed Rotation Specification	MF218A
Arm Length: 1800mm, With Manipulator, High-Speed Rotation Specification(with Spindle unit)	MF218A_SPINDLE
Arm Length: 1400mm, Without Manipulator, High-Speed Rotation Specification	MF214B
Arm Length: 1400mm, Without Manipulator, High-Speed Rotation Specification(with spindle unit)	MF214B_SPINDLE
Arm Length: 1600mm, Without Manipulator, High-Speed Rotation Specification	MF216B
Arm Length: 1600mm, Without Manipulator, High-Speed Rotation Specification(with spindle unit)	MF216B_SPINDLE
Arm Length: 1800mm, Without Manipulator, High-Speed Rotation Specification	MF218B
Arm Length: 1800mm, Without Manipulator, High-Speed Rotation Specification(with spindle unit)	MF218B_SPINDLE
Arm Length: 1600mm, With Manipulator, Heavy Load Specification	MF416A

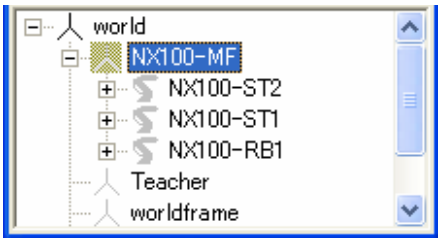
Arm Length: 1800mm, With Manipulator, Heavy Load Specification	MF418A
Arm Length: 1400mm, Without Manipulator, Heavy Load Specification	MF414B
Arm Length: 1600mm, Without Manipulator, Heavy Load Specification	MF416B
Arm Length: 1800mm, Without Manipulator, Heavy Load Specification	MF418B

2. After set "Robot Model File" of S1, press the [OK] button without setting "Robot Model File" of S2.
3. Virtual pendant restarts. Then, the "The initialization file of a controller is loaded" dialog box is displayed, press the [OK] button.

13.13.3 Relocation of robot and MOTOFEEDER

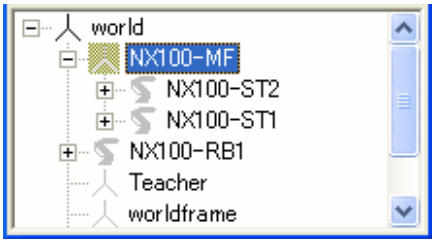
When the robot is displayed, relocate the robot model and MOTOFEEDER model in the CADTREE dialog box.
The robot model and MOTOFEEDER model are registered as below.
When relocate them, relocate the dummy model of MOTOFEEDER as below.

■ With Manipulator Specification



The dummy model "(Controller Name)-MF" is created. Robot model and MOTOFEEDER model are registered under the dummy model.

■ Without Manipulator Specification



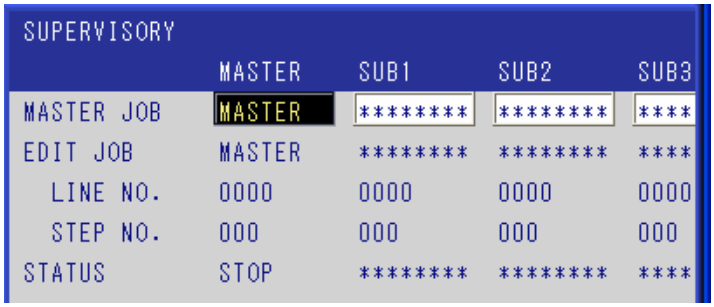
The dummy model "(Controller Name)-MF" is created. MOTOFEEDER model is registered under the dummy model. Robot model is registered under the world model.

13.13.4 Master job Registration

The paint operation of MOTOFEEDER and robot is performed with the prepared control job and the created paint job. The prepared job calls the created paint job. So, the prepared Job needs to be registered as Master Job.
The prepared control job has already loaded, register it as below.

Procedure

1. Select {JOB} - {CTRL MASTER} on the virtual pendant.
2. Press the [Space] key at MASTER of MASTER JOB, select "SETTING MASTER JOB" and press the [Space] key.
3. Select "MASTER.JBI", and press the [Space] key.

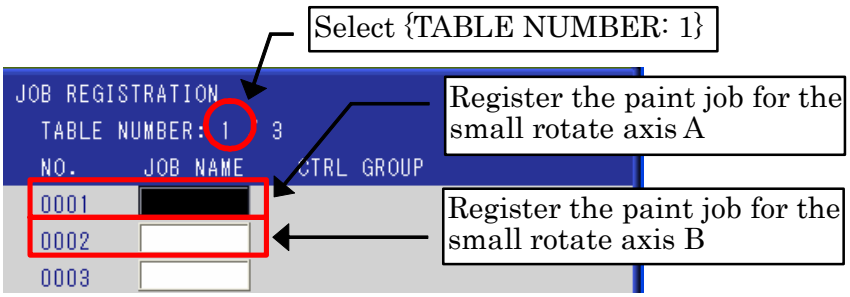


13.13.5 Paint job creating and registering

Create the paint job as usage. (Refer to manual "MOTOFEEDER OPERATING INSTRUCTIONS" about the procedure of creating the paint job.)
To perform the operation including the MOTOFEEDER motion, register the created paint job in the registration table.

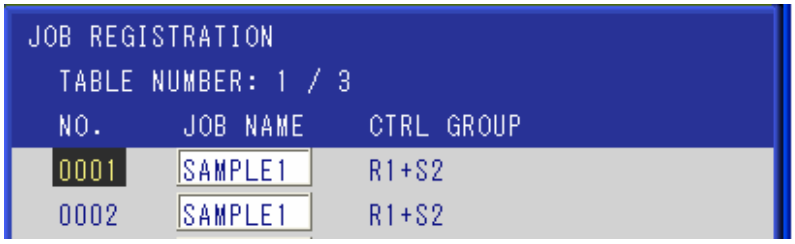
Procedure

1. Select {JOB} - {JOB REGISTRATION} on the virtual pendant.
2. Press the [Space] key at "JOB NAME" and select the paint job from job list.
   Set the paint job for the small rotary axis A: No. 0001, and set the paint job for the small rotary axis B: No. 0002.



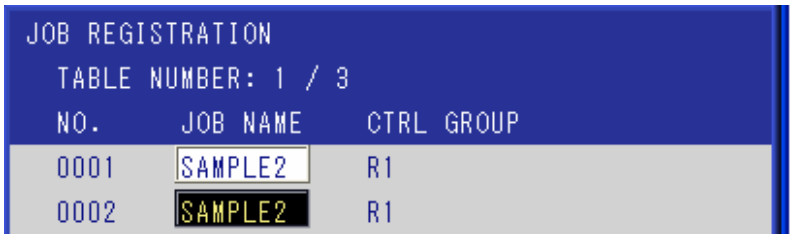
■ Without Spindle Unit Specification

The job "SAMPLE1" has already loaded. (Control Group: R1 + S2)
Set the "SAMPLE1" to No.001 and No.002, you can see the MOTOFEEDER motion of "SAMPLE1".



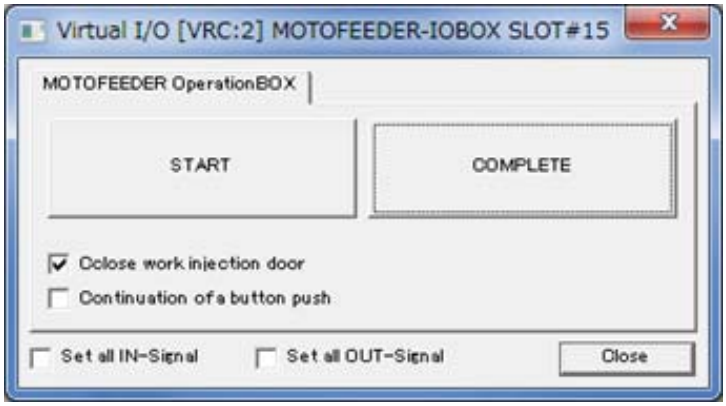
■ With Spindle Unit Specification

The job "SAMPLE2" has already loaded. (Control Group: R1)
Set the "SAMPLE2" to No.001 and No.002, you can see the MOTOFEEDER motion of "SAMPLE2".



13.13.6 Playback the paint job

On the [Simulation] tab, in the [Monitor] group, click the [I/O Monitor] button and select the [Operation Panel] menu. The [MOTOFEEDER-IOBOX] dialog appears.



Item	Description
[START] button	The large rotary axis rotates, and the paint job is executed.
[COMPLETE] button	The large rotary axis rotates. But, the paint job is not executed.
[Close work injection door] checkbox	Check this check box, the input of safeguarding is "ON". When execute playback, this check box needs to be checked.
[Continuation of a button push] button	Check this check box, keep the START button or the COMPLETE button pressed.

13.14Setting of Paint workpiece supplying system "MOTOFEEDERII"(DX200)

The MOTOFEEDER II is the turntable-typed workpiece supplying equipment with the external 2-axis structure.
This section explains the procedure for creating an environment for initial setting of MOTO-FEEDER II and teaching painting operation.

NOTE
- MOTOFEEDERII can be used only with DX200.
- Only one MOTOFEEDERII can be registered per controller.

The procedure of MOTOFEEDERII registration is as below.

System Construction

Controller Initialization

↓

MOTOFEEDERII model setting

↓

Relocation of robot and MOTOFEEDERII

↓

Master job Registration

Teaching

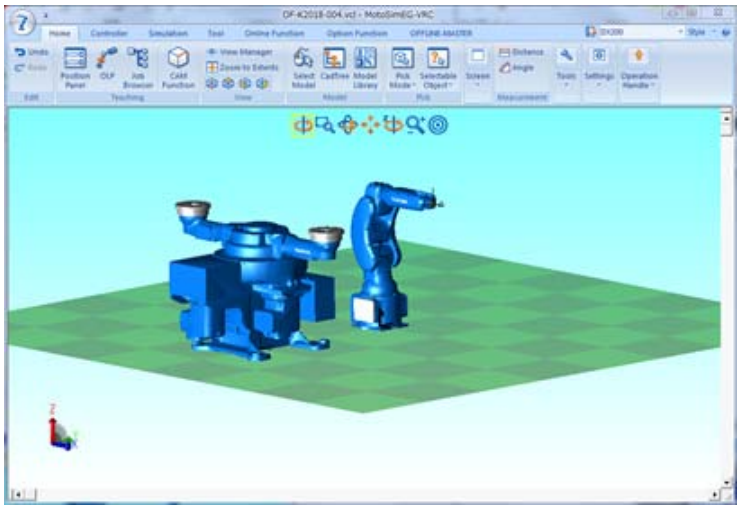
↓

Paint job creating and registering

Playback

↓

Playback the paint job



13.14.1 Controller Initialization

The large rotary axis S1 and small rotary axis S2 of MOTOFEEDERII are set as station axes. When the controller is initialized, the control group is set as one robot (R1) and two station axes (S1, S2).

Procedure

1. Proceed to the step 1and 2 of " 7.1.1 Create a New VRC Controller (no file) " to create a new VRC controller". Select "DX200" to controller type. Then, Proceed to the step 3 and press the [Maintenance Mode Startup] button, the controller starts up in maintenance mode.
2. Follow the procedure of section " 7.1.3 Initializing the Controller (YRC1000, YRC1000micro, DX200, DX100, NX100) ". When asked for the "Control Group", select the model to suit the actual robot system as a guide for the following table.

Actual robot system	Model registration on the VRC controller		
	R1	S1	S2
High-Speed Rotation Specification	MPX Series	MFDS1	MFDS2-20KG
Heavy Load Specification			MFDS2-40KG

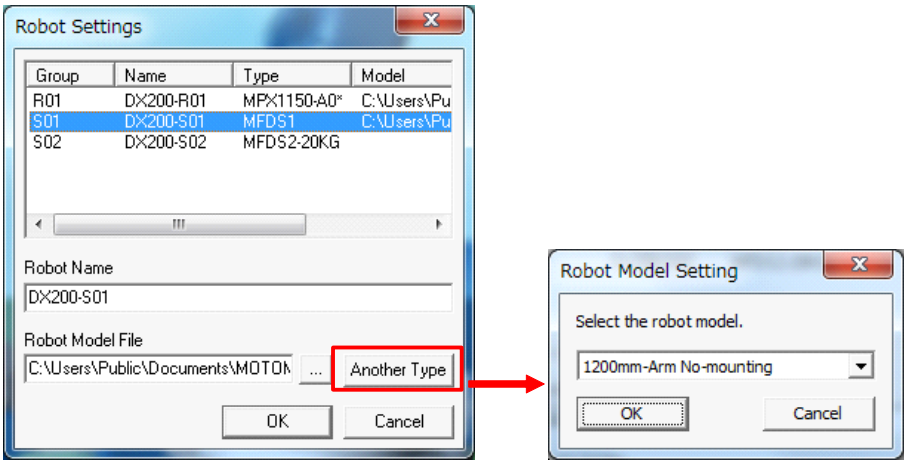
■ Registration of R1
MOTOFEEDER is registered in combination with MPX-series.
■ Registration of S1
Select "MFDS1".
■ Registration of S2
For High-Speed Rotation Specification, select "MFDS2-20KG". For Heavy Load Specification, select "MFDS2-40KG".

3. Set "APPLICATION" to "PAINT" in the application display. Then, press the [ENTER] button as default setting again, until controller initializing is finished.

13.14.2 MOTOFEEDERII model setting

After controller setting is finished, the Robot Settings dialog box is displayed. Set the MOTO-

FEEDERII model to "Robot Model File" of S01.



Procedure

1. Selects S01 from the list and presses the [Another Type] button.
2. From the dropdown list on the Robot Model Setting dialog, selects the robot model that matches the real robot configuration.
3. Presses the [OK] button on the Robot Model Setting dialog.
4. Presses the [OK] button without setting "Robot Model File" of S02.
5. Virtual pendant restarts. Then, the "The initialization file of a controller is loaded" dialog box is displayed, press the [OK] button.

13.14.3 Relocation of robot and MOTOFEEDERII

To relocate the robot and MOTOFEEDERII, please refer to section " 13.13.3 Relocation of robot and MOTOFEEDER ".

13.14.4 Master job Registration

To register the master job, please refer to section " 13.13.4 Master job Registration ".

13.14.5 Paint job creating and registering

Create the paint job as usage. (Refer to manual "MOTOFEEDERII OPERATING INSTRUCTIONS" about the procedure of creating the paint job.)

13.14.6 Playback the paint job

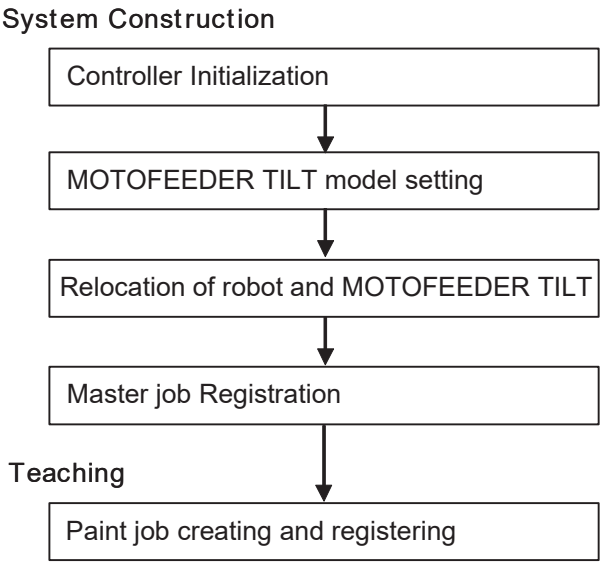
To playback the paint job, please refer to section " 13.13.6 Playback the paint job ".

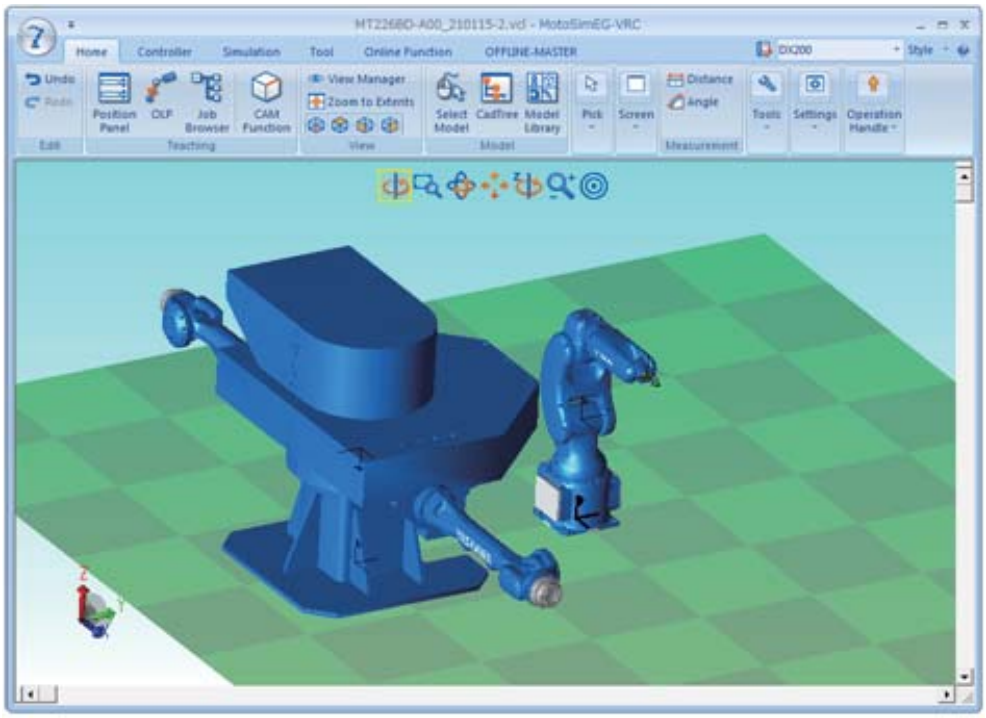
13.15 Setting of Paint workpiece supplying system "MOTOFEEDER TILT"

The MOTOFEEDER TILT is the turntable-typed workpiece supplying equipment with the external 5-axis structure.
This section explains the procedure for creating an environment for initial setting of MOTOFEEDER TILT and teaching painting operation.

NOTE
- MOTOFEEDER TILT can be used only with DX200.
- Only one MOTOFEEDER TILT can be registered per controller.

The procedure of MOTOFEEDER TILT registration is as below.





13.15.1 Controller Initialization

The large rotary axis S1 and small rotary axis S2/S3 of MOTOFEEDER TILT set as station axes. When the controller is initialized, the control group is set as one robot (R1) and three station axes (S1, S2, S3).

Procedure

1. Proceed to the step 1and 2 of " 7.1.1 Create a New VRC Controller (no file) " to create a new VRC controller". Select "DX200" to controller type. Then, Proceed to the step 3 and press the [Maintenance Mode Startup] button, the controller starts up in maintenance mode.

2. Follow the procedure of section " 7.1.3 Initializing the Controller (YRC1000, YRC1000micro, DX200, DX100, NX100) ". When asked for the "Control Group", select the model to suit the actual robot system as a guide for the following table.

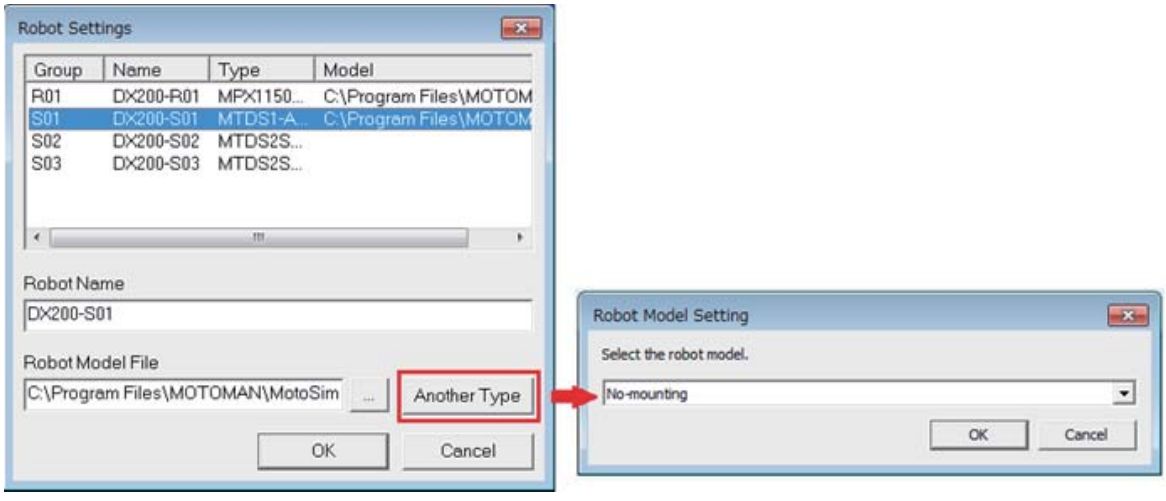
Model registration on the VRC controller			
R1	S1	S2	S3
MPX Series	MTDS1-A0	MTDS2S3-VT-A0	MTDS2S3-VT-A0

■Registration of R1
MOTOFEEDER is registered in combination with MPX-series.
■Registration of S1
Select "MTDS1-A0".
■Registration of S2
Select "MTDS2S3-VT-A0".
■Registration of S3
Select "MTDS2S3-VT-A0".

3. Set "APPLICATION" to "PAINT" in the application display. Then, press the [ENTER] button as default setting again, until controller initializing is finished.

13.15.2 MOTOFEEDER TILT model setting

After controller setting is finished, the Robot Settings dialog box is displayed. Set the MOTOFEEDER TILT model to "Robot Model File" of S01.



Procedure

1. Selects S01 from the list and presses the [Another Type] button.
2. From the dropdown list on the Robot Model Setting dialog, selects the robot model that matches the real robot configuration.
3. Presses the [OK] button on the Robot Model Setting dialog.
4. Presses the [OK] button without setting "Robot Model File" of S02/S03.
5. Virtual pendant restarts. Then, the "The initialization file of a controller is loaded" dialog box is displayed, press the [OK] button.

13.15.3 Relocation of robot and MOTOFEEDER TILT

To relocate the robot and MOTOFEEDER TILT, please refer to section " 13.13.3 Relocation of robot and MOTOFEEDER ".

13.15.4 Master job Registration

To register the master job, please refer to section " 13.13.4 Master job Registration ".

13.15.5 Paint job creating and registering

Create the paint job as usage. (Refer to manual "MOTOFEEDER TILT OPERATING INSTRUCTIONS" about the procedure of creating the paint job.)

13.16 3DPDF Output Function

This function outputs 3D PDF file containing the animation of a playback and the viewpoint control function. The information on the 3DPDF (e.g. title, company name, etc.) can be set with an output setting dialog.

NOTE

- To open the outputted 3DPDF file, Acrobat Reader is needed. The outputted 3DPDF files are not guaranteed to open on any PDF viewers other than Acrobat Reader*1.
- Some Acrobat Reader version can not open the 3DPDF file. Please use the latest version.
- If the animation is long, it takes a long time to open the 3DPDF files.
  Only as a guide, when the animation is about three minute, it takes 30 seconds to open the 3DPDF file. This depends on the PC specifications.

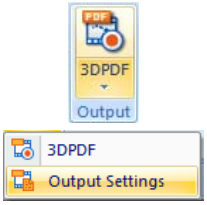
*1 Acrobat Reader is registered trademarks or trademarks of Adobe Inc. in the United States and/or other countries.

■ RESTRICTION

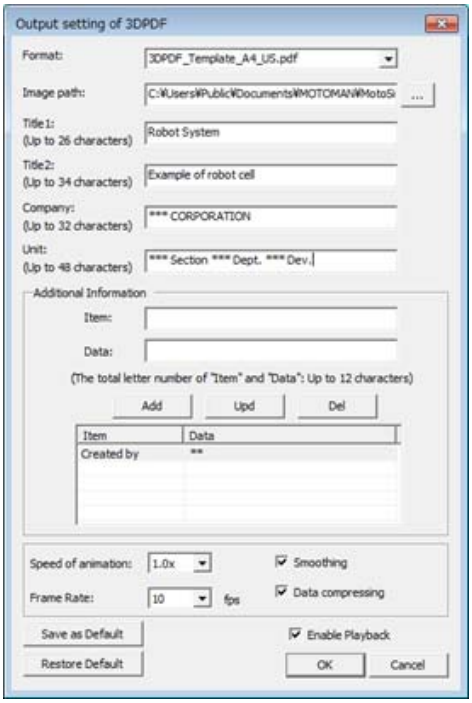
- Only the current job is displayed on the job contents list. As for peripheral equipment (conveyor, press and gantry), only animation is played.
- When CALL JOB or PSTART is used, it can not move to the step in the job of called job.
- As for trace line, the trace lines are displayed when finishing the playback. To display the trace lines, the kind of line in the trace property needs to be set to "Normal" or "Thick".
- Operation of the ribbon menu under recording is limited as same as the time of a playback.
- It does not correspond to changing the color of the pulse limit warning or the interference check.
- It does not correspond to a cutting plane, a memo, a dimension line, and a markup, and target a point arrow of CAM function.
- The model which exists after the end of a playback is the target of animation. The model deleted during a playback (by the model command etc.) is not contained.
- The data of LINE and LINE2 format of MDL form cannot be displayed.
- Template file can use "3DPDF_Template_A4_US.pdf" , "3DPDF_Template_A4_no_job-list_US.pdf" , "3DPDF_Template_A4_steptime_US.pdf" and “3DPDF_Template_A4_-full3D_US.pdf” only. If editing this file, 3DPDF is not outputted correctly.
- Do not delete the "3DPDF_Template_A4_US.pdf" ,"3DPDF_Template_A4_no_job-list_US.pdf" , "3DPDF_Template_A4_steptime_US.pdf" and “3DPDF_Template_A4_-full3D_US.pdf”.
- NS4.69-A5 Controller is not supported.
- To use the 3DPDF function, Driver is set to "OpenGL" or "OpenGL2". It is in [Options] dialog - [Graphic] tab - [Display].

13.16.1 Output Setting

On the [Simulation] tab, in the [Output] group, click the [Output Settings] of the [3DPDF]. [Output setting of 3DPDF] dialog is displayed.



Set each items on the [Output setting of 3DPDF] dialog.



Output setting of 3DPDF

Item	Description
Format	Sets the file name of 3DPDF format. PDF file in the \Users\Pubilc\Documents\MOTOMAN\MotoSim EG-VRC\Template\3DPDF folder is displayed. When installing MotoSim EG-VRC, "3DPDF_Template_A4_US.pdf" , "3DPDF_Template_A4_no_joblist_US.pdf" and "3DPDF_Template_A4_steptime_US.pdf" are copied to the 3DPDF folder. "3DPDF_Template_A4_US.pdf" is set by default.
Image path	Sets the JPG file of the logo image. When this is not set, the logo of YASKAWA is displayed.
Title1	Sets the contents of title 1. NOTE : A string longer than the number of characters restriction can't be used.
Title2	Sets the contents of title 2. NOTE : A string longer than the number of characters restriction can't be used.

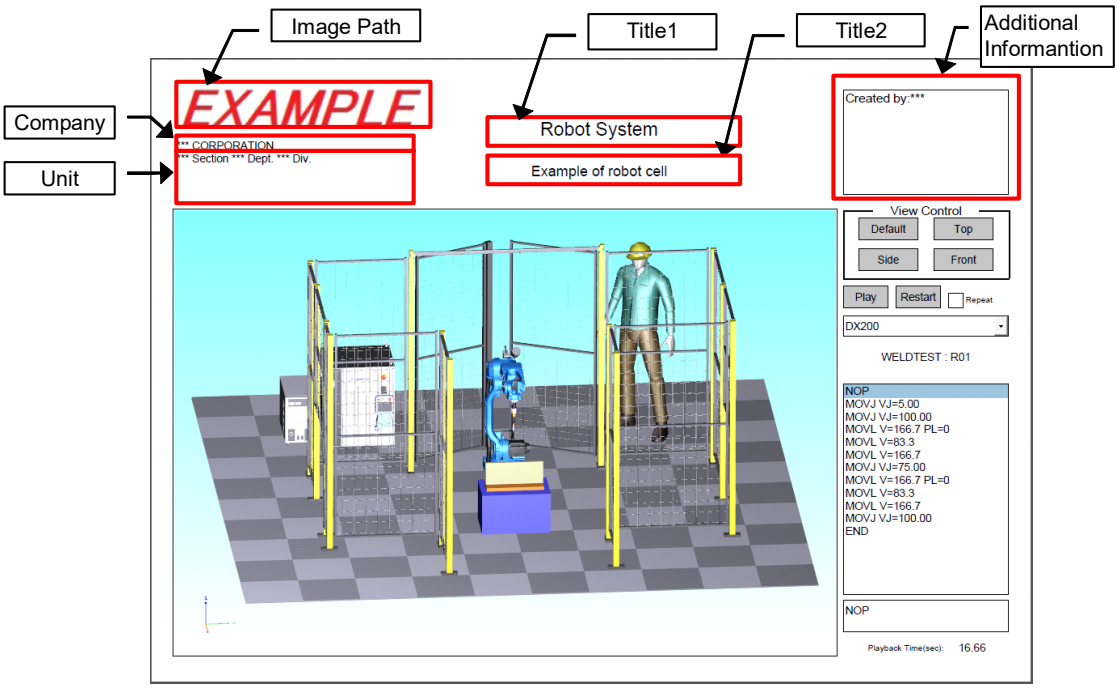
Output setting of 3DPDF

Item	Description
Company	Sets the company name. NOTE : A string longer than the number of characters restriction can't be used.
Unit	Sets the unit name. NOTE : A string longer than the number of characters restriction can't be used.
Additioal Information	Sets the additional information. This is displayed as [Item] : [Data]. [Item] : Sets the item name. [Data] : Sets the data. [Add] button When input the [Item] and [Data] and press the [Add] button, the item is added to the list. [Upd] button When click the item of the list, the item is reflected to [Item] and [Data]. When change the contents of [Item] or [Data] and press the [Upd] button, the item of the list is changed. [Del] button When click the item of the list and press the [Del] button, the item of the list is deleted. NOTE : A total characters number of [Item] and [Data] has to be below the number of characters restriction.
Speed of animation	Sets the speed of the animation.
Frame Rate	Sets the number of the frame displayed per 1 second. 10 fps is set by default. If the 3DPDF operation is so slow, set this less than 10 fps. In this case, the animation is jumpy.
Smoothing	When enabled, The gap of the same model between frames is interpolated linearly. This is enabled by default.
Data compressing	When enabled, the 3D data is compressed. This is enabled by default.
Save as Default	This setting of the cell is saved as a default setting of MotoSim EG-VRC.
Restore Default	This setting of the cell is restored by a default setting of Moto-Sim EG-VRC.
Enable Playback	When disenabled, 3DPDF which can only use viewpoint operation is created. The default is enabled. When disenabled, only "3DPDF_Template_A4_full3D_US.pdf" template is selected.

NOTE

- When the cell is a new created cell or created by MotoSim EG-VRC before Ver2015, a default setting of MotoSim EG-VRC is loaded. When this setting dialog is opened or a 3DPDF file is created, the setting is saved in the cell folder. The setting in the cell folder will be loaded after that.
- The number of characters restriction of each item changes with the selected 3DPDF format.

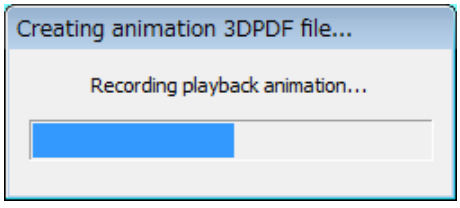
The relation of each setup items and the screen of 3DPDF are as follows.



13.16.2 Outputting 3DPDF

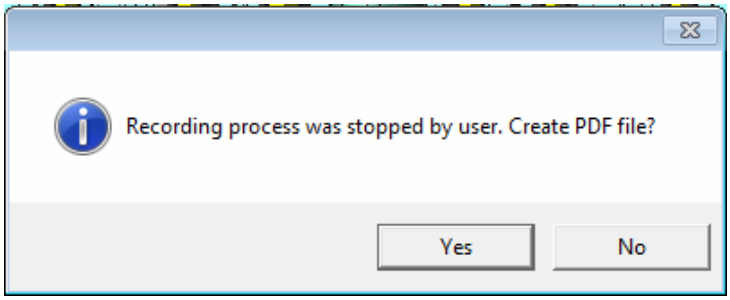
Procedure

1. Select the controller and the job to output the job contents list.
2. On the [Simulation] tab, in the [Output] group, click the [3DPDF] of the [3DPDF].
   The process of 3DPDF outputting is executed. During the process, the following dialog is displayed.

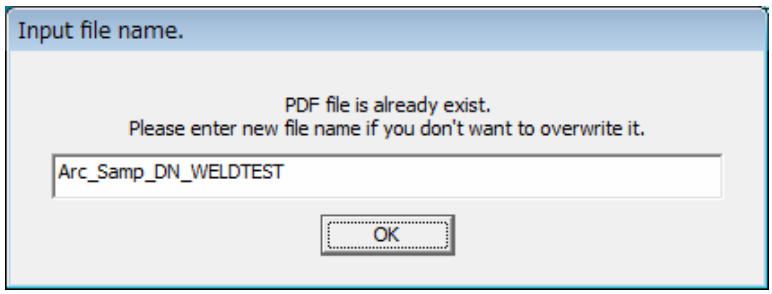


During playback, click the [3DPDF] of the [3DPDF] in the [Output] group on the [Simulation] tab, the playback can be stopped. Then, the following dialog is displayed. Press the [Yes] button, the animation until stopping the playback is outputted. And Press the

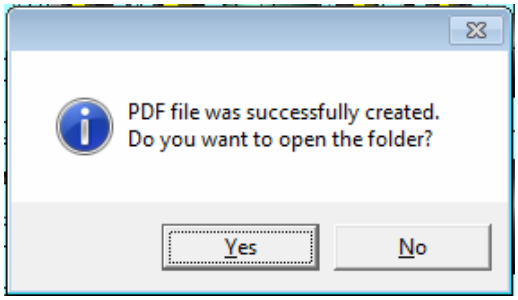
[No] button, the process of 3DPDF outputting is finished.



3. When finished the recording, the 3DPDF file is created in the cell folder and that file is named as "cell name".pdf. If the file already exists, the following dialog is displayed. When overwrite it, press the [OK] button. When want not to overwrite it, enter the new file name and press the [OK] button.



4. When the 3DPDF file creation is finished successfully, the following dialog is displayed. Press the [Yes] button, the cell folder is opened. Press the [No] button, the cell folder is not opened.

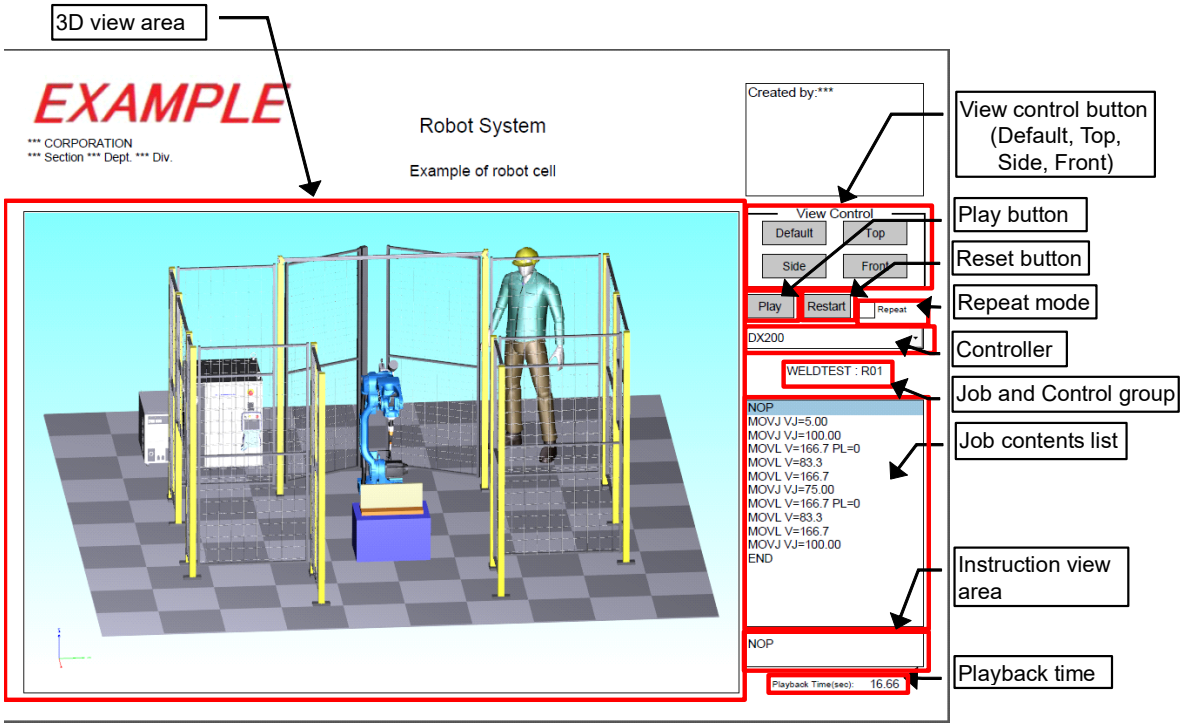


13.16.3 Display and Operation of 3DPDF

3DPDF file which created by "3DPDF_Template_A4_US.pdf" as a format

When open the 3DPDF file which created by 3DPDF_Template_A4_US.pdf as a format, it will

be displayed as follows.

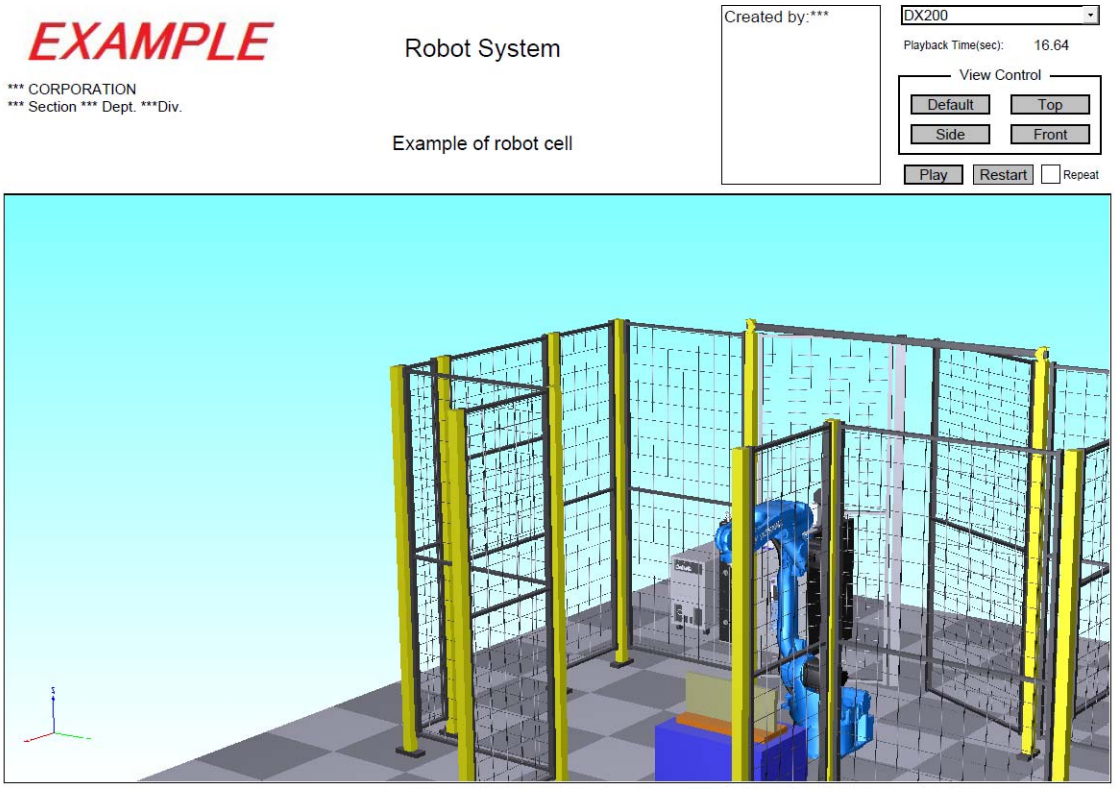


Press the each button of [View Control] (the [Default] button, the [Top] button, the [Side] button and the [Front] button), the viewpoint of 3D view area is changed.
Press the [Play] button, the animation is played. Then, if check the [Repeat], the animation is played repeatedly.
Press the [Reset] button, the robot moves to the start position of the animation.
When the controller is changed by the drop-down list, the contents of job name, control group, job list, and playback time are changed.
Click the move instruction in the job contents list, the robot moves to the teaching point. And, the information of the clicked line is displayed in the instruction view area.
The playback time of the job displayed in the job contents list is displayed in the lower right-hand corner of the page.

3DPDF file which created by "3DPDF_Template_A4_no_joblist_US.pdf" as a format

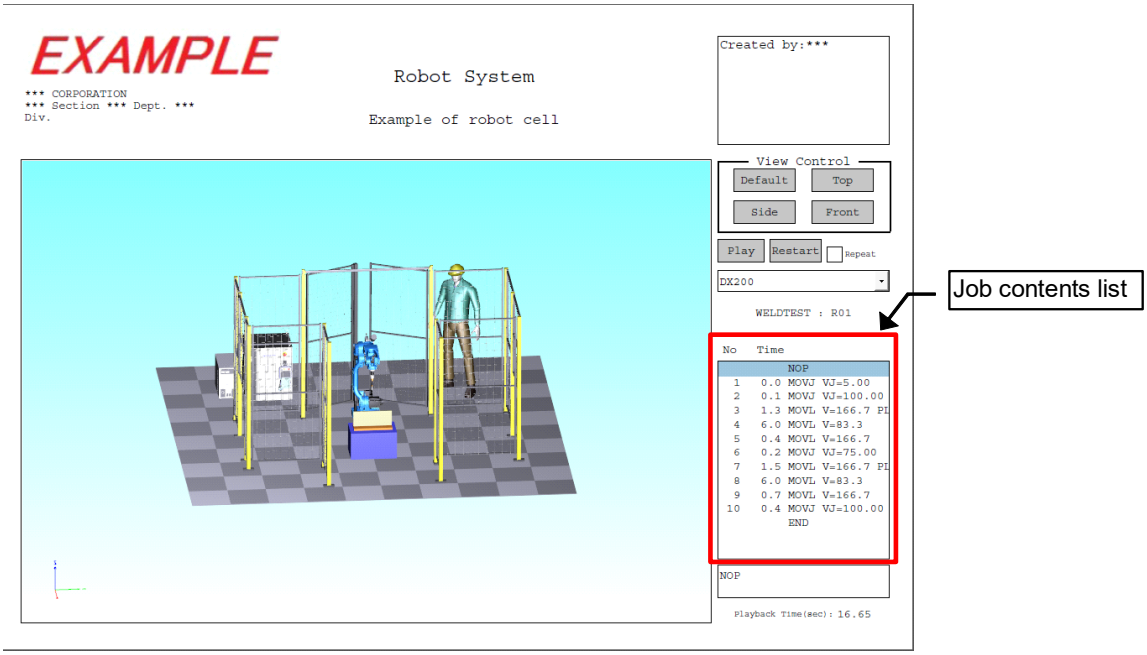
When open the 3DPDF file which created by 3DPDF_Template_A4_no_joblist_US.pdf as a

format, it will be displayed as follows.

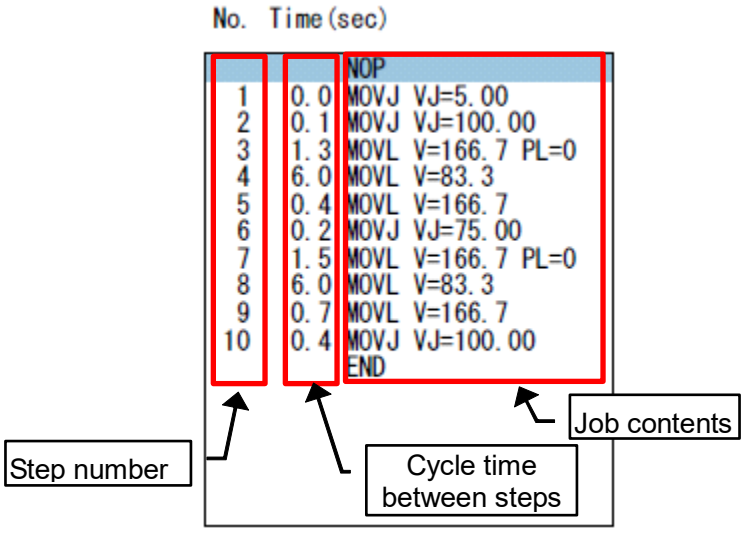


3DPDF file which created by "3DPDF_Template_A4_steptime_US.pdf" as a format

When open the 3DPDF file which created by "3DPDF_Template_A4_steptime_US.pdf" as a format, it will be displayed as follows.



Job contents list will be displayed in the order of "step number", "Cycle time between steps" and "job contents". Other items is equivalent to format "3DPDF_Template_A4_JP.pdf".



RESTRICTION

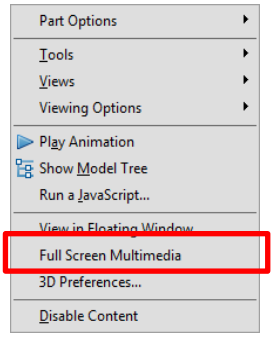
- When the job execution order is changed (e.g. CALL instruction, JUMP instruction), the step between the cycle time will be displayed as follows.
- When there is the CALL instruction in the current job, time spent in the CALL instruction is added to the next step time.
- When the same steps are executed multiple times (e.g. Label instruction and JUMP instruction), the cycle time between steps of first time is displayed.
- When the step has not executed according to the instruction (e.g. JUMP instruction), cycle time between steps of that is blank display.
- When stop in the middle of the play back at the time of 3DPDF output, cycle time between steps of step execution has been completed is displayed only.

In 3D view area, the viewpoint can be changed by mouse operation. The assignment of the viewpoint operation mode is as follows.

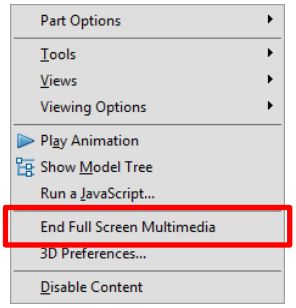
Viewpoint Operation Mode	Mouse Operation
Rotate	Press-and-hold the left button and drag
Zoom	Rotate the scroll wheel or Press-and-hold the right button and drag upward or downward or Press the Shift key of the keyboard and press-and-hold the left button or the right button and drag upward or downward

Viewpoint Operation Mode	Mouse Operation
Parallel	Press the Ctrl key of the keyboard and press-and-hold the left button and drag or Press-and-hold the left button and the right button and drag
Zoom in	Press the Ctrl key of the keyboard and press-and-hold the right button and drag

To display 3D view as full screen, right-click on the 3D view area and display the right-click menu, and select the [Full Screen Multimedia].

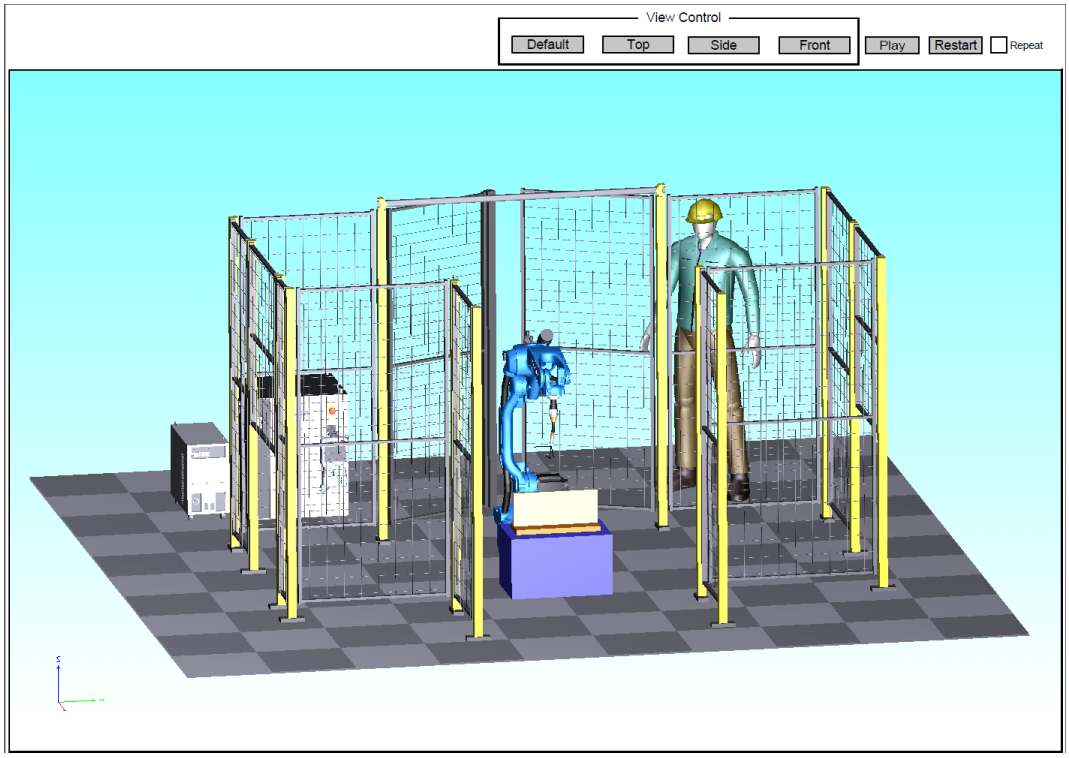


To end full screen, right-click on the 3D view area and display the right-click menu and select the [End Full Screen Multimedia], or press the [Esc] key of the keyboard.



3DPDF file which created by "3DPDF_Template_A4_full3D_US.pdf" as a format

When open the 3DPDF file which created by 3DPDF_Template_A4_full3D_US.pdf as a format, it will be displayed as follows.



■ NOTE

- When left-click on the 3D view area, the model may be selected. By the setting of the Acrobat Reader, the model will be not selected.

  Procedure

  1) Select [Edit] - [Prefernces…], and the [Prefernces] dialog is displayed.
  2) In the [3D & Multimedia], Uncheck the [Enable selection for the Hand tool] of the [3D Tool Options].

- When playing the animation, the robot and the other models in the 3D view area may be displayed as bounding box. By the setting of the Acrobat Reader, the bounding box will be not displayed.

  Procedure

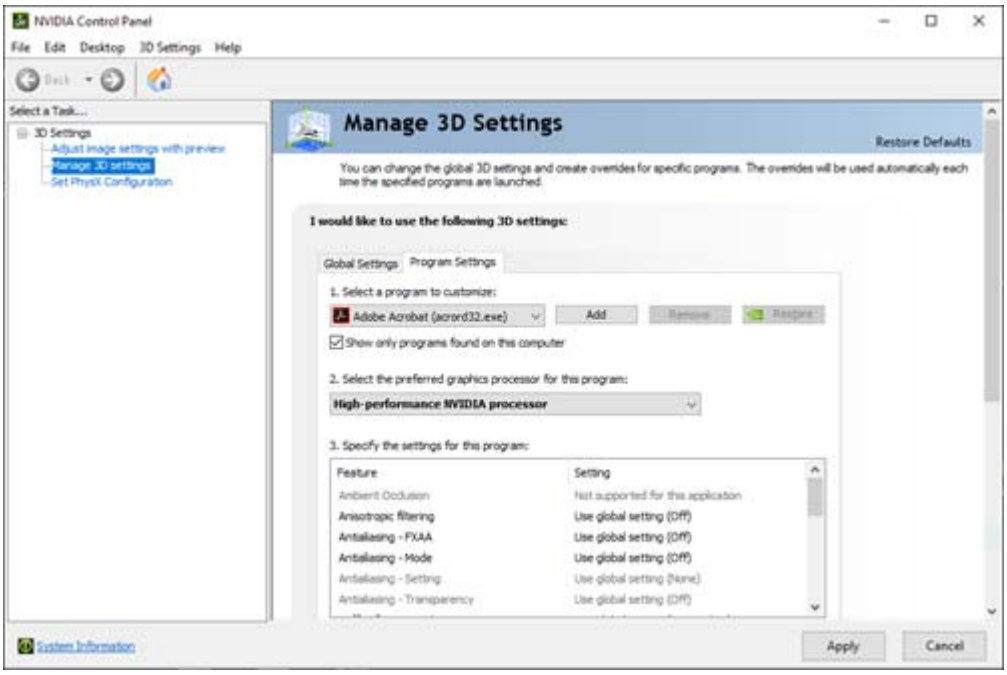
  1) Select [Edit] - [Prefernces…], and the [Prefernces] dialog is displayed.
  2) In the [3D & Multimedia], Set [None] to [Optimization Scheme for Low Framerate] of the [Auto-Degrade Options].

- When playing the animation in a 3DPDF output from a cell containing a model script, the model script may cause the display to be distorted at the switching between showing and hiding of the model. By the setting of the Acrobat Reader, you can avoid this.

Procedure

1) Select [Edit] - [Prefernces…], and the [Prefernces] dialog is displayed.
2) In the [3D & Multimedia], Set [None] to [Optimization Scheme for Low Framerate] of the [Auto-Degrade Options].

• Enabling the following 3D graphic board settings for Acrobat Reader may improve 3DPDF performance. For the setting method when using NVIDIA 3D graphic board, refer to " 1.3.1 3D Graphic Board Setting ".



13.17AVI Output Function

This function outputs AVI file containing the animation of a playback. The video resolution can be set with an output setting dialog. If operate the viewpoint during playback, the state is also reflected to the animation.

NOTE

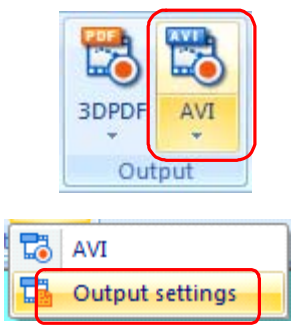
- To Open the outputted AVI file, the video playback software is needed. And, installation of a codec is needed depending on PC.
- A file size becomes big depending on the length of animation.
- Animation is played in time a playback takes actually, not playback time in the virtual controller.

RESTRICTION

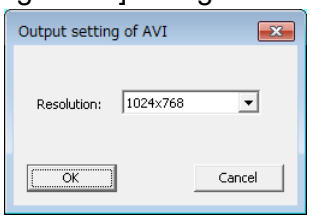
- The frame rate of AVI file changes by refresh interval of MotoSim EG-VRC. When refresh interval becomes small, the frame rate becomes big, so the animation becomes smoothly. But, the file size becomes big.
- When changing a viewpoint quickly, a minute movement of viewpoint can't be replicated right sometimes.
- Operation of the ribbon menu under recording is limited as same as the time of a playback.
- It does not correspond to changing the color of the pulse limit warning or the interference check.
- It does not correspond to a trace line, a cutting plane, a memo, a dimension line and a markup, and target a point arrow of CAM function.
- The model which exists after the end of a playback is the target of animation. The model deleted during a playback (by the model command etc.) is not contained.
- Showing and Hiding the weld spark model can't be replicated.
- There is a possibility that a PC will be heavily by lack of a memory depending on the length of the animation.

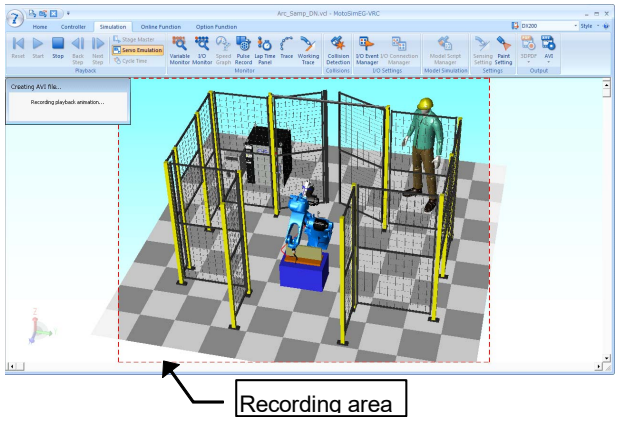
13.17.1 Output Setting

On the [Simulation] tab, in the [Output] group, click the [Output settings] of the [AVI].
[Output setting of AVI] dialog is displayed.



Set each items on the [Output setting of AVI] dialog.



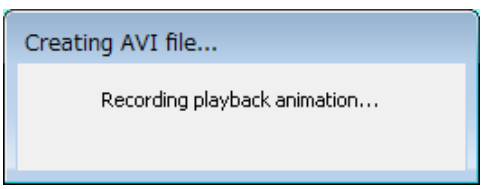
Resolution	Sets the resolution of AVI. Selectable resolution are as follows. • 1280x720 • 1024x768 • 640x480 • 320x240 Recording area is the specified size rectangle, and which center is the center of view area of MotoSim EG-VRC. When AVI file output is started, the frame of recording area is displayed. For details, refer to the section " 13.17.2 Outputting AVI ". 

NOTE When the resolution becomes big, the image quality becomes delicately, but the file size becomes big.

13.17.2 Outputting AVI

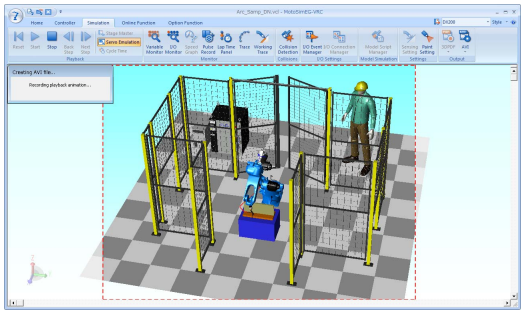
Procedure

1. Select the controller and the job to output the job.
2. On the [Simulation] tab, in the [Output] group, click the [AVI] of the [AVI]. The process of AVI outputting is executed. During the process, the following dialog is displayed.

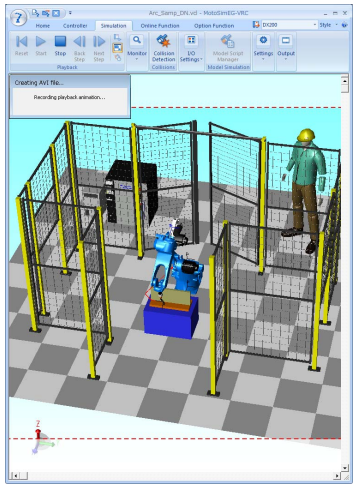


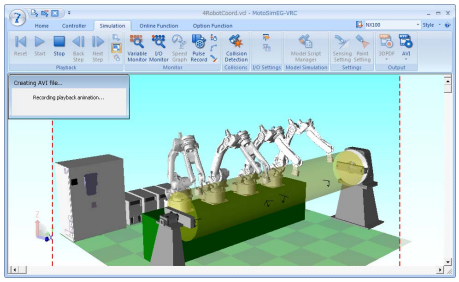
When AVI file output is started, the frame of recording area is displayed on the Moto-

Sim EG-VRC window. The animation in this frame is saved to a AVI file.



Depending in the aspect ratio of MotoSim EG-VRC window, vertical lines or horizontal lines are not displayed in the window sometimes as below. In this case, the area outside the window is saved to the AVI file.

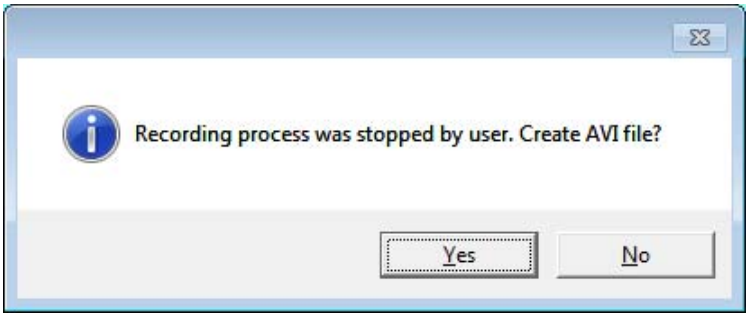




NOTE

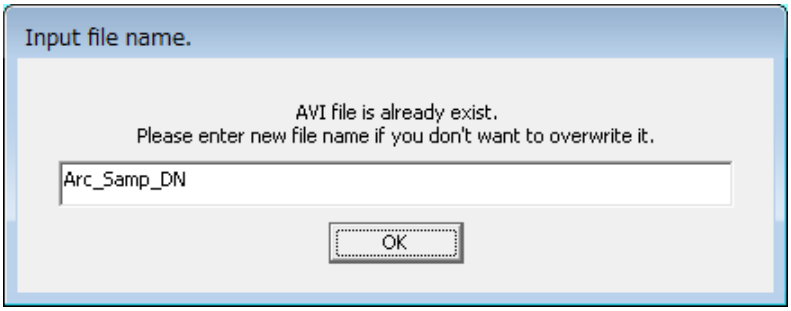
- The frame of output area cannot be changed. (e.g. mouse drag operation, etc.)
- When the window size is changed, the frame of output area is changed.
- The frame of output area is not saved to the AVI file.

During playback, click the [AVI] of the [AVI] in the [Output] group pm the [Simulation] tab, the playback can be stopped. Then, the following dialog is displayed. Press the [Yes] button, the animation until stopping the playback is outputted. And press the [No] button, the process of AVI outputting is finished.

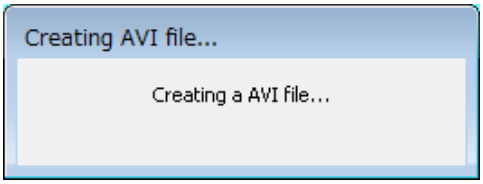


3. When finished the recording, the AVI file is created in the cell folder and that file is named as "cel name".pdf. If the file already exists, the following dialog is displayed. When overwrite it, press the [OK] button. When want not to overwrite it, enter the new

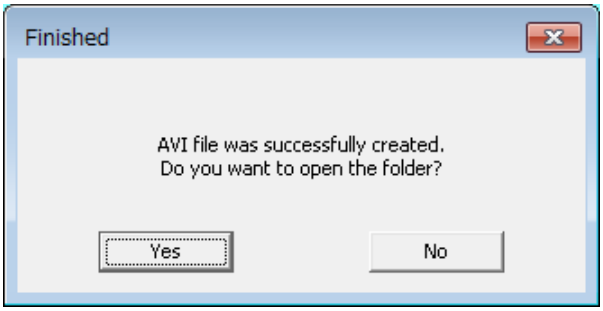
file name and press the [OK] button.



4. AVI file creation is started, and the following dialog is displayed. During AVI file creation, the recorded contents is played back. And, MotoSimEG -VRC can't be operated any more entirely until output processing is completed.



5. When the AVI file creation is finished successfully, the following dialog is displayed. Press the [Yes] button, the cell folder is opened. Press the [No] button, the cell folder is not opened.



6. Outputted file can be played back by the video playback software.

13.18 Working Trace Function

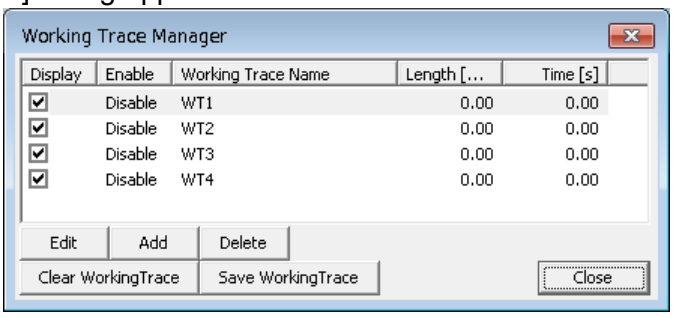
13.18.1 Changing Trace Object

The tracking drawn by the working trace function is normally created and drawn as a model having "world" as the parent. Therefore, changing the name of the "Parent" in the Working Trace Configuration dialog box will change the parent of the tracking. For example, work is on the station and turns and the robot welds this work, if the parent is set to work, the working trace is drawn on the work.

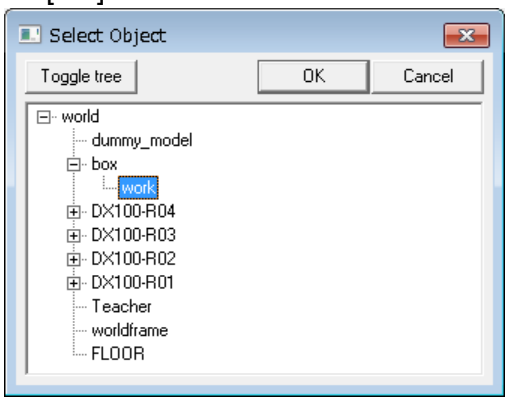
Procedure

The procedure is explained with the "1con4robot.vcl" example.

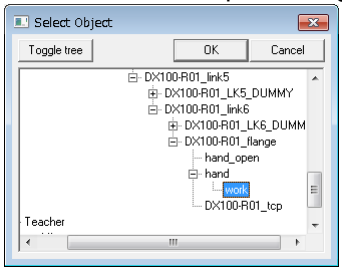
1. On the [Simulation] tab, in the [Monitor] group, click the [Working Trace] button, the [Working Trace Manager] dialog appears.



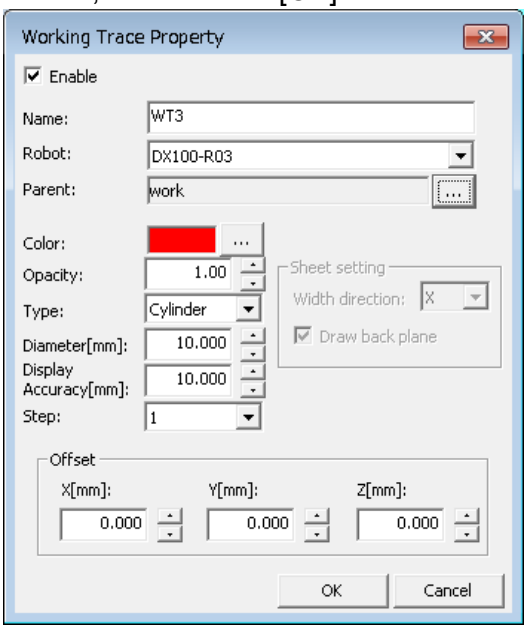
2. Edit the setting of "WT3".
   Select "WT3" on the list and click the [Edit] button.
3. Click the [...] button beside the "Parent" field to display the "Select Object" dialog box.
   Select "work" and click the [OK] button.



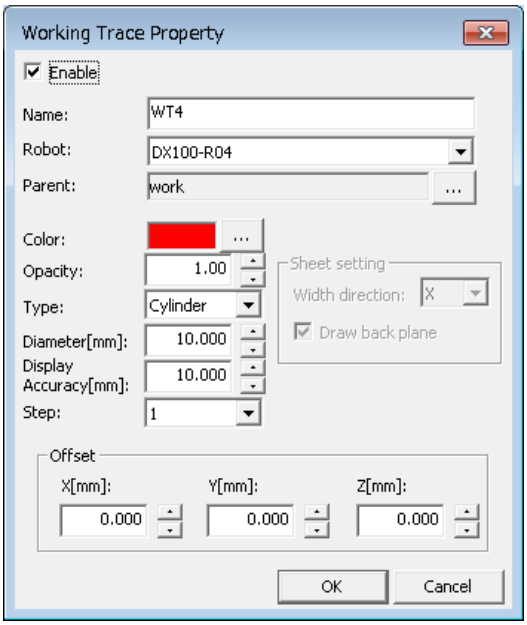
NOTE When the playback is canceled, the "work" model parent might be "DX100-R01".



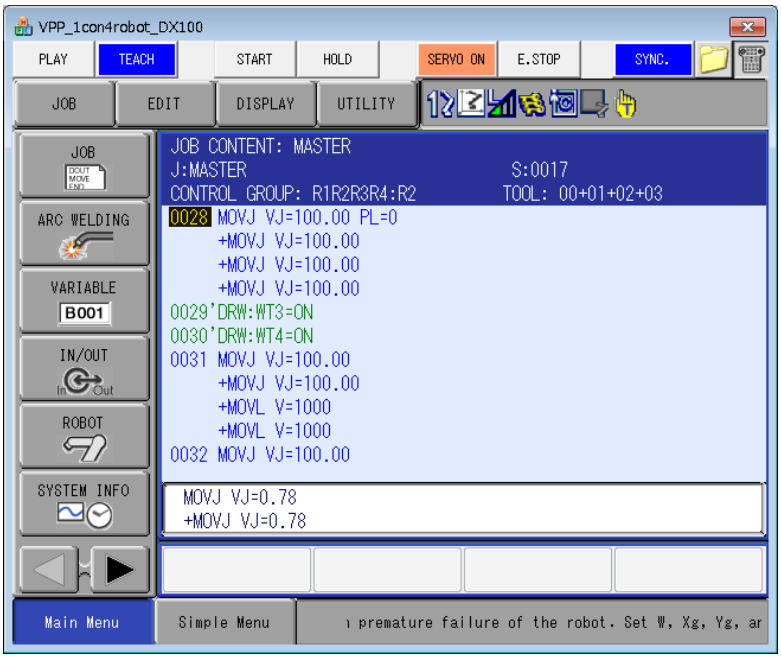
4. Check the [Enable] check box, and click the [OK] button.



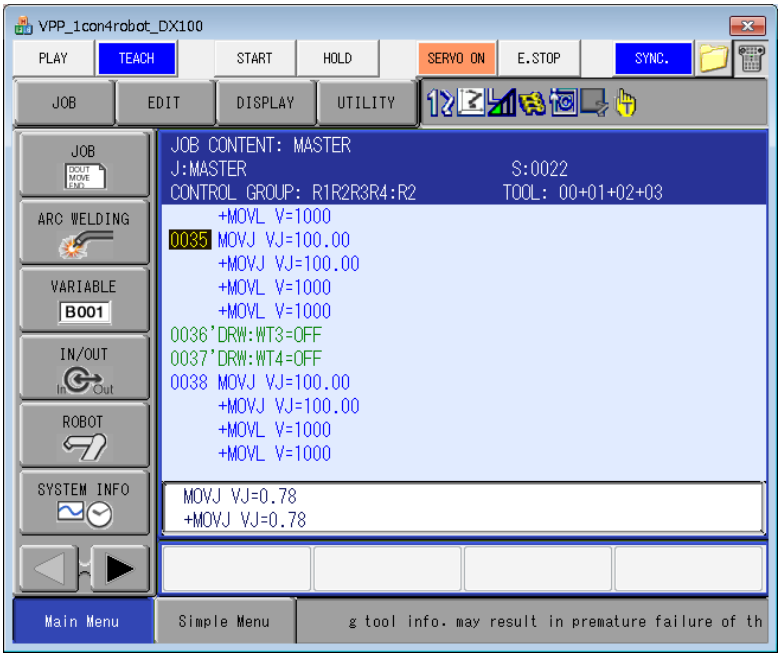
5. Edit the setting of "WT4".
For "WT4", execute same procedure from Step.2 to Step.4.
When the setting is completed, click the [Close] button of the [Working Trace Manager] dialog.



6. Insert the comments to start drawing the working trace.
On the virtual pendant, show the "MASTER" job, and move the cursor to the step where R3 and R4 starts welding. "POS LEVEL" of that step is changed "PL=0". And, the following comments is inserted to the next of that step.
'DRW:WT3=ON
'DRW:WT4=ON



7. Insert the comments to start drawing the working trace.
Move the cursor to the step where R3 and R4 finishes welding. And, the following comments is inserted to the next of that step.
'DRW:WT3=OFF
'DRW:WT4=OFF



8. Start playback.
When start playback, the working trace is move according to the movement of "work".

13.19 Simulation of Mechanical Mirror Robot

The mechanical mirror robot is changed the parameters of SVxG0 - 5 (motor rotation direction specified).
When the motor rotation direction is reversed, the robot in the MotoSimEG-VRC is displayed to the specified value in the opposite direction.
But, for the following models, it is displayed in consideration of the motor rotation direction.

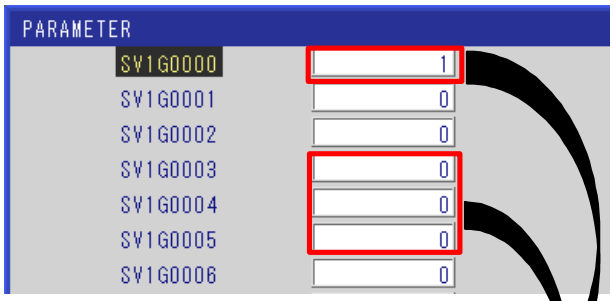
- EPX2050-A5
- EPX2800-A0
- EPX2800R-A0
- EPX2900-A0
- UH0100D-J20
- UH0100Y-A20
- UH0100Y-A22
- UH0100Y-A24
- UH0100Y-A30
- UH0100Y-A32
- UH0100Y-A34
- UH0100Y-A40
- UH0100Y-A42
- UH0100Y-A44

NOTE When this function is used, the operation of the robot in the position panel and the OLP operation still guarantees, but the others does not guarantees.

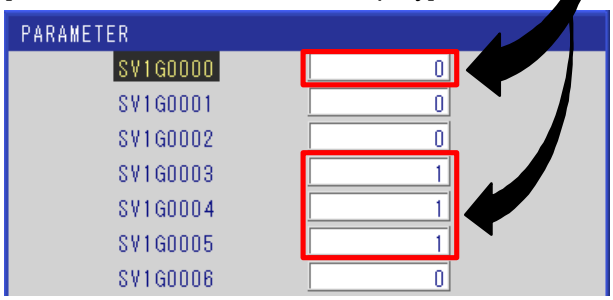
■ Inverts the Parameter

Inverts the parameter of S axis, R axis, B axis, and T axis.
When the traveling axis is inverted, executes the same operation for traveling axis.
UH-series models only invert the parameter of SV1G0000.
After changing parameters, please re-start of MotoSimEG-VRC.

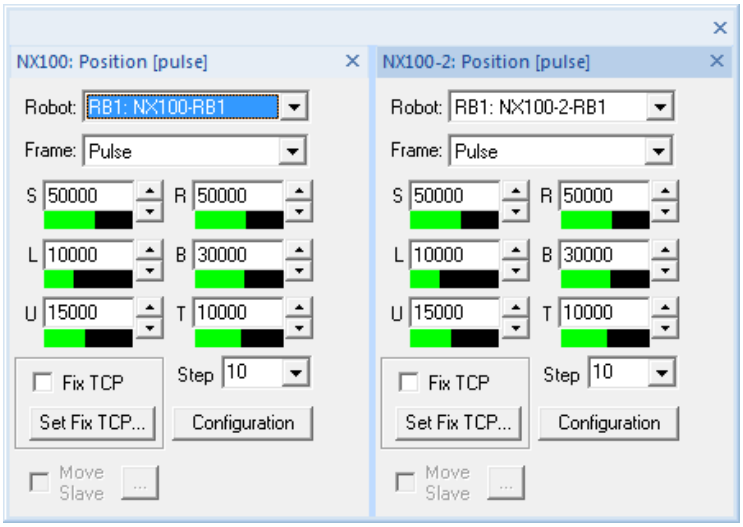
[Robot Controller to Normal Display]



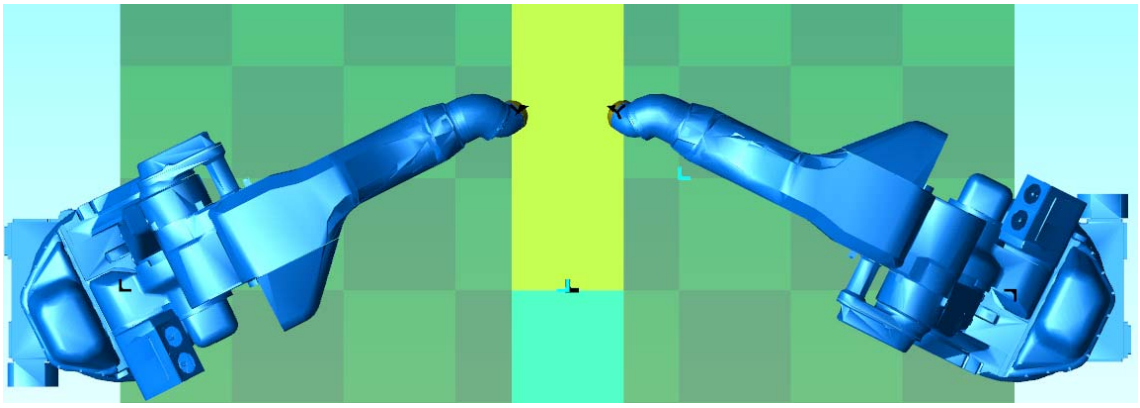
[Robot Controller to Mirror Display]



E.G. Two EPX2900-A0 is placed face-to-face



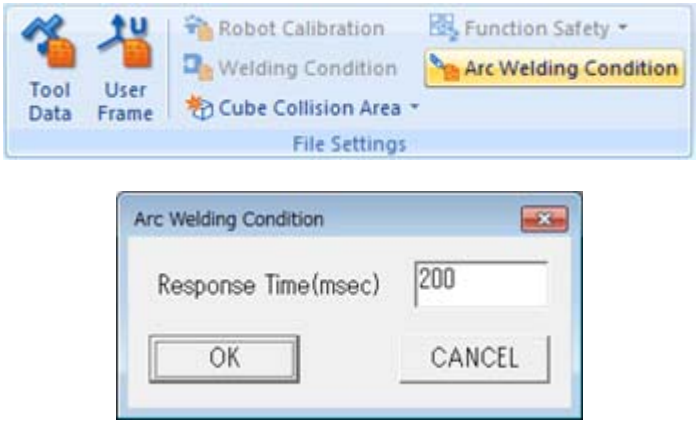
In spite of the same pulse, the configured EPX2900-A0 moves in the same direction.



13.20Setting of arc welding simulation

To simulate the arc welding, it needs to set the response time of welding machine.
On the [Controller] tab, in the [File Settings] group, click the [Arc Welding Condition] button, the [Arc Welding Condition] dialog appears.

NOTE
- This setting is avalable when the use of the controller is "Arc" only.
- The simulation of the arc welding is a function that can be used only with YRC1000/ DX200/DX100.It doesn't deal with other controllers.



Arc Welding Condition

Item	Description
“Response Time(msec)” edit box	Sets the response time of welding machine.

13.21 Rearranging Travel Axis Function

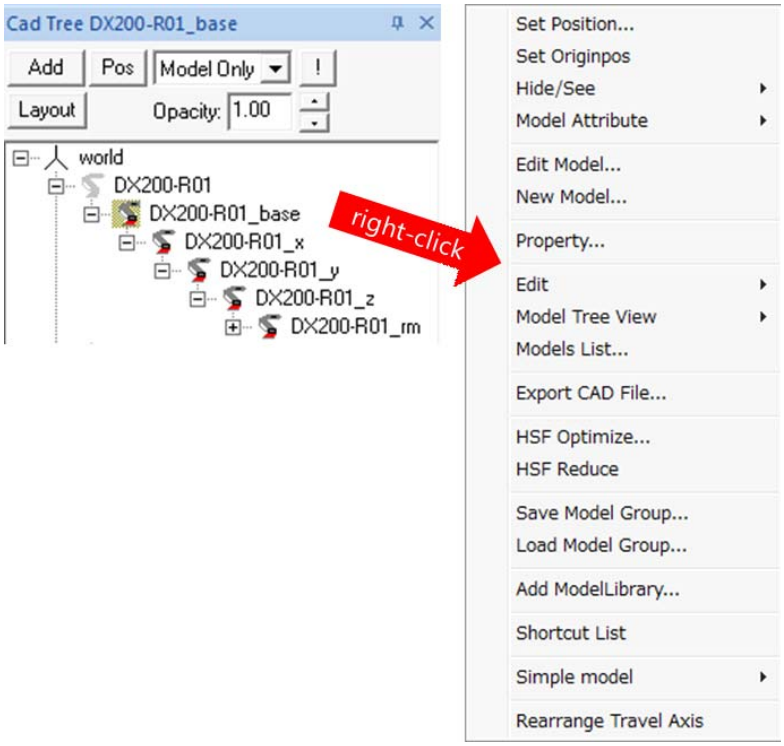
This function changes robot's travel axis order registered in CadTree, and allows you to change the order in which the user moves the travel axis.

■ RESTRICTION

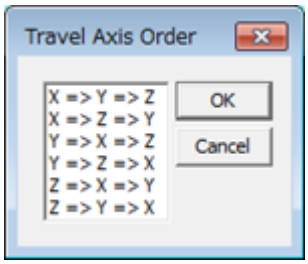
This function is not supported 1-axis.

Procedure

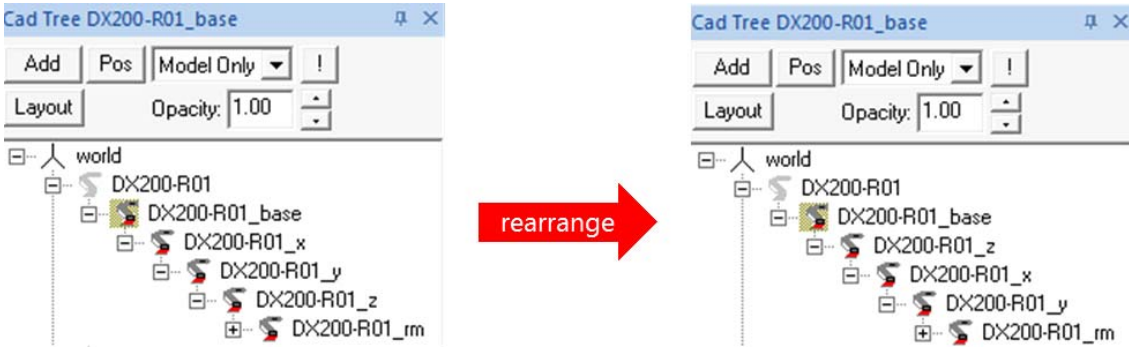
1. Expand the model tree view of the robot model registered in Cad Tree, select a model described as "_base" at the end, and right click on this to display a popup menu.



2. When clicking [Rearrange Driving Axis] in the popup menu, a dialog for selecting the following sorting order will be displayed (2 patterns for 2-axes, 6 patterns for 3-axes). Select the order you want to change from the list and press OK.



3. For example, change the order of X → Y → Z to Z → X → Y. Please confirm that CadTree is as follows before and after change. In addition, rearranging can execute repeatedly.



4. When saving and reloading the cells, MotoSimEG-VRC assembles the travel axis in a sorted state.

13.22 Retrofit Function

This function supports job conversion when replacing from existing controller to new controller. The main functions are as follows.

1. Converts job from source robot to destination robot
2. Checks robot configuration at teach point
3. Collects the log of the trajectory by the playback of the job of source robot and destination robot and displays the difference information in the report.
4. Supports the following modification so that the trajectory of destination robot approaches the trajectory of source robot
   - Teach point modification
     Move the teaching point of the job by the amount of deviation so that the trajectory of destination robot approaches the trajectory of source robot
   - PL modification
     Sets the PL tag to the movement command having a large deviation
   - Speed modification
     Sets the slow speed to the movement command having a large deviation
   - Gun axis modification
     In the case of a robot with the motor gun, the teaching point is added so that the trajectory of destination robot approaches the trajectory of source robot

■ Preparation

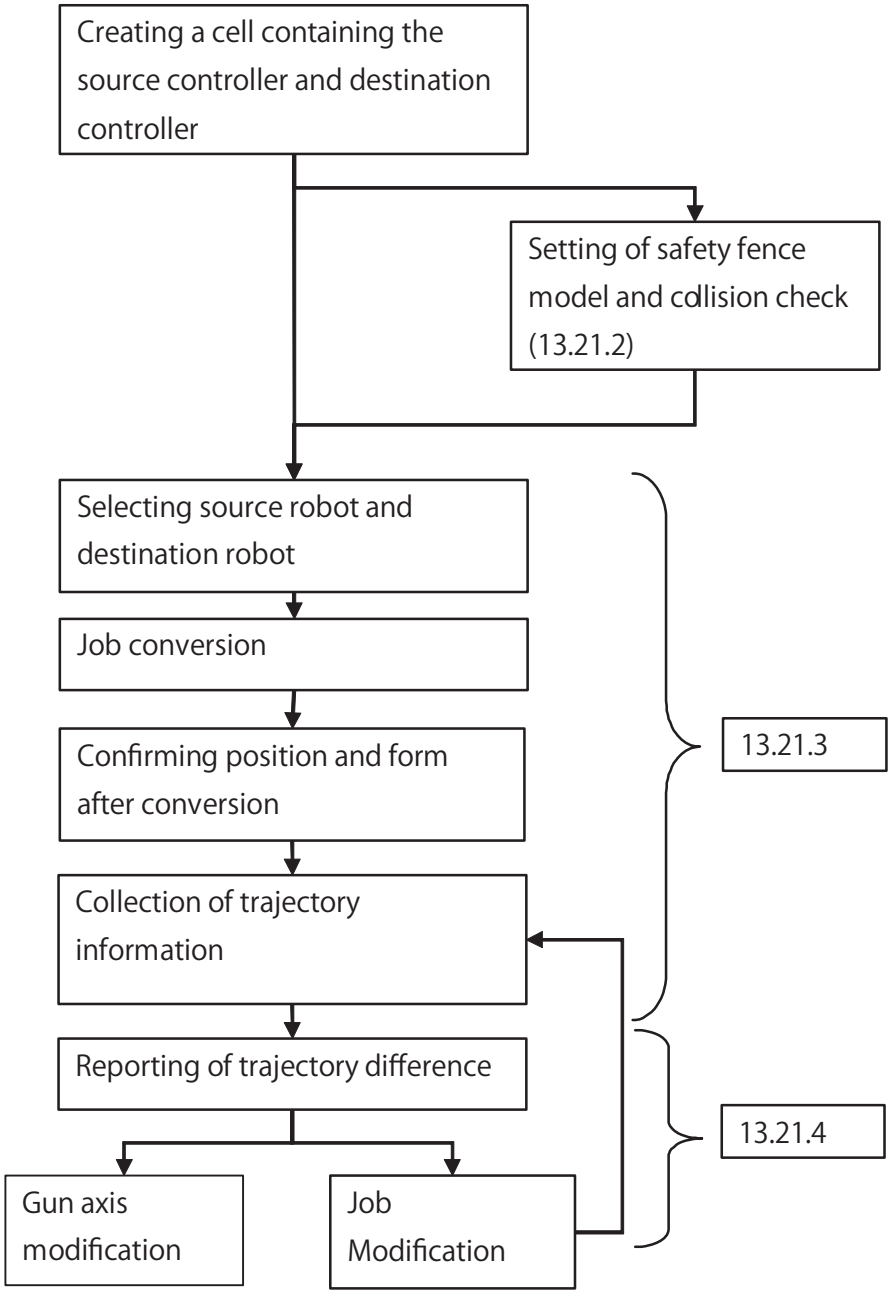
- Create a cell in which the source and destination controllers are registered.

■ NOTE

- When applying the created job on the actual controller, please check or modify the position by jog operation before playback.
- Only one axis robots are supported.
- This function supports R1, B1, S1 (gun axis) only. Positioner, multiple robot system and gun change system are not supported.
- It does not correspond to change of electric gun. Therefore, the motor gun position data are not changed.
- If there is a CALL or JUMP instruction, the called job is excluded from conversion.
- The tool number of the destination job reflects the tool number of the source job. However, only R1 is supported.

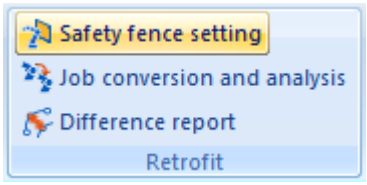
13.22.1 Overview Flowchart

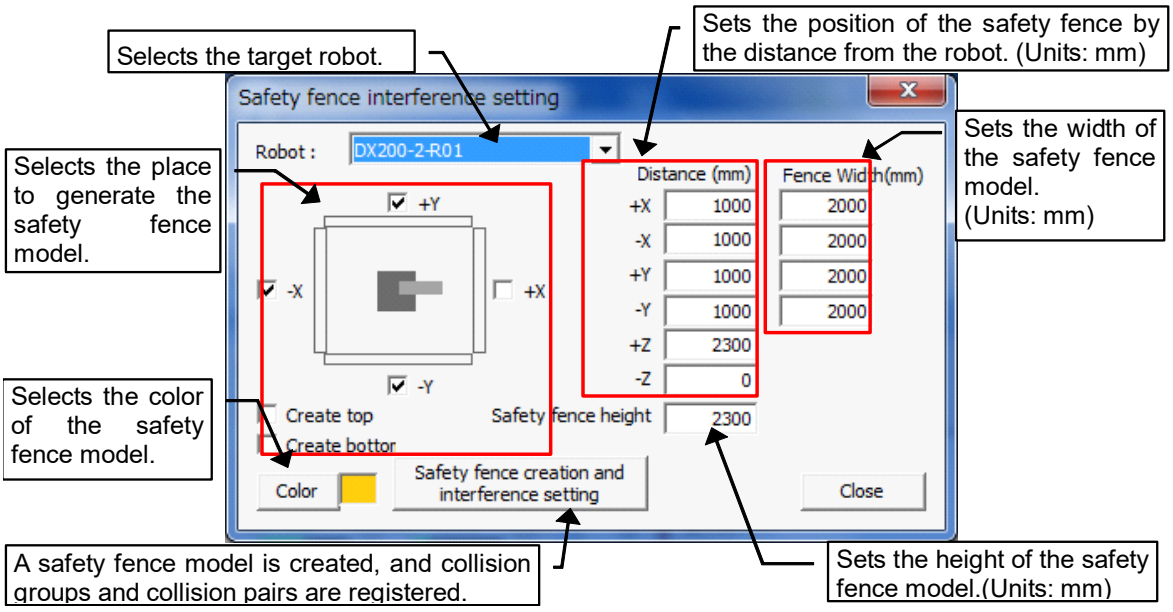
Follow the flowchart below to use retrofit function.



13.22.2 Setting of Safety Fence Model and Collision Check

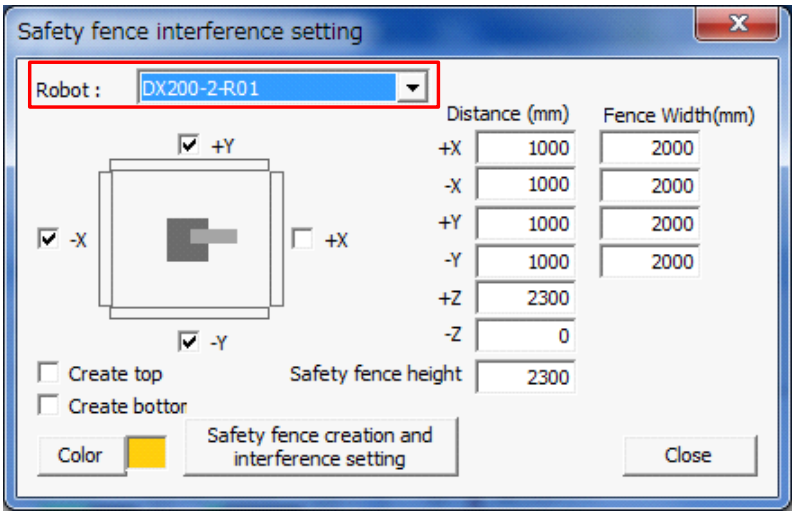
As a result of job conversion, the robot and the surrounding fence may interfere.
With the retrofit function, a model of the safety fence around the robot can be created easily, and the interference with the safety fence can be checked at the time of collection of trajectory information.
On the [Tool] tab, in the [Retrofit] group, click the [Safety fence setting] button, the [Safety fence interference setting] dialog appears.



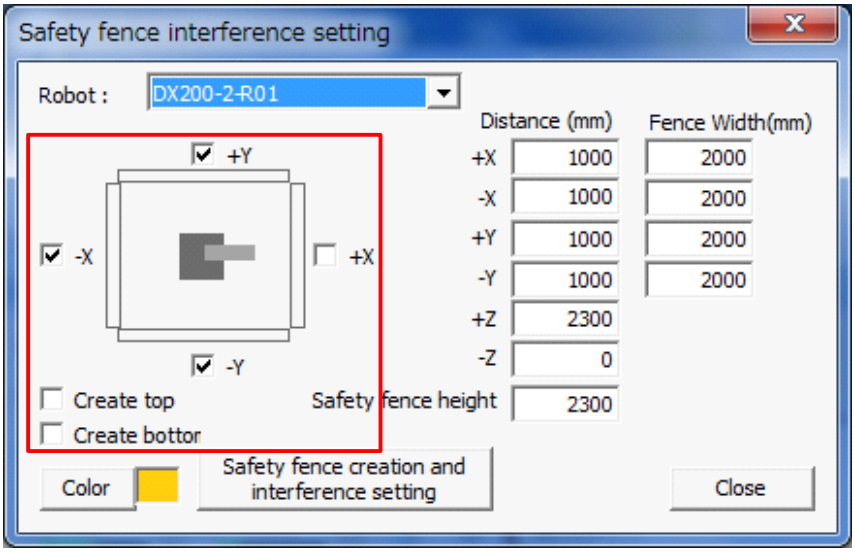


Procedure

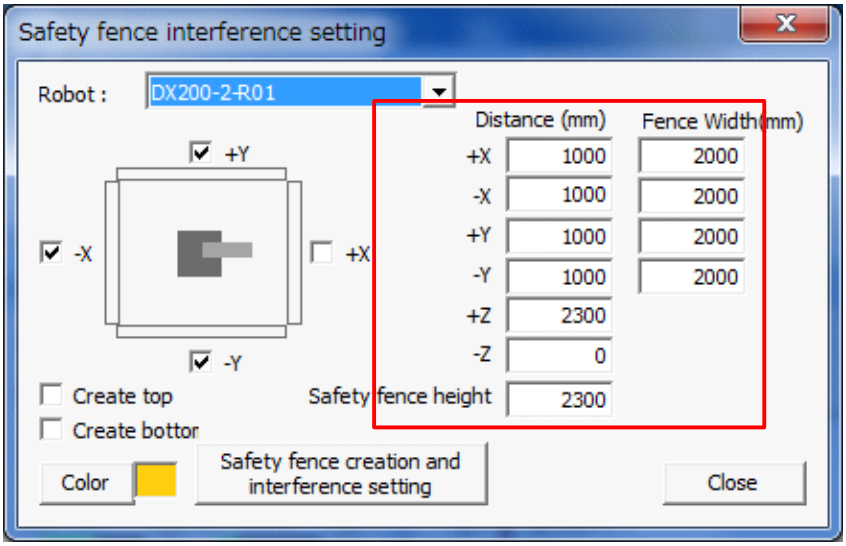
1. Selects the robot to place the safety fence. Select the robot specified as the conversion destination.



2. Selects the direction to place the safety fence around the robot. A safety fence is created in the checked direction.

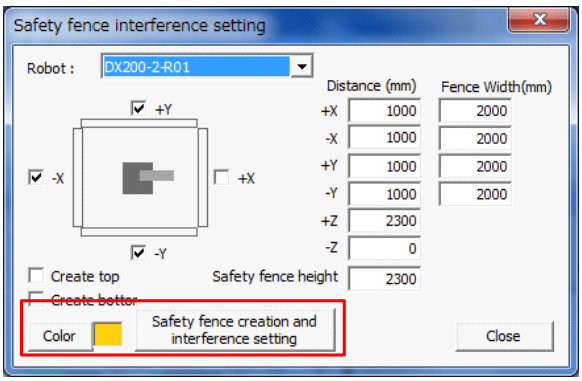


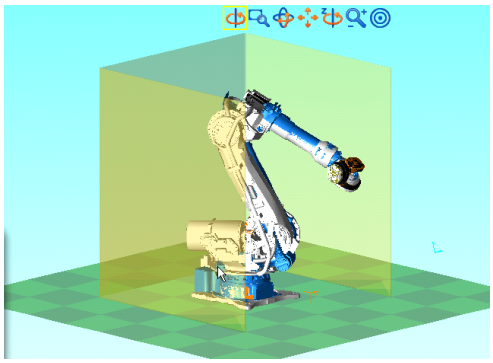
3. Sets the location where the safety fence is to be placed, and the width and the height of the safety fence. Sets the distance from the robot position.



4. Selects the color of the model of the safety fence and clicks the "Safety fence creation and interference setting" button. The following models, collision groups, collision pairs are created.

   Safety fence model : SafetyFence
   Collision group : SafetyFenceGroup
   Collision pair :SafetyFencePair

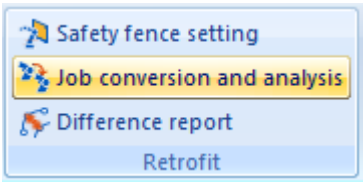




The collision with the placed safety fence can be checked on the "Job Conversion and Analyze" dialog or the "Trajectory difference report" dialog. Please refer to " 13.22.3 Job Conversion and Analysis " and " 13.22.4 Trajectory Difference Report ".

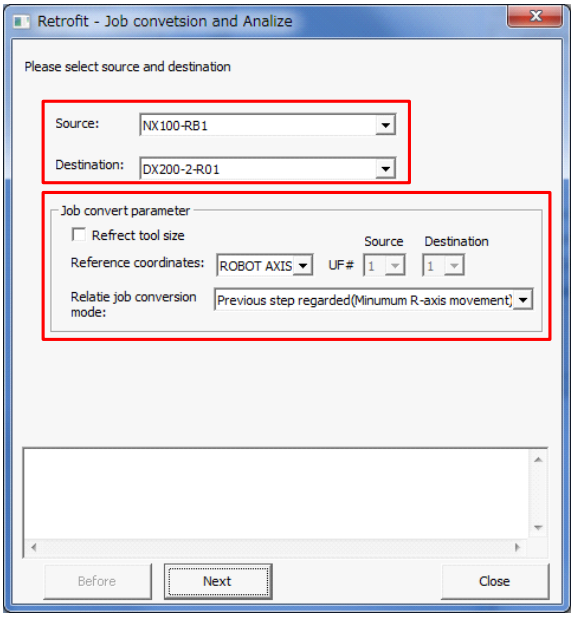
13.22.3 Job Conversion and Analysis

Jobs are converted from the source controller to the destination controller.
On the [Tool] tab, in the [Retrofit] group, click the [Job conversion and analysis] button, the [Job conversion and Analyze] dialog appears.



Procedure

1. Selects the source robot and the destination robot and sets the job conversion parameters.

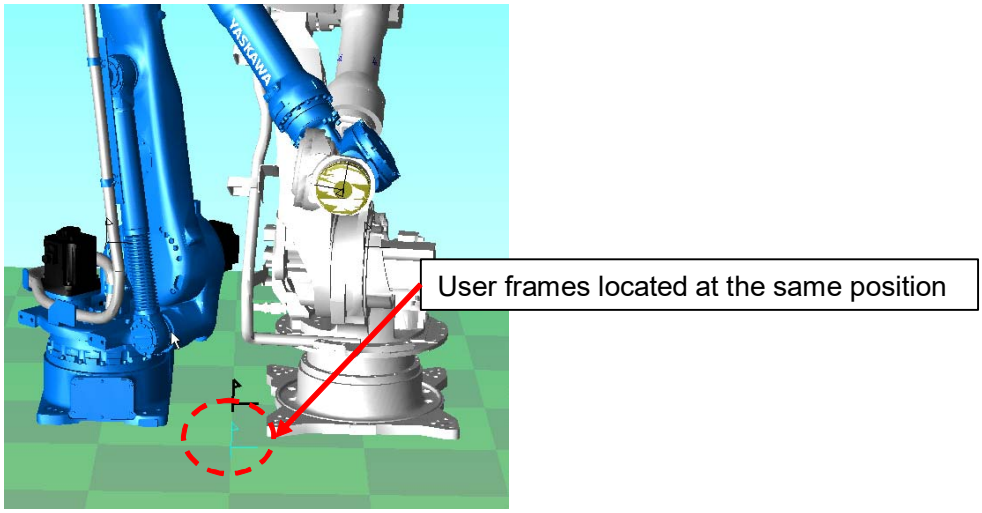


Robot selection screen

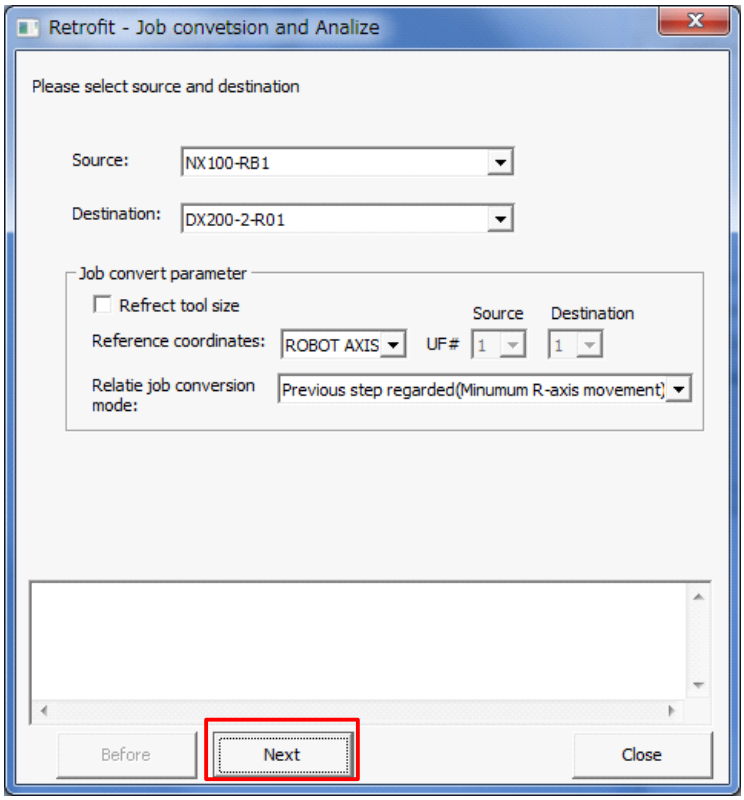
Source	Selects the conversion source robot.
Destination	Selects the conversion target robot.
Reflect tool size	When enabled, the tool data of the source robot is reflected in the destination robot.
Reference coordinates	Selects the reference coordinates for job conversion from the following three coordinate systems. Base coordinates, Robot coordinates, User coordinates For user coordinates, sets the user frame number to be referenced at the conversion source and conversion destination.
Relative job conversion mode	When converting a job, the conversion source jobs are converted to a relative job, they are loaded to the conversion destination robot, and they are converted to a standard job. Selects the conversion operation mode. Previous Step Regarded: Effective for a job of which the B-axis does not pass the point 0 degree. (i.e., in the case of an operation performed with the B-axis pointed downward.) Type Regarded: Effective when there is little difference in external shape of the robot. Previous Step Regarded (Minimum R-axis movement): Effective for a job of which the B-axis passes the point 0 degree.
Next	Transits to the job conversion screen.

When "Reflect tool size" is checked, tool data of the conversion source robot is transferred to the conversion target robot. When the robot layout is different or when the

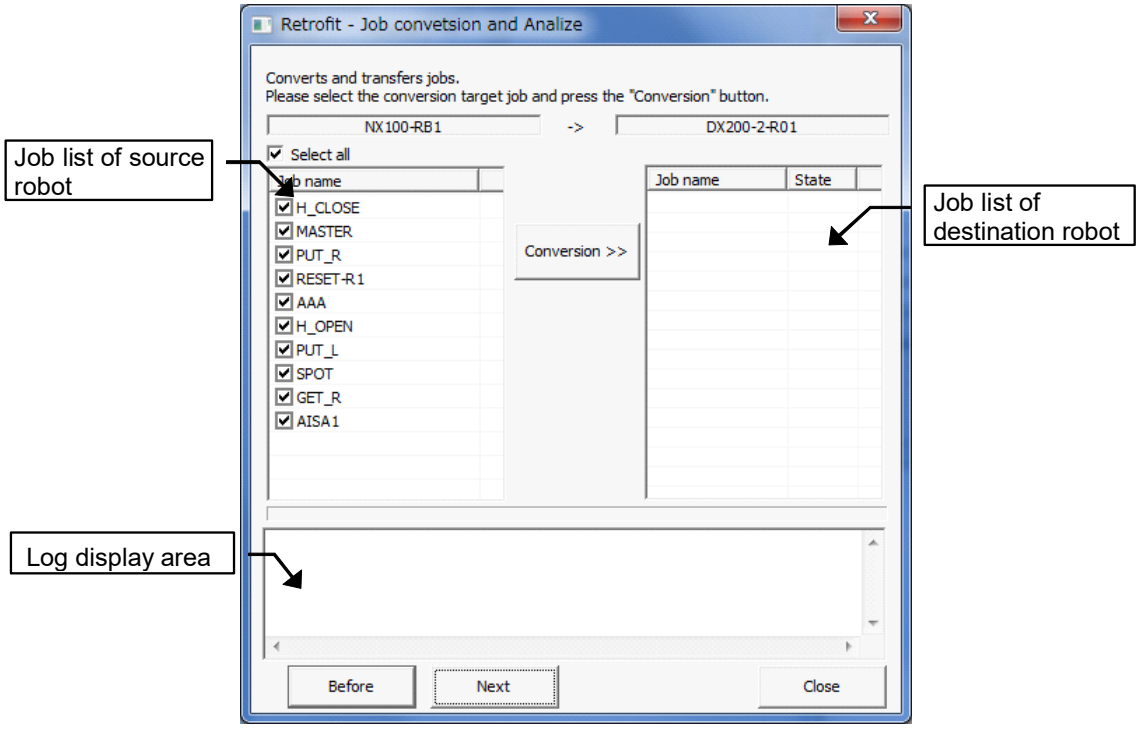
robot coordinates are different in position (the offset value of the robot model is different), please convert the job based on the user frame. For the offset value of the robot model, please refer to " 15.9 List of Manipulator Models and Offset Values Supported by MotoSim EG-VRC ". Please set the user frame to the same position on two robots.



After setting, clicks the [Next] button.



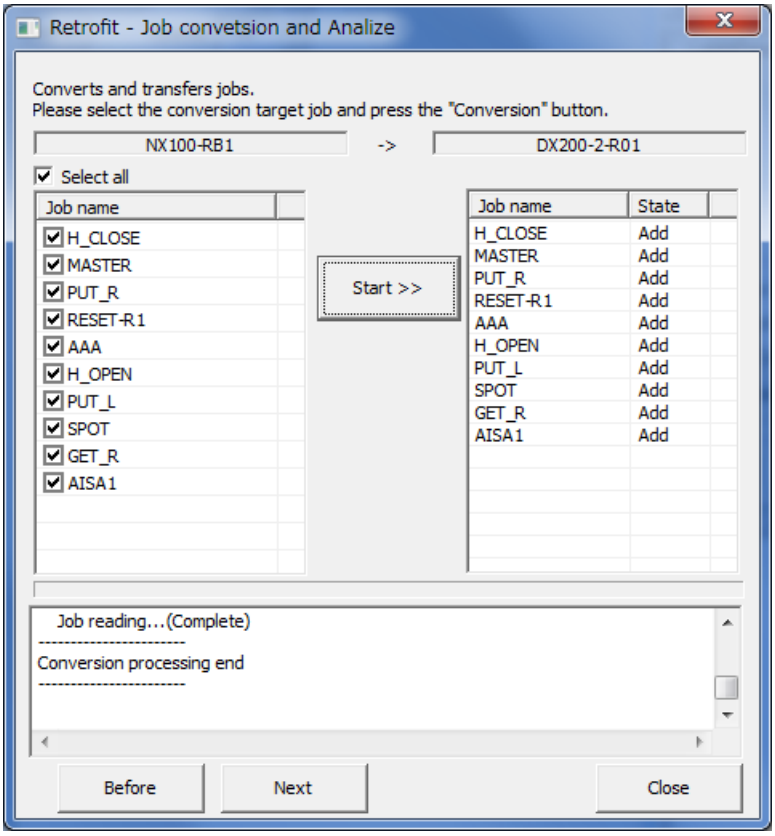
2. Selects the jobs to convert and presses the [Conversion >>] button to convert the jobs.



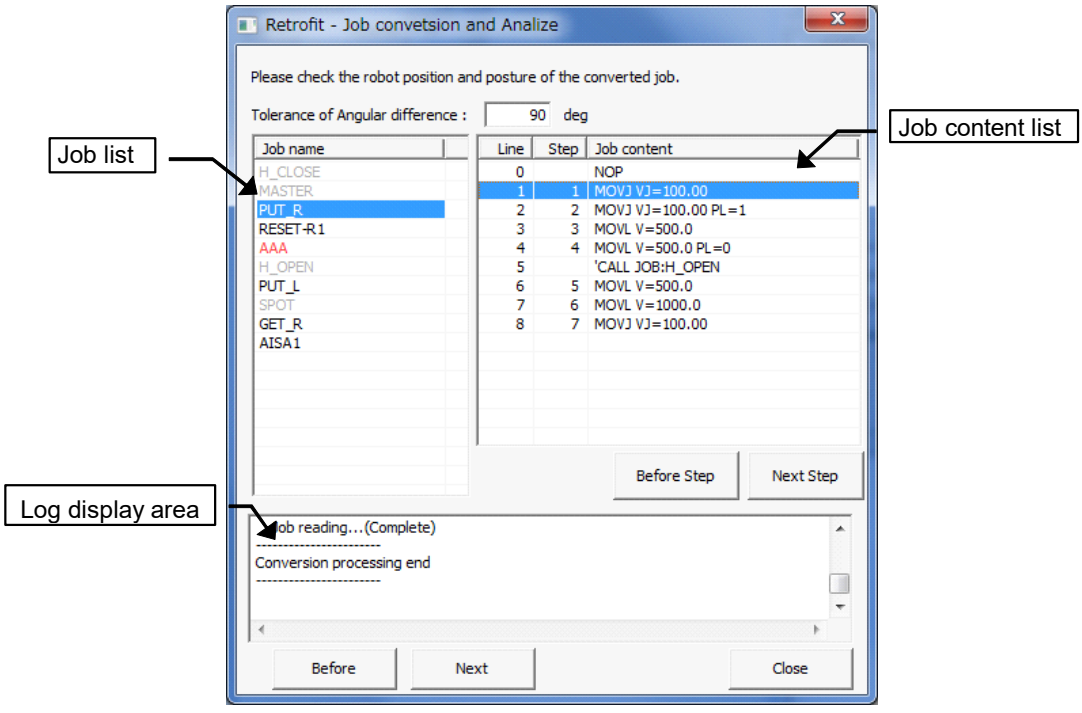
Job conversion screen

Select All	Selects all jobs of the conversion source robot.
Job list of source robot	Displays the list of jobs of the conversion source robot.
Job list of destination robot	Displays the list of jobs of the conversion destination robot.
Conversion >>	Converts jobs checked in the job list of the source robot to the destination robot. The selected jobs are converted to a relative job, they are loaded to the conversion destination robot, and they are converted to a standard job.
Before	Transits to the robot selection screen.
Next	Transits to the position / configuration confirmation screen.

After completion, clicks the [Next] button.



3. A list of jobs selected on the job conversion screen is displayed. Please check the robot position and configuration at each step.



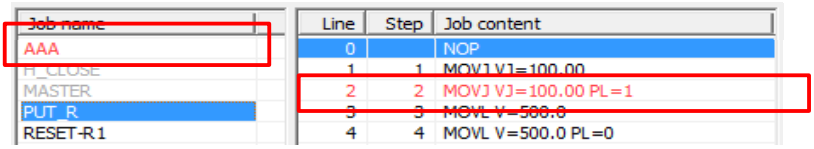
Position / configuration confirmation screen

Tolerance of angular difference	Sets the allowable reference value for detecting the abnormal transition of the angle between steps.

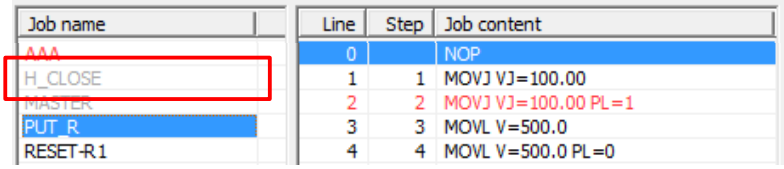
Position / configuration confirmation screen

Job list	Displays the list of jobs to be converted.
Job content list	Displays the content of the job registered in the conversion destination robot. When selecting a step row, the robot moves to the corresponding step position.
Before Step Next Step	Searches forward or backward steps from the current selection line and move the cursor to that step. The robot moves to the corresponding step position.
Before	Transits to the job conversion screen.
Next	Transits to the trajectory information collection screen.

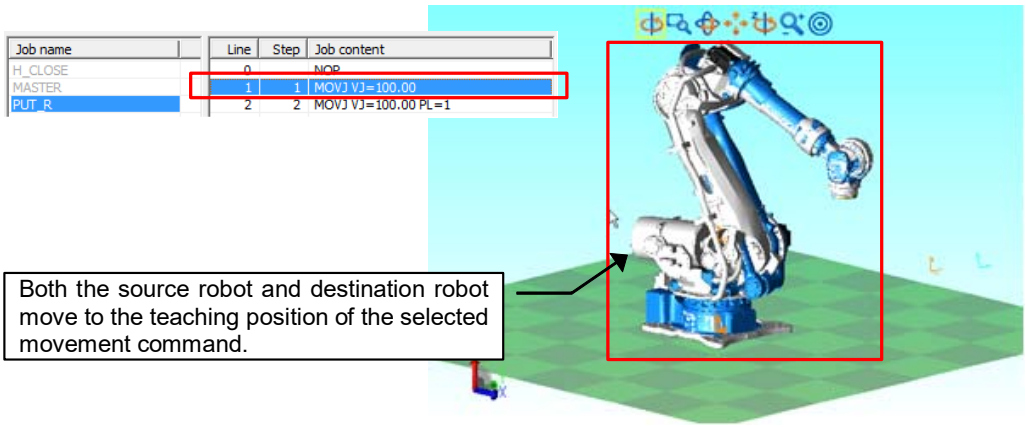
- When the angular difference between steps exceeds the angle specified in " Tolerance of angular difference" as a result of job conversion, the job name and the relevant part are displayed in red as follows.



- The name of the job that does not contain the move instruction is grayed out.

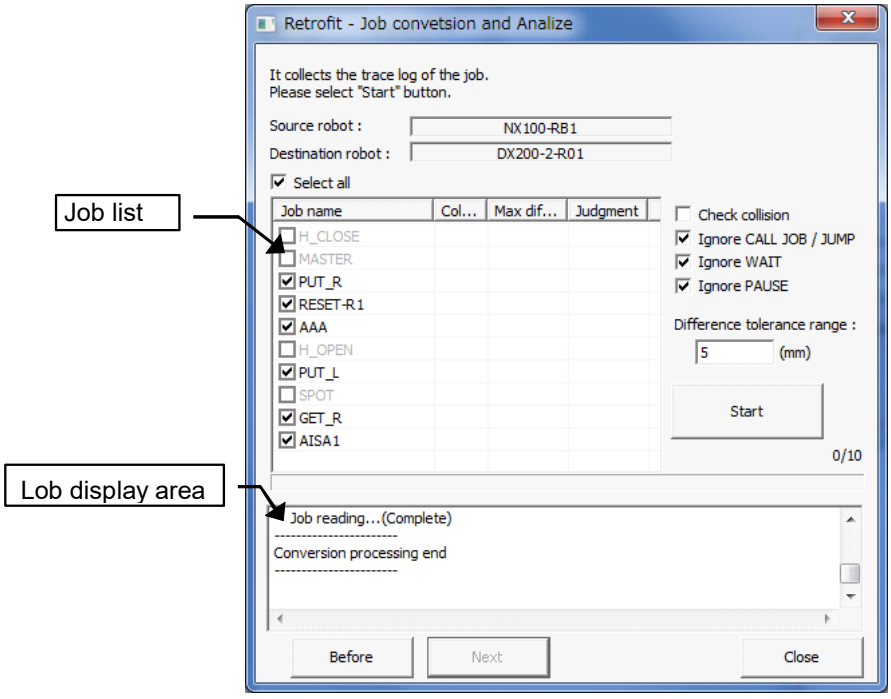


- When selecting a step row, the robot moves to the corresponding step position.



If there is no problem, clicks the [next] button.

4. Analyzes the trajectory of the job. Selects the job from the job displayed in the job list and clicks [Start] button. Playback of the selected job and collection of trajectory information are started.

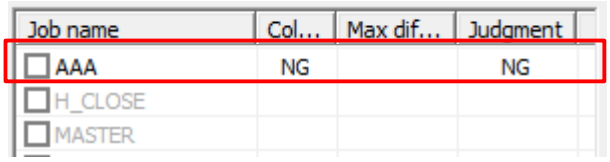


Trajectory information collection screen.

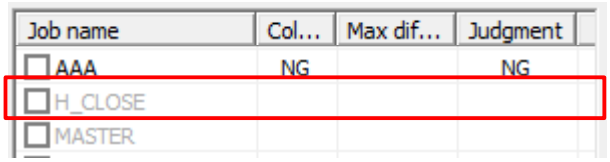
Job list	Displays the list of jobs to be converted.
Check collision	When enabled, at the start of verification, the collision detection dialog is displayed and the collision check function with "Safety Fence Pair" is activate. When collision with "Safety Fence" model occurs during trajectory verification, it will be recorded in the log. In the trajectory verification, collision check for models other than "Safety Fence" can also be performed. However, check OFF the "Playback stop by collision detection" in the collision definition dialog.
Ignore CALL JOB/ UMP	When enabled, the CALL instruction and JUMP instruction described in the job are ignored.
Ignore WAIT	When enabled, the WAIT instruction described in the job is ignored.
Ignore PAUSE	When enabled, the PAUSE instruction described in the job is ignored.
Difference tolerance range	Sets the allowable range value. This value is used for the distance difference tolerance range check that is performed after the log collection of the job is completed.
Start	Starts collecting trajectory information for the jobs checked from the job list.
Before	Transits to the position / configuration confirmation screen.

NOTE When the job contains a CALL, JUMP, WAIT, or PAUSE instruction, it cannot be analyzed correctly. Normally set each "*** Ignore" checkbox to be enabled and start verification.

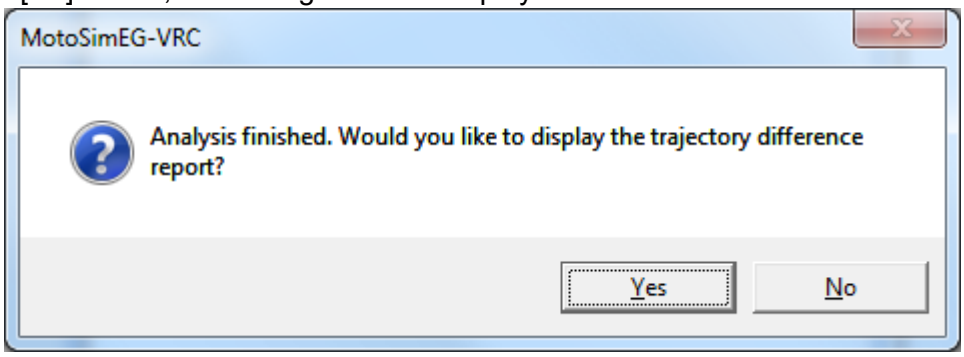
- When clicks [Start] button with [Check collision] enabled, trajectory analysis is performed while checking collision. When collision occurs, "NG" is displayed in the Collision column of the job list.



- The name of the job that does not contain the move instruction is grayed out. That cannot be checked.

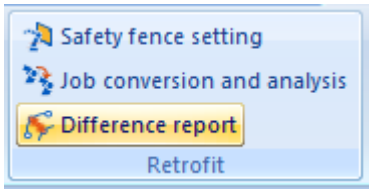


When the trajectory analysis is completed, the following dialog is displayed. When clicks the [Yes] button, the trajectory difference report dialog is displayed. When clicks the [No] button, that dialog is not be displayed.



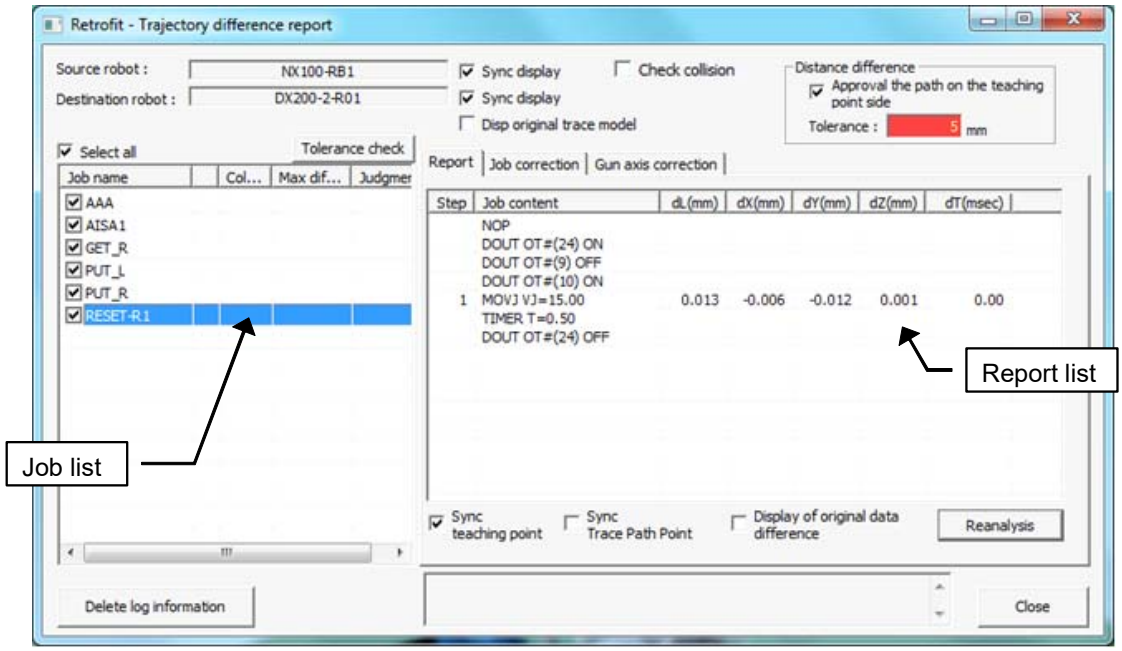
13.22.4 Trajectory Difference Report

The trajectory difference report dialog displays the results analyzed on the job conversion and analysis dialog. In addition, Jobs of the destination robot can be modified. On the [Tools] tab, in the [Retrofit] group, click the [Difference report] button, the [Trajectory difference report] dialog appears.



Procedure

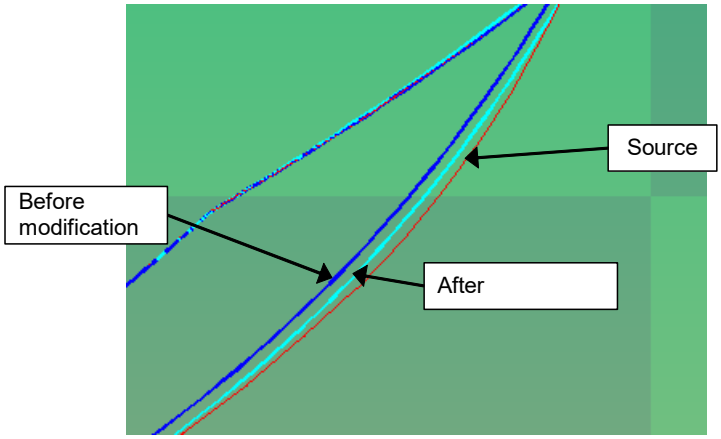
1. Selects a job from the job list and display the difference information. On the Report tab, the contents of the selected job are listed.
2. On the Report tab, the contents of the selected job are listed. For each step, the difference in distance between the transit point of the source robot and the transit point of the destination robot is displayed.



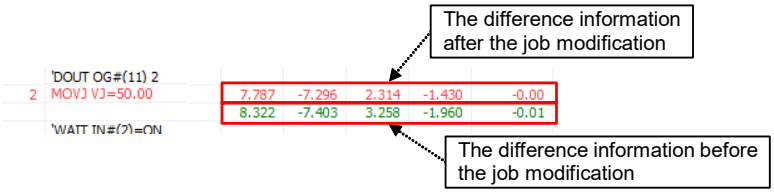
Trajectory difference report dialog - Report tab

Sync display	When enabled, when the step line of the job is selected, the position of the robot is displayed synchronously.
Check collision	When enabled, at the start of reanalysis, the collision detection dialog is displayed and the collision check function with "Safety Fence Pair" is activate. When collision with "Safety Fence" model occurs during reanalysis, it will be recorded in the log and collision occurrence step lines in the report list are displayed in yellow. In the trajectory verification, collision check for models other than "Safety Fence" can also be performed. However, check OFF the "Playback stop by collision detection" in the collision definition dialog.
Difference tolerance range	Sets the effective range of the distance tolerance between the transit point of the source robot and the transit point of the destination robot. For steps with a distance difference outside this range, the letters on the report screen are displayed in red. However, even if the distance difference is outside the range, it will not be out of range when it is close to the route point.

Trajectory difference report dialog - Report tab

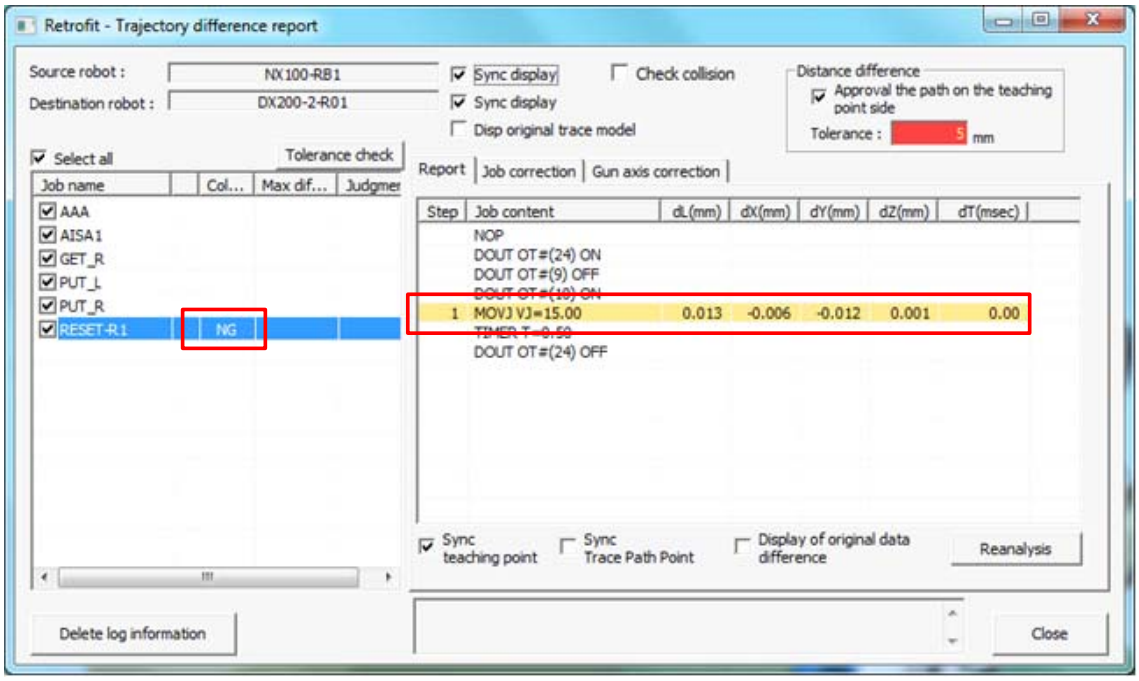
Disp original trace model	The trajectory information collected at the time of trajectory analysis is displayed superimposed on the trace line of the modified trajectory. 
Job list	Displays a list of jobs with trajectory information.
Tolerance check	Checks whether the distance difference is within the effective range from the trajectory information of the job displayed in the job list and displays the result on the job list in the list.
Report list	The contents of the job selected in the job list are displayed. For step rows, the following difference information on each distance is displayed. dL : Distance difference of point + value: The path point of the destination robot is farther from the teaching point than the source robot - value : The path point of the destination robot is closer to the teaching point than the source robot dX : X coordinate difference of point dY : Y coordinate difference of point dZ : Z coordinate difference of point dT : Arrival time difference If dT is a negative value, it means that it has arrived earlier. The step row whose dL value exceeds the "Difference tolerance range" is displayed in red.
Sync teaching point	When enabled, the robot moves to the position of the teaching point of the step selected in the report list.
Sync trace path point	When enabled, the robot moves to the position of the route point of the step selected in the report list.

Trajectory difference report dialog - Report tab

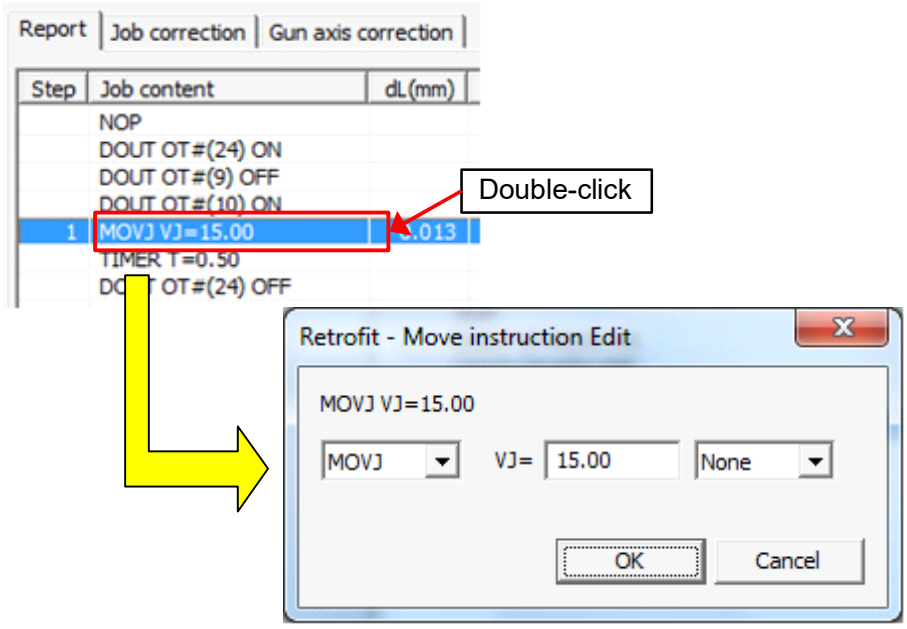
Display of original data difference	When enabled, the distance difference information of the trajectory information before modification is displayed. As shown below, the difference information before the job modification and the difference information after the job modification are displayed for each step. 
Reanalysis	For the job for which the difference report is displayed, start play-back again and collect the trajectory information.
Delete log information	Deletes the trajectory information of the jobs checked in the job list. That jobs are also deleted from the job list.
Approval the path on the teaching point side	When the trajectory is closer to the teaching point than the route point of the source robot, it is not target to correction. When checking OFF, all teach points are corrected so that they fall within the effective range of the route difference.

- When clicks [Reanalysis] button with [Check collision] enabled, trajectory analysis is performed again while checking collision. When collision with "Safety Fence" model occurs, "NG" is displayed in the Collision column of the job list and collision occurrence step lines in the report list are displayed in yellow.

NOTE When clicks [Reanalysis] button with [Check collision] enabled, please disable the "Play-back stop by collision detection" function on the Collision Definition Dialog.
For details, please refer to section " 8.11 Collision Detection ".

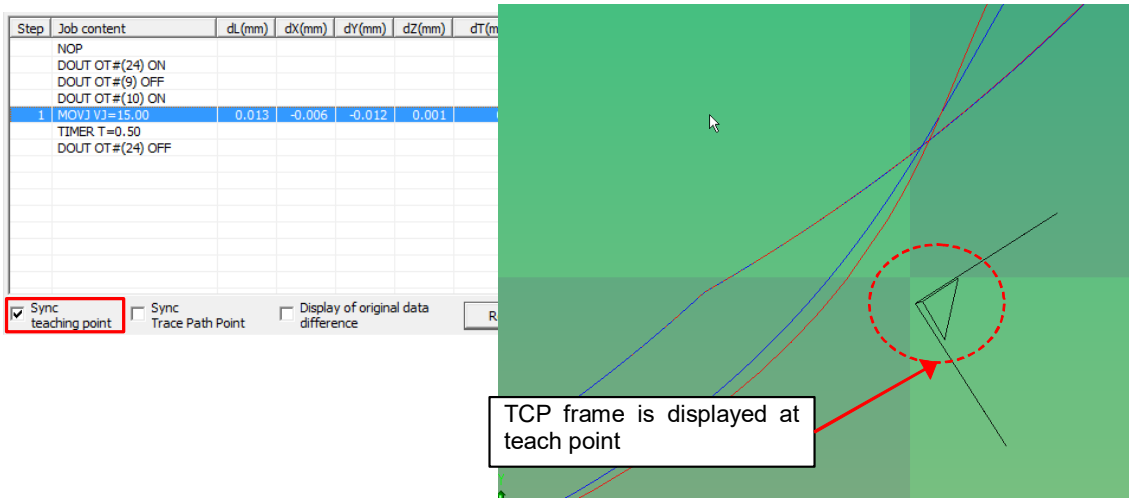


- The movement instruction, speed tag, and PL tag can be edited on the report list. Double-click the step to edit with the mouse. When clicks [Reanalysis] button after completion of editing, trajectory information is collected and verified with the contents of the edited job.

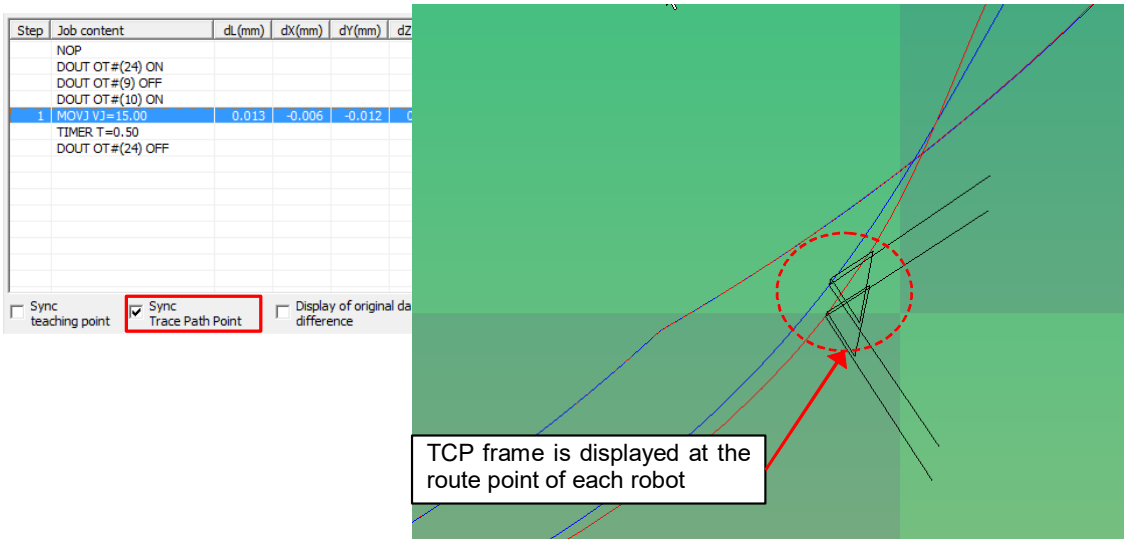


3. On the graphic screen, checks the difference state of the trajectory path point. When the step row of the report list is selected in a state whether either "Sync teaching point" or "Sync trace path point" is checked, the source robot and destination robot move to the target step position.

• When "Sync teaching point" is checked

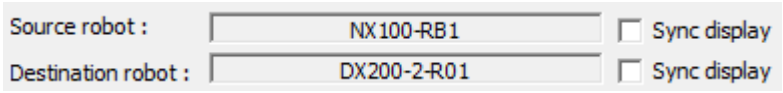


• When "Sync trace path point" is checked

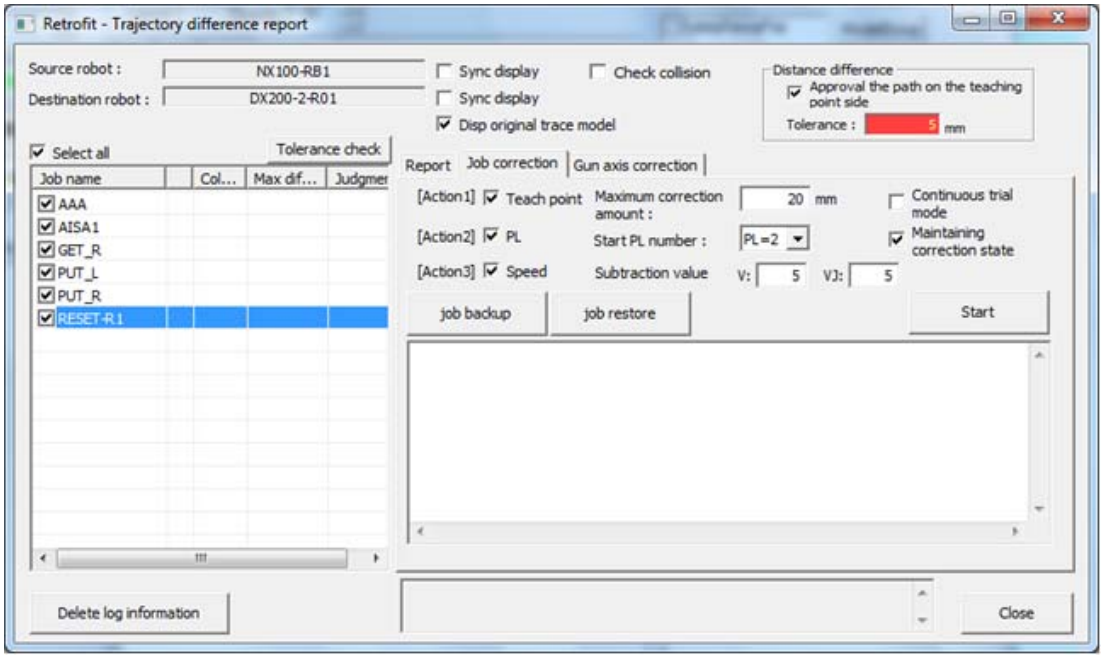


SUPPLE-MENT

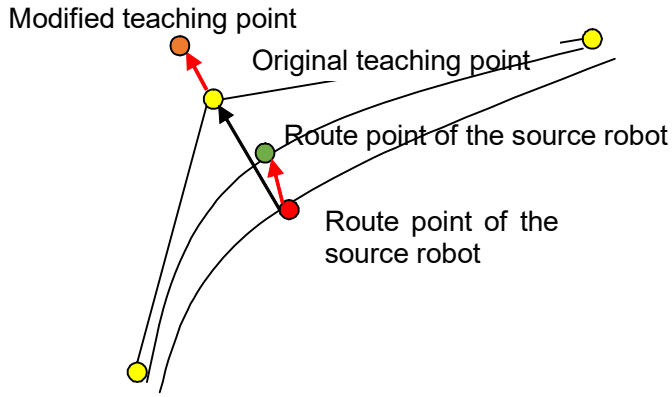
When uncheck the "Sync display" checkbox beside the source robot name and destination robot name, even if select a step line from the report list, the robots do not move to the position of the teaching point of the step selected in the report list.



4. Jobs with steps outside the effective range can be modified. Modify the job in the Job correction tab.



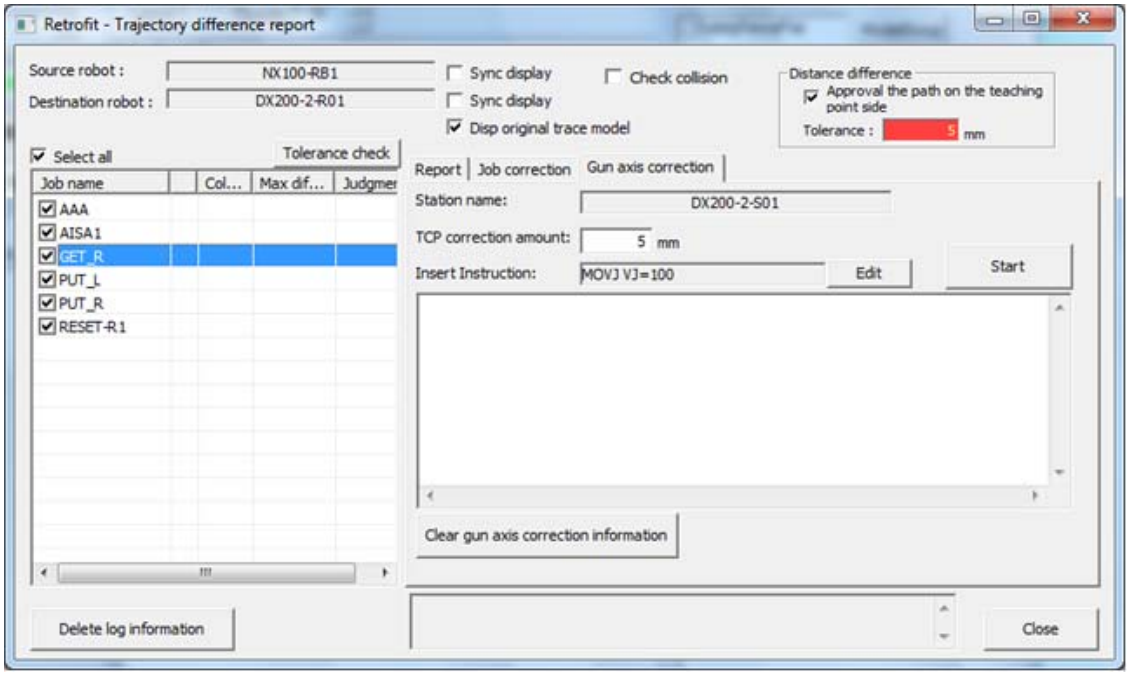
Trajectory difference report dialog - Job correction tab

Teaching point	Modifies the teaching points from the difference information between the route point of the source robot and the destination robot to reduce the difference of the route points as follows. Please set the maximum correction amount as necessary. This amount is the upper limit of correction amount.  Corrected distances are as follows. • When the distance difference is within the maximum correction amount, the teaching point is moved by the distance difference. • When the distance difference exceeds the maximum correction amount, the teaching point is moved by the maximum correction amount.
PL	Sets the PL (positioning level) tag for the movement instruction to reduce the difference of the path points. The PL number specified by the start PL number is set. For PL setting, PL=0?PL=8 can be specified.

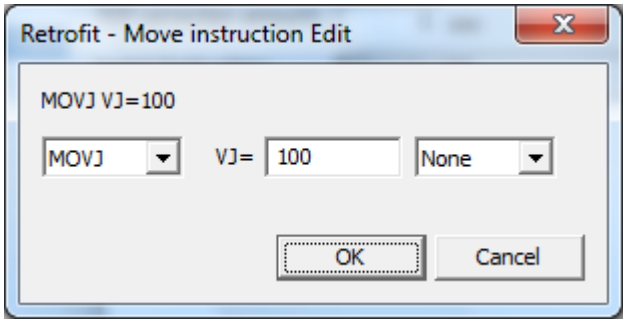
Trajectory difference report dialog - Job correction tab

Speed	Reduces the speed and reduce the difference of the route points. Subtract the value of V or VJ at each step by the amount of modification specified for subtraction value.
Continuous trial mode	When enabled, modification and trajectory verification are repeated until the following conditions are satisfied for the selected modification method. • Teaching point In all steps to be corrected, it is modified until the accumulated amount of the modified distance reaches the maximum correction amount. • PL In all steps to be corrected, it is modified until PL=0 is set. • Speed In all steps to be corrected, It is modified until it cannot be subtracted by the subtraction value. When multiple modification method is enabled, the next modification method is executed if it is judged that the above conditions are not satisfied by the currently method. Priority order of modification method is order of teach point, PL, speed. When disabled, according to the priority order of the modification method, one of the modification methods is executed once. When all of them are selected and the continuous trial mode is unchecked, only the teaching point modification is executed. When implement PL only, turn off the checkpoint of teaching point or turn ON only PL and turn continuous trip mode off. To modify the PL only, uncheck the teaching point or check only the PL and uncheck the continuous trial mode.
Maintaining correction state	This setting is effective only when continuous trial mode is enabled. When enabled, even if the modification method is switched, modification is executed based on the job at that time. When disabled, the job is returned to the initial state before switching the modification method, and then next modification is executed.
Job backup	Back up the jobs checked in the job list to an arbitrary folder.
Job restore	For jobs checked in the job list, returns to the job file saved in an arbitrary folder.
Start	For jobs checked in the job list, starts correction of the job.

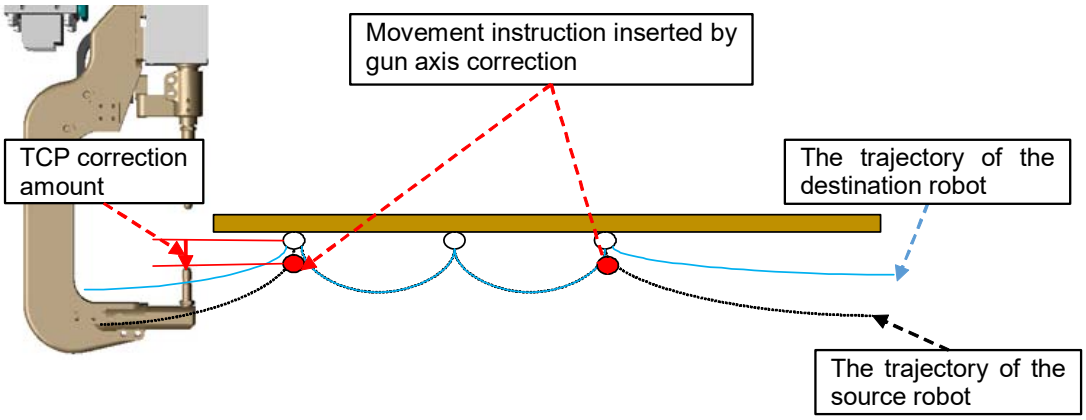
5. For robots for motor gun applications, gun axis modification can be executed. In the gun axis correction, a movement instruction for TCP modification is inserted before and after the SVSPOTMOV instruction, and the route point is modified so as to approach the trajectory of the source robot. Enters TCP correction amount and clicks [Start] button.



Trajectory difference report dialog - Gun axis correction tab

TCP correction amount	It is used to set the TCP position of the movement instruction inserted before and after the SVSPOTMOV instruction. A movement instruction is inserted at the position shifted from the position of the SVSPOTMOV instruction by the TCP correction amount in the -Z direction of the TOOL coordinate system.
Insert instruction	Sets the instruction to be inserted before and after the SVSPOTMOV instruction. The insert movement instruction can be changed from [Edit] button. 
Start	Starts the gun axis modification process.
Clear gun axis correction information	Deletes the line of the instruction added by gun axis correction.

The inserted movement instruction is the movement instruction displayed in the "Insert instruction". The teaching point of the movement instruction is the point shifted in the -Z direction of the TOOL coordinate system.



Before correction

```
51  MOVL V=300.0
52  SVSPOTMOV CLF#(1) GUN#(1) PRESS#(1) WTM=1 WST=1
53  MOVL V=400.0
```

After correction

```
59  MOVL V=300.0
60  MOVJ VJ=100.00  //RETROFIT:ADD(5.00 mm)
61  SVSPOTMOV CLF#(1) GUN#(1) PRESS#(1) WTM=1 WST=1
62  MOVJ VJ=100.00  //RETROFIT:ADD(5.00 mm)
63  MOVL V=400.0
```

Inserted movement instruction

When the SVSPOTMOV instruction is contiguous, no movement instruction is added between SVSPOTMOV instructions.

```
5   MOVJ VJ=100.00
6   MOVJ VJ=100.00  //RETROFIT:ADD(5.00 mm)
7   SVSPOTMOV V=200.0 CLF#(1) GUN#(1) PRESS#(201) WTM=201 WST=1
8   SVSPOTMOV V=200.0 CLF#(1) GUN#(1) PRESS#(202) WTM=202 WST=1
9   MOVJ VJ=100.00  //RETROFIT:ADD(5.00 mm)
10  MOVJ VJ=100.00
```

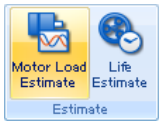
Inserted movement instruction

Because the movement instruction is additionally inserted, the number of steps does not match between the job before correction and the job after correction. Therefore, differential display and job correction cannot be executed for jobs with gun axis correction.To execute difference display or job correction again for jobs with gun axis correction, please delete the added movement instruction by clicking the [Clear gun axis correction information] button. Because gun axis correction information is deleted, please execute gun axis correction again after difference display and job correction.

13.23 Motor Load Estimate

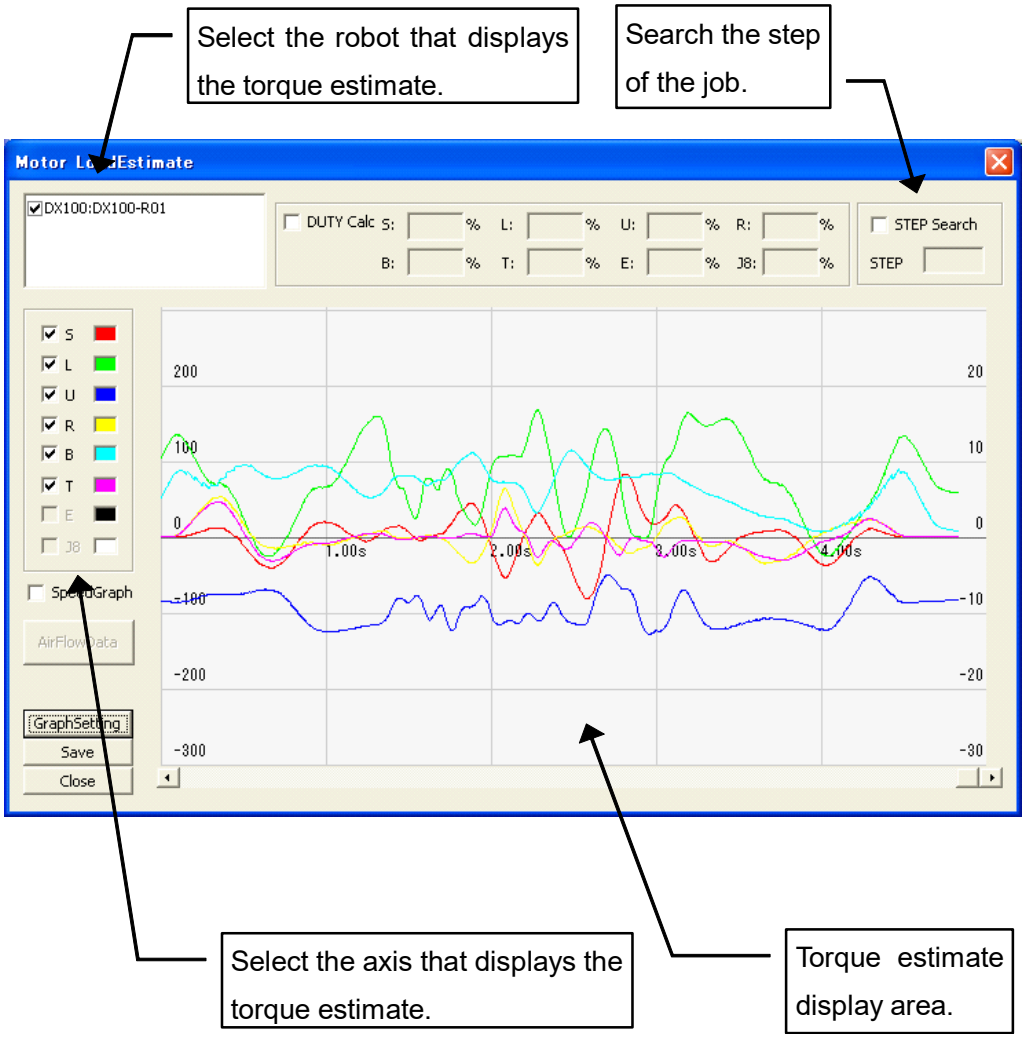
The estimate torque (the unit: The rated torque is displayed as 100%) and speed (the unit: rpm) of each axis are displayed after the playback of the robot in a wavy graph.
And, an arbitrary DUTY calculation in the section and the step of the job can be retrieved from the wavy graph.

On the [Tool] tab, in the [Estimate] group, click the [Motor Load Estimate] button, the [Motor Load Estimate] dialog appears.



NOTE

- YASKAWA does not warrant the result of this function. It should be used only as a guide. Because it is affected by Tool settings, Load condition of real robot, Lubricated condition of grease, and Temperature.
  Configure the following items of Tool setting collectly, Weight, Position of the center of gravity, and Inertia moment. Especially, when Weight item of Tool setting is set lower than real tool weight, this function makes wrong results.
- A wavy graph is an estimated torque when the job is executed. Therefore, the torque in the interruption (ex. the emergency stop) is not included.
- The graph display and DUTY calculation of this function can be used only with the robot axes. Travel axes and external axes cannot be used. Although it is possible to use it even in the job which added traveling axis and external axis to the robot, but robot axes are only displayed by the graph and DUTY calculation.
- This function cannot be used with two or more robot system other than a dual-arm robot.
- This function can be used only with the specified system version of controllers, and this function can be used only with target robots of Motor Load Estimate with that system version. Please refer to section "13.5 List of Function depending on the system version of controller".



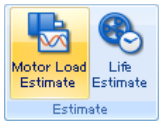
Motor Load Estimate

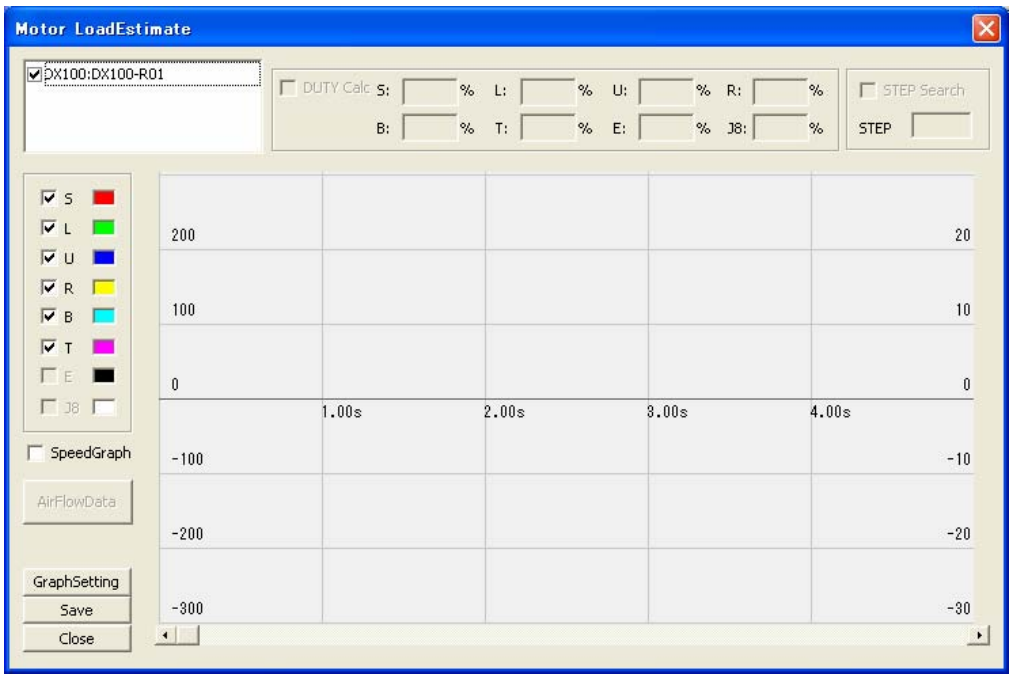
Item	Description
[SpeedGraph] check box	The speeds of each axis are displayed.
[GraphSetting] button	The display range (horizontal axis and spindle) in a wavy graph and the re-drawing intervals and the torque threshold are set.
[Save] button	The torque data every drawing time set with HartBeat is saved in text file (.TXT). Please refer to “7.5.4 Refresh Interval”.
[Close] button	The Torque Estimate display is closed.

The vertical scale of left-side is torque, and right-side is speed.

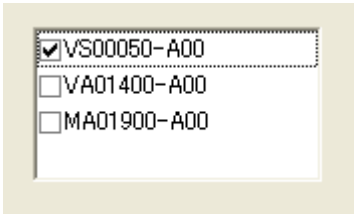
Procedure

1. On the [Tool] tab, in the [Estimate] group, click the [Motor Load Estimate] button, the [Motor Load Estimate] dialog appears.

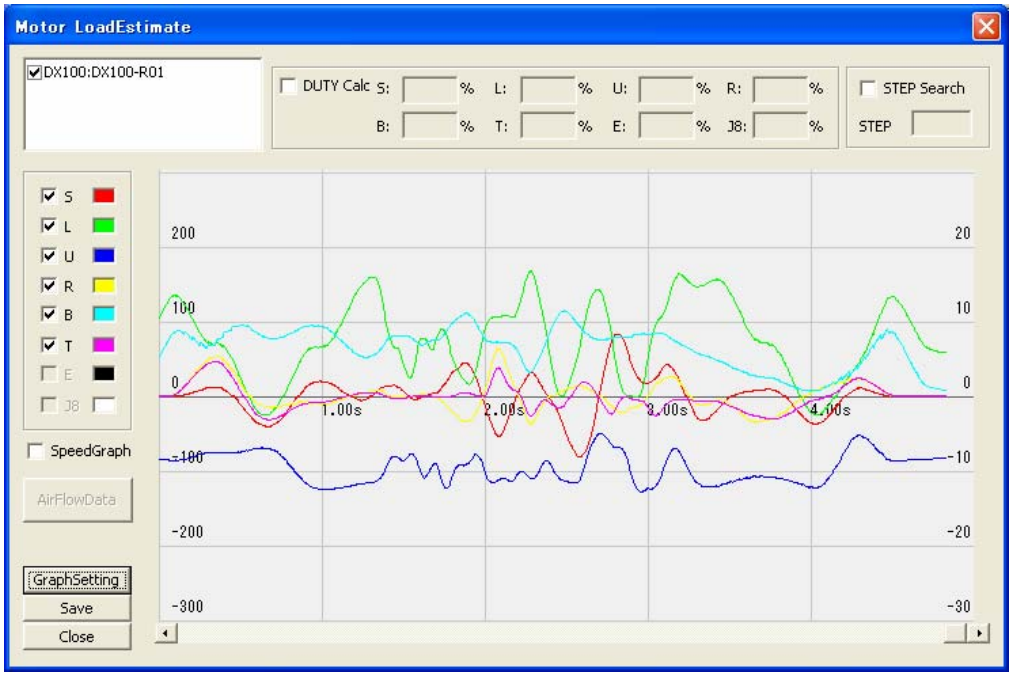




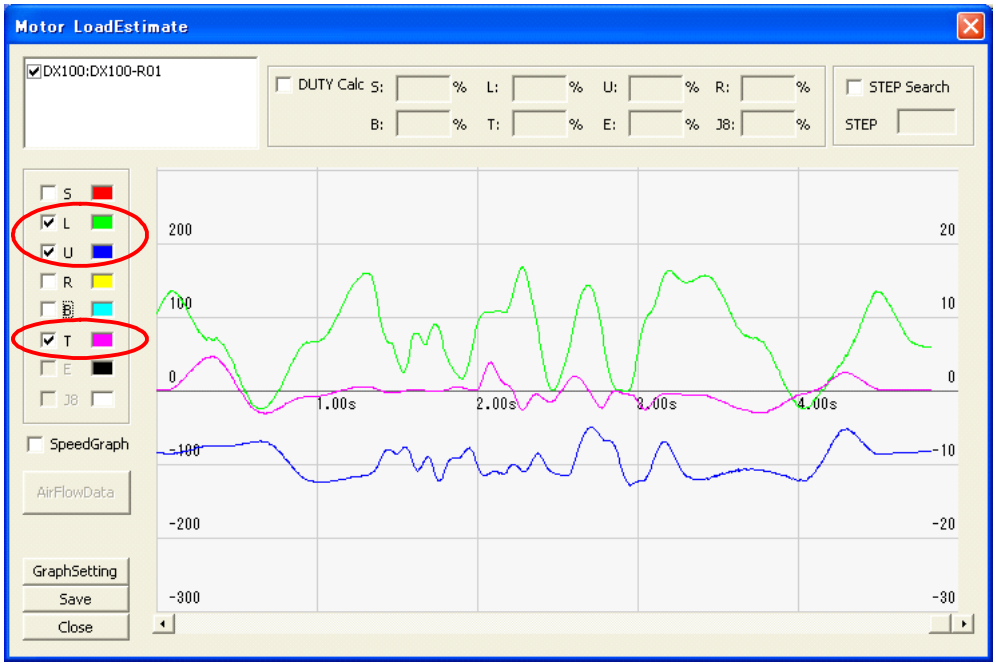
2. Select the robot that displays the torque estimate.



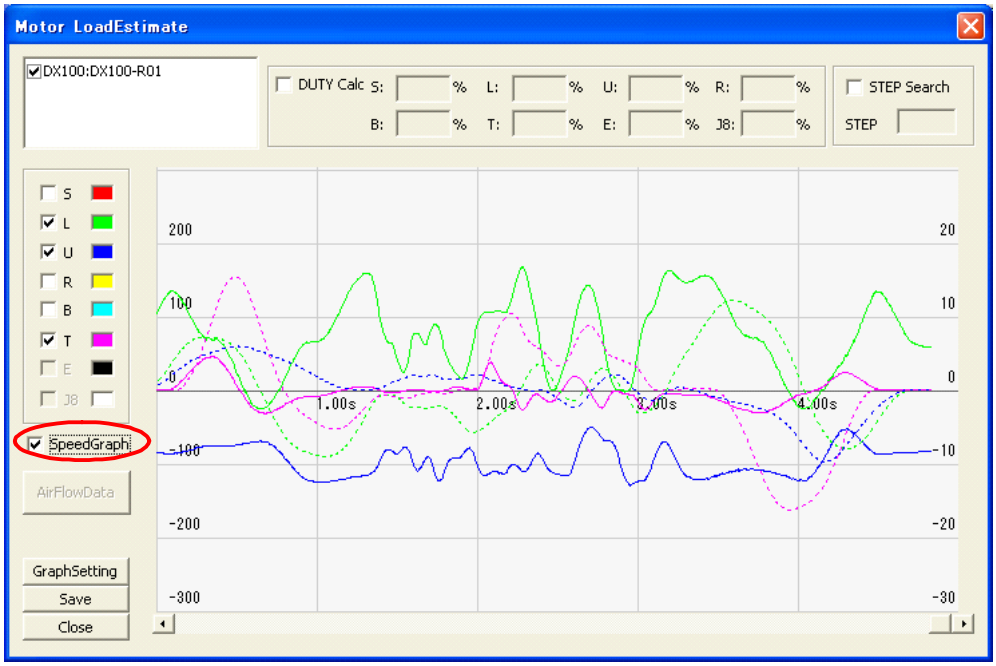
3. The job is executed, and the torque estimate of the selected robot is displayed.



4. Select the axis that displays the torque estimate in the check box of the axis. (The axis can be selected even before the job is executed.)



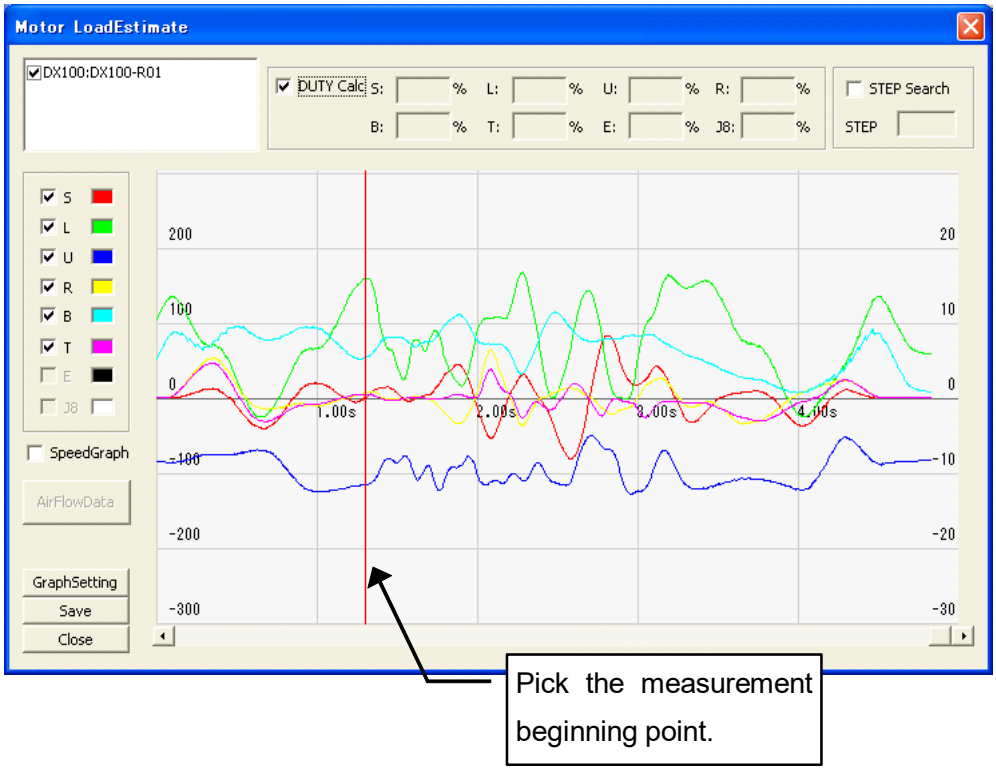
5. Check the [SpeedGraph] box, the graphs of each axis speed are displayed with a dotted line.



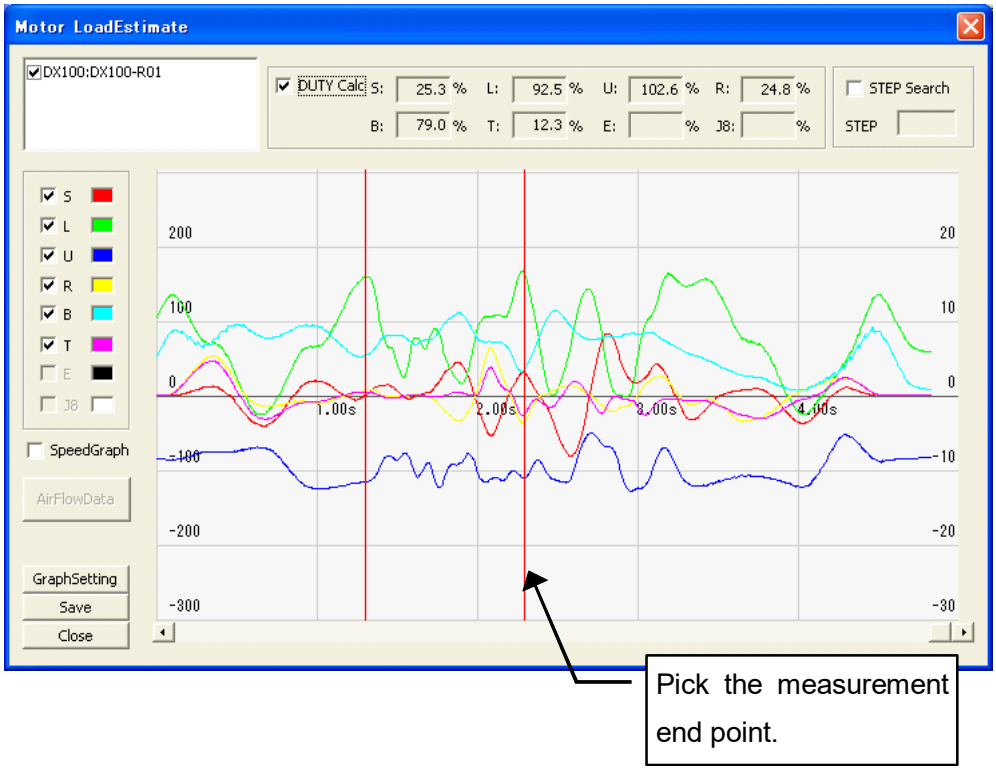
■ Duty calculation

1. Check the [DUTY Calc] check box.

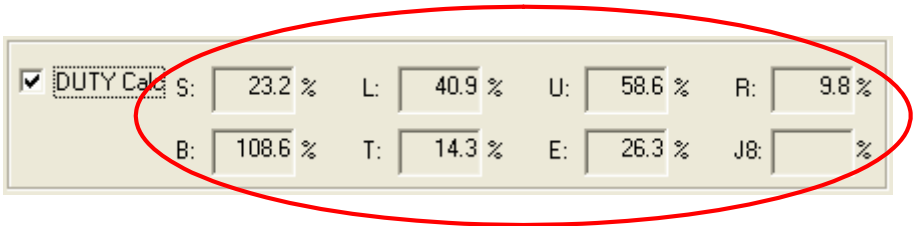
2. Pick the measurement beginning point.



3. Pick the measurement end point.

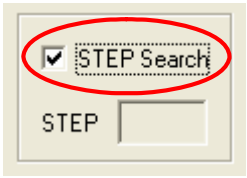


4. The measurement result is displayed.

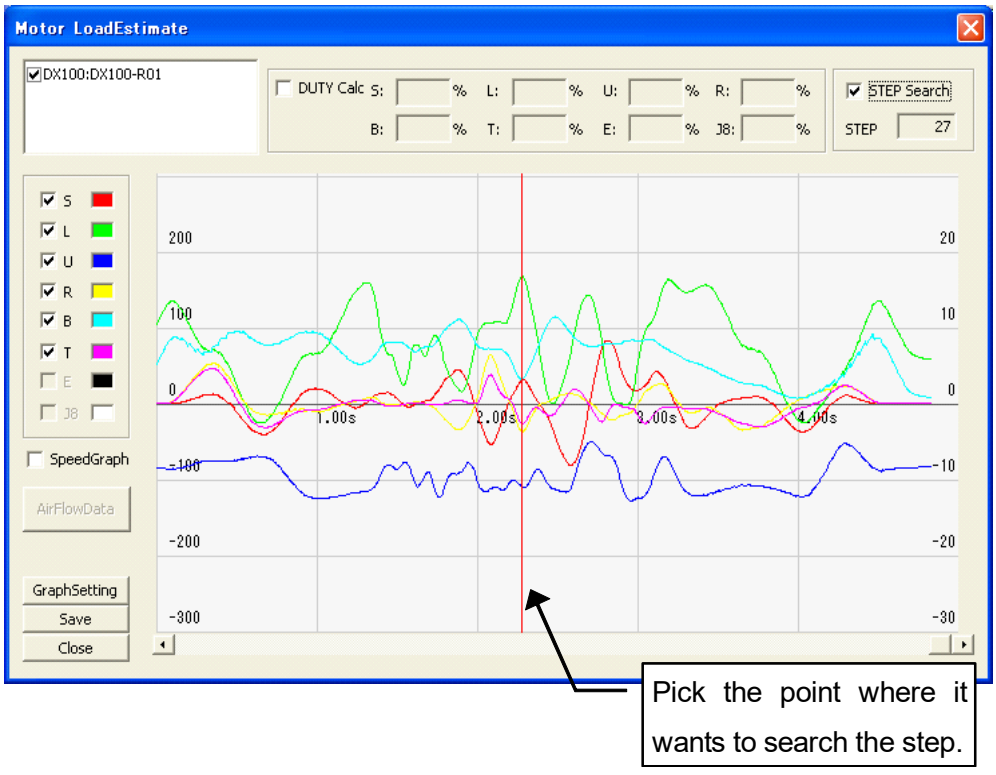


■ Step Search

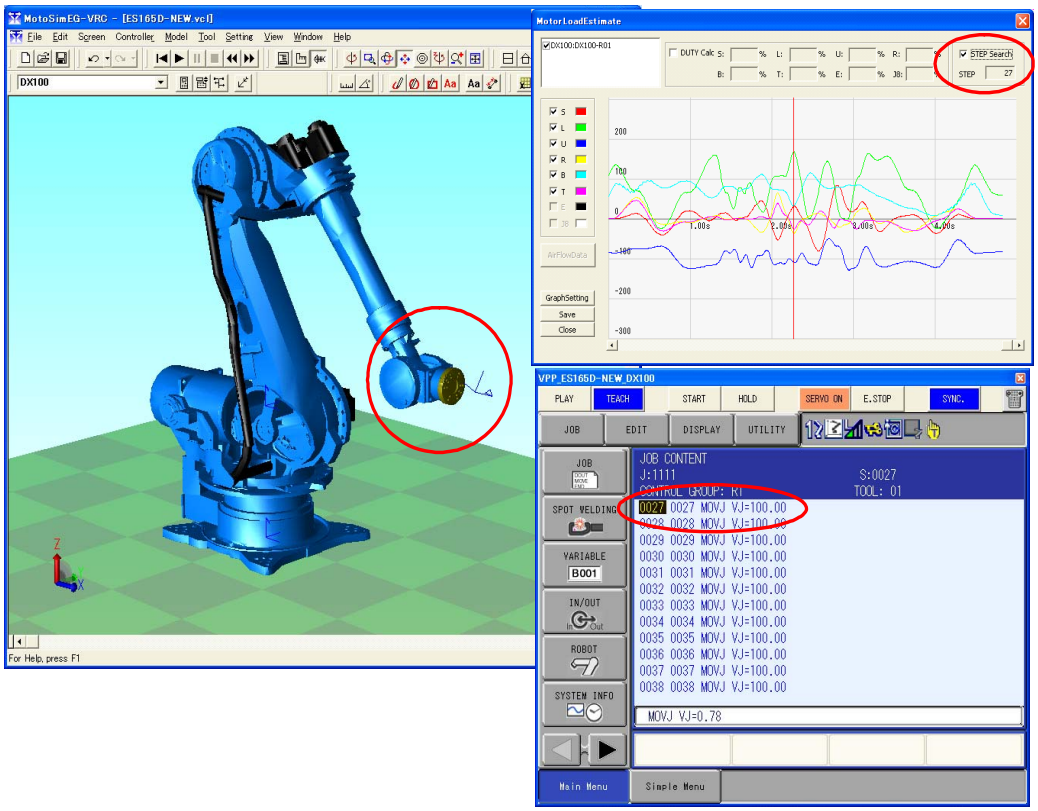
1. Check the [STEP Search] box.



2. Pick the point where it wants to search the step.



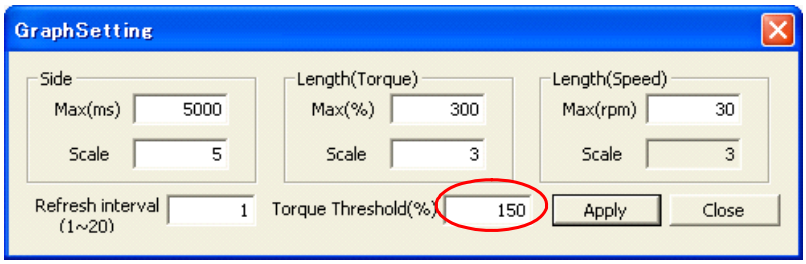
3. The step number is displayed, and robot moves to the searched position.



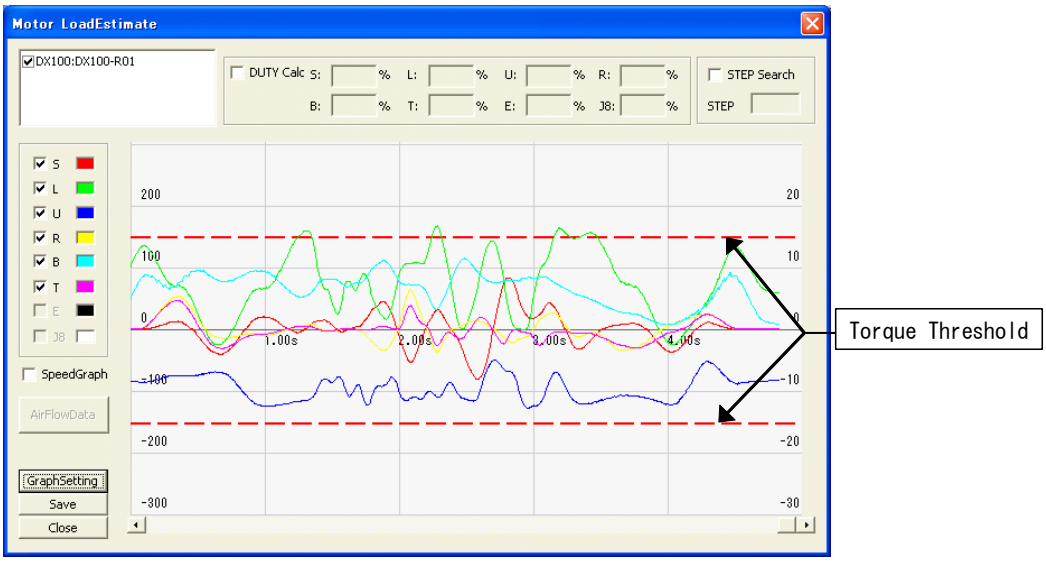
■ Torque Threshold Setting

To set the torque threshold, the threshold is displayed on the graph. It can be checked whether the presumed torque of each axis is over the threshold value during the playback has been exceeded.

1. Click the [GraphSetting] button, and enter the value of [Torque Threshold] in the dialog.



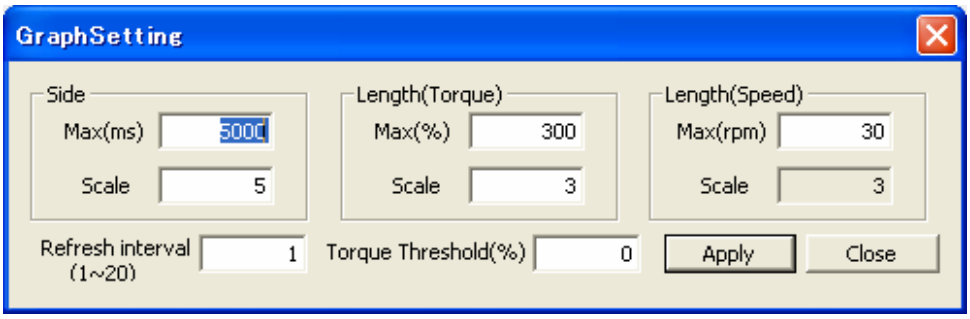
2. The Threshold value is displayed in the graph area with a dotted red line.



3. After the playback of a job, if the presumed torque exceeded the threshold value, the dialog will be displayed as follows.

■ Graph Setting

The display range (horizontal axis and spindle) in the torque estimate display area (wavy graph) and the re-drawing intervals are set.



Graph Setting

Item	Description
Side	Maximum value (ms) of a horizontal axis in a wavy graph and the number of scales are set.
Length(Torque)	Maximum value (%) of the spindle in a torque wavy graph and the number of scales are set. The number of scale is as common as Length(Speed).
Length(Speed)	Maximum value (rpm) of the spindle in a speed wavy graph and the number of scales are set. As for the number of scales, a setup of Length(Torque) is reflected.
Refresh interval (1-20)	The interval of the re-drawing time of a wavy graph is set.
Torque Threshold(%)	The threshold of torque is set.
[OK] button	A set value of each item is reflected. (The Graph Setting doesn't close.)
[Close] button	The Graph Setting is close.

■ Target robots for Moter Load Estimate

YRC1000

Model Name	Robot Type	Remarks
AR700	1-06VX8-A00	Added at Ver2018
AR900	1-06VX7-A00	Added at Ver2018
AR1440	1-06VXH12-A00	Added at Ver2018
AR1440E	1-07VXHE6-A00	Added at Ver2020SP1
AR1730	1-06VXH25-A01	Added at Ver2018
AR2010	1-06VXH25-A11	Added at Ver2018
AR3120	1-06VXHL20-A00	Added at Ver2020SP1
GP4	1-06VX4-A00	Added at Ver2021
GP7	1-06VX7-A00	Added at Ver2018
GP8	1-06VX8-A00	Added at Ver2018
GP12	1-06VXH12-A00	Added at Ver2018
GP12	1-06VXH12-C00	Added at Ver2020SP1
GP20HL	1-06VXHL20-A00	Added at Ver2020SP1
GP25	1-06VXH25-A00	Added at Ver2018
GP25	1-06VXH25-A50	Added at Ver2020SP1
GP25	1-06VXH25-C00	Added at Ver2020SP1
GP25	1-06VXH25-F40	Added at Ver2020SP1
GP25-12	1-06VXH25-A10	Added at Ver2018
GP25-12	1-06VXH25-C10	Added at Ver2021
GP35L	1-06VXL35-A00	Added at Ver2018
GP50	1-06VX50-A00	Added at Ver2018
GP88	1-06VX88-A00	Added at Ver2018
GP88	1-06VX88-C00	Added at Ver2021
GP110	1-06VX110-A00	Added at Ver2018
GP110	1-06VX110-C00	Added at Ver2021
GP110B	1-07VXB110-A00	Added at Ver2018
GP110H	1-06VXH110-A00	Added at Ver2020SP1
GP165R	1-06VR165-A00	Added at Ver2018
GP180	1-06VX180-A00	Added at Ver2018
GP180	1-06VX180-C00	Added at Ver2021
GP180-120	1-06VX180-120-A00	Added at Ver2018
GP180-120	1-06VX180-120-C00	Added at Ver2021
GP180H	1-06VXH180-A00	Added at Ver2020SP1
GP200R	1-06VR200-A00	Added at Ver2018
GP200S	1-06VXH200-A00	Added at Ver2020SP1
GP215	1-06VX215-A00	Added at Ver2018
GP215	1-06VX215-C00	Added at Ver2021
GP225	1-06VX225-A00	Added at Ver2018
GP225	1-06VX225-C00	Added at Ver2021

Model Name	Robot Type	Remarks
GP225H	1-06VXH225-A00	Added at Ver2020SP1
GP250	1-06VX250-A00	Added at Ver2018
GP250	1-06VX250-C00	Added at Ver2021
GP280	1-06VX280-A00	Added at Ver2018
GP300R	1-06VR300-A00	Added at Ver2020SP1
GP400	1-06VX400-A00	Added at Ver2018
GP400R	1-06VR400-A00	Added at Ver2018
GP400R	1-06VR400-A10	Added at Ver2020SP1
GP600	1-06VX600-A00	Added at Ver2018
HC10	1-06VXHC10-A00	Added at Ver2018
HC10DT	1-06VXHC10-A10	Added at Ver2018
HC10DT Dust-Proof/Drip-Proof	1-06VXHC10-B10	Added at Ver2021
HC10DTF	YR-1-06VXHC10-F10	Added at Ver2021
HC20DT Dust-Proof/Drip-Proof	YR-1-06VXHC20-B10	Added at Ver2021
PH130F	1-06VXF130-A00	Added at Ver2020SP1
PH130RF	1-06VRF130-A00	Added at Ver2018
PH200R	1-06-VRY200-J00	Added at Ver2020SP1
PH200R	1-06-VRY200-K00	Added at Ver2020SP1
PH200R	1-06-VRY200-L00	Added at Ver2020SP1
PH200RF	1-06-VRF200-J00	Added at Ver2020SP1
PH200RF	1-06-VRF200-J10	Added at Ver2020SP1
PH200RF	1-06-VRF200-K00	Added at Ver2020SP1
PH200RF	1-06-VRF200-K10	Added at Ver2020SP1
PH200RF	1-06-VRF200-L00	Added at Ver2020SP1
PH200RF	1-06-VRF200-L10	Added at Ver2020SP1
PL190	1-04-LXH190-A00	Added at Ver2021
PL320	1-04-LXH320-A00	Added at Ver2021
PL500	1-04-LXH500-A00	Added at Ver2020SP1
PL800	1-04-LXH800-A00	Added at Ver2021
SP80	1-06VX88-A00	Added at Ver2018
SP100	1-06VX110-A00	Added at Ver2018
SP100B	1-07VXB110-A00	Added at Ver2018
SP110H	1-06VXH110-A00	Added at Ver2020SP1
SP130	1-06VX140-A00	Added at Ver2020SP1
SP150R	1-06VR165-A00	Added at Ver2018
SP165	1-06VX180-A00	Added at Ver2018
SP165-105	1-06VX180-120-A00	Added at Ver2018
SP180H	1-06VXH180-A00	Added at Ver2020SP1
SP180H-110	1-06VXH180-A10	Added at Ver2020SP1

Model Name	Robot Type	Remarks
SP185R	1-06VR200-A00	Added at Ver2018
SP210	1-06VX225-A00	Added at Ver2018
SP225H	1-06VXH225-A00	Added at Ver2020SP1
SP225H-135	1-06VXH225-A10	Added at Ver2020SP1
SP235	1-06VX250-A00	Added at Ver2018

YRC1000micro

Model Name	Robot Type	Remarks
GP4	1-06VX4-A00	Added at Ver2021
GP7	1-06VX7-A00	Added at Ver2018
GP8	1-06VX8-A00	Added at Ver2018
GP12	1-06VXH12-A00	Added at Ver2018
HC10DT	1-06VXHC10-A10	Added at Ver2018
HC10DT Dust-Proof/Drip-Proof	1-06VXHC10-B10	Added at Ver2021
HC10DT Hand-Carry	1-06VXHC10-C11	Added at Ver2021
HC10DTF	YR-1-06VXHC10-F10	Added at Ver2021
HC20DT Dust-Proof/Drip-Proof	YR-1-06VXHC20-B10	Added at Ver2021
MotoMINI	1-06VX05-A00	Added at Ver2018
SG400	1-04SX400-A00	Added at Ver2020SP1
SG650	1-04SX650-A00	Added at Ver2020SP1

DX200

Model Name	Robot Type	Remarks
ES200RDII	ES200RD-J00	Added at Ver2018SP1
MA1440	MA01440-A00	Added at Ver2019
MA2010	MA02010-A00	Added at Ver2018SP1
MH5LSII	MH005LS-J00	Added at Ver2019
MH24	MH00024-A00	Added at Ver2017SP1
MH24-10	MH00024-A10	Added at Ver2018SP1
MH50II-20	MH00050-J10	Added at Ver2018SP1
MH80II	MH00080-J00	Added at Ver2018SP1
MH110	MH110-A00	Added at Ver2018SP1
MH180	MH180-A00	Added at Ver2015
MH225	MH225-A00	Added at Ver5.10
MH250II	MH00250-J00	Added at Ver2016SP1
MH280II	H00280-J00	Added at Ver2018SP1
MH400II	MH00400-J00	Added at Ver2018SP1

Model Name	Robot Type	Remarks
MH600	MH00600-A00	Added at Ver2018SP1
MHP45L	MHP045L-A00	Added at Ver2020
MHP45L	MHP045L-B00	Added at Ver2020
MPL160II	MPL0160-J00	Added at Ver2019
MPL800II	MPL0800-J00	Added at Ver2018SP1
MPX1150	MPX1150-A00	Added at Ver2017
MPX1150	MPX1150-C00	Added at Ver2017
MPX3500	MPX3500-A00	Added at Ver2016SP3
MPX3500	MPX3500-A00_WALL	Added at Ver2016SP3
MPX3500	MPX3500-A10	Added at Ver2016SP3
MPX3500	MPX3500-A10_WALL	Added at Ver2016SP3
MPX3500	MPX3500-B00	Added at Ver2016SP3
MPX3500	MPX3500-B00_WALL	Added at Ver2016SP3
MPX3500	MPX3500-B10	Added at Ver2016SP3
MPX3500	MPX3500-B10_WALL	Added at Ver2016SP3
MPX3500	MPX3500-C00	Added at Ver2016SP3
MPX3500	MPX3500-C00_WALL	Added at Ver2016SP3
MPX3500	MPX3500-C10	Added at Ver2016SP3
MPX3500	MPX3500-C10_WALL	Added at Ver2016SP3
MPX3500	MPX3500-F00	Added at Ver2016SP3
MPX3500	MPX3500-F00_WALL	Added at Ver2016SP3
MPX3500	MPX3500-F10	Added at Ver2016SP3
MPX3500	MPX3500-F10_WALL	Added at Ver2016SP3
MS80WII	MS0080W-J00	Added at Ver2019
MS100	MS100-A00	Added at Ver2018SP1
MS165	MS165-A00	Added at Ver2015
MS210	MS210-A00	Added at Ver5.10
UP400RD	UP400RD-J00	Added at Ver2018SP1
UP400RD	UP400RD-J10	Added at Ver2018SP1
VS100	VS00100-A00	Added at Ver2015SP3

DX100

Model Name	Robot Type	Remarks
EP4000D	EP4000D-J72	Added at Ver2.80
EP4000D	EP4000D-K72	Added at Ver2.80
EP4000D	EP4000D-L72	Added at Ver2.80
EPH130D	EPH130D-A00	Added at Ver2.80
EPH130RLD	PH13RLD-A00	Added at Ver2.80
EPH4000D	EPH400D-JA0	Added at Ver2.80
EPH4000D	EPH400D-KA0	Added at Ver2.80
EPH4000D	EPH400D-LA0	Added at Ver2.80
ES165D	ES0165D-A00	Added at Ver2.60
ES200D	ES0200D-A00	Added at Ver2.72
HP20D	HP0020D-A00	Added at Ver2.81
MH5LS	MH005LS-A00	Added at Ver2.80
MH5S	MH0005S-A00	Added at Ver5.00
MH50	MH00050-A00	Added at Ver5.00
MH80	MH0080-A00	Added at Ver5.00
MH165	MH00165-A00	Added at Ver2.72
MH200	MH00200-A00	Added at Ver2.80
MH215	MH00215-A00	Added at Ver2.80
MH250	MH00250-A00	Added at Ver2.80
MH250	MH00250-B00	Added at Ver2.80
MPK2	MPK0002-B01	Added at Ver2.60
SDA5D	SDA005D-A00	Added at Ver4.00
SDA10D	SDA010D-A00	Added at Ver2.80
SDA10D	SDA010D-B00	Added at Ver2.80
SDA20D	SDA020D-A00	Added at Ver2.81
SIA5D	SIA005D-A00	Added at Ver4.00
SIA10D	SIA010D-A00	Added at Ver2.81
SIA20D	SIA020D-A00	Added at Ver2.60
SIA20D	SIA020D-Y00	Added at Ver2.81

FS100

Model Name	Robot Type	Remarks
MHJ	MH0000J-A00	Added at Ver2.80
MH3F	MH0003F-A00	Added at Ver2.72
MH5F	MH0005F-A00	Added at Ver2.60
MH5LF	MH005LF-A00	Added at Ver2.80
MH12	MH12-A00	Added at Ver2019
MPK2F	MPK002F-A00	Added at Ver2.60
MPP3	MPP0003-A00	Added at Ver2.60

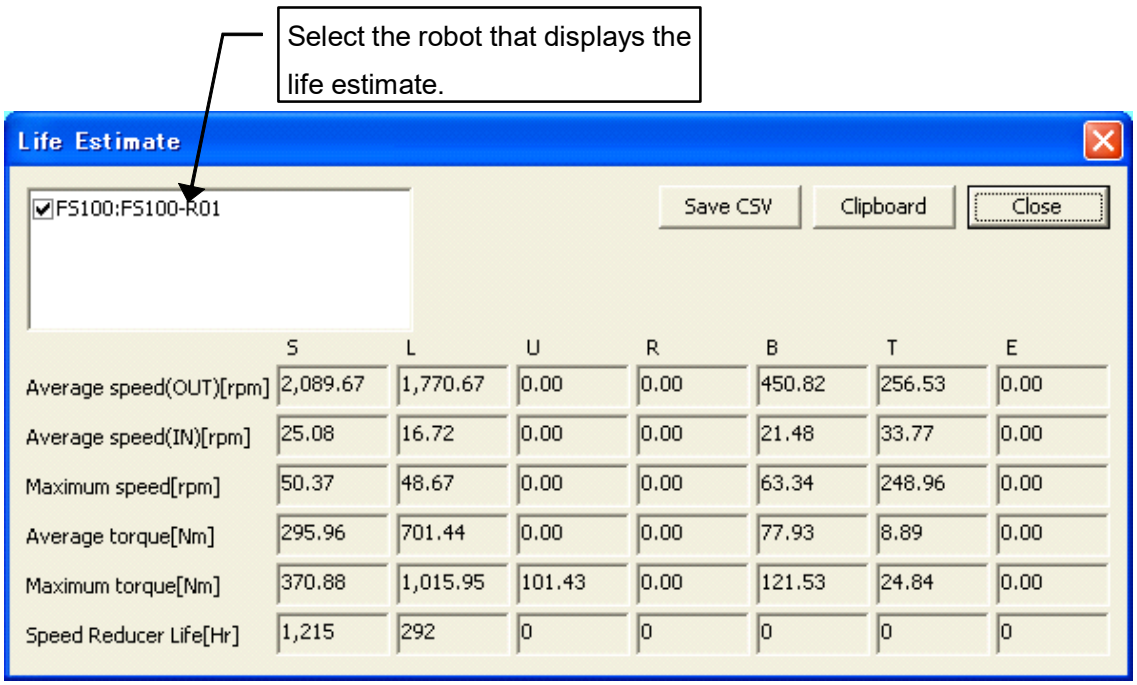
Model Name	Robot Type	Remarks
MPP3S	MPP003S-A00	Added at Ver4.10
SDA5F	SDA005F-A00	Added at Ver4.00
SDA10F	SDA010F-A00	Added at Ver2.80
SIA5F	SIA005F-A00	Added at Ver4.00
SIA10F	SIA010F-A00	Added at Ver2.81
SIA20F	SIA020F-A00	Added at Ver2.60

13.24 Life Estimate

Life estimate value of each reducer (Unit: Hour) is displayed when playback is executed.

NOTE

- YASKAWA does not warrant the result of this function. It should be used only as a guide. Because it is affected by Tool settings, Load condition of real robot, Lubricated condition of grease, and Temperature.
  Configure the following items of Tool setting collectly, Weight, Position of the center of gravity, and Inertia moment. Especially, when Weight item of Tool setting is set lower than real tool weight, this function makes wrong results.
- This function estimates the life of reducers from the normal result of playback. Therefore, the result of playback with interruption (ex. the emergency stop) is not included.
- This function can be used only with the robot axes. (external axes are not included.)
- This function cannot be used with two or more robot system other than a dual-arm robot.
- This function can be used only with the specified system version of controllers, and this function can be used only with target robots of Life Estimate with that system version. Please refer to section "13.5 List of Function depending on the system version of controller".



Life Estimate

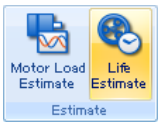
Item	Description
[Save CSV] button	The result of Life Estimate, the used torque data, the used gravity moment, and the used speed data are saved in text file (.csv).

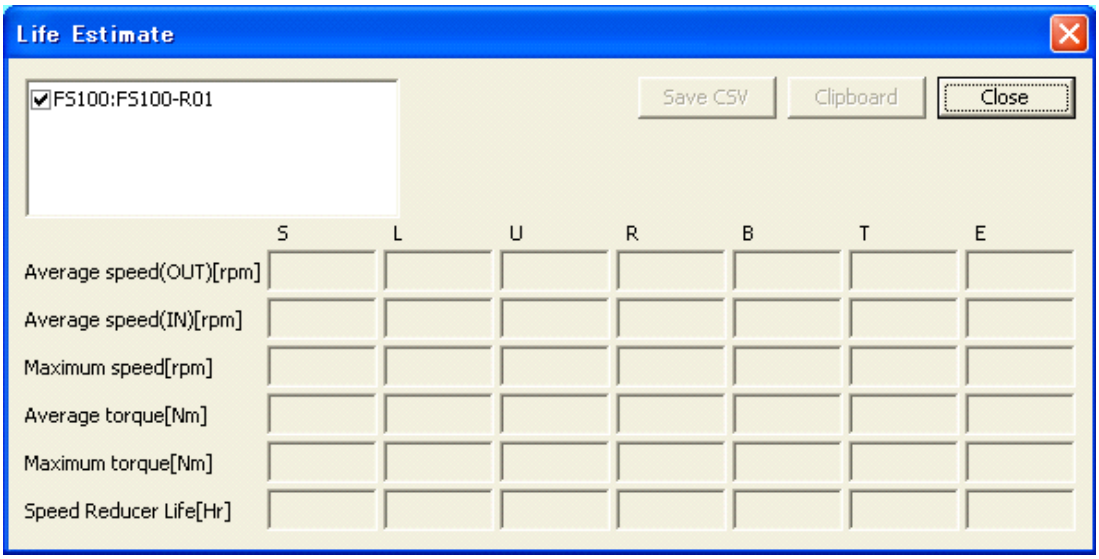
Life Estimate

Item	Description
[Clipboard] button	The result of Life Estimate, the used torque data, the used gravity moment, and the used speed data are copied to the clipboard.
[Close] button	The Life Estimate display is closed.

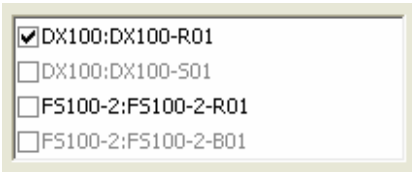
Procedure

1. On the [Tool] tab, in the [Estimate] group, click the [Life Estimate] button, the [Life Estimate] dialog appears.





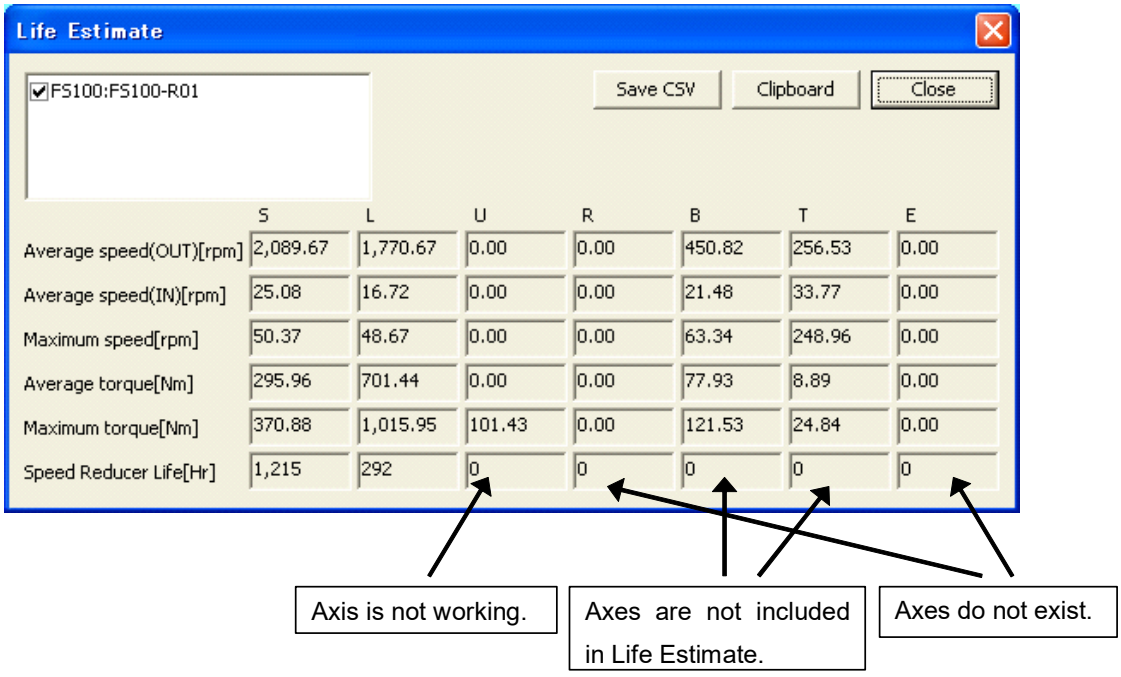
2. Select the robot estimated the reducer life.



3. The job is executed, and Average speed[rpm], Maximum speed[rpm], Average torque[Nm], Maximum torque[Nm], and Speed Reducer Life[Hr] are displayed.

NOTE

Reducer life time calculated by this function is that when the robot repeats this movement with this cycletime. The displaying areas exist for 7 axes, but the displaying areas of the Speed Reducer Life are displayed "0", when the axes are not working, the axes do not exist, or the axes are not included in Life Estimate.
If the robot has overhaul time, the value of Speed Reducer Life is displayed as [xxx over] (xxx is overhaul time), when it exceed overhaul time.



Axis is not working.

Axes are not included in Life Estimate.

Axes do not exist.

■ Target robots of Life Estimate

YRC1000

Model Name	Robot Type	Remarks
AR700	1-06VX8-A00	Added at Ver2018
AR900	1-06VX7-A00	Added at Ver2018
AR1440	1-06VXH12-A00	Added at Ver2018
AR1440E	1-07VXHE6-A00	Added at Ver2020SP1
AR1730	1-06VXH25-A01	Added at Ver2018
AR2010	1-06VXH25-A11	Added at Ver2018
AR3120	1-06VXHL20-A00	Added at Ver2020SP1
GP4	1-06VX4-A00	Added at Ver2021
GP7	1-06VX7-A00	Added at Ver2018
GP8	1-06VX8-A00	Added at Ver2018
GP12	1-06VXH12-A00	Added at Ver2018
GP12	1-06VXH12-C00	Added at Ver2020SP1
GP20HL	1-06VXHL20-A00	Added at Ver2020SP1
GP25	1-06VXH25-A00	Added at Ver2018
GP25	1-06VXH25-A50	Added at Ver2020SP1
GP25	1-06VXH25-C00	Added at Ver2020SP1
GP25	1-06VXH25-F40	Added at Ver2020SP1
GP25-12	1-06VXH25-A10	Added at Ver2018
GP25-12	1-06VXH25-C10	Added at Ver2021
GP35L	1-06VXL35-A00	Added at Ver2018
GP50	1-06VX50-A00	Added at Ver2018
GP88	1-06VX88-A00	Added at Ver2018
GP88	1-06VX88-C00	Added at Ver2021
GP110	1-06VX110-A00	Added at Ver2018
GP110	1-06VX110-C00	Added at Ver2021
GP110B	1-07VXB110-A00	Added at Ver2018
GP110H	1-06VXH110-A00	Added at Ver2020SP1
GP165R	1-06VR165-A00	Added at Ver2018
GP180	1-06VX180-A00	Added at Ver2018
GP180	1-06VX180-C00	Added at Ver2021
GP180-120	1-06VX180-120-A00	Added at Ver2018
GP180-120	1-06VX180-120-C00	Added at Ver2021
GP180H	1-06VXH180-A00	Added at Ver2020SP1
GP200R	1-06VR200-A00	Added at Ver2018
GP200S	1-06VXH200-A00	Added at Ver2020SP1
GP215	1-06VX215-A00	Added at Ver2018
GP215	1-06VX215-C00	Added at Ver2021
GP225	1-06VX225-A00	Added at Ver2018
GP225	1-06VX225-C00	Added at Ver2021

Model Name	Robot Type	Remarks
GP225H	1-06VXH225-A00	Added at Ver2020SP1
GP250	1-06VX250-A00	Added at Ver2018
GP250	1-06VX250-C00	Added at Ver2021
GP280	1-06VX280-A00	Added at Ver2018
GP300R	1-06VR300-A00	Added at Ver2020SP1
GP400	1-06VX400-A00	Added at Ver2018
GP400R	1-06VR400-A00	Added at Ver2018
GP400R	1-06VR400-A10	Added at Ver2020SP1
GP600	1-06VX600-A00	Added at Ver2018
HC10	1-06VXHC10-A00	Added at Ver2018
HC10DT	1-06VXHC10-A10	Added at Ver2018
HC10DT Dust-Proof/Drip-Proof	1-06VXHC10-B10	Added at Ver2021
HC10DTF	YR-1-06VXHC10-F10	Added at Ver2021
HC20DT Dust-Proof/Drip-Proof	YR-1-06VXHC20-B10	Added at Ver2021
PH130F	1-06VXF130-A00	Added at Ver2020SP1
PH130RF	1-06VRF130-A00	Added at Ver2018
PH200R	1-06-VRY200-J00	Added at Ver2020SP1
PH200R	1-06-VRY200-K00	Added at Ver2020SP1
PH200R	1-06-VRY200-L00	Added at Ver2020SP1
PH200RF	1-06-VRF200-J00	Added at Ver2020SP1
PH200RF	1-06-VRF200-J10	Added at Ver2020SP1
PH200RF	1-06-VRF200-K00	Added at Ver2020SP1
PH200RF	1-06-VRF200-K10	Added at Ver2020SP1
PH200RF	1-06-VRF200-L00	Added at Ver2020SP1
PH200RF	1-06-VRF200-L10	Added at Ver2020SP1
PL190	1-04-LXH190-A00	Added at Ver2021
PL320	1-04-LXH320-A00	Added at Ver2021
PL500	1-04-LXH500-A00	Added at Ver2020SP1
PL800	1-04-LXH800-A00	Added at Ver2021
SP80	1-06VX88-A00	Added at Ver2018
SP100	1-06VX110-A00	Added at Ver2018
SP100B	1-07VXB110-A00	Added at Ver2018
SP110H	1-06VXH110-A00	Added at Ver2020SP1
SP130	1-06VX140-A00	Added at Ver2020SP1
SP150R	1-06VR165-A00	Added at Ver2018
SP165	1-06VX180-A00	Added at Ver2018
SP165-105	1-06VX180-120-A00	Added at Ver2018
SP180H	1-06VXH180-A00	Added at Ver2020SP1
SP180H-110	1-06VXH180-A10	Added at Ver2020SP1

Model Name	Robot Type	Remarks
SP185R	1-06VR200-A00	Added at Ver2018
SP210	1-06VX225-A00	Added at Ver2018
SP225H	1-06VXH225-A00	Added at Ver2020SP1
SP225H-135	1-06VXH225-A10	Added at Ver2020SP1
SP235	1-06VX250-A00	Added at Ver2018

YRC1000micro

Model Name	Robot Type	Remarks
GP4	1-06VX4-A00	Added at Ver2021
GP7	1-06VX7-A00	Added at Ver2018
GP8	1-06VX8-A00	Added at Ver2018
GP12	1-06VXH12-A00	Added at Ver2018
HC10DT	1-06VXHC10-A10	Added at Ver2018
HC10DT Dust-Proof/Drip-Proof	1-06VXHC10-B10	Added at Ver2021
HC10DT Hand-Carry	1-06VXHC10-C11	Added at Ver2021
HC10DTF	YR-1-06VXHC10-F10	Added at Ver2021
HC20DT Dust-Proof/Drip-Proof	YR-1-06VXHC20-B10	Added at Ver2021
MotoMINI	1-06VX05-A00	Added at Ver2018
SG400	1-04SX400-A00	Added at Ver2020SP1
SG650	1-04SX650-A00	Added at Ver2020SP1

DX200

Model Name	Robot Type	Remarks
ES200RDII	ES200RD-J00	Added at Ver2018SP1
MA1440	MA01440-A00	Added at Ver2019
MA2010	MA02010-A00	Added at Ver2018SP1
MH5LSII	MH005LS-J00	Added at Ver2019
MH24	MH00024-A00	Added at Ver2017SP1
MH24-10	MH00024-A10	Added at Ver2018SP1
MH50II-20	MH00050-J10	Added at Ver2018SP1
MH80II	MH00080-J00	Added at Ver2018SP1
MH110	MH110-A00	Added at Ver2018SP1
MH180	MH180-A00	Added at Ver2015
MH225	MH225-A00	Added at Ver5.10
MH250II	MH00250-J00	Added at Ver2016SP1
MH280II	H00280-J00	Added at Ver2018SP1
MH400II	MH00400-J00	Added at Ver2018SP1
MH600	MH00600-A00	Added at Ver2018SP1
MHP45L	MHP045L-A00	Added at Ver2020
MHP45L	MHP045L-B00	Added at Ver2020
MPL160II	MPL0160-J00	Added at Ver2019
MPL800II	MPL0800-J00	Added at Ver2018SP1
MPX1150	MPX1150-A00	Added at Ver2017
MPX1150	MPX1150-C00	Added at Ver2017
MPX3500	MPX3500-A00	Added at Ver2016SP3
MPX3500	MPX3500-A00_WALL	Added at Ver2016SP3
MPX3500	MPX3500-A10	Added at Ver2016SP3
MPX3500	MPX3500-A10_WALL	Added at Ver2016SP3
MPX3500	MPX3500-B00	Added at Ver2016SP3
MPX3500	MPX3500-B00_WALL	Added at Ver2016SP3
MPX3500	MPX3500-B10	Added at Ver2016SP3
MPX3500	MPX3500-B10_WALL	Added at Ver2016SP3
MPX3500	MPX3500-C00	Added at Ver2016SP3
MPX3500	MPX3500-C00_WALL	Added at Ver2016SP3
MPX3500	MPX3500-C10	Added at Ver2016SP3
MPX3500	MPX3500-C10_WALL	Added at Ver2016SP3
MPX3500	MPX3500-F00	Added at Ver2016SP3
MPX3500	MPX3500-F00_WALL	Added at Ver2016SP3
MPX3500	MPX3500-F00	Added at Ver2016SP3
MPX3500	MPX3500-F00_WALL	Added at Ver2016SP3
MS80WII	MS0080W-J00	Added at Ver2019
MS100	MS100-A00	Added at Ver2018SP1
MS165	MS165-A00	Added at Ver2015
MS210	MS210-A00	Added at Ver5.10

Model Name	Robot Type	Remarks
UP400RD	UP400RD-J00	Added at Ver2018SP1
UP400RD	UP400RD-J10	Added at Ver2018SP1
VS100	VS00100-A00	Added at Ver2015SP3

DX100

Model Name	Robot Type	Remarks
EP4000D	EP4000D-J72	Added at Ver2.80
EP4000D	EP4000D-K72	Added at Ver2.80
EP4000D	EP4000D-L72	Added at Ver2.80
EPH130D	EPH130D-A00	Added at Ver2.80
EPH130RLD	PH13RLD-A00	Added at Ver2.80
EPH4000D	EPH400D-JA0	Added at Ver2.80
EPH4000D	EPH400D-KA0	Added at Ver2.80
EPH4000D	EPH400D-LA0	Added at Ver2.80
ES165D	ES0165D-A00	Added at Ver2.60
ES200D	ES0200D-A00	Added at Ver2.72
HP20D	HP0020D-A00	Added at Ver2.81
MH5LS	MH005LS-A00	Added at Ver2.80
MH5S	MH0005S-A00	Added at Ver5.00
MH50	MH00050-A00	Added at Ver5.00
MH80	MH0080-A00	Added at Ver5.00
MH165	MH00165-A00	Added at Ver2.72
MH200	MH00200-A00	Added at Ver2.80
MH215	MH00215-A00	Added at Ver2.80
MH250	MH00250-A00	Added at Ver2.80
MH250	MH00250-B00	Added at Ver2.80
SDA5D	SDA005D-A00	Added at Ver4.00
SDA10D	SDA010D-A00	Added at Ver2.80
SDA10D	SDA010D-B00	Added at Ver2.80
SDA20D	SDA020D-A00	Added at Ver2.81
SIA5D	SIA005D-A00	Added at Ver4.00
SIA10D	SIA010D-A00	Added at Ver2.81
SIA20D	SIA020D-A00	Added at Ver2.60
SIA20D	SIA020D-Y00	Added at Ver2.81

FS100

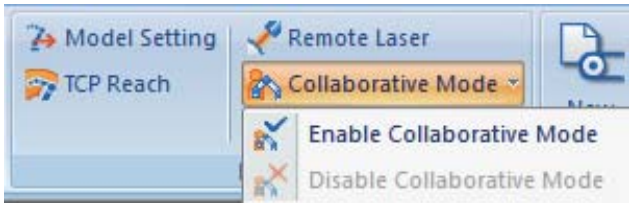
Model Name	Robot Type	Remarks
MHJ	MH0000J-A00	Added at Ver2.80
MH3F	MH0003F-A00	Added at Ver2.72
MH5F	MH0005F-A00	Added at Ver2.60
MH5LF	MH005LF-A00	Added at Ver2.80
MH12	MH12-A00	Added at Ver2019
MPK2F	MPK002F-A00	Added at Ver2.60
MPP3	MPP0003-A00	Added at Ver2.60
MPP3S	MPP003S-A00	Added at Ver4.10
SDA5F	SDA005F-A00	Added at Ver4.00

Model Name	Robot Type	Remarks
SDA10F	SDA010F-A00	Added at Ver2.80
SIA5F	SIA005F-A00	Added at Ver4.00
SIA10F	SIA010F-A00	Added at Ver2.81
SIA20F	SIA020F-A00	Added at Ver2.60

13.25 Collaborative Mode

Singularity Limit and Speed Limit are enabled when collaborative mode is enabled with collaborative robot (MOTOMAN-HC Series).
Same as release condition of real robot controller, MotoSim set collaborative mode to enable when new controller with collaborative robot is made. It is possible to enable or disable collaborative mode on the button of the ribbon menu.

To enable or disable collaborative mode, on the [Controller] tab, in the [Robot] group, click the [Collaborative Mode] button and select [Enable Collaborative Mode] or [Disable Collaborative Mode].

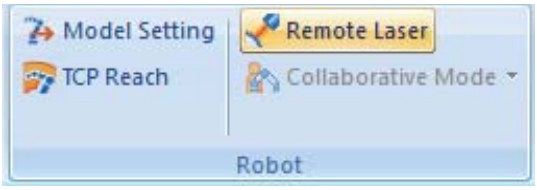


NOTE This function can be used only HC series robot and controller version after YRC1000 ver.4.21 or YRC1000micro ver.2.44.

13.26 Remote Laser Function

Setting files of controller, creating a JOB and play back the JOB can be performed on remote laser function.

To enable Remote Laser function, on the [Controller] tab, in the [Robot] group, click the [Remote Laser] button.



NOTE

- This function can be used only after YRC1000 version 4.00, and controller application is “ARC” or “GENERAL”.
- It is not possible to use conveyor synchronization function at the same time on the same controller.
- When controller is created from CMOS or ALL.PRM, click [Remote Laser] after creating controller to enable remote laser function.
- Jobs that include remote laser instructions can be played back, but the laser trajectory cannot be seen on the MotoSim screen.

14 Troubleshooting

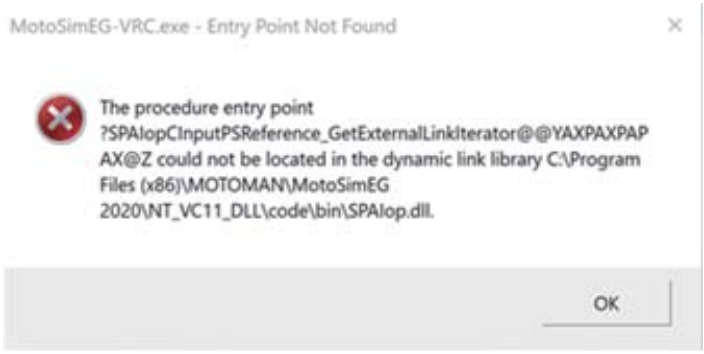
14.1 Start of MotoSim EG-VRC

■ Fails in the start of MotoSim EG-VRC

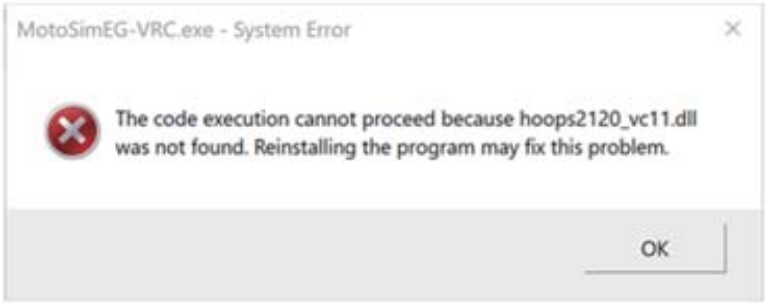
Problem

The following messages are displayed and fail in the start of MotoSim EG-VRC.

- MotoSimEG-VRC.exe – Entry Point Not Found



- MotoSimEG-VRC.exe – System Error



Solution

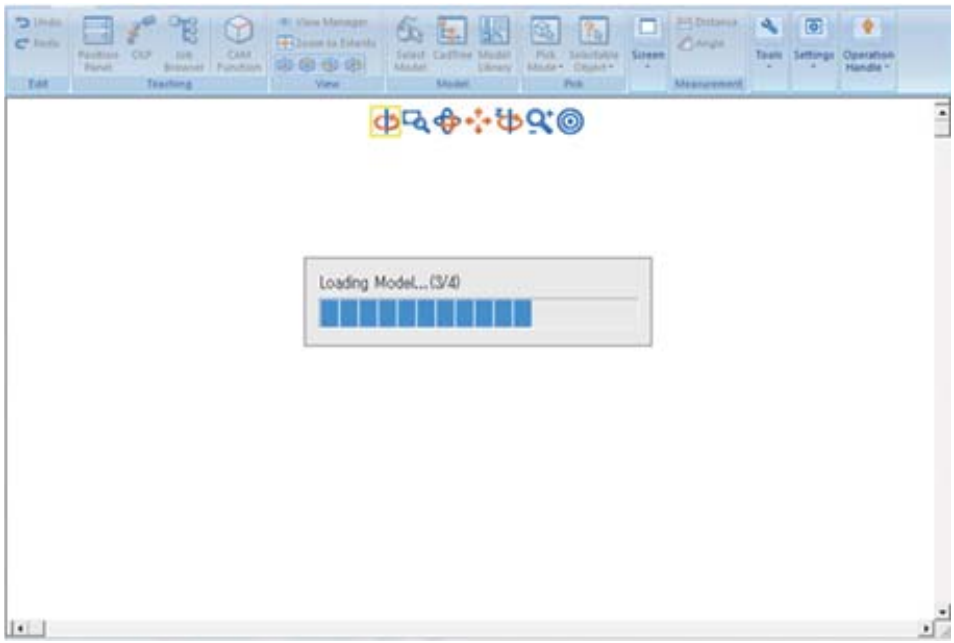
When MotoSim EG-VRC of multiple versions are installed in your PC, it occurs.
Please uninstall MotoSim EG-VRC of the old version.

14.2 Creating and Editing a Cell

■ MotoSim EG-VRC stops at 3/4 of the start sequence of the cell.

Problem

MotoSim EG-VRC stops at 3/4 of the start sequence of the cell.



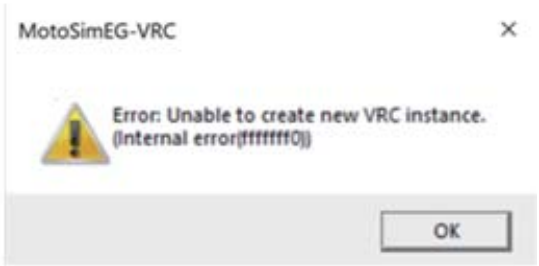
Solution

When the CAD models of large size are included in the cell, the reading of the models may take time.
Please wait until the cell start.

■ Error message “fffffff0” is displayed, and fails in the start of the controller.

Problem

When a cell including a controller started, error message “fffffff0” is displayed and fails in the start of the controller.



Solution

Please check the following.

- After rebooting your PC, please check whether the cell can start.

- Please start Task Manager, and check whether the CPU utilization rate and the memory utilization rate do not become nearly 100%.
  When it becomes nearly 100%, please close unnecessary application.

- Please check whether the cell folder of MotoSim EG-VRC is not saved in a deep hierarchical directory.
  When you have been saving the cell folder in a deep hierarchical directory, please move the cell folder in another directory.

NOTE The pass of a cell folder is to up to 259 characters in path name including a folder name.

- Please check whether the cell folder of MotoSim EG-VRC has been saved in a folder with access rights.
  When there is not access right, please move the cell folder in a folder with access rights.

- Please check whether a sample cell can start.
  When you cannot start a sample cell, please install MotoSim EG-VRC after the uninstallation.

14.3 Controller and Robot Settings

■ Virtual programming pendant can not be operated

Problem

Virtual programming pendant can not be operated after creating a controller.

Solution

Please check the following.

- After rebooting your PC, please check whether you can operate the virtual programming pendant.

- Please check whether the message "Windows Defender Firewall has blocked some features of this app " is not displayed when you started a cell.
  When "Windows Defender Firewall has blocked some features of this app " is displayed, please click on "Allow access".

- After having invalidated an anti-virus software, and reboot the controller.
  Please check whether you can operate the virtual programming pendant.

- When problem does not solve by the above, please create the controller again.

■ Error message "3220" is displayed and fails in the job file reading.

Problem

Error message “3220” is displayed and fails in the job file reading.

Solution

Error message "3220" means syntax error of a job file.
Please check whether there is not a mistake in the syntax of the job file.

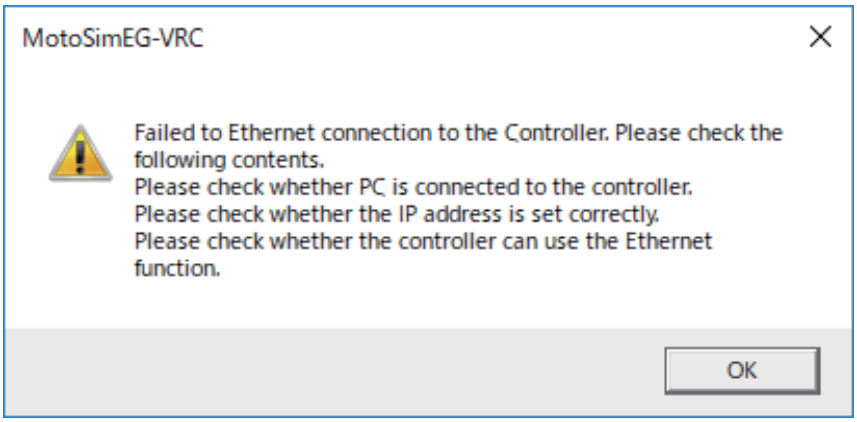
Error message "3220" may occur when a setting of controller is insufficient.
Please create a controller using CMOS.BIN file of the controller that you made the job file.
Please refer to section " 7.1.2 Create VRC Controller (using CMOS.BIN file or ALL.PRM file) " about detail procedure of creating a controller using CMOS.BIN file.

14.4 Online Function

■ Fails in the Ethernet connection to the real controller

Problem

Fails in the Ethernet connection to the real controller.

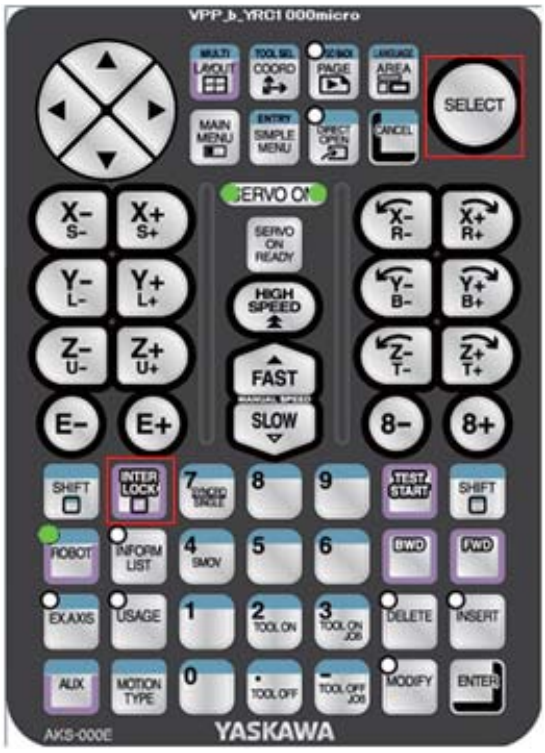


Solution

Please check the following.
[Real Controller]

- Make sure that the LAN cable is connected.
- Make sure that the IP address is set correctly.
- Select [SYSTEM INFO] – [NETWORK SERVICE] in the main menu of programming pendant and check that the device name on the displayed screen is set to [Ethernet].
- Select [IN/OUT] – [PSEUDO INPUT SIG] in the main menu of programming pendant and enable the CMD REMOTE SEL.
  The CMD REMOTE SEL is enabled in the following procedures.

1. Change the mode of the real controller to the "TEACH" mode.
2. Click on "INTER LOCK" button and "SELECT" button.



- Make sure that the mode of the real controller becomes the “REMOTE” mode.

[PC]

- Make sure that the LAN cable is connected.
- Make sure that the IP address is set correctly.
- Make sure the IP address setting of the target controller is correct in MotoSim EG-VRC. Please refer to section " 9.2 Network Function " about detail procedure of setting IP address.

■ Error message "9001" is displayed and fails in the communication with the real controller.

Problem

Error message "9001" is displayed and fails in the communication with the real controller.

Solution

Error message “9001” means communication error by the receive timeout.
It occurs when communication setting of PC and the real controller are wrong.

For details, please refer to section “Fails in the ethernet connection with the real controller” of troubleshooting.

■ Error message “2140” is displayed and fails in the file reading

Problem

Error message “2140” is displayed and fails in the file reading.

Solution

Error message “2140” means the file reading error.

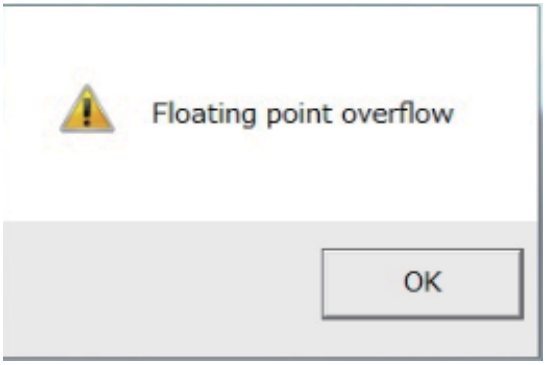
It is necessary to turn off the servo power of the real controller when you read a file such as [TOOL.CND] or [VARNAME.DAT].
Please turn off servo power of the real controller.

14.5 Model Editings

■ Error message “Floating point overflow” is displayed and fails in importing the CAD model.

Problem

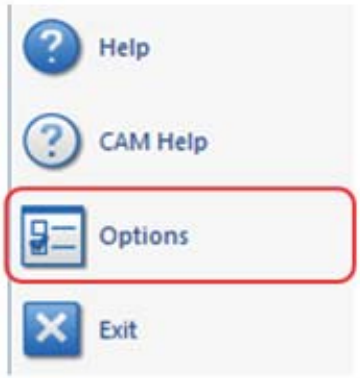
Error message "Floating point overflow" is displayed and fails in importing the CAD model.



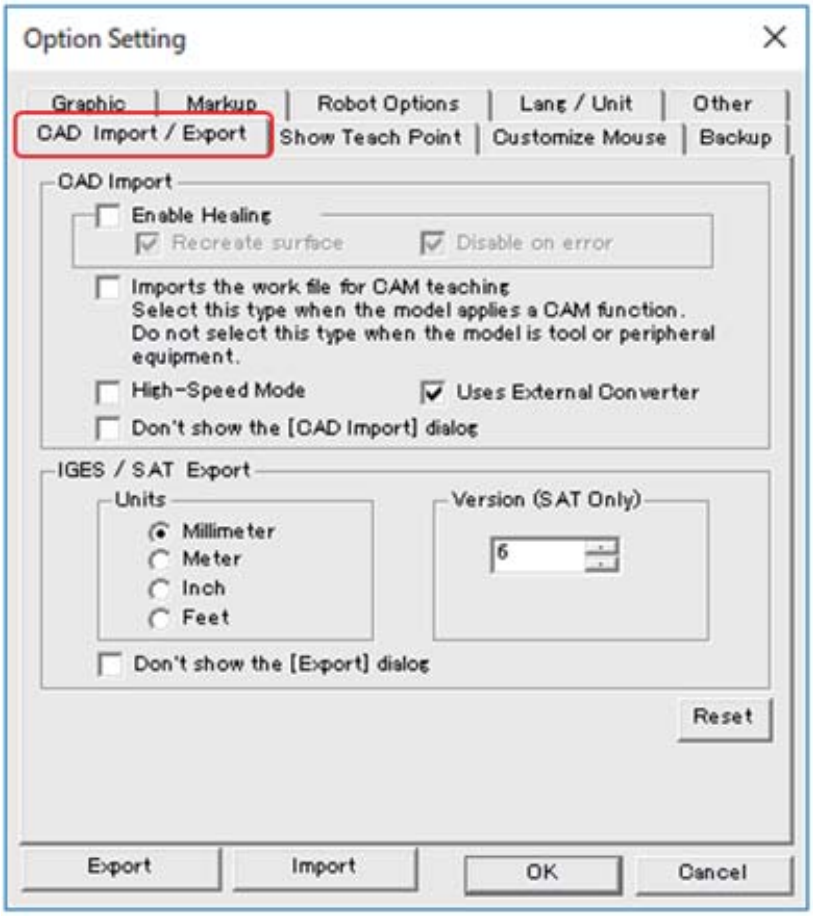
Solution

1. Click on application button of MotoSim EG-VRC.

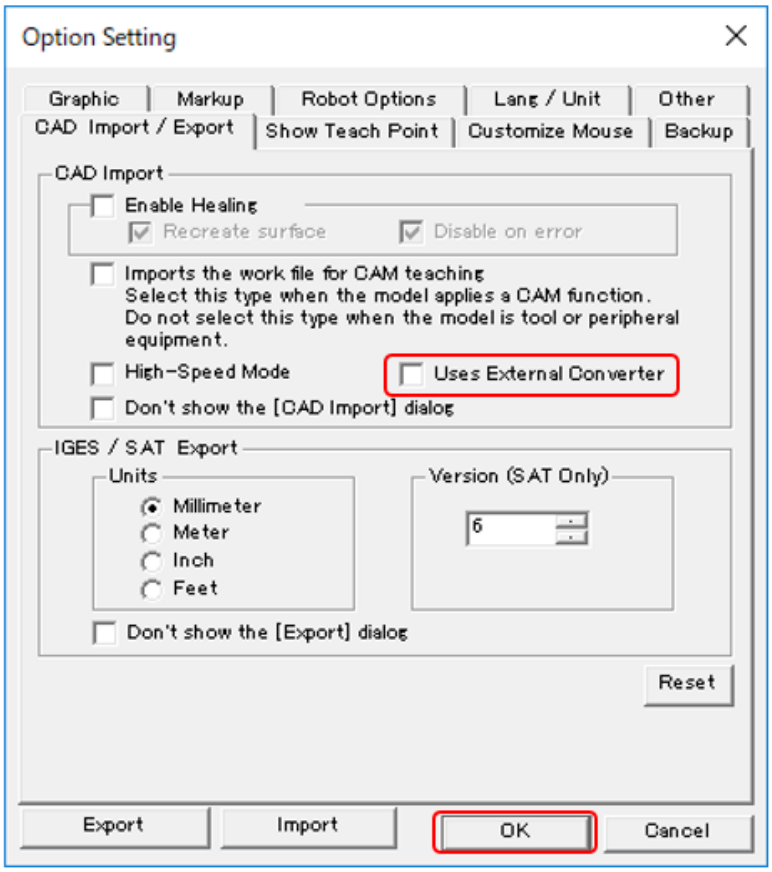
2. Click on [Options] button of contextmenu.



3. Click on [CAD Import / Export] tab of the Option Setting dialog.



4. Uncheck [Uses External Converter] checkbox and click on [OK] button.



15 Appendix

15.1 Data Format

This section describes the formats of model data files and cell data files.

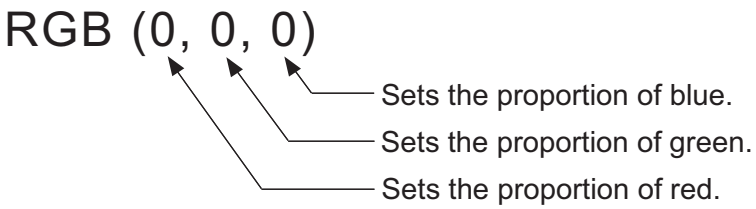
■ Model File (*.mdl)

There are eight parts available for MotoSim EG as described later in " Each Part Format " of this section.
Data unit system is in millimeters (mm) and real numbers are available. Use decimal point as required.

Model Color Settings

The color of each model can be set by using the basic color code function or using RGB.
The following describe each setting.

• RGB
RGB is created with the format RGB (0, 0, 0).
Each color proportion can be set by a number from 0 to 255.



<E.g.>	RGB(255,255,255)	Color: White
	RGB(255,0,0)	Color: Red
	RGB(0,255,0)	Color: Green
	RGB(0,0,255)	Color: Blue
	RGB(0,0,0)	Color: Black

Basic Color Code (QB Color) Function
Setting a number from 0 to 15 displays its corresponding color.
For example, setting BOX (4, 2) creates a red BOX model.

Number	Color	Number	Color
0	Black	8	Gray
1	Blue	9	Light blue
2	Green	10	Light green
3	Cyan	11	Light cyan
4	Red	12	Light red
5	Magenta	13	Light magenta
6	Yellow	14	Light yellow
7	White	15	Light white

Each Part Format

- BOX (color, num): Box form model
  Described with data of width, length, height, X, Y, Z, Rx, Ry and Rz.
  <Sample>

```
BLOCK
{
BOX(RGB(255,0,0),2)                          Description
{
100.000,100.000,100.000,0.000,0.000,0.000    Width, length, height, 0, 0, 0
0.000,0.000,0.000,0.000,0.000,0.000          X, Y, Z, Rx, Ry, Rz
}
}
```

- BOX2 (color, num): Box form model
  Described with data of width, length, height, X, Y, Z, Rx, Ry and Rz.
  <Sample>

```
BLOCK
{
BOX2(RGB(255,0,0),2)                         Description
{
100.000,100.000,100.000,0.000,0.000,0.000    Width, length, height, 0, 0, 0
0.000,0.000,0.000,0.000,0.000,0.000          X, Y, Z, Rx, Ry, Rz
}
}
```

- CYLINDER (color, num): Cylinder form model
  Described with data of lower face diameter, upper face diameter, height, number of divided faces, X, Y, Z, Rx, Ry and Rz.
  <Sample>

```
BLOCK
{
CYLINDER(RGB(255,0,0),2)                     Description
{
200.000,100.000,16.000,100.000,0.000,0.000   Lower face dia. height, No. of divided
                                             faces, upper face dia., 0, 0
0.000,0.000,0.000,0.000,0.000,0.000          X, Y, Z, Rx, Ry, Rz
}
}
```

• CONE2 (color, num): Cone form model
Described with data of bottom diameter, height, number of divided faces, X, Y, Z, Rx, Ry and Rz.
<Sample>

```
BLOCK
{
CONE2(RGB(255,0,0),2)                    Description
{
200.000,100.000,16.000,0.000,0.000,0.000 Bottom dia., height, No. of divided faces,
                                         0, 0, 0
0.000,0.000,0.000,0.000,0.000,0.000      X, Y, Z, Rx, Ry, Rz
}
}
```

• SPHERE(color,num): Spherical model
Described with data of diameter, number of divided faces, X, Y and Z.
<Sample>

```
BLOCK
{
SPHERE(RGB(255,0,0),2)                   Description
{
100.000,30.000,0,0,0,0                   Diameter, No.of devided face, 0, 0, 0, 0
0.000,0.000,0.000,0,0,0                  X, Y, Z, 0, 0, 0
}
}
```

• PIPE2 (color, num): Pipe form model
Described with data of lower face diameter, bottom plate thickness, upper face diameter, upper plate thickness, height, number of divided faces, X, Y, Z, Rx, Ry and Rz.
<Sample>

```
BLOCK
{
PIPE2(RGB(255,0,0),2)                    Description
{
100.000,100.000,100.000,10.000,100.000,16. Lower face dia., bottom plate thickness,
000                                        upper face dia., upper plate thickness,
                                           height, No. of divided faces
0.000,0.000,0.000,0.000,0.000,0.000      X, Y, Z, Rx, Ry, Rz
}
}
```

• AXIS6 (color, num): Model having information only of position and posture
Described with data of X, Y, Z, Rx, Ry and Rz.
“num” sets the number of target points.
<Sample>

```
BLOCK
{
AXIS6(RGB(255,0,0),3)                    Description
{
0.000,0.000,0.000,0.000,0.000,0.000      Point1 (X, Y, Z, Rx, Ry, Rz)
100.000,0.000,0.000,0.000,0.000,0.000    Point2 (X, Y, Z, Rx, Ry, Rz)
200.000,0.000,0.000,0.000,0.000,0.000    Point3 (X, Y, Z, Rx, Ry, Rz)
}
}
```

• LINE(color,num): Continuous line model
Described with data of X, Y and Z.
"num" sets the number of points.
<Sample>

```
BLOCK
{
LINE(RGB(255,0,0),3)                     Description
{
0.000,0.000,0.000                        Point1 (X, Y, Z)
100.000,200.000,300.000                  Point2 (X, Y, Z)
500.000,235.000,111.000                  Point3 (X, Y, Z)
}
}
```

• LINE2(color,num): Segmented line model
Described with data of X, Y and Z.
"num" sets the number of points.
<Sample>

```
BLOCK
{
LINE2(RGB(255,0,0),4)                    Description
{
253.000,353.000,686.000                  Segment 1 Start (X, Y, Z)
89.000,254.000,79.000                    Segment 1 End (X, Y, Z)
413.000,3.000,99.000                     Segment 2 Start (X, Y, Z)
917.000,524.000,-48.000                  Segment 2 End (X, Y, Z)
}
}
```

• CUBE (color, num): Polygonal cube model
Data of polygonal cube are described with data of bottom and height.
A rectangular parallelepiped is composed of four points and one height, therefore, num is 5 in this case.
<Sample>

BLOCK	
{	
CUBE(RGB(255,0,0),5)	Description
{	
0.000,0.000,0.000	Start point1 (X, Y, Z)(= End point 4)
100.000,0.000,0.000	End point1 (X, Y, Z)(= Start point 2)
100.000,100.000,0.000	End point2 (X, Y, Z)(= Start point 3)
0.000,100.000,0.000	End point3 (X, Y, Z)(= Start point 4)
0.000,0.000,100.000	Offset value (X, Y, Z)
}	
}	

• FLOOR (color, num): Floor form model
Describes a plane meshed data string.
Described with data of number of divided faces (vertical and horizontal) and frame data of floor end point.

<Sample>

BLOCK	
{	
FLOOR(RGB(255,0,0),3)	Description
{	
6.000,6.000,0.000	No. of divided faces (X division No., Y division No., 0)
-1500.000,-3000.000,0.000	Floor end point1 (X, Y, Z)
1500.000,3000.000,0.000	Floor end point2 (X, Y, Z)
}	
}	

• FACE (color, num): Face model
Describes a face with the frame data of X, Y, and Z of each point.
In this case the face model is composed of three points on the face and the data for X, Y, Z, Rx, Ry and Rx, num is 4.
<Sample>

BLOCK	
{	
FACE(RGB(255,128,0),4)	Description
{	
0.000,0.000,0.000,0.000,0.000,0.000	X, Y, Z, Rx, Ry, Rz Face is created with the following three points.
200.000,300.000,300.000,3,0,0	Point1 (X, Y, Z)
-200.000,300.000,300.000,0,0,0	Point2 (X, Y, Z)
-200.000,300.000,-300.000,0,0,0	Point3 (X, Y, Z)
}	
}	

■ Cell File

When constructing a cell, a cell file is created. The following describe an example of a cell file

```
CELL_INIT
{
VERSION=1, 0, 0, 0

CONTROLLER(0)
{
PATH=%CELPATH%\NX100;
NAME=NX100;
RB1
        {
        NAME=HP6;
        FILE=%CELPATH%\NX100\RB1\robotinf.dat;
        }
TRACE
        {
        ROBOT=HP6;
        }
}

MANIPULATOR
{
}

NSIMVIEW
{
CAMERAPOSITION=1.806423,3.445533,2.179023;
CAMERATARGET=0.594751,0.020004,0.705908;
CAMERAUPVECTOR=-0.161379,-0.341156,0.926049;
CAMERAFIELD=2.237789,1.568312;
USERVIEW
        {
        NO=0
        NAME=
        CAMERAPOSITION=0.000000,0.000000,0.000000;
        CAMERATARGET=0.000000,0.000000,0.000000;
        CAMERAUPVECTOR=0.000000,0.000000,0.000000;
        CAMERAFIELD=0.000000,0.000000;
        }
...
USERVIEW
        {
        NO=9
        NAME=
        CAMERAPOSITION=0.000000,0.000000,0.000000;
        CAMERATARGET=0.000000,0.000000,0.000000;
        CAMERAUPVECTOR=0.000000,0.000000,0.000000;
        CAMERAFIELD=0.000000,0.000000;
        }
}

NSIMLIGHT
{
LIGHT
        {
        NO=0
        DEFINE=1;
        ONOFF=1;
        TYPE=0;
        COLOR=RGB(255,255,255);
```

```
		LIGHTPOSITION=0.000000,0.000000,0.000000;
		LIGHTTARGET=0.000000,0.000000,0.000000;
		SCALLING=100.000000;
		}
...
LIGHT
		{
		NO=4
		DEFINE=0;
		ONOFF=0;
		TYPE=0;
		COLOR=RGB(255,255,255);
		LIGHTPOSITION=0.000000,0.000000,0.000000;
		LIGHTTARGET=0.000000,0.000000,0.000000;
		SCALLING=100.000000;
		}
}

}
MODEL_INIT
{
MODEL
		{
		NAME=FLOOR;
		PARENT=world;
		FILENAME=%CELPATH%\models\floor.mdl;
		COLOR=RGB(0,0,255);
		HIDESEE=1;
		OPACITY=0.50;
		SCALE=1.000000;
		AXIS6=0,0,0,0,0,0;
		}
MODEL
		{
		NAME=Teacher;
		PARENT=world;
		FILENAME=dummy;
		COLOR=RGB(0,0,255);
		HIDESEE=256;
		OPACITY=1.00;
		SCALE=1.000000;
		AXIS6=0,0,0,0,0,0;
		}
MODEL
		{
		NAME=HP6;
		PARENT=world;
		FILENAME=%CELPATH%\NX100\RB1\robotinf.dat;
		COLOR=RGB(0,0,255);
		HIDESEE=1;
		OPACITY=1.00;
		SCALE=1.000000;
		AXIS6=0,0,450,0,0,0;
		}
MODEL
		{
		NAME=HP6_LK0;
		PARENT=HP6_rm;
		FILENAME=%CELPATH%\NX100\RB1\HP6_LK0.hsf;
		COLOR=RGB(0,0,255);
		HIDESEE=1;
		OPACITY=1.00;
		SCALE=1.000000;
		AXIS6=0,0,-450,90,0,90;
```

```
        }
MODEL
        {
        NAME=HP6_LK1;
        PARENT=HP6_link1;
        FILENAME=%CELPATH%\NX100\RB1\HP6_LK1.hsf;
        COLOR=RGB(0,0,255);
        HIDESEE=1;
        OPACITY=1.00;
        SCALE=1.000000;
        AXIS6=0,0,0,90,0,90;
        }
...
MODEL
        {
        NAME=HP6_LK6;
        PARENT=HP6_link6;
        FILENAME=%CELPATH%\NX100\RB1\HP6_LK6.hsf;
        COLOR=RGB(0,0,255);
        HIDESEE=1;
        OPACITY=1.00;
        SCALE=1.000000;
        AXIS6=0,0,0,0,0,0;
        }
MODEL_RB
        {
        NAME=HP6_rm;
        HIDESEE=1;
        OPACITY=1.00;
        }
MODEL_RB
        {
        NAME=HP6_link1;
        HIDESEE=1;
        OPACITY=1.00;
        }

...
MODEL_RB
        {
        NAME=HP6_link6;
        HIDESEE=1;
        OPACITY=1.00;
        }
MODEL_RB
        {
        NAME=HP6_flange;
        HIDESEE=1;
        OPACITY=1.00;
        }
MODEL_RB
        {
        NAME=HP6_tcp;
        HIDESEE=257;
        OPACITY=1.00;
        }
}
PAIR_INIT
{
}
```

1) VERSION Command

- VERSION=1, 0, 0, 0
  Describes the MotoSim EG version.

2) CONTROLLER Command

The CONTROLLER command describes data concerning controllers.

- CONTROLLER(0)
  Describes the Controller No. 0.
  When more than one controller is used, the controllers are provided with numbers CONTROLLER(0), CONTROLLER(1), CONTROLLER(2) ···.
- PATH=%CELPATH%\NX100;
  Describes the directory path to which the CONTROLLER refers.
  This directory needs a “VRC.BIN” file.
- NAME=NX100;
  Describes the name of the CONTROLLER.
- Control Group sub-commands (RB1, BS1,ST1)
  The control group sub-commands describes data concerning control groups. There are three type of control group RB for robot, BS for base station and ST for station. The type is followed by an index number.
  - NAME=HP6;
    Describes the name of the control group.
  - FILE=%CELPATH%\NX100\RB1\robotinf.dat;
    Describes the directory path contraining the robot models and file containing information on how the models are assemble together to make the robot.
- TRACE sub-command
  Describes that trace points are displayed at playback.
  - ROBOT=HP6;
    Name of the robot (control group) being traced.
  - MODEL=HP6_tcp;
    Name of the model being traced. If not specified, the robot TCP model is traced.
  - PARENT=world;
    Describes the name of the parent model. If not specified, the parent is the “world” model.
  - POINTS=1000;
    Description of the maximum number of trace points. If not specified, the value is 1000.

3) MANIPULATOR Command

The MANIPULATOR command describes functions to move models according to a robot axis value. Mainly used to move secondary link model of a robot.

4) NSIMVIEW Command

The NSIMVIEW command describes data related to the camera viewpoint.

5) NSIMLIGHT Command

The NSIMLIGHT command describes data related to the light type and position.

6) MODEL_INIT Command

The MODEL_INIT command describes data concerning models.

- MODEL
  Describes a MODEL.
  - NAME=HP6-A00;
    Describes the name of the MODEL.
  - PARENT=world;
    Describes the PARENT model of the MODEL.
  - FILENAME=%CELPATH%\HP6-A00\HP6-A00-MDL.mdl;
    Describes the directory path and MODEL file name to which the MODEL refers.
    If no MODEL file exists, "dummy" is described.
  - COLOR=RGB(0,0,255);
    Describes the color of the MODEL.
  - HIDESEE=1;
    Describes the display bit of the MODEL.
  - OPACITY=1.00;
    Describes the opacity of the MODEL.
  - SCALE=1.000000;
    Describes the scale factor of the MODEL.
  - AXIS6=0,0,450,0,0,0;
    Describes the relative coordinates to the MODEL PARENT.
- MODEL_RB
  Describes a robot joint model. Robot joints model define the frame of a robot joint. Only the NAME, HIDESEE and OPACITY values are defined (see above for description).

Default Models are:

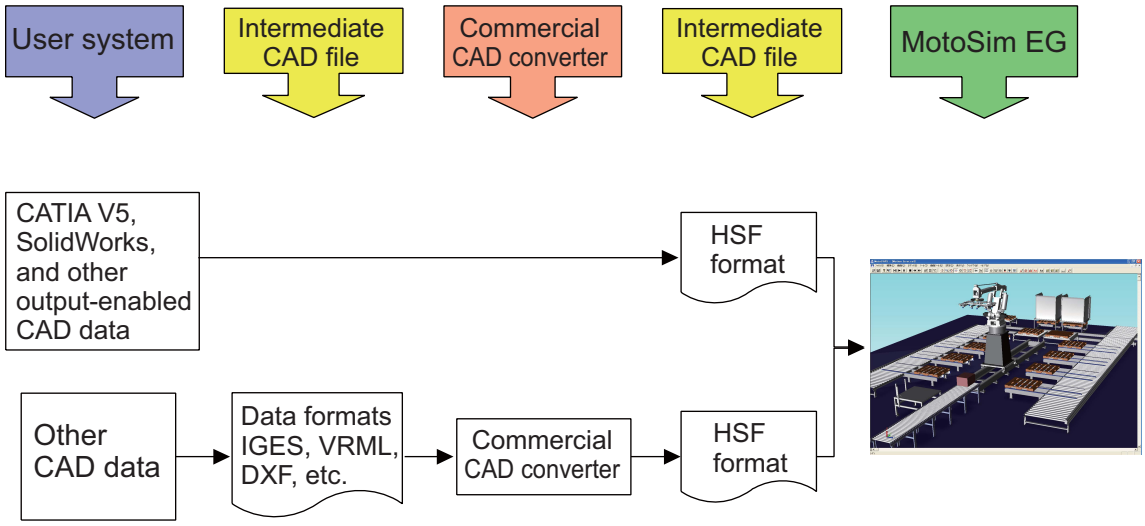
- world
  Starting point for all models. It does not appear.
- worldframe
  Displays the world position with a frame.
- Teacher
  Displays a frame to create a target coordinate on any point.
- FLOOR
  Displays world XY plane.

7) PAIR_INIT Command

The PAIR_INIT command describes pairs of models that are checked for collision when the collision detection function is active.

15.2 Reading the CAD Data with MotoSim EG-VRC

The CAD data must be converted into a form readable for MotoSim EG-VRC before starting the reading operation. The following flowchart shows the data conversion operations required for MotoSim EG-VRC.



NOTE The CAD converters "PolyTrans" and "Inovate" are not included with MotoSim EG-VRC. Prepare such application software before the operation.
PolyTrans: Okino Computer Graphics (http://www.okino.com)
Inovate: IRONCAD (http://www.ironcad.com)

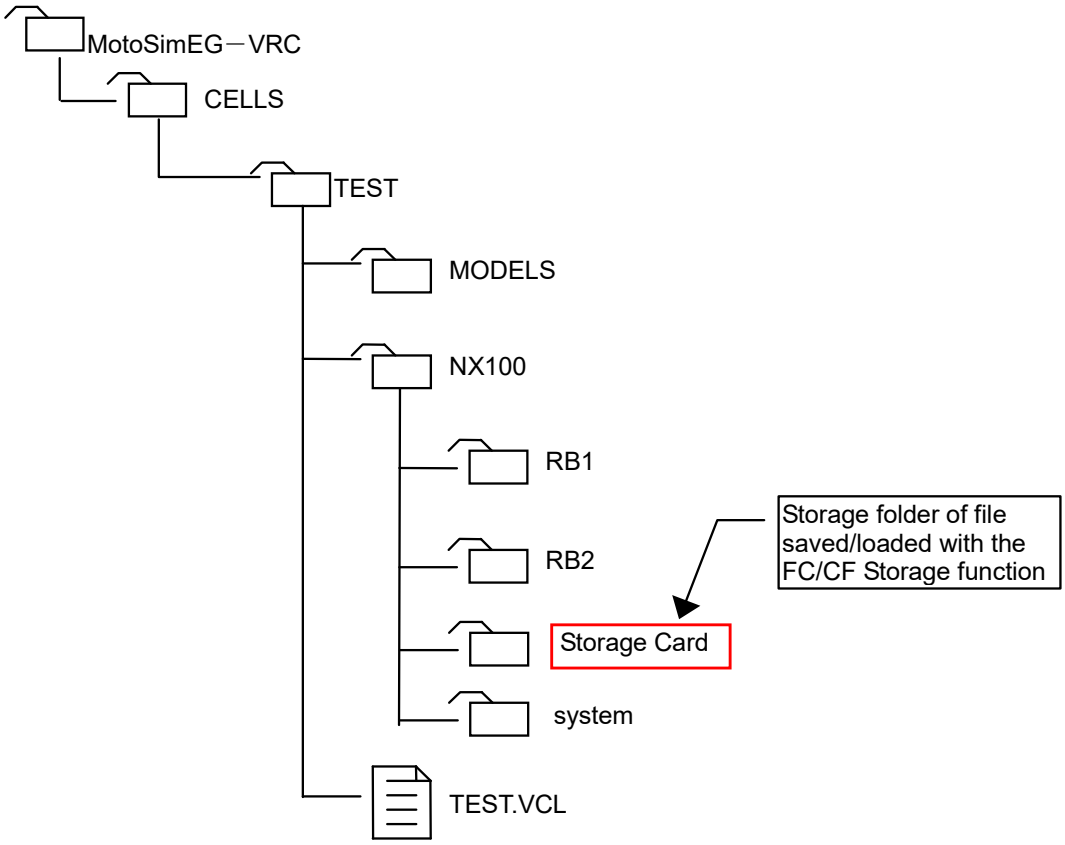
15.3 Storage Card

The FD/CF function of the Virtual Pendant is used to save or load MotoSim EG-VRC data such as edited jobs, condition files, etc.

15.3.1 Folder Structure

The folder used to save or load data files is the “Storage Card” folder located under the controller folder of the cell (for example in the figure below: \Cells\Test\NX100). Data saved or loaded are put in this folder. Like with the real controller, it is possible to create sub-folder under the “Storage Card” folder, and also load/save data from those folders.

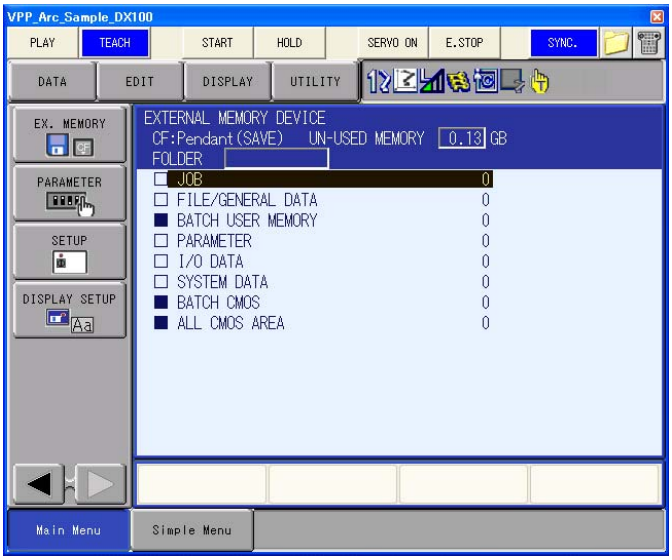
When the  button in the virtual pendant is clicked, the target folder can be opened.



15.3.2 Save controller data created with MotoSim EG-VRC

Procedure

1. Select {FD/CF} - {SAVE} from the Virtual Pendant main menu.



2. Select the type of data to be saved. For the figure below, {JOB} was selected. The list of files (in this case, the list of jobs) will display.

3. Select the files to be saved by moving the cursor on the file name and, press the [Space-bar] on the keyboard or click [Select] in the Virtual Pendant keypad. The selected files will be marked by a star ★ mark on there left.

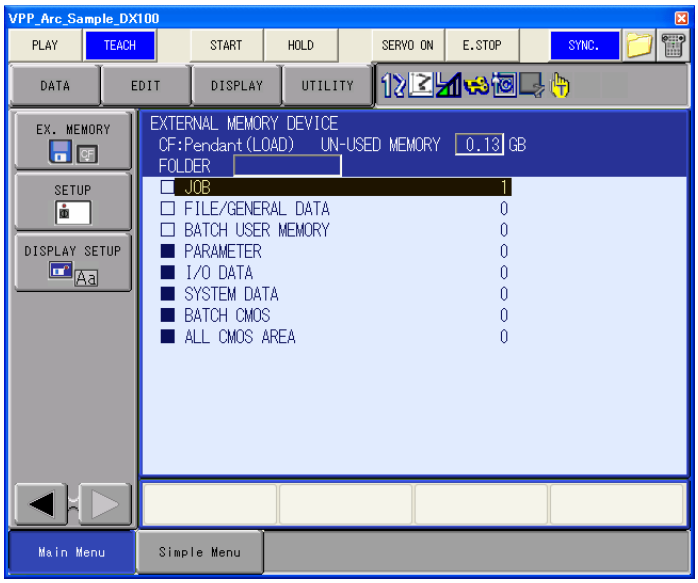
4. Press [Enter]. Select [Yes] in the confirmation dialog box that will display. The selected files will be saved in the “Storage Card”.

NOTE Files cannot be overwritten. If the files already exist, an error message will display. First delete the existing file or select a different folder, then proceed with the save operation.

15.3.3 Load controller data to MotoSim EG-VRC

Procedure

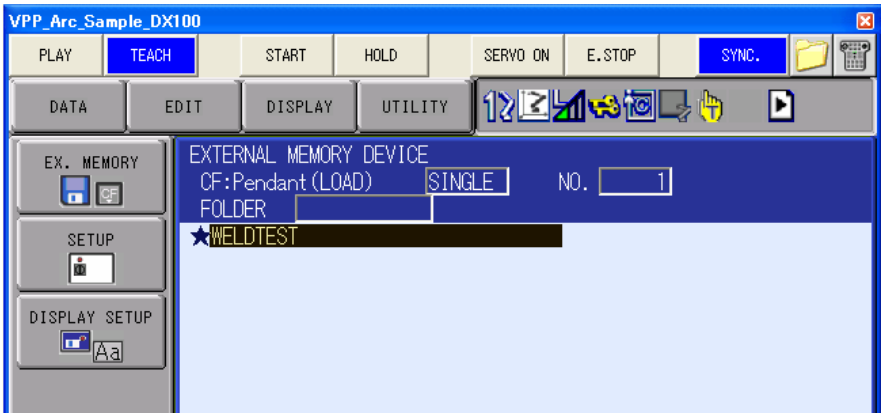
1. Select {FD/CF} - {LOAD} from the Virtual Pendant main menu.



2. Select the type of data to be saved. For the figure below, {JOB} was selected. The list of files in the “Storage Card” folder (in this case, the list of jobs) will display.

NOTE Unlike Windows, the VRC controller is case sensitive for the file names. File names need to be entered with all capital letters or they will not be detected in the “Storage Card” folder. If this is not the case, rename the file name with Windows Explorer so that the names are written in capital letters.

3. Select the files to be loaded by moving the cursor on the file name and, press the [Space-bar] on the keyboard or click [Select] on the Virtual Pendant keypad. The selected files will be marked by a star ★ mark.



4. Press [Enter]. Select [Yes] in the confirmation dialog box that will display. The selected files will be loaded to the MotoSim EG-VRC controller.

NOTE Job files cannot be loaded, if they already exist in the controller.
In such case, first rename or delete the existing job, then proceed with the load operation.

15.4 Standard function about YRC1000

○:Enable, △:Display only, ×:Disable

Main Menu	Main Menu Item	Menu	Menu Item	Correspondence
JOB	JOB	JOB		○
		EDIT		○
		DISPLAY	JOB HEADER	○
			ENABLE STEP NO	○
			ENABLE TOOL NO	○
			ARC INFORMATION (ARC)	○
			TIME MEASUREMENT	○
			WELD LINE TABLE (ARC)	×
		UTILITY	SETUP SPECIAL RUN	○
			PARALLEL SHIFT JOB	○
			MIRROR SHIFT	○
			PAM	×
			ARC SHIFT CANCEL (ARC)	○
	SELECT JOB			○
	CREATE NEW JOB			○
	MASTER JOB			○
	JOB CAPACITY			○
	JOB REGISTRATION (PAINT, SEALING)			○
	CYCLE			○
	JOB EDIT(PLAY)			○
	PLAY EDIT JOB LIST			○
	SECURITY_JOB LIST			○
	USED CONDITION SEARCH (ARC)			○
VARIABLE				○
IN/OUT	EXTERNAL INPUT			△
	EXTERNAL OUTPUT			△
	GENERAL PURPOSE INPUT			△
	GENERAL PURPOSE OUTPUT			△

Main Menu	Main Menu Item	Menu	Menu Item	Correspondence
	SPECIFIC INPUT			△
	SPECIFIC OUTPUT			△
	RIN			△
	REGISTER			△
	AUXILIARY RELAY			△
	INTERNAL CONTROL STATUS			△
	PSEUDO INPUT SIG			△
	NETWORK INPUT			△
	NETWORK OUTPUT			△
	ANALOG OUTPUT			△
	SV POWER STATUS			△
	LADDER PROGRAM			△
	I/O ALARM			△
	I/O MESSAGE			△
	REMOTE			×
	TERMINAL			△
	IO SIMULATION LIST			△
	SERVO ON FACTOR			×
	RB STOP FACTOR MONITOR			△
	USER GROUP INPUT			△
	USER GROUP OUTPUT			△
ROBOT	CURRENT POSITION			○
	COMMAND POSITION			○
	SERVO MONITOR			×
	WORK HOME POS			○
	SECOND HOME POS			○
	DROP AMOUNT			×
	POWER ON/OFF POS			×
	TOOL			○
	INTERFERENCE			○
	SHOCK SENS LEVEL			×
	USER COORDINATE			○
	HOME POSITION			○
	MANIPULATOR TYPE			○
	ANALOG MONITOR			×
	OVERRUN&S-SENSOR			×

Main Menu	Main Menu Item	Menu	Menu Item	Correspondence
	LIMIT RELEASE			○
	ARM CONTROL			○
	SHIFT VALUE			○
	SOFTLIMIT SETTING			○
	SHOCK SENS LV. (CURRENT)			×
SYSTEM INFO	VERSION			○
	MONITORING TIME			×
	CONTROLLER INFORMATION			○
	ALARM HISTORY			○
	ALM CONT. CUSTOMIZE			×
	I/O MSG HISTORY			○
	LOGDATA			○
	USER DEFINITION MENU			○
	SECURITY			○
EX. MEMORY	LOAD			○
	SAVE			○
	VERIFY			○
	DELETE			○
	FOLDER			○
PARAMETER				△
SETUP	TEACHING COND.		LANGUAGE LEVEL	○
			INSTRUCTION INPUT LEARNING	○
			MOVE INSTRUCTION SET POSITION	○
			BUZZER WHEN POSITION TEACHING	○
			STEP ONLY CHANGING	○
			RECT/CYLINDRICAL	○
			TOOL NO. SWITCH	○
			TOOL NO. INTLK FOR STEP ENTRY	○
			CHECK AT P-VAR TOOL NO. CHANGE	○
			POS. TEACH ONLY JOG CONTROL GROUP	○
			JOB UNDELETE FUNCTION	×

Main Menu	Main Menu Item	Menu	Menu Item	Correspondence
			TEST RUN CONTROL	○
			MANUAL SPEED SELECT (TEST RUN)	○
			USER ALARM CAPACITY	○
			PROMP BEF OVERWRITE POS VARIABLE	○
		DATA	RESET INSTRUCTION	×
	OPERATE COND.		SPEED DATA INPUT FORM	○
			CYCLE SWITCH IN TEACH MODE	○
			CYCLE SWITCH IN PLAY MODE	○
			CYCLE SWITCH IN LOCAL MODE	×
			CYCLE SWITCH IN REMOTE MODE	×
			SET CYCLE ON POWER ON	○
			SECURITY MODE WHEN POWER ON	×
			JOB STEP WHEN POWER ON	○
			GENERAL OUT KEEP WHEN POWER ON	×
			SV ON READY OFF AT DSW RELEASED	×
	OPERATE ENABLE		EXTERNAL START	×
			PP START	○
			EXTERNAL MODE SWITCH	×
			EXTERNAL CYCLE SWITCH	×
			PP CYCLE SWITCH	○
			EXTERNAL SERVO ON	×
			PP SERVO ON	×
			DSW SERVO ON	×
	FUNCTION ENABLE		MASTER JOB CHANGE	○
			RESERVED START	×
			RESERVED START JOB CHANGE	×
			JOB SELECT WHEN PLAY MODE	○

Main Menu	Main Menu Item	Menu	Menu Item	Correspondence
			JOB SELECT WHEN REMOTE AND PLAY	○
			I/O-VARIABLE CUSTOMIZE FUNCTION	×
			GENERAL I/O NAME DISP. ON JOB	○
			ANTICIPATION FUNCTION	×
			ALL AXES ANGLE DISP FUNCTION	○
			PENDANT BUZZER FUNCTION	△
	JOG COND.			○
	PLAYBACK COND.		CHECK/MACHINE LOCK	○
			MASTER CALLING UP	○
			INITIAL MOVE SPEED OF ROBOT	×
			START METHOD AFTER ABSO OVER	×
			SIGNAL NO. WHEN DROP VALUE OVER	×
	FUNCTION COND.			×
	DISPLAY COLOR COND.			○
	LOGDATA COND.			×
	DATE/TIME			○
	SET WORD			○
	RESERVE JOB NAME			×
	USER ID			○
	SET SPEED			○
	KEY ALLOCATION			×
	SIMULTANEOUS KEY HELP			○
	JOG KEY ALLOC.			○
	WRONG DATA LOG			○
	ENERGY SAVING FUNCTION			×
	ENCODER MAINTENANCE			×
	SETTM SETUP			○
	SPEED OVERRIDE SETTING			○
SAFETY FUNC.	TIMER DELAY SET			○
	SAFETY LOGIC CIRCUIT			○

Main Menu	Main Menu Item	Menu	Menu Item	Correspondence
	SLC SIGNAL DISPLAY			×
	SLC SIGNAL DISPLAY SET			○
	SPIN COMMENT SET			○
	TOTAL CRC DISPLAY			×
DISPLAY SETUP				○
ARC WELDING (ARC, JIG-LESS ARC)	ARC START COND.			○ *1
	ARC END COND.			○ *1
	ARC AUX COND.			○
	POWER SOURCE COND.			○
	ARC WELD DIAG.			○
	WEAVING			○
	ARC MONITOR			○
	ARC MONITOR (SAMPL)			○
	APPLI COND.(JIGLESS ARC)			× *2
HANDLING	HANDLING DIAG.			×
SPOT WELD-ING (SPOT)	WELD DIAGNOSIS			×
	I/O ALLOCATION			○
	GUN CONDITION			○
	SPOT POWER SOURCE COND.			○
	TIP DRESS SUPERVI-SION			×
	APPLI COND.			○
SPOT WELD-ING (MOTOR GUN)	SPOT SUPERVISION			×
	CLEARANCE SETTING			○
	PRESSURE			○
	GUN PRESSURE			○
	TIP DRESS CONDITION			×
	TIP DRESS SUPERVI-SION			×
	GUN CONDITION			○
	GUN DETAIL SETTING			○
	WELDER IF			×

Main Menu	Main Menu Item	Menu	Menu Item	Correspondence
	I/O ALLOCATION			○
	PRSSR ERR DETECT			×
	PRSSR ERR DETECT HIST			×
	APPLI COND.			○
GENERAL	WEAVING			○
	GENERAL DIAG.			×
PAINT (PAINT, PAINT(NP)	PAINT SYS CONFIG			○
	PAINTING SPECIAL			○
	PAINT CONDITION			○
	CALIBRATION CONFIG			○
	TIME CHART CONFIG			○
	TIME CHART			×
	PAINT DATA CONFIG			○
	PAINT OUTPUT TEST			×
SEALING	SEAL SYS CONFIG			○
	SEAL SPECIAL			○
	SEAL CONDITION			○
	SEAL CALIBRATION CONFIG			○
	DEVICE CALIB. CONFIG			○
	SPEED TRACK. CONDITION			○
	CORRECTION TABLE CONFIG			○
	APPLICATION DATA CONFIG			○
Maintenance mode				
SYSTEM	INITIALIZE			○
	SETUP		LANGUAGE	○
			CONTROL GROUP	○
			APPLICATION	○
			OPTION BOARD	○
			IO MODULE	○
			CMOS MEMORY	×
			DATE/TIME	×
			OPTION FUNCTION	○ *3
	VERSION			○

Main Menu	Main Menu Item	Menu	Menu Item	Correspondence
	CONTROLLER INFORMATION			○
	ALARM HISTORY			○
	SD ACCESS			×
	TIMESTAMP INFORMATION			○
	SECURITY			○
FILE				○
EX. MEMORY				○
TOOL				×
DISPLAY SETUP				○

1 Graphical setting display is not supported.
2 WELDING SPEED PRIORITY can be used only.
3 Please refer to section " 1.2.1 Optional Functionof controller " for the list of each optional function.

15.5 Standard function about YRC1000micro

○:Enable, △:Display only, ×:Disable

Main Menu	Main Menu Item	Menu	Menu Item	Correspondence
JOB	JOB	JOB		○
		EDIT		○
		DISPLAY		○
		UTILITY	SETUP SPECIAL RUN	○
			PARALLEL SHIFT JOB	○
			MIRROR SHIFT	○
			PAM	×
	SELECT JOB			○
	CREATE NEW JOB			○
	MASTER JOB			○
	JOB CAPACITY			○
	CYCLE			○
	JOB EDIT(PLAY)			○
	PLAY EDIT JOB LIST			○
	SECURITY_JOB LIST			○
VARIABLE				○
IN/OUT	EXTERNAL INPUT			△
	EXTERNAL OUTPUT			△
	GENERAL PURPOSE INPUT			△
	GENERAL PURPOSE OUTPUT			△
	SPECIFIC INPUT			△
	SPECIFIC OUTPUT			△
	RIN			△
	REGISTER			△
	AUXILIARY RELAY			△
	INTERNAL CONTROL STATUS			△
	PSEUDO INPUT SIG			△
	NETWORK INPUT			△
	NETWORK OUTPUT			△
	ANALOG OUTPUT			△
	SV POWER STATUS			△

Main Menu	Main Menu Item	Menu	Menu Item	Correspondence
	LADDER PROGRAM			△
	I/O ALARM			△
	I/O MESSAGE			△
	REMOTE			×
	TERMINAL			△
	IO SIMULATION LIST			△
	SERVO ON FACTOR			×
	RB STOP FACTOR MONITOR			△
	USER GROUP INPUT			△
	USER GROUP OUTPUT			△
ROBOT	CURRENT POSITION			○
	COMMAND POSITION			○
	SERVO MONITOR			×
	WORK HOME POS			○
	SECOND HOME POS			○
	DROP AMOUNT			×
	POWER ON/OFF POS			×
	TOOL			○
	INTERFERENCE			○
	SHOCK SENS LEVEL			×
	USER COORDINATE			○
	HOME POSITION			○
	MANIPULATOR TYPE			○
	ANALOG MONITOR			×
	OVERRUN&S-SENSOR			×
	LIMIT RELEASE			○
	ARM CONTROL			○
	SHIFT VALUE			○
	MANUAL BRAKE RELEASE			×
	SOFTLIMIT SETTING			○
	SHOCK SENS LV. (CURRENT)			×
SYSTEM INFO	VERSION			○
	MONITORING TIME			×
	CONTROLLER INFORMATION			○
	ALARM HISTORY			○

Main Menu	Main Menu Item	Menu	Menu Item	Correspondence
	ALM CONT. CUSTOMIZE			×
	I/O MSG HISTORY			○
	LOGDATA			○
	USER DEFINITION MENU			○
	SECURITY			○
EX. MEMORY	LOAD			○
	SAVE			○
	VERIFY			○
	DELETE			○
	FOLDER			○
PARAMETER				△
SETUP	TEACHING COND.		LANGUAGE LEVEL	○
			INSTRUCTION INPUT LEARNING	○
			MOVE INSTRUCTION SET POSITION	○
			BUZZER WHEN POSITION TEACHING	○
			STEP ONLY CHANGING	○
			RECT/CYLINDRICAL	○
			TOOL NO. SWITCH	○
			TOOL NO. INTLK FOR STEP ENTRY	○
			CHECK AT P-VAR TOOL NO. CHANGE	○
			POS. TEACH ONLY JOG CONTROL GROUP	○
			JOB UNDELETE FUNCTION	×
			TEST RUN CONTROL	○
			MANUAL SPEED SELECT (TEST RUN)	○
		DATA	RESET INSTRUCTION	×
	OPERATE COND.		SPEED DATA INPUT FORM	○
			CYCLE SWITCH IN TEACH MODE	○
			CYCLE SWITCH IN PLAY MODE	○
			CYCLE SWITCH IN LOCAL MODE	×

Main Menu	Main Menu Item	Menu	Menu Item	Correspondence
			CYCLE SWITCH IN REMOTE MODE	×
			SET CYCLE ON POWER ON	○
			SECURITY MODE WHEN POWER ON	×
			JOB STEP WHEN POWER ON	○
			GENERAL OUT KEEP WHEN POWER ON	×
			SERVO ON READY OFF WHEN DSW RELEASE	×
	OPERATE ENABLE		EXTERNAL START	×
			PP START	○
			EXTERNAL MODE SWITCH	×
			EXTERNAL CYCLE SWITCH	×
			PP CYCLE SWITCH	○
			EXTERNAL SERVO ON	×
			PP SERVO ON	×
			DSW SERVO ON	×
	FUNCTION ENABLE		MASTER JOB CHANGE	○
			RESERVED START	×
			RESERVED START JOB CHANGE	×
			JOB SELECT WHEN PLAY MODE	○
			JOB SELECT WHEN REMOTE AND PLAY	○
			I/O-VARIABLE CUSTOMIZE FUNCTION	×
			GENERAL I/O NAME DISP. ON JOB	○
			ANTICIPATION FUNCTION	×
			ALL AXES ANGLE DISP FUNCTION	○
			PENDANT BUZZER	△
	JOG COND.			○
	PLAYBACK COND.		CHECK/MACHINE LOCK	○
			MASTER CALLING UP	○
			INITIAL MOVE SPEED OF ROBOT	×

Main Menu	Main Menu Item	Menu	Menu Item	Correspondence
			START METHOD AFTER ABSO OVER	×
			SIGNAL NO. WHEN DROP VALUE OVER	×
	FUNCTION COND.			×
	DISPLAY COLOR COND.			○
	LOGDATA COND.			×
	DATE/TIME			○
	SET WORD			○
	RESERVE JOB NAME			×
	USER ID			○
	SET SPEED			○
	KEY ALLOCATION			×
	SIMULTANEOUS KEY HELP			○
	JOG KEY ALLOC.			○
	WRONG DATA LOG			○
	ENERGY SAVING FUNC-TION			×
	ENCODER MAINTE-NANCE			×
	SETTM SETUP			○
SAFETY FUNC.	TIMER DELAY SET			○
	SAFETY LOGIC CIRCUIT			○
	SLC SIGNAL DISPLAY			×
	SLC SIGNAL DISPLAY SET			○
	SPIN COMMENT SET			○
	TOTAL CRC DISPLAY			×
DISPLAY SETUP				○
GENERAL	WEAVING			○
	GENERAL DIAG.			×
Maintenance mode				
SYSTEM	INITIALIZE			○
	SETUP		LANGUAGE	○
			CONTROL GROUP	○
			OPTION BOARD	○
			IO MODULE	○
			CMOS MEMORY	×

Main Menu	Main Menu Item	Menu	Menu Item	Correspondence
			DATE/TIME	×
			OPTION FUNCTION	○ *3
	VERSION			○
	CONTROLLER INFORMATION			○
	ALARM HISTORY			○
	SD ACCESS			×
	TIMESTAMP INFORMATION			○
	SECURITY			○
FILE				○
EX. MEMORY				○
TOOL				×
DISPLAY SETUP				○

15.6 Standard function about DX200

○:Enable, △:Display only, ×:Disable

Main Menu	Main Menu Item	Menu	Menu Item	Correspondence
JOB	JOB	JOB		○
		EDIT		○
		DISPLAY		○
		UTILITY	SETUP SPECIAL RUN	○
			PARALLEL SHIFT JOB	○
			MIRROR SHIFT	○
			PAM	×
			ARC SHIFT CANCEL (ARC)	○
	SELECT JOB			○
	CREATE NEW JOB			○
	MASTER JOB			○
	JOB CAPACITY			○
	JOB REGISTRATION (PAINT)			○
	CYCLE			○
	JOB EDIT(PLAY)			○
	PLAY EDIT JOB LIST			○
VARIABLE				○
IN/OUT	EXTERNAL INPUT			△
	EXTERNAL OUTPUT			△
	UNIVERSAL INPUT			△
	UNIVERSAL OUTPUT			△
	SPECIFIC INPUT			△
	SPECIFIC OUTPUT			△
	RIN			△
	REGISTER			△
	AUXILIARY RELAY			△
	CONTROL INPUT			△
	PSEUDO INPUT SIG			△
	NETWORK INPUT			△
	NETWORK OUTPUT			△
	ANALOG OUTPUT			△

Main Menu	Main Menu Item	Menu	Menu Item	Correspondence
	SV POWER STATUS			△
	LADDER PROGRAM			△
	I/O ALARM			△
	I/O MESSAGE			△
	TERMINAL			△
	IO SIMULATION LIST			△
	SERVO ON FACTOR			×
	RB STOP FACTOR MONITOR			△
ROBOT	CURRENT POSITION			○
	COMMAND POSITION			○
	SERVO MONITOR			×
	WORK HOME POS			○
	SECOND HOME POS			○
	DROP AMOUNT			×
	POWER ON/OFF POS			×
	TOOL			○
	INTERFERENCE			○
	SHOCK SENS LEVEL			×
	USER COORDINATE			○
	HOME POSITION			○
	MANIPULATOR TYPE			○
	ANALOG MONITOR			×
	OVERRUN&S-SENSOR			×
	LIMIT RELEASE			○
	ARM CONTROL			○
	SHIFT VALUE			○
	SOFTLIMIT SETTING			○
	SHOCK SENS LV. (CURRENT)			×
SYSTEM INFO	VERSION			○
	MONITORING TIME			×
	CONTROLLER INFORMATION			○
	ALARM HISTORY			○
	I/O MSG HISTORY			○
	LOGDATA			○
	USER DEFINITION MENU			○

Main Menu	Main Menu Item	Menu	Menu Item	Correspondence
	SECURITY			○
EX. MEMORY	LOAD			○
	SAVE			○
	VERIFY			○
	DELETE			○
	FOLDER			○
PARAMETER				△
SETUP	TEACHING COND.		LANGUAGE LEVEL	○
			INSTRUCTION INPUT LEARNING	○
			MOVE INSTRUCTION SET POSITION	○
			BUZZER WHEN POSITION TEACHING	○
			STEP ONLY CHANGING	○
			RECT/CYLINDRICAL	○
			TOOL NO. SWITCH	○
			TOOL NO. INTLK FOR STEP ENTRY	○
			CHECK AT P-VAR TOOL NO. CHANGE	○
			POS. TEACH ONLY JOG CONTROL GROUP	○
			JOB UNDELETE FUNCTION	×
			TEST RUN CONTROL	○
			MANUAL SPEED SELECT(TEST RUN)	○
		DATA	RESET INSTRUCTION	×
	OPERATE COND.		SPEED DATA INPUT FORM	○
			CYCLE SWITCH IN TEACH MODE	○
			CYCLE SWITCH IN PLAY MODE	○
			CYCLE SWITCH IN LOCAL MODE	×
			CYCLE SWITCH IN REMOTE MODE	×
			SET CYCLE ON POWER ON	○
			SECURITY MODE WHEN POWER ON	○

Main Menu	Main Menu Item	Menu	Menu Item	Correspondence
			JOB STEP WHEN POWER ON	○
			GENERAL OUT KEEP WHEN POWER ON	×
	OPERATE ENABLE		EXTERNAL START	×
			PP START	○
			EXTERNAL MODE SWITCH	×
			EXTERNAL CYCLE SWITCH	×
			PP CYCLE SWITCH	○
			EXTERNAL SERVO ON	×
			PP SERVO ON	×
			DSW SERVO ON	×
	FUNCTION ENABLE		MASTER JOB CHANGE	○
			RESERVED START	×
			RESERVED START JOB CHANGE	×
			JOB SELECT WHEN PLAY MODE	○
			JOB SELECT WHEN REMOTE AND PLAY	○
			I/O-VARIABLE CUSTOM-IZE FUNCTION	×
			GENERAL I/O NAME DISP. ON JOB	○
			ANTICIPATION FUNC-TION	×
			ALL AXES ANGLE DISP FUNCTION	○
			CURSOR MOVE BY TOUCH(JOB)	×
	JOG COND.			○
	PLAYBACK COND.		CHECK/MACHINE LOCK	○
			MASTER CALLING UP	○
			INITIAL MOVE SPEED OF ROBOT	×
			START METHOD AFTER ABSO OVER	×
			SIGNAL NO. WHEN DROP VALUE OVER	×
	FUNCTION COND.			×
	DISPLAY COLOR COND.			○
	LOGDATA COND.			×

Main Menu	Main Menu Item	Menu	Menu Item	Correspondence
	DATE/TIME			○
	RESERVE JOB NAME			×
	USER ID			○
	SET SPEED			○
	KEY ALLOCATION			×
	JOG KEY ALLOC.			○
	WRONG DATA LOG			○
	ENERGY SAVING FUNCTION			×
	ENCODER MAINTENANCE			×
	SETTM SETUP			○
SAFETY FUNC.	M-SAFETY SIGNAL ALLOC			○
	TIMER DELAY SET			○
	SAFETY LOGIC CIRCUIT			○
	TOTAL CRC DISPLAY			×
DISPLAY SETUP				○
ARC WELDING (ARC, JIGLESS ARC)	ARC START COND.			○ *1
	ARC END COND.			○ *1
	ARC AUX COND.			○
	POWER SOURCE COND.			○
	ARC WELD DIAG.			○
	WEAVING			○
	ARC MONITOR			×
	ARC MONITOR (SAMPL)			×
	APPLI COND.(ARC)			○
	APPLI COND.(JIGLESS ARC)			× *2
HANDLING	HANDLING DIAG.			×
SPOT WELDING (SPOT)	WELD DIAGNOSIS			×
	I/O ALLOCATION			○
	GUN CONDITION			○
	SPOT POWER SOURCE COND.			○
	TIP DRESS SUPERVISION			×

Main Menu	Main Menu Item	Menu	Menu Item	Correspondence
	APPLI COND.			○
SPOT WELDING (MOTOR GUN)	SPOT SUPERVISION			×
	CLEARANCE SETTING			○
	PRESSURE			○
	GUN PRESSURE			○
	TIP DRESS CONDITION			×
	TIP DRESS SUPERVISION			×
	GUN CONDITION			○
	GUN DETAIL SETTING			○
	WELDER I/F			×
	I/O ALLOCATION			○
	APPLI COND.			○
GENERAL	WEAVING			○
	GENERAL DIAG.			×
PAINT (PAINT, PAINT(NP))	PAINT SYS CONFIG			○
	PAINTING SPECIAL			○
	PAINT CONDITION			○
	CALIBRATION CONFIG			○
	TIME CHART CONFIG			○
	TIME CHART			×
	PAINT DATA CONFIG			○
	PAINT OUTPUT TEST			×
Maintenance mode				
SYSTEM	INITIALIZE			○
	SETUP		LANGUAGE	○
			CONTROL GROUP	○
			APPLICATION	○
			OPTION BOARD	○
			IO MODULE	○
			CMOS MEMORY	×
			DATE/TIME	×
			OPTION FUNCTION	○ *3
	VERSION			○
	SECURITY			○

Main Menu	Main Menu Item	Menu	Menu Item	Correspondence
FILE				○
EX. MEMORY	LOAD			○
	DEVICE			△
	FOLDER			×
TOOL				×
DISPLAY SETUP				○

1 Graphical setting display is not supported.
2 WELDING SPEED PRIORITY can be used only.
3 Please refer to section " 1.2.1 Optional Functionof controller " for the list of each optional function.

15.7 Standard function about DX100

○:Enable, △:Display only, ×:Disable

Main Menu	Main Menu Item	Menu	Menu Item	Correspondence
JOB	JOB	JOB		○
		EDIT		○
		DISPLAY		○
		UTILITY	SETUP SPECIAL RUN	○
			PARALLEL SHIFT JOB	○
			MIRROR SHIFT	○
			PAM	×
			SPEED OVERRIDE	○
			COND ADJUSTMENT	×
	SELECT JOB			○
	CREATE NEW JOB			○
	MASTER JOB			○
	JOB CAPACITY			○
	CYCLE			○
	JOB EDIT(PLAY)			○
	PLAY EDIT JOB LIST			○
VARIABLE				○
IN/OUT	EXTERNAL INPUT			△
	EXTERNAL OUTPUT			△
	UNIVERSAL INPUT			△
	UNIVERSAL OUTPUT			△
	SPECIFIC INPUT			△
	SPECIFIC OUTPUT			△
	RIN			△
	CPRIN			△
	REGISTER			△
	AUXILIARY RELAY			△
	CONTROL INPUT			△
	PSEUDO INPUT SIG			△
	NETWORK INPUT			△
	NETWORK OUTPUT			△
	ANALOG OUTPUT			△

Main Menu	Main Menu Item	Menu	Menu Item	Correspondence
	SV POWER STATUS			△
	LADDER PROGRAM			△
	I/O ALARM			△
	I/O MESSAGE			△
	TERMINAL			△
	IO SIMULATION LIST			△
ROBOT	CURRENT POSITION			○
	COMMAND POSITION			○
	SERVO MONITOR			×
	WORK HOME POS			○
	SECOND HOME POS			○
	DROP AMOUNT			×
	POWER ON/OFF POS			×
	TOOL			○
	INTERFERENCE			○
	SHOCK SENS LEVEL			×
	USER COORDINATE			○
	HOME POSITION			○
	MANIPULATOR TYPE			○
	ANALOG MONITOR			×
	OVERRUN&S-SENSOR			×
	LIMIT RELEASE			○
	ARM CONTROL			○
	SHIFT VALUE			○
	SOFTLIMIT SETIING			○
SYSTEM INFO	VERSION			○
	MONITORING TIME			×
	ALARM HISTORY			○
	I/O MSG HISTORY			○
	USER DEFINITION MENU			○
	SECURITY			○
EX. MEMORY	LOAD			○
	SAVE			○
	VERIFY			○
	DELETE			○
	FOLDER			○

Main Menu	Main Menu Item	Menu	Menu Item	Correspondence
PARAMETER				△
SETUP	TEACHING COND.	DATA	RESET INSTRUCTION	×
			LANGUAGE LEVEL	○
			INSTRUCTION INPUT LEARNING	○
			MOVE INSTRUCTION SET POSITION	○
			BUZZER WHEN POSITION TEACHING	○
			STEP ONLY CHANGING	○
			RECT/CYLINDRICAL	○
			TOOL NO. SWITCH	○
			TOOL NO. INTLK FOR STEP ENTRY	○
			CHECK AT P-VAR TOOL NO. CHANGE	○
			POS. TEACH ONLY JOG CONTROL GROUP	○
			JOB UNDELETE FUNCTION	×
	OPERATE COND.		SPEED DATA INPUT FORM	○
			CYCLE SWITCH IN TEACH MODE	○
			CYCLE SWITCH IN PLAY MODE	○
			CYCLE SWITCH IN LOCAL MODE	×
			CYCLE SWITCH IN REMOTE MODE	×
			SET CYCLE ON POWER ON	○
			SECURITY MODE WHEN POWER ON	○
			JOB STEP WHEN POWER ON	○
			GENERAL OUT KEEP WHEN POWER ON	×
	OPERATE ENABLE		EXTERNAL START	×
			PP START	○
			EXTERNAL MODE SWITCH	×
			EXTERNAL CYCLE SWITCH	×
			PP CYCLE SWITCH	○

Main Menu	Main Menu Item	Menu	Menu Item	Correspondence
			EXTERNAL SERVO ON	×
			PP SERVO ON	×
			DSW SERVO ON	×
	FUNCTION ENABLE		MASTER JOB CHANGE	○
			RESERVED START	×
			RESERVED START JOB CHANGE	×
			JOB SELECT WHEN PLAY MODE	○
			JOB SELECT WHEN REMOTE AND PLAY	○
			I/O-VARIABLE CUSTOMIZE FUNCTION	×
			GENERAL I/O NAME DISP. ON JOB	○
			ANTICIPATION FUNCTION	×
			ALL AXES ANGLE DISP FUNCTION	○
	JOG COND.			○
	PLAYBACK COND.		CHECK/MACHINE LOCK	○
			MASTER CALLING UP	○
			INITIAL MOVE SPEED OF ROBOT	×
			START METHOD AFTER ABSO OVER	×
			SIGNAL NO. WHEN DROP VALUE OVER	×
	FUNCTION COND.			×
	DISPLAY COLOR COND.			○
	DATE/TIME			○
	RESERVE JOB NAME			×
	USER ID			○
	SET SPEED			○
	KEY ALLOCATION			×
	JOG KEY ALLOC.			○
	WRONG DATA LOG			○
	ENERGY SAVING FUNCTION			×
	ENCODER MAINTENANCE			×
DISPLAY SETUP				○

Main Menu	Main Menu Item	Menu	Menu Item	Correspondence
ARC WELDING	ARC START COND.			○ *1
	ARC END COND.			○ *1
	ARC AUX COND.			○
	POWER SOURCE COND.			○
	ARC WELD DIAG.			×
	WEAVING			○
	ARC MONITOR			×
	ARC MONITOR (SAMPL)			×
	APPLI COND.			× *2
HANDLING	HANDLING DIAG.			×
ARC WELDING (JIGLESS ARC)	ARC START COND.			○ *1
	ARC END COND.			○ *1
	ARC AUX COND.			○
	POWER SOURCE COND.			○
	ARC WELD DIAG.			×
	WEAVING			○
	ARC MONITOR			×
	ARC MONITOR (SAMPL)			×
SPOT WELDING (SPOT)	WELD DIAGNOSIS			×
	I/O ALLOCATION			○
	GUN CONDITION			○
	SPOT POWER SOURCE COND.			○
	APPLI COND.			○
GENERAL	WEAVING			○
	GENERAL DIAG.			×
SPOT WELDING (MOTOR GUN)	WELD DIAGNOSIS			×
	GUN PRESSURE			○
	PRESSURE			○
	I/O ALLOCATION			○
	GUN CONDITION			○
	CLEARANCE SETTING			○
	TIP INSTALLATION			×

Main Menu	Main Menu Item	Menu	Menu Item	Correspondence
	SPOT POWER SOURCE COND.			○
	APPLI COND.			○
Maintenance mode				
SYSTEM	INITIALIZE			○
	SETUP		LANGUAGE	○
			CONTROL GROUP	○
			APPLICATION	○
			OPTION BOARD	○
			IO MODULE	○
			CMOS MEMORY	×
			DATE/TIME	△
			OPTION FUNCTION	○ *3
	VERSION			○
	SECURITY			○
FILE				○
EX. MEMORY	LOAD			○
	SAVE			×
	SYSTEM RESTORE			×
	DEVICE			△
	FOLDER			×
TOOL				×
DISPLAY SETUP				○

1 Graphical setting display is not supported.
2 WELDING SPEED PRIORITY can be used only.
3 Please refer to section " 1.2.1 Optional Functionof controller " for the list of each optional function.

15.8 List of Function depending on the system version of controller

■ YRC1000

Function	Version
	YAS4.21-00
Motor load estimate	○
Life estimate	○
Reset Job	○
Cycle time display	○
Step end points display in the trace points	○
Collision step movement	○
Conveyor synchronization	○
Open the storage card folder	○
Job Browser	○
Lap Time Panel	○
Working Trace	○
Online Function	○
Simple PP	○
JobPad	○
Layout Robot	○
Remote Laser Function	○
Singularity Limit of Collaborative Mode	○

■ YRC1000micro

Function	Version
	YBS2.44-00
Motor load estimate	○
Life estimate	○
Reset Job	○
Cycle time display	○
Step end points display in the trace points	○
Collision step movement	○
Conveyor synchronization	○
Open the storage card folder	○
Job Browser	○
Lap Time Panel	○
Working Trace	○
Online Function	○
Simple PP	○
JobPad	○
Layout Robot	○
Singularity Limit of Collaborative Mode	○

■ DX200

Function	Version
	DN2.87-00
Motor load estimate	○
Life estimate	○
Reset Job	○
Cycle time display	○
Step end points display in the trace points	○
Collision step movement	○
Conveyor synchronization	○
Open the storage card folder	○
Job Browser	○
Lap Time Panel	○
Working Trace	○
Online Function	○
Simple PP	○
JobPad	○
Layout Robot	○

■ DX100

Function	Version
	DS3.93-00
Motor load estimate	○
Life estimate	○
Reset Job	○
Cycle time display	○
Step end points display in the trace points	○
Collision step movement	○
Conveyor synchronization	○
Open the storage card folder	○
Job Browser	○
Lap Time Panel	○
Working Trace	○
Online Function	○
Simple PP	○
JobPad	○
Layout Robot	○

■ FS100

Function	Version			
	FS3.20A-00	FS3.20B-00	FS3.20C-00	FS2.00-00
Motor load estimate	○	○	○	×
Life estimate	○	○	○	×
Reset Job	○	○	○	○
Cycle time display	○	○	○	○
Step end points display in the trace points	○	○	○	○
Collision step movement	○	○	○	○
Conveyor synchronization	○	○	○	○
Open the storage card folder	○	○	○	○
Job Browser	○	○	○	○
Lap Time Panel	○	○	○	○
Working Trace	○	○	○	○
Online Function	○	○	○	○
Simple PP	○	○	○	○
JobPad	○	○	○	○
Layout Robot	○	○	○	○

■ NX100

Function	Version		
	NS4.75-00	NS5.35-45	NS4.69-A5
Motor load estimate	×	×	×
Life estimate	×	×	×
Reset Job	○	○	×
Cycle time display	○	○	×
Step end points display in the trace points	○	○	×
Collision step movement	○	○	×
Conveyor synchronization	○	○	×
Open the storage card folder	○	○	○
Job Browser	○	○	×
Lap Time Panel	○	○	×
Working Trace	○	○	×
Online Function	×	×	×
Simple PP	○	○	×
JobPad	○	○	×
Layout Robot	○	○	×

15.9 List of Manipulator Models and Offset Values Supported by MotoSim EG-VRC

■ YRC1000

Model Name	Robot Type (Model File Name)	Offset Value (mm)	Remarks
AR700	1-06VX8-A00	330	Added at Ver2016SP2
AR900	1-06VX7-A00	330	Added at Ver2016SP2
AR1440	1-06VXH12-A00	450	Added at Ver2016SP2
AR1440E	1-07VXHE6-A00	450	Added at Ver2018SP2
AR1730	1-06VXH25-A01	505	Added at Ver2017
AR2010	1-06VXH25-A11	505	Added at Ver2017SP1
AR3120	1-06VXHL20-A00	540	Added at Ver2019SP1
GP4	1-06VX4-A00	330	Added at Ver2021
GP7	1-06VX7-A00	330	Added at Ver2016SP2
GP7	1-06VX7-F00	330	Added at Ver2020
GP8	1-06VX8-A00	330	Added at Ver2016SP2
GP8	1-06VX8-F00	330	Added at Ver2019SP2
GP12	1-06VXH12-A00	450	Added at Ver2016SP2
GP12	1-06VXH12-C00	450	Added at Ver2019
GP12	1-06VXH12-F00	450	Added at Ver2019SP1
GP20HL	1-06VXHL20-A00	540	Added at Ver2019SP1
GP25	1-06VXH25-A00	505	Added at Ver2017
GP25	1-06VXH25-A50	505	Added at Ver2019SP1
GP25	1-06VXH25-C00	505	Added at Ver2018SP2
GP25	1-06VXH25-F40	505	Added at Ver2019
GP25-12	1-06VXH25-A10	505	Added at Ver2017SP1
GP25-12	1-06VXH25-C10	505	Added at Ver2021
GP25SV	1-06VXHSV25-A60	505	Added at Ver2020SP1
GP35L	1-06VXL35-A00	540	Added at Ver2017SP1
GP50	1-06VX50-A00	540	Added at Ver2017SP1
GP50	1-06VX50-C00	540	Added at Ver2019
GP50	1-06VX50-F00	540	Added at Ver2019SP2
GP88	1-06VX88-A00	540	Added at Ver2017SP1
GP88	1-06VX88-C00	540	Added at Ver2021
GP110	1-06VX110-A00	540	Added at Ver2017SP1
GP110	1-06VX110-C00	540	Added at Ver2021
GP110B	1-07VXB110-A00	540	Added at Ver2017SP1
GP110H	1-06VXH110-A00	540	Added at Ver2019
GP165R	1-06VR165-A00	450	Added at Ver2017SP1
GP180	1-06VX180-A00	650	Added at Ver2017SP1

Model Name	Robot Type (Model File Name)	Offset Value (mm)	Remarks
GP180	1-06VX180-C00	650	Added at Ver2021
GP180	1-06VX180-F00	650	Added at Ver2019SP2
GP180-120	1-06VX180-120-A00	650	Added at Ver2017SP1
GP180-120	1-06VX180-120-C00	650	Added at Ver2021
GP180H	1-06VXH180-A00	650	Added at Ver2019
GP200R	1-06VR200-A00	450	Added at Ver2017SP1
GP200R	1-06VR200-C00	450	Added at Ver2021
GP200S	1-06VXS200-A00	650	Added at Ver2019
GP215	1-06VX215-A00	650	Added at Ver2017SP1
GP215	1-06VX215-C00	650	Added at Ver2021
GP225	1-06VX225-A00	650	Added at Ver2017SP1
GP225	1-06VX225-C00	650	Added at Ver2021
GP225H	1-06VXH225-A00	650	Added at Ver2019
GP250	1-06VX250-A00	650	Added at Ver2017SP1
GP250	1-06VX250-C00	650	Added at Ver2021
GP280	1-06VX280-A00	650	Added at Ver2017SP1
GP300R	1-06VR300-A00	600	Added at Ver2020SP1
GP400	1-06VX400-A00	900	Added at Ver2017SP1
GP400R	1-06VR400-A00	1000	Added at Ver2017SP1
GP400R	1-06VR400-A10	1000	Added at Ver2020SP1
GP600	1-06VX600-A00	900	Added at Ver2017SP1
GP600	1-06VX600-C00	900	Added at Ver2019
GP600	1-06VX600-F00	900	Added at Ver2019SP1
HC10	1-06VXH10-A00	275	Added at Ver2017
HC10DT	1-06VXH10-A10	275	Added at Ver2018
HC10DT	1-06VXH10-B10	275	Added at Ver2019SP2
HC10DTF	1-06VXHC10-F10	275	Added at Ver2020
HC20DT	1-06VXHC20-B10	380	Added at Ver2020
PH130F	1-06VXF130-A00	730	Added at Ver2018SP1
PH130RF	1-06VRF130-A00	600	Added at Ver2017SP1
PH200R	1-06VRY200-J00	740	Added at Ver2019SP1
PH200R	1-06VRY200-K00	740	Added at Ver2019SP1
PH200R	1-06VRY200-L00	740	Added at Ver2019SP1
PH200RF	1-06VRF200-J00	758	Added at Ver2018SP1
PH200RF	1-06VRF200-J10	758	Added at Ver2018SP1
PH200RF	1-06VRF200-K00	758	Added at Ver2018SP1
PH200RF	1-06VRF200-K10	758	Added at Ver2018SP1
PH200RF	1-06VRF200-L00	758	Added at Ver2018SP1
PH200RF	1-06VRF200-L10	758	Added at Ver2018SP1
PL190	1-04LXH190-A00	880	Added at Ver2021
PL320	1-04LXH320-A00	880	Added at Ver2021
PL500	1-04LXH500-A00	880	Added at Ver2019SP2

Model Name	Robot Type (Model File Name)	Offset Value (mm)	Remarks
PL800	1-04LXH800-A00	880	Added at Ver2021
SP80	1-06VX88-A00	540	Added at Ver2017SP1
SP100	1-06VX110-A00	540	Added at Ver2017SP1
SP100B	1-07VXB110-A00	540	Added at Ver2017SP1
SP110H	1-06VXH110-A00	540	Added at Ver2019
SP130	1-06VX140-A00	540	Added at Ver2019
SP150R	1-06VR165-A00	450	Added at Ver2018
SP165	1-06VX180-A00	650	Added at Ver2017SP1
SP165-105	1-06VX180-120-A00	650	Added at Ver2018
SP180H	1-06VXH180-A00	650	Added at Ver2019
SP180H-110	1-06VXH180-A10	650	Added at Ver2019SP1
SP185R	1-06VX180-120-A00	450	Added at Ver2018
SP210	1-06VX225-A00	650	Added at Ver2017SP1
SP225H	1-06VXH225-A00	650	Added at Ver2019
SP225H-135	1-06VXH225-A10	650	Added at Ver2019SP2
SP235	1-06VX250-A00	650	Added at Ver2018
UH100Y	UH0100Y-A20	379	Added at Ver2020SP1
UH100Y	UH0100Y-A21	379	Added at Ver2020SP1
UH100Y	UH0100Y-A22	379	Added at Ver2020SP1
UH100Y	UH0100Y-A23	379	Added at Ver2020SP1
UH100Y	UH0100Y-A24	379	Added at Ver2020SP1
UH100Y	UH0100Y-A25	379	Added at Ver2020SP1
UH100Y	UH0100Y-A30	379	Added at Ver2020SP1
UH100Y	UH0100Y-A31	379	Added at Ver2020SP1
UH100Y	UH0100Y-A32	379	Added at Ver2020SP1
UH100Y	UH0100Y-A33	379	Added at Ver2020SP1
UH100Y	UH0100Y-A34	379	Added at Ver2020SP1
UH100Y	UH0100Y-A35	379	Added at Ver2020SP1
UH100Y	UH0100Y-A40	379	Added at Ver2020SP1
UH100Y	UH0100Y-A41	379	Added at Ver2020SP1
UH100Y	UH0100Y-A42	379	Added at Ver2020SP1
UH100Y	UH0100Y-A43	379	Added at Ver2020SP1
UH100Y	UH0100Y-A44	379	Added at Ver2020SP1
UH100Y	UH0100Y-A45	379	Added at Ver2020SP1

■ YRC1000micro

Model Name	Robot Type (Model File Name)	Offset Value (mm)	Remarks
GP4	1-06VX4-A00	330	Added at Ver2021
GP7	1-06VX7-A00	330	Added at Ver2016SP2
GP7	1-06VX7-F00	330	Added at Ver2020
GP8	1-06VX8-A00	330	Added at Ver2016SP2
GP12	1-06VX12-A00	450	Added at Ver2018
HC10	1-06VXHC10-A00	275	Added at Ver2021
HC10DT	1-06VXHC10-A10	275	Added at Ver2018
HC10DT	1-06VXHC10-B10	275	Added at Ver2019SP2
HC10DTF	1-06VXHC10-F10	275	Added at Ver2020
HC10DT HANDCARRY TYPE	1-06VXHC10-C11	1049	Added at Ver2020SP1
HC20DT	1-06VXHC20-B10	380	Added at Ver2020
MotoMINI	1-06VX05-A00	103	Added at Ver2017SP1
SG400	1-04SX400-A00	-60	Added at Ver2020
SG650	1-04SX650-A00	-70	Added at Ver2020

■ DX200

Model Name	Robot Type (Model File Name)	Offset Value (mm)	Remarks
EPX1250II	EPX1250-J00	310	Added at Ver2018SP1
ES165RDII	ES165RD-J00	450	Added at Ver5.10
ES200RDII	ES200RD-J00	450	Added at Ver5.11
MA1440	MA1440-A00	450	Added at Ver4.00
MA1440	MA1440-A10	450	Added at Ver2015
MA2010	MA02010-A00	505	Added at Ver5.20
MA2010	MA02010-A10	505	Added at Ver5.20
MC2000II	MC02000-J00	680	Added at Ver2015SP1
MH5SII	MH0005S-J00	330	Added at Ver2016
MH5LSII	MH005LS-J00	330	Added at Ver5.11
MH12	MH12-A00	450	Added at Ver4.00
MH24	MH00024-A00	505	Added at Ver5.20
MH24-10	MH00024-A10	505	Added at Ver2016
MH50II	MH00050-J00	540	Added at Ver5.10
MH50II-20	MH00050-J10	540	Added at Ver5.11
MH50II-35	MH00050-J20	540	Added at Ver5.10
MH80II	MH00080-J00	540	Added at Ver5.20
MH110	MH110-A00	540	Added at Ver5.10
MH180	MH180-A00	650	Added at Ver4.01
MH180	MH180-C00	650	Added at Ver2015SP3
MH180-120	MH180-A10	650	Added at Ver2015SP3
MH215II	MH00215-J00	650	Added at Ver2016SP3
MH225	MH225-A00	650	Added at Ver4.01
MH250II	MH00250-J00	650	Added at Ver2016SP1
MH280II	MH00280-J00	650	Added at Ver5.11
MH400II	MH00400-J00	900	Added at Ver5.20
MH600	MH00600-A00	900	Added at Ver2015SP2
MHC130II	MHC0130-J00	0	Added at Ver2018
MHP45L	MHP045L-A00	800	Added at Ver2020
MHP45L	MHP045L-B00	800	Added at Ver2020
MLT1700	MLT1700-F20	673	Added at Ver2018SP2
MN100	MN00100-J02	0	Added at Ver2018SP1
MPL80II	MPL0080-J00	540	Added at Ver5.11
MPL100II	MPL0100-J00	650	Added at Ver2015
MPL160II	MPL0160-J00	880	Added at Ver2015
MPL300II	MPL0300-J00	880	Added at Ver2015
MPL500II	MPL0500-J00	880	Added at Ver2017SP2
MPL800II	MPL0800-J00	880	Added at Ver2015SP3
MPO10	MPO0010-A00	0	Added at Ver2015SP1
MPO10	MPO0010-C00	0	Added at Ver2015SP1

Model Name	Robot Type (Model File Name)	Offset Value (mm)	Remarks
MPO10	MPO0010-F00	0	Added at Ver2015SP1
MPX1150	MPX1150-A00	430	Added at Ver2017
MPX1150	MPX1150-C00	430	Added at Ver2017
MPX1950	MPX1950-A00	500	Added at Ver2018SP2
MPX1950	MPX1950-B00	500	Added at Ver2018SP2
MPX2600	MPX2600-A00	600	Added at Ver2017
MPX2600	MPX2600-A00_CEIL	600	Added at Ver2018
MPX2600	MPX2600-A00_WALL	600	Added at Ver2018
MPX3500	MPX3500-A00	0	Added at Ver2015SP1
MPX3500	MPX3500-A00_WALL	0	Added at Ver2016SP3
MPX3500	MPX3500-A10	0	Added at Ver2015SP1
MPX3500	MPX3500-A10_WALL	0	Added at Ver2016SP3
MPX3500	MPX3500-B00	0	Added at Ver2016SP3
MPX3500	MPX3500-B00_WALL	0	Added at Ver2016SP3
MPX3500	MPX3500-B10	0	Added at Ver2016SP3
MPX3500	MPX3500-B10_WALL	0	Added at Ver2016SP3
MPX3500	MPX3500-C00	0	Added at Ver2015SP1
MPX3500	MPX3500-C00_WALL	0	Added at Ver2016SP3
MPX3500	MPX3500-C10	0	Added at Ver2015SP1
MPX3500	MPX3500-C10_WALL	0	Added at Ver2016SP3
MPX3500	MPX3500-F00	0	Added at Ver2015SP1
MPX3500	MPX3500-F00_WALL	0	Added at Ver2016SP3
MPX3500	MPX3500-F10	0	Added at Ver2015SP1
MPX3500	MPX3500-F10_WALL	0	Added at Ver2016SP3
MS80WII	MS0080W-J00	540	Added at Ver2015SP3
MS100	MS100-A00	540	Added at Ver5.10
MS165	MS165-A00	650	Added at Ver4.01
MS210	MS210-A00	650	Added at Ver4.01
MSC35	MSC0035-A00	0	Added at Ver2018SP1
UH100DII	UH0100D-J20	379	Added at Ver2020SP1
UH100DII	UH0100D-J21	379	Added at Ver2020SP1
UP400RDII	UP400RD-J00	1000	Added at Ver2015
UP400RDII	UP400RD-J10	1000	Added at Ver2016SP1
VA1400II	VA01400-J00	450	Added at Ver2015
VS100I	VS00100-A00	540	Added at Ver2015SP3

■ DX100

Model Name	Robot Type (Model File Name)	Offset Value (mm)	Remarks
DX1350D	DX1350D-A00	480	Added at Ver2.60
EP4000D	EP4000D-J72	740	Added at Ver2.72
EP4000D	EP4000D-K72	740	Added at Ver2.72
EP4000D	EP4000D-L72	740	Added at Ver2.72
EPH130D	EPH130D-A00	730	Added at Ver2.45
EPH130RLD	PH13RLD-A00	600	Added at Ver2.72
EPH4000D	EPH400D-JA0	758	Added at Ver2.80
EPH4000D	EPH400D-JB0	758	Added at Ver2.72
EPH4000D	EPH400D-KA0	758	Added at Ver2.80
EPH4000D	EPH400D-KB0	758	Added at Ver2.72
EPH4000D	EPH400D-LA0	758	Added at Ver2.80
EPH4000D	EPH400D-LB0	758	Added at Ver2.72
ES165D	ES0165D-A00	650	Added at Ver2.00
ES165D-100	ES0165D-A10	650	Added at Ver2.81
ES165RD	ES165RD-A00	450	Added at Ver2.20
ES200D	ES0200D-A00	650	Added at Ver2.00
ES200RD-120	ES200RD-A10	450	Added at Ver2016
ES280D-230	ES0280D-A10	650	Added at Ver2.21
HP20D	HP0020D-A00	505	Added at Ver2.00
HP20D-6	HP0020D-A10	505	Added at Ver2.40
HP20RD	HP020RD-A00	305	Added at Ver2.21
IS300D	IS0300D-A00	0	Added at Ver2.21
MA1400	MA01400-A00	450	Added at Ver2.00
MA1800	MA01800-A00	555	Added at Ver2.10
MA1900	MA01900-A00	505	Added at Ver2.00
MC2000	MC02000-A00	680	Added at Ver2.40
MFL2200D-2650	MFL050D-C20	827	Added at Ver2.45
MFL2200D-3600	MFS050D-A00	0	Added at Ver5.20
MFL2400D-2400	MFL080D-C10	955	Added at Ver2020SP1
MFS2500D-4000	MFS060D-A00	0	Added at Ver4.00
MH5	MH00005-C00	330	Added at Ver2.21
MH5	MH00005-E00	330	Added at Ver2.24
MH5	MH00005-E10	330	Added at Ver2.24
MH5L	MH0005L-C00	330	Added at Ver2.21
MH5LS	MH005LS-A00	330	Added at Ver2.60
MH5S	MH0005S-A00	330	Added at Ver2.60
MH6	MH00006-A00	450	Added at Ver2.00
MH6	MH00006-C00	450	Added at Ver4.00
MH6-10	MH00006-A30	450	Added at Ver2.21
MH6S	MH0006S-A00	450	Added at Ver2.10

Model Name	Robot Type (Model File Name)	Offset Value (mm)	Remarks
MH50	MH00050-A00	540	Added at Ver2.00
MH50-20	MH00050-A10	540	Added at Ver2.10
MH50-35	MH00050-A20	540	Added at Ver2.21
MH80	MH00080-A00	540	Added at Ver2.24
MH165	MH00165-A00	650	Added at Ver2.25
MH165	MH00165-B00	650	Added at Ver2.25
MH165-100	MH00165-A10	650	Added at Ver2.81
MH200	MH00200-A00	650	Added at Ver2.80
MH215	MH00215-A00	650	Added at Ver2.21
MH250	MH00250-A00	650	Added at Ver2.40
MH250	MH00250-B00	650	Added at Ver2.40
MH400	MH00400-A0E	900	Added at Ver2.81
MPK2	MPK0002-A00	500	Added at Ver2.24
MPK2	MPK0002-B01	420	Added at Ver2.24
MPL80	MPL0080-A00	540	Added at Ver2.21
MPL100	MPL0100-A00	880	Added at Ver2.20
MPL160	MPL0160-A00	880	Added at Ver2.10
MPL300	MPL0300-A00	880	Added at Ver2.20
MPL500	MPL0500-A00	880	Added at Ver2.21
MPL800	MPL0800-A00	880	Added at Ver2.20
MS80	MS00080-A00	540	Added at Ver2.00
MS80W	MS0080W-A00	540	Added at Ver2.40
MS80W	MS0080W-B00	540	Added at Ver2.40
MS120	MS00120-A00	680	Added at Ver2.24
VD20S	RVD800S6A1	508.5	Added at Ver2.27
VD35D-G4A	RVD1230D6A1	556.5	Added at Ver2.27
VD35S-G4A	RVD1230S6A1	556.5	Added at Ver2.27
VD40D	RVD2200D6A1	624	Added at Ver2.72
VD40S	RVD2200S6A1	624	Added at Ver2.72
VD95D	RVD1450D6D1	679	Added at Ver2.27
SDA5D	SDA005D-A00	900	Added at Ver2.22
SDA10D	SDA010D-A00	1200	Added at Ver2.10
SDA10D	SDA010D-B00	550	Added at Ver2.10
SDA20D	SDA020D-A00	550	Added at Ver2.10
SIA5D	SIA005D-A00	309.5	Added at Ver2.45
SIA10D	SIA010D-A00	360	Added at Ver2.10
SIA20D	SIA020D-A00	410	Added at Ver2.10
SIA20D	SIA020D-Y00	0	Added at Ver2.21
SIA30D	SIA030D-A00	598	Added at Ver2.81
SIA50D	SIA050D-A00	540	Added at Ver2.00
UP120ED-165	UP120ED-A10	525	Added at Ver2.21
UP350D	UP0350D-A00	900	Added at Ver2.10

Model Name	Robot Type (Model File Name)	Offset Value (mm)	Remarks
UP350D-600	UP0350D-B30	900	Added at Ver2.24
UP400RD	UP400RD-A00	1000	Added at Ver2.81
UP400RD	UP400RD-A10	1000	Added at Ver2016SP1
VA1400	VA01400-A00	450	Added at Ver2.00
VS50	VS00050-A00	540	Added at Ver2.00

■ FS100

Model Name	Robot Type (Model File Name)	Offset Value (mm)	Remarks
BMDA3	BMDA003-A01	460	Added at Ver4.10
CSDA5F	CSDA05F-B1A	500	Added at Ver5.10
CADA10F	CSDA10F-A1A	1200	Added at Ver5.10
HP20F	HP0020F-A00	505	Added at Ver2.81
MHJ	MH0000J-A00	240	Added at Ver2.40
MH3BM	MH003BM-A00	350	Added at Ver2.80
MH3F	MH0003F-A00	290	Added at Ver2.40
MH5BM	MH005BM-A00	362	Added at Ver2016SP3
MH5F	MH0005F-A00	330	Added at Ver2.40
MH5LF	MH005LF-A00	330	Added at Ver2.60
MH6F	MH0006F-A00	450	Added at Ver2.81
MH6SF	MH006SF-A00	450	Added at Ver2016SP3
MH12	MH12-A00	450	Added at Ver2016SP1
MPK2F	MPK002F-A00	420	Added at Ver2.60
MPK2F-5	MPK002F-A20	420	Added at Ver2.70
MPL160	MPL0160-A00	880	Added at Ver2.70
MPP3	MPP0003-A00	0	Added at Ver2.40
MPP3H	MPP003H-A00	0	Added at Ver5.11
MPP3S	MPP003S-A00	0	Added at Ver4.10
SDA5F	SDA005F-A00	900	Added at Ver2.45
SDA10F	SDA010F-A00	1200	Added at Ver2.40
SDA20F	SDA020F-A00	550	Added at Ver5.10
SIA5F	SIA005F-A00	309.5	Added at Ver2.70
SIA10F	SIA010F-A00	360	Added at Ver2.44
SIA20F	SIA020F-A00	410	Added at Ver2.44

■ NX100

Model Name	Robot Type (Model File Name)	Offset Value (mm)	Remarks
DA20	DA20-A00	559	
DIA10	DIA10-A00	1037	
DIA20	DIA20-A00	1050	Added at Ver2.10
DX1350N	DX1350N-A00	480	
EA1400N	EA1400N-A00	450	
EA1400N Ceiling Mounted Type	EA1400N-A10	450	
EA1800N	EA1800N-A00	555	
EA1900N	EA1900N-A00	505	
EA1900N Ceiling Mounted Type	EA1900N-A10	505	
ECD2500D-3700	ECD80D-A00	0	Added at Ver2.20
ECR200	ECR200-A00	735	
ECR3J	ECR3J-A00	290	Added at Ver2.20
ECR400R-200	ECR400R-A10	1005	Added at Ver2.20
ECR400R-400	ECR400R-B00	1005	Added at Ver2.20
ECS15DWN-1400	ECS15DN-D10	770	Added at Ver2016SP3
ECS600N	ECS600N-A01	730	Added at Ver2.21
EH80	EH80-A00	540	
EH130	EH130-A00	650	
EH130	EH130-A20	650	
EH200	EH200-A00	730	
EH200-150	EH200-A10	730	
EP4000N	EP4000N-J00	740	
EP4000N	EP4000N-J10	740	
EP4000N	EP4000N-J30	740	
EP4000N	EP4000N-J40	740	
EP4000N	EP4000N-J50	740	
EP4000N	EP4000N-J60	740	
EP4000N	EP4000N-K00	740	
EP4000N	EP4000N-K10	740	
EP4000N	EP4000N-K30	740	
EP4000N	EP4000N-K40	740	
EP4000N	EP4000N-K50	740	
EP4000N	EP4000N-K60	740	
EP4000N	EP4000N-L00	740	
EP4000N	EP4000N-L10	740	
EP4000N	EP4000N-L30	740	
EP4000N	EP4000N-L40	740	
EP4000N	EP4000N-L50	740	

Model Name	Robot Type (Model File Name)	Offset Value (mm)	Remarks
EP4000N	EP4000N-L60	740	
EPH130	EPH130-A00	730	
EPH130	EPH130-C24	730	
EPH130R	EPH130R-A00	600	
EPH130RL	EPH130RL-A00	600	
EPH130RL	EPH130RL-A54	600	
EPH130RL-85	EPH130RL-A34	600	
EPH130RL-85	EPH130RL-A60	600	Added at Ver1.42
EPH4000	EPH4000-J01	758	
EPH4000	EPH4000-J11	758	
EPH4000	EPH4000-J31	758	
EPH4000	EPH4000-J41	758	
EPH4000	EPH4000-J51	758	
EPH4000	EPH4000-J60	758	
EPH4000	EPH4000-J71	758	Added at Ver1.42
EPH4000	EPH4000-J81	758	Added at Ver1.20
EPH4000	EPH4000-JA0	758	
EPH4000	EPH4000-K01	758	
EPH4000	EPH4000-K11	758	
EPH4000	EPH4000-K31	758	
EPH4000	EPH4000-K41	758	
EPH4000	EPH4000-K51	758	
EPH4000	EPH4000-K60	758	
EPH4000	EPH4000-KA0	758	
EPH4000	EPH4000-L01	758	
EPH4000	EPH4000-L11	758	
EPH4000	EPH4000-L31	758	
EPH4000	EPH4000-L41	758	
EPH4000	EPH4000-L51	758	
EPH4000	EPH4000-L60	758	
EPH4000	EPH4000-LA0	758	
EPL80	EPL80-A00	540	
EPL160	EPL160-A00	880	
EPL160	EPL160-A10	880	
EPL300	EPL300-A00	880	
EPL300	EPL300-A10	880	
EPL500	EPL500-A00	880	
EPL500	EPL500-A10	880	
EPX1250	EPX1250-A000	310	Added at Ver2.80
EPX2050	EPX2050-A300	600	Added at Ver2.80
EPX2050	EPX2050-A500	600	Added at Ver2.80
EPX2700	EPX2700-A000	0	Added at Ver2.80

Model Name	Robot Type (Model File Name)	Offset Value (mm)	Remarks
EPX2700	EPX2700-A100	0	Added at Ver2.80
EPX2750	EPX2750-A300	600	Added at Ver2.80
EPX2800	EPX2800-A000	795.5	Added at Ver2.80
EPX2800R	EPX2800R-A000	817.5	Added at Ver2.80
EPX2900	EPX2900-A000	750	Added at Ver2.80
ES120N	ES120N-A00	650	Added at Ver2.00
ES120N	ES120N-A20	680	Added at Ver2.00
ES165N	ES165N-A00	650	
ES165N-100	ES165N-A10	650	
ES165RN	ES165RN-A00	450	
ES200N	ES200N-A00	650	
ES200RN	ES200RN-A00	450	
ES200TN	ES200TN-A00	650	
ES200RN-120	ES200RN-A10	450	
ES280N	ES280N-A00	650	
HP3	HP3-A00	300	
HP3J	HP3J-J00	290	
HP3L	HP3L-A00	300	
HP3XF	HP3XF-A00	300	
HP3XF	HP3XF-B00	300	
HP5	HP5-A00	300	
HP6	HP6-A00	450	
HP6R	HP6-R00	240	
HP6R	HP6-R10	240	
HP6S	HP6-A10	450	
HP20	HP20-A00	505	
HP20-6	HP20-A10	505	
HP20 IP65	HP20-A20	505	
HP20R	HP20R-B2C	305	Added at Ver2.00
HP165	HP165-A00	650	
IA20	IA20-A00	450	
SDA10	SDA10-A00	1200	
SDA10	SDA10-B00	550	Added at Ver2.10
SDA20	SDA20-A00	550	Added at Ver1.42
SIA10	SIA10-A00	360	Added at Ver1.20
SIA20	SIA20-A00	410	Added at Ver1.20
SP800N	SP800N-A00	540	
SSA2000	SSA3-A00	450	
SSA2000 Ceiling Mounted Type	SSA3-A10	450	
SSF2000	SSF6-A00	450	
SSF2000R	SSF6R-A20	240	Added at Ver2.00

Model Name	Robot Type (Model File Name)	Offset Value (mm)	Remarks
UP20MN	UP20MN-A00	540	
UP50N	UP50N-A00	540	
UP50N	UP50N-A51	540	
UP50N	UP50N-AA1	540	Added at Ver1.20
UP50N-80	UP50N-A10	540	
UP50SN	UP50N-A20	540	
UP50SN	UP50N-A71	540	
UP50N-35	UP50N-A30	540	
UP50RN-35	UP50RN-A10	450	
UP120EN-165	UP120EN-A10	525	
UP130RN	UP130RN-B00	600	Added at Ver1.20
UP130RLN	UP130RN-A2A	600	
UP130RLN	UP130RN-A2B	600	
UP130RLN-85	UP130RN-A4A	600	
UP350N	UP350N-A00	900	
UP350N-200	UP350N-A10	900	
UP350N-500	UP350N-A20	900	
UP350N-600	UP350N-A30	900	
UP400RN	UP400RN-A00	1000	

■ MOTOPOS

YRC1000

Model Name	Robot Type	Model File Name	Remarks
D250B(A00)	MPD250B-A00	MPD250B-A00	Added at Ver2017
D250F-A00	MPD250F-A00	MPD250F-A00	Added at Ver2017SP1
D500B(A00)	MPD500B-A00	MPD500B-A00	Added at Ver2016SP3
D500B(B00)	MPD500B-B00	MPD500B-B00	Added at Ver2016SP3
D500F(A00)	MPD500F-A00	MPD500F-A00	Added at Ver2020SP1
D700F(A00)	MPD700F-A00	MPD700F-A00	Added at Ver2020SP1
D700F(A04)	MPD700F-A04	MPD700F-A04	Added at Ver2020SP1
S250B(A00)	MPS250B-A00	MPS250B-A00	Added at Ver2017
S250B(B00)	MPS250B-B00	MPS250B-B00	Added at Ver2016SP3
S500B(A00)	MPS500B-A00	MPS500B-A00	Added at Ver2016SP3
S500B(A30)	MPS500B-A30	MPS500B-A30	Added at Ver2017
S500E-A00	MPS500E-A00	MPS500E-A00	Added at Ver2016SP3
S500F-A00	MPS500F-A00	MPS500F-A00	Added at Ver2017
S1000F-A00	MPS1000F-A00	MPS1000F-A00	Added at Ver2021
T2000F-A00	MPT2000F-A00	MPT2000F-A00	Added at Ver2021
T5000B	MPT5000B-A00	MPT5000B-A00	Added at Ver2016SP3
T5000F-A00	MPT5000F-A00	MPT5000F-A00	Added at Ver2021

DX200

Model Name	Robot Type	Model File Name	Remarks
D250B(A00)	MPD250B-A00	D250B-A00	Added at Ver2015
D250B(B00)	MPD250B-B00	D250B-B00	Added at Ver2015
D500B(A00)	MPD500B-A00	D500B-A00	Added at Ver5.20
D500B(B00)	MPD500B-B00	D500B-B00	Added at Ver2015
D700B(A00)	MPD700B-A00	D700B-A00	Added at Ver5.20
S250B(A00)	MPS250B-A00	S250B-A00	Added at Ver5.20
S500B(A00)	MPS500B-A00	S500B-A00	Added at Ver5.20
S500E-A00	MPS500E-A00	S500E-A00	Added at Ver2015
T5000B	MPT5000B-A00	T5000B-A00	Added at Ver2015

DX100

Model Name	Robot Type	Model File Name	Remarks
D200B-C00	MPD200B-C00	D200B-C00	Added at Ver2.45
D250B(A00)	MPD250B-A00	D250B-A00	
D250B(B00)	MPD250B-B00	D250B-B00	Added at Ver2015
D500B(A00)	MPD500B-A00	D500B-A00	
D500B(A12)	MPD500B-A12	D500B-A12	
D500B(B00)	MPD500B-B00	D500B-B00	Added at Ver2015

Model Name	Robot Type	Model File Name	Remarks
D700B(A00)	MPD700B-A00	D700B-A00	Added at Ver2.20
S250B(A00)	MPS250B-A00	S250B-A00	
S500B(A00)	MPS500B-A00	S500B-A00	
S500E-A00	MPS500E-A00	S500E-A00	Added at Ver2015
T5000B	MPT5000B-A00	T5000B-A00	

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Model Name	Robot Type	Model File Name	Remarks
D200B-C00	MPD200B-C00	D200B-C00	Added at Ver2.45
D250B(A00)	MPD250B-A00	D250B-A00	
D250B(B00)	MPD250B-B00	D250B-B00	Added at Ver2015
D500B(A00)	MPD500B-A00	D500B-A00	
D500B(A12)	MPD500B-A12	D500B-A12	
D500B(B00)	MPD500B-B00	D500B-B00	Added at Ver2015
D700B(A00)	MPD700B-A00	D700B-A00	Added at Ver2.20
S250B(A00)	MPS250B-A00	S250B-A00	
S500B(A00)	MPS500B-A00	S500B-A00	
S500E-A00	MPS500E-A00	S500E-A00	Added at Ver2015
T5000B	MPT5000B-A00	T5000B-A00	

■ MOTOFEEDER

Model registration on the VRC controller	Model Name	Remarks
Arm Length: 1600mm, With Manipulator, High-Speed Rotation Specification	MF216A	Added at Ver2.80
Arm Length: 1600mm, With Manipulator, High-Speed Rotation Specification(with spindle unit)	MF216A_SPINDLE	Added at Ver2.80
Arm Length: 1800mm, With Manipulator, High-Speed Rotation Specification	MF218A	Added at Ver2.80
Arm Length: 1800mm, With Manipulator, High-Speed Rotation Specification(with Spindle unit)	MF218A_SPINDLE	Added at Ver2.80
Arm Length: 1400mm, Without Manipulator, High-Speed Rotation Specification	MF214B	Added at Ver2.80
Arm Length: 1400mm, Without Manipulator, High-Speed Rotation Specification(with spindle unit)	MF214B_SPINDLE	Added at Ver2.80
Arm Length: 1600mm, Without Manipulator, High-Speed Rotation Specification	MF216B	Added at Ver2.80
Arm Length: 1600mm, Without Manipulator, High-Speed Rotation Specification(with spindle unit)	MF216B_SPINDLE	Added at Ver2.80
Arm Length: 1800mm, Without Manipulator, High-Speed Rotation Specification	MF218B	Added at Ver2.80
Arm Length: 1800mm, Without Manipulator, High-Speed Rotation Specification(with spindle unit)	MF218B_SPINDLE	Added at Ver2.80
Arm Length: 1600mm, With Manipulator, Heavy Load Specification	MF416A	Added at Ver2.80
Arm Length: 1800mm, With Manipulator, Heavy Load Specification	MF418A	Added at Ver2.80
Arm Length: 1400mm, Without Manipulator, Heavy Load Specification	MF414B	Added at Ver2.80
Arm Length: 1600mm, Without Manipulator, Heavy Load Specification	MF416B	Added at Ver2.80
Arm Length: 1800mm, Without Manipulator, Heavy Load Specification	MF418B	Added at Ver2.80

■ MOTOFEEDER Ⅱ

Model registration on the VRC controller	Model Name	Remarks
Arm Length: 1200mm, Without Manipulator	MF_12BD-A00	Added at Ver2018
Arm Length: 1200mm, Without Manipulator (DOUBLE SPINDLE UNIT)	MF_12BD-A00_SPINDLE	Added at Ver2020SP1
Arm Length: 1400mm, Without Manipulator	MF_14BD-A00	Added at Ver2018
Arm Length: 1400mm, Without Manipulator (DOUBLE SPINDLE UNIT)	MF_14BD-A00_SPINDLE	Added at Ver2020SP1
Arm Length: 1600mm, Without Manipulator	MF_16BD-A00	Added at Ver2018
Arm Length: 1600mm, Without Manipulator (DOUBLE SPINDLE UNIT)	MF_16BD-A00_SPINDLE	Added at Ver2020SP1
Arm Length: 1800mm, Without Manipulator	MF_18BD-A00	Added at Ver2018

Model registration on the VRC controller	Model Name	Remarks
Arm Length: 1800mm, Without Manipulator (DOUBLE SPINDLE UNIT)	MF_18BD-A00_SPINDLE	Added at Ver2020SP1
Arm Length: 1200mm, With MPX1150	MF_12AD-A00	Added at Ver2018
Arm Length: 1200mm, With MPX1150 (DOUBLE SPINDLE UNIT)	MF_12AD-A00_SPINDLE	Added at Ver2020SP1
Arm Length: 1800mm, With MPX1950	MF_18CD-A00	Added at Ver2020SP1
Arm Length: 1800mm, With MPX1950 (DOUBLE SPINDLE UNIT)	MF_18CD-A00_SPINDLE	Added at Ver2020SP1
Arm Length: 1200mm, With MPX1150 Wall	MF_12DD-A00	Added at Ver2018
Arm Length: 1200mm, With MPX1150 Wall (DOUBLE SPINDLE UNIT)	MF_12DD-A00_SPINDLE	Added at Ver2020SP1
Arm Length: 1400mm, Without MPX1150 Wall	MF_14DD-A00	Added at Ver2018
Arm Length: 1400mm, With MPX1150 Wall (DOUBLE SPINDLE UNIT)	MF_14DD-A00_SPINDLE	Added at Ver2020SP1
Arm Length: 1400mm, With EPX1250II	MF_14ED-A00	Added at Ver2020SP1
Arm Length: 1400mm, With EPX1250II (DOUBLE SPINDLE UNIT)	MF_14ED-A00_SPINDLE	Added at Ver2020SP1
Arm Length: 1600mm, With EPX1250II	MF_16ED-A00	Added at Ver2020SP1
Arm Length: 1600mm, With EPX1250II (DOUBLE SPINDLE UNIT)	MF_16ED-A00_SPINDLE	Added at Ver2020SP1
Arm Length: 1800mm, With EPX1250II	MF_18ED-A00	Added at Ver2020SP1
Arm Length: 1800mm, With EPX1250II (DOUBLE SPINDLE UNIT)	MF_18ED-A00_SPINDLE	Added at Ver2020SP1

■ MOTOFEEDER TILT

Model registration on the VRC controller	Model Name	Remarks
Without Manipulator	MT226BD-A00	Added at Ver2021
With MPX2600	MT226GD-A00	Added at Ver2021

15.10 Frequently-Asked Questions

■ When the driver has been installed with USB type key connected to a personal computer

1. With the USB type key attached to a personal computer, delete the item registered as "USB Token" in Device Manager.
2. Uninstall the driver (Sentinel System Driver 5.41.1(32-bit)) with "Add/Remove Programs".
3. Install the driver with key detached from personal computer.

■ When a older version key driver has been installed over a newer key driver version.

In such case, the key driver may not operate properly.
Uninstall the Sentinel System Driver with Windows "Add / Remove Programs" function. Then reinstall the Sentinel key driver. For details, please refer to section " 1.4 Hardware Key " of the manual.

■ Cell file dosen't display properly

Check that the full path of the cell file is less than 240 characters and that the cell file is saved in a folder that you have access right.

■ Cell file containing HSF files don't display properly

When cell file containing HSF model files, if the HSF format version is higher than the one currently supported by MotoSim EG-VRC, the HSF file may not display properly. In the case that a newer MotoSim EG-VRC version displays the cell properly, the newer MotoSim EG-VRC can save the cell file in a previous MotoSim EG-VRC format. This will also save the HSF file into the corresponding format version (Refer to section " 4.3.2 Save As " for details.) If the HSF file was generated by a 3rd party software, look in the that software HSF export options to export the file in an HSF format version corresponding to you current version of MotoSim EG-VRC.

■ MotoSim EG Cell file compatibility

MotoSim EG-VRC can convert and load files created by MotoSim EG but cannot playback the job and the robot operations are limited. The MotoSim EG robot should be replace by the VRC corresponding robot type. Please refer to section " 13.5 Dual-Arm robot Setting ".
Cell file created with MotoSim EG-VRC cannot be used by MotoSim EG or MotoSim EG.

■ MotoSim EG-VRC - CadPack Cell file compatibility

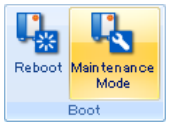
Cell file created with MotoSim EG-VRC can be used by MotoSim EG-VRC-CadPack. Cell file created with MotoSim EG-VRC-CadPack can also be used by MotoSim EG-VRC even if CAD data (IGES,SAT) was imported into the cell. When saving the cell, the MotoSim EG-VRC-CadPack converts imported CAD data into HSF files. Once that conversion is done, the regular MotoSim EG-VRC can open the file without problems.

■ Backup VRC.BIN file

If computer power shortage or an application error occurs when MotoSim EG-VRC is accessing the VRC.BIN file, the file may become corrupted and prevent the controller and Virtual Pendant to load properly. As a safeguard, when the cell is saved, the previous copy of the VRC.BIN is kept as a backup.

To restore the backup copy of the VRC.BIN file:

1. Open the controller folder under the cell directory and rename the VRC.BIN.bak file to VRC.BIN.
2. Start MotoSim EG-VRC but don't open the cell yet. If MotoSim EG-VRC is already running, close all the cells.
3. Start the controller in maintencae mode with the restored CMOS.BIN file On the [Controller] tab, in the [Boot] group, click the [Maintenance mode] button, and then selecting the newly renamed VRC.BIN. (For details, refer to section " 7.10 VRC Maintenance Mode ".)

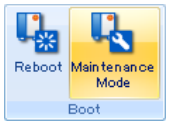


4. Load the VRC.BIN on the Virtual Pendant, select {Compact Flash} - {LOAD CMOS}. (This may take a few moments and warning message, indicating not to turn off the controller, appears at the bottom of the Virtual Pendant. Wait until the message disappears before proceeding to another operation that may cause the controller to reboot or close.)
5. Once the VRC.BIN load is done, close the controller by pressing the "End" button of the "VRC Maintenance Mode" dialog.
6. Open the cell.

■ Recovery method when an alarm occurs during the creation of a new controller.

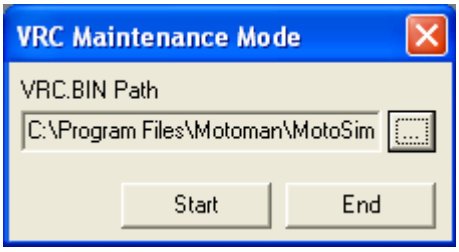
When a new controller is created with the "VRC Controller (using CMOS.BIN file)" of an actual controller, alarms may display on the Virtual Pendant.
In such case, use the following procedure:

1. Save the cell and then close it.
2. On the [Controller] tab, in the [Boot] group, click the [Maintenance mode] button, the [Maintenance mode] dialog appears.



3. The VRC Maintenance Mode dialog will display. Use the browsing button to select the VRC.BIN file located in the controller folder under the cell folder. Once the VRC.BIN file is selected, press the [Start] button. The controller will start in maintenance mode

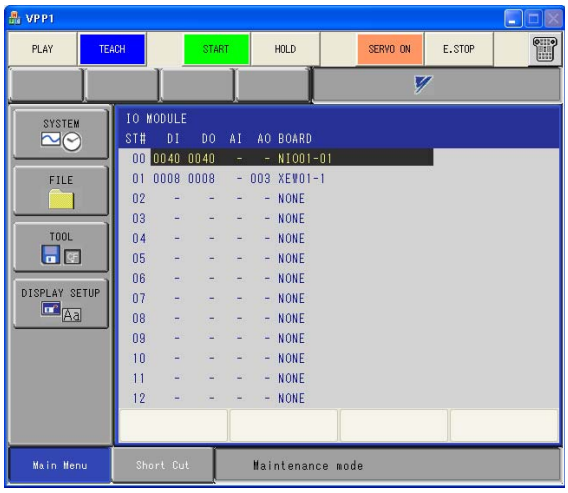
and display the Virtual Pendant (it may take a few moments).



The procedures below corresponds to various alarm.

Alarm 0320 Verify error (I/O Module)

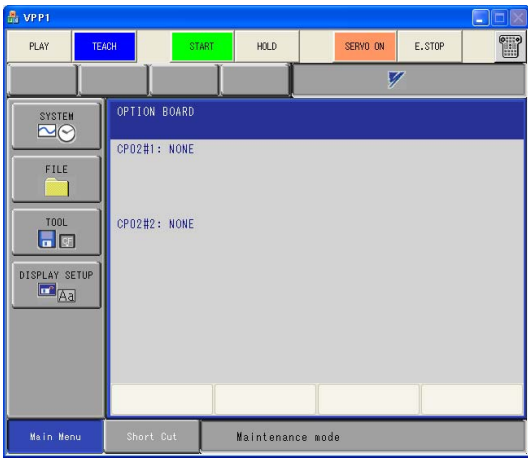
(1) Select {System} - {Setup}.
(2) Select [I/O Module].



(3) Press the [Enter] key twice. When the confirmation message displays, select [Yes].
(4) Press the [End] button of the [VRC Maintenance Mode] dialog to close the controller.
(5) When all the step above are completed. Reopen the cell.

Alarm 0020 Communication Error(CPU)

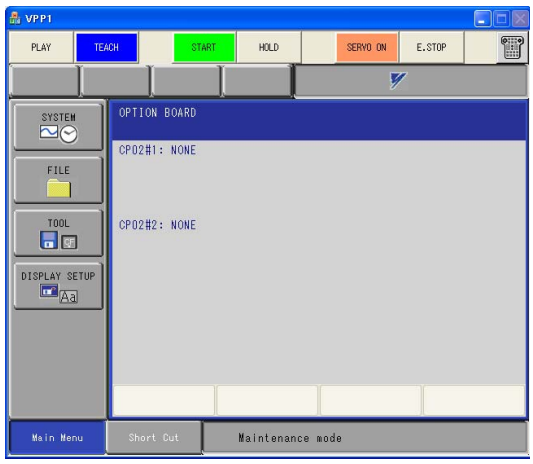
(1) Select {System} - {Setup}.
(2) Select [Options].



(3) Press the [Enter] key. When the confirmation message displays, select [Yes].
(4) Press the [End] button of the [VRC Maintenance Mode] dialog to close the controller.
(5) When all the step above are completed. Reopen the cell.

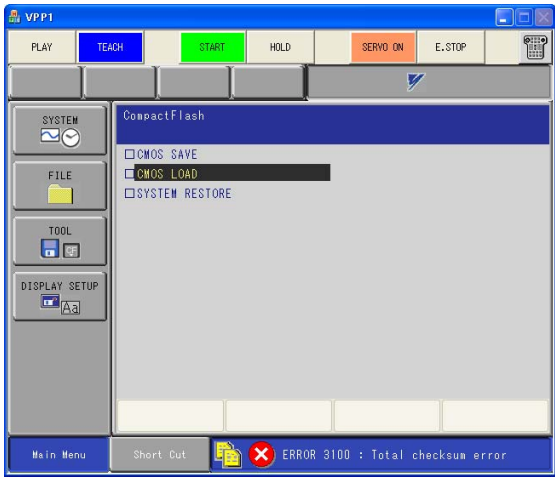
Alarm 0060 Communication Error (IO Module) [16]

(1) Select {System} - {Setup}.
(2) Select [Options].



(3) Press the [Enter] key. When the confirmation message displays, select [Yes].
(4) Select [IO Module].
(5) When the [IO Module] displays, press the [Enter] key twice.
(6) When the confirmation message displays, select [Yes].
(7) Press the [End] button of the [VRC Maintenance Mode] dialog to close the controller.
(8) When all the step above are completed. Reopen the cell.

Error 3100 Total checksum error



The CMOS cannot be loaded because the “VRC.BIN” version is from a controller version incompatible with the selected VRC version.
In such case, retrieve the individual data files from the actual controller and load them in the

VRC controller.

1. On the pendant of the actual controller, select [FD/CF] - [SAVE] and save:
   - All the files from the JOB, FILE /GENERAL DATA, I/O DATA, SYSTEM DATA section.
   - The "BATCH PARAMETER (ALL.PRM)" file under the PARAMETER section.
2. In MotoSim EG-VRC, select [Controller] - [New Controller] and add a new controller with "No CMOS.BIN file".

   Please refer to section " 7.1 Adding a New Controller " for more details.

NOTE When initializing this new controller, make sure to select the same settings as the actual controller (the control group and application must match to be able to load the individual files).

3. Copy the individual files retrieved from the actual controller in the "Storage Card" folder under the controller folder of the cell.
4. On the Virtual Pendant, select [FD/CF] - [LOAD]

NOTE When loading the individual files, please proceed in the following order:
(1) PARAMETER file
(2) I/O DATA files
(3) Other files

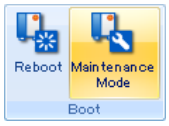
Please refer to section " 15.3 Storage Card " for details.

■ Trouble shooting when virtual pendant doesn't accept operation after newly making controller (Nothing is displayed on the screen).

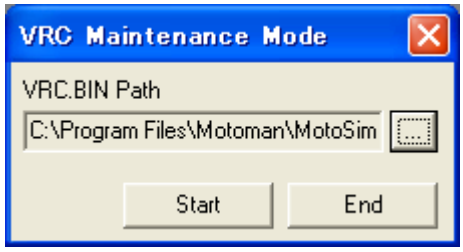
When a virtual pendant starts in the ordinary mode after completing CMOS loading operation in the maintenance mode when newly making it by setting "VRC Controller (using CMOS.BIN file)" when the controller newly makes it, a virtual pendant might not accept the operation at all (Even if the menu is selected, nothing is displayed on the screen).

When this phenomenon is generated, it restores it according to the following procedures.

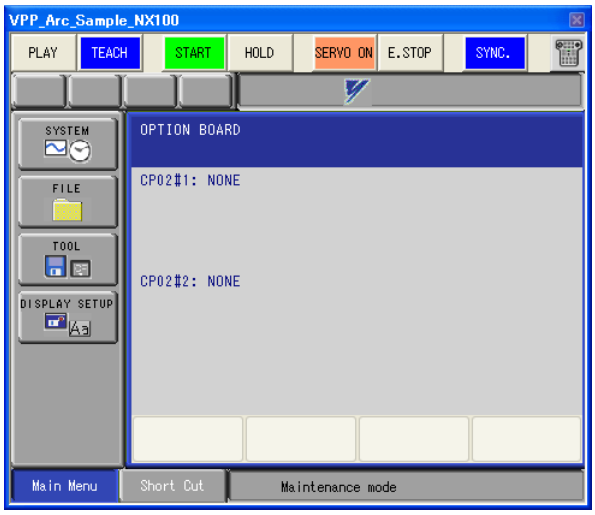
1. After the cell is preserved, the cell is closed.
2. On the [Controller] tab, in the [Boot] group, click the [Maintenance mode] button.



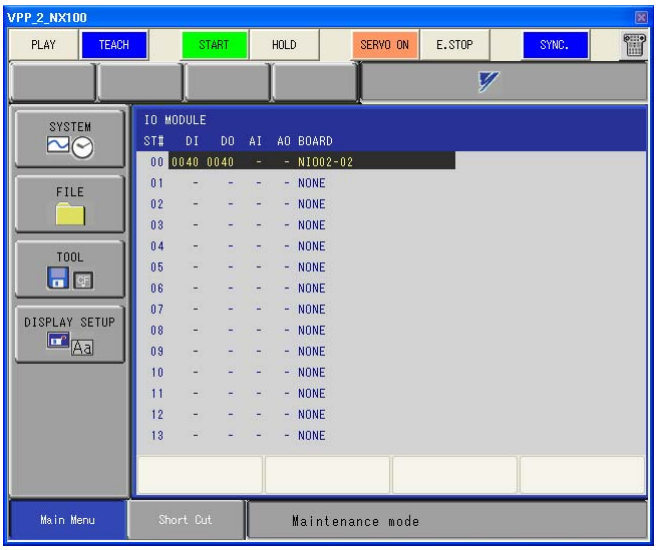
3. [VRC Maintenance Mode] appears.
   Select "VRC.BIN" that exists in the controller folder below the folder where the cell exists, Push [Start] , and the maintenance mode is started.



4. Select [SYSTEM]-[SETUP].
5. Select [OPTION BOARD].



6. Because the confirming message displays to push [enter], select [yes].
7. The “IO MODULE” screen displays it continuously. Select [SYSTEM]-[SETUP]-[IO MODULE] When it is not displayed.



8. Because the confirming message displays to push [enter] twice, select [yes].
9. The [End] is selected by the [VRC Maintenance Mode], and the maintenance mode is ended.
10. The restoration operation is completed above. Please open the cell again.

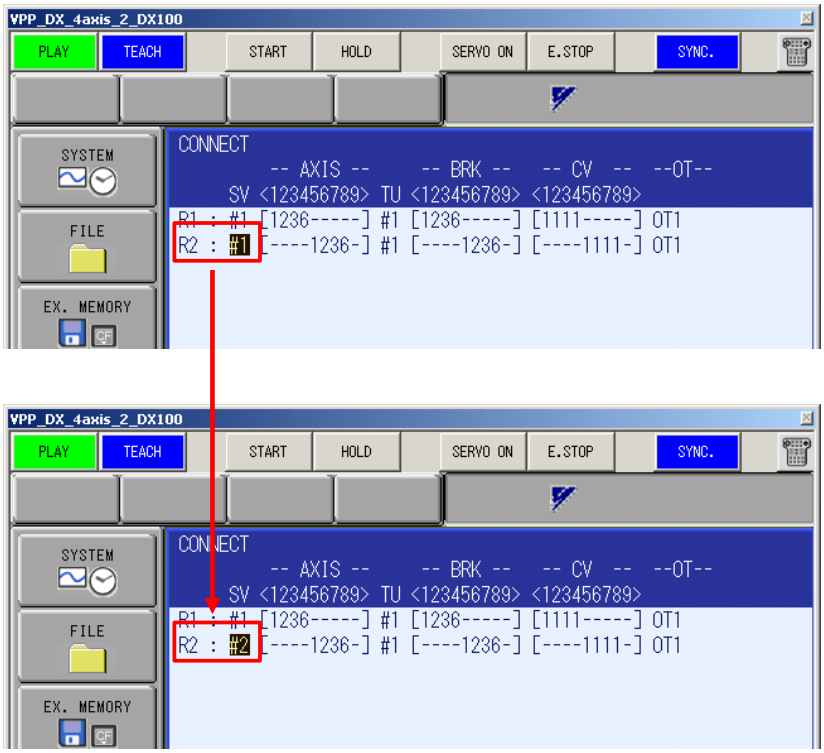
■ Caution on setting up two or more 4-axis robots (ex. MPL300) to the one controller

On creating a new controller without a New VRC Controller (no file), If two or more 4-axis robots are set up to the one controller, use the following procedure certainly.
Basically, the following procedure is equal to that of " 7.1.1 Create a New VRC Controller (no file) ", but Setting on the [CONNECT] display of "Initialize the controller in the step 3" is used the following procedure.

The procedure is explained with setting up the two 4-axis robots to the one controller.

Procedure

1. Proceed to the step 1 to 3 of " 7.1.3 Initializing the Controller (YRC1000, YRC1000micro, DX200, DX100, NX100) ".
2. On setting [CONNECT] in the step 4 of " 7.1.3 Initializing the Controller (YRC1000, YRC1000micro, DX200, DX100, NX100) ", change [SV] from "#1" to "#2".



3. Proceed to the step 5 to 10 of " 7.1.3 Initializing the Controller (YRC1000, YRC1000micro, DX200, DX100, NX100) ".

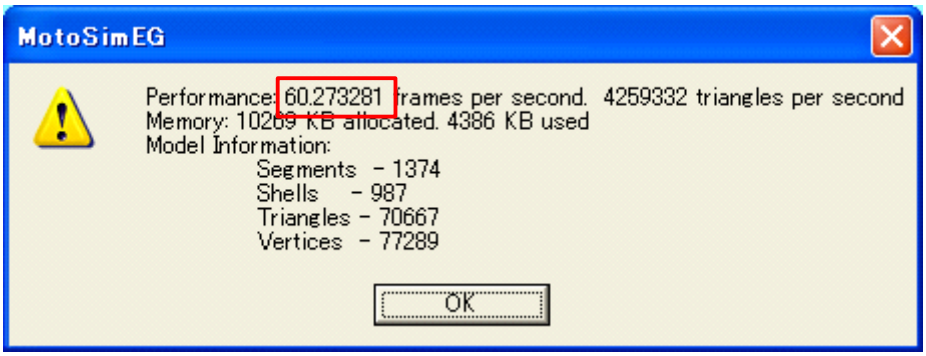
■ Way to make the display speed faster

When the large CAD data is used, the Collision Detection function is used, or the performance of using PC is low, the display process can not executed smoothly, so the simulation speed may be lower.
If the above symptoms occurred, do the following operation, and the display performance may be made better.

- Raise the number of Refresh Interval
  The number of redrawing is reduced, so the load of redrawing is reduced.
  → For details, please refer to the section " 7.5.4 Refresh Interval ".
- Reduce the number of trace or Delete the trace
  The number of drawing trace is reduced, so the load of drawing trace is reduced.
  → For details, please refer to the section " 7.9 Trace ".
- Enable "Back Plane Culling" of models
  The back plane of the CAD data is hidden, so the CAD data is displayed faster.
  → For details, please refer to the section " 11.3 Editing a Part ".
- Raise the Culling Threshold of Framerate Optimization
  Model data which displayed size is smaller than the selected pixel on the display are not

displayed, so the model is displayed faster.
→ For details, please refer to the section " 12.5 Other ".

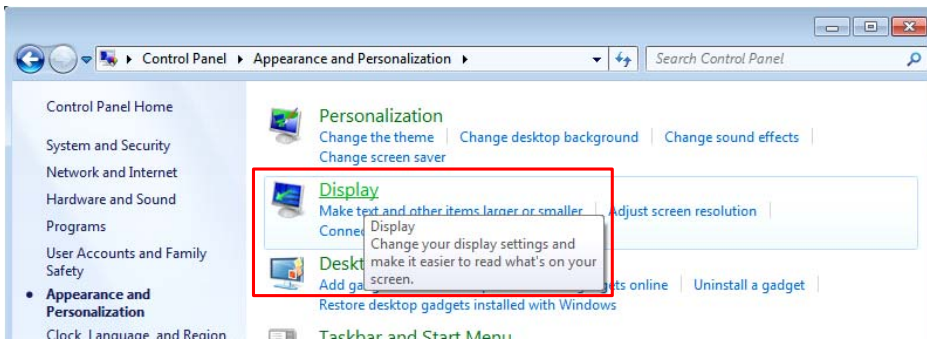
- Hide the shadow
  The shadow is hidden, so the load of drawing shadow is reduced.
  → For details, please refer to the section " 12.1.4 Shadow ".
- Disable "Smooth Transition"
  The viewpoint changes without "Smooth Transition", it changes immediately.
  → For details, please refer to the section " 12.1.2 Smooth Transition ".
- Drawing performance is measurable.
  On the [Home] tab, in the [Tools] group, click the [Measure Performance] button, the screen of MotoSimEG-VRC begins rotation and displays the number of drawing frames per second. If it measures before and after setting change and the following red frame numerical value becomes large, it is shown that drawing performance is going up.



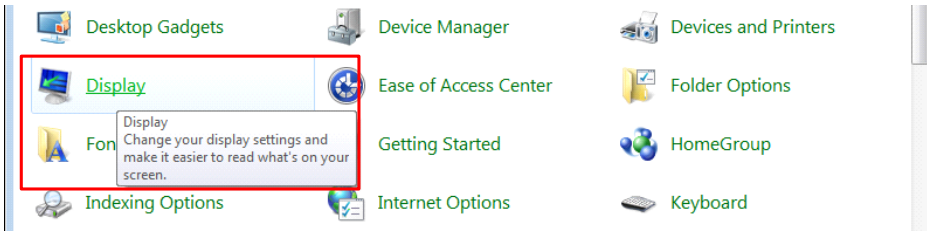
■ Solution in case characters is missing from the screen of MotoSimEG-VRC in Windows7

When a character is missing from the screen of MotoSimEG-VRC in Windows7, please change character size by the following procedure.

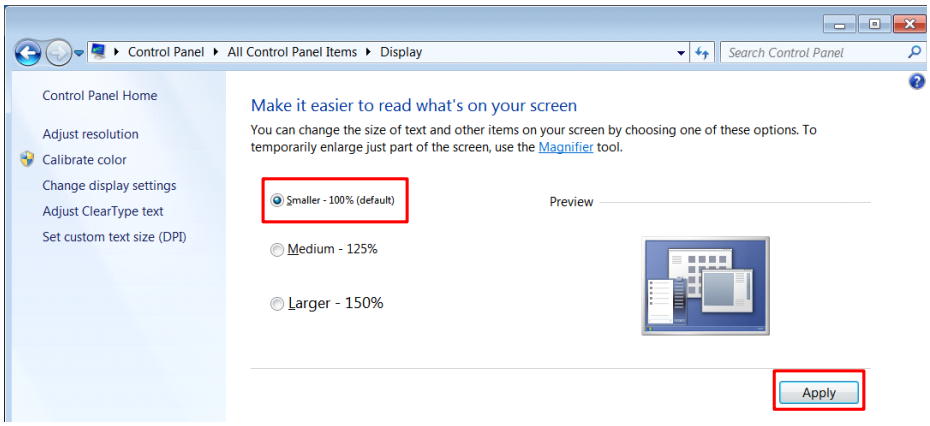
1. Open the {Display} of Control Panel.
   To open {Display}, Click the [Start] button, and [Control Panel].
   (a) In the case of "View by" is "Category":
   Click the [Appearance and Personalization] and [Display].



(b) In the case of "View by" is "Large icons" or "Small icons":
Click the [Display].



2. In [Make it easier to read what's on your screen], Select the [Smaller - 100%] button, and click the [Apply] button.



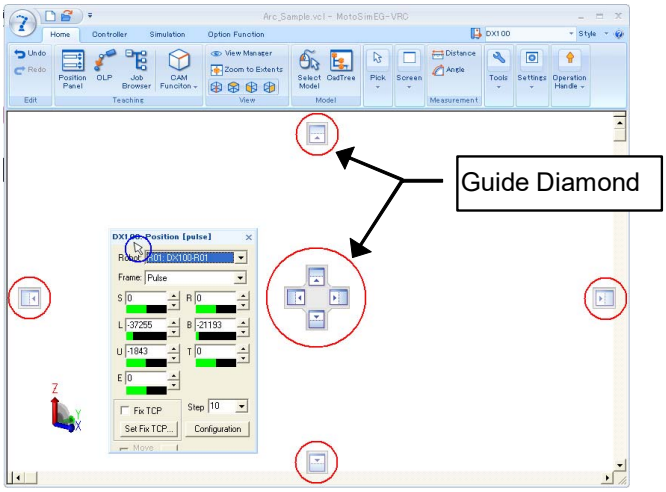
■ Docking Window

Some windows are dockable with any of the four directions of the main screen.
In MotoSim EG-VRC, the following windows are dockable.

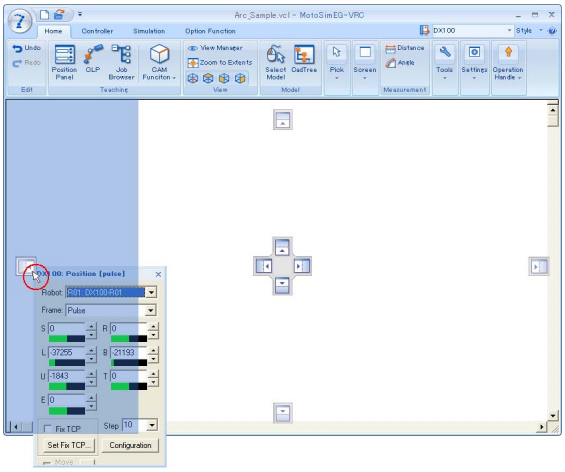
- Position Panel
- OLP
- CadTree
- Variable Monitor
- Pulse Recorder
- Lap Time Panel
- Collision Detection
- Model Library
- Simple PP
- JobPad
- I/O Monitor
- Lap Time Panel
- BreakPoint
- Debug Monitor
- Safety logic circuit

Docking Operation

When the window is dragged to another position, the guide diamond is displayed in order to re-dock the window.

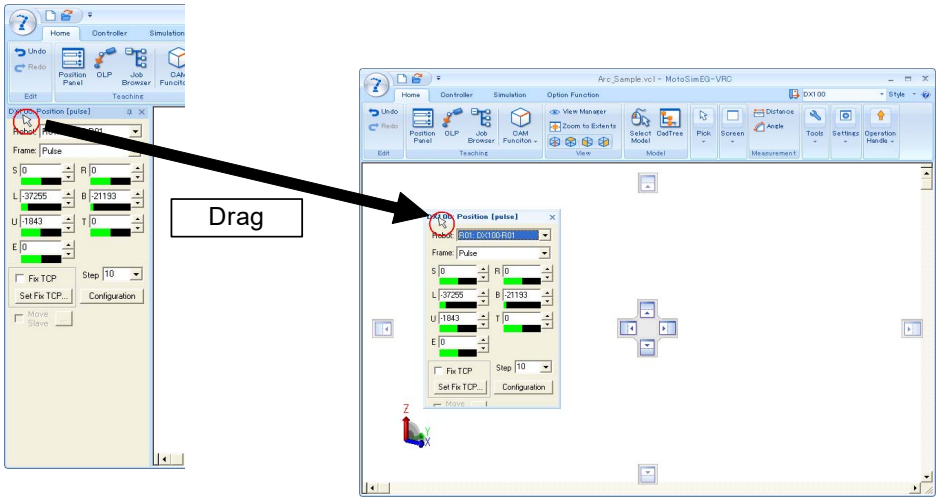


When the dragged window reaches the location where want to dock it , move the pointer over the corresponding portion of the guide diamond. The designated area is shaded. To dock the window in the position indicated, release the mouse button.



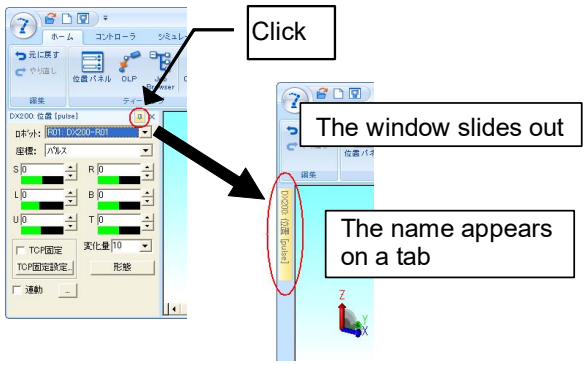
Floating Operation

Drag the window, and release the mouse button at places other than the guide diamond. However, the window is "Auto Hide" enabled ( ), the window can not be froated. So, make the window "Auto Hide" dislabed ( ), and float the window..

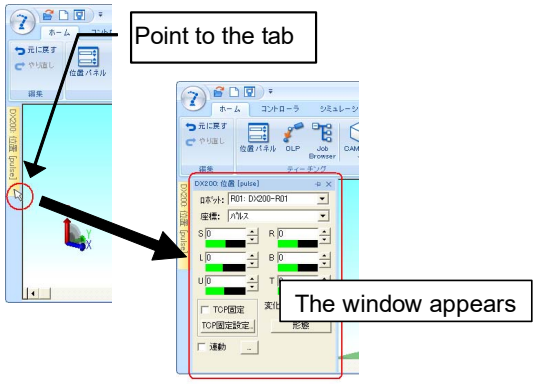


To Enable Auto Hide

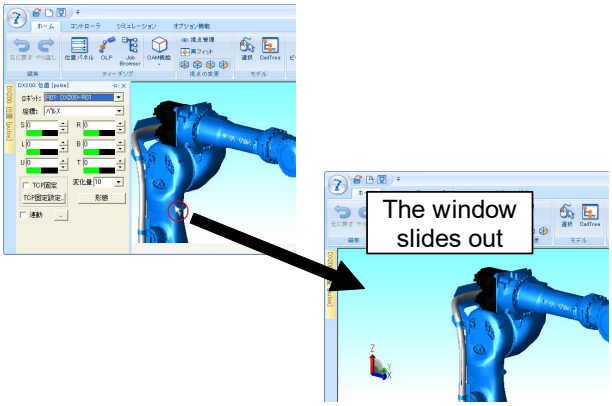
Click the pushpin icon on the title bar of the window, the window becomes "Auto Hide" enabled ( ). The window slides out of the way. When a window is auto-hidden, its name appears on a tab at the edge of the main window.



To use the window, point to the tab so that the window slides back into view.



The window slides out of the way when use a different window.

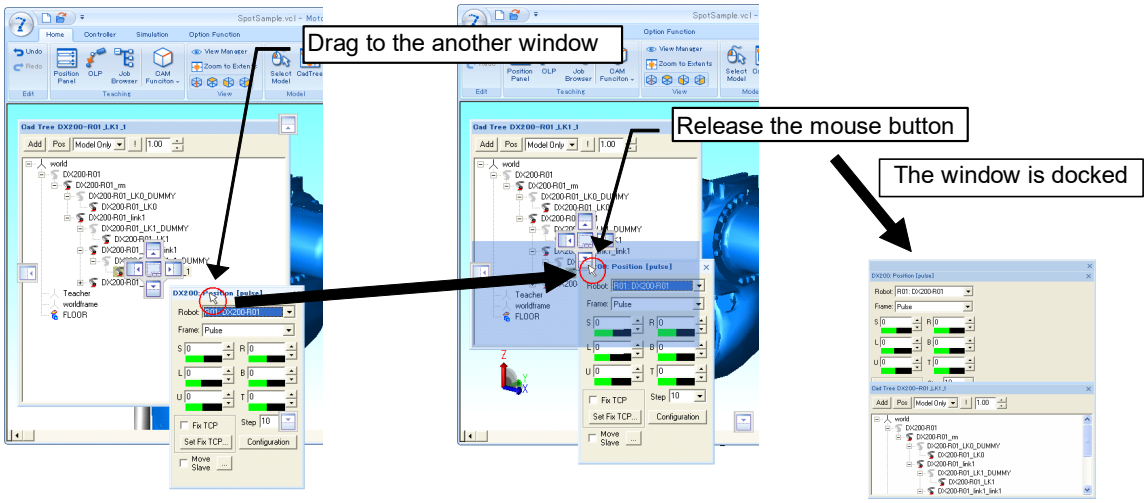


To Disable Auto Hide

Click the pushpin icon again on the title bar of the window, the window becomes "Auto Hide" disabled ( ).

Docking Operation with Two or More Windows

When two or more dockable windows show, it can dock not only with the main window but with another window. However, the window is "Auto Hide" enabled ( ), the window can not be froated. So, make the window "Auto Hide" dislabed ( ), and dock the window.



Floating Operation with Two or More Windows

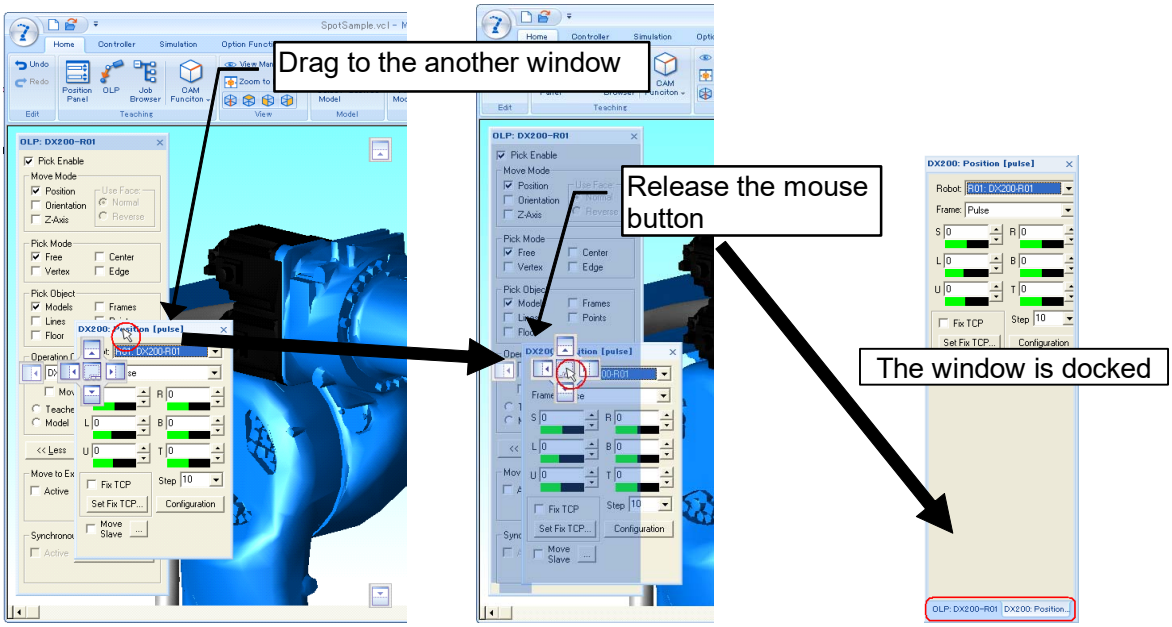
Drag the window, and release the mouse button at places other than the guide diamond. Please refer to the "Floating Operation" for details.

Docking Operation as Tab with Two or More Windows

When two or more dockable windows show, Windows are dockable also as a tab.

Drag the window and move the pointer over the center of the guide diamond ( ) or drag to

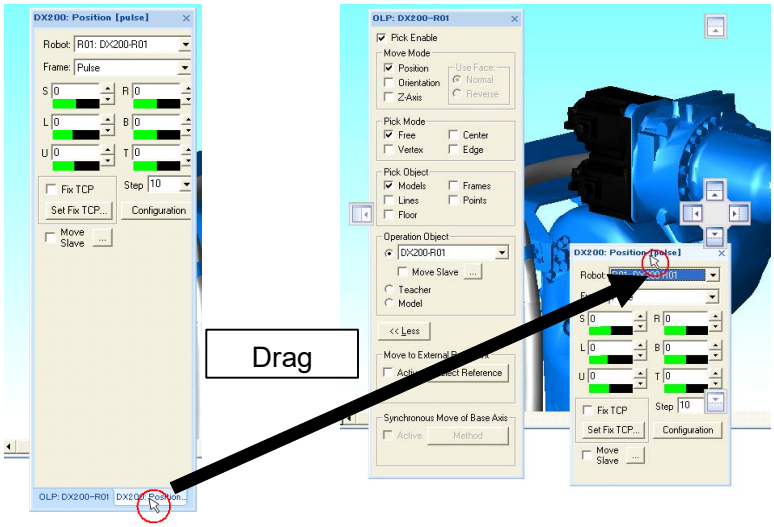
the title bar of another dockable window and release the mouse button.



Floating Operation as Tab with Two or More Windows

To float the window shown as the tab, drag it, and release the mouse button at places other than the guide diamond.

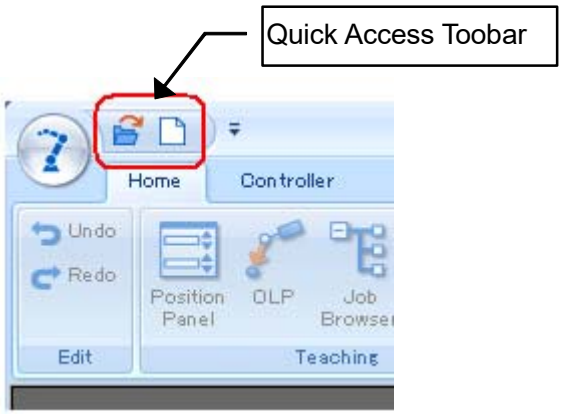
However, the window is "Auto Hide" enabled ( ), the window can not be froated. So, make the window "Auto Hide" dislabed ( ), and dock the window.



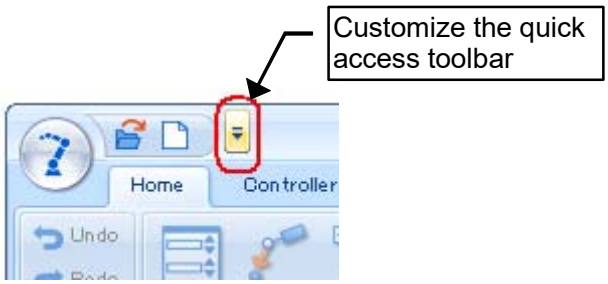
■ Quick Access Toolbar

"Quick Access Toolbar" is convenient to execute a command quickly, without not changing a ribbon tab or displaying a menu from the MotoSim EG-VRC button ( ).

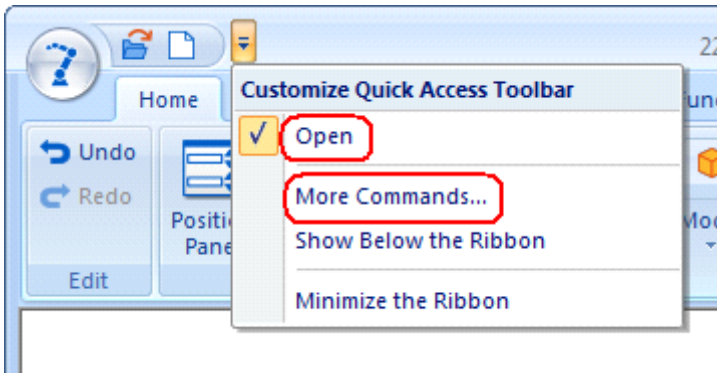
If prepopulate the quick access toolbar with the frequently used commands, the button of the commands can always be displayed.



1. To customize the quick access toolbar, click the the following button. ( )

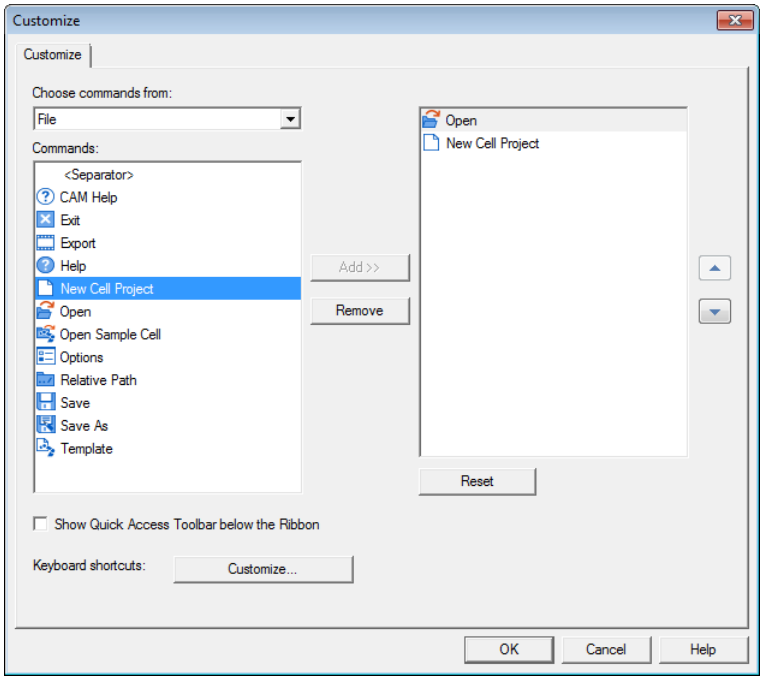


2. When add the "Open" command to the quick access toolbar, click the "Open" menu. When add the other commands, click the "More commands..." menu. The "Customize" dialog appears.



3. Select the tab name by "Choose commands from" list box, and the commands is dis-

played. Select the command, and click the [Add] button.



4. The added command is diplayed in the right side list. Click the [OK] button.
   Then the command is added to the quick access toolbar.

NOTE

To delete the command button from the quick access toolbar, right-click the target button, and click the "Remove from Quick Access Toolbar on the shortcut menu" menu.
When add or remove the two or more buttons, it can be operated efficiently in the "Customize" dialog.

■ Comparison Table with the New Menu from the Old Menu and the Old Tool Bar

Old Menu and the Old Tool Bar	New Menu
File	
New	- New - New
Open	- Open - Open
Close	
Save	- Save
Save As	- Save As
Open Sample Cell	- Open - Open Sample Cell
Template	- New - Template
Exit	- Exit
Edit	
Undo	[Home] - [Edit] - Undo
Redo	[Home] - [Edit] - Redo
Copy	[Home] - [Tools] - Copy
Screen	
Camera Scope	
Zoom To Extents	[Home] - [View] - Zoom to Extents
Direction	
View	[Home] - [View] -
Side	[Home] - [View] -
Top	[Home] - [View] -

Old Menu and the Old Tool Bar	New Menu
Front	[Home] - [View] -
View Manager	[Home] - [View] - View Manager
Select Model	[Home] - [Model] - Select Model
Pick Mode	[Home] - [Pick] - Pick Mode Free Vertex Center Edge
Free	
Vetex	
Center	
Edge	
Pick Object	[Home] - [Pick] - Selectable Object Models Frames Lines Points Floor
Models	
Frames	
Lines	
Points	
Floor	
Line Size	[Home] - [Screen] - Line Size Small Medium Large
Small	
Medium	
Large	
Frame Display	[Home] - [Screen] - Frame Display
Rendering Mode	[Home] - [Screen] - Rendering Mode Flat Shading Gouraud Shading Wire Frame Smooth Transition
FlatShading	
GourandShading	
Wireframe	
SmoothTransition	
Light Manager	[Home] - [Screen] - Light Manager
Shadow	[Home] - [Screen] - Shadow

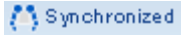
Old Menu and the Old Tool Bar	New Menu
Memo	[Home] - [Screen] - Memo
Dimension Line	[Home] - [Screen] - Measure Line
Markup	[Home] - [Screen] - Mark-up (Circle, Rectangle, Free Hand, Note)
Freehand	
Circle	
Rectangle	
Notes	
Cutting Planes	[Home] - [Screen] - Cutting Plane (X, Y, Z)
X-Cutting Planes	
Y-Cutting Planes	
Z-Cutting Planes	
Measure	
Distance	[Home] - [Mesurement] - Distance
Angle	[Home] - [Mesurement] - Angle
Controller	
New Controller	[Controller] - [Setup] - New
Copy Controller	[Controller] - [Setup] - Copy
Delete Controller	[Controller] - [Setup] - Delete
Select Controller/Robot	
Controller Setting	
Tool Data	[Controller] - [File Settings] - Tool Data

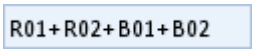
Old Menu and the Old Tool Bar	New Menu
User Frame Data	[Controller] - [File Settings] - 
Open a folder external storage	[Controller] - [VPP] - 
Reboot Controller	[Controller] - [Boot] - 
Boot Maintenance-Mode	[Controller] - [Boot] - 
Refrash Interval	[Home] - [Settings] - 
Servo Emulation	[Simulation] - [Playback] - 
Welding Condition	[Controller] - [File Settings] - 
Cube Area Update & Display	[Controller] - [File Settings] - 
Delete Cube Area Model	
Safety Function	[Controller] - [File Settings] -  
Safety Function File	
Tool Interfer-ence Model	
Robot Approxi-mate Model	
Robot Setting	
Property	[Controller] - [Robot] - 
ReachView	[Controller] - [Robot] - 
Calibration	[Controller] - [File Settings] - 
Device	[Controller] - [External Device] -  
Add Conveyor	
Ade Press	
Add Gantry	
SoftLimit Setting	[Controller] - [External Device] - 

Old Menu and the Old Tool Bar	New Menu
Job Panel	[Controller] - [External Device] - Job Panel
Conveyor Operation Panel	[Controller] - [External Device] - Conveyor Operation Panel
Conveyor Setting	[Controller] - [External Device] - Conveyor Settings
Conveyor Synchoroni-zation	[Controller] - [External Device] - Conveyor Condition File
Playback	
Cycle Time	[Simulation] - [Playback] - Cycle Time
Start 	[Simulation] - [Playback] - 
Hold 	[Simulation] - [Playback] - 
Step Next 	[Simulation] - [Playback] - 
Step Back 	[Simulation] - [Playback] - 
Reset Job 	[Simulation] - [Playback] - 
Trace	[Simulation] - [Monitor] - 
Model	
New Model	
Edit Model	
Hide/See	
Model	
Frame	
Name	
Wiring View	
Model Attribute	
Set Parent	
Move Parent	
Set File Path	

Old Menu and the Old Tool Bar	New Menu
Rename	
Set Position	
Property	
Edit	
Cut	
Copy	
Patsh	
Delete	
Fine	
Model Tree View	
Refresh View	
Expand Tree	
Models List	
Save Model Group	
Load Model Group	
Model Script Editor	[Simulation] - [Model Simulation] - 
Tool	
CAD Tree 	[Home] - [Model] - 
Positon Panel 	[Home] - [Teaching] - 
OLP 	[Home] - [Teaching] - 
Job Shift	
I/O Monitor 	[Simulation] - [Monitor] - 
I/O Events	[Simulation] - [I/O Settings] - 
I/O Connections	[Simulation] - [I/O Settings] - 

Old Menu and the Old Tool Bar	New Menu
Variable Monitor	[Simulation] - [Monitor] - 
Lap Time Panel	[Simulation] - [Monitor] - 
StafeMaster	[Simulation] - [Playback] - 
Collision Detection	[Simulation] - [Collision] - 
Sensing Definition	[Simulation] - [Settings] - 
Pulse Record	[Simulation] - [Monitor] - 
Paing Setting	[Simulation] - [Settings] - 
Show Speed Graph	[Simulation] - [Monitor] - 
Execute Soft	[Home] - [Tools] - 
Execute JobBraowser	[Home] - [Teaching] - 
Option	 -  [Home] - [Settings] - 
CAM	[Home] - [Teaching] - 
Create Job Form CAM	
Load Robot Settings	
Option Tool	
Motor Load Estimate	[Tool] - [Estimate] - 
Life Estimate	[Tool] - [Estimate] - 
View	
Toolbar	

Old Menu and the Old Tool Bar	New Menu
File Bar	
Edit Bar	
Playback Bar	
CAD Bar	
View Bar	
Controller Bar	
Memo Bar	
Cutting Bar	
Mesure Bar	
Status Bar	
Japanese	
Windwos	
Cascade	
Tile Horizontally	
Tile Vertically	
Split	
Help	
Help	
CAM Help	
Version	
Performance	[Home] - [Tools] - 
Toolbar Only	
	[Controller] - [VPP] - 
	[Home] - [Operation Handle] - 
	[Home] - [Operation Handle] - 
	[Home] - [Operation Handle] - 

Old Menu and the Old Tool Bar	New Menu
	[Home] - [Operation Handle] - 
	[Home] - [Operation Handle] - 
	[Home] - [Operation Handle] - 

■ Solution in case "The program can't start because MSVCP110.dll is missing from your computer." is displayed

"Microsoft Visual C++ 2012 Update 4 Redistributable Package" might not be installed.

- In case MotoSim EG-VRC is 64-bit application
  In the Install DVD,
  (1) \setup_64bit\ISSetupPrerequisites\{BF2F04CD-3D1F-444e-8960-D08EBD285C3F}
  vcredist_x86.exe
  (2) \setup_64bit\ISSetupPrerequisites\{3A3AF437-A9CD-472f-9BC9-8EEDD7505A02}
  vcredist_x64.exe
  are executed, install "Microsoft Visual C++ 2012 Update 4 Redistributable Package".
  Please check MotoSim EG-VRC can start.

- In case MotoSim EG-VRC is 32-bit application
  In the Install DVD,
  \setup_32bit\ISSetupPrerequisites\{BF2F04CD-3D1F-444e-8960-D08EBD285C3F}
  vcredist_x86.exe
  is executed, install "Microsoft Visual C++ 2012 Update 4 Redistributable Package".
  Please check MotoSim EG-VRC can start.

■ Way to import a DWG file

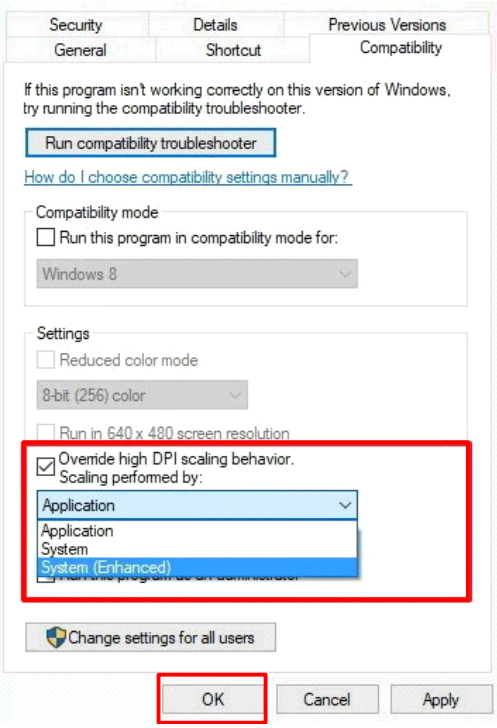
DWG file may be able to be imported by changing the extension of CAD file to DXF.

■ Solution in case characters is missing from the screen of MotoSim EG-VRC and virtual pendant in Windows10 Version 1703 or later with the high resolution monitor

When a character is missing from the screen of MotoSim EG-VRC and virtual pendant in Windows10 Version 1703 or later with the high resolution monitor, please change the settings by the following procedure.

1. Open the installation folder of MotoSim EG-VRC in File Explorer.
   (Ex1: C:\Program Files\MOTOMAN\MotoSimEG-VRC 2017SP2)
   (Ex2: C:\Program Files (x86)\MOTOMAN\MotoSimEG-VRC 2017SP2)
2. Display the right-click menu with MotoSimEG-VRC.exe in the installation folder and select [Properties].
3. In the "Properties" dialog, on the "Compatibility" tab, under "Settings", check "Override

high DPI scaling behavior." and set "Scaling performed by:" to "System (Enhanced)".



4. Click the [OK] button.
5. Repeat STEP2 through STEP4 for each of the following files in the "Controller" folder in the MotoSim EG-VRC installation folder.
   - Controller\DX100\VPP\DXPP_2.02-00\YppMain.exe
   - Controller\DX200\VPP\DNPP_1.00-00\YppMain.exe
   - Controller\FS100\VPP\FSPP_1.00-00\YppMain.exe
   - Controller\FS100\VPP\FLPP_2.00-00\YppMain.exe
   - Controller\NX100\VPP\NXPP_4.30-00\NxPp.exe
   - Controller\YRC1000\VPP\YASPP_1.30-00\YppMain.exe
   - Controller\YRC1000micro\VPP\YBSPP_1.30-00\YppMain.exe

■ Exception Setting of Anti-virus Software

When anti-virus software (Symantec, McAfee, etc.) is installed on a PC running MotoSim EG-VRC, when running MotoSimEG-VRC.exe, an error may occur and execution may not be possible.
If this happens, you will need to reinstall MotoSim EG-VRC for recovery.

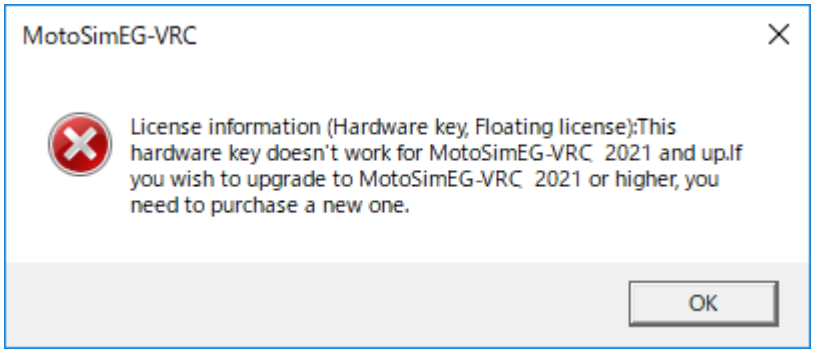
To avoid this problem, please set "Exception Setting" for the installation folder of MotoSim EG-VRC with anti-virus software installed in PC.
The default installation folder is "C:\Program Files\MOTOMAN\<<Installation Version Name>>".

When cannot specify the folder by exception setting, please set the exception setting to the following files.
File storage folder: installation folder
Setting target file: CollisionDetectorManager.dll
COMGraph.dll

ModelMakerCLI.dll
MotoIk.dll
MotoSimEG-VRC.exe
msegcom.dll
PathPlanEgn.dll
RobotModel.dll
RtsLib32.dll
RtsRRSx.dll
Rwdll32b.dll
SpaCDHOOPS_3DF.dll
SPACDKernel.dll
SweepModelGenerator.dll
VRC_IF.dll
VRC_IF_CS.dll

■ Error Screen Displayed When Starting MotoSimEG-VRC

If the expiration date of the hardware key has passed, the following screen is displayed. If you would like to upgrade, please contact our sales department.



MotoSim EG-VRC Ver2021
OPERATOR'S MANUAL

For inquiries or after-sales service on this product, contact your local YASKAWA representative as shown below.

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