K-ROSET
Instruction Manual

90210-1432DEC

Kawasaki Heavy Industries, Ltd.

contents

Summary

This manual describes operating instructions for the K-ROSET. This manual should be read with careful review of the related manuals listed below. Once the contents of all the manuals are thoroughly read and understood, the robot can be used.

- [Safety Manual]
- [Instruction Manual]
- [Installation and Connection Manual (Arm)]
- [Installation and Connection Manual (Controller)]
- [External I/O Manual] (When connecting with external equipment)
- [Maintenance Manual]
- [AS Language Manual]

Please contact Kawasaki Robot Services for any question or troubles concerning operational method and robot specifications.

This manual explains functions including optional equipment. Not every function explained in this manual is available depend on the robot specification. Also, some pictures shown in this manual might be different from those actual screens.

1	This manual does not constitute a guarantee of the systems in which the robot is utilized. Accordingly, Kawasaki is not responsible for any accidents, damage, and/or problems relating to industrial property rights as a result of using the system.
2	It is recommended that all personnel assigned for activation of operation, teaching, maintenance or inspection of the robot attend the necessary education/training course(s) prepared by Kawasaki, before assuming their responsibilities.
3	Kawasaki reserves the right to change, revise, or update this manual without prior notice.
4	This manual may not, in whole or in part, be reprinted or copied without the prior written consent of Kawasaki.
5	Store this manual with care and keep it available for use at any time. If the robot is reinstalled or moved to a different side or sold off to a different use, attach this manual to the robot without fail. In the event the manual is lost or damaged severely, contact Kawasaki.

Safety Instruction

The items that require special attention in this manual are designated with the following symbols.

Ensure proper and safe operation of the robot and prevent physical injury or property damage by complying with the safety matters given in the boxes with these symbols.

[NOTE]

Denotes precautions regarding K-ROSET specification, handling, teaching, operation and maintenance.

WARNING

1. **The accuracy and effectiveness of the diagrams, procedures, and detail explanations given in this manual cannot be confirmed with absolute certainty. Should any unexplained questions or problems arise, please contact Kawasaki.**
2. **Safety related contents described in this manual apply to each individual work and not to all robot work. In order to perform every work in safety, read and fully understand the safety manual, all pertinent laws, regulations and related materials as well as all the safety explanations described in each chapter, and prepare safety measures suitable for actual work.**

1 Introduction

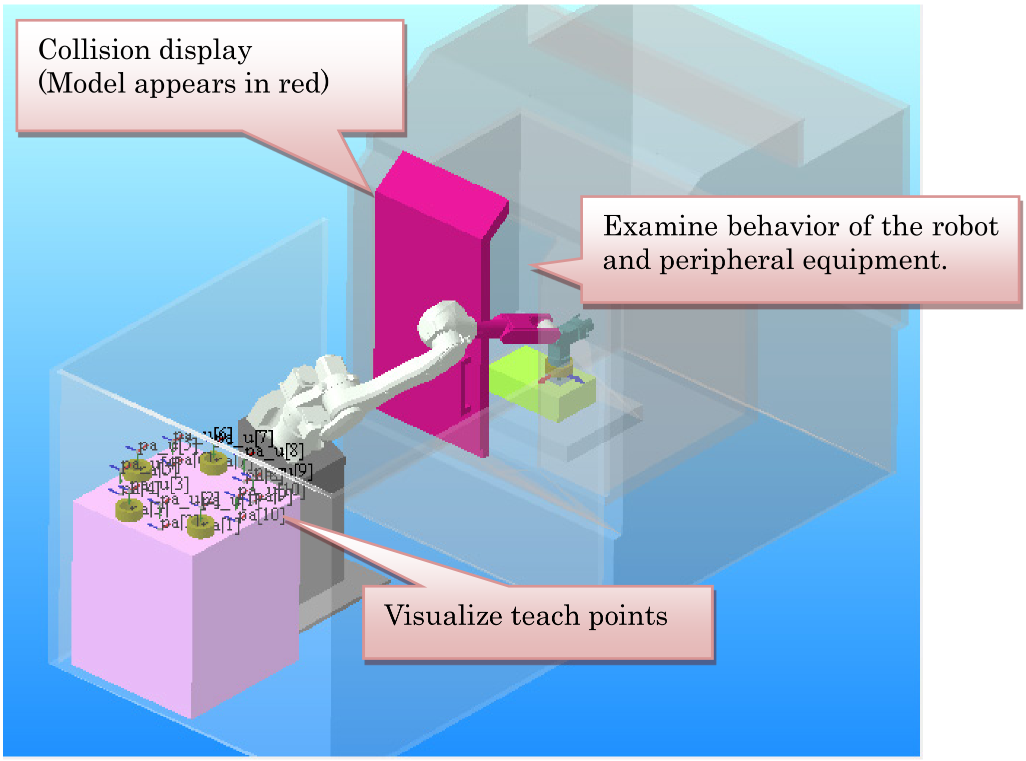
This section describes an environment, installation method and a license necessary for the K-ROSET.

1.1 What is K-ROSET?

K-ROSET is an offline programing application that allows user to create teaching programs and simulate the unit system by arranging Kawasaki robot, workpiece and peripheral equipment in the screen view to create a virtual environment which is similar to the real unit system. MoNo.RAIL is adopted to the View function for 3D model.

* MoNo.RAIL is a framework for OpenGL which is a product of MoNo Community Inc.

As K-ROSET faithfully reproducing the real Kawasaki controller, it is capable of showing accurate robot motion path and accurate result of robot motion time. That makes K-ROSET suitable for robot pose research and cycle time study. It also helps user to design whole unit system and visualize efficient facility layout including workpiece and peripheral equipment besides robot. As motion of the peripheral equipment can also be set in K-ROSET, K-ROSET allows user to examine collision cases beforehand by creating similar system environment as real one and avoid those situation (Model color turns to red when a model collide to other models.). Simulating on K-ROSET does not involve any physical damages and that enables to test the program efficiently. For the already installed system, make a good use of K-ROSET to visualize the target point of the robot (Teach point). K-ROSET will also help you for the system proposal with 3D motion files you can create using K-ROSET.



Load/unload to the processing equipment

Efficient use of K-ROSET before installation is for system proposal for presentation material as well as for design tool to design an entire system. During a system installation, K-ROSET can be used for layout design material as well as helps for managing a change on the system. It also helps to make a change on program besides checking required items for the system installation in parallel by using simulator whenever any problem is found and that helps to shorten a lead time. For the already installed system, K-ROSET allows user to make a change on the current program without stopping the operating production line. It's also useful to touch up the teach points when replacing an old robot to new one.

System condition	Use of K-ROSET
Before system installation	Layout design Create animation video for presentation material
During a system installation	Management on design change Change system and program when any problem occurs.
After system installation	Change system and program when any problem occurs. Robot replacement Visualize teach points

1.1.1 K-ROSET specification

K-ROSET limits the number of robots that can be connected to a controller in a project
(Eight for F, E, D, D+ controllers and four for C controllers). The controller is prepared for each application.

- Applications are categorized according to the real controller.

Controller	Handling	Handling (Special)	Painting	Sealing	Servo welding	Arc
F Controller	✓	✓	—	—	✓	✓
E Controller	✓	—	✓	✓	✓	✓
D+ Controller	✓	—	—	—	—	✓
D Controller	✓	✓	—	—	—	—
C Controller	—	—	✓	—	—	—

- Please refer to the "7.2 Controller library" and "7.3 Simulation Models" and "7.4 Program instructions" for supported models and program instructions.

1.2 License

Functions that can be used in K-ROSET varies depends on the license type.
Additional license might be required in order to use functions written in this instruction manual.
Please contact K-ROSET support if you would like to have a license for optional function.
Following license types are available.

License Type	License Key	Contents
Correct	USB / File	Paid license that can be used all functions indefinitely. Separate licenses for each application.
Trial	File	Free license that provides full applications and functions for two months.
LITE Mode	Not required	Free license (Limited functionality available)

Application Types

License key has information of application types that can be used in K-ROSET. Robots with application type which is not set as license cannot add to projects. Robots of application type without license cannot connect to the robot controller, thereas robots cannot be operated. Besides, related plugin cannot be used such as the paint simulation cannot be used with the handling license. Please contact Kawasaki Heavy Industries, Ltd. if you would like to have license for additional application types or plugin function.
The latest K-ROSET version (Ver.1.8.6) can be applied [Handling], [Handling(special)], [Arc Welding], [Servo Welding Gun], [Painting] and [Sealing].

* Another software [K-SPARC] is available specialized in palletizing.

LITE Version

If there is no license key in your PC or the validity of the license key has expired, K-ROSET starts in LITE mode. K-ROSET version can be checked with the splash at the time of starting. With LITE version, only a robot can be added and limited plugin can be used. Please refer to the attached [K-ROSET Available functions on LITE] for details.

Trial License

Trial License is available for experiencing K-ROSET functions before purchase. It is valid for two months and it can be operated in LITE mode after expiring. The expiry date of Trial license is shown on the splash screen at the time of K-ROSET starting. If you have purchased K-ROSET standard version, the expiry date is now shown as it is for indefinite period.

*

- Trial license can be issued only one time per device.

1.2.1 License Key

The purpose of a license key is to confirm which functions can be used with PC that K-ROSET is installed. It is provided in license file or USB. A license key contains PC information that K-ROSET is installed, the expiry date of the license and application type.

License File

A license file issued according to the information peculiar to the target PC (KROSET_License.key) is necessary to start the K-ROSET.　When the suitable file doesn’t exist in the installation folder, the K-ROSET does not start properly. A trial license before purchase has validity for two months and this information is described in a license file. A license is no longer valid after the expiry date. Please refer to the attached [K-ROSET license file application method] for details.

USB

USB key that contains license information is also available. As USB doesn’t contain individual PC information, it can be used in any PC that you would like to use K-ROSET. Please contact Kawasaki Heavy Industries, Ltd for details about USB key.

1.3 Operating environment of K-ROSET

The PC operating environment necessary for installing K-ROSET is shown below.

Item	Details
Operating System(OS)	Windows® 10 Professional x64 : Japanese/English/Chinese/German
CPU	Intel®, AMD® 2GHz(32bit) or higher
RAM	Minimum of 4 GB RAM, 16 GB or more recommended.
Storage device	5GB or more
Disk device	Not required
Graphic card	A combination of a verified OpenGL workstation video card and its driver. NVIDIA product is recommended
Other requirements	A Mouse (Recommendation: mouse with a scroll wheel) or equivalent pointing device Microsoft® Edge PDF Reader(e.g. Adobe® Acrobat® Reader)
How to obtain an installer	Download the K-ROSET installer from the Kawasaki Robotics Download Center. (https://dl.robotics.khi.co.jp/login) For Chinese, use our Chinese website. (https://dl.kawasakirobot.cn/login)

*1. Windows, Microsoft Edge is registered trademarks of Microsoft Corporation.

*2. Intel is registered trademarks of Intel Corporation.

*3. AMD is registered trademarks of Advanced Micro Devices Incorporated.

*4. NVIDIA is registered trademarks of NVIDIA Corporation.

*5. Open GL is registered trademarks of Silicon Graphics Incorporated.

*6. Adobe Reader is registered trademarks of Adobe Systems Incorporated.

- When installing in Japanese, operation cannot be guaranteed on non-Japanese operating systems.
- A membership application is required to use the Kawasaki Robotics Download Center. For more information, contact a Kawasaki sales representative.

1.4 Setup and Start

This chapter explains how to setup and start K-ROSET.

1.4.1 Setup

For the details on installation and uninstallation, refer to "K-ROSET Installation Guide" in the install disk (DVD).

1.4.2 Start

How to start K-ROSET

After completing setup, double-click K-ROSET shortcut on the desktop.

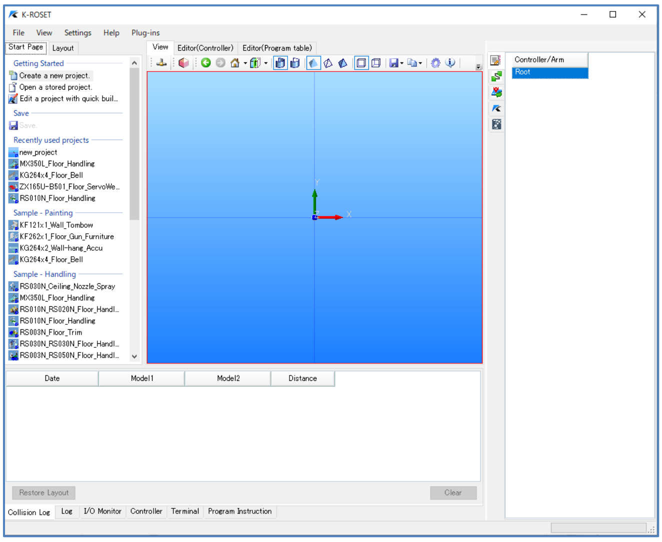
The splash screen of K-ROSET is appeared at the time of starting.

Please confirm the license type.

The expiry date is appeared for a trial license of V1.7.1 onwards.

Standard	LITE	Trial
		

K-ROSET starts. The following screen is appeared.

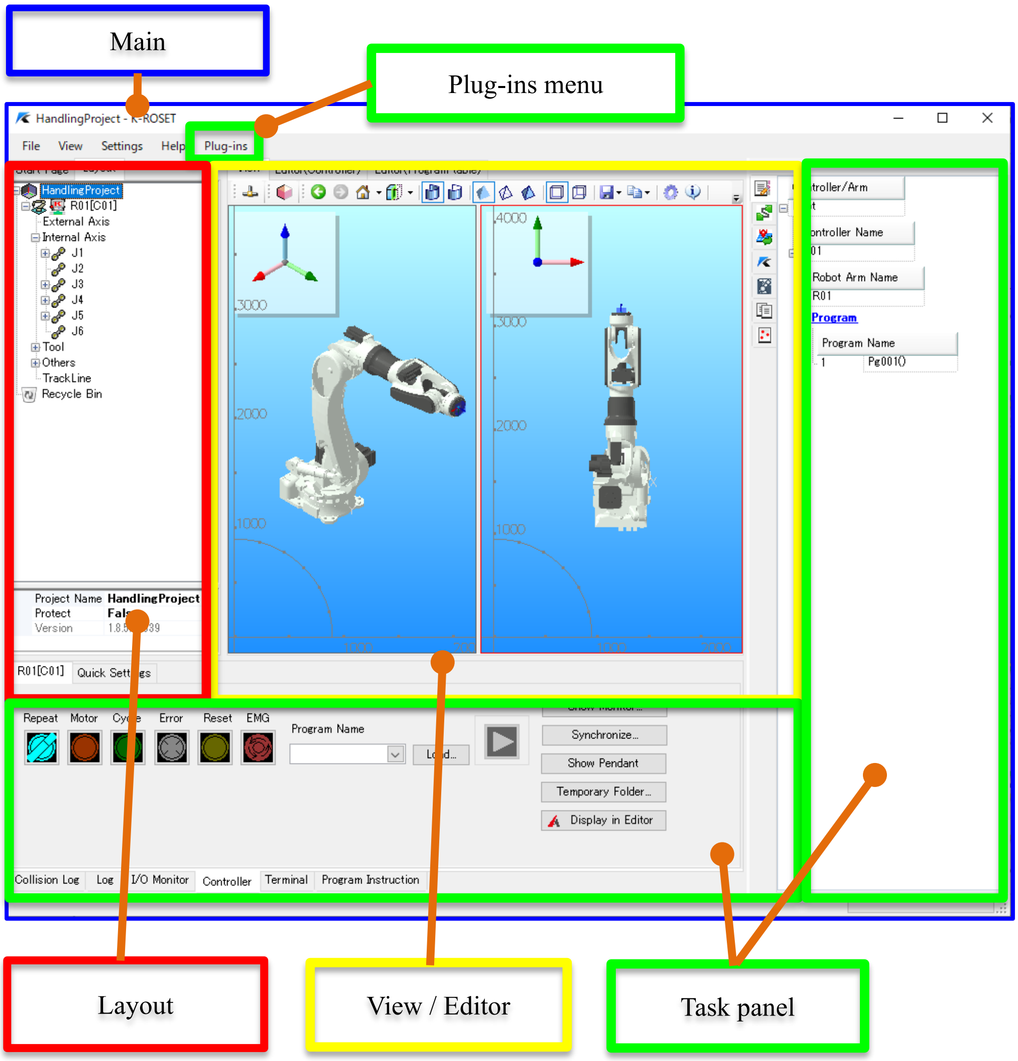


1.5 Concept and Terms

This chapter describes a concept and terms of K-ROSET used in the main text.

1.5.1 Concept

This chapter describes an idea of K-ROSET. A screen of K-ROSET is displayed below.



The screen of K-ROSET consists of a main screen, layout, view, editor, and a task panel.

The roles of the screens are shown below.

Screen name	Role
Main	A menu and a tool bar of the view are displayed.
Layout	Basic screen. Addition and change of models can be carried out on this screen. Select a model, right-click to show a menu, and set a necessary setting for the model.
View	Screen to display a model. The screen can be displayed in three dimensions. In addition, a viewpoint can be changed, and a model can be dragged to move.

Screen name	Role
Editor	Selecting the Editor tab will display AS language development editor (AS-IDE) and you can edit controller data and/or data in the program table in editor format. Refer to [K-ROSET AS Language Integrated Development Environment Instruction Manual] for further information. *AS-IDE is the abbreviation of AS Language Integrated Development Environment.
Task panel Plug-ins menu	This panel mainly displays extended applications. According to work details, only necessary screens can be displayed. Floating display from the task panel can also be carried out.

► Right-click menu

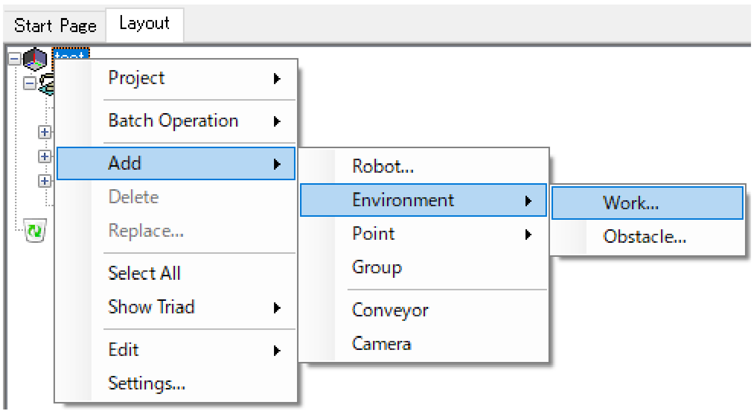
In K-ROSET, operations such as opening a project and addition of a robot are carried out from a layout screen or a view screen. Refer to a screen below. Addition of a work to a project is shown.

1 **Right-click a project icon.**

A menu is displayed, and a menu related to the project is displayed.

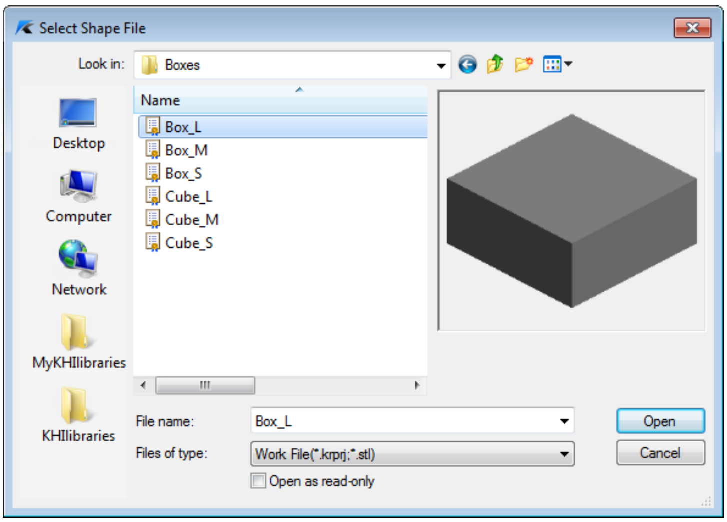
2 **Select [Add] -> [Environment] -> [Work].**

The file dialog box is displayed.



3 **Select a work file.**

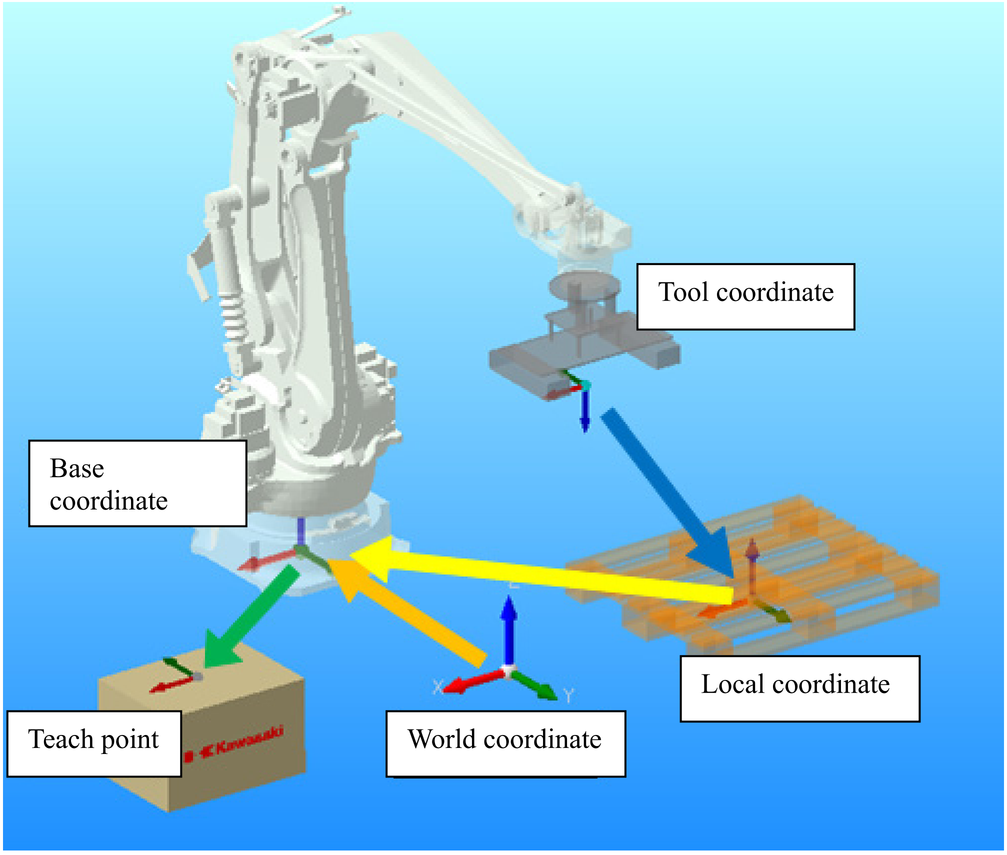
Model is read on the view.



1.5.2 Coordinate system

This section describes converted coordinate values. Converted coordinate values indicate the coordinate values of a coordinate system created around certain coordinates serving as an origin. Coordinate values consist of six values, which are three values indicating the position and three values indicating the orientation, and are generally expressed as (X, Y, Z, O, A, T). Converted coordinate values are classified into four variations: world coordinate, local coordinate, tool coordinate, and base coordinate. Each of these is described below. OAT shows RZ、 RY and RZ rotation in Euler angle.

- Please refer to the AS Language Manual for Euler angles.



➢ **World coordinate system**

A coordinate system having its origin at the world origin. This coordinate system is an absolute coordinate system.

➢ **Local coordinate system**

A coordinate system having its origin at the center of gravity of the object.

- The example above is in workpiece origin.

➢ **Tool coordinate system**

A coordinate system having its origin at the tool origin of the robot.

➢ **Base coordinate system**

A coordinate system having its origin at the origin of the base coordinates.

- Coordinate system differs depending on robot model.
- Use the value on the base coordinate when specifying XYZ in robot program.

► Robot pose

Robot pose to use in the program is shown in joint value and transformation value

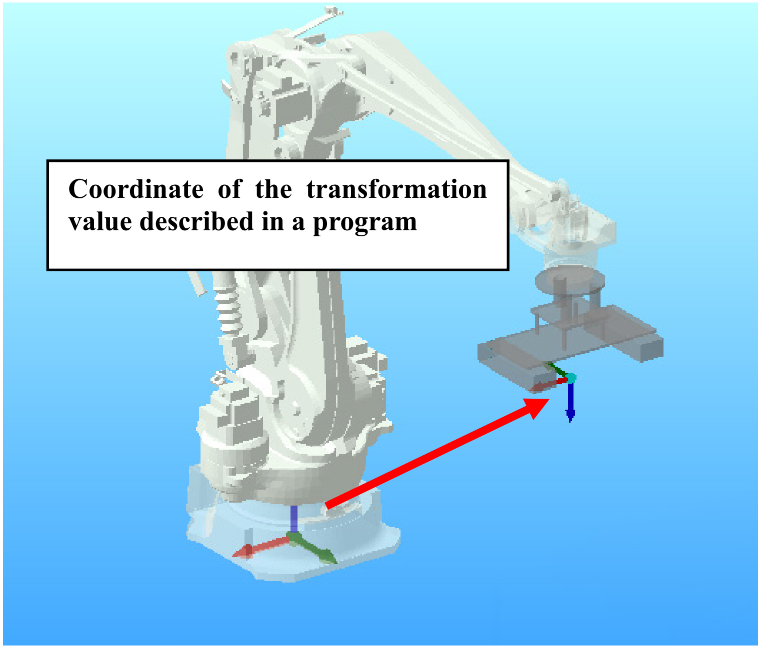
➢ Joint value

Joint value is the position data expressed in precision point of each robot joint. Value will be expressed in angle (°) for rotation and in displacement (mm) for linear motion axis.

➢ Transformation value

Transformation value is the position data expressed in a combination of a position on a reference coordinate and robot pose. Set value in XYZOAT based on the robot flange for the Tool transformation value mentioned earlier and set XYZOAT based on the initial base transformation value for the Base transformation value.

Register XYZOAT of working position (tool transformation value after moved the robot) based on the Base transformation value mostly when describing in a program.



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- Please refer to the AS Language Manual for advantage and disadvantage of Joint value and Transformation value.

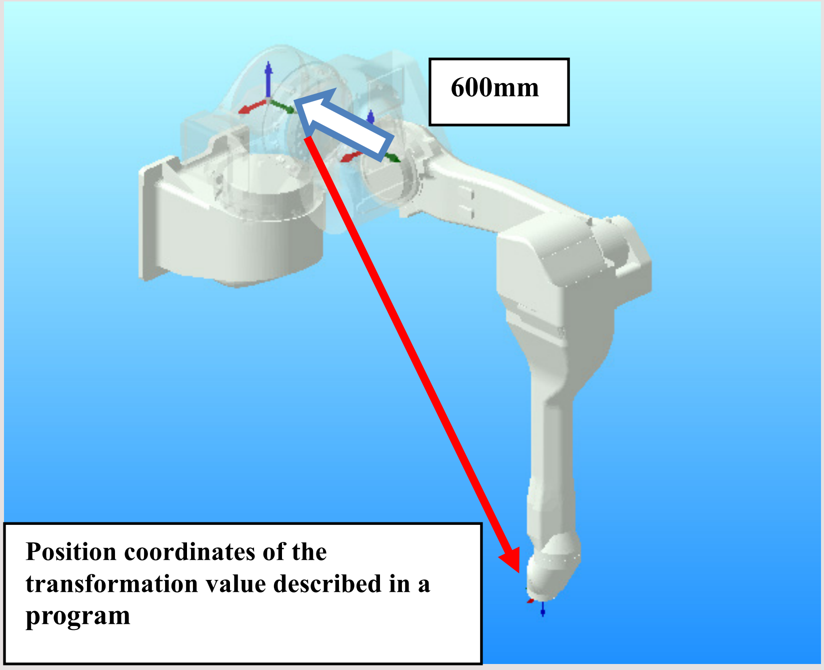
column

Special case

Some robot models and operation methods are not specified by normal transformation value (Base transformation value =>Tool transformation value) when creating or executing a program.

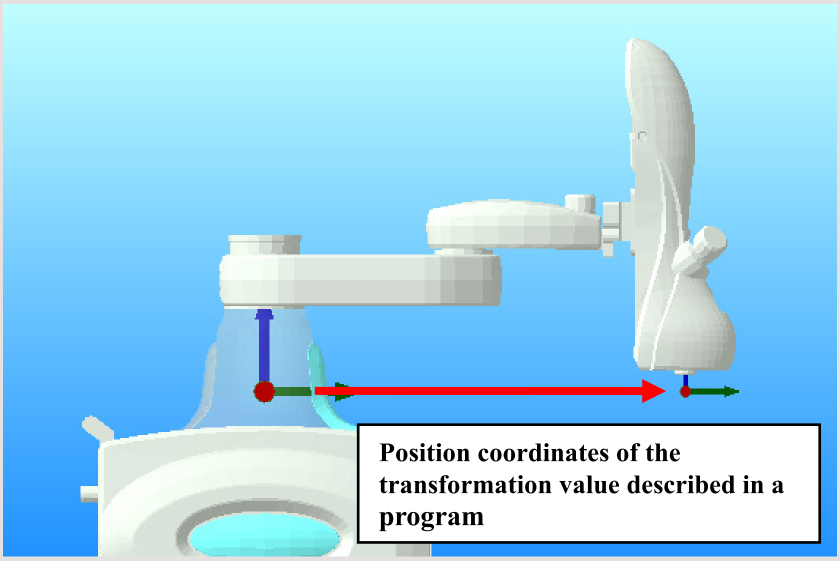
KJ314

For the painting robot KJ314 with 7 axes, as the 7th axis is swing axis, base of the robot base position is 600mm shifted to Y direction from the arrow of base transformation value.



WD002/WD003 (duAro)

This model is categorized as link type robot and it cannot be set Base transformation value and Tool transformation value (XYZOAT).
Set base rotation R and Y direction of tool base in the Link function instead. Please refer to the setting for Link function in this manual.

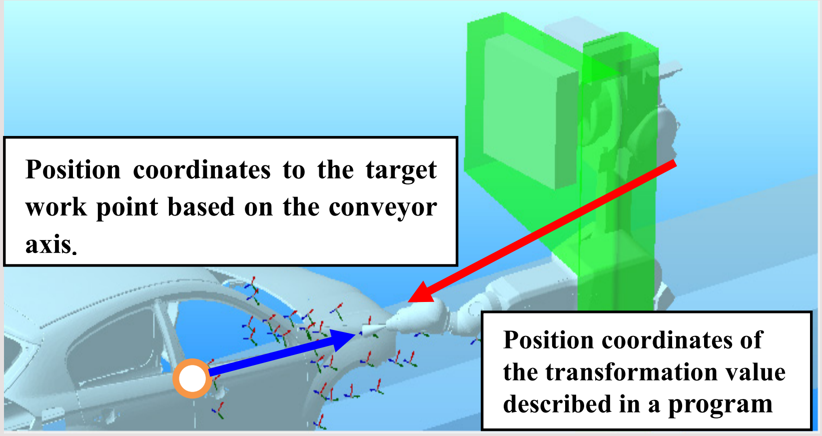


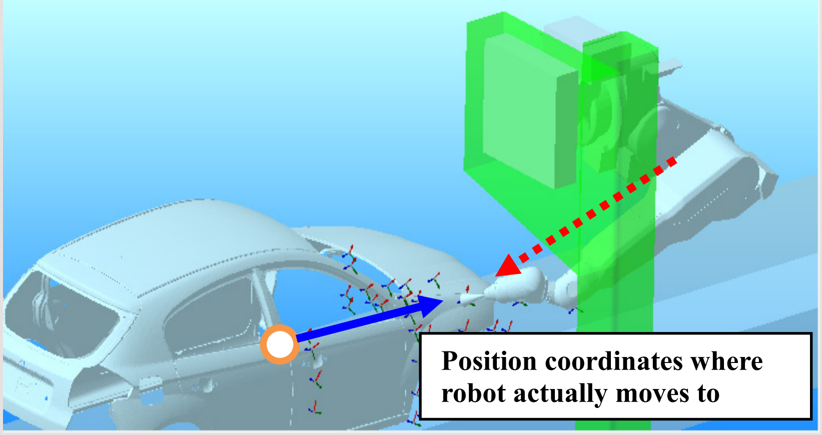
Position of the Base arrow and the Tool arrow are same at the initial robot pose.

Conveyor synchronization

When conveyor synchronization is set, besides registering XYZOAT of working position (tool transformation value after moved the robot) based on the Base transformation value as usual, travel distance of conveyor axis needs to be set. And robot moves to the target working point based on the conveyor axis value when program is executed. That causes a case that robot cannot have the poses when executed a program which it could at the time of teaching.

Conveyor synchronization supported applications :C controller (Painting), D,D+ controller (Handling), E controller (Handling, Painting and Sealing) , F controller (Handling)



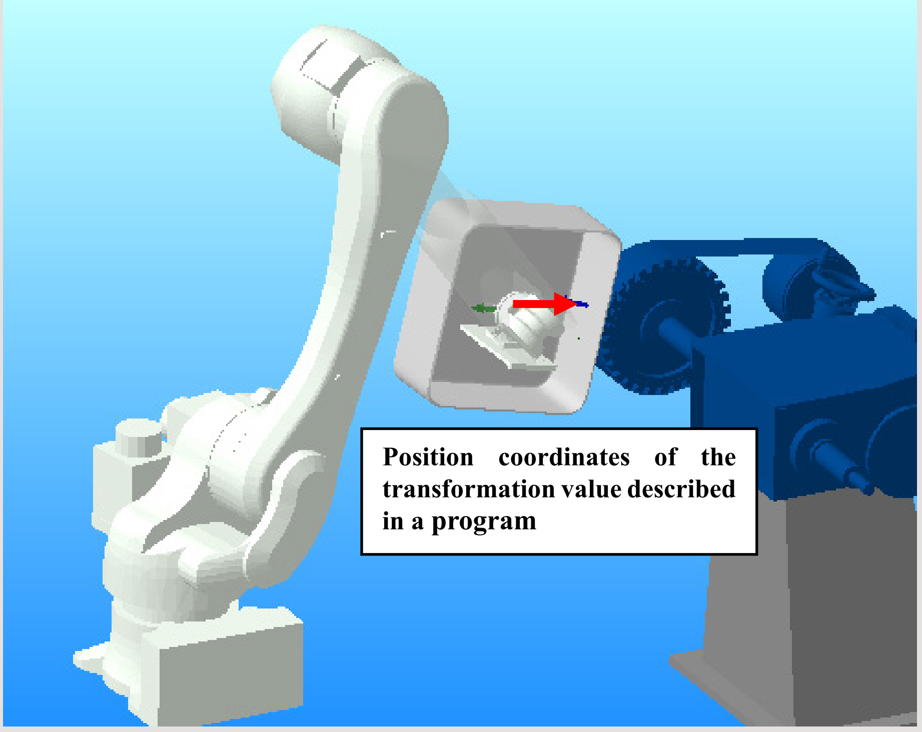


Fixed tool

Use this for the program which includes the task that robot holds a workpiece and set a fixed tool which is a working point based on the Base transformation value before executing the program. Robot moves for the teach points on the workpiece to pass through the Tool transformation value on the fixed tool.

Set the work point (the position where the robot moves to the specified fixed tool) based on the robot flange position to the transformation value which is specified by an instruction such as FJMOVE and FLMOVE.

Fixed tool supported applications : F controller (Handling), E controller (Handling and Servo welding)



1.5.3 K-ROSET files and CAD files

K-ROSET files

Operable project data format is KRPRJ.

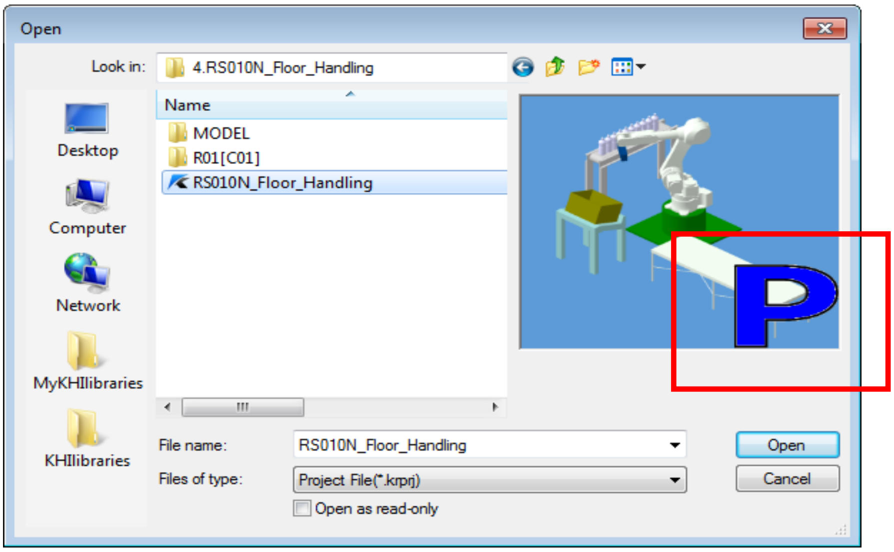
File type is appeared on thumbnail when KRPRJ is selected on the file selection screen.

P:Project

R:Robot

T:Tool

E:Environment



Besides above, there are following files.

KHIRC:Robot controller file

Bin:Recycle bin data file

- Refer to the robot controller operation manual for the robot data (as,pg,st,lc)

CAD files

The 3D data format used for Hisui version is STL.

The STL is widely used as a triangular mesh solid display file format to display 3D models. The 3D model data recorded are a surface normal vector of triangle and the coordinate value of three vertexes.

The order of the three vertexes and the relations of the front and back faces comply with the rule of right-hand screw.

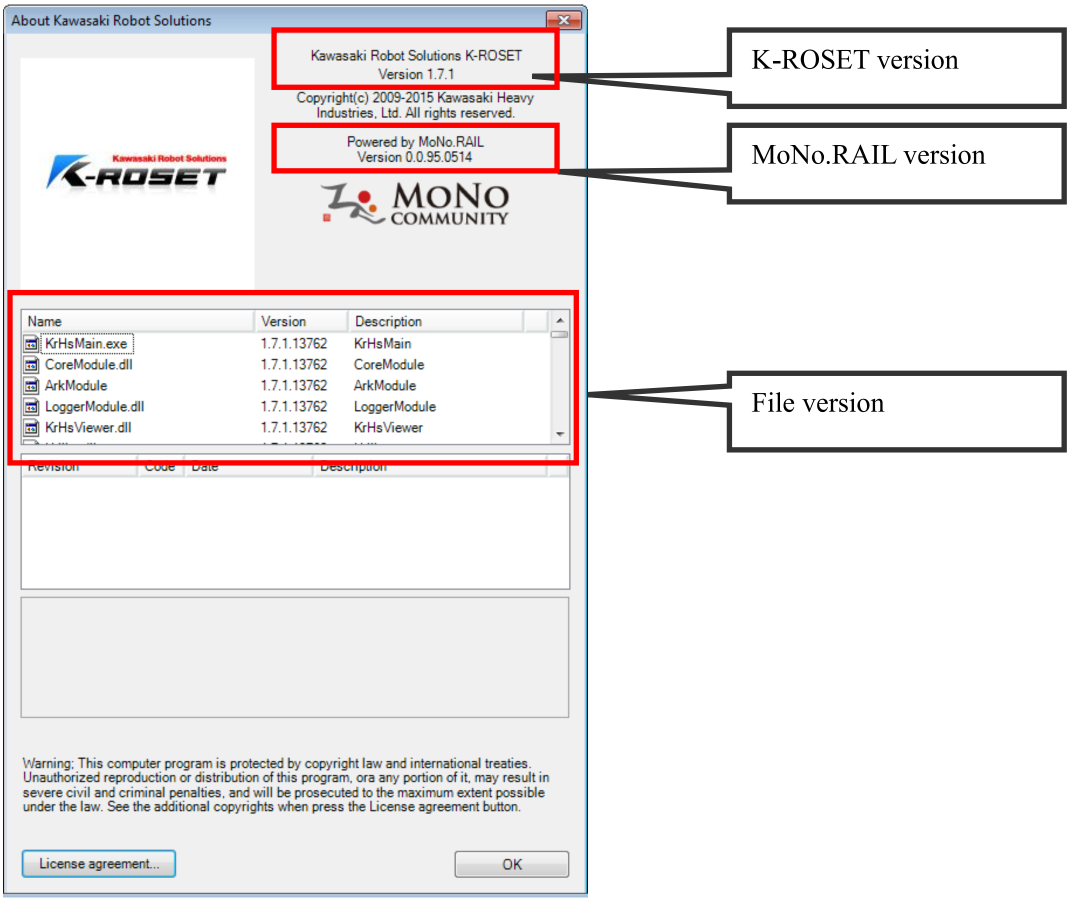
The STL file format has ASCII format and a binary format.

Please use a binary format for K-ROSET.

- Appearance color and transparency are saved in hox file.

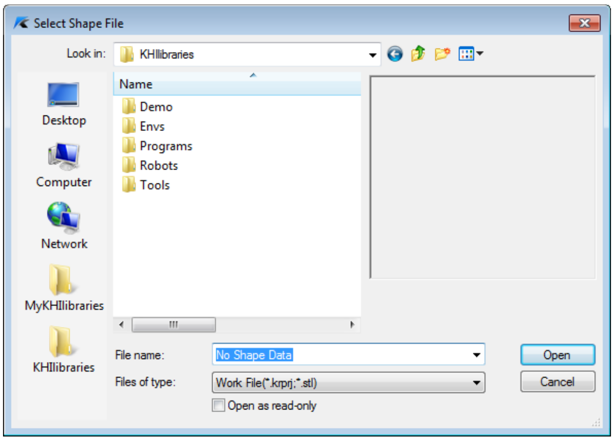
1.5.4 K-ROSET configuration

K-ROSET consists of three basic applications, an extended application (Plug-in), software 3D drawing software (MoNo.RAIL).
Following screen is displayed when selecting the version display from the help menu.
Each software version is displayed.



1.5.5 Folder structure

Folder configuration of the K-ROSET is described.



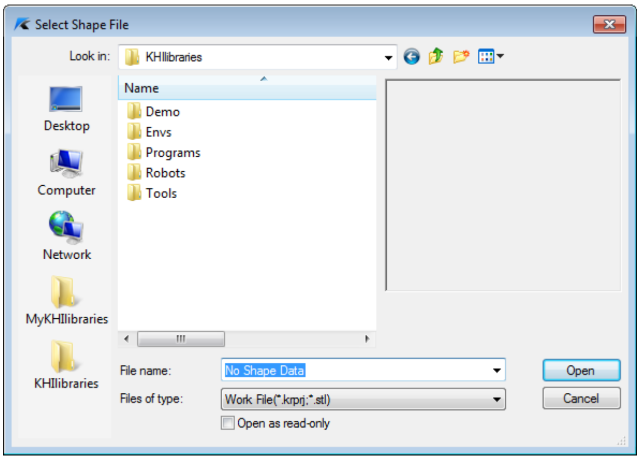
MyKHIlibraries

The K-ROSET creates MyKHIlibraries folder in My Documents of the log in account when installed.

Example) User is OLP

(Document)¥OLP¥My Documents¥MyKHIlibraries

This folder is a default folder for the file selection dialog opened for saving/reading the project and the trace file created by you.



* ● It can be changed to the designated folder in option settings.

Project data you have created is saved in MyKHIlibraries.

➢ Projects

Each project data is saved in the project name folder.

Contents of each project folder are as follows.

- (Project name).krprj

  Project data

* ● model data is not included in KRPRJ.

- Robot name folder

  Each robot data is saved.

  ✧ PG Folder：Programs and variables are saved.

- ✧ LOG Folder：Log of terminal is saved.
- ✧ TRAJ Folder：Trace line file is saved after simulation
- ✧ Data Folder：Controller settings are saved with controller memory function.
- ✧ Backup Folder：Controller settings of the forwarding destination is saved when forwarding data.

- Model Folder

  Using model in the project (STL） and appearance (hox) files are saved.

- Recycle.bin

  Data placed in the recycle bin is saved.

► KHIlibraries

(Installation folder)¥Kawasaki¥K-ROSET¥Hisui¥KHIlibraries
Sample project and library provided from us are contained in this folder.
We recommend that the file that created by you should be saved in the above-mentioned MyKHIlibraries folder.

* The installation folder may be changed without notice.

- ➢ Demo

  Sample project is saved.
- ➢ Envs

  Environments registered in Ob library are saved.
- ➢ Programs

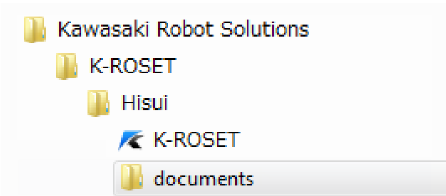
  Sample programs are saved.
- ➢ Robots

  Robots registered in library are saved.
- ➢ Tools

  Tools registered in library are saved.

► documents

(Installation folder)¥K-ROSET¥Hisui¥documents
K-ROSET operation manual is saved. It can be displayed by selecting [documents] on the start page.



* The installation folder may be changed without notice.

► logs

(Installation folder)¥K-ROSET¥Hisui¥logs
Files of motion history related to K-ROSET system are saved.

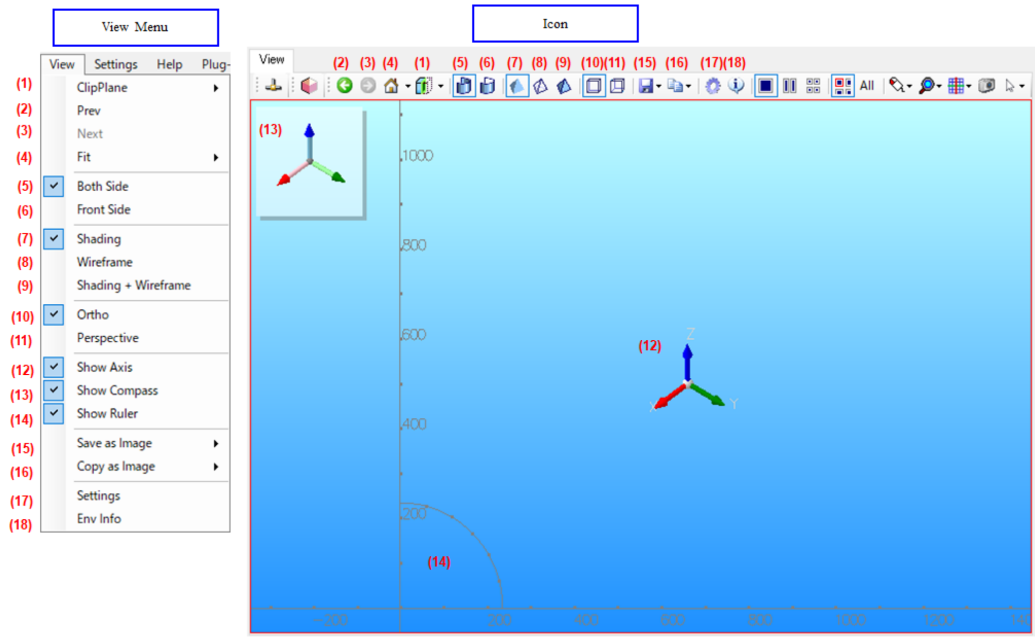
* The installation folder may be changed without notice.

Memo

2 Operation of View

This section describes an operation of view for Hisui.

The operation can be carried out with an icon or view menu.



2.1 View Operation

Mouse operation

Rotation	Press a right button on a mouse to drag a view.
Pan	Press Shift key and a right button on a mouse to drag a view.
Zoom	Three methods are available: (a). Press Ctrl key and a right button on a mouse to drag a view. (b). Zoom with a mouse wheel. (c). Drag with a central button on a mouse and draw a rectangle to zoom the rectangular region.
Partial Zoom - In	Click the object with a central button on the mouse to move the fixation point to the position. This operation enables the control a center of rotation of the view. In addition, the fixation point (center of rotation) is also set to the destination of the zoom in the zoom operation (c).

Touchscreen operation

Rotation	There are 2 ways. (a).Press and hold then drag. (b).Place two fingers apart on the touchscreen and rotate. 
Pan	Place three fingers on the touchscreen and slide (Keep all three fingers on the screen and move up and down, left and right) 
Zoom	“Pinch” to zoom out (Place two fingers on the screen and pinch them together.) and “Stretch” to zoom in (Move two fingers apart.). 

2.2 Restore a View Point/Undo

When a display of the model is changed, the display can be restored or undone.

Restore 	Click Restore view point.
Undo 	Click Undo view point.

2.3 Fit

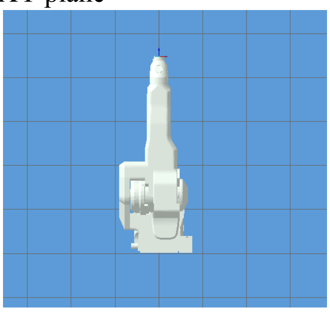
A model is adjusted automatically so that the entire model can be displayed within the view from the point of view when the mouse is clicked.

1 **Click Fit.** 

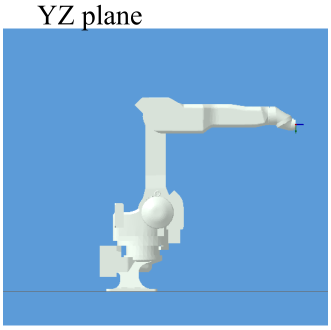
A model is displayed in the view perpendicular to a visual line. Select XY / YZ / ZX.

A model is displayed in the view perpendicular to a visual line.

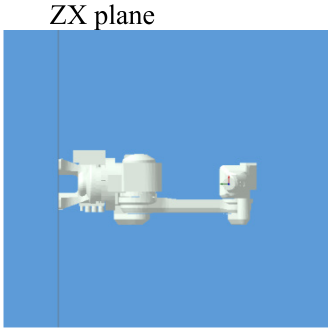
XY plane



YZ plane



ZX plane



2.4 Clip Plane ON/OFF

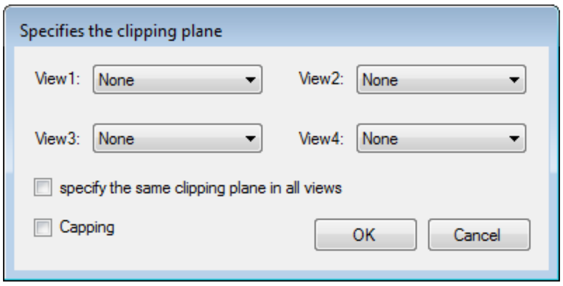
A cross section of the model is displayed.

1 **Click Clip ON/OFF icon.** 

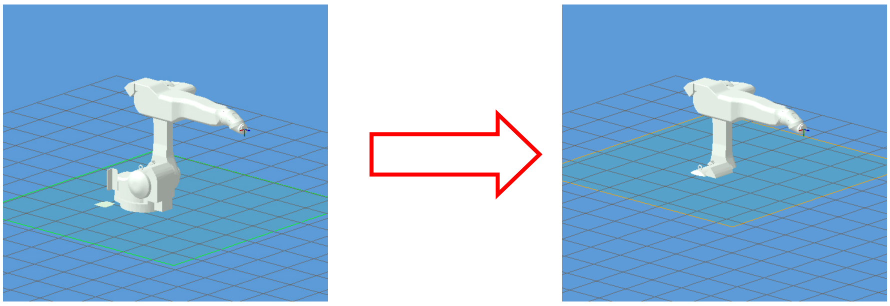
2 **Click Clip ON/OFF icon.** 

Each click switches ON/OFF.

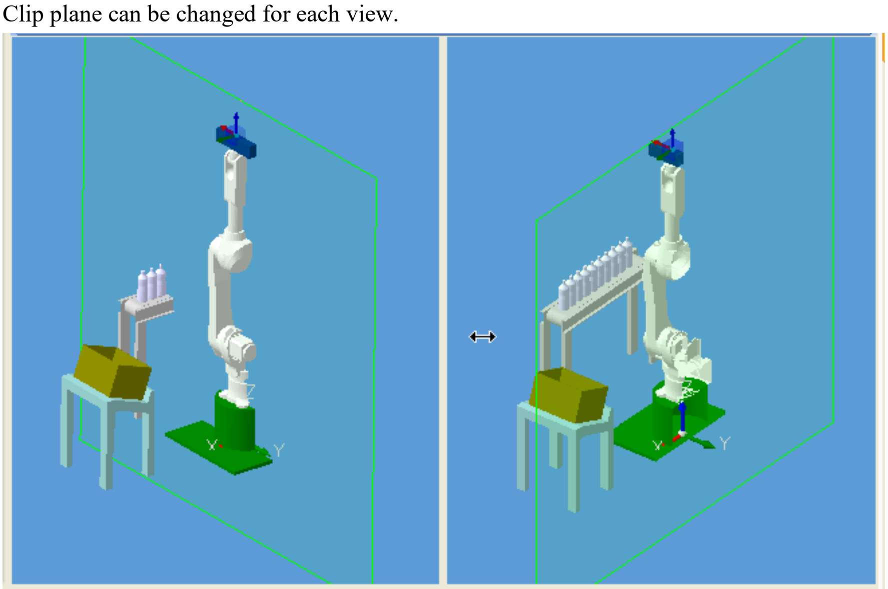
Setting dialogue is displayed. Select a plane to be cut from the drop down list.



By dragging a plane, position of cutting plane can be decided.



Clip plane can be changed for each view.



2.5 Both side Front side

Display of wire frame is switched.

[ ] Both Side ...Wire frame of the rear side is also displayed.

[ ] Front Side …Only wire frame of the front side is displayed.

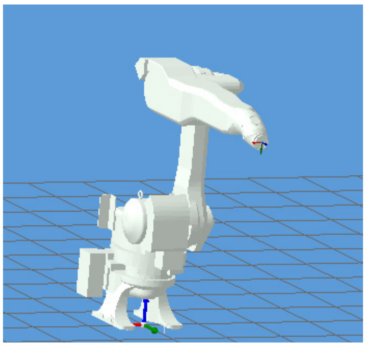
2.6 Displaying Style

Displaying style of the model is controlled.

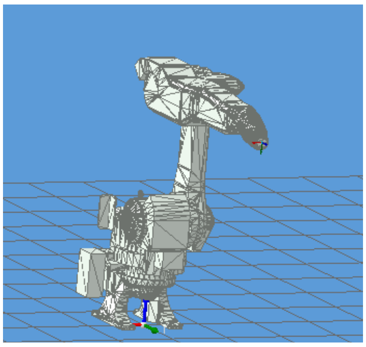
[ ] Shading ...A model is displayed in shading (default display).

[ ] Wireframe ...A model is displayed with a wire frame.

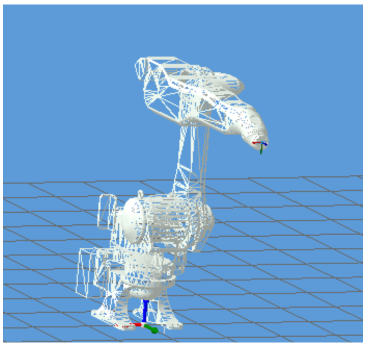
[ ] Shading＋Wireframe ...A model is displayed in shading and with wiring.



Shading



Wire frame



Shading+Wire frame

2.7 View Setting

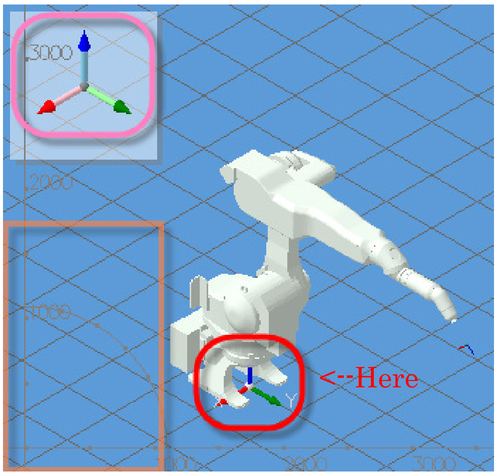
A projection method is switched.

[ ] Ortho ...Display method projected parallel to a view.

[ ] Perspective ...View with a depth (a view usually seen from human eyes).

2.8 Show axis

An origin of the world coordinate is displayed with an arrow.
Red is for X, green for Y, and blue for Z.
The hide/show of the coordinate axis is switched.

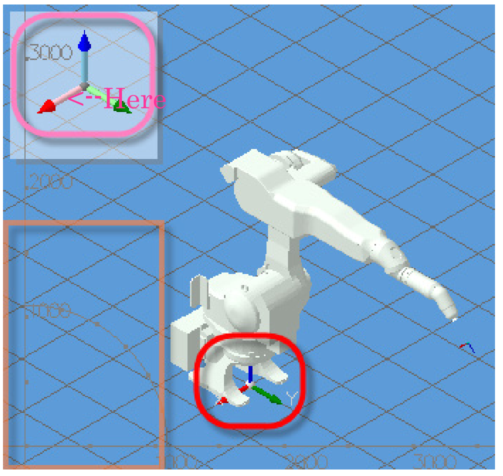


1 **Click the display of the coordinate axis of the view menu to place a check mark.**

Display the coordinate axis. Click when a check is marked to the coordinate axis display menu. The display is unchecked and the coordinate axis disappears.

2.9 Show compass

A compass displays the direction of the world coordinate.
The hide/show of the compass is switched.



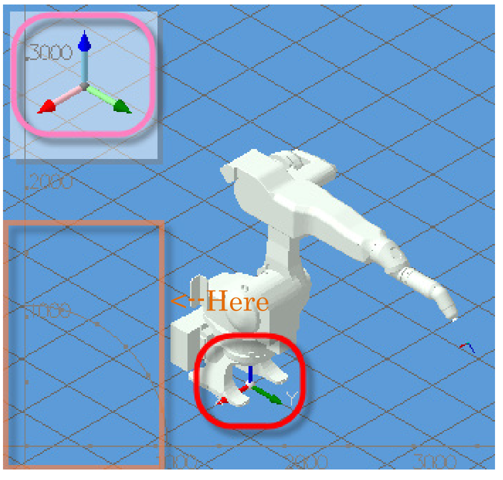
1 **Click the compass display of the view menu to place a check mark.**

Display the compass.

Click when a check is marked to the compass display menu. The display is unchecked and the compass disappears.

2.10 Show ruler

An origin of the world coordinate is displayed with an arrow.
Red is for X, green for Y, and blue for Z.
The hide/show of the coordinate axis is switched.



1 **Click the display of the coordinate axis of the view menu to place a check mark.**

Display the coordinate axis. Click when a check is marked to the coordinate axis display menu. The display is unchecked and the coordinate axis disappears.

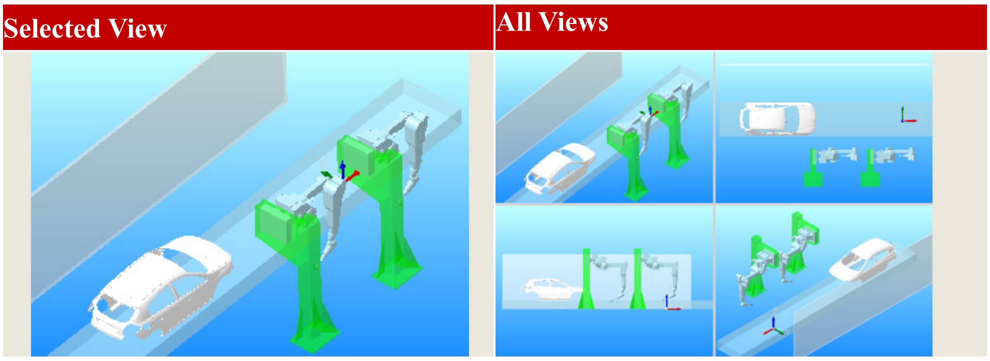
►►► 2.11 Save and Copy as image

Images of the view can be saved/copied.

The view to save/copy can be chosen from either Selected view or All views from V1.8.0.

[ ] Save an image …A view in display is named and saved into an arbitrary position.

[ ] Copy an image…A view in display is saved into a clipboard.



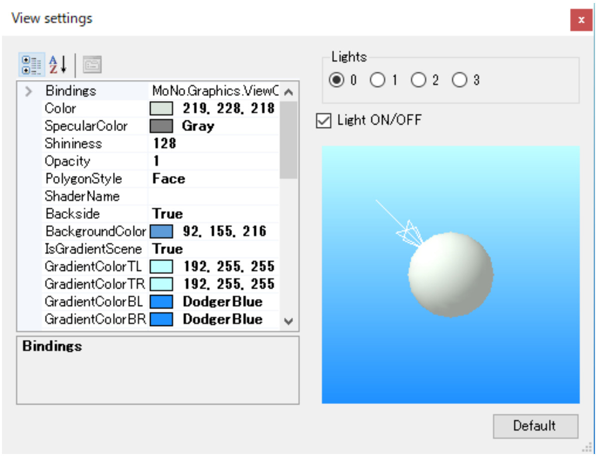
►►► 2.12 Setting

A background color of the view, a default color of the model (non-selected), and the color of the background are set.

1 Click [ ] from a tool bar of the view, or select the setting of the view menu.

A view setting screen on the right is displayed.

Various kinds of setting can be carried out.



The settings can be restored to their default values using the Default button.

The setting frequently used is described.

➢ **Color**

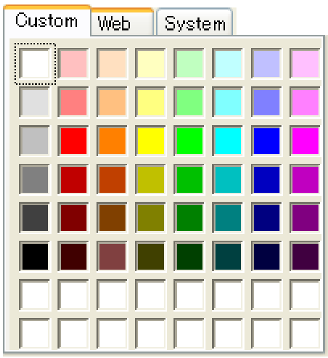
A color of all models when the color is not selected can be changed.

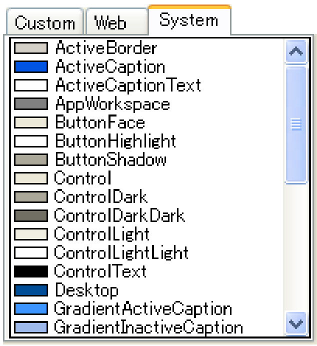
Click a numeric value next to Color to display a list selection button. Click the button.

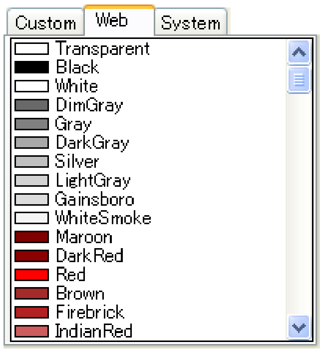
A color setting screen below is displayed.

The colors can be selected from custom/Web/system tabs.

The colors of all models change.







➢ **BackGroundColor**

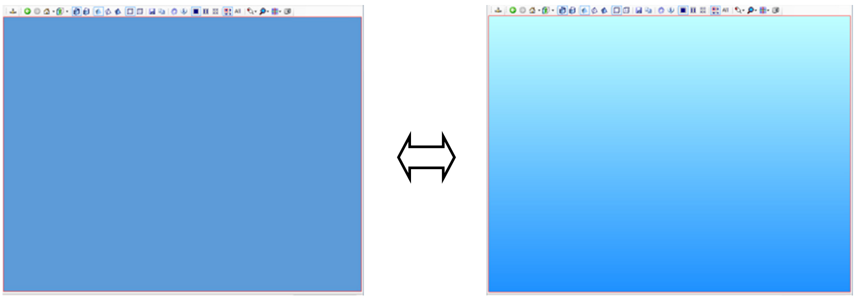
Click a numeric value next to Color to display a list selection button. Click the button to change.

Default settings

➢ **GradientColor**

Since V1.7.1, gradient can be set as background color of view.

Set gradient by changing 4 colors (left, right, upper and lower) on GradientColor.



➢ **Lower/Upper ZoomScale**

Lower and upper limitation of view zoom can be changed.

For example, if you’d like to expand model detail, change LowerZoomScale to be 0.01.

► Default Settings

Bindings	MoNo.Graphics.ViewOperationBindingCollection
Color	219, 228, 218
SpecularColor	Gray
Shininess	128
Opacity	1
PolygonStyle	Face
ShaderName	
Backside	True
BackgroundColor	92, 155, 216
IsGradientScene	True
GradientColorTL	192, 255, 255
GradientColorTR	192, 255, 255
GradientColorBL	DodgerBlue
GradientColorBR	DodgerBlue
Perspective	False
Lights	LightSetting[] Array
UseVertexBuffer	False
UseDrawElements	True
PolygonOffsetFactor	0
PolygonOffsetUnits	10000
SelectionBufferSize	1024
DragZoomSign	1
WheelZoomSign	1
LowerZoomScale	1%
UpperZoomScale	1000%
AutoFocus	True
ZoomToMousePosition	True
ZKeptRotation	False
AxisScene	KHI.Fortuna.HisuiViewer.Gui.Scenes.WorldAxisScene
ShowAxis	True
ShowCompass	False
ShowRuler	False
ZoomBinding	MoNo.Gui.ViewSetting+ViewBinding
PanBinding	MoNo.Gui.ViewSetting+ViewBinding
RotationBinding	MoNo.Gui.ViewSetting+ViewBinding
SpinBinding	MoNo.Gui.ViewSetting+ViewBinding
FocusBinding	MoNo.Gui.ViewSetting+ViewBinding
PerspectiveBinding	MoNo.Gui.ViewSetting+ViewBinding

2.13 Split Screen of View

The view is displayed in split screens.

[ ]Single view ...Display in a single view.

[ ]Double views ...Display in dual (right and left) views.

[ ]Quad views ...Display in tetrahedral (top, bottom, right and left) views.

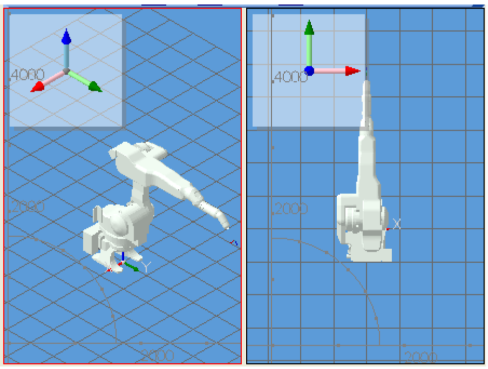
[ ]Show current view ...The currently selected view is surrounded in a red frame for easy recognition of the currently selected view among split views.

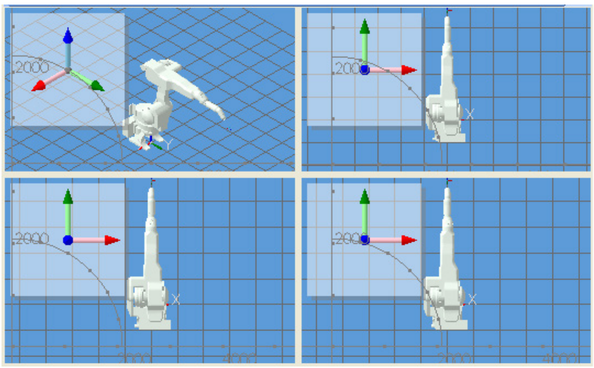
[All] All view ...Apply zoom operation for all view.

1 Click the applicable icon.

The screen is switched to the selected view. The background of the selected icon turns orange.

The figures below show a dual view and a tetrahedral view.


Dual view


Quad view

2.14 Click Action

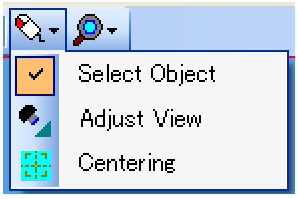
Clicking the view, an action is set.

[Select Object]Select Object ...Select clicking models.
[Adjust View]Adjust View ...Adjust the clicking surface.
[Centering]Quad views ...Center the clicking point.

1 Click [] from a tool bar of the view.

A menu list is displayed.

Various kinds of setting can be carried out.



2.15 ZOOM

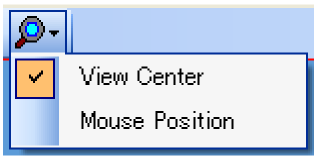
A center of zoom of the view is set.

[View Center]View Center ...Zoom a center of the view..
[Mouse Position]Mouse Position ...Zoom a mouse point.

1 Click zoom in and out [] from a tool bar of the view.

A menu list is displayed.

Various kinds of setting can be carried out.



2.16 Coordinate Plane Display

Display a coordinate plane on the view.

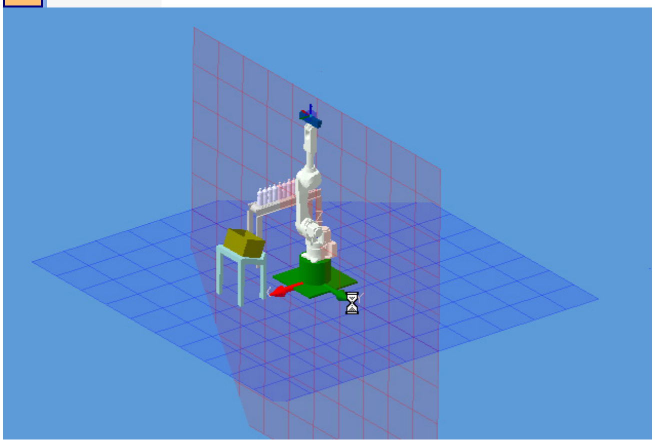
- Since V1.7.0 onwards, grid display is not saved to the project.

- [XY] XY plane ...Display coordinate plane on XY plane of the view.
- [YZ] YZ plane ...Display coordinate plane on YZ plane of the view.
- [ZX] ZX plane ...Display coordinate plane on ZX plane of the view.

1 Click operation coordinate plane display [ ].

Display the menu list. Select the object operation from the list.

XY



- The indication of the grid was not stored for a project after V1.7.0.
- A color and the width set it with an Option settings. Please refer to “5.11.1.2 [Option Settings] -> [Display]” for the options.

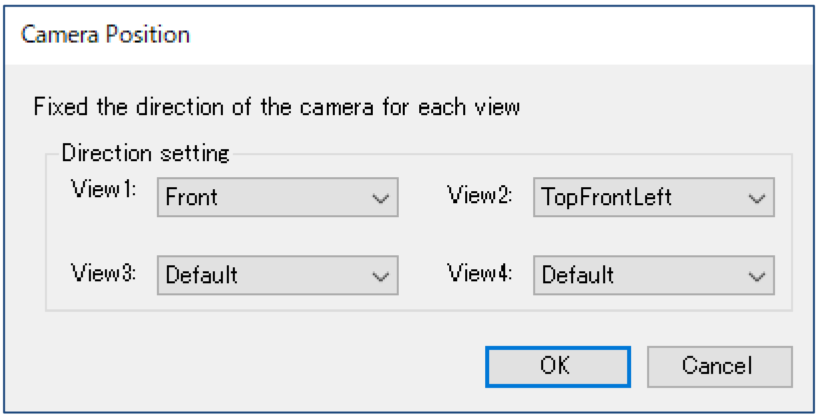
2.17 Camera Settings

Set a viewpoint.

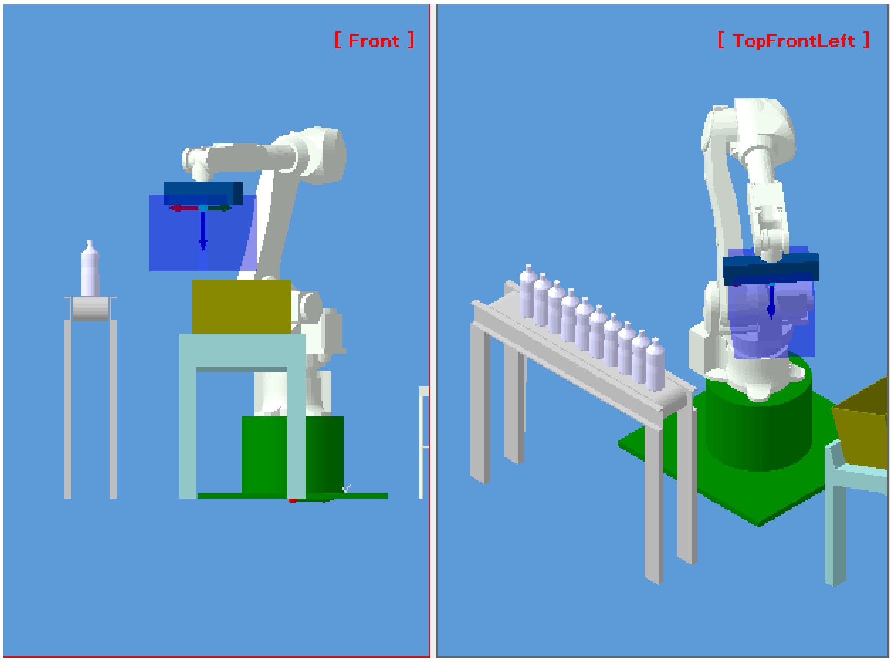
1 **Click operation camera settings [].**

Setting dialogue is displayed.

Select viewpoint to be displayed from drop down list.



Viewpoint can be changed and fixed for each view.



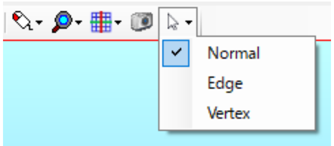
- Views with a fixed camera direction cannot be rotated.

2.18 Snap Mode

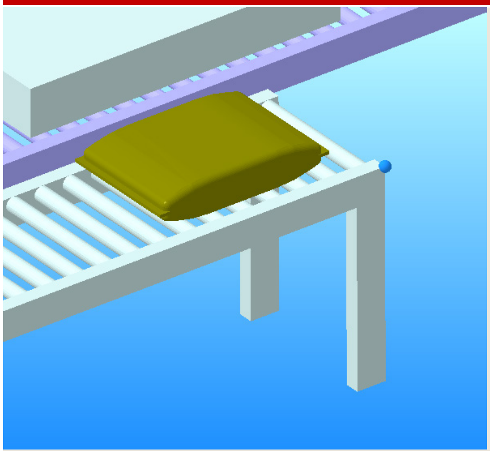
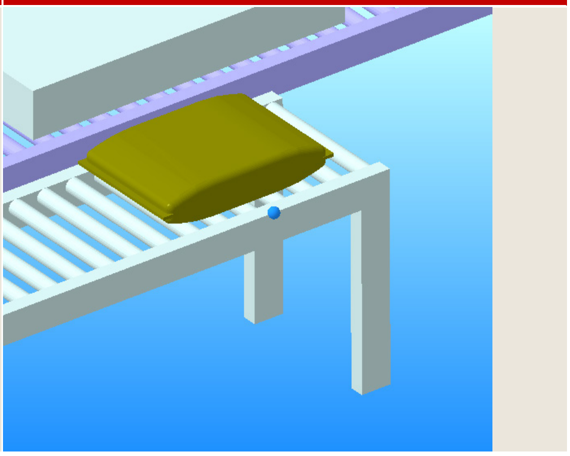
This function enables to snap the mouse pointer along the model edges and corner displayed in the view.

1 **Click on “Change Snap Mode[ ]”.**

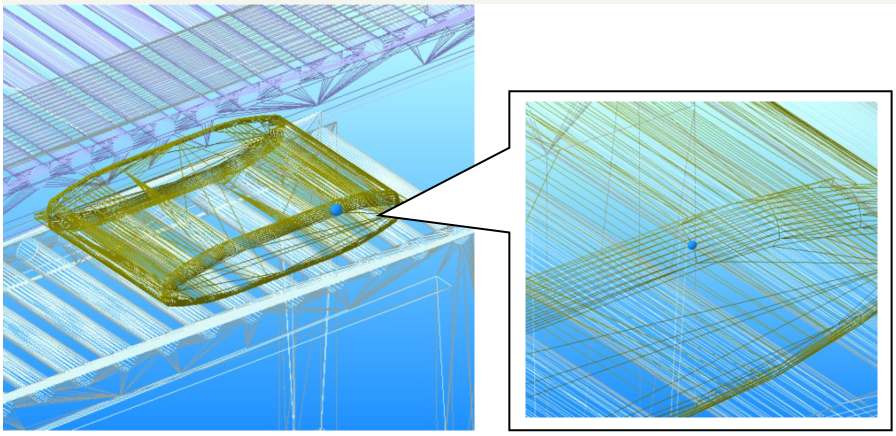
Drop down menu will be displayed. Select the desired operation method in the menu.



Vertex is the corner of the model and the Edge is the mid-point of the aligned model edges.

Vertex	Edge
	

- The pointer may not be able to snap the desired point properly when the model has curve or many polygon points because there will be multiple vertex points as this function identifies the corner and edges based on the vertex of the polygon in STL format. In that case, switch the display mode of the view to wire frame to zoom the view.
- Note that the Snap function is disabled when the view is in Hand guide or Tryadd (Teaching points and model).



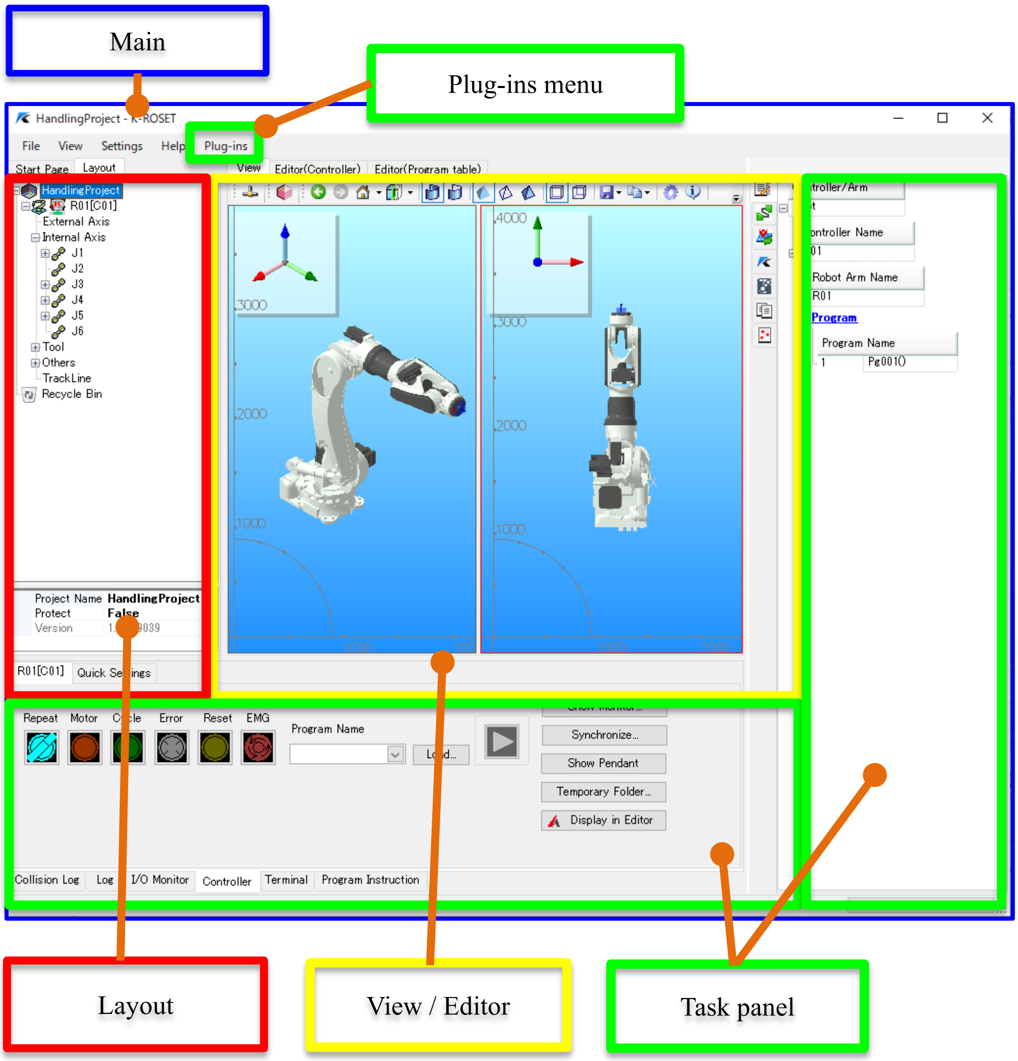
Snap function is only supported by the Click teaching, Measuring distance and Change installation location.

3 Basic Function

3.1 Screen Configuration

Main screen of K-ROSET

This chapter describes basic terms and concepts concerning the robot and offline programming of K-ROSET



The main screen of K-ROSET consists of the following three major sub-screens.

- Layout tab

  For model layout and settings.

- View

  3D model is displayed.

- Editor

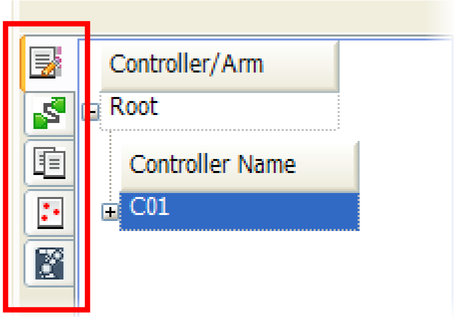
  A section of the screen to display AS Integrated Development Environment (AS-IDE). Selecting the Editor tab will switch the screen to editor screen.

  Refer to the [K-ROSET AS Language Integrated Development Environment Instruction Manual] for further information.

- Task panel, Plug-in menu

Applications for robot operation are displayed such as program tab and the teach panel.

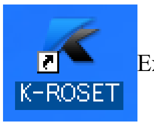
Applications added in plug-in menu are displayed.



3.2 Start

Start K-ROSET.

1 **Double click the shortcut icon on the desktop.**



Example of the shortcut icon

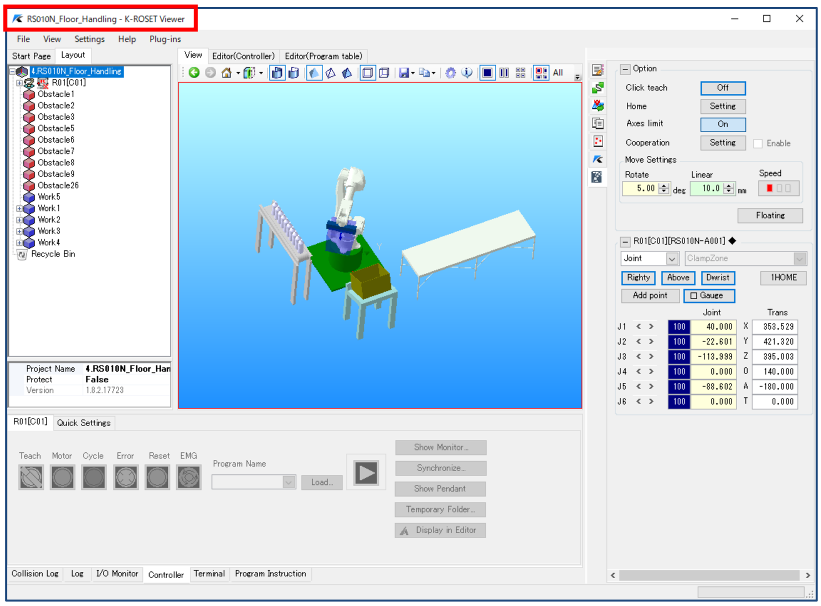
- In case there is no shortcut icon on the desktop,
  click K-ROSET of Start Menu. (Start Menu - Apps lists or All Apps - Kawasaki Robot Solutions - K-ROSET)
- By double clicking the project file of KRPRJ, the project data is read and K-ROSET can be started.

Multiple Start

Multiple K-ROSET can be started from V1.7.0.

Second K-ROSET and onwards are started as [K-ROSET Viewer].

A layout adjustment, posture examination and the programing of the robot can be changed at the same time.



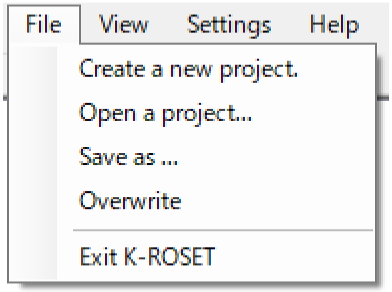
- Second K-ROSET and onwards are Viewer mode and the controller cannot be started.

3.3 Menu

This section describes menu bar.

For more information on views, see Chapter 2.

3.3.1 File



➢ **K-ROSET projects can be operated.**

- Create a new project

  Create a new project.

- Open a project

  Open an existing project.

- Save as…

  Save the current project with a different name.

> After "Save As" is executed, the previous project is still referenced. To edit a project that has been renamed and saved, reload the renamed project after saving.

- Overwrite

  Save by overwriting the current project

For detailed instructions on project operation, see [3.4.1 Project](#).

➢ **Exit K-ROSET**

Exit the application.

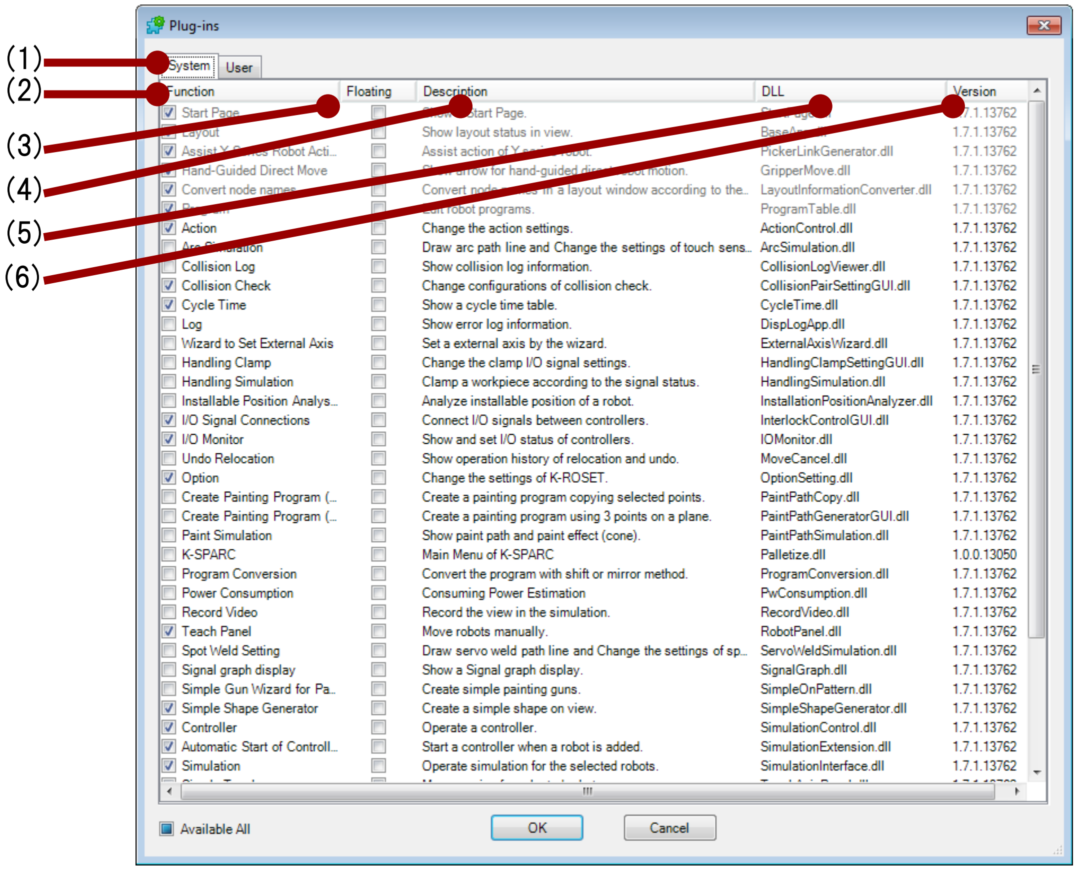
3.3.2 Setting

Plug-in setting menu can be selected.

On plug-in application list screen, plug-in application can be switched on/off, floating of plug-in application window can be set/unset, guide and version of plug-in application can be checked.

Plug-in application list that a user created and stored in plugins folder is displayed on the user tab. (It is not supported yet.)

* K-ROSET needs to be restarted in order to unload (remove check) plug-in application and to set/unset floating.
* Files not recognized as plug-in are not displayed. Grayout applications cannot be removed as they are required for the system.



(1) Tab

As for the system tab, our plug-in application (called as extended application) is displayed.

The application created by customer can be registered into user tab.

(2) Function

A function name of the extended application is displayed.

Check the box for enabling the function, and uncheck for disabling.

When checked, application is loaded immediately.

After uncheck, make sure to restart K-ROSET.

* When the project is loaded before applications are loaded, please load the project again.

(3) Floating

When checked, a screen in the application will float to be displayed.

(4) Description

The description of each function is displayed.

(5) DLL

The file name of each function is displayed.

(6) Version

The version of each function is displayed.

System Plug-ins List

Plug-in list is described.

There are following applications.

Handling/Handling(Special): H

Paint/Sealing: P

Arc Welding: A

Servo Welding: S

* These applications require exclusive license.

Applications displayed on the left screen.

Name	App.	Contents
Layout	-	Check and operate layout structure of model.
Start page	-	Displayed on the next tab of layout. Read and save projects. Select recently used shortcuts
Quick builder	-	Support project creation. Project template can be created by dialogue method.

Applications displayed on the lower screen

Name	App.	Contents
Controller	-	Operate controller
Terminal	-	Display controller terminal
I/O monitor	-	Display controller I/O status, change I/O settings
Log	-	Display log information such as warning/error
Program instruction	-	Edit program step with tab type GUI
Collision log	-	Display collision log information

Applications displayed on the right screen.

Name	App.	Contents
Position change undo	-	Display position change history and undo.
I/O signal connection	-	Set I/O signal interlock between controllers
Teach panel	-	Operate robot manually
Program	-	Create programs
Auto program creation (copy)	P	Create paint program copied teaching line
Auto program creation (3 teaching points)	P	Automatically create paint program from 3 points on a plane

Applications displayed from menu.

Name	App.	Contents
Collision detection	-	Change settings of collision detection
Action	-	Let paint/track line follow work motion, operate models for external equipment using signals
Option	-	Change various settings

Name	App.	Contents
Simulation	-	Execute multiple robots at the same time. Set conveyor.
Installable position analysis	-	Analyze installable position of robot
Cycle time	-	Display cycle time
Teaching posture settings	-	Set posture at the time of creating teaching points
Video recording	-	Create motion movie
Program change	-	Parallel shift / Mirror change of programs in program screen
Timeline	-	Move robot by track file
External axis setting wizard	-	Set external axis to robot by wizard method
Simple paint gun generator	-	Generate simple paint gun
View operation plug-in	-	Enable view point operation and distance measure function
Signal graph display	-	Display a graph of input/output signal
Electricity consumption	-	Estimate electricity consumption of robot
Handling clamp	H,S	Check and set clamp signal
Simple paint gun generator	P	Generate simple shape paint gun
Paint simulation	P	Change settings of gun signal. Display paint line and paint effect (paint pattern shape).
Welding simulation	A	Display welding line and change setting of touch sensing.
Spot welding settings	S	Display servo gun welding spot. Display and change settings of servo welding gun
Failure Prediction	-	Predict failure.

Applications not displayed

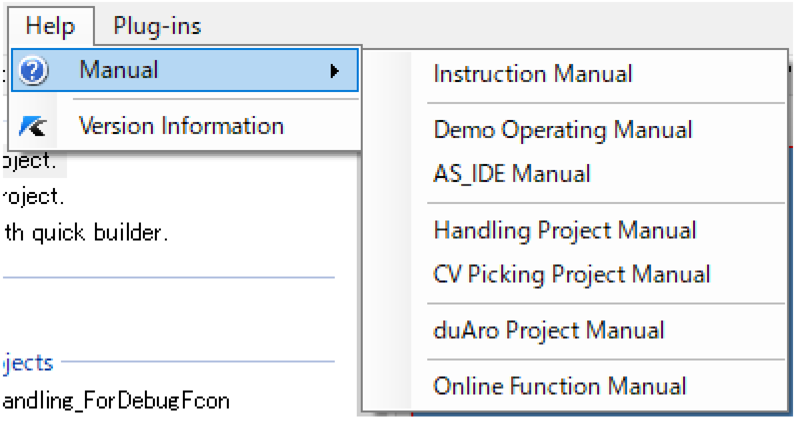
Name	App.	Contents
Controller auto start	-	Automatically start controller when robot is added
Track line drawing	-	Robot draws motion track.
Teaching point drawing	-	Draw teaching point position of executing program
Y series robot motion	H	Display parallel link of Y series
Manual direct teach	-	Display hand guide to robot and change posture by dragging mouse
Object name change of the layout screen	-	Change language of layout
Handling simulation	H	Grasp a work near the tool by clamp signal

Application displayed on the view.

Name	App.	Contents
Simple teach	-	Move axis clicked on the view

3.3.3 Help

Version information of K-ROSET is displayed.



- Manual

  Various manuals are displayed. (PDF file)

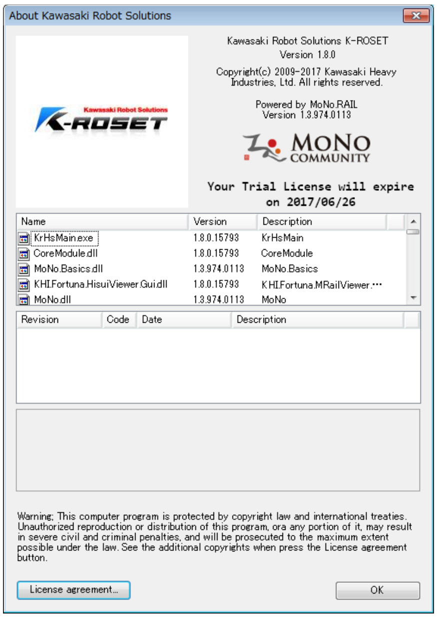
- Version Information

  Select version information from help menu.

  The screen below is displayed.

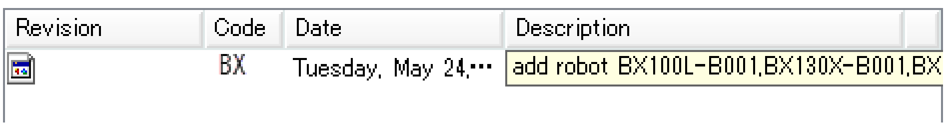
  The version, logo, and license agreement are displayed.

  Since V1.7.1, expiry date of trial license is displayed.



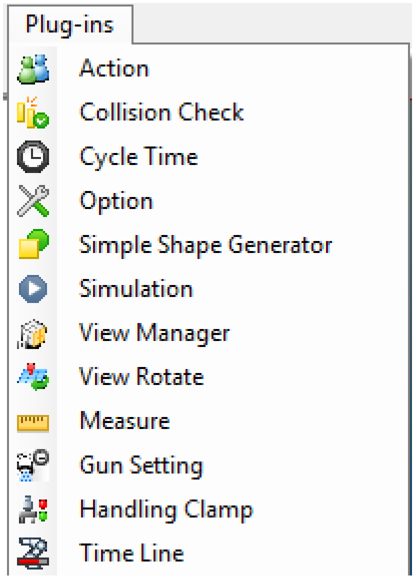
- Revision, Code, Date, Description

  Display when a different file is added as update from Kawasaki.



3.3.4 Plug-ins

Plug-ins application is selected.



Click the plug-ins menu.

The available menu is displayed.

The alignment sequence of the menu follows the order of adding functions.

The description of each plug-ins function is described in Chapter 4 Plug-ins Application.

3.4 Layout Tab

This section describes the object tab.

The object tab consists of the tree and properties panes.

Tree pane

You can create new project, load, save, add/change/delete items. The tree pane includes two types of items: physical (existing) items having a real form and logical items not having a real form (data only).

(1) Physical items

Icon	Node	Description
	Robot	The robot. Consists of several items such as the base and joint.
	Multi robot*1	Item to indicate multi robot. It groups multiple robot items together when operating multiple robot arms by one controller.
	Base	One of the robot component items, which is the base of the robot.
	Joint	One of the robot component items, which works as a joint of the robot.
	Tool	One of the robot component items, which is installed at the end of the robot arm to perform work such as painting or grasping depending on the tool type.
	Fixed tool*2	One of the robot component items used when equipment to process and grasp is not the end of the robot arm and when fixed tool of robot option is valid.*
	Workpiece	An item to be the target of work such as painting or grasping. Parts etc. are applicable.
	Obstacle	An item out of the target of work such as painting or grasping. Part stands etc. are applicable.
	ClampZone	An item to indicate the area where workpiece to be picked up can be detected for an application such as handling.
	Conveyor	Item to indicate conveyor. Workpiece moves in the specified direction when allocated a workpiece as a child of the conveyor.
	Camera*3	Item to indicate camera for the vision system. This allows user to check the image through the camera.
	Cubic-S*4	Item to indicate the motion monitoring safety unit (Cubic-S). CS-Configurator functions are available.

- *1 Available for V1.7.2 and later.
- *2 Functions can be used since V1.7.1. Refer to manual for fixed tool operation for details.
- *3 Available for V1.8.0 and later. Refer to the manuals for K-VFinder and K-VAssist for details.
- *4 Available for V1.8.4 and later. Refer to the manual for Cubic-S simulation function operation for details.

(2)Logical items

Icon	Node	Description
	Flange	One of the robot component items, which connects the arm end with the tool.

Icon	Node	Description
	Logical joint	One of the robot component items, which is a joint to control the robot's motion on the PC side.
	Teaching point	A point to be used as a reference for work.
	Group	Two or more items can be managed as a single group.
	Project	Display project name
	Recycle Bin	A deleted entity is restored.

Also, the icon of the item changes depending on the state of the object.

(3)Controller connection status

Icon	Node	Description
	Offline	Status of connected with controller(Offline)
	Online	Status of connected with controller(Online)
	Controller disconnected	Status of disconnected with controller

(4) Option terms

Icon	Node	Description
	Hide	A state that the model is hidden
	Lock	A state that the location of model is locked.

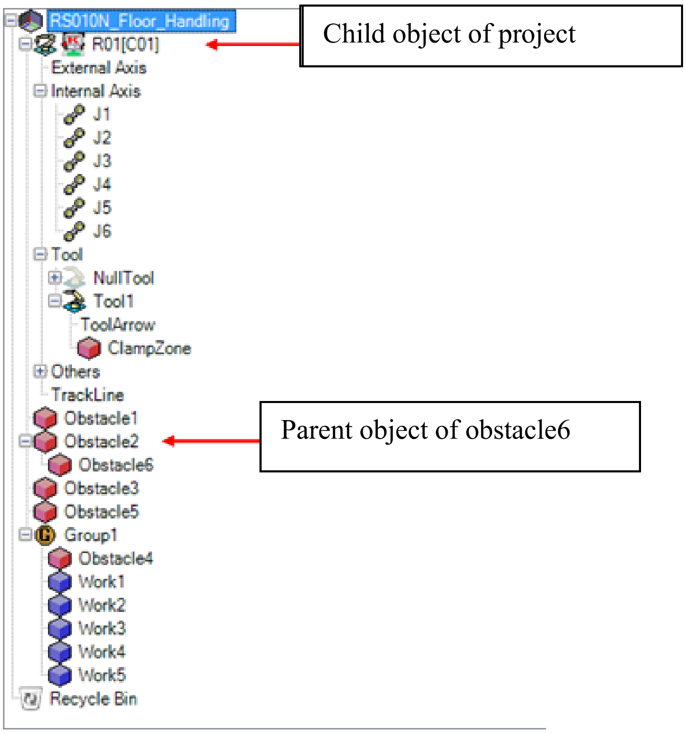
Words are described.

- Words

  On the tree, R01[C01] is called child object of the project name object. Project name object is parent object of R01[C01]. It is called attach when parent-child relationship is created. It is called detach when parent-child relationship is removed.

- Tree and Coordinate system

  Local coordinate system of R01[C01] is a coordinate base of parent object and a coordinate base of project. Project name object is a world base. Local coordinate of obstacle6 is a coordinate base of obstacle2.



Properties pane

The properties pane is used to browse or change various item parameters in the project. (Some parameters do not accept changes.)

Parameters that can be browsed or changed are shown below.

(1)Project

Parameter	Change	Description
Project Name	√	Project name
Protect	√	
Version		Project version

(2)Robot

Parameter	Change	Description
Name	√	Item name
Product Type		The model code of the robot
Controller		Controller name
AS Version		AS version of controller
Lock	√	Place change is invalidated
World Trans	√	World coordinate values
Local Trans	√	Local coordinate values
Joint value	√	Value of each joint *1
Base Trans	√	Base coordinate values
Deactivate Collision Detection		Whether the item is applicable to collision check or not is indicated.
Entity Type		The type of the item is indicated.
Show Origin	√	Whether the origin of the item is displayed or not is indicated.
Shape File Path		The absolute path to the shape file is indicated.

Parameter	Change	Description
Visible		Name of the shape file.
Tool Trans	✓	Whether the item is displayed or not is indicated.

(3)Base

Parameter	Change	Description
Name	✓	Item name
Entity type		The type of the item is indicated
Color	✓	Color of the model
Transparency	✓	Transparency of the model
World Trans	✓	World coordinate values
Local trans	✓	Local coordinate values
Deactivate Collision Detection		Whether the item is applicable to collision check or not is indicated.
Show Origin	✓	Whether the origin of the item is displayed or not is indicated.
Shape File Path		The absolute path to the shape file is indicated.
Shape File Name		Name of the shape file
Visible	✓	Whether the item is displayed or not is indicated.

(4)Joint

Parameter	Change	Description
Axis No		The joint number is indicated.
Deactivate Collision Detection		Whether the item is applicable to collision check or not is indicated.
Entity type		The type of the item is indicated.
Color	✓	Color of the model
Transparency	✓	Transparency of the model
Local Trans	✓	Local coordinate values
Name	✓	Item name
Show Origin	✓	Whether the origin of the item is displayed or not is indicated.
Shape File Path		The absolute path to the shape file is indicated.
Shape File Name		Name of the shape file
Joint value	✓	Value of each joint *1
Visible	✓	Whether the item is displayed or not is indicated.
World Trans	✓	World coordinate values

(5)Tool

Parameter	Change	Description
Name	✓	Item name
Lock	✓	Whether installation position of the item is locked or not is indicated.
World Trans	✓	World coordinate values
Local Trans	✓	Local coordinate values

Parameter	Change	Description
Tool Trans	√	Tool coordinate values
Deactivate Collision Detection		Whether the item is applicable to collision check or not is indicated.
Entity type		The type of the item is indicated.
Color	√	Color of the model
Transparency	√	Transparency of the model
Show Origin	√	Whether the origin of the item is displayed or not is indicated.
Shape File Path		The absolute path to the shape file is indicated.
Shape File Name		Name of the shape file
Visible	√	Whether the item is displayed or not is indicated.

(6)Work-piece, obstacle

Parameter	Change	Description
Name	√	Item name
Entity type		The type of the item is indicated.
Color	√	Color of the model
Transparency	√	Transparency of the model
Lock	√	Place change is invalidated
World Trans	√	World coordinate values
Local Trans	√	Local coordinate values
Grip Attribute		Whether the item is grasped or not is indicated.
Deactivate Collision Detection		Whether the item is applicable to collision check or not is indicated.
Show Origin	√	Whether the origin of the item is displayed or not is indicated.
Shape File Path		The absolute path to the shape file is indicated.
Shape File Name		Name of the shape file
Visible	√	Whether the item is displayed or not is indicated.

(7)Flange

Parameter	Change	Description
Name		Item name
Entity type		The type of the item is indicated.
World Trans	√	World coordinate values
Local Trans	√	Local coordinate values
Preset Trans	√	Recorded coordinate value

(8)Logical joint

Parameter	Change	Description
Deactivate Collision Detection		Whether the item is applicable to collision check or not is indicated.
Entity type		The type of the item is indicated.
Color	√	Color of the model

Parameter	Change	Description
Local Trans	✓	Local coordinate values
Name	✓	Item name
Show Origin	✓	Whether the origin of the item is displayed or not is indicated.
Shape File Path		The absolute path to the shape file is indicated.
Shape File Name		Name of the shape file
Joint value		Value of each joint *1
Visible	✓	Whether the item is displayed or not is indicated.
World Trans	✓	World coordinate values

(9)Teaching point

Parameter	Change	Description
Local Trans of Point Base	✓	Local coordinate values of a teaching point as a reference
World Trans of Point Offset	✓	World coordinate values of a teaching point offset
Local Trans of Point Offset	✓	Local coordinate values of a teaching point offset
Entity type		The type of the item is indicated.
Name	✓	Item name
Lock	✓	Place change is invalidated
World Trans of Point Base	✓	World coordinate values of a teaching point as a reference

(10)Group

Parameter	Change	Description
Name	✓	Item name
Entity type		The type of the item is indicated.
Lock	✓	Place change is invalidated
World Trans	✓	World coordinate values
Local Trans	✓	Local coordinate values
Preset Trans	✓	Recorded coordinate value

(11) Camera

Parameter	Change	Description
Name	✓	Item name
Entity type		The type of the item is indicated.
Color	✓	Color of the model
Transparency	✓	Transparency of the model
Lock	✓	Place change is invalidated
World Trans	✓	World coordinate values
Local Trans	✓	Local coordinate values
Show Origin	✓	Whether the origin of the item is displayed or not is indicated.
Shape File Path		The absolute path to the shape file is indicated.

Parameter	Change	Description
Shape File Name		Name of the shape file
Visible	✓	Whether the item is displayed or not is indicated.
Camera No.	✓	Unique ID for camera model.
Connect to K-VFinder	✓	Set enable or disable of the connection with K-VFinder.
Connect to K-VAssist	✓	Set enable or disable of the connection with K-VAssist.
IP address of the vision system	✓	Specify the IP address of the computer to detect the workpiece position (Vision function of the K-ROSET or K-VFinder).
Port for receiving measurement request	✓	Specify the port to receive requests from a controller.
Port for sending measurement request	✓	Specify the port to send the measurement result to a controller.
Port for receiving vision communication settings	✓	Specify the port for the K-VAssit to receive.
Port for sending vision communication settings	✓	Specify the port for the K-VAssit to send.
Port for receiving vision scan request	✓	Specify the port to receive the scan request from the K-VFinder.
Port for receiving vision scan result	✓	Specify the port to send the scan result to the K-VFinder.
Image file path	✓	Specify the file path to store the scanned image.
Image file name	✓	Specify the file name of the scanned image.
Image format to save	✓	Select the format either TIF or BMP to save the scanned image.
Auto resize	✓	Specify enable or disable the auto resize of the camera view.
Resize the image to save (%)	✓	Specify the magnification of the image to save.
Reference point of the view		Indicates the left bottom of the view.
Center of field of view	✓	Specify the position of the view center arrow.
Size of the field of view	✓	Specify the size of the view (mm).
View Distance	✓	Specify the view distance of the camera.
Projection	✓	Specify the view type of the camera. False is parallel.
Target controller		Shows the paired controller.
Target conveyor		Shows the paired conveyor.

*

- Joint values exceeding the movable range can be entered when they are changed in the properties pane.

3.4.1 Project

A project is constructed by placing these objects and arranging them in predetermined positions.
Objects to be arranged include the robot, workpieces, and obstacles.

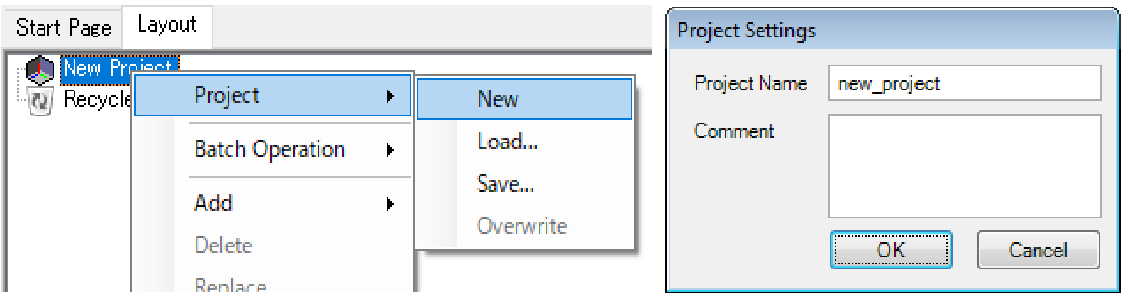
3.4.1.1 Creating a new project

Make sure to save a project before this operation.

1 **In the tree pane, right-click the project icon [ ].**
The view is cleared, and the project setting screen is displayed.

2 **The project menu will be displayed. Select [Project] -> [New].**
The project setting screen is displayed.

- *When the model has already been displayed, the confirming message is displayed.

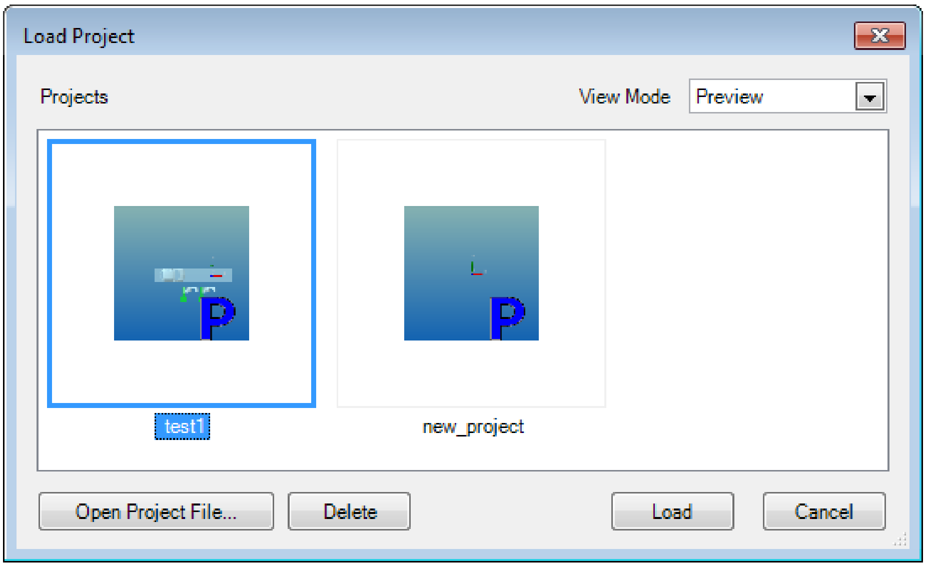


3 **Enter a project name in a project name column. Enter the details of the project into the comment column.**

4 **Press OK button.**
The project with the specified project name is newly created.

3.4.1.2 Reading in a project

- Make sure to save a project before this operation.
- The procedure to read in a project is as follows.



1 **In the tree pane, right-click the project icon [ ].A project reading dialog is displayed, and then the file saved in the past is displayed.**

Specify a file and read	The project file in an arbitrary position can be selected.
Delete	The project selected in the preview is deleted.
Read	The project selected in the preview is read.
Cancel	The project reading screen is closed.
Display mode	The display method of the preview is changed. Preview, icon, the detailed display can be selected.

The project menu will be displayed. Select [Project] -> [Read-in].

A dialog to read files will be displayed. Thumbnails of the project saved by [Save Speedy] are shown.

Read the project by selecting it. The selecting way is as follow.

2 **Select arbitrary project in the preview, and click the read button.**

3 **A confirm dialog to read the project is displayed.**

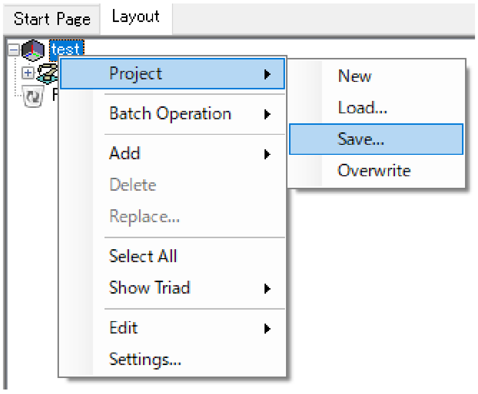
4 **Click YES to read the project.**

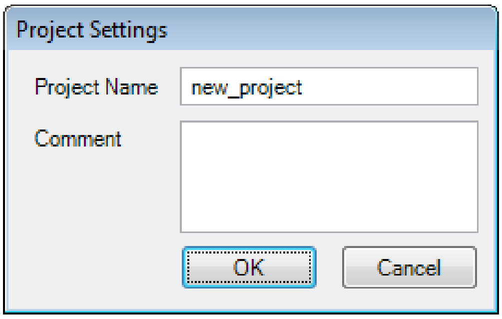
*

- When No is selected, it cancels to read the project.
- Dragging a KRPRJ project file on to the view in the K-ROSET enables to read the project.
- All the project files which are read successfully will be stored in the “<My Documents>¥MyKHIlibraries¥Projects¥Backup¥” from V1.8.0. Find the previously saved project file from the Backup to recover if the project file cannot be loaded or suspect that the file is damaged.

► 3.4.1.3 Saving a project

The procedure to save a project is as follows.





1 **In the tree pane, right-click the project icon [ ].**

2 **The project menu will be displayed. Select [Project] -> [Save]. The project setting dialog is displayed.**

3 **Enter the name of the project to save. Enter remarks if necessary.**
Select [OK].

Save	Specifies a new file name, and saves files including a model file. Creates a folder with the specified project name to save.
Overwrite	Saves the opened project in the original project folder without change.

A dialog to save files will be displayed. Select the destination folder and the file name to be saved, and press the [Save] button.

- Make the new folder for model before saving the model.
- Refer to the previous project even after [Save]. When editing project which changed name and saved, read changed project again after save.

3.4.2 User Operations Common to Robot, Workpieces and Obstacles

This section describes the user operations common to the robot, workpieces, and obstacles.

3.4.2.1 Showing/Hiding

This section describes how to switch display between showing and hiding.

A state hidden the model is displayed by [ ].

In the tree pane, right-click the workpiece icon [ ].

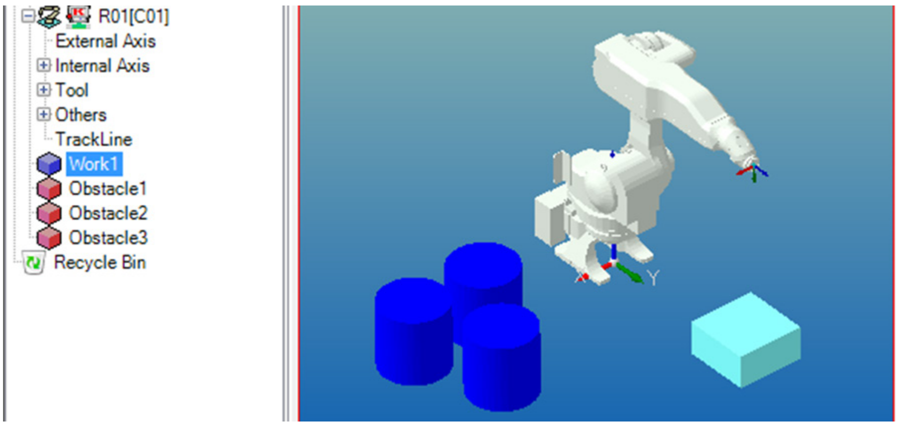
A menu is displayed. Click [View].

The check mark [Show Model] indicates that the object is being displayed.

3.4.2.2 Highlighting

This section describes how to highlight on the view.

1 Left-click the work icon [ ] in the tree pane.



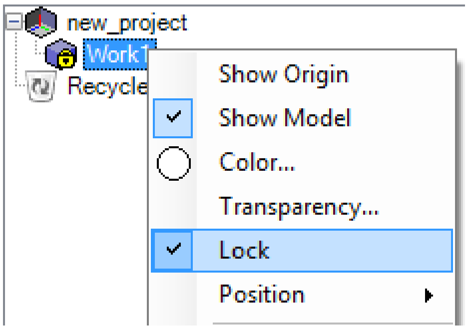
3.4.2.3 Locking/Unlocking

This section describes how to switch between lock and unlock.

A state locked the position of the model is displayed by [ ].

1 In the tree pane, right-click the work icon [ ].

2 Menu is displayed. Click the [Lock].



- *A state locked is check mark such [Lock].

► 3.4.2.4 Showing/hiding the origin

This section describes how to switch between show and hide of the origin.

1 In the tree pane, right-click the work icon [ ].

2 Menu is displayed. Click the [Show origin].

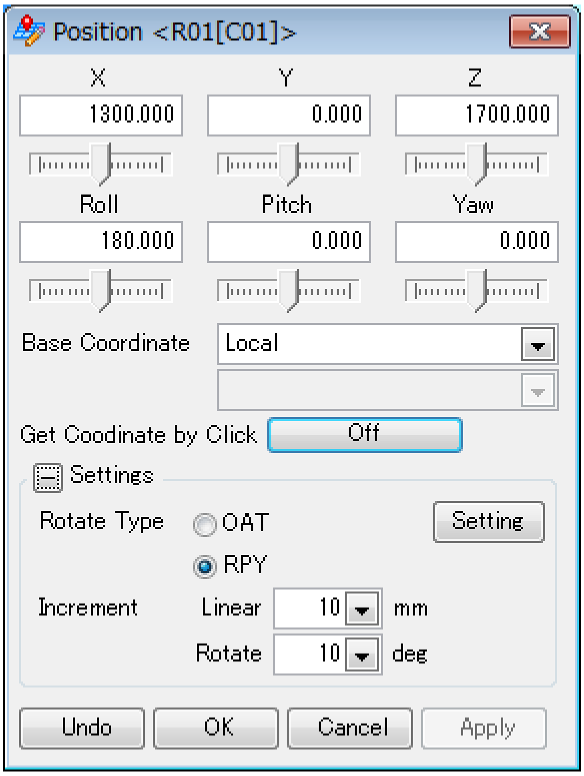
- *A state locked is check mark such [Show Origin].

► 3.4.2.5 Repositioning a robot

This section describes procedures to reposition a robot added to the project.
To reposition the robot, perform one of the methods below.

➢ Changing in the tree pane

In the tree pane, double-click the robot icon [ ] to open the reposition dialog box.



Manually enter or use the slide bar to adjust each coordinate value.

To apply the settings that you set up, press the [Apply] button. To return to the former settings, press the [Undo] button.

Once the Apply button is pressed, the former settings before change cannot be returned to.

Current position Z shows the value of distance from the surface of grid display to the origin of the base coordinate.

➢ Changing from the robot menu

In the tree pane, right-click the robot icon to select [Position] -> [Change] from the menu to open the reposition dialog box.

Follow the procedure of method (1).

➢ Changing from the view

In the view pane, double-click the robot model to open the reposition dialog box.

Follow the procedure of method (1).

➢ Changing from the properties pane

In the tree pane, select the robot icon.

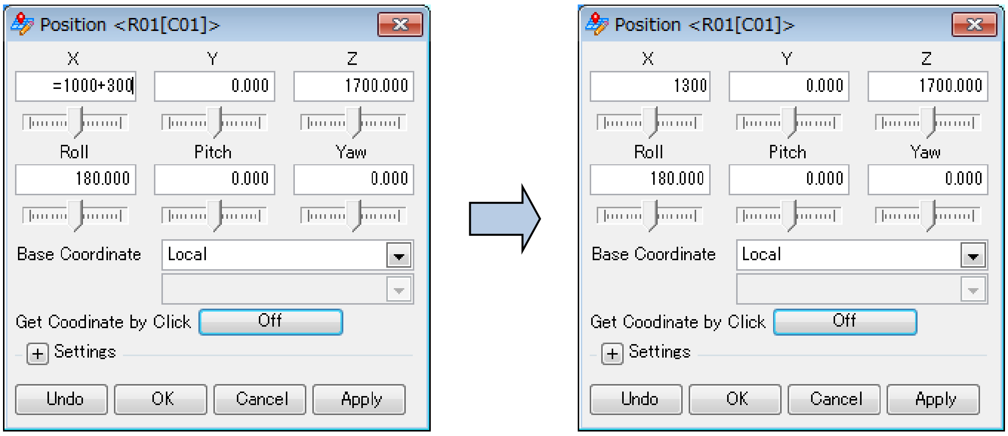
In the properties pane, change the converted local coordinate values.

➢ XYZOAT（RPY）

Input value or use slide bar. Position is viewed from selecting base coordinate system.

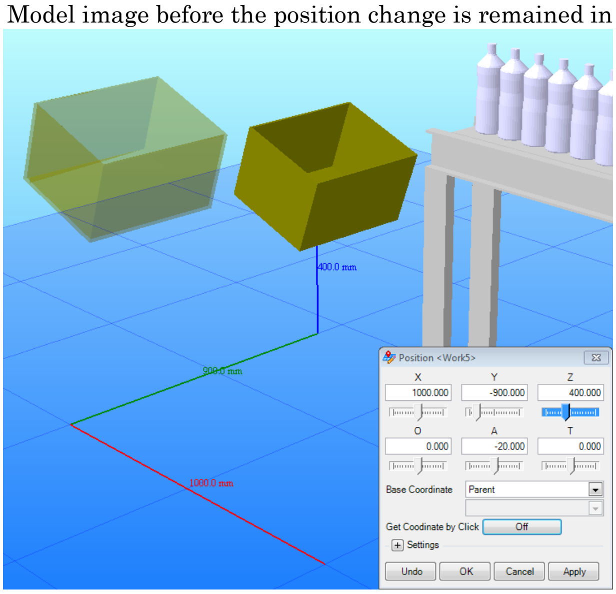
Value range -100000～100000 can be set. After inputting value and press Enter, object for position change moves in the view.

- By rotating a center scroll of a mouse on the slide bar, it can be operated without upper and lower limit.
- Since V1.7.1, four arithmetic operations can be input. In position change dialogue, formula starting with [=] can be input in X, Y, Z, O, A and T value box instead of inputting values directly. In a formula, four arithmetic operations [+, -, *, /] and parenthesis [( )] can be used. When formula is input, formula is fixed and calculated by Enter key. Value is input and position is changed by pressing Enter key again.

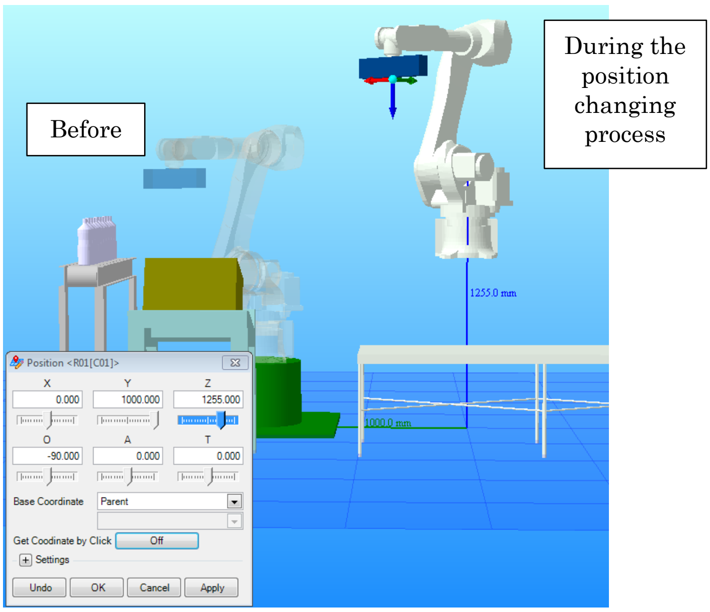


Followings are displayed when model position is changed via Position dialog.

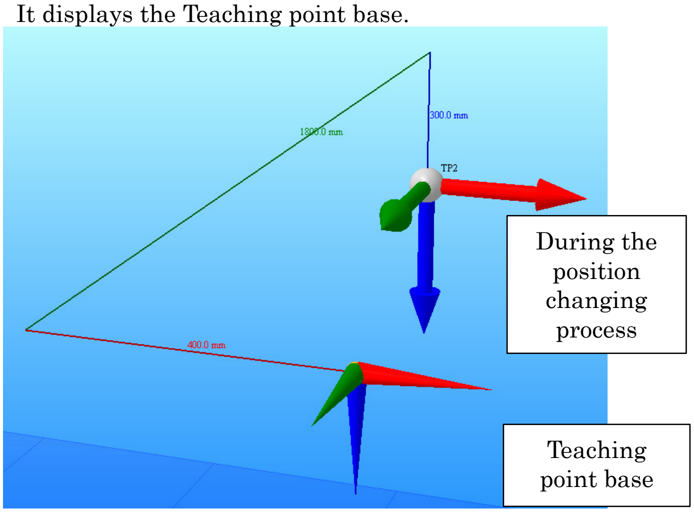
- Model image before the position change is remained in the display until you apply the changes.



- It indicates the distance how much the model is moved from the reference coordinate system.



- It displays the Teaching point base.



- Refer to the [3.4.8 Teaching Point] for Teaching point base.

- Base coordinate system

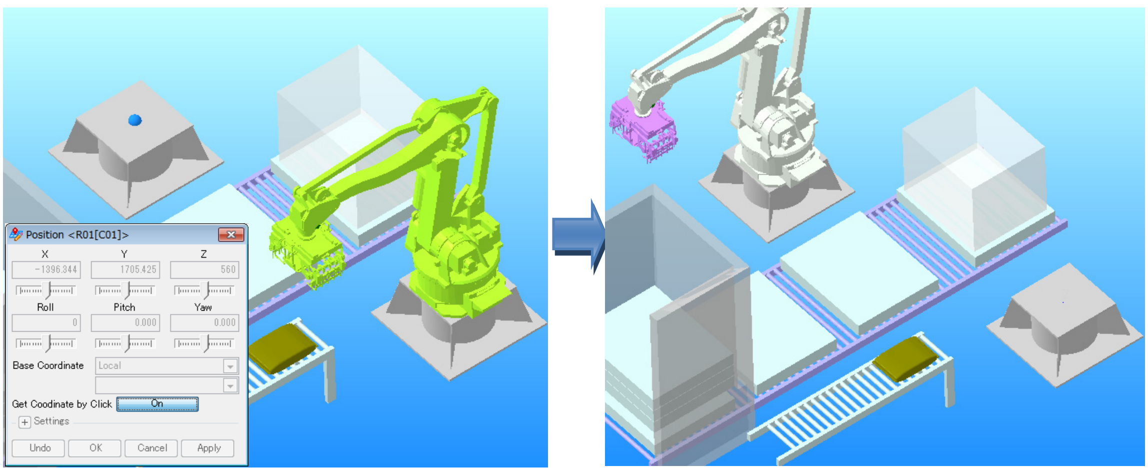
Input value or operate by slide bar. Position is viewed from the selecting base coordinate system.

Base coordinate system	Contents
Local	Object coordinate base of one upper level of object
World	Origin base on the view
Upper	Object coordinate base of one upper level of the selecting object on the tree.
Designated model	Designated object coordinate base
Robot base	Base transformation value coordinate of designated robot
Tool	Tool transformation value coordinate of designated robot
Flange	Flange coordinate base of designated robot

- Local is basically same as upper but motion is changed with teaching point that have teaching point base.
- Δ shows relative position.

- Get Coordinate by Click

This feature enables to obtain the X, Y, Z values of the clicked position. Use this feature with the Snap function allows user to layout objects to the specific position smoothly.

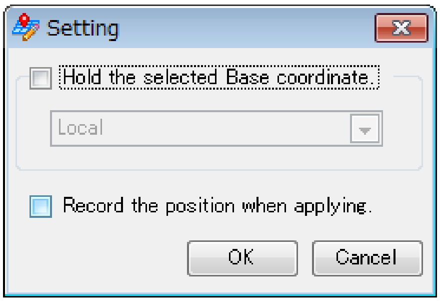


- Rotation method

Select OAT (RZ、RY、RZ) rotation or Roll, Pitch, Yow(RX、RY、RZ) rotation.

- Zoom

Set pitch of 1 scale of slide bar when straight move and rotation.



- Settings

Hold the selected Base coordinate.

When opening the position change dialogue, select base coordinate system to use as standard.

Record the position when applying.

When the model position is set in the Position dialog, [Position] – [Record] will automatically be executed.

3.4.2.6 Using Undo Relocation to restore former coordinates

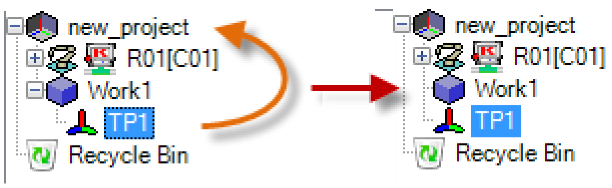
The robot can be restored to the previous coordinate values using Undo Relocation, which is an extended application.

Please refer for detail to chapter of “5.7.6”.

3.4.2.7 Drag and drop in tree pane

Drag and drop each object in the tree pane creates a parenting relationship.

- * The model only changes the configuration of layout and doesn’t move on the view, because the world coordinate is taken over.

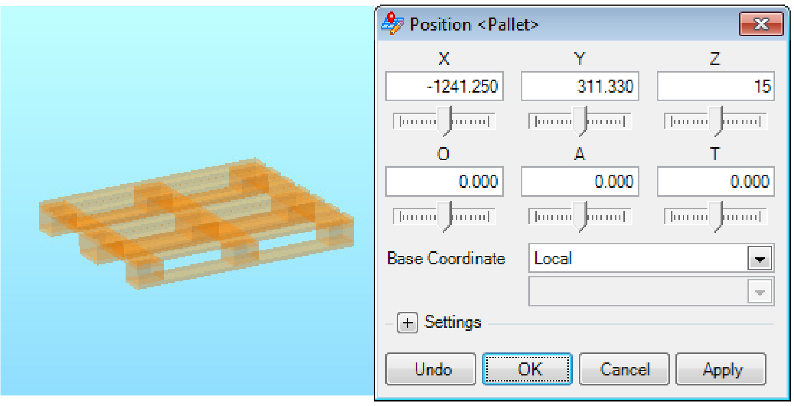


3.4.2.8 Layout using tree structure

By changing tree structure and using local coordinate system, layout can be done easily without inputting detailed values.

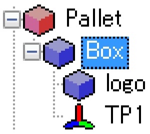
- Model origin should be located where work coordinate system can be set easily.

For example, layout box workpiece on pallet position like below.



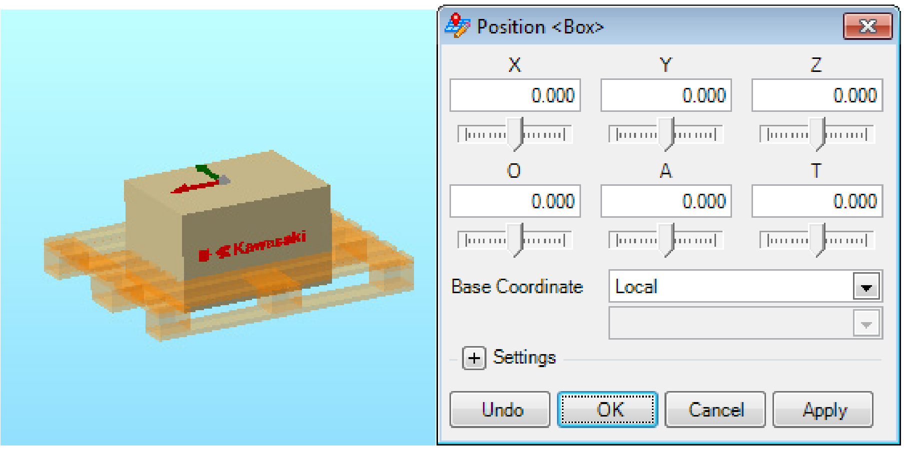
1 **Add box workpiece and drag to Pallet object.**

Parent-child relationship is created.



2 **Display position dialogue of Box and set as local base coordinate system. Input all value as 0.**

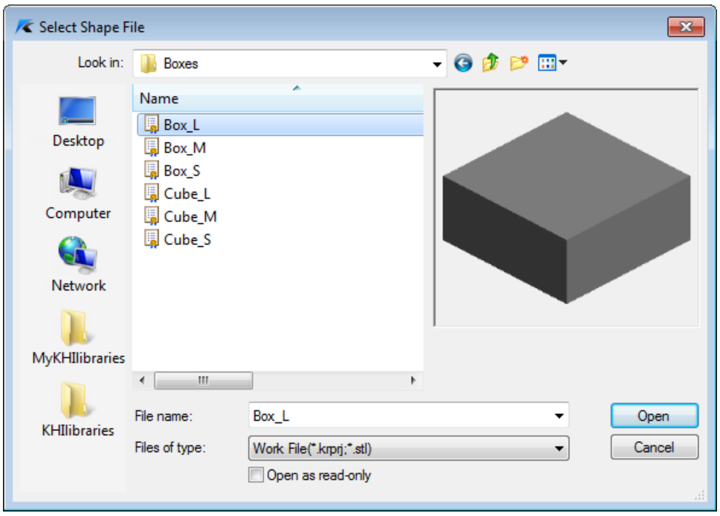
Box workpiece is moved to the pallet origin.



- Return layout structure to original as necessary.

3.4.2.9 Selecting Model file

This section describes the model selection dialog to add works and obstacles.

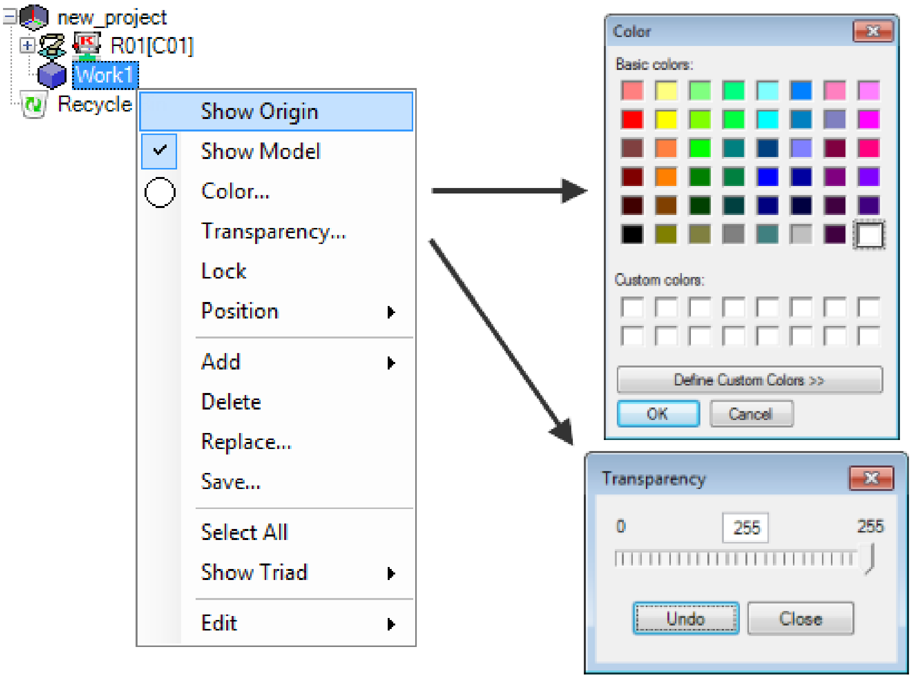


The dedicated dialog to open the models such as environment or tool is displayed in K-ROSET.
A shortcut of [MyKHIlibraries] and [KHIlibraries] are displayed in the dedicated dialog.

- Refer to the folder configuration for the folders.

3.4.2.10 Setting of color/transparency

This section describes color/transparency setting for shape files such as works, obstacles, and robot axis models.
As right-click the node of the shape file in the tree pane, then it is display the items of color and transparency in the menu.



➢ Setting of the color
Select "Color" of the menu to display a color palette.
Select a color to change and press OK to reflect in the view.

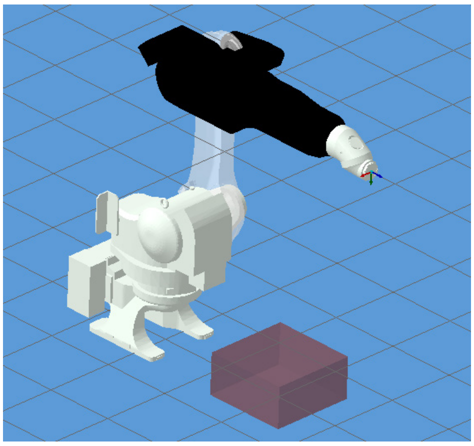
➢ Setting of the transparency
Select "Transparency" of the menu to display a transparency setting screen. (Default value is 255.)

Change transparency in a bar to reflect in the view.

Close with the Close button or "X" to fix transparency.

Press the button "Return" to cancel the change and return to original transparency.

(Example) J2 ... transparency: 100 / J3 ... color: Black / Work ... color: Brown Transparency ... 120



In K-ROSET, the special dialog is to open a model of an environment, a tool and so on.

Shortcuts, [MyKHIlibraries] and [KHIlibraries], are shown in the special dialog.

- Reference: folder configurations

3.4.3 Robot

This section describes how to add a robot to the project.

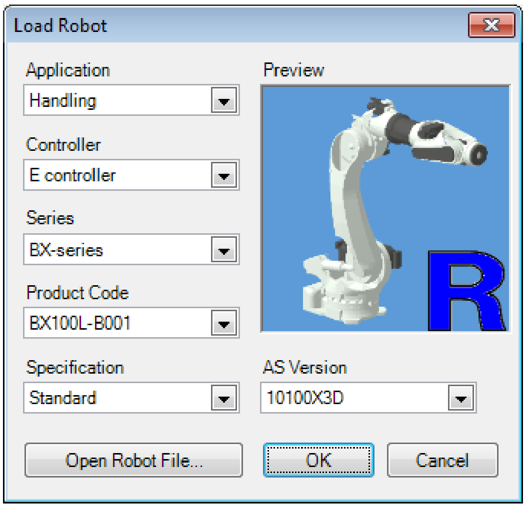
3.4.3.1 Adding a robot

This section describes how to arrange a robot in a project.

Adding a standard robot

In the tree pane, right-click a project icon [] to select [Add] -> [Robot] from the menu.

The robot selection dialog box will open. Select the robot's model, controller, and Application, and press the [OK] button.

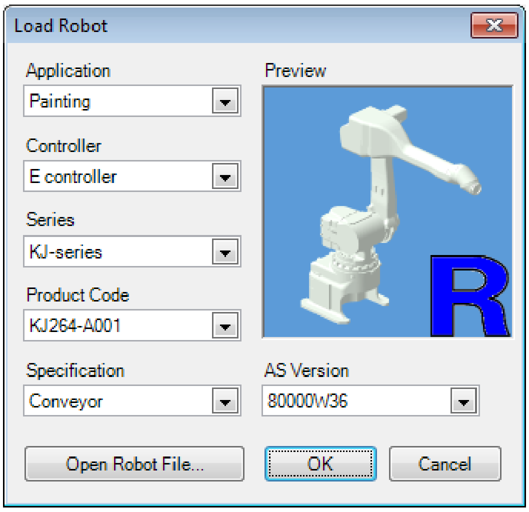


The designated robot is added to the origin after the button is pressed.

Adding a custom robot

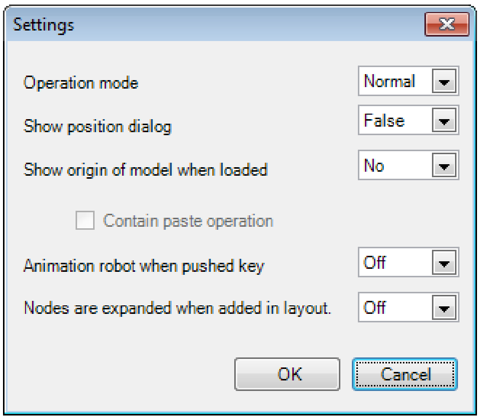
In the tree pane, right-click the project icon [] to select [Add] -> [Robot] from the menu.

The robot selection dialog box will open. Change the Library Type into [Custom]. Select the robot's model, controller, and Application, and press the [OK] button.



When adding a robot, the reposition dialog box can be displayed.

In the tree pane, right-click the project icon [ ] to select [Settings] from the menu. The basic application GUI setting dialog box will appear.



Select [Yes] at the [View reposition dialog box] item, and press the [OK] button. The view position dialog box will appear every time a robot is added hereafter.

The tool and base arrows can be resized.
It is also possible to add a robot from the design library by the drag and drop operation.

- **Designate file directly**

When there are robot model file （*.krprj） and controller file （*.khirc） in a same folder, robot can be added by directly designating krprj.
Robot can be added by selecting krprj from [Designate file and load] on robot load or dragging krprj file to the view.

Example） BX100N
BX100N-B001.krprj
BX100N-B001_AS-10100V2M.khirc

- Other Model folder saved stl of robot model is required.

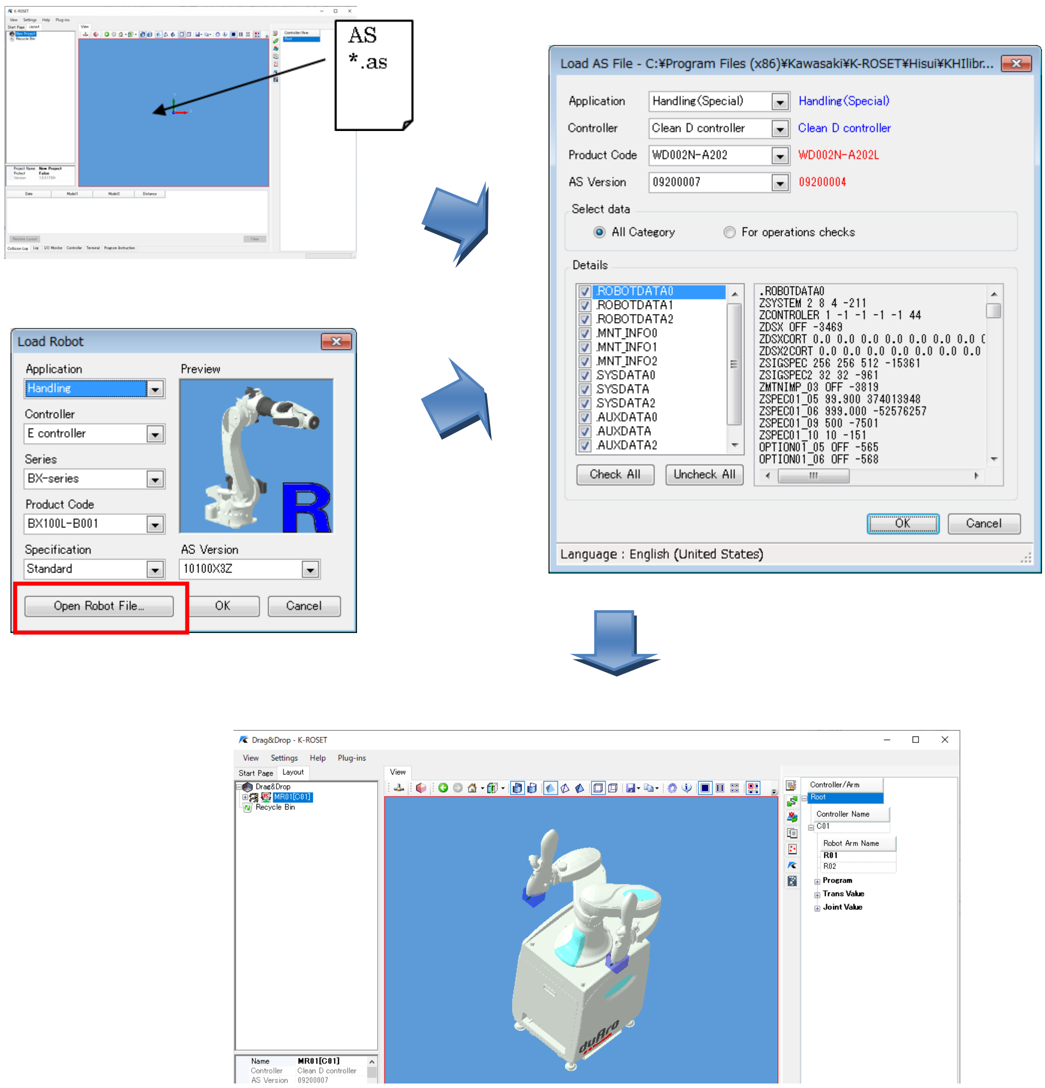
- Use All save data (AS file)

Robot can be added from the saved data file (*.as) which stores all robot controller models.

Either selecting a "as" file from the [Specify the file to read] in the robot load or dragging a "as" file on to the view enable to add a robot model.

Selecting an "as" file will open the Load AS File dialog. It automatically identifies the application as well as the robot model and selects corresponding items to load with in the dialog. Remove the checkmark for the unnecessary items and click OK.

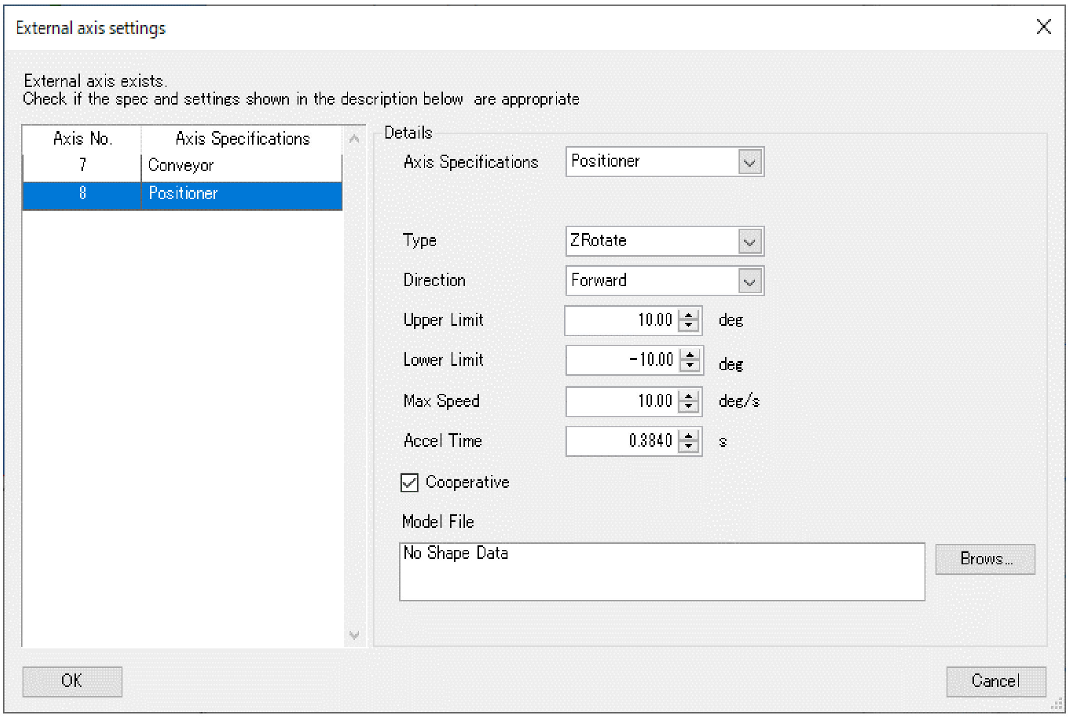
- Supported controllers are F, E, D+D controller. Settings file for C controller or earlier cannot be loaded.
- If controller cannot be connected after clicking on OK, remove checkmarks of the categories in the detailed settings and check again.



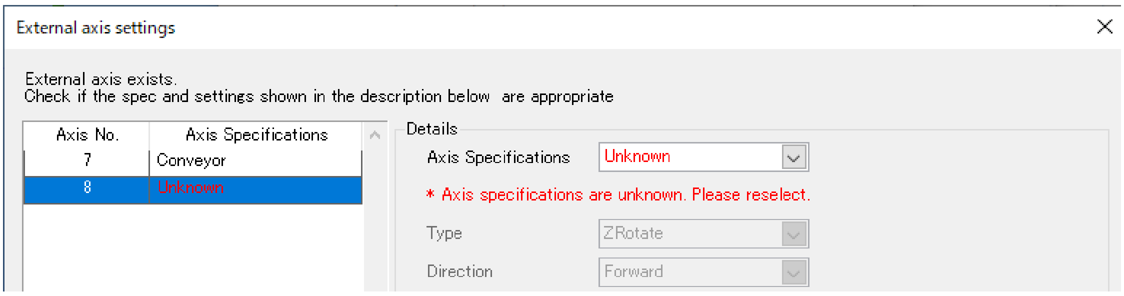
➤ Addition of robot by loading AS file with external axis settings

When external axis setting is included in the loaded AS file, the [External axis settings] dialog shown below opens up. Check and edit the settings if necessary.

The table in left top corner is the list of available external axes. Detailed settings of the selected external axis are displayed on the right half of the dialog.



* Axis specification may not be recognized correctly depends on the robot model and/or AS version you use.
* If the specification shown in this dialog appears to be different from what it actually is and/or if the axis specification is indicated as unknown, please correct them in this dialog.
  To change the settings of external axis specification after adding a robot model, use the [External axis wizard] instead.



► 3.4.3.2 Repositioning a robot

This section describes procedures to reposition a robot added to the project.
To reposition the robot, perform one of the methods below.

- Changing in the tree pane

  In the tree pane, double-click the robot icon [] to open the reposition dialog box.
  Manually enter or use the slide bar to adjust each coordinate value.
  To apply the settings that you set up, press the [Apply] button. To return to the former settings, press the [Undo] button.
  Once the Apply button is pressed, the former settings before change cannot be returned to.
  Current position Z shows the value of distance from the surface of grid display to the origin of the base coordinate.

- Changing from the robot menu

  In the tree pane, right-click the robot icon to select [Position] -> [Change] from the menu to open the reposition dialog box.
  Follow the procedure of method (1).

- Changing from the view

  In the view pane, double-click the robot model to open the reposition dialog box.
  Follow the procedure of method (1).

- Changing from the properties pane

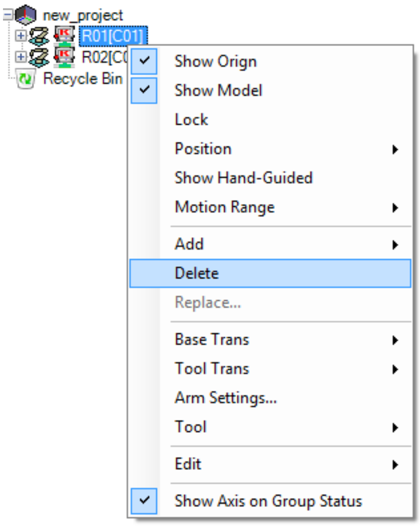
  In the tree pane, select the robot icon.
  In the properties pane, change the converted local coordinate values.

► 3.4.3.3 Deleting a robot

This section describes the procedure to delete a robot.

Right-click the robot to be deleted.
A menu will be displayed. Select [Delete].

- It can be deleted by [Delete] button on keyboard.



3.4.3.4 Replace robot model

This section describes how to replace the robot to another robot.

1 **Right-click on the robot icon [] in the directory tree.**
Drop down menu will appear.

2 **Select [Replace] in the menu.**
Open file dialog will appear.

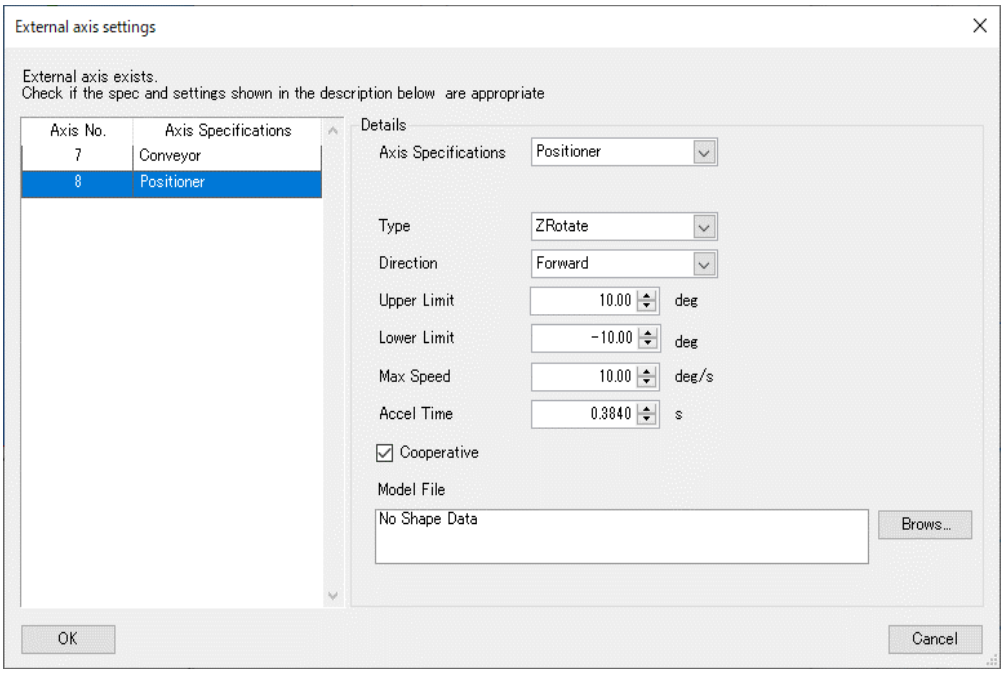
3 **Select the robot file to replace and click [Open] button.**
Robot model will be replaced with no change in layout.

- Robot model replacement is supported from V1.8.0. However, for the robot which is added external axis or replacement between multi arm robot and single arm robot are not supported.

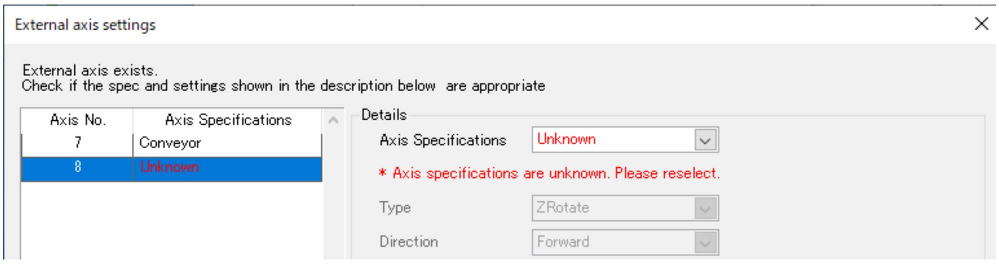
➤ Robot replacement involving external axis settings

[External axis settings] dialog opens up when replacing a robot model involving external axis settings. Check and edit the settings if necessary.

When both robot model sources have external axis settings, the external axis settings of the robot model before replacement will be added to the replaced model as an additional axis.



- Axis specification may not be recognized correctly depends on the robot model and/or AS version you use.
- If the specification shown in this dialog appears to be different from what it actually is and/or if the axis specification is indicated as unknown, please correct them in this dialog.
  To change the settings of external axis specification after adding a robot model, use the [External axis wizard] instead.



► 3.4.3.5 Rename robot model

This section describes how to rename robot model.

1 **Select the robot in the tree in the Layout tab to edit.**

Selected robot item will be highlighted.

2 **Left click on the selected item or press F2.**

The robot name will be in the "editable" state.

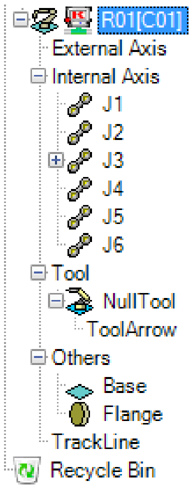
3 **Type a desired name in and then press on Enter.**

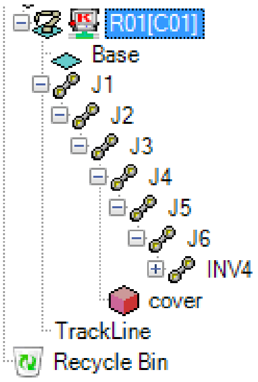
Robot name is renamed.

● Robot name shall be [Arm name[Controller name]] like R01[C01].

3.4.3.6 Display a grouping robot constitution

This section describes how to show the joint of the robot in the state of not tree but term.





1. Group show
2. Tree show

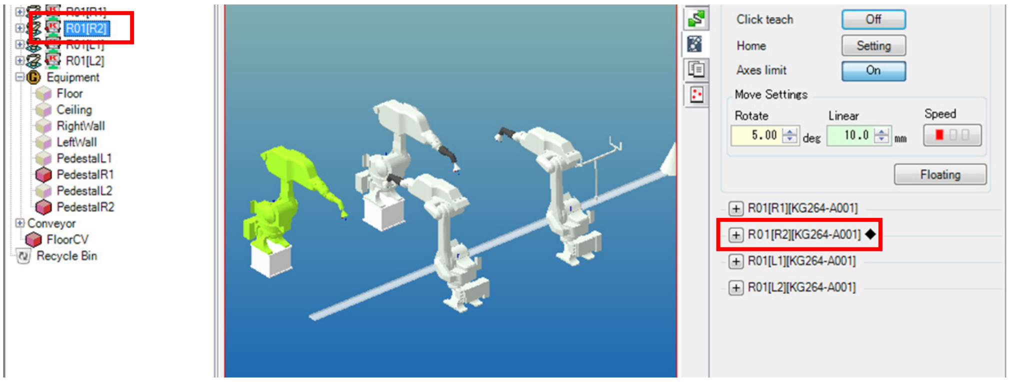
In the tree pane, right-click the robot icon and select [Show axis on group status] from menu.

● *Initialize state show group status.

3.4.3.7 Switching the current robot

This section describes the procedure to switch the current robot in a project having multiple robots.

In the tree pane, select the target robot to be made the current one.



3.4.3.8 Arm Settings

This section describes how to set the arm of the robot.

A method to set mechanical information of the robot is described.

The setting of the arm number, system, and auxiliary data can be edited.

The screen can start from layout and a program table.

➢ Start from Layout

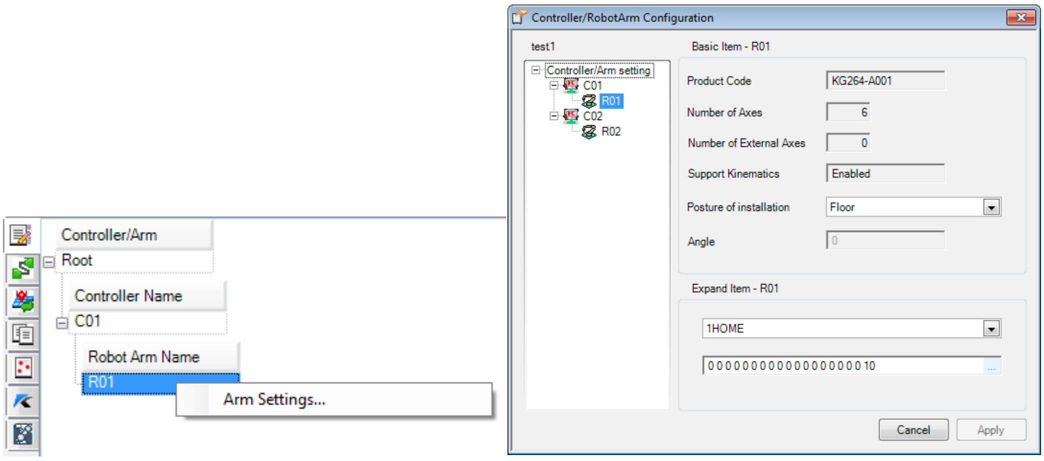
Right-click on a robot icon.
Select [Arm Settings].

➢ Start from Program Table

Display a robot node menu of the program table, and select [Arm Settings].

Controller and arm are displayed in tree structure, and the arm setting can be displayed from a controller setting screen.

Setting the number of the robot and editing and deleting the tag data can be performed.



Registering the installation of a robot

This section describes the procedure to specify a place to install the robot (floor, ceiling, etc.)

In the program table, select [Arm Settings] from the arm menu.

Change the [Register Installation] item on the arm settings screen.

Installation can be registered by selecting from “floor,” “ceiling,” “wall” (facing downward), or “wall (reversed)” (facing upward) according to the place where the robot is installed.

A confirmation dialog is shown to synchronize the setting in Arm setting with PC-AS after clicking [Apply].

➢ Expand Item

Tag Name	Item Name	Tag Name	Item Name
UP-LIM	Upper limit value of an axis	LO-LIM	Lower limit value of an axis
HOME	Initial coordinate	TOOL	Tool trans.
CVDIRECT	Conveyor direction		

► 3.4.3.9 Controller setting

➢ Start from Layout

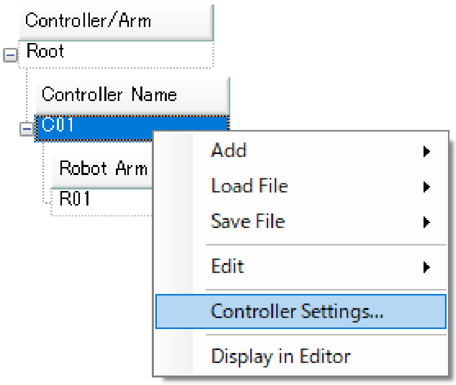
Right-click on a robot icon.

Select [Arm Settings].

Click on a robot icon in the Controller/RobotArm Configuration dialog.

➢ Start from Program Table

1 Right-click the controller of the program table to display a menu.



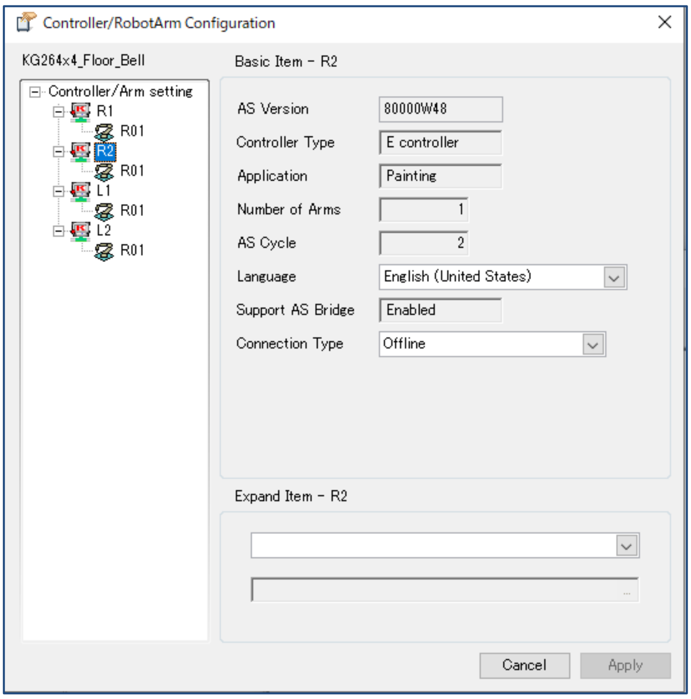
2 Select [Controller setting].

Controller setting can be displayed from the controller and the arm setting screen.

AS Version	AS version of the robot controller is displayed.
Controller Type	The type of the robot controller is displayed.
Application	Application of the controller, such as painting/standard/arc welding, is s displayed.
Arm Number	The number of robots operated by one robot controller is displayed.
AS Cycle	The control period of the robot controller is displayed at msec.
Language	The language setting of the robot controller is changed. When changed, make sure to restart.
AS link support condition	Execution of AS is displayed. Enabled for bootable, and Disabled for unbootable.
Connection Type	You can switch offline/online. For details on items that can be set when online, see the K-ROSET Online Function Manual.

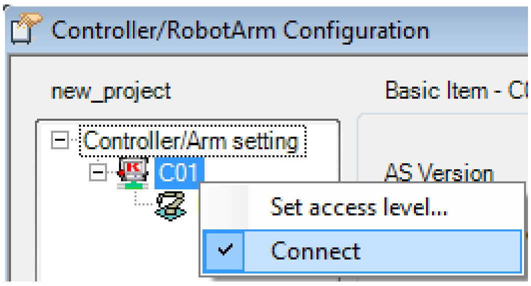
➢ Controller name menu of the tree

Right-click on the controller name [C**] of the [Controller/Arm setting] to display the controller menu.



➢ Controller name menu of tree

Controller menu is displayed by right-clicking controller name [C**] in Controller/Arm setting.



Connection	Start/exit the robot controller from context menu of the controller name of the tree pane. * Check mark is placed when robot controller has been started.
Change of access level	Editing operation level of the [Controller/Arm setting] is changed from context menu of the controller name of the tree pane. * This menu is intended for maintenance. Please do not use.

3 Change the settings and click the Apply button.

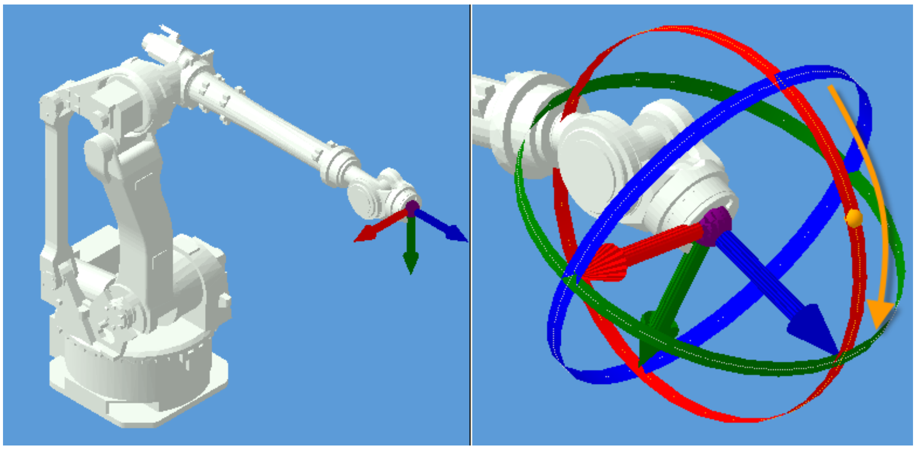
A confirmation dialog is shown to synchronize the setting in Controller setting with PC-AS after clicking [Apply].

4 Click on [Yes] to the message.

Synchronize to controller.

► 3.4.3.10 Hand guide display

Batch switching of hide/show of the origin of the teaching point/base coordinate/tool coordinate is carried out.



► 3.4.3.11 Motion range display

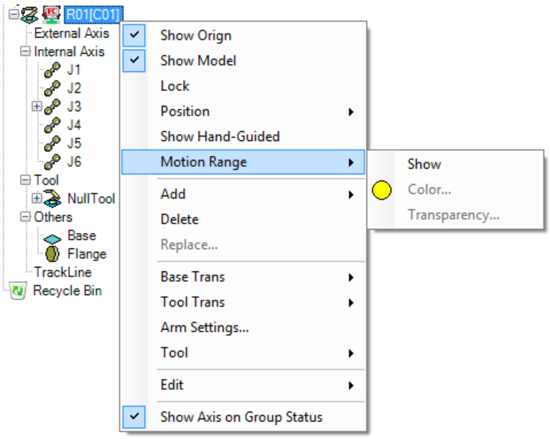
Display the motion range of P point of the robot.

- It is impossible to display the motion range at the tool tip.
- Range is not shown for some models. Contact Kawasaki for details.

Refer to the following method to display.

1 **Add a robot and right-click the robot icon.**

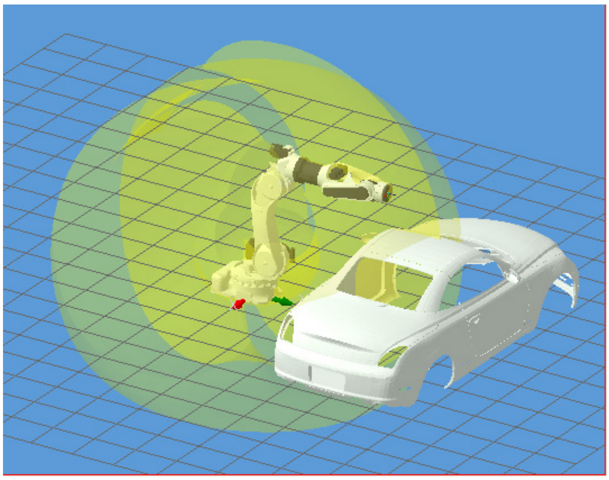
Select Motion Range menu.



2 **Click Show to put a check mark.**

Motion range is displayed. Default color is yellow and this color can be changed.

Click Show and remove a check mark to hide the motion range.



- If there is no motion range model, a menu is not displayed.

Motion range model is out of collision target.

3.4.4 Workpiece

This section describes the installation method of workpieces. Workpiece is a model to grasp and process. Objects like transferred by robot or conveyor has to be added as workpiece.

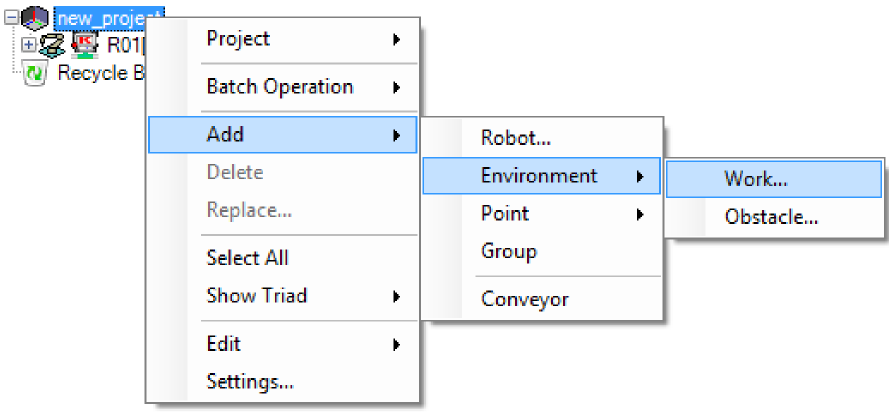
3.4.4.1 Adding a workpiece

This section describes the procedure to add a workpiece.

➢ **Standard adding method**

1 **In the tree pane, right-click the project icon [ ].**

2 **The project menu will be displayed. Select [Add] -> [Environment] -> [Work].**



3 **The file selection dialog box will appear. Select the target file, and press the [Open] button.**

An icon of the work [ ] is added to the tree pane on the left side of the screen, and a model of the added workpiece appears in the central view pane.

The folder of frequently used models can be added from the design library. Click Add File Location in the design library to add the folder.

The models displayed in the design library on the right side of the screen can be added by the drag-and-drop operation.

For details, refer to Help.

➢ **Drag a file**

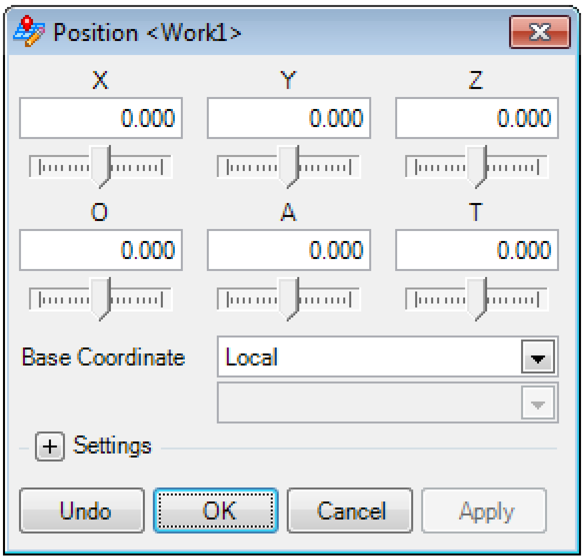
Object can be added as workpiece by dragging STL file (*.stl) to the view.

► 3.4.4.2 Changing the workpiece position

This section describes the procedure to change the workpiece position.

1 **Double-left-click the added workpiece icon [ ] in the tree pane.**

2 **The reposition dialog box will appear. Manually enter settings or use the slide bar to change the coordinate values.**

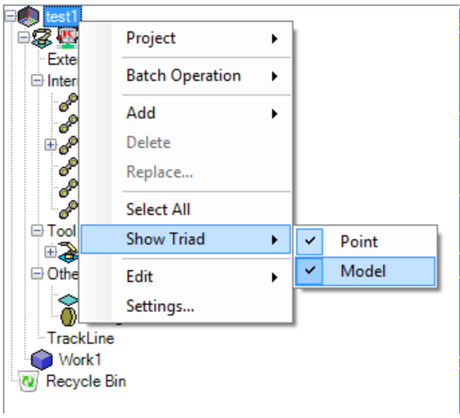


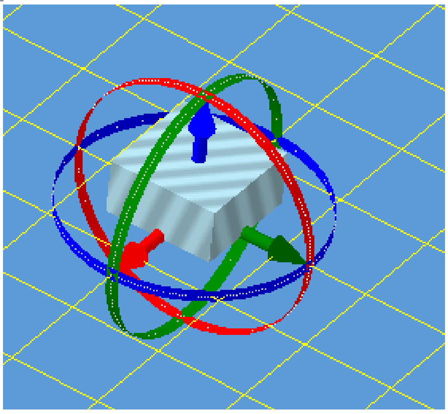
3 Press the [Apply] button to reflect the change, and press the [Close] button to close the dialog box.

The reposition dialog box can also be displayed by double-clicking the workpiece model in the view pane, or by selecting [Position] -> [Assigned Position] from the menu of the workpiece instead of double-left-clicking the workpiece icon.

Move with Triad

This can be changed the position of models in the view by using the SolidWorks function.



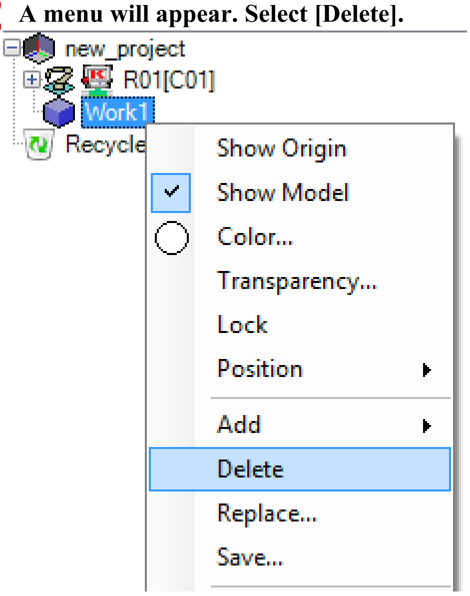


► 3.4.4.3 Deleting a workpiece

This section describes the procedure to delete a workpiece.

1 Right-click the workpiece to be deleted.

2 A menu will appear. Select [Delete].

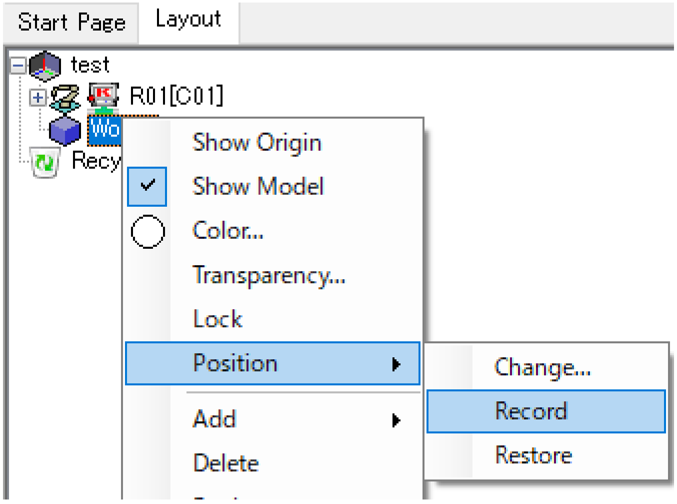


► 3.4.4.4 Recording a workpiece position

This section describes the procedure to record a workpiece position.

1 Right-click the workpiece [] to be recorded in the tree pane.

2 **The workpiece menu will appear. Select [Position] -> [Record]. The workpiece position will be recorded.**

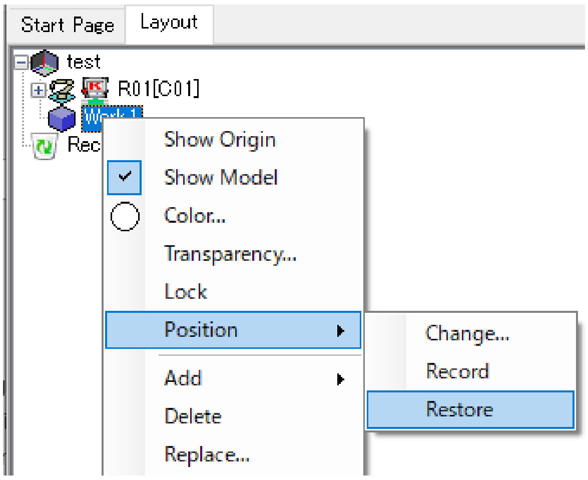


► 3.4.4.5 Resetting a workpiece position

This section describes the procedure to reset a workpiece position.

1 **Right-click the workpiece [ ] to be reset in the tree pane.**

2 **The workpiece menu will appear. Select Location] -> [Restore]. The previous position (recorded location) is restored.**

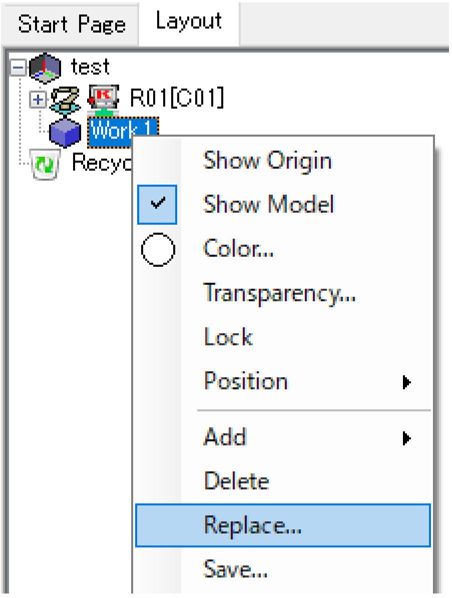


► 3.4.4.6 Replacing a workpiece

This section describes the procedure to replace a workpiece with another.

1 **Right-click a workpiece icon [ ] in the tree pane.**

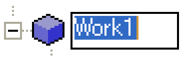
2 **A menu will be displayed. Select [Replace].**
The file selection dialog box will appear. Select the workpiece file to be replaced, and press the [Open] button.



► 3.4.4.7 Renaming a workpiece

This section describes the procedure to rename a workpiece.

1 **Select a workpiece icon [] in the tree pane.**

2 

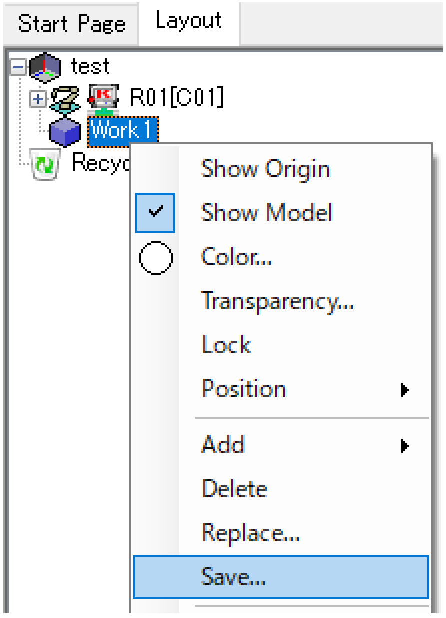
Then, left-click the icon again.

► 3.4.4.8 Saving a workpiece

Workpieces added to the project can be saved.
This section describes the procedure to save a workpiece.

1 **Right-click the target workpiece icon [] in the tree pane.**

2 **The workpiece menu will be displayed. Select [Save].**



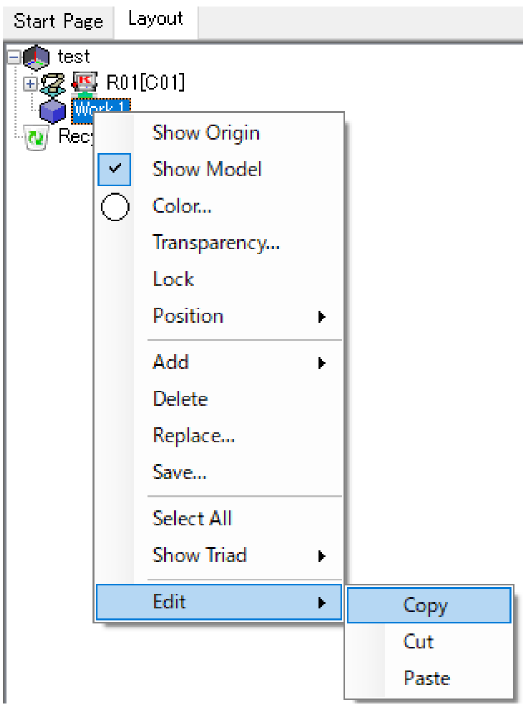
3 **The destination selection dialog box will appear. Select the name of the workpiece to be saved and the destination folder, and press the [Save] button.**

► 3.4.4.9 Copying a Workpiece

This section describes how to copy a workpiece.
The workpiece can be selected for making the reproduction.

1 **Right-click the target workpiece icon [ ] in the tree pane.**

2 **The workpiece menu will be displayed. Select [Edit] -> [Copy].**



* ● It can be operated by < Ctrl+C > on the keyboard.

► 3.4.4.10 Cutting a Workpiece

This section describes how to cut a workpiece.
The workpiece can be selected for moving.

1 Right-click the target workpiece icon [ ] in the tree pane.

2 The workpiece menu will be displayed. Select [Edit]->[Cut].

* ● It can be operated <Ctrl+X> on the keyboard.

► 3.4.4.11 Pasting a Workpiece

This section describes how to paste a workpiece.
The cut or copied workpiece can be applied on the other object.

1 Perform the above workpiece (copy or cut).

2 Right-click the target object icon in the tree pane.

3 The workpiece menu will be displayed. Select [Edit] ->[Paste].

* ● Local coordinate is taken over.
  ● It can be operated by <Ctrl+V> on the keyboard.

►►► 3.4.5 Obstacle

This section describes the installation method of obstacles.

► 3.4.5.1 Adding an obstacle

This section describes the procedure to add an obstacle.

1 In the tree pane, right-click the project icon [ ].

2 The project menu will appear. Select [Add] -> [Environment] -> [Obstacle].

3 The file selection dialog opens. Select the target file, and press the [Open] button.
The obstacle icon [ ] is added in the tree pane on the left side of the screen, and a model of the added obstacle is displayed in the central view.

► 3.4.5.2 Changing an obstacle position

This section describes the procedure to change the position of an obstacle.

1 **Double-left-click the added obstacle icon [] in the tree pane.**

2 **The position change dialog box will appear. Set each coordinate value by manually entering them or with the slide bar.**

3 **Press the [Apply] button to reflect the changed values, and press the [Close] button to close the dialog box.**

- The reposition dialog box can also be displayed by double-clicking the obstacle model in the view pane, or by selecting [Position] -> [Assigned Position] from the menu of the obstacle instead of double-left-clicking the obstacle icon.

► 3.4.5.3 Deleting an obstacle

This section describes the procedure to delete an obstacle.

1 **Right-click the obstacle to be deleted.**

2 **A menu will appear. Select [Delete].**

► 3.4.5.4 Recording an obstacle position

This section describes the procedure to record an obstacle position.

1 **Right-click the obstacle [] to be recorded in the tree pane.**

2 **A menu will appear. Select [Position] -> [Record]. The obstacle position will be recorded.**

► 3.4.5.5 Resetting an obstacle position

This section describes the procedure to reset an obstacle position.

1 **Right-click the obstacle [] to be reset in the tree pane.**

2 **A menu will appear. Select [Position] -> [Restore]. The previous position (recorded location) is restored.**

► 3.4.5.6 Replacing an obstacle

This section describes the procedure to replace an obstacle with another.

1 **Right-click an obstacle icon [ ] in the tree pane.**

2 **The obstacle menu will be displayed. Select [Replace].**

3 **The file selection dialog box will appear. Select the obstacle file to be replaced, and press the [Open] button.**

► 3.4.5.7 Renaming an obstacle

This section describes the procedure to rename an obstacle.

1 **Select an obstacle icon [ ] in the tree pane.**

2 **Then, left-click the icon again.**

► 3.4.5.8 Saving an obstacle

This section describes the procedure to save an obstacle

.

1 **Right-click the target obstacle icon [ ] in the tree pane.**

2 **The obstacle menu will be displayed. Select [Save].**

3 **The destination selection dialog box will appear. Select the name of the obstacle to be saved and the destination folder, and press the [Save] button.**

► 3.4.5.9 Copying an Obstacle

This section describes how to copy an obstacle.
The obstacle can be selected for making the reproduction.

1 **Right-click the target obstacle icon [ ] in the tree pane.**

2 **The obstacle menu will be displayed. Select [Edit] -> [Copy].**

* ● It can be operated by < Ctrl+C > on the keyboard.

► 3.4.5.10 Cutting an Obstacle

This section describes how to cut an obstacle.
The obstacle can be selected for moving.

1 **Right-click the target obstacle icon [ ] in the tree pane.**

2 **The obstacle menu will be displayed. Select [Edit] -> [Cut].**

- It can be operated by < Ctrl+X > on the keyboard.

3.4.5.11 Pasting an Obstacle

This section describes how to paste an obstacle.
The cut or copied obstacle can be applied on the other object.

1 **Perform the above obstacle (copy or cut).**

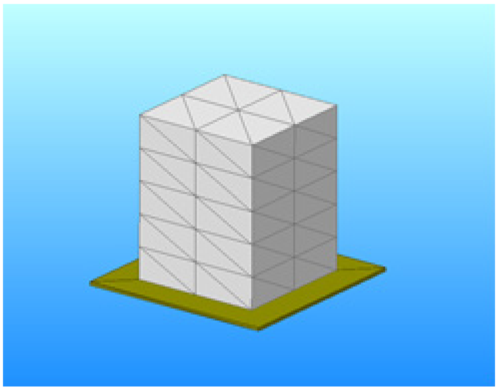
2 **Right-click the target object icon in the tree pane**

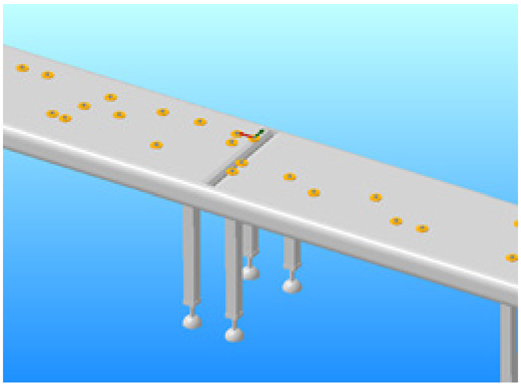
3 **The obstacle menu will be displayed. Select [Edit]->[Paste]**

- Local coordinate is taken over.
- It can be operated by < Ctrl+V > on the keyboard.

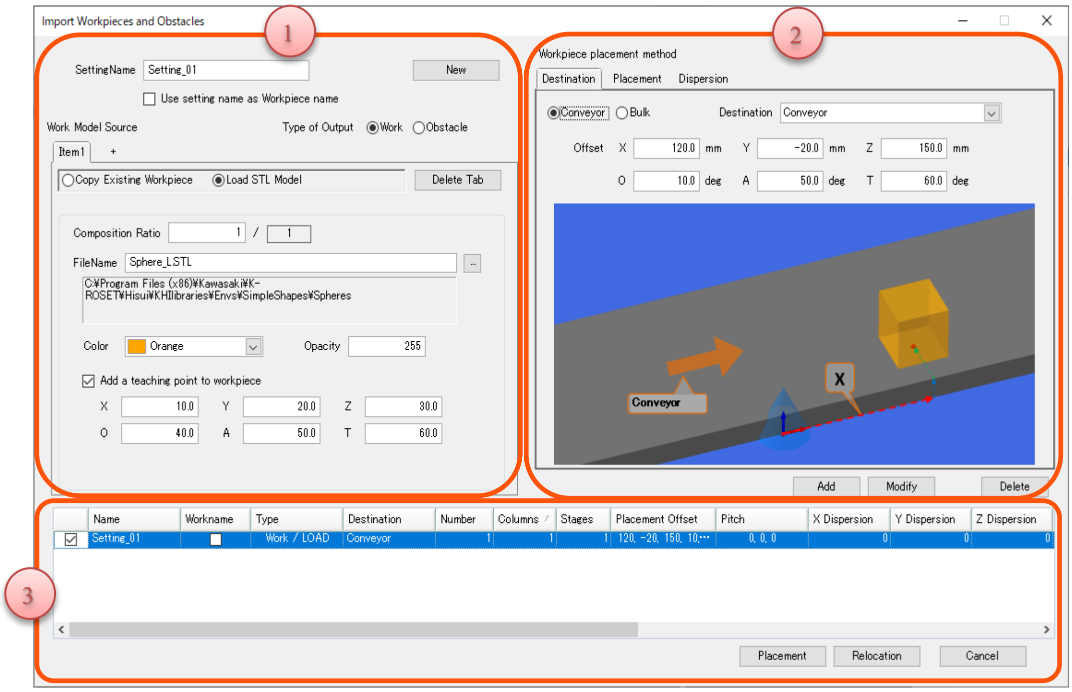
3.4.6 Multi Objects

Use the multi workpiece/obstacle generator to add multiple workpieces or obstacles.
Workpiece placement method can be set to stacking by setting the pitch evenly or set to scattered by setting the dispersion. Since teaching point for picking can also be created when creating a workpiece at the same time, it allows user to save time for teaching.

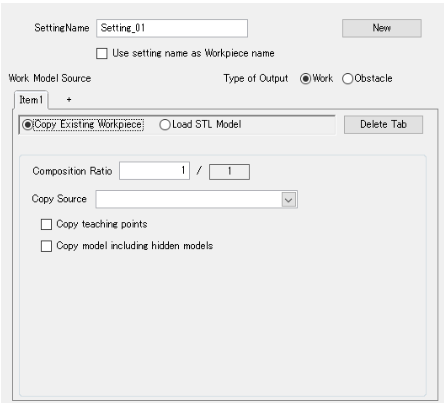


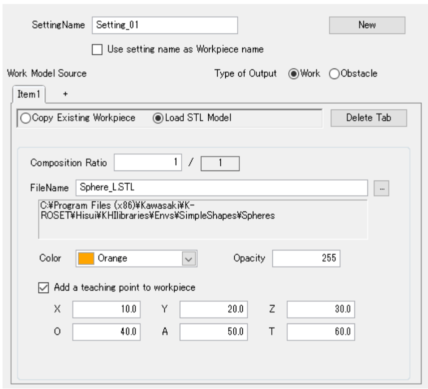


Settings dialog screen is configured by (1) [Work Model Source] section, (2) [Workpiece placement method] section and (3) Create a workpiece and locate based on the settings section.



➤ **(1) Work Model Source**





Common

Item	Description
Setting Name	Name of the settings for workpiece generation and layout.
[New] button	Discard the changes currently in process and create a new one.
Use setting name as Workpiece name	Set whether to use the setting name as a workpiece name or not.
Type of Output	Switch target object to create between [workpiece] and [obstacle].
Copy Existing Workpiece Load STL Model	Specify the method how to create the workpiece.
[Delete Tab] button	Delete the Item tab for the Work Model Source.
Composition Ratio	Set the ratio of the number of workpieces per type against the whole workpieces when multiple workpieces are set to generating method. e.g.) When three tabs to load the A, B and C STL files are created and the configuration ratio is set to 2:3:5, the number of adding workpieces will be type A in approx. 20% , type B in approx. 30% and type C in approx. 50% in the whole workpieces.

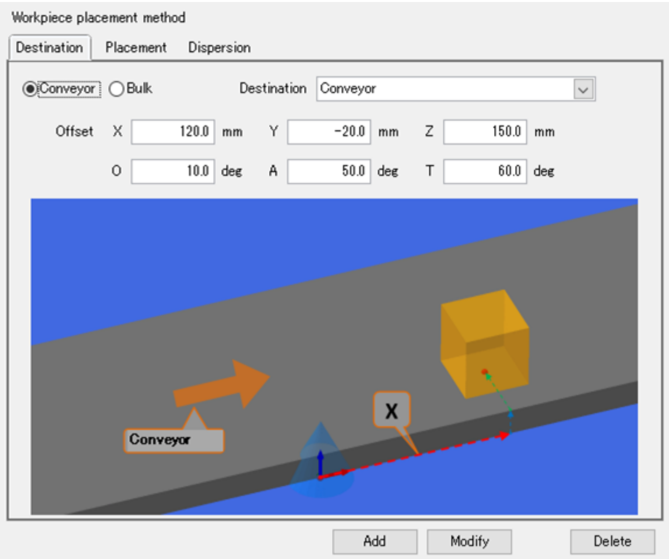
Copy Existing Workpiece

Item	Description
Copy Source	Select workpiece model source to copy.
Copy teaching points	Includes the teaching points which belong to the copy source when copying a workpiece model from existing one.
Copy model including hidden models	Includes all models (workpiece, obstacle, group) which belong to the copy source when copying a workpiece model from existing one.

Load STL model

Item	Description
File name	Specify the file name of the STL model or the file path to load when creating a workpiece model by loading a STL model.
Open File dialog button	Opens the file dialog to specify the STL model.
STL model file directory	Displays the file directory when the open file dialog button is pressed.
Color	Set the workpiece color to create.
Opacity	Set the opacity of the workpiece to create.
Add a teaching point to workpiece	Set whether to add a new teaching point to the workpiece to create or not.
Coordinate of added teaching point (X, Y, Z, O, A, T)	Specify the coordinate of the teaching point to create.

- **(2) Workpiece placement method**



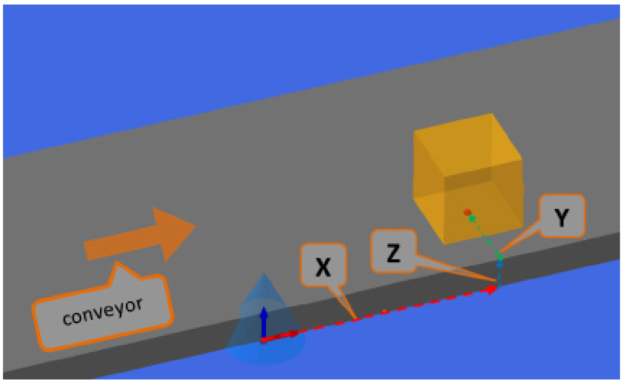
Common

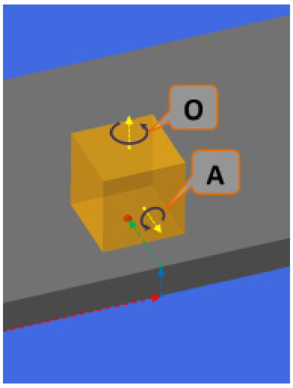
Item	Description
Add	Register the settings for Work Model Source and Workpiece placement method.
Modification	Modify the settings for Work Model Source and Workpiece placement method.
Delete	Delete the settings for Work Model Source and Workpiece placement method.

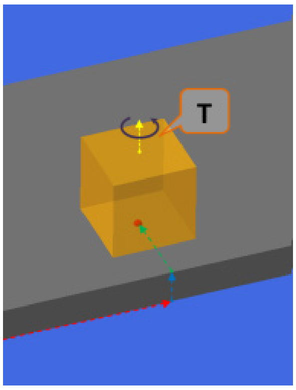
Destination

Item	Description
Conveyor Bulk	Specify the placement type of the workpiece to create. "Obstacle" shall be selected for [Bulk].
Destination	Select the destination to place the workpiece to create.
Offset	Specify the distance from the model origin.

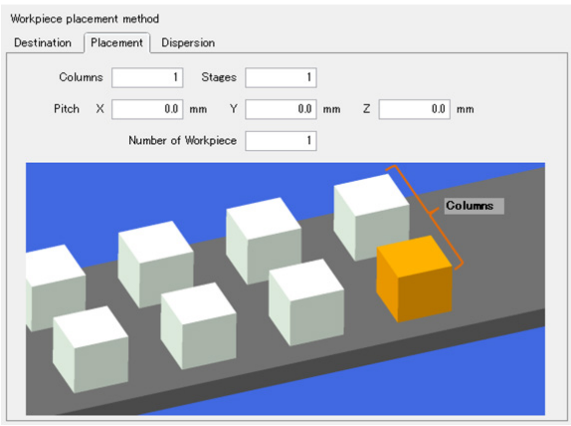
Offset







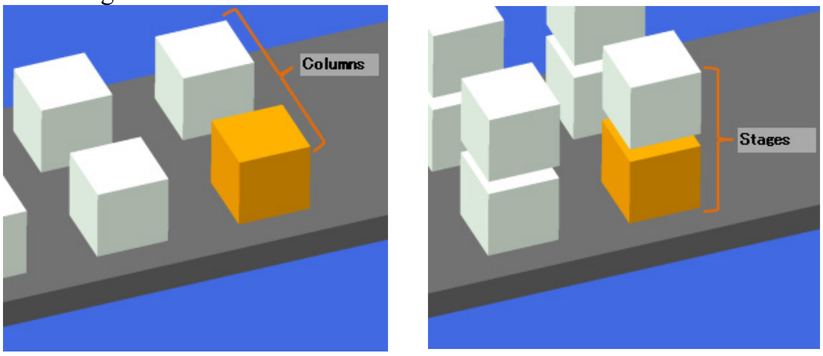
T shows the rotational axis when O and A are at zero degree.



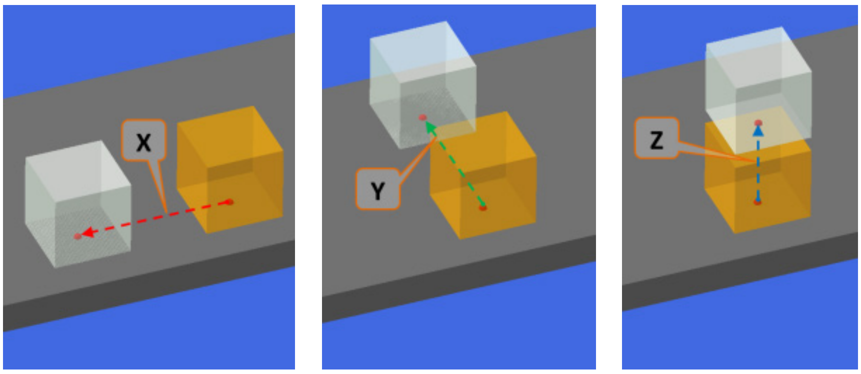
Placement

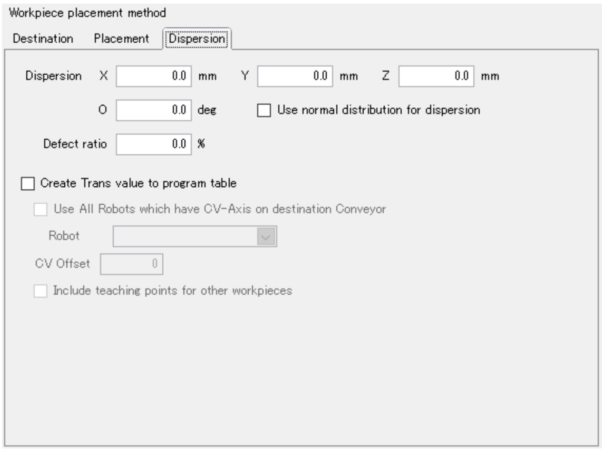
Item	Description
Columns/Stages	Set how many workpieces to align in Y direction (Columns) and Z direction (Stages).
Pitch	Set the pitch between workpieces to align.

Columns/Stages



Pitch



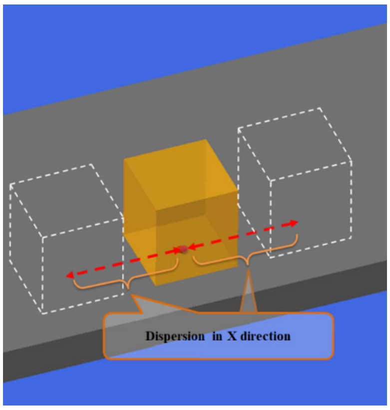


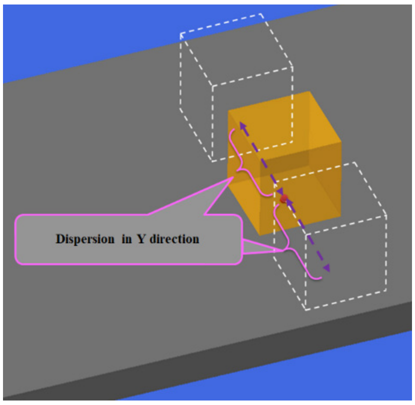
Dispersion

Item	Description
Dispersion	Set the range for dispersion.
Dispersion in rotation (o)	Set the range for dispersion of the workpiece rotation direction in center of Z axis.
Use normal distribution for dispersion	Set whether to use normal distribution (The smaller the deviation, the higher the rate and amount of movement within the dispersion range will be smaller.) for dispersion or not.
Defect ratio	Set the defect rate for locating workpieces to where they should be located.
Number of workpiece	Specify the total number of workpieces to create.
Create Trans value to program table	Register the created/copied teaching points to the program table in transformation value.
Robot	Select the robot to create the transformation value to the program table.
CV Offset	Set the conveyor offset for creating the transformation value from

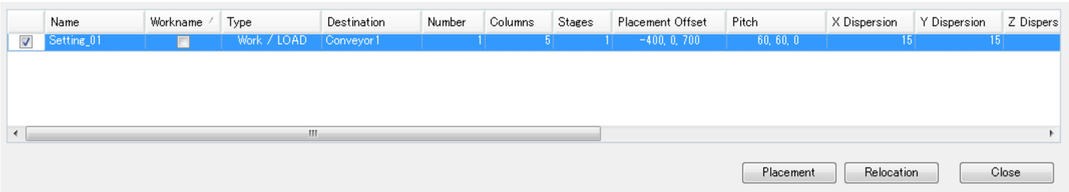
Item	Description
	teaching points when the destination to place the workpiece is conveyor.
Include teaching points to for other workpieces	Convert the teaching points for other workpieces in the destination (besides the workpiece which is created this time) into transformation value when creating transformation value.

Dispersion





➢ **(3) Screen for create and locate**



Adding the settings for Work Model Source and Workpiece placement method will register the settings to the list.

Perform the [Placement] or [Relocation] against the checkmarked settings in the list.

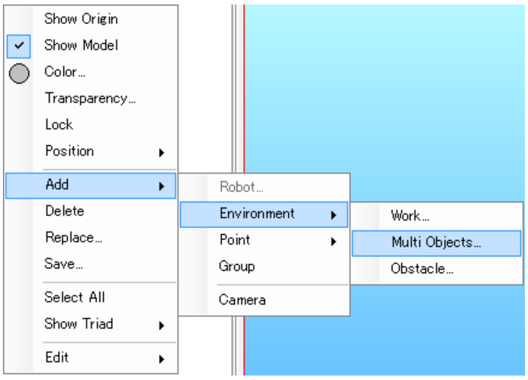
Placement - Add a new workpiece to the currently added workpieces.
Relocation – Delete all currently added workpieces and create a new workpiece.

► 3.4.6.1 Add multi workpieces/obstacles

This section describes how to add multiple wokrpieces/obstacles to a project.
Obstacles or conveyors need to be already added to the project beforehand.

1 Right-click on the obstacle icon [ ] in the directory tree.
Drop down menu of the obstacle appears.

2 Select [Add] – [Environment] – [Multi Objects…].
Multi Workpieces/Objects dialog appears.



3 Specify the target workpiece model and set the placement method then click [Add] button.
The set settings will be added to the list box in the bottom of the screen.

4 Click on [Placement].
Workpieces/Obstacles will be added to the project based on the settings.

►►► 3.4.7 ClampZone

This section describes how to set a ClampZone in a project.
ClampZone is a cubic virtual model which indicates the area where workpiece to be picked up can be detected for an application such as handling.

* ● To use the ClampZone feature, plug-ins for "Handling Simulation" is required.
Go to the Plug-ins settings and place a checkmark to the [Handling Simulation] to add to the Plug-ins.

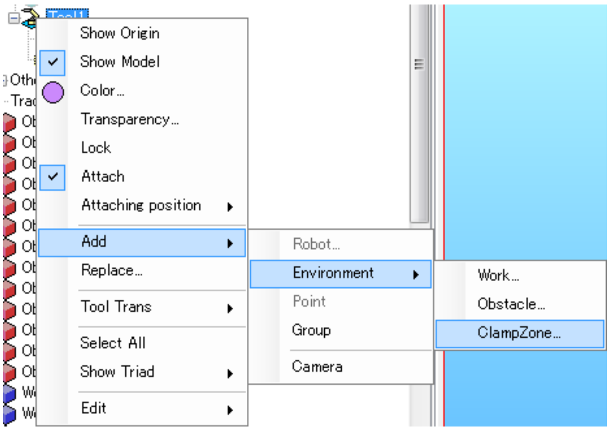
► 3.4.7.1 Adding an ClampZone

This section describes how to add ClampZone to a project.

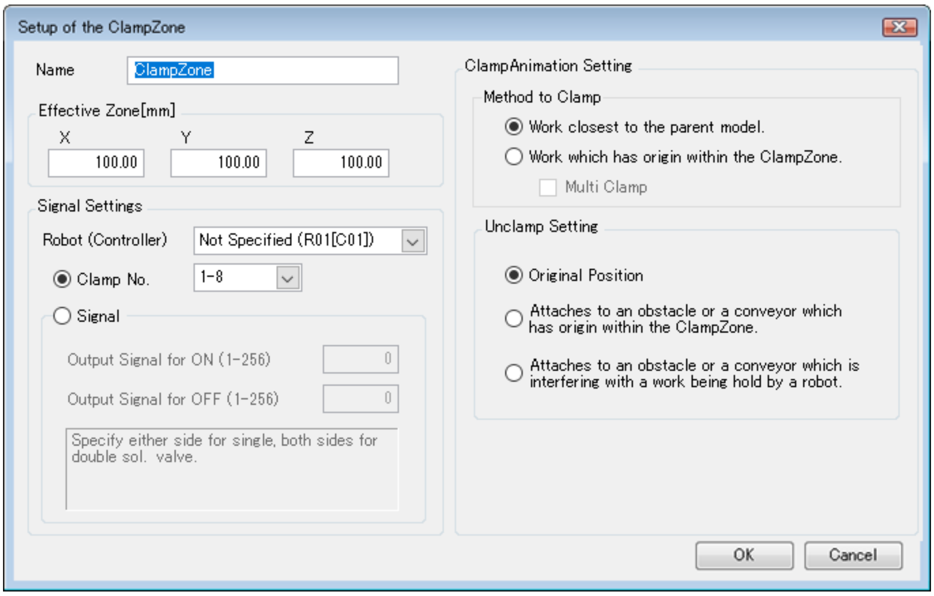
1 Right-click on either of the icons, Tool [ ], Workpiece[ ] or Obstacle[ ] in the tree in the Layout.
Project menu will be displayed.

2 Go to [Add]–[Environment]-[ClampZone] in the project menu.

ClmapZone Settings dialog will popup.



Setup of the ClampZone



- Controller name menu of the tree

Set the name of the ClampZone to create.
Default name is set to "ClampZone".

Effective zone[mm]

- X Y Z

Specify the size of the zone to create in XYZ.
Unit of the zone is mm.

- Robot (Controller)

Select target robot to set the signal for ClampZone.
When [Not Specified] is selected, the target robot to set the ClampZone will be the one the tool object or workpiece object you are adding the ClampZone to is belonged.

- Clamp No.

Select a Clamp No. to use for ClampZone by setting in "Handling Clamp settings".
Select the Clamp No. to set from the dropdown list.
Selecting [1-8] will enable the ClampZone to all signal settings set to Clamp No. 1 through 8.

- Signal

Assign desired signal number to use for ClampZone.

- Output Signal for ON

Assign signal number to use for clamping.
Detailed settings of the clamping action are set in the ClampAction Setting.

- Output Signal for OFF

Assign desired signal number to use for releasing clamp for double solenoid valve.
When the assigned signal goes ON, the attached workpiece to the robot will be detached.
You can set the detailed settings of the clamp in the ClampAnimation Setting.

ClamAnimation Setting

Setup the settings of the clamping and unclamping action.

Method to Clamp

- Work closest to parent model.

  Clamps the nearest workpiece from the Tool model, Workpiece model or Obstacle model which the ClampZone is set to regardless the size of the ClampZone.
- Work which has origin within the ClampZone.

  Clamps the workpiece model whose origin is inside the ClamZone.
- Multiple clamp

  Clamps all workpiece models whose origin is inside the ClampZone.

UnClamp Setting

Select the destination of the released workpiece to be attached to.

- Original Position

  Put the released workpiece back to the original position.
- Attaches to an obstacle or a conveyor which has origin within the ClampZone.

  Attaches the released workpiece to the obstacle whose model origin is inside the ClampZone or to a conveyor. When the destination to attach to cannot be found, released workpiece will go back to the original position same as when [Original Position] is selected.
- Attaches to an obstacle or a conveyor which is interfering with being hold by a robot.

  Attaches the released workpiece to the obstacle which is interfering with the workpiece or to the conveyor. When the destination to attach to cannot be found, released workpiece will go back to the original position same as when [Original Position] is selected.

3 Go to [Add]–[Environment]-[ClampZone] in the project menu.

ClampZone icon [] will appear in the directory tree in the Layout and the ClampZone model will appear in the View.

*

- Default position of the ClampZone differs depends on the icon you clicked on to add the ClampZone in the procedure 1.

  If you added by clicking the Tool icon, default position will be at the tool arrow and if it's either Workpiece icon or Obstacle icon, it will be at the original position of the target model,

3.4.7.2 How to edit ClampZone position

This section describes how to change ClampZone position.

1 Double-click the left mouse button on the added ClampZone icon [] in the directory tree in the Layout.

Position dialog will popup.

2 Edit each coordinate value by directly entering the value in the input field or sliding the sliding bar.

ClampZone model in the View will jump to the specified position.

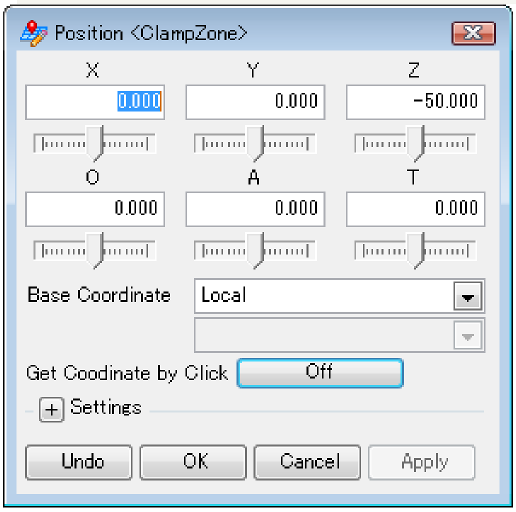
*

- If position is edited by entering the value, model position will change when Enter is pressed.

3 Press [Apply] button to reflect the changes and then click on [OK].

Position will be set and closed the dialog.

* Double-clicking on the ClampZone model in the View or access to [Position]-[Edit] from the menu of the ClampZone will also open the Position dialog.

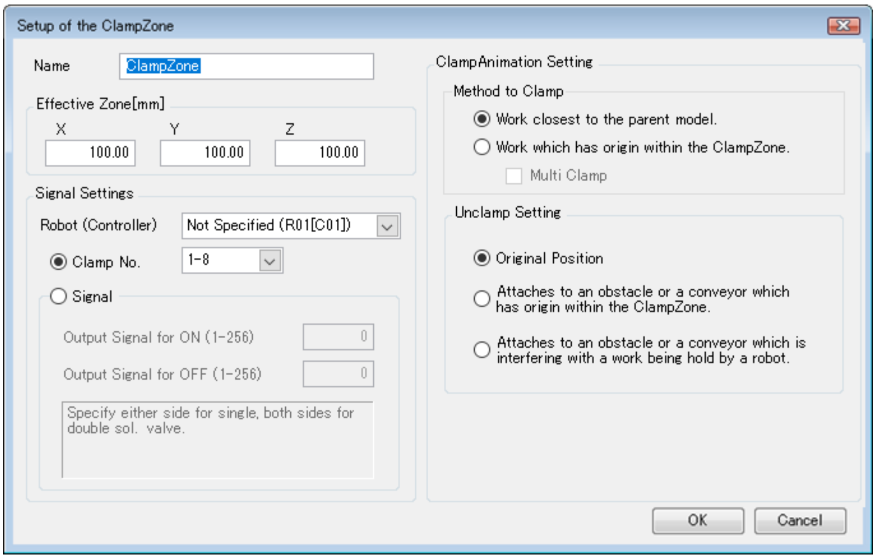


3.4.7.3 How to edit ClampZone settings

This section describes how to edit the settings of the ClampZone.

1 Right-click on the target ClampZone to edit its settings.
ClampZone menu will appear.

2 Click on [Settings].
[Setup of the ClampZone] dialog will popup.



3 Edit the settings and click on [OK] to apply the changes.
If [Effective Zone] is edited, ClampZone model in the View will reappear in the set size.

► 3.4.7.4 Deleting a ClampZone

This section describes how to delete added ClampZone.

1 Right-click on the ClampZone to be deleted.
ClampZone menu will appear.

2 Click on [Delete].
Confirmation dialog will popup.

3 Click on [Yes] to the message.
ClampZone in both the Layout and View will be deleted

► 3.4.7.5 Recording a ClampZone position

This section describes how to record the ClampZone position.

1 Right-click on the target ClampZone icon [ ] in the tree that you wish to record its position.
ClampZone menu will appear.

2 Click [Position]-[Record].
Position of the ClampZone will be recorded.

► 3.4.7.6 Resetting a ClampZone position

This section describes how to reset the set ClampZone position.

1 Right-click on the target ClampZone icon [ ] in the tree that you wish to reset its set position.
ClampZone menu will appear.

2 Go to [Position]-[Recover] in the menu.
Position of the ClampZone will be reset back to the position before change (Recorded position).

► 3.4.7.7 Renaming a ClampZone

This section describes how to rename the ClampZone.

1 Click on the ClampZone icon [ ] in the tree for the icon to be selected state.
Node of the ClampZone will be highlighted.

2 And left-click on it again.
Name of the icon will be in the editing state.

3 Input a name and press Enter.

Entered name will be set.

3.4.7.8 Copying a ClampZone

Use [Copy] feature to create duplicate ClampZone.
This section describes how to copy a ClampZone.

1 Right-click on the ClampZone icon [] in the tree.
ClampZone menu will appear.

2 Go to [Edit]-[Copy] in the menu.
There is no visible change when copy item is selected.

*

- [Ctrl+C] operation will do the same.

3.4.7.9 Cutting a ClampZone

Use [Cut] feature when moving the ClampZone location to a new location within the tree.
This section describes how to cut a ClampZone.

1 Right-click on the ClampZone icon [] in the tree.
ClampZone menu will appear.

2 Go to [Edit]-[Cut] in the menu.
There is no visible change when cut item is selected.

*

- [Ctrl+X] will do the same.

3.4.7.10 Pasting a ClampZone

Use [Paste] feature when moving the copied/cut ClampZone to a new location.
This section describes how to paste a copied/cut ClampZone.

1 Copy/Cut a target ClampZone by following the procedure described above.
There is no visible change at this point.

2 Right-click on the object icon where you wish to place the copied/cut ClampZone.
Menu of the selected object will appear.

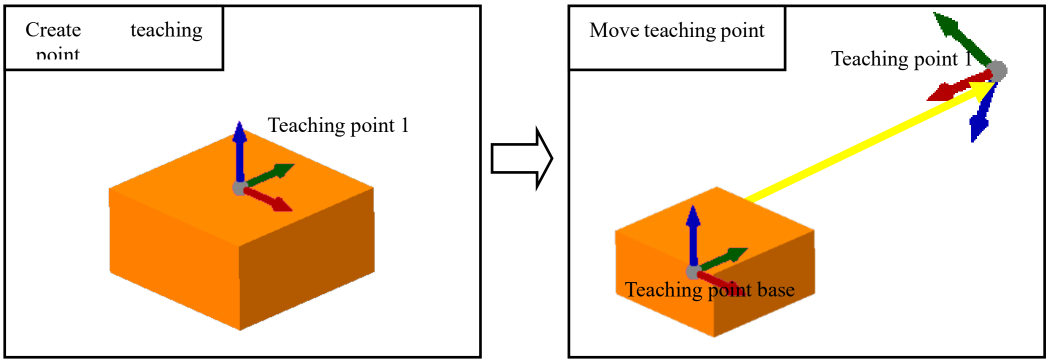
3 Go to [Edit]-[Paste] in the menu.
The copied/cut ClampZone will be added/moved to the location under the selected object.

*

- Local coordinate value as well as all settings set in the [Setup of ClampZone] dialog will be carried over.
- [Ctrl+V] will do the same.

3.4.8 Teaching Point

The teaching point is the coordinate serving as a reference of the tool end when the robot is operated. In K-ROSET, when selecting teaching point in layout, robot posture is automatically changed to match teaching point.
Character of teaching point is that base is created at the position where point is created. Teaching point base is for keeping information at the time of point creation and plane information of model is saved. Position of teaching point can be changed based on this teaching point base position. For example, when moving teaching point 1 like below, teaching point base is created on workpiece plane at the time of point creation.
When local is selected as position change dialogue, designate distance from that teaching point base.



- Teaching point base is not actually shown on the view.

This section describes the methods for adding teaching points and moving coordinates.
The procedure to start the teach mode is as follows.

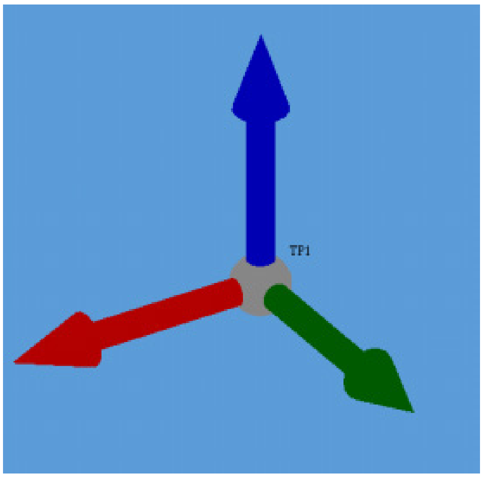
3.4.8.1 Add a teaching point

➢ **Specifying values to add a teaching point**

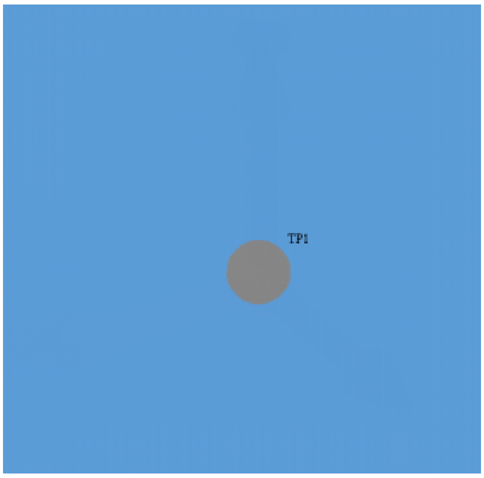
This section describes the procedure to specify values to add a teaching point

1 **In the tree pane, right-click the project icon [].**

2 **The project menu is displayed. Select [Add] -> [Point] -> [Assigned position].**
The reposition dialog box opens. Manually enter or use the slide bar to set each coordinate value.
Press the [Apply] button to reflect the settings. Then, press the [Close] button to close the dialog box.



Showing the origin



Hiding the origin

- **Adding a teaching point to the current values**

This section describes the procedure to add a teaching point at the current values located at the tool (arm) end.

1 **In the tree pane, right-click the project icon [ ].**

2 **The project menu is displayed. Select [Add] -> [Point] -> [Current Position].**

The teaching point will be added to the tool end (or the end of the robot arm when no tool is attached).

*
- Assuming that the robot has been added and the teach mode is selected.

- **Other adding methods of teaching point**

Adding teaching point can be done from some other applications.

Application	Operation
Teach panel	Click [Add teaching point]
View	Select model on the view while turning click teach ON
Auto program creation (3 points)	Click [Teaching point]
Auto program creation (Copy)	Click [Create]on[Teaching point auto creation settings]
Create teaching point from program	Drag program from program tab to layout
Teaching point posture	Set posture and add teaching point by other application.*

*
- *Function to change posture only.

3.4.8.2 Repositioning a teaching point

This section describes the procedure to change the position of a teaching point.

Double-left-click the added teaching point icon [ ] in the tree pane.
The position change dialog box will appear. Set each coordinate value by manually entering them or with the slide bar.

Press the [Apply] button to reflect the changed values, and press the [Close] button to close the dialog box

The reposition dialog box can also be displayed by double-clicking the teaching point in the view pane, or by selecting [Position] -> [Assigned Position] from the menu of the teaching point instead of double-left-clicking the teaching point icon.

► 3.4.8.3 Recording the position of a teaching point

This section describes the procedure to record the position of a teaching point.

1 **In the tree pane, select the teaching point to be recorded.**

2 **Right-click to display a menu, and select [Position] -> [Record]. The position of the teaching point is recorded.**

► 3.4.8.4 Resetting the position of a teaching point

This section describes the procedure to reset the position of a teaching point.

1 **In the tree pane, select the teaching point to be reset.**

2 **Right-click to display a menu, and select [Position] -> [Restore].**
The original position (recorded location) is restored.

► 3.4.8.5 Showing/Hiding a teaching point

This section describes the procedure to switch the display of a teaching point.

1 **In the tree pane, right-click the target teaching point.**

2 **A menu is displayed. Click on [View].**

3 **The check mark [

] indicates that the teaching point is being displayed.**

► 3.4.8.6 Deleting a teaching point

This section describes the procedure to add a teaching point.

1 **Select the teaching point to be deleted.**

2 **Right-click to display a menu, and select Delete.**

► 3.4.8.7 Copying a teaching point

This section describes how to copy a teaching point.

The teaching point can be selected for making the reproduction.

1 **Right-click the target teaching point icon [ ] in the tree pane.**

2 **The teaching point menu will be displayed. Select [Edit] -> [Copy].**

- It can be operated by < Ctrl+C > on the keyboard.

3.4.8.8 Cutting a teaching point

This section describes how to cut a teaching point.
The teaching point can be selected for moving.

1 **Right-click the target teaching point icon [ ] in the tree pane.**

2 **The teaching point menu will be displayed. Select [Edit] -> [Cut].**

- It can be operated by < Ctrl+X > on the keyboard.

3.4.8.9 Pasting a teaching point

This section describes how to paste a teaching point.
The cut or copied teaching point can be applied on the other object.

1 **Perform the above teaching point (copy or cut).**

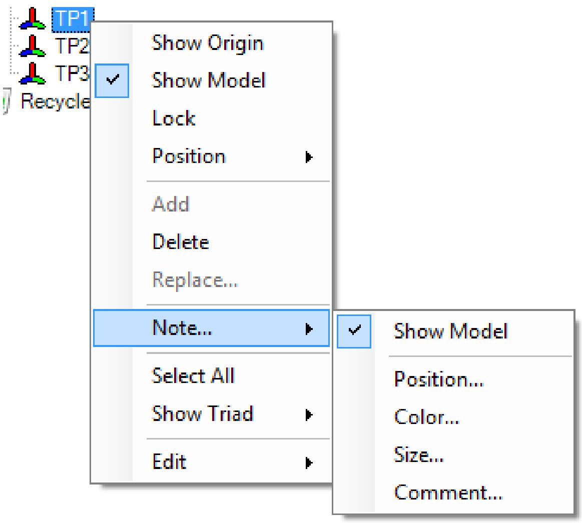
2 **Right-click the target object icon in the tree pane.**

3 **The teaching point menu will be displayed. Select [Edit]->[Paste].**

- Local coordinate is taken over.
- It can be operated by < Ctrl+V > on the keyboard.

3.4.8.10 Comment setting of teaching point

Characters displayed near the teaching point can be edited, and their format can be changed.
Each function of the comment menu of the teaching point is described below.
[Show Model] ......The display setting of the comment is changed. Default setting is to display the comment.
[Position ...] ......The display position of the comment is changed.
[Color ...] ......The color of the comment is changed. Default color is black.
[Size ...] ......The size of the comment is changed. Default is 10.
[Comment ...] ......The character of the comment is changed. Default is the same name as teaching point node.



3.4.9 Tool

This section describes how to handle tools. Tool is equipment to grasp and process workpieces which is used installing to robot flange. In K-ROSET, it automatically added in flange by loading tool model.

3.4.9.1 Adding a tool

➢ **Standard adding methods**

This section describes the procedure to add a tool to the robot.

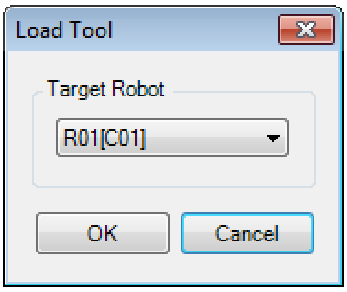
1 **In the tree pane, select [Tool] -> [Load] from the robot menu.**

2 **The file selection dialog box will appear. Select the target file, and press the [Open] button.**

➢ **Drag a file**

Tool can be added by dragging tool file （*.krprj） to the view.

Set screen of target robot when adding.

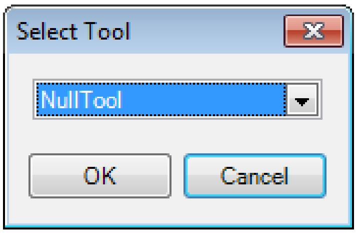


3.4.9.2 Attaching a tool

This section describes the procedure to attach the tool read in the robot.

1 **In the tree pane, select [Tool] -> [Attach] from the robot menu.**

2 **The tool selection dialog box is displayed. The read tool is displayed in the list box.**



3 **Select the tool to attach from the list box, and press [OK] button. The tool attached before change is released, and the selected tool is attached.**

3.4.10 Other Components

This section describes the method for arranging other components.

3.4.10.1 Add Group

The group is a component to group objects into a hierarchy.

This section describes the procedure to add a group.

1 **Select [Add] -> [Group] from the menu.**

User operations to attach/detach, copy, cut, paste and delete a group are equal to those of workpieces and obstacles.

- The operations of attach/detach, copy, cut, paste, and delete are the same operations as work/obstruction.

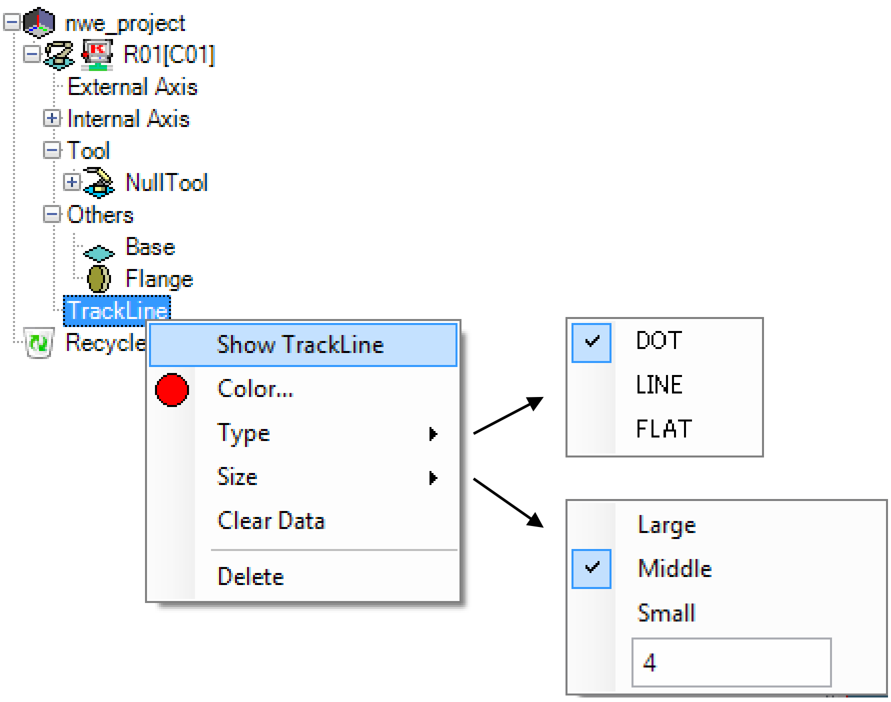
3.4.11 Track Line

This section describes the Track line of the end of the robot arm.

3.4.11.1 Track Line Setting

This section describes the procedure to display the Track line.

Right-click the [Track line] item located in the robot tree, and check that a check mark is placed at [Show Track Line]. In this case, the Track line is drawn when the end of the robot arm moves.



The functions of the Track line are described below.

[Color...]: Usable to change the color of the Track line.

[Type]: you can select dots or lines.

[Size]: you can specify the size of dot when selecting dots.

[Clear Data]: Usable to delete the Track line data.

After the Track line data are deleted, a new Track line is drawn when the robot arm has been moved.

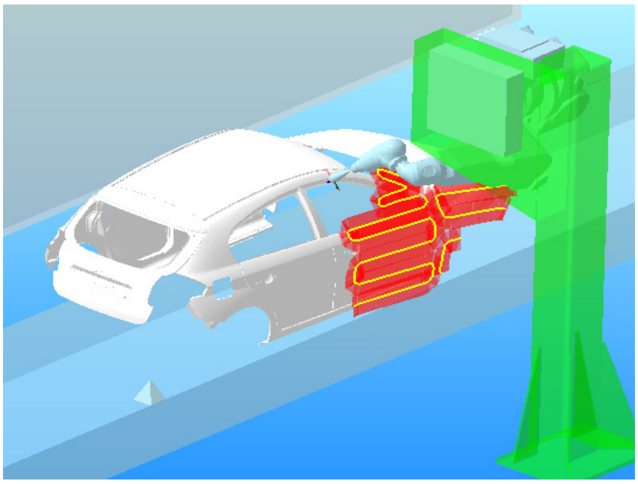
[Delete]: Usable to delete selected teaching points when there are multiple Track line items.

As functions other than above, Track line can be renamed in the same way as applied to the robot, or repositioned by double-clicking it.

* ● When keep displaying track line, K-ROSET motion gets slower as project data amount gets increased. Delete data periodically.

V1.8.0 allows user to select surface for trajectory display and that enables to check the state of painting. Adjusting the transparency enables to show the overlap of the painting.

* ● Surface angle will not be saved in the project. Execute the simulation again to draw the paining trajectory after loading the project.



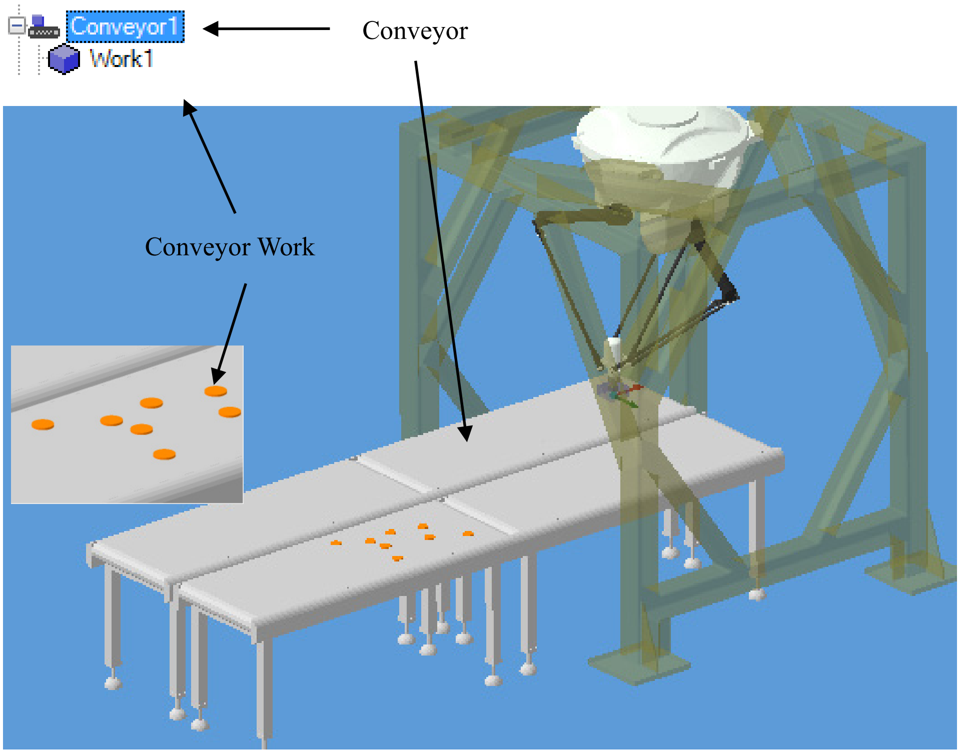
3.4.12 Conveyor

Conveyor and conveyor workpiece which is attached to the conveyor are required to be added to the project for the simulation with conveyor.

- Select a robot with a controller which supports conveyor axis. Create a robot with conveyor axis by using Wizard to Set External Axis or select one from the library for Painting application.

Conveyor work

Conveyor work is the workpieces for simulation with conveyor which has conveyor feature. Conveyor can transport workpieces by attaching the workpiece to the conveyor (allocate it as a child).



3.4.12.1 Add a conveyor model

This section describes how to add conveyors.

1 Right-click on the project icon [ ] in the tree in the Layout tab.
Menu dialog for the project will appear.

2 Go to [Add] – [Conveyor] in the dialog.
Select Shape File dialog will appear.

3 Select desired file to load and click on [Open].
Conveyor icon [ ] will be added to the tree and conveyor model will appear in the view.

- Conveyor can be added from the Conveyor settings dialog as well.

3.4.12.2 Change position of an created conveyor

This section describes how to edit the conveyor position.

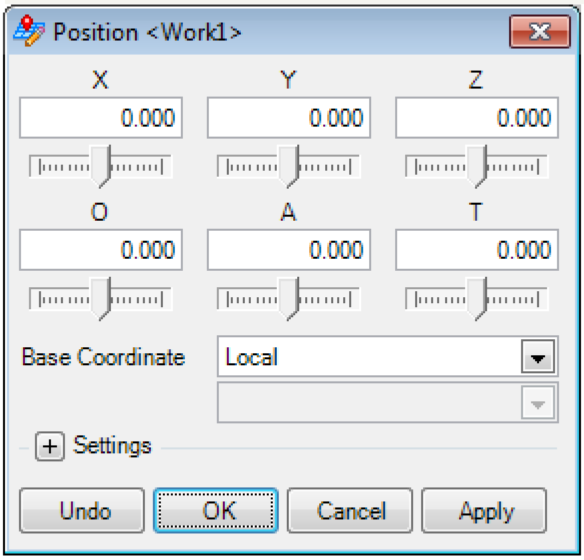
1 Double-click on the added conveyor icon [ ] in the tree.
Position dialog will appear.

2 Set each coordinate value by entering values or sliding the bar.
Model in the view will jump to the specified position.

- Model position does not change until the Enter button is pressed when value is entered in the column.

3 Click on [Apply] to reflect the changes and then click on [OK] to set the position.
Model position is set and the dialog will close.

- In order to open the Position dialog besides left-double clicking the conveyor icon, double click on the conveyor model on the view or access to the context menu of conveyor then select [Position] - [Change] will also open the dialog.



► 3.4.12.3 Delete a conveyor model

This section describes how to delete a conveyor model.

1 **Right-click on the conveyor to delete.**
Conveyor context menu will appear.

2 **Click on "Delete".**
A confirmation dialog will appear.

3 **Click on [OK] to the confirmation message.**
The target conveyor will be deleted from both Layout and view.

- Conveyor model can also be deleted via Conveyor settings dialog.

► 3.4.12.4 Record position of a conveyor model

This section describes how to record the conveyor position.

1 **Right-click on the desired conveyor icon [] in the tree to record the position.**
Conveyor context menu will appear.

2 **Click [Position]-[Record].**
The target conveyor position will be recorded.

► 3.4.12.5 Reset position of a conveyor model

This section describes how to reset the conveyor position.

1 **Right-click on the conveyor icon [] in the tree to reset its position.**
Conveyor context menu will appear.

2 **Click on [Position] – [Restore].**
It resets the conveyor position back to before the change (recorded position).

► 3.4.12.6 Replace a conveyor model

This section describes how to replace conveyor model.

1 **Right-click on the conveyor icon [] in the tree.**
Conveyor context menu will appear.

2 **Select [Replace] in the context menu.**
Select Shape File dialog will appear.

3 **Select a desired conveyor file to replace and click on [Open].**
The conveyor model will be replaced but the position stays the same.

► 3.4.12.7 Rename a conveyor model

This section describes how to rename the conveyor model.

1 **Click on the conveyor icon [ ] in the tree to be "selected" state.**
Conveyor context menu will appear.

2 **Left-click on the icon while it's in "selected" state.**
The conveyor name will be in the "editable" state.

3 **Type a desired name in and then press on Enter.**
Conveyor name will be renamed.

► 3.4.12.8 Save a Conveyor model

This section describes how to save the added conveyor.

1 **Right-click on the conveyor icon [ ] in the tree.**
Conveyor context menu will appear.

2 **Select [Save] in the context menu.**
Select Exporting File dialog will appear.

3 **Create a new folder to save a model to and select the model to save then click on [Save].**
{Specified conveyor name}.krprj file will be added to the destination folder.

► 3.4.12.9 Copy a conveyor model

Use copy function to copy a conveyor model.
This section describes how to copy a conveyor model.

1 **Right-click on the conveyor icon [ ] in the tree.**
Conveyor context menu will appear.

2 **Select [Edit] – [Copy] in the context menu.**
There's no visual reaction when [Copy] is selected.

*

- [Ctl+C] on keyboard has the same effect.

► 3.4.12.10 Cut a conveyor mode

Use [Cut] function to cut and paste a conveyor model to move in the tree.
This section describes how to cut a conveyor model.

1 **Right-click on the conveyor icon [ ] in the tree.**
Conveyor context menu will appear.

2 **Select [Edit] – [Cut] in the context menu.**
There's no visual reaction when [Cut] is selected.

- [Ctrl+X] on keyboard has the same effect.

3.4.12.11 Paste a conveyor model

Copied or cut conveyor model can be pasted to a desired location in the tree by selecting [Edit] – [Paste] in the context menu.
This section describes how to paste a copied/cut conveyor model in the tree.

1 **Either copy or cut a conveyor model by following the procedure above.**
There's no visual reaction when [Cut] is selected.

2 **Right-click on the object icon to paste the copied conveyor to locate underneath it.**
Context menu of the selected object will appear.

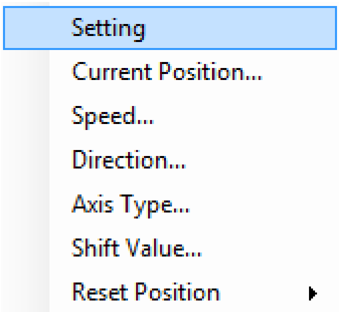
3 **Select [Edit] – [Paste] in the context menu.**
Copied or pasted conveyor model will be added or moved to below the selected object in the tree.

- Position coordinate of the copied model holds the same environment as the local model.
- [Ctrl+V] on keyboard has the same effect.

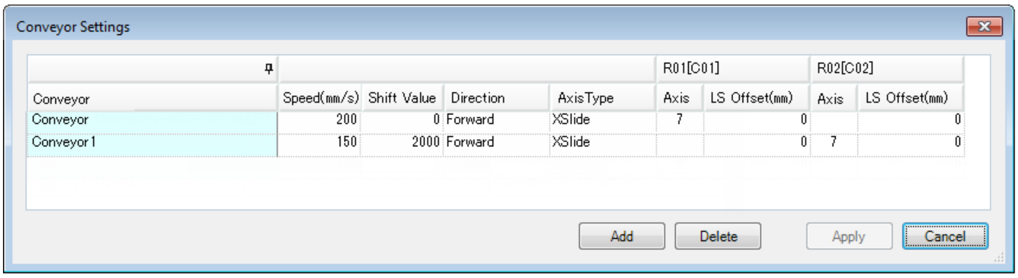
3.4.12.12 Conveyor settings

Conveyor Settings menu

Right-click on the conveyor work in the tree will display the conveyor context menu and accessing the Setting will let you add settings which cannot be set in the Conveyor Settings dialog.



➤ Conveyor setting



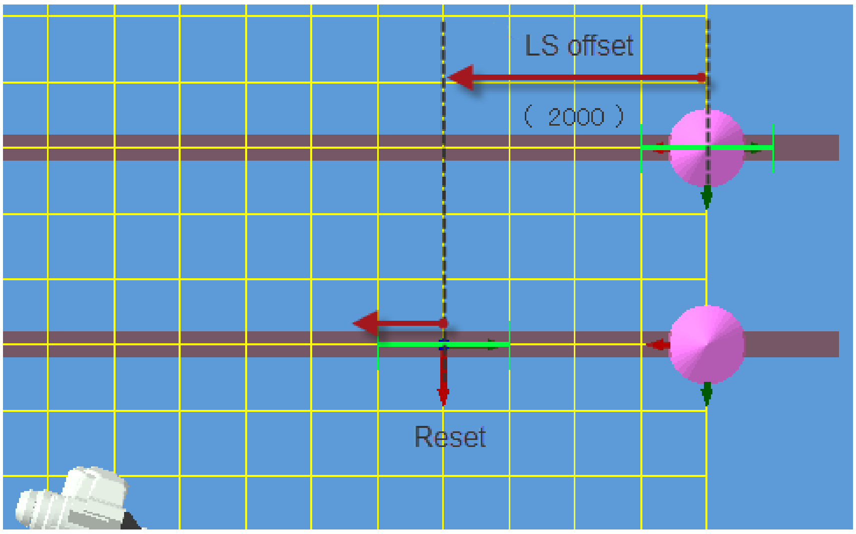
[Axis number]

Conveyor axis number can be set when a robot has conveyor axis. Setting a conveyor number will enable to transmit the conveyor axis value to the specified conveyor when simulating.

[LS offset]

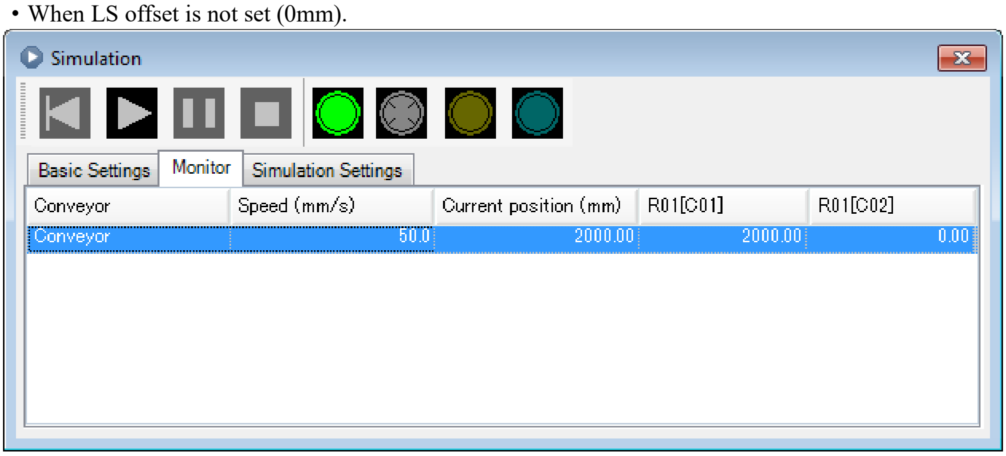
LS offset enables to set as assumption setting for a limit switch.

Conveyor value will be reset when the conveyor value reaches to the set LS value.



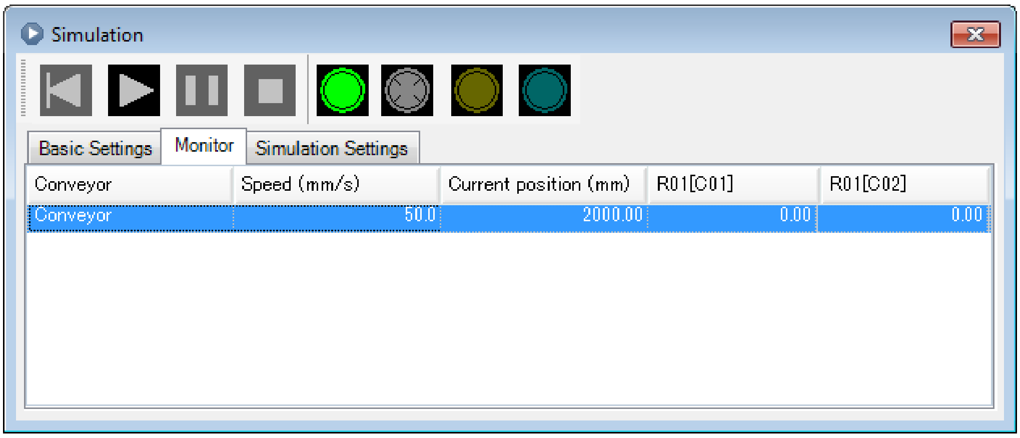
When LS offset is set to 2000mm, conveyor value against the robot will be reset to 0mm once conveyor value reaches to 2000mm.

• When LS offset is not set (0mm).



The current position of the conveyor and the robot are same.

• When LS offset is set to 2000mm.



Current value of the robot will be reset to 0mm when conveyor reaches to 2000mm.

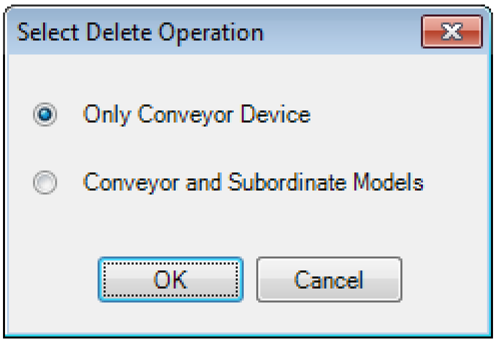
[Add]

[Add] button will open the Select Shape dialog to select a file for conveyor model.

[Delete]

Selecting a list to delete will bring up the Select Delete Operation dialog.

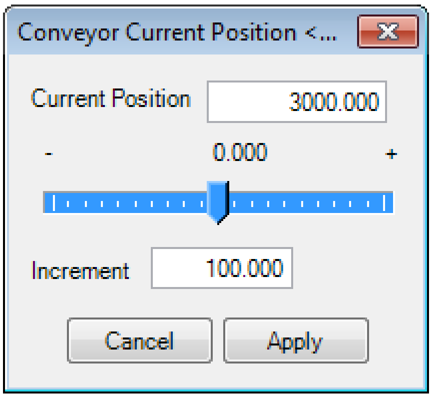
- Only Conveyor Device: Deletes only conveyor object. Conveyor work will not be deleted.
- Conveyor and Subordinate Models: Deletes both conveyor and the attached conveyor work.



- Accessing to the [Delete] in the context menu by right-clicking on the conveyor also allows you to delete an object. Be aware that this procedure is same as selecting the “Conveyor and Subordinate Models”.

Current position

Move a conveyor work to the specified conveyor moving direction by editing the conveyor value.



Speed

Speed can be set between 0 and 999[mm/sec].

Direction

Direction can be set either to Forward or Inverse.

Axis type

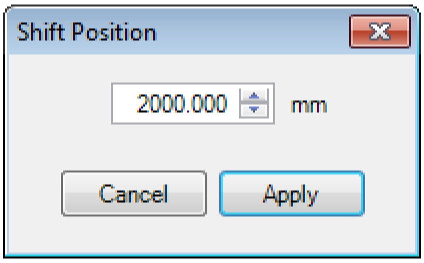
Axis can be set from XSlide (move along X axis), YSlide (move along Y axis) or ZSlide (move along Z axis). Axis direction is based on the world coordinate system.

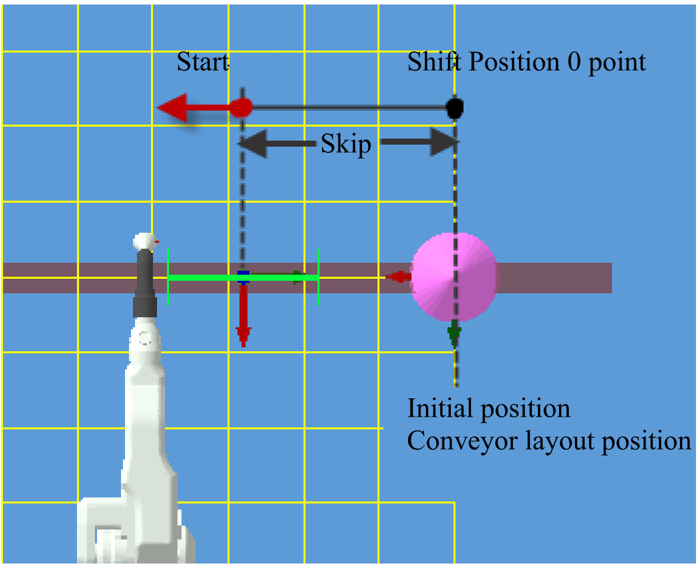
Shift Position

Sets the shifting amount of conveyor moving direction.
This function shifts conveyor position to allow user to start from the middle of a program to save simulation time.

The example shown below will omit the simulation from 0 to 2000 and starts from 2000mm when the program is executed.

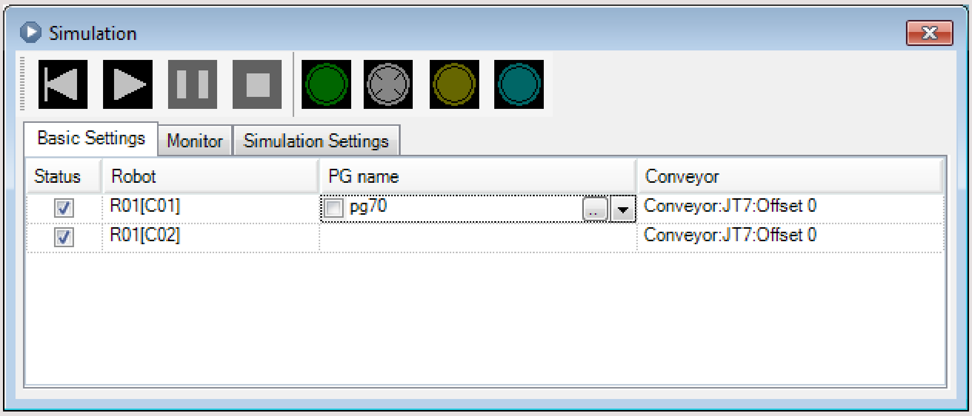
(Set Shift Position is set to 2000)



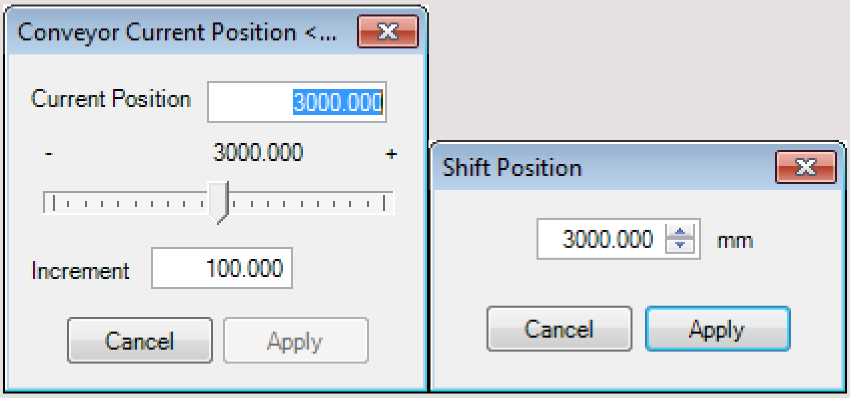


Relation between Shift Position and current position

Set shift position will be reflected to the current value when simulation is rewinded.



Conveyor current value will be 3000 when rewind button is clicked as the Shift position is set to 3000 here.

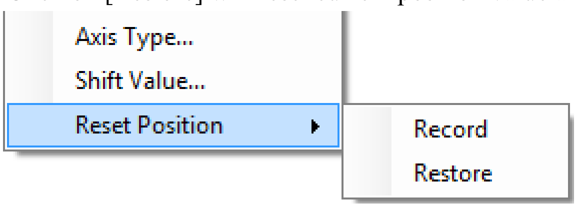


➢ **Reset Position**

This function enables to Record or Restore initial position of the conveyor work.

To record the position, click on [Record].

Click on [Restore] will reset current position value and restore the object to the registered position.



* Registered position will be the 0 of the conveyor value.

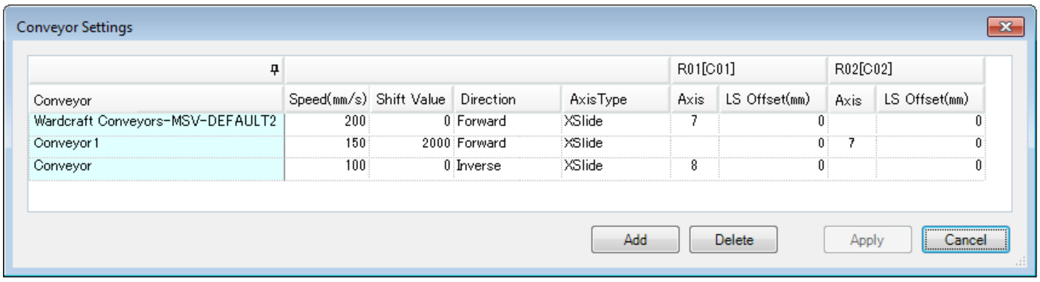
► 3.4.12.13 Conveyor operation settings

1 Right-click on the conveyor.
Context menu of the conveyor will appear.

2 Select [Settings] in the context menu.
Conveyor Settings dialog will appear.

3 Set Speed, Shift Value, Direction, Axis Type, Axis and LS offset for the target conveyor model and click on [Apply].
Entered value will be set.

- Speed: Speed can be set between 0 and 999[mm/sec].
- Direction: Direction can be set either to Forward or Inverse.
- Axis Type: Axis can be set from XSlide (move along X axis), YSlide (move along Y axis) or ZSlide (move along Z axis).



					R01[C01]		R02[C02]	
Conveyor	Speed(mm/s)	Shift Value	Direction	AxisType	Axis	LS Offset(mm)	Axis	LS Offset(mm)
Wardcraft Conveyors-MSV-DEFAULT2	200	0	Forward	XSlide	7	0		0
Conveyor1	150	2000	Forward	XSlide		0	7	0
Conveyor	100	0	Inverse	XSlide	8	0		0

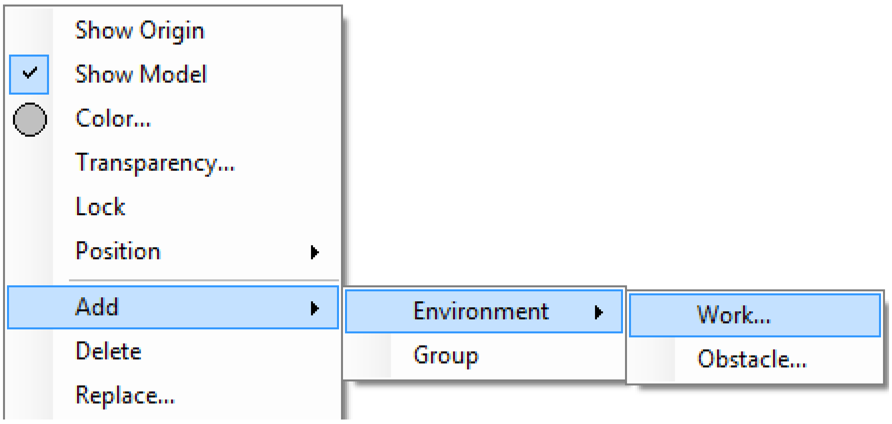
* Pair setting for robot and conveyor is necessary for V1.7.2 and later as this version is capable of adopting multiple robots to one project. Pair setting is set by setting the axis number in the Conveyor Settings dialog.

► 3.4.12.14 Add a conveyor work model

This section describes how to add a workpiece model to move on the conveyor.

➢ Add a model

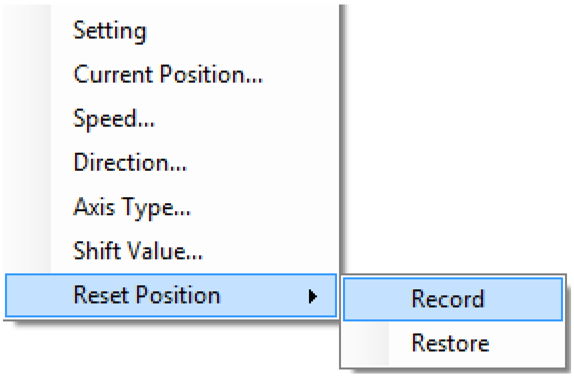
1 Right-click on the conveyor to access to [Add] – [Environment] – [Work].
Select shape file dialog will open.



2 **Add a workpiece model to move on the conveyor.**
Workpiece will be added to below the conveyor object in the Layout tab.

3 **Double-click on the workpiece model.**
Position dialog will appear.
Move the conveyor work to a position where to set as conveyor start position.

4 **Once position is set, record the position by accessing to [Reset Position] – [Record] in the context menu.**
The position will be registered as a conveyor start position.



➢ **Add teach points to a conveyor work model.**

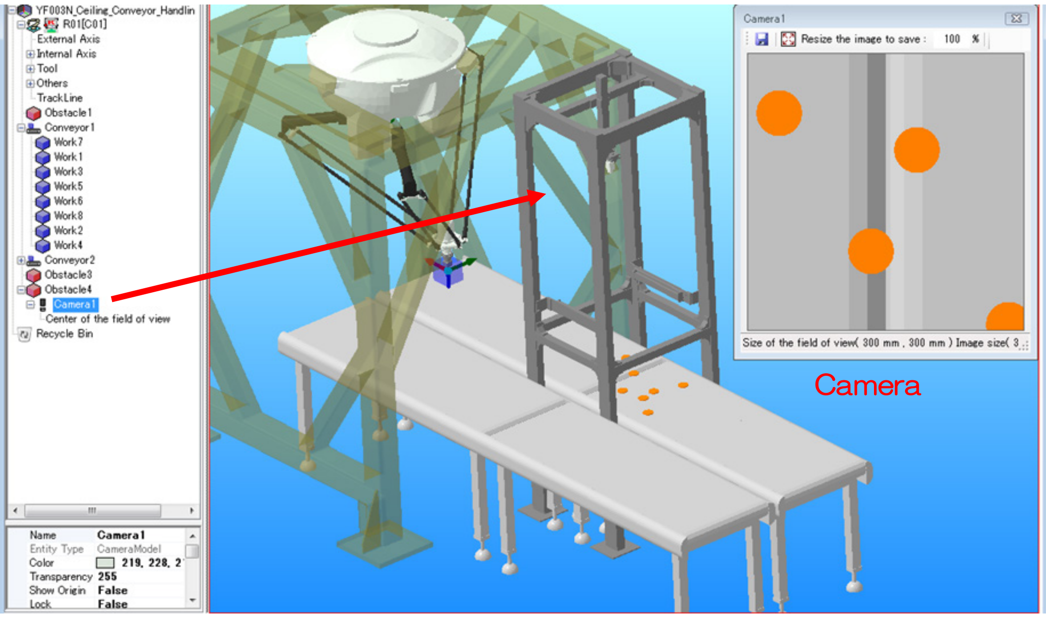
Teach points for the conveyor work model can be added in the same manner as adding teach points to a regular workpiece.

3.4.13 Camera

This section describes how to add camera to the project. Adding camera objects in the view allows user to see the camera's view in the simulation. And this feature is capable of linking to the image processing software, [K-VFinder] as well as the software designed to distribute data to multiple robot, [K-VAssist] and that allows user to simulate applications which involve workpiece position detection using a camera (Vision system).

*

- Note that the camera's view in the K-ROSET does not match to the actual camera.
- Both [K-VFinder] and [K-VAssist] are provided with the Kawasaki vision system.
- Simulation which involves vision system is available not only to the [K-Vfinder] user but to any K-ROSET user using this function.

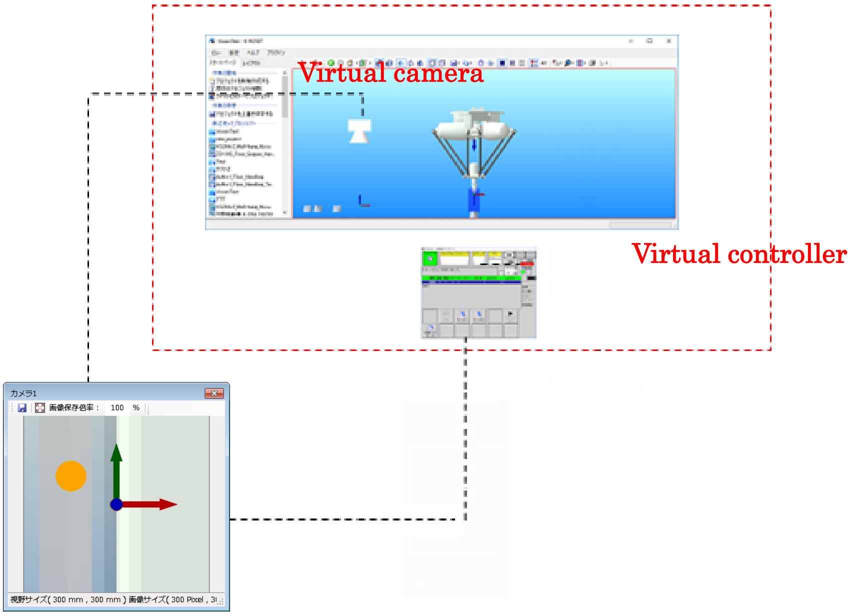


➢ **Vision System Configuration**

Following shows the available system configuration in K-ROSET. Configuration patterns are 4 patterns with the use or without use of K-VAssist and K-VFinder. Image recognition part will be done by detecting the workpiece position with the K-ROSET vision function instead when K-VFinder cannot be used.

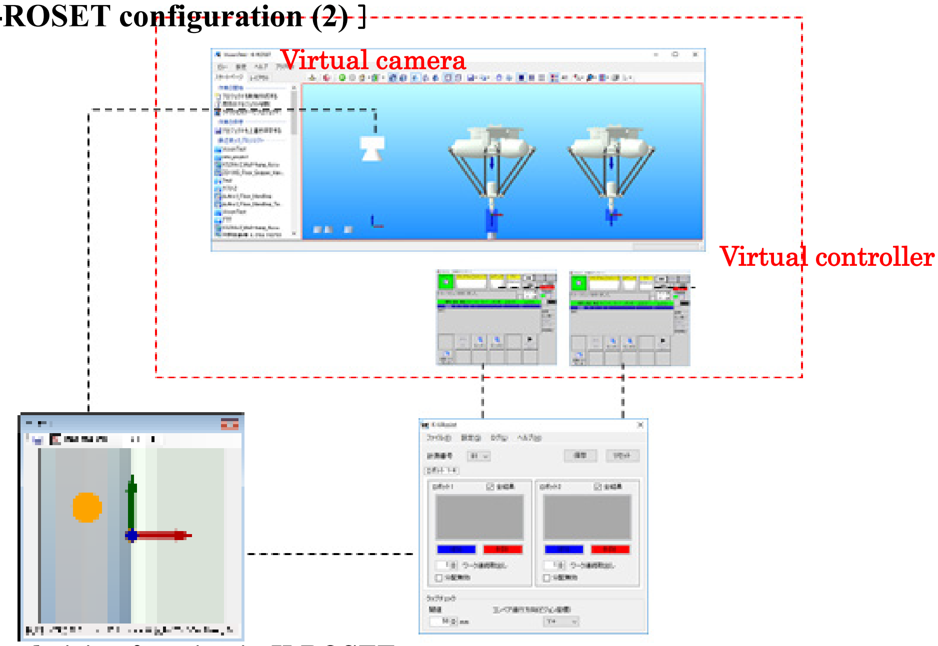
* This function also supports hand eye camera. Attach camera to a tool object in order to use as hand eye camera.

[K-ROSET configuration (1)]



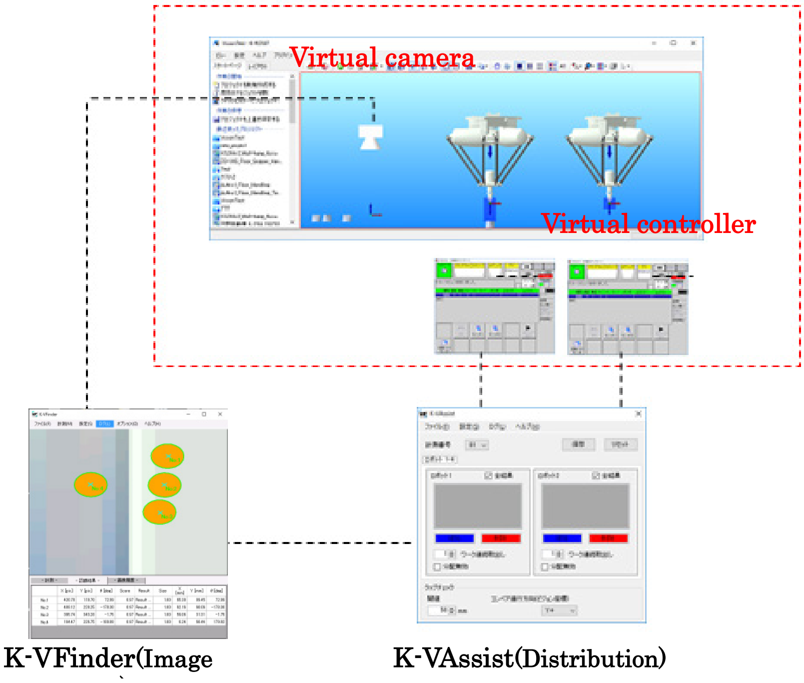
Virtual vision function in K-ROSET

[K-ROSET configuration (2)]

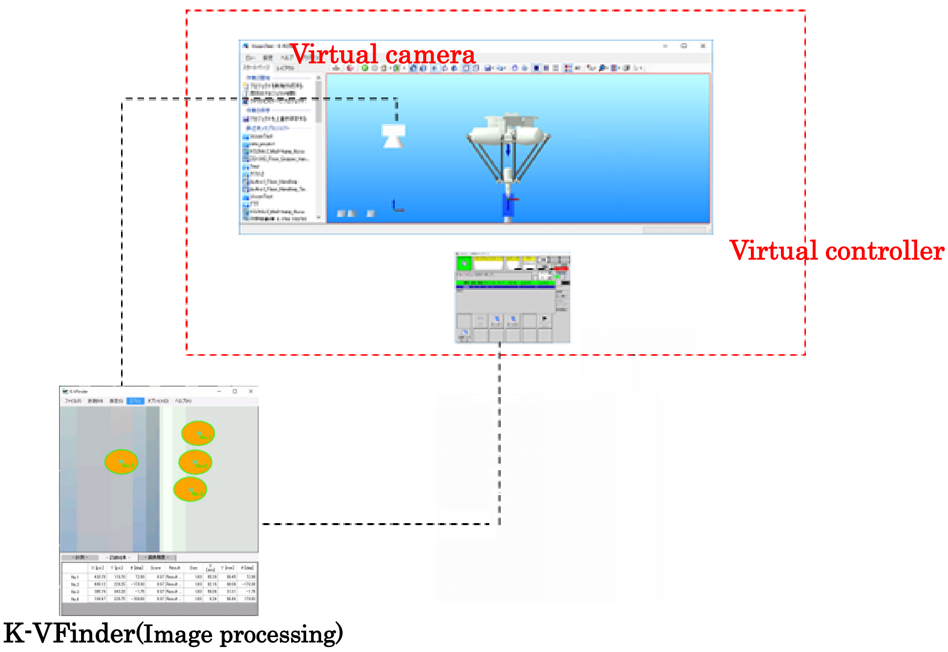


Virtual vision function in K-ROSET K-VAssist(Distribution)

[K-ROSET configuration (3)]



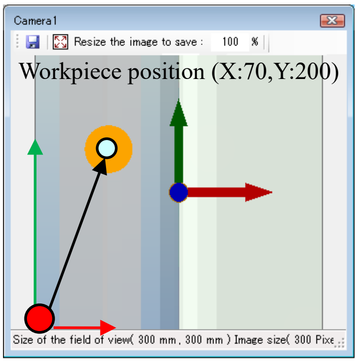
[K-ROSET configuration (4)]



➢ **Virtual vision function of K-ROSET**

K-ROSET detects the origin of the workpiece which is based on the left bottom of the camera's field of view (Camera's reference point) when received a certain character in UDP communication. (It returns the first teaching point when teaching points are attached to the workpiece.)

Arrows in the figure below indicates the following directions.
Red: X, Green: Y, Blue: Z



Camera's reference point

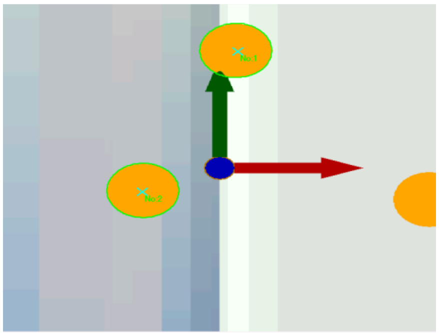
K-ROSET returns the workpiece origin from the camera's reference point when [ViS,1,1] is sent to the K-ROSET in UDP communication.
[OK,1,][001,70,200,0,]
In the[]shall be 32 characters in left-aligned with no space.

It returns the value with conveyor No. in the head when [MES,1,1,1,150,] is sent.

[OK,1,][1,001,70,200,0,]

- It may differ from the recognition result of the K-VFinder as it detects the workpiece origin.
- UDP communication of the virtual vision is only available while cycle is ON.

Since vision function in K-ROSET detects the target when workpiece origin is in the camera's field of view, number of the detected items in the figure below will be 3. However, as the pattern match feature of the K-VFinder may not detect the target depends on the set pattern even though the center of the workpiece is in the camera's field of view, number of the detected items in the figure below may be appear as 2.



- This function is not capable of handling more than 2 robots like K-VAssist. K-VAssist is required for the simulation which uses multiple robots. This function does not have sorting feature to the multiple robots like K-VAssist.

3.4.13.1 Add camera

This section describes how to add camera object to a project.

1 Right-click the project icon [ ] in the directory tree.
Drop down menu of the project will appear.

2 Select [Add] – [Camera] in the drop down menu.
Open file dialog will appear.

3 Select the target file to read and click [Open].
Camera icon [ ] will be added to the directory tree in the left part of the screen and a camera model will appear in the view.

- Add a camera to the tool object for hand eye camera.

► 3.4.13.2 Change installed camera position

This section describes how to change the position of the installed camera.

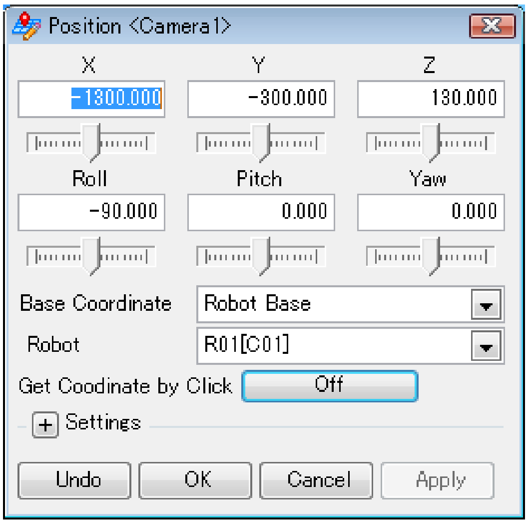
1 **Left double click on the added camera icon [ ] in the directory tree.**
Position dialog will appear.

2 **Set each coordinate by entering values in the input field or sliding the bar.**
Model on the view will move.

- When value is entered to move the model, model will jump to the position when Enter is pressed.

3 **Click [Apply] button to reflect the set values and then click [OK] button.**
Position is defined and closes the dialog.

- Instead of left-double clicking the camera icon, double click on the camera model in the view or go to [Position] - [Edit] from the camera menu will also open the Position dialog.



► 3.4.13.3 Delete camera

This section describes how to delete camera object.

1 **Right-click on the camera to delete.**
Drop down menu of the camera will appear.

2 **Click on [Delete].**
A confirmation dialog will pop up.

3 **Click on [Yes] to the message.**
Camera object will be deleted from the view in the layout.

► 3.4.13.4 Record camera installation position

This section describes how to record installation position of the camera.

1 **Right-click on the desired camera icon [ ] to record its position in the directory tree.**
Drop down menu of the camera will appear.

2 **Select [Position] – [Record].**
Camera's position will be recorded.

► 3.4.13.5 Reset installation position of the camera

This section describes how to reset the installation position of the camera.

1 **Right-click on the target camera icon [ ] to reset its position in the directory tree.**
Drop down menu of the camera will appear.

2 **Select [Position] – [Restore] in the menu.**
The changed position will be reset back to previous position (Recorded position).

► 3.4.13.6 Replace a camera

This section describes how to replace the camera model.

1 **Right-click on the camera icon [ ] in the directory tree.**
Drop down menu of the camera will appear.

2 **Click [Replace] in the drop down menu.**
Open file dialog will appear.

3 **Select desired camera file to replace and click on [Open].**
Camera model will be replaced in the same position.

► 3.4.13.7 Change name of a camera

This section describes how to change the camera name.

1 **Click on the camera icon [ ] in the directory tree to be in the selected state.**
Camera menu will appear.

2 **Left-click on the icon again.**
Camera name will be in the editable state.

3 **Input the name to change and press Enter.**
The name will be set.

► 3.4.13.8 Save a camera

This section describes how to save a camera model.

1 **Right-click on the camera icon [ ] in the directory tree.**
Drop down menu of the camera will appear.

2 **Select [Save] in the drop down menu.**
Save file dialog will appear.

3 **Select the target camera and destination folder to save and click on [Save].**
{Specified name}.krprj file will be created in the destination folder.

► 3.4.13.9 Copy a camera

This section describes how to copy a camera model.

1 **Right-click on the camera icon [ ] in the directory tree.**
Drop down menu of the camera will appear.

2 **Select [Edit] – [Copy] in the menu.**
Nothing happens when you attempt to copy the model.

- [Ctrl+C] on the keyboard will do the same.

► 3.4.13.10 Cut a camera

Use "Cut" to move the camera model to another directory tree.
This section describes how to cut a camera model.

1 **Right-click on the camera icon [ ] in the directory tree.**
Drop down menu will appear.

2 **Select [Edit] – [Cut] in the drop down menu.**
Nothing happens when you attempt to cut the model.

- [Ctrl+X] on the keyboard will do the same.

3.4.13.11 Paste a camera

Locate the copied or cut camera object to underneath the desired model.
This section describes how to paste a camera model.
Click [Edit] – [Paste] in the drop down menu of the target object.

1 Copy/Cut a camera model by following the procedure in the previous section.
Nothing happens at this point.

2 Right-click the target object icon to locate the copied camera under.
Drop down menu will appear.

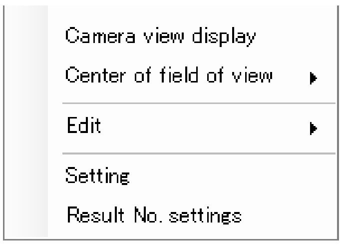
3 Select [Edit] – [Paste] in the menu.
The copied/cut camera model will be added/moved to under the selected object.

- Local coordinate is copied to the pasted model.
- [Ctrl+V] on the keyboard will do the same.

3.4.13.12 Camera settings

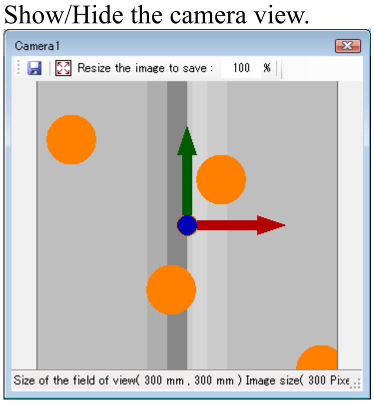
Camera Settings menu

Right-click on a camera in the tree will open the drop down menu of the camera.



Show camera view

Show/Hide the camera view.



[Save]
Save the image shown in the camera view.

- File path to automatically store the images when connected to the K-VFinder.

[Auto resize]
Image in the view will also be zoomed or zoomed out accordinly when camera view window is changed with it’s ON.

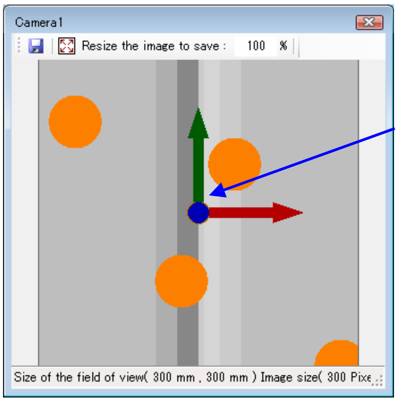
* Area of the camera’s field of view does not change.
* Auto resize is disabled when using K-VFinder as the resolution affects the detection result.

[Image save magnification]
Value of the pixel and mm will be 1:1 when it’s set to 100%. Changing the maniginification enables to save the image in high resolusion.

* Adjust the magnification by checking the size of the field of view and the image size appear in the left bottom of the window.

Center of the field of view

This will be the reference position of the field of view.
Camera’s filed of view will be decided based on this point.



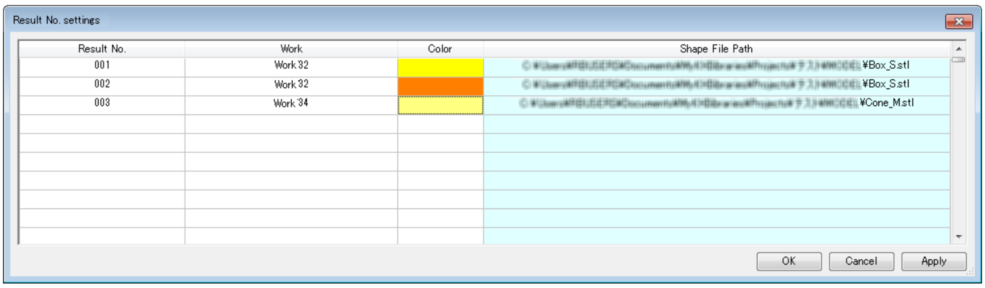
Center of the field of view

Result No. settings

Result No. of the workpiece (indicated in red) which is returned from the vision function of the K-ROSET can be edited.

[OK,1,][001,70,200,0,]

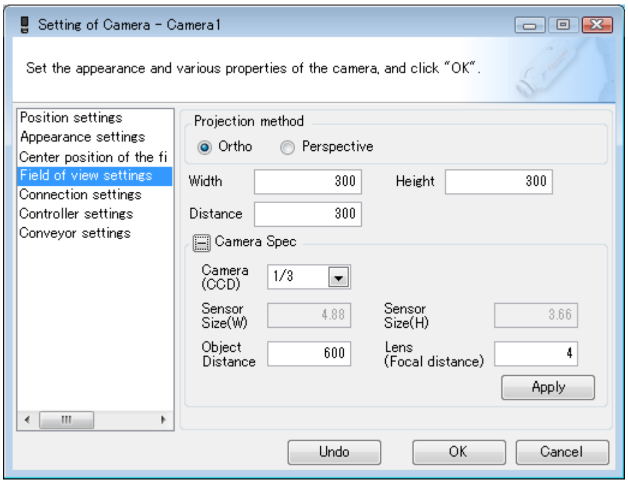
No. will be set based on the workpiece color or the STL type.
From 001 through 999 can be set and entering 000 will clear the settings.



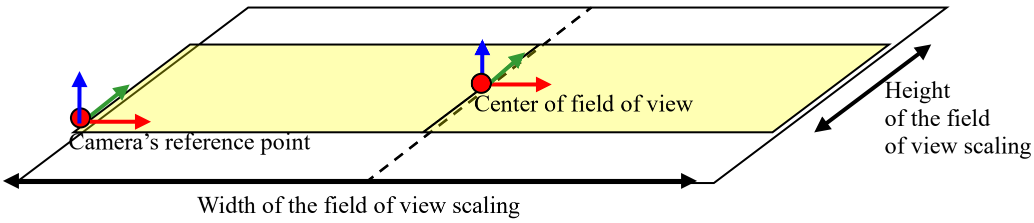
* Result No. for all the workpieces which are not set will be [001].

➢ Settings

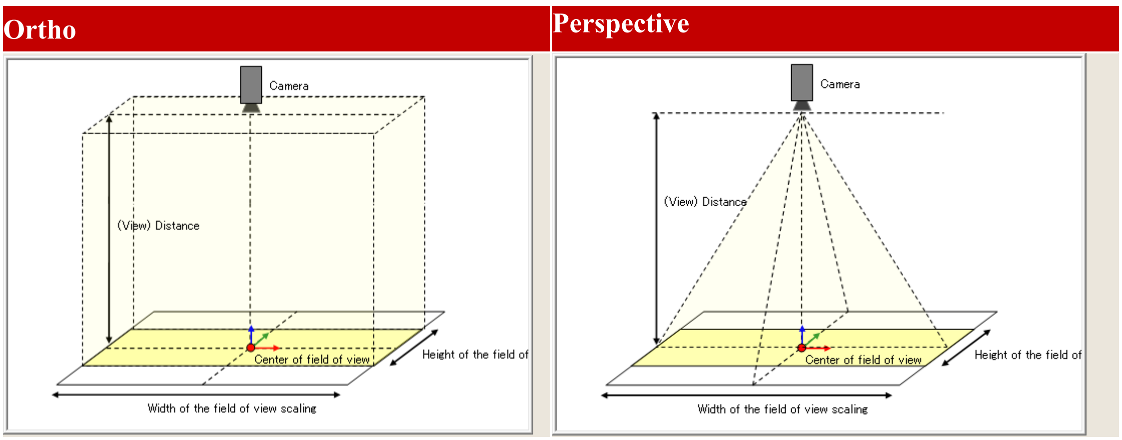
[Field of view settings]



Set the area of the camera's field of view (height and width) and view distance (mm).



* View distance is the parameter which decides the angle from the camera to the view at the time of perspective projection.



Camera specification

Entering the CCD size or the distance from target to camera of the actual camera enables to enter the [Width of the field of view] and [Height of the field of view] automatically.

* Sensor size can be set directly when [The other] is selected to CCD size.

CCD size and the focal distance which are registered in the K-ROSET are as follows.

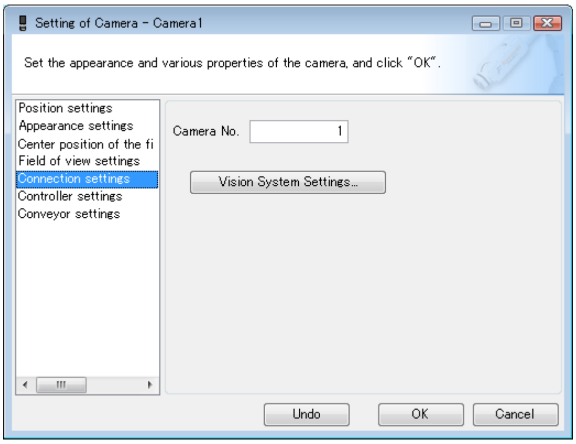
CCD size	Sensor size (W)	Sensor size (H)
1	11.26	11.26
1/1.8	7.16	5.44
1/2.5	5.70	4.28
1/3	4.88	3.66
2/3	11.26	5.98
1/4	3.69	2.77
The other	Direct input enabled	Direct input enabled

Focal distance									
4	4.2	4.8	5	6	6.5	8	8.5	10	12
12.5	15	16	20	25	30	35	50	75	

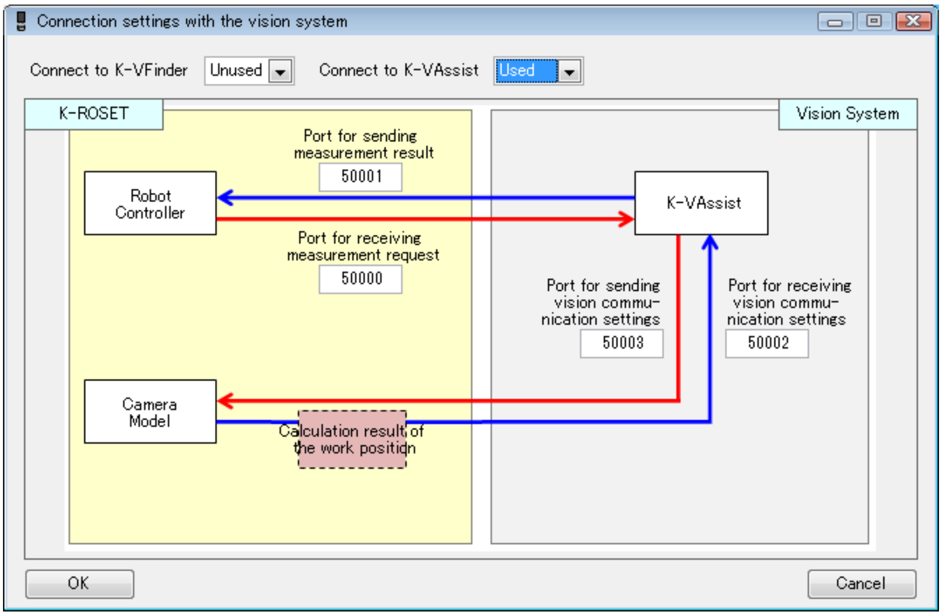
Warning

View image and the actual image are never the same even though the same settings are set.

[Connection settings]

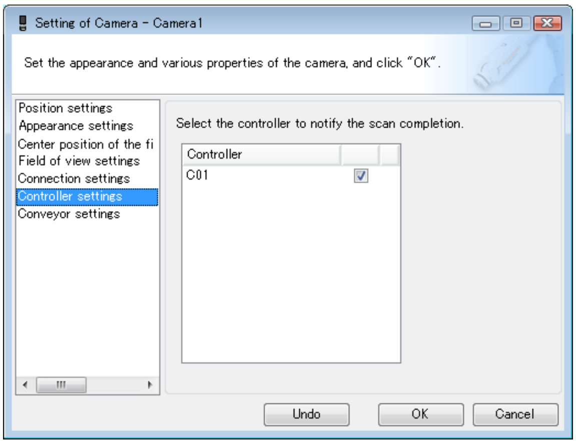


Set the camera No. and set the configuration of the vision system.
The configuration patterns are 4 patterns depends on the use or not use of the K-VAssist and K-VFinder as mentioned in the earlier section.



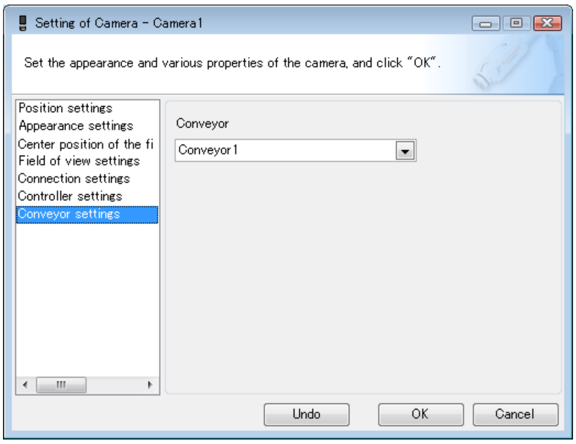
[Controller settings]

Set the pair of controller and camera. Conveyor reset signal of the robot controller turns ON when the camera received UDP data.



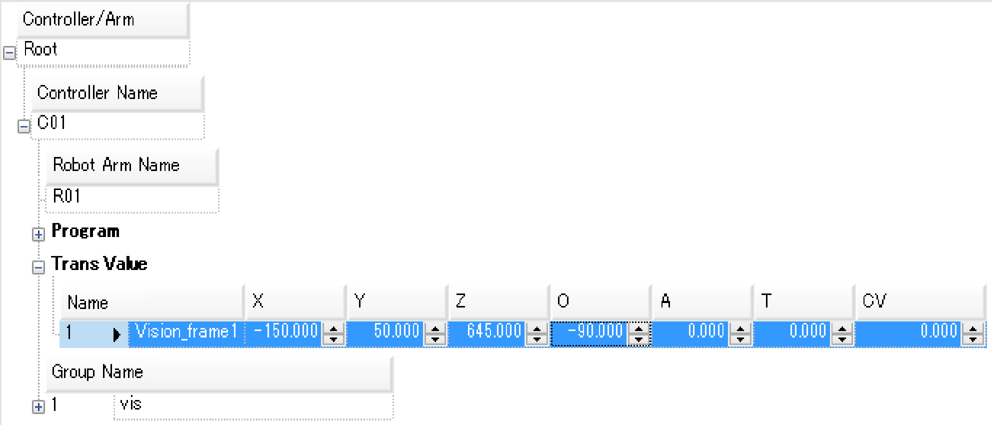
[Conveyor settings]

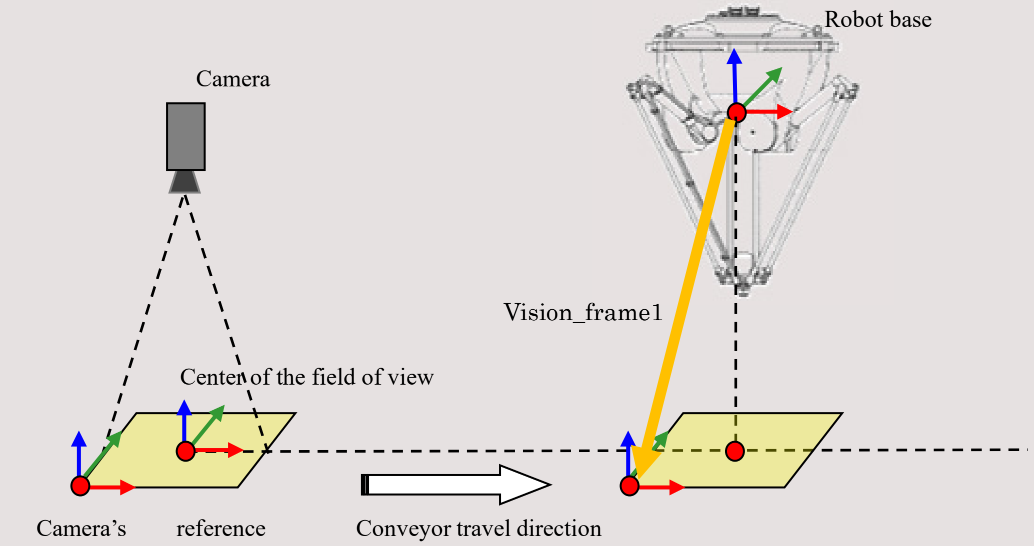
Set the pair with a camera in order to set the conveyor reset signal as well as the Vision frame. And the Virtual vision function detects the conveyor workpiece which is in the camera's field of view when conveyor is allocated to camera object.



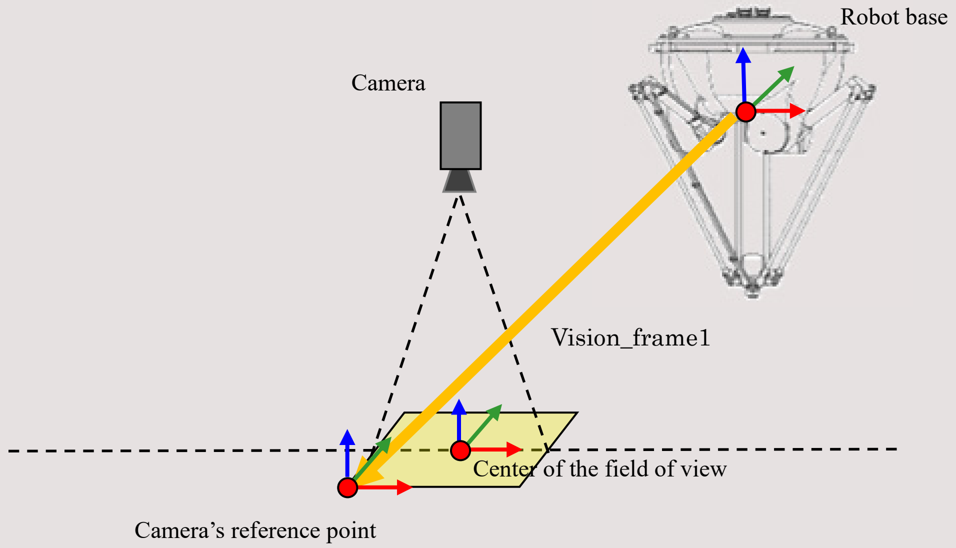
Vision frame

This chapter describes Vision frame which is created at the calibration of the camera and robot. K-ROSET automatically calculates the coordinate system [Vision_frame1] to use for AS application by deciding the system configuration and register to the program table.
Change the value in [Vision_frame1] if necessary.



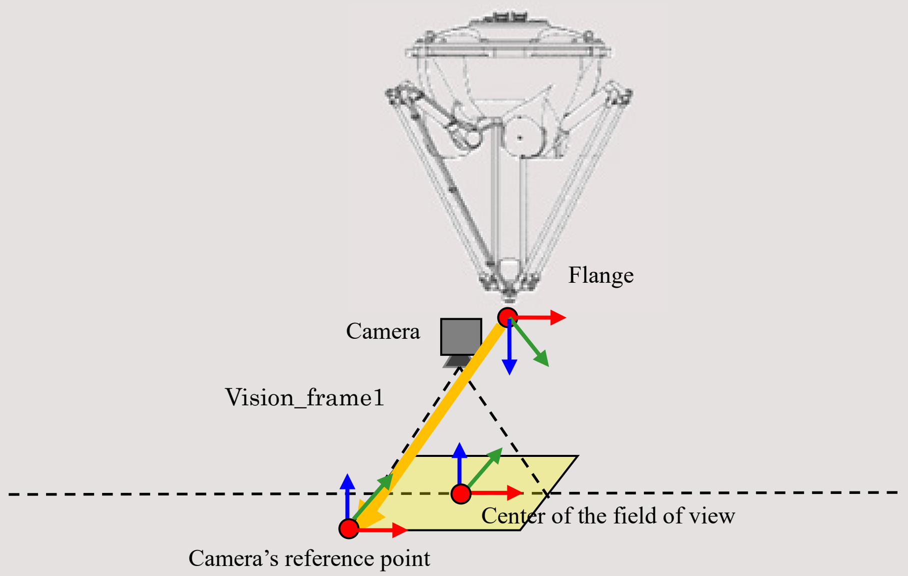


◆With conveyor
The position which is projected to the robot as [Vision_frame1] by automatically calculating the relation between the center of camera's field of view and camera's reference point will be registered for the system which involves conveyor synchronization.



◆Without conveyor

The [Camera’s reference point] which is seen from the robot base coordinate will be registered as [Vision frame] for the system which does not involves conveyor.



◆Hand eye

The [Camera’s field of view] which is seen from the flange position will be registered as [Vision frame] for the system that camera is attached to the robot hand.

3.4.14 Batch Operation

Operation can be applied to multiple objects at once. Batch operation is described in this section.

This operation is effective in recording/restoring positions and showing/hiding origins and showing/hiding.

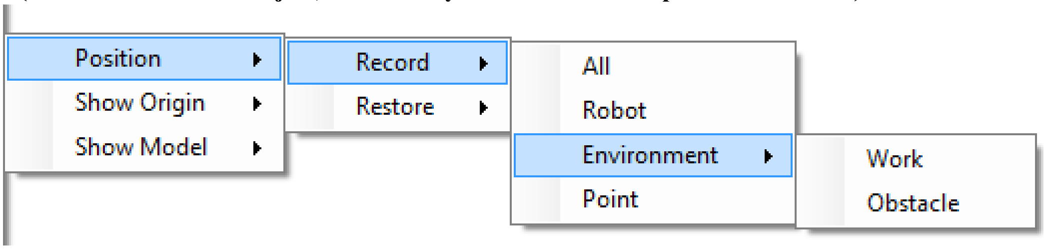
► 3.4.14.1 Recording positions by batch operation

This section describes the procedure to record positions by batch operation.

1 **In the tree pane, right-click the project icon [].**

2 **A menu will be displayed. Select [Batch Operation] -> [Position] -> [Record].**

3 **A list is displayed. Select the target items.**
(For Environmental Object, additionally select either Workpiece or Obstacle.)



The procedure to reset positions by batch operation is as follows:

► 3.4.14.2 Restoring positions by batch operation

1 **In the tree pane, right-click the project icon [].**

2 **A menu will be displayed. Select [Batch Operation] -> [Position] -> [Restore].**

3 **A list is displayed. Select the target items.**
(For Environmental Object, additionally select either Workpiece or Obstacle.)

► 3.4.14.3 Switching show/hide display of objects and origins by batch operation

This section describes the procedure to show/hide objects and origins by batch operation.

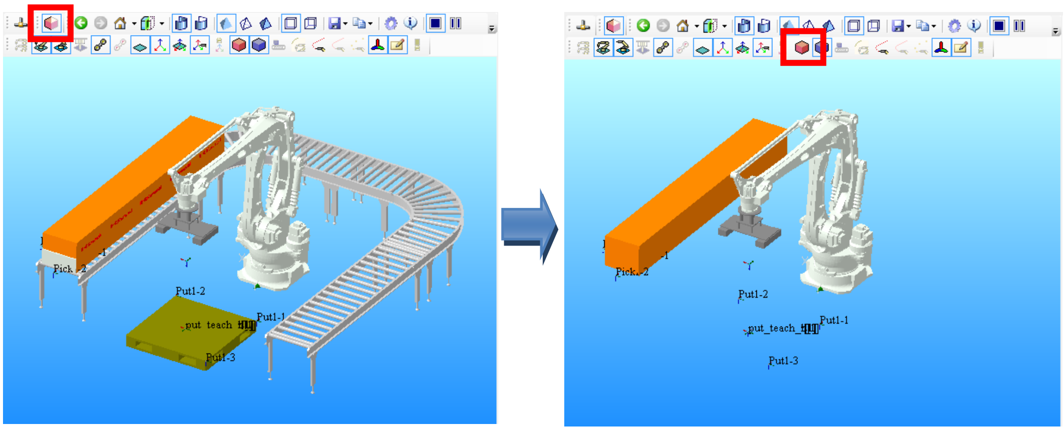
1 **In the tree pane, right-click the project icon [].**

2 **A menu will appear. Select [Batch Operation] -> [View Origin] or [Batch Operation] -> [View].**

3 **A list will be displayed. Select the target items for batch operation.**
(For Environmental Object, additionally select either Workpiece or Obstacle.)

➢ **Show/Hide by item**

This feature is added V1.8.0 which enables to show/hide the models in the view by item.



* When hiding robot or tool, all attached objects under it will also be hidden.

3.4.15 Transformed value

3.4.15.1 Modifying a Base trans

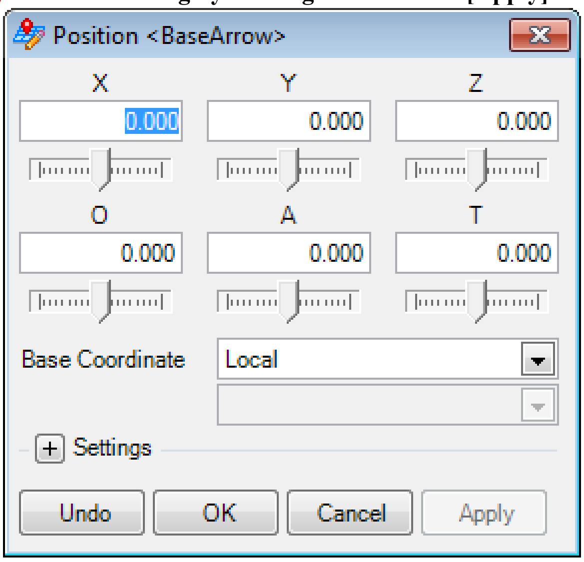
The method for changing the base trans performs the following procedure.

Select the robot from tree pane.

1 **A menu will be displayed. Select [Base Trans] -> [Setting].**

2 **The Base Trans dialog box will appear. Input the value in the space.**

3 **Close the dialog by clicking the button of [Apply].**



► 3.4.15.2 Show/hide a Base trans

The method to show or hide the base trans performs the following procedure.

1 **Select the robot from tree pane.**

2 **A menu will be displayed. Select [Base Trans] -> [Show].**

* The check mark [✓ Show Model] indicates the state of showing.

► 3.4.15.3 Modifying a Tool trans

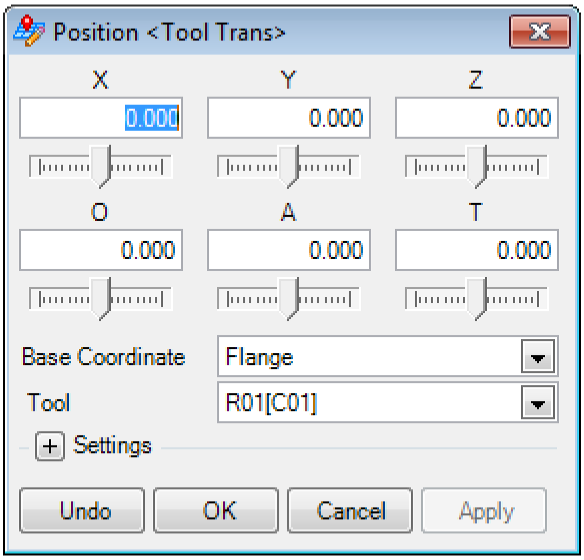
The method for changing the tool trans perform the following procedure.

1 **Select the tool from tree pane.**

2 **A menu will be displayed. Select [Tool Trans] -> [Setting].**

3 **The Tool Trans dialog box will appear. Input the value in the space.**

4 **Close the dialog by clicking the button of [Apply].**



► 3.4.15.4 Show/hide a Tool trans

The method to show or hide the tool trans perform the following procedure.

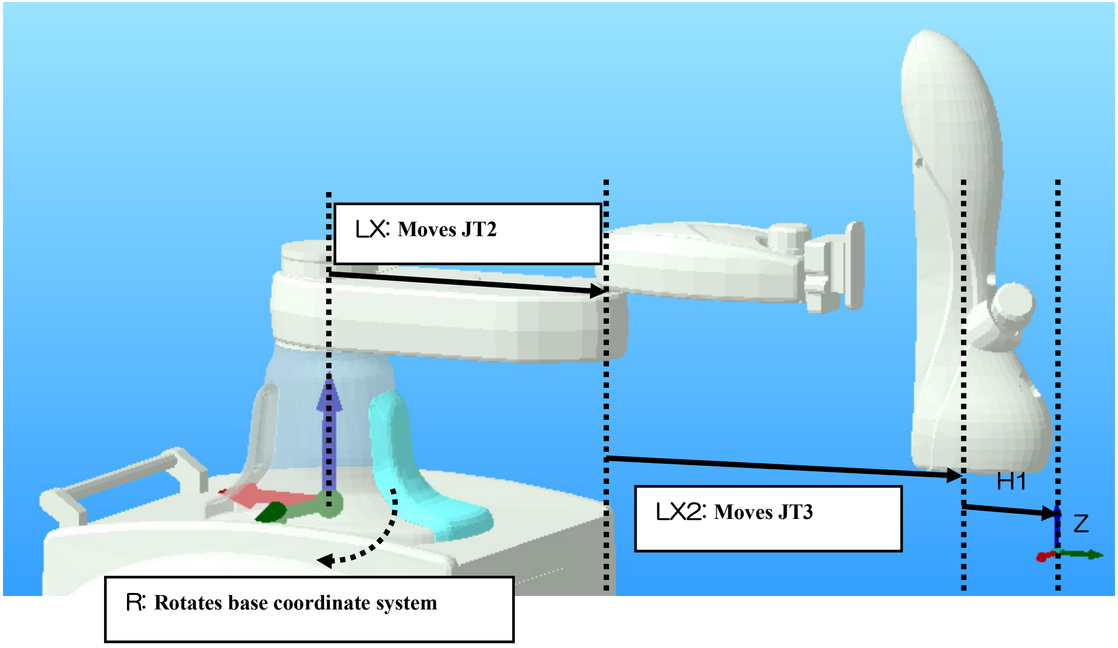
1 **Select the robot from tree pane.**

2 **A menu will be displayed. Select [Tool Trans] -> [Show].**
The check mark [✓ Show Model] indicates the state of showing.

3.4.16 Link function [duAro]

3.4.16.1 Link

Length of each joint can be changed when the selected robot is link type duAro.
Since link type robot cannot use tool transformation value, adjust tool reference arrow by adjusting each joint length, H1 (as tool transformation value cannot be used) and Z parameter.

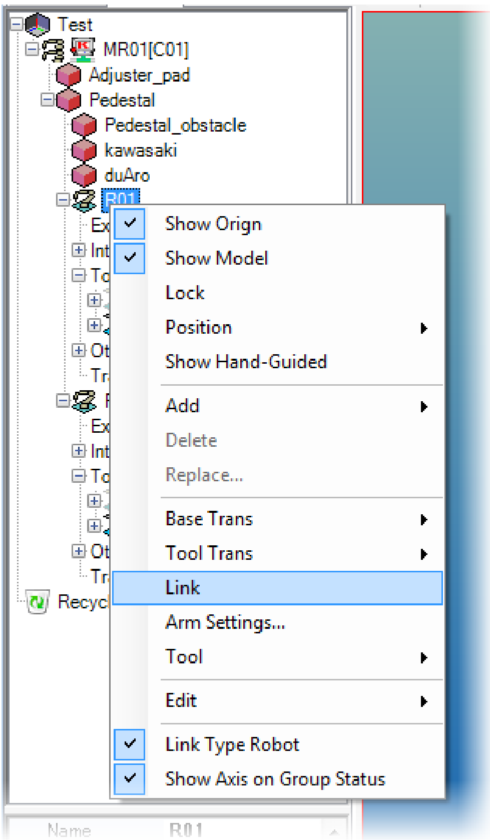


Caution

Currently 100mm extended upper arm (LX2500) is available as an option. Please note that arms for other length are not available.

1 **Right-click on the R01 robot icon [ ] in the layout and select [Link].**

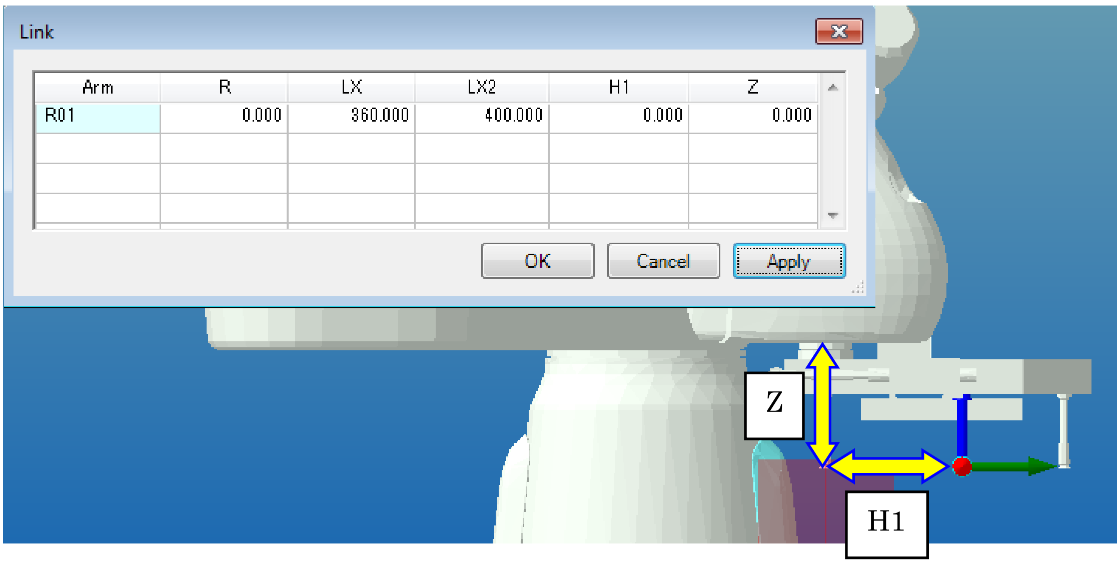
Link dialog will appear.



2 **Edit the value for H1 and Z.**

Tool arrow position will change.

H1 is the parameter to shift the tool arrow from the flange to Y direction.

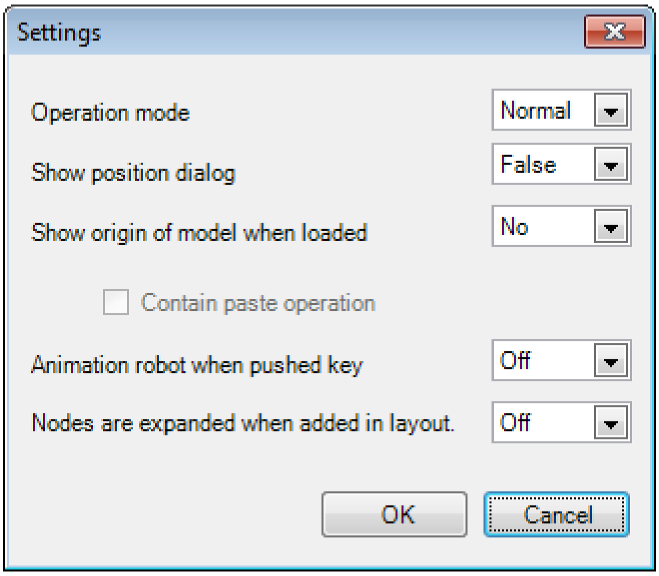


* Z axis can be set in the Link dialog only when the controller model is earlier than 09200023.

3.4.17 Project Setting

Right-click on the project name of the layout tab to show the menu, and then select [Setting].

The project setting is described.



- Operation mode

  Standard mode and editor mode are switched. The applied function can be used in the editor mode.

* See below for the editor mode.

- Show Position dialog

  The position change dialog is automatically opened when a model is added.

- Show origin of model when loaded

  The model origin is displayed when a model is added and a project is read.

  [Pasting operation included] ...This setting is applied for [Edit] - [Paste] operation.

- **Animation robot when pushed key**

  When selection of the teaching point is switched in tree of the layout tab with the up and down keys on the keyboard, the setting for changing robot posture on a view is carried out.

- **Expand the nodes when object is added to the layout**

  Adding an object which has tree structure to the layout will be appeared in the layout with the child object shown.

- **Teaching point name**

  Specify the initial settings to add teaching points. Position of the [*] in the name to sequentially increment the number can be specified by the user.

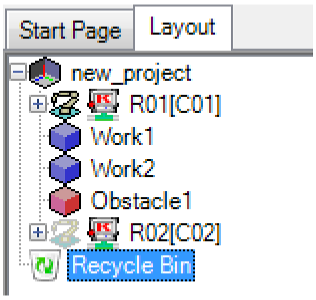
  Default is set to [TP*] and the name will be TP1, TP2, TP3… every time teach point is added to the program.

* Available characters in the input field are capital alphabet letter, lower-case letter, digit, period, under bar, and brackets[,].
* Up to 15 characters excluding [].

3.4.18 Layout Recycle Bin

Recycle bin icon is displayed in the layout when K-ROSET is started.

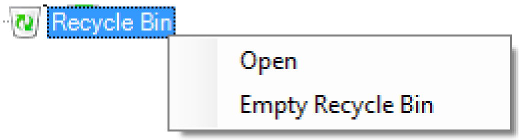
- This function can be used from V1.7.0.
- A project stored with V1.7.0 can be loaded in a version of past K-ROSET, but the data moved to a recycle bin cannot be restored to the original state.

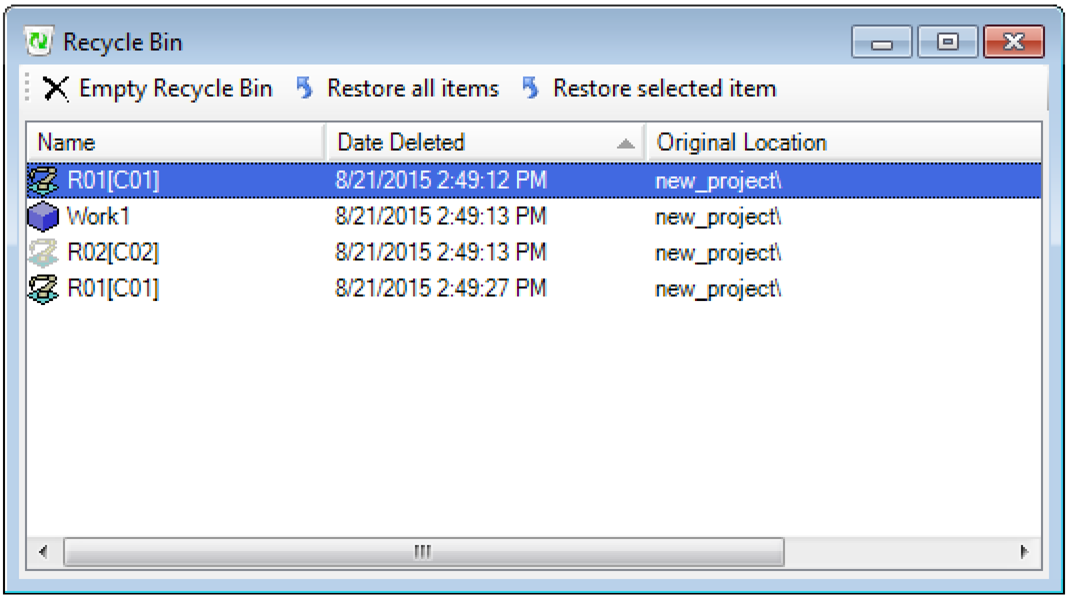


When entity is deleted, it is temporary stored in the recycle bin. It is possible to undo.

- Icons can be moved to the recycle bin by drag and trop

Right-click recycle bin icon in the layout and select [Open]. Recycle bin window is displayed.

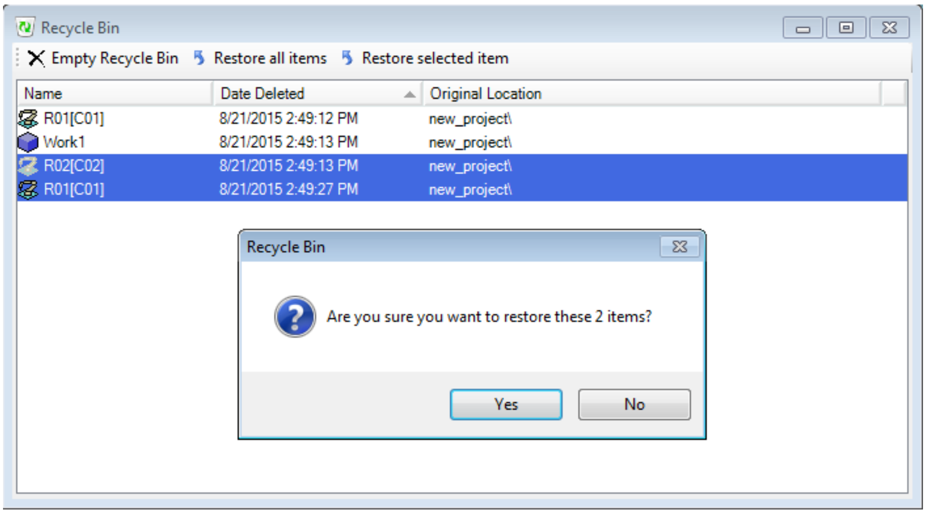




In the recycle bin window, deleted entity name, date, entity structure at the time of deletion are displayed.

- Only icons of deleted entity are displayed in the window. In case of deleting parent entity, child entity is not displayed.

If child entity was deleted first, child entity is also displayed in the window.
In case there is no parent in the layout when undoing, confirmation message whether undoing parent entity as well is displayed.

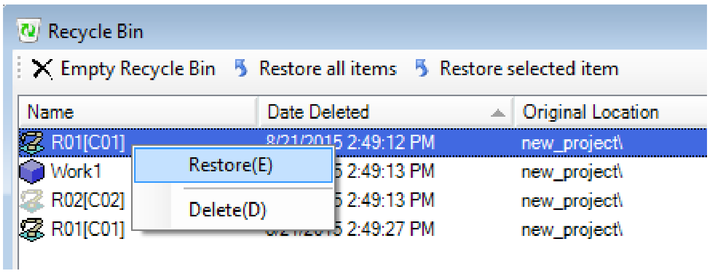


➢ **Empty Recycle Bin**

Delete all entities displayed in recycle bin

It would be impossible to undo.

- In case of deleting separately, select an entity and right-click to execute



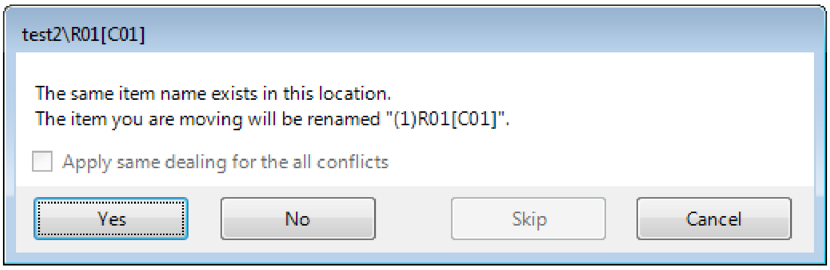
➢ **Undo All Items**

Undo all entities displayed in recycle bin to the layout.

➢ **Undo Selected Items**

Undo selected entities in recycle bin.

- In case there is same entity name in the layout when undoing, confirmation dialogue is displayed whether undoing as a name with (*) at the beginning.

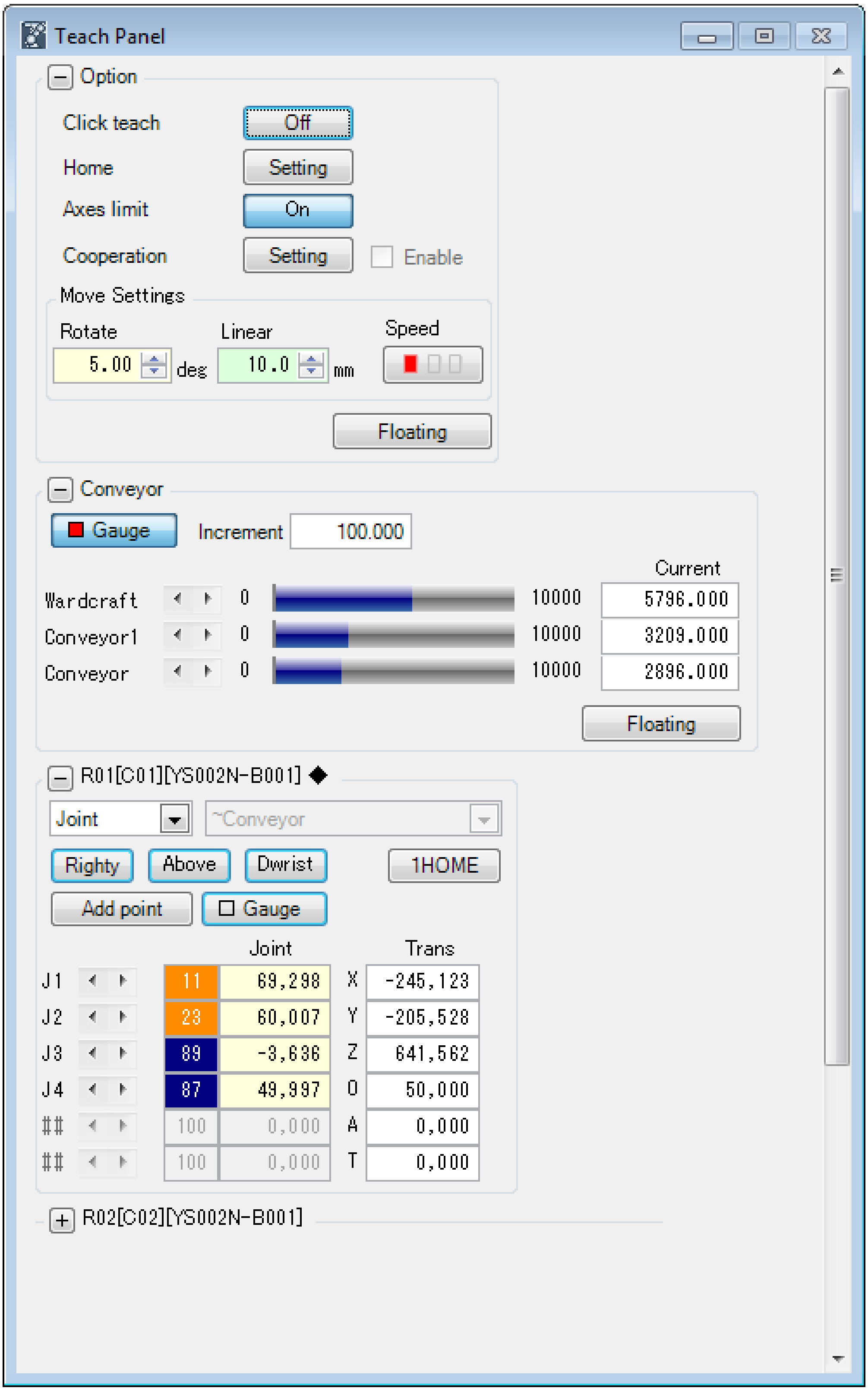


3.5 Teach Panel

This section describes the Teach Panel.

Display method

With the status that plug-in is read, click Task panel icon on the right side of K-ROSET.

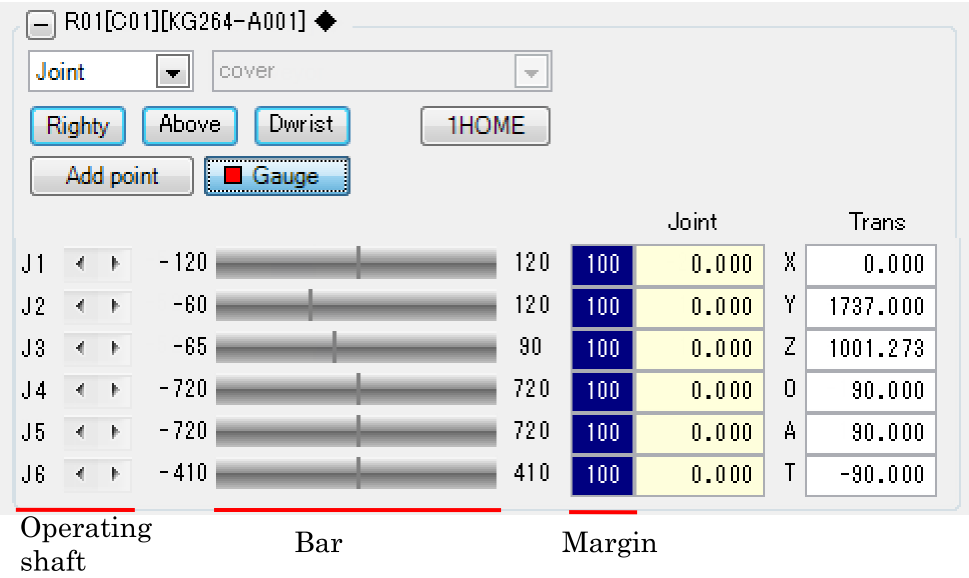


3.5.1 Robot control

Robot names and robot types are displayed and posture checking and teaching are carried out.

The robot marked with a diamond shape on the right of the robot name is a current target robot.

Operation on this panel during controller running is invalid.



➤ **Teaching Operation**

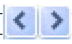
Posture change is selected in each travel mode.

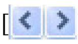
Select from each axis, base coordinate, tool coordinate, world coordinate, and work coordinate with the radio button.

* Since V1.7.1., fixed tool coordinate can be selected. It can be selected when fixed tool is installed. When fixed tool is selected, robot posture is changed as fixed tool arrow base.

➤ **Posture Change**

Posture of the robot is changed with each operation.

Spin-box []

Increase/decrease the value of the variables on the left by clicking Spin-box [] to change the robot posture.

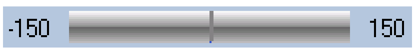
➤ **Gauge**

Switch Display/Not display of the bar-control.

➤ **Bar-control**

Posture of the robot is changed at each axis by clicking the bar.

Blue:30 to 100%, Yellow:10 to 30%, Red:0 to 10%



Values at both sides indicate motion range of joint.

[Value Input]

Posture of the robot is changed by direct input of the axis values and transformation values. After input of the values, the values are applied by pressing [Enter].

➢ **Adding teach point**

Add a teach point to the tip or arm. The teaching point is added as an object under the robot in the tree.

* When the direction of the added teaching point is not specified at teaching point posture setting, the direction of the added teaching point is the direction of the tool tip. For the teaching point posture setting, refer to "5.7.3".

➢ **Posture**

[RIGHTY] <-->[LEFTY]

Robot posture is changed so that the posture looks like the right arm (RIGHTY) or left arm (LEFTY) of a human.

[ABOVE] <--> [BELOW]

Robot posture is changed so that the posture looks like the right elbow located above (ABOVE) or below (BELOW) of a human.

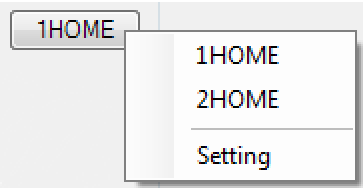
[UWRIST] <--> [DWRIST]

Robot posture is changed so that the angle of the 5 axis of the robot is positive (UWRIST) or negative (DWRIST).

➢ **1 HOME**

Change robot posture to the home position. 2 HOME also can be switched by right-click.

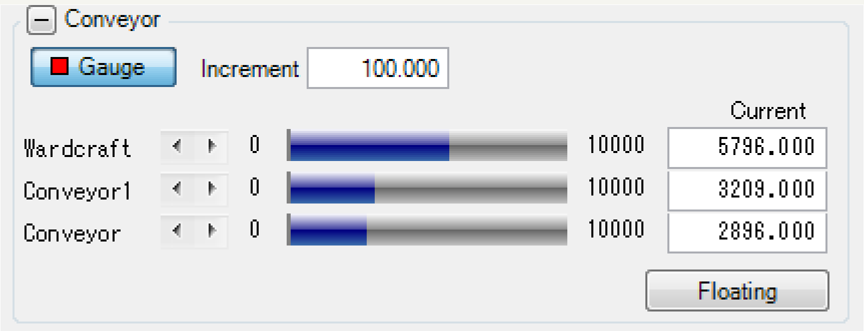
Setting displays 3.4.1 Home setting screen.

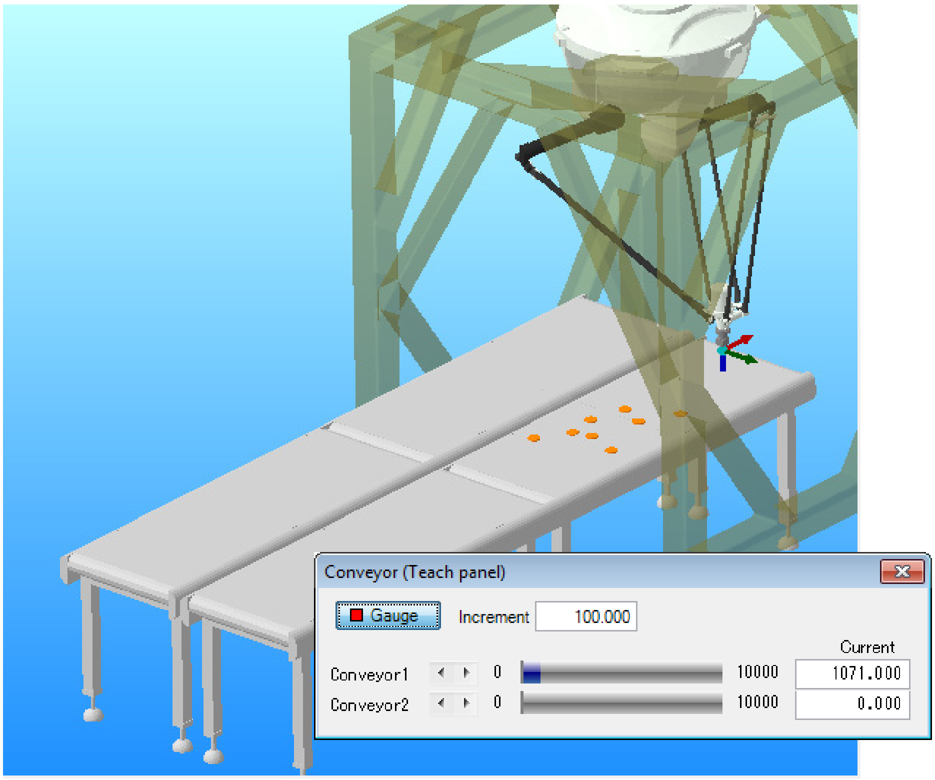


3.5.2 Conveyor

Control panel to operate a conveyor axis is added to the Teach panel in V1.7.2 and later. Position of the conveyor work can be adjusted by controlling the "Gauge" and "Bar".

* Note that this function is not for changing the conveyor work position. This function is to set a motion of a conveyor work when change is made on a conveyor axis value whose initial position was 0.





- **Current**

  [Spine box][< >]

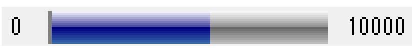
  This enables to change the conveyor work position by incrementing and decrementing the value variable by clicking on the [< >] buttons. Travel distance is set in [Increment].

- **Gauge**

  Switches to display or hide the bar control.

- **Bar control**

  Clicking on the bar will change the conveyor work position.



- **Floating**

  Clicking on the [Float] button will separate the panel from the right panel.

  Clicking on X button will bring the panel back into the right panel.

3.5.3 Option

The setting at the current robot is carried out.

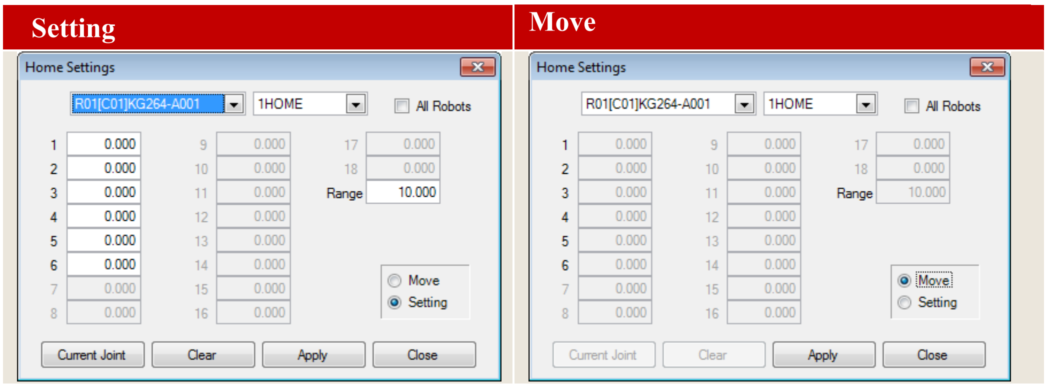
- **Home setting**

Current robot postures, up to 2 home postures and accuracy, can be recorded so that the robot can restore its posture to the recorded ones later.

[Current value] ...... Posture of the robot in the combo box is input.

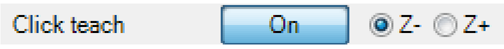
[Clear] ...... The entered numeric value is cleared.

[Application] ...... Posture of the entered numeric value is applied to the robot.



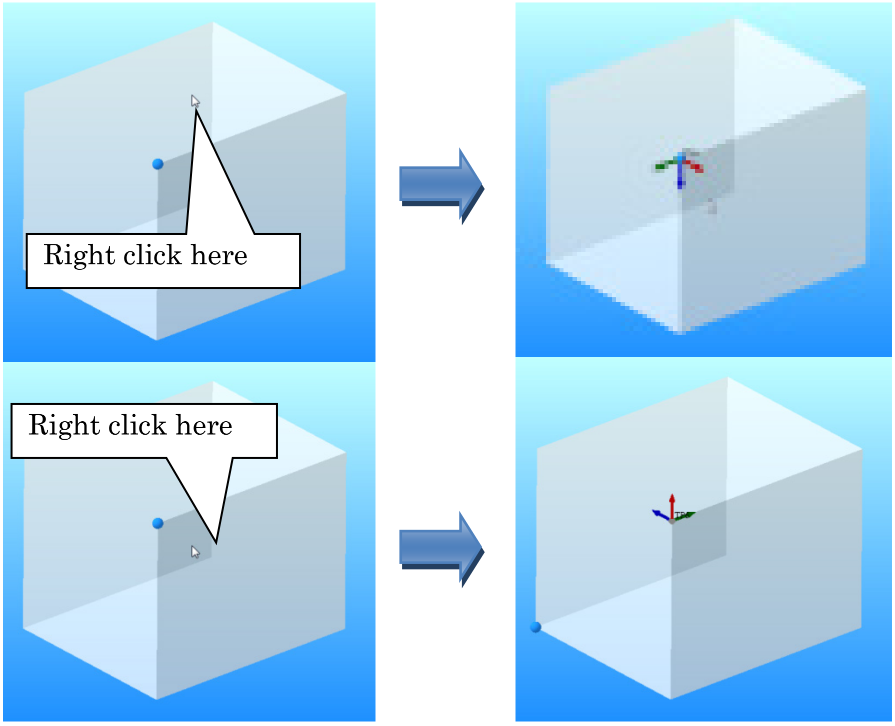
- **Click Teach**

Enable by placing a check mark in [Click Teach]. When click teach mode is enabled, a teach point is added by clicking the surface of the environment on the view.



Normal direction can be selected by Z+ or Z-.

Combination of the Click teaching function and Snap function enables to create teaching points in model edges and corners. Pose of the OAT relies on the plane which is selected last. Right-click on the desired plane to select before left-clicking to create a teach point.



➢ **Velocity**

Magnification of the displacement is changed.

Press the button to change the display of the gauge and increase the displacement single/double/triple time(s).

➢ **Displacement**

The displacement of the posture change in each travel mode is set.

The displacement is changed by spin control or entering a numeric value.

Initial value of the displacement is [rotation: angle of 5 degrees, direct motion: 10mm].

➢ **Limitation of axis values**

Posture limit of the robot in teaching is disabled.

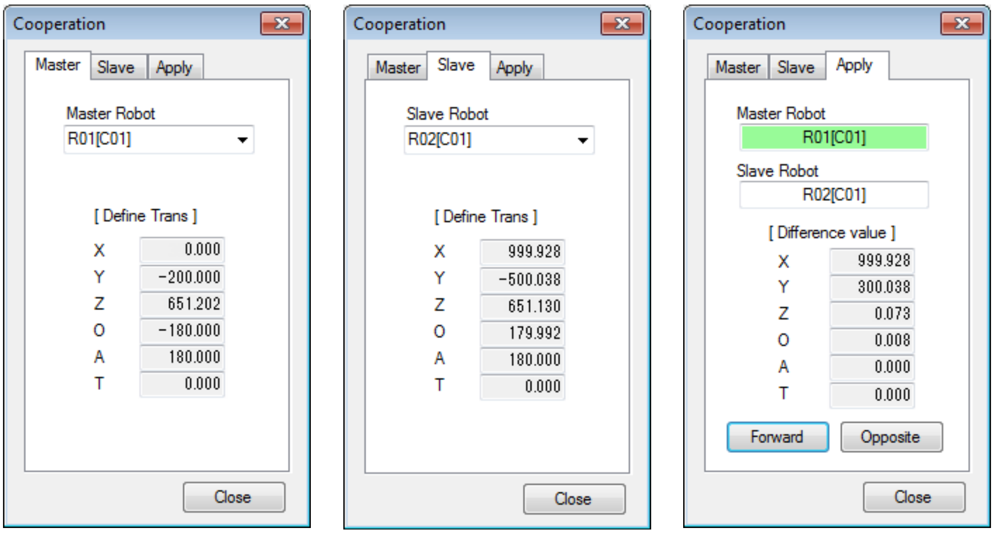
Place a check mark in [Disable axis value limitation of controller] to disable.

➢ **Cooperation**

This sets cooperation move between the arms. This enables robots to move in cooperation while using robot jump feature or operating teach panel to check how robots move.

While this is set, slave robot follows the mater robot keeping the set positional relation between tool tips.

- This feature is to create teach points in K-ROSET. Option setting for controller will be required separately to move the robot in cooperation move in simulation. Cooperation move is only available for duAro.



- **Master robot**

  Select a robot to be the master which leads the motion.

  Variable value will be displayed when selected.

- **Slave robot**

  Select a robot to be the slave which follows the master robot.

  The set transformation value will be displayed when selected.

- **Application**

  ■Forward

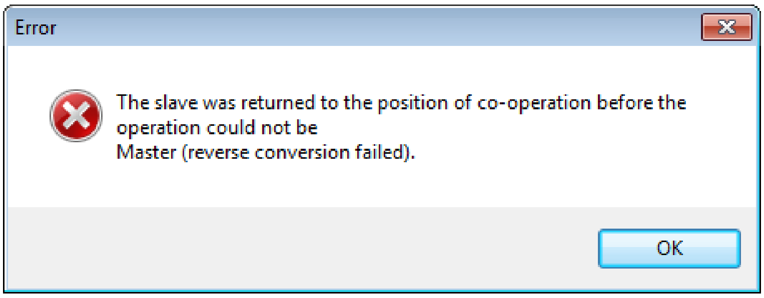
  Once this is set, slave robot follows the master robot accordingly regardless of change on posture for master robot.

  ■Opposite

  Once this is set, master robot follows the slave robot accordingly regardless of change on posture for slave robot.

*

- Following error message appears when slave robot pose cannot change. In that case, please check the cooperation settings or robot posture



- **Valid**

  This enables the cooperation move.

Set cooperation

1 **Move robot pose to where cooperation move starts.**

2 **Click on [Setting] button for Cooperation in the Teach panel.**

Cooperation dialog will appear.

3 **Select robot in the Master tab.**

The transformation value when master robot is selected will be displayed.

4 **Select robot in the Slave tab.**

The set transformation value when slave robot is selected will be displayed.

5 **Select “Forward” in the [Apply] tab.**

The relative position between tool points is registered.

➢ **Floating**

By selecting button, it can be apart from the right panel.

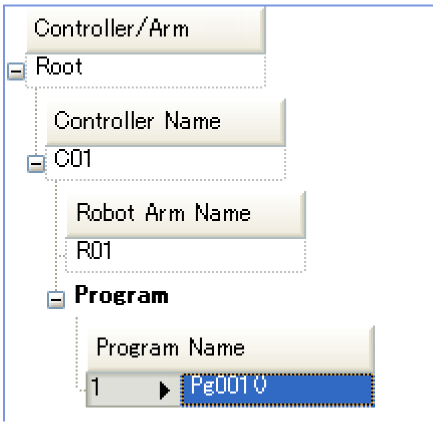
Press X to return it to the right panel.

3.6 Program Table

This section describes the program table.

3.6.1 Creating a program

Creating a program and adding/editing program instructions on K-ROSET.



The program table is used to create programs using the AS language, add I/O instructions, and import programs created with PC-ROSET.

3.6.1.1 Adding a program

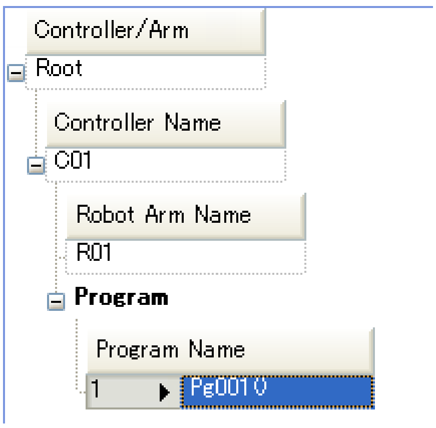
This section describes how to add a program to K-ROSET.

1 **In the extended application pane, choose the [ ] icon to display the [ProgramTable] screen.**

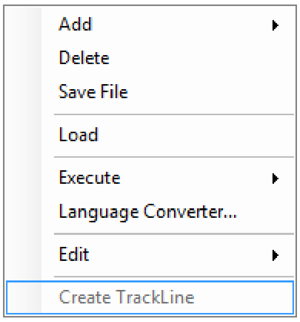
2 **From the Controller Name menu (displayed by right-clicking the area indicated by [C01] below), choose the [Add] -> [Program].**
After the menu is selected, a program is newly created on the program table.

* ● The program can be renamed from this menu item.

Then, the method of adding program instructions to a program is described.



This section describes how to add each program instruction into the program.



➢ **Create a program using the created teach points.**

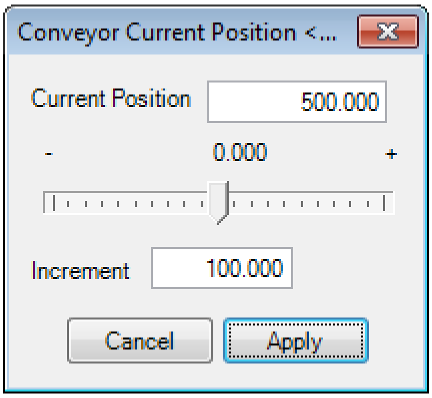
This section describes how to create a teaching program based on the taught points.

1 **Add a new program in the program table.**

A program with a name of “Pg***” will be added.

2 **Right-click on the conveyor to access to [Current position] in the context menu to change the conveyor position.**

Conveyor Current Position dialog will open.



3 **Select the desired teach point in the Layout to create a teaching program. (*)**

Robot will jump to the selected teach point.

4 **Change conveyor position value and select move instruction from program menu in the program tab.**

A program step with the specified conveyor value and current robot pose will be added.

- (*)Drag and drop the teach point to the target program will also add a program step as same as the process mentioned above. Teach point variable can be created by changing the setting of the program tab.

3.6.1.2 Changing a program name

1 **Input box become available state by clicking it. Change the name by typing keys.**

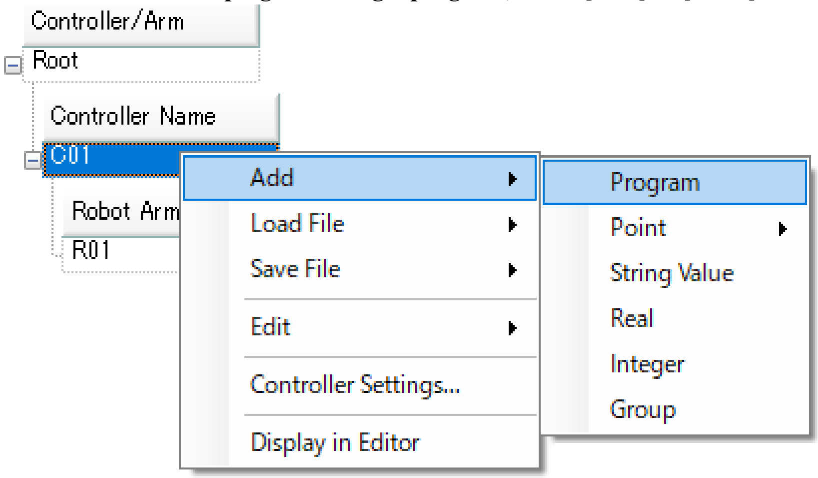
► 3.6.1.3 Coping/ Cutting a program

1 **Select [Edit] -> [Copy] or [Edit] -> [Paste] from the program menu.**

* It can be operated by < Ctrl+C > and < Ctrl+X > on the keyboard.

► 3.6.1.4 Pasting a program

1 **In the state of the coping or cutting a program, select [Edit] -> [Paste] from the program menu.**



* ● It can be operated by < Ctrl+V > on the keyboard.

► 3.6.1.5 Deleting a program

Select [Delete] from the program menu.

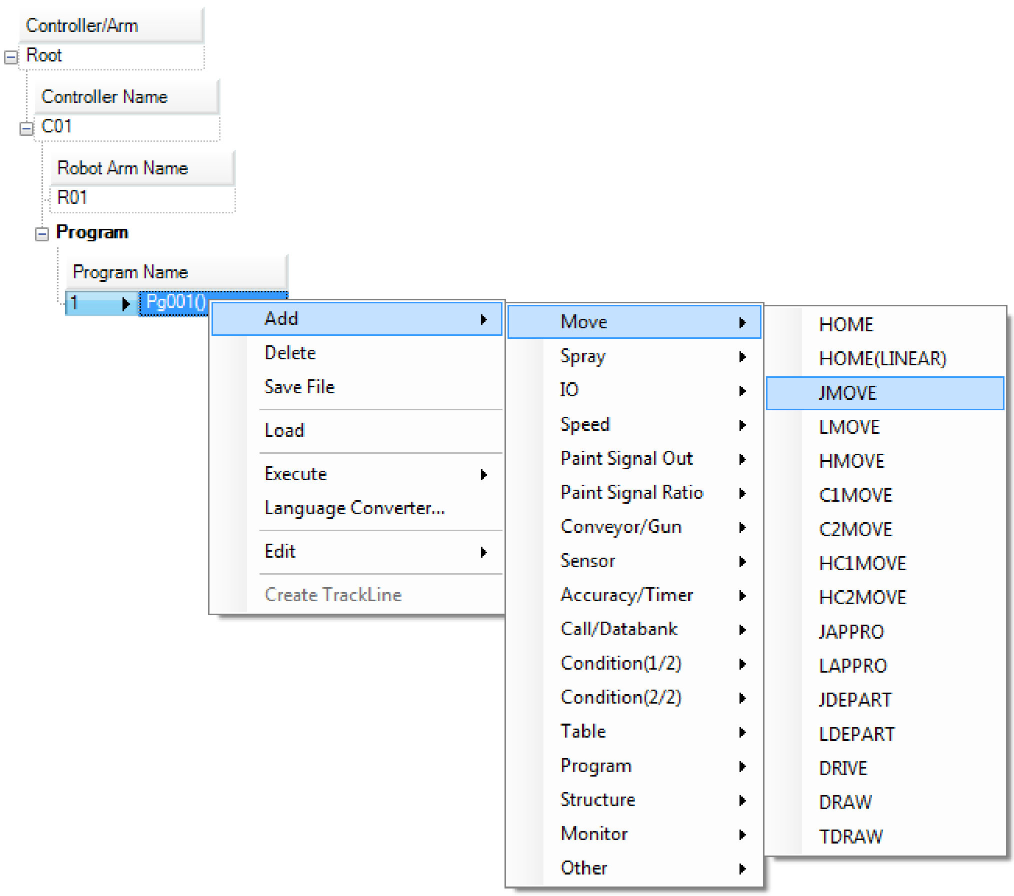
* ● It can be operated by < Delete > on the keyboard.

►►► 3.6.2 Adding program instructions

► 3.6.2.1 Adding program instructions

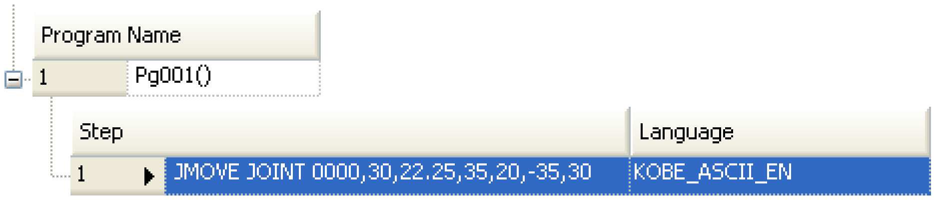
➢ **Standard adding method of program instructions**

1 **Select any program instruction after selecting [Add]-[Program Step] from program name menu.**



2 **The selected program instruction will be added to the program.**

Values in the instruction and programming language can be changed from this menu item.



*

- For the detailed description and details of each command, refer to "AS Language Practical Guide."
- Blank lines can be added by < Insert > on the keyboard.

➢ **How to add a program with an external axis.**

1 **Change the external axis value by either incrementing or decrementing the value in the Teach panel in the Task panel.**

Robot posture changes accordingly.

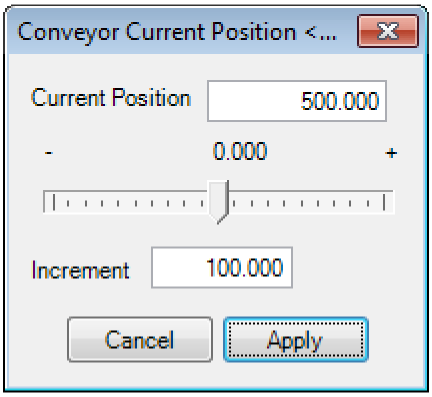
2 **Select move instruction in the program menu in the program tab with the external axis value changed.**

A program step with the specified external axis value and the current robot pose.

- **How to add a conveyor program.**

1 **Right-click on the conveyor to access to [Current position] in the context menu to change the conveyor position.**

Conveyor Current Position dialog will open.



2 **Edit the conveyor value.**

Conveyor work position will change.

3 **Select move instruction in the program menu in the program tab with the external axis value changed.**

A program step with the specified external axis value and the current robot pose.

*

- (*)Drag and drop the teach point to the target program will also add a program step as same as the process mentioned above. Teach point variable can be created by changing the setting of the program tab.

- **Other adding methods of program instructions**

Teaching point can be added from some other applications.

Application	Operation
Program creation from layout	Drag a teaching point of layout to program
Program instruction	Press [Add] button
Auto program creation （3 points）	Press [Program] button
Auto program creation （copy）	Press [Create] on [Program auto creation settings]
Program conversion	Select target program to convert and press [Execute] button

3.6.2.2 Editing Program Instructions

This chapter describes how to edit program instructions.

- **Editing/deleting a program instruction**

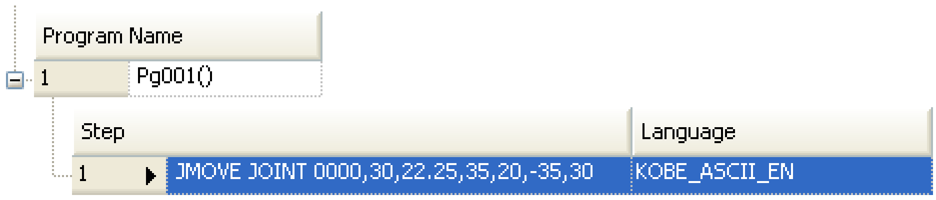
For the editing methods of program instructions, the following four are typical.

➢ **Edit on the program table.**

On the program table, the content of each program instruction can be edited directly. In addition, from the menu displayed by right-clicking an instruction, the instruction can be deleted, copied, cut, or pasted. It is also possible to move each program instruction by selecting the line number section.

*

- It can be operated by < Ctrl+C > < Ctrl+X > < Ctrl+V > on the keyboard



3.6.3 Loading/Saving in programs

Save or load the robot data or the created K-ROSET data to a file.

3.6.3.1 Loading in programs

The procedure of loading in created program files is as follows.

1 **Add a robot to the tree pane.**

2 **From the controller menu of the program table, choose [Add] -> [Program] -> [File (.pg)].**

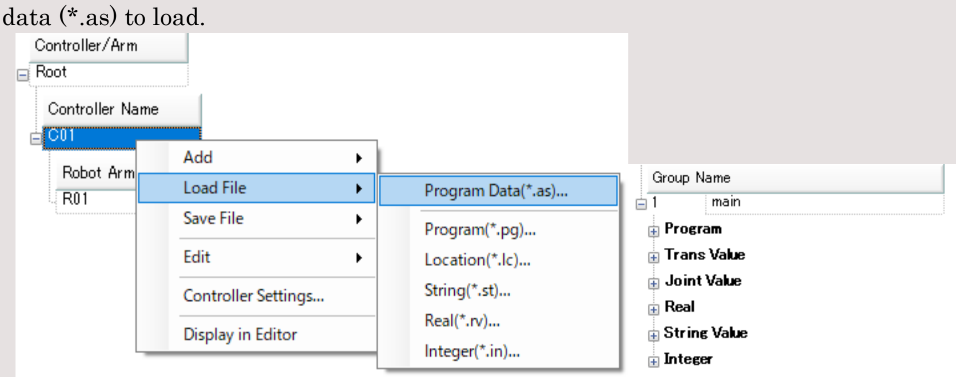
3 **The program file choice dialog will be displayed. Select the program files that you wish to read in.**

column

*

Real robot data loading

In order to load the real robot data to K-ROSET, load the data from Load File in the program table. As the real robot data contains more *.as file than *.pg or *.lc, select the target program data (*.as) to load.



Using the Real robot connection function can also load the real robot data. Refer to the K-ROSET Online Function Manual for details.

► 3.6.3.2 Saving a program

The procedure of saving the program being created currently is as follows.

* ● Default folder to load is（project name folder)¥(robot name folder)¥PG.

1 **From the controller menu of the program table, choose [Add] -> [Program].**

2 **From the program menu of the program table, choose [Save file].**

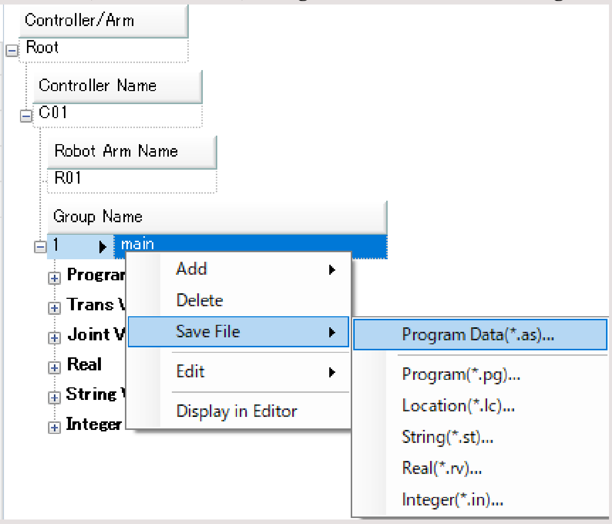
3 **A dialog to save program files will be displayed. Select the destination folder and the program file name to be saved, and press the [Save] button.**

The name of the program saved is partially restricted. For details, confirm the section of restriction in Chapter 8.

column

Real robot data creation

To output the program or variable data in order to use the program data which is simulated in K-ROSET, use Save File. Select the "Program data (*.as)" to save the entire program, variable, real number, integer and character strings all together.



Load the data by copying the saved data to a USB and connect it to the controller then load the data via Aux screen on the Teach Pendant or use KRterm or KcWin. Refer to the operation manual for robot controller for how to load data to real robot.

Using the Real robot connection function can also load the real robot data. Refer to the K-ROSET Online Function Manual for details.

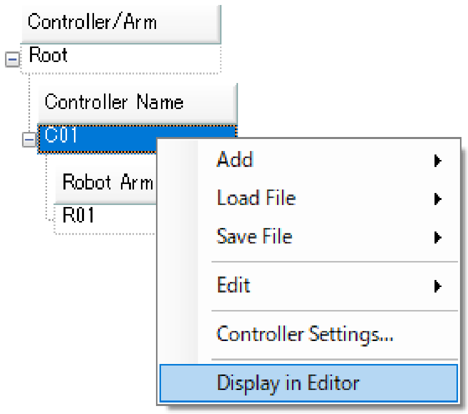
Warning

Data might be lost. Make sure to have backup before loading to robot.

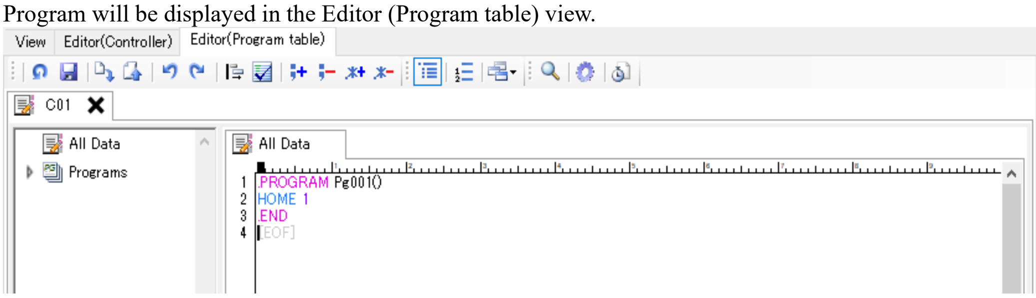
3.6.3.3 Display in Editor

This section describes how to display data in the program table to the editor view for AS language development.

1 **Go to Program Table and open the controller dropdown menu by right-clicking on a controller and select [Display in Editor].**



Program will be displayed in the Editor (Program table) view.



3.6.4 Execution of a program

- **All Step execution**

  By using a robot controller, simulation is performed.

- **Simplified execution**

  Before conducting a detailed simulation, execute simplified execution to see rough motion by using robot jump of motion instruction.

3.6.5 Other Functions

3.6.5.1 Variables

It is possible to store values in variables on a program and perform programming using them. Values of a teaching point, string, integer, or real number can be stored in variables. Hereinafter how to create variables are described. Values in the instruction and programming language can be changed from this menu item.

- For the detailed description and details of each command, refer to "AS Language Practical Guide."

Name		JT1	JT2	JT3	JT4	JT5	JT6
1	#gen	0.000	0.000	-25.000	0.000	-90.000	0.000

Name		X	Y	Z	O	A	T
1	Val002	600.000	1369.843	1283.958	-90.000	155.000	90.000
2	Val003	-600.000	1369.843	1283.958	-90.000	155.000	90.000

Name		Value
1	Real001	1.000

Program Name	
1	Pg0010

Step		Language
1	SPEED 50 ALWAYS	AS language
2	ACCURACY 10 ALWAYS	AS language
3	JMOVE #gen	AS language
4	FOR i=0 TO Real001	Unknown
5	LMOVE Val001	AS language
6	LMOVE Val002	AS language
7	END	AS language
8	JMOVE #gen	AS language
9	PRINT $String001	Unknown

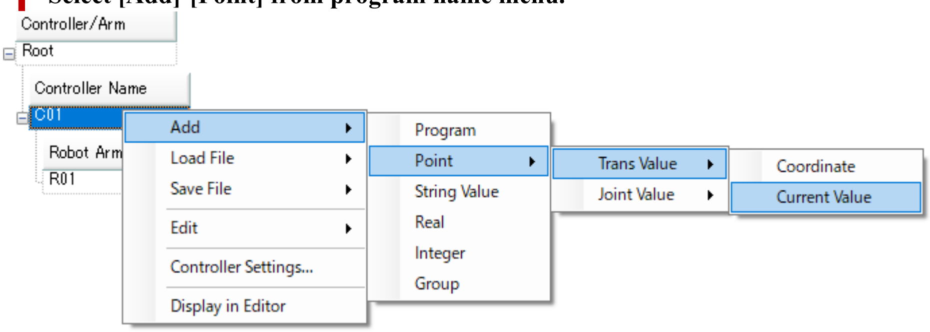
► 3.6.5.2 Creating a teaching point variable

It is possible to store teaching points in variables and use them on programs.

To do so, this section describes the creation of a teaching point variable used when a program is created.

Note that the variable is handled differently from the teaching point on the object tree.

1 Select [Add]-[Point] from program name menu.



2 Select [Trans] or [Joint]

Joint: Input each axes value.

Name		JT1	JT2	JT3	JT4	JT5	JT6
1	#Val001	0.000	0.000	0.000	0.000	0.000	0.000

Trans: Input the coordinates from the base trans to the tool trans

Name		X	Y	Z	O	A	T
1	Val001	0.000	1816.000	2040.000	90.000	90.000	-90.000

3 Select [Coordinate] or [Current Value].

Coordinate: An input box is added. They are all zero values. Specify the joint degree.

Current Value: An input box is added. They are values of current coordinate.

3.6.5.3 Creating a string variable

The procedure of creating a string variable is described.

1 **Select [Add]-[String Value] from program name menu.**

2 **Input character string**

Name		Value
1	$String001	Test

3.6.5.4 Creating a real number variable

The procedure of creating a real variable is described.

1 **Select [Add]-[Real Value] from program name menu.**

2 **Input the value or click the spin button.**

Name		Value
1	Real001	1.00

3.6.5.5 Creating an integer variable

The procedure of creating an Integer variable is described.

1 **Select [Add]-[Integer Value] from program name menu.**

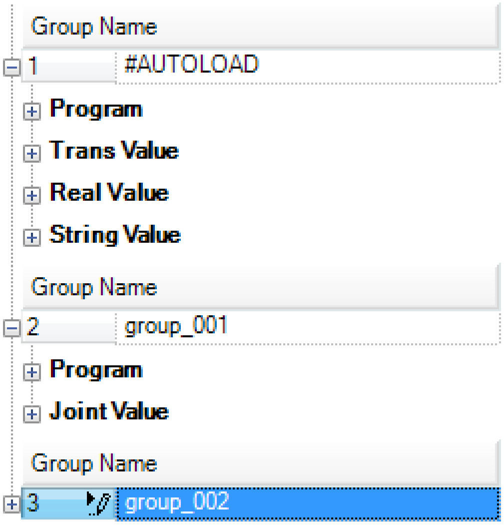
2 **Input the value or click the spin button.**

Integer

Name		Value
1	@Int001	1000

3.6.5.6 Group

Program and variable for the controller can be arranged into group to register.
This feature allows you to manage the backup data per day.
And it also allows to export the program and variable in the group automatically when loading a program or restarting a controller by naming the group as [#AUTOLOAD].



3.6.5.7 Load

Load the selected program to the robot controller.

3.6.5.8 Convert Language

Convert AS language, Explosion proof ASCII and AS ASCII to the designated language.

*
- Block Teach Language is not supported.
- Some orders cannot be exchanged.

3.6.5.9 Track Line Drawing

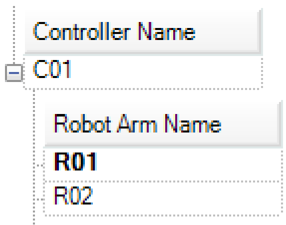
Track line is drawn at the position of operation order. Name of track line is a name of executed program.

*
- It is impossible to draw track line that follows conveyor motion.

3.6.5.10 Switch current arm

Current arm can be switched by selecting the arm name in the program table.

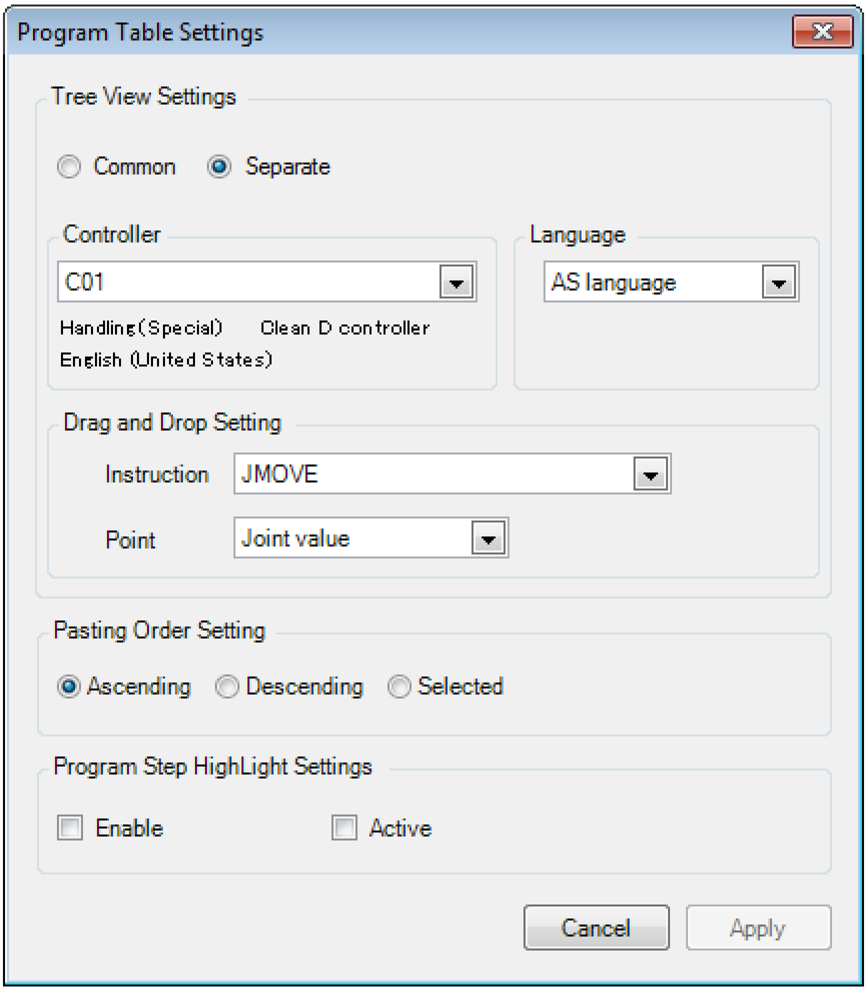
*
- Arm needs to be specified when creating a program for multi-arm robot in V1.7.2 and later.



3.6.6 Program Table Settings

The procedure of setting program table is described.

Select [Application Setting] from the root menu of the program table to display.



- **Tree View Setting**

  Language displayed in the tree can be changed.

  Set "Common" for all controllers and "Separate" for the specified controller for the language setting.

- **Drag and Drop Setting**

  Motion command/teach point converted for drag and drop can be changed.

- **Pasting Order Setting**

  When program step is coped several times and they were pasted, the order to add to a program can be changed.

- **Program step highlight setting**

  When simulation is executed, execution steps can be highlighted.

  Place a check mark in "Enable" to select and display the applicable column.

  Place a check mark in "Activate" to move Focus to the applicable column.

  Place a check mark in "Enabled when executed from other application" to display with highlighted even when executed from terminal and controller tab.

3.7 Other Functions

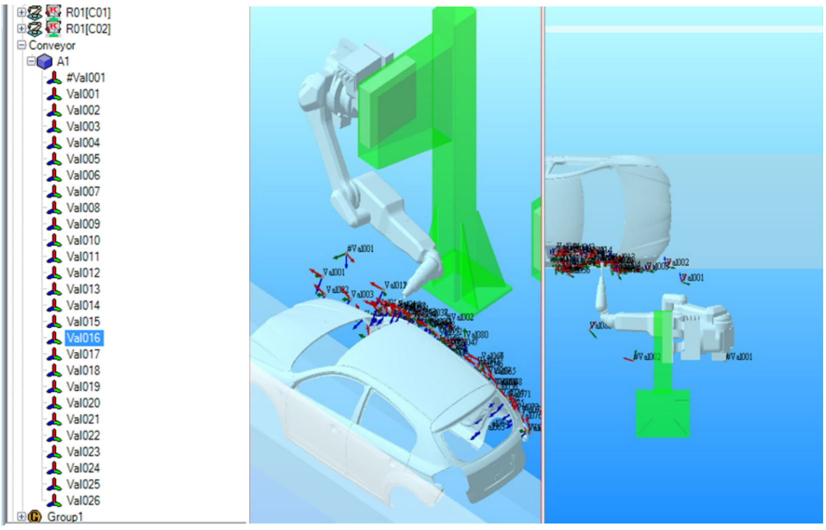
This chapter explains other basic functions.

3.7.1 Robot Jump

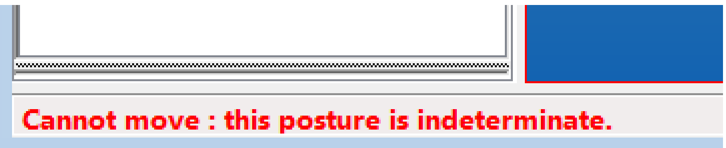
With this function, current robot posture can be changed to the designated teaching point, step or variable position when each teaching point added on the tree is selected, or when program step or variable on the program table is selected.

3.7.1.1 Layout

Robot posture can be changed by selecting teaching point.
When teaching point is selected, robot posture is changed to match the equipped tool arrow and the teaching point of the robot hand.



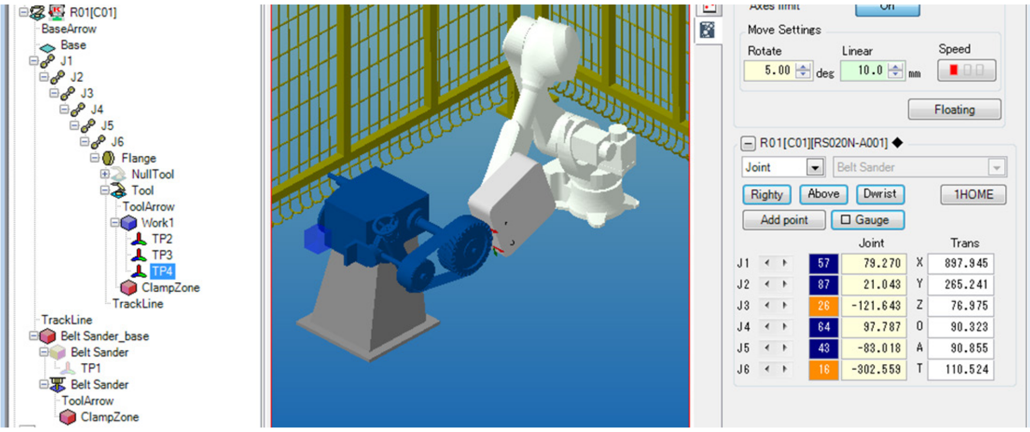
In case posture cannot be changed, a message “Cannot move: this posture is indeterminate.” is appeared at the lower left.



*

- Conveyor value and external axis value are not changed automatically. These values have to be designated by the teaching panel etc. before executing jump.

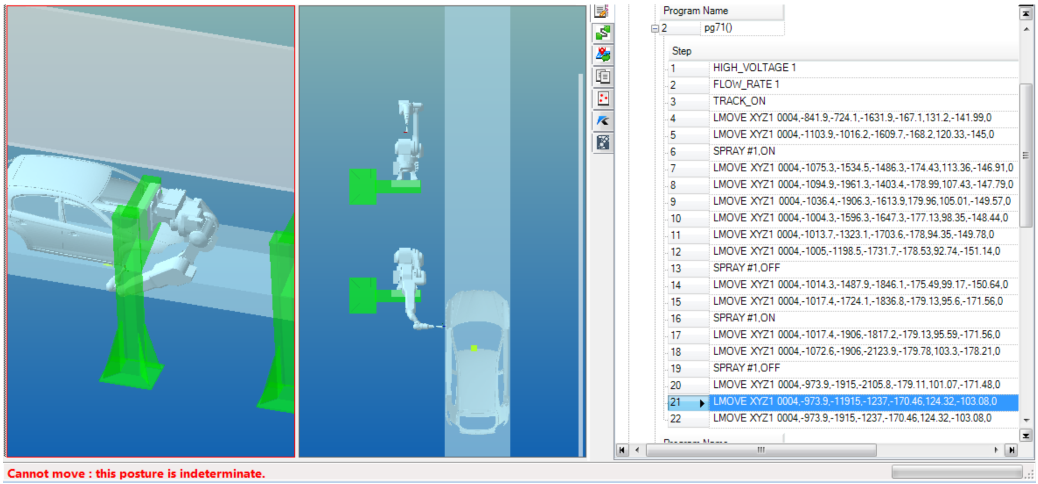
Since V1.7.1, operation of the fixed tool option can be reviewed.
When fixed tool is equipped and there is a teaching point under the tool, by selecting a teaching point under the tool, robot posture is changed to match tool arrow of the fixed tool and the robot hand.



► 3.7.1.2 Program Table

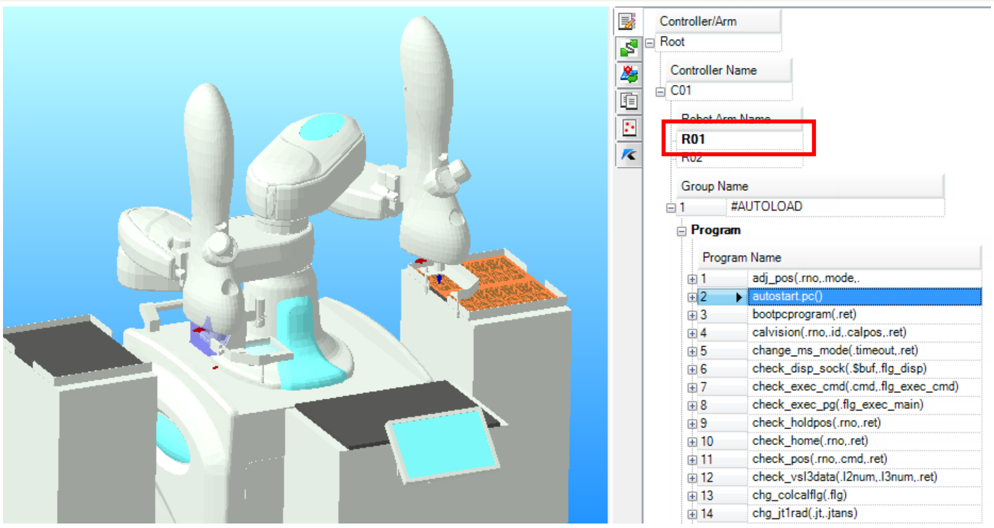
Robot posture can be changed by selecting program step and variable on the program table.

When program step and variable on the program table is selected, robot posture is changed at the designated axes value and convert value.



In case posture cannot be changed, a message “Cannot move: this posture is indeterminate.” is appeared at the lower left.

★ ● Conveyer value and external axis value are values designated in program and variable.

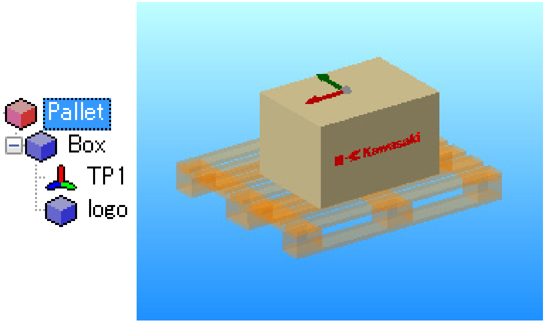


- The current arm selected in the program tab will jump for multi-arm robot.

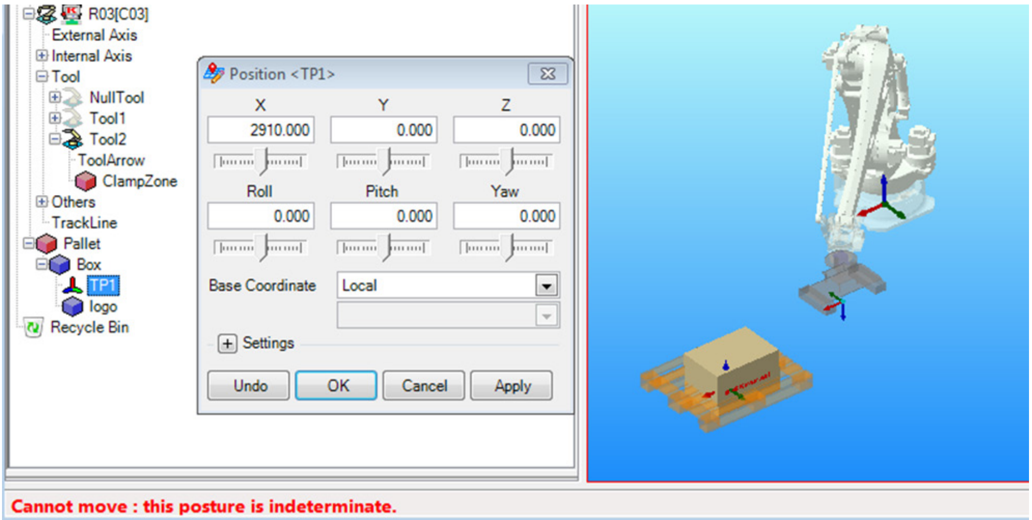
► 3.7.1.3 Operation review using robot jump function

By using robot jump function and tree structure, layout review task can be done effectively.
Make parent-child relation between work pedestal and work/work processing position so that system depending on the work can be moved together and overall offset can be done for robot. Confirm whether robot jump function is workable while keeping away and close for each system.

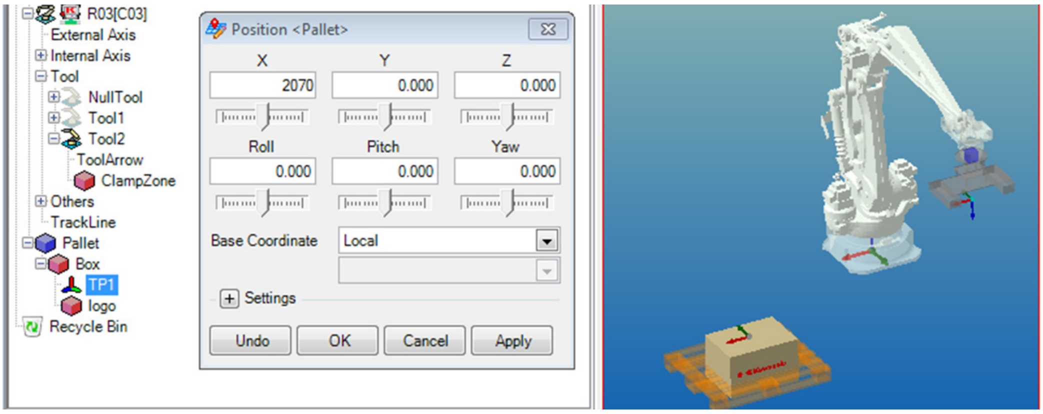
1 **Combine work, obstacle and teach point at the tree structure.**
When parent object is moved, child object is also moved.



2 **Select teach point object.**
Robot posture is changed when robot jump is succeeded. An error massage is appeared in case the posture is indeterminate.

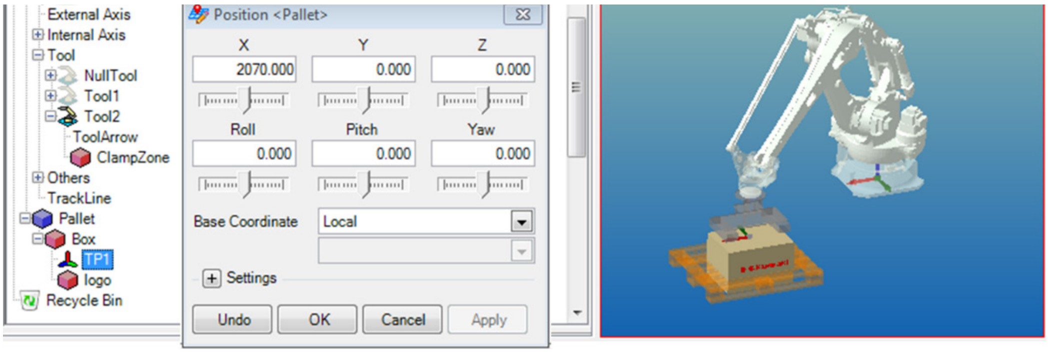


3 **When reviewing layout again, keep parent object closer to the robot with position change dialogue.**
Child object is also moved.



4 **Select teach point object.**

Robot posture is changed when robot jump is succeeded. In case the posture is indeterminate, execute 3 and 4 again.



3.7.2 Create program and variable on layout

By dragging and dropping each teaching point added on the tree to the program table, motion instruction and variable can be added.

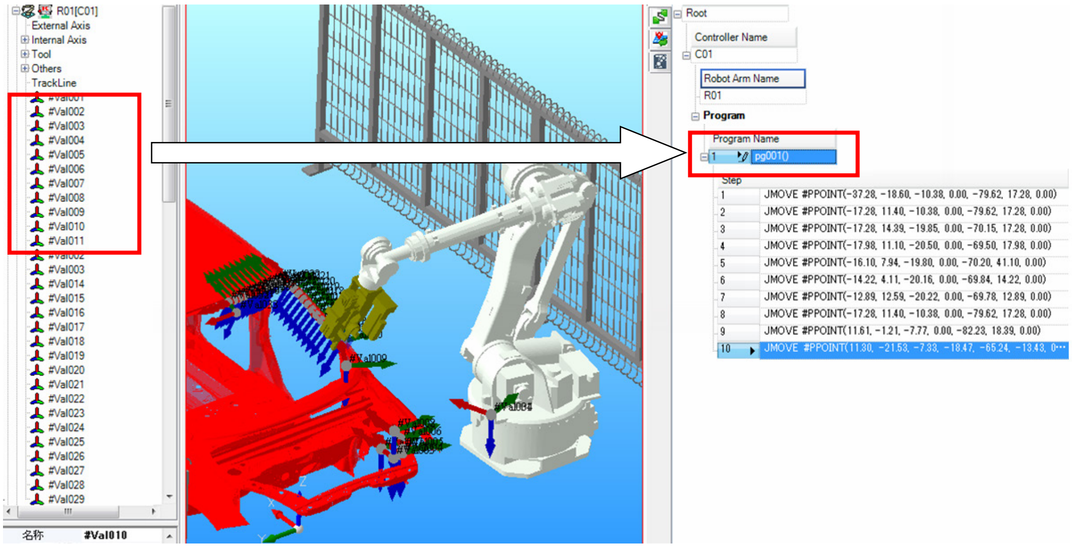
- When moving multiple steps, use < Ctrl > and < Shift > key.

The instruction which is able to be added by dragging and dropping is an instruction of joint interpolation move or linear interpolation move.

To change a kind of instruction, right click “Root” on program table and show root menu. Then, select [Settings...] and set a kind of instruction to [Drag and Drop Setting] - [Instruction] in [Program Table Settings] screen.

Whether to add motion instruction or trans value depends on the place where teaching point is dropped into.

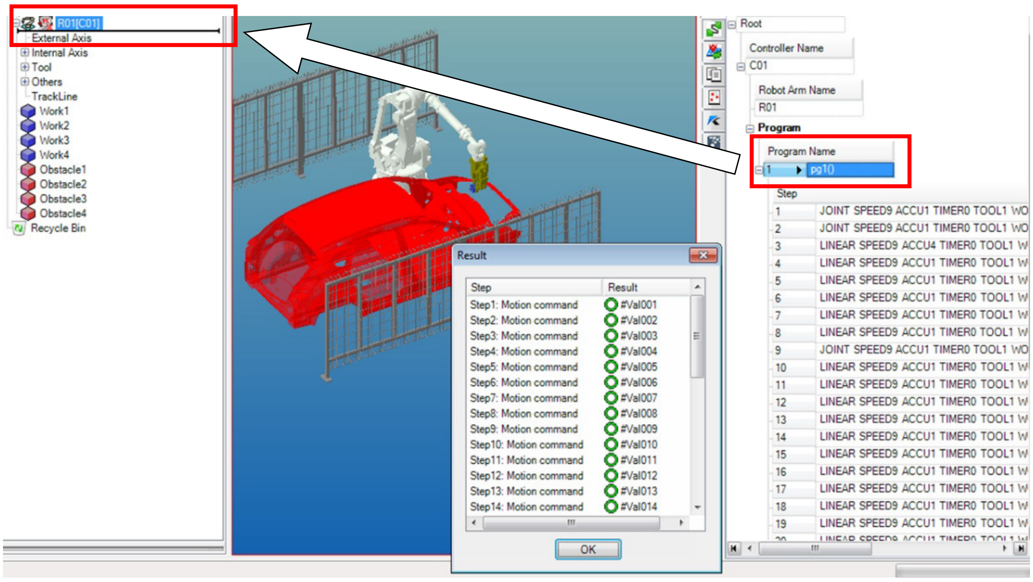
Drop destination of program tab	Converted result
Program	Move instruction
Controller	Trans value
Group	Trans value



3.7.3 Create a teaching point on a program

Since V1.7.1, a teaching point of layout can be created from motion step of a program, Trans value and joint value data. In opposite to create program step from a teaching point, drag a program step to the layout side.

- When moving multiple steps, use < Ctrl > and < Shift > key.



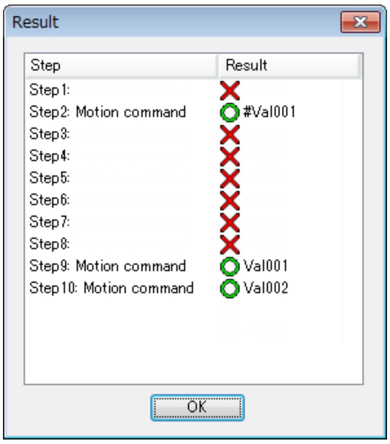
Motion varies depending on place to drop. Movable instruction, variable and drop destination are as follows.

Drop destination of layout	Trans value	Joint value	Base coordinate
	✓	✓	Base transformation value
	✓	–	Flange
	✓	–	Model origin
	✓	–	Model origin
	✓	–	Origin
	✓	–	Teaching point base

	✓	–	Base transformation value
Conveyor work (Required item)	✓	✓	Base transformation value (includes conveyor axis value)

* It is impossible to move to destination of object not mentioned above.

Converted results are shown in O or X. In a program, a teaching point is created with a name of Val*** from converted steps.



4 Basic function (Controller)

This chapter explains functions of the controller in K-ROSET.

4.1 Robot Controller

This chapter explains functions related to the robot controller.

4.1.1 Offline（PCAS）

Offline connection is available. It is possible to simulate operations by connecting with the emulator of the robot controller that is operated on Windows.

*

- When a robot is added in K-ROSET, it automatically starts with offline connection.

4.1.1.1 Virtual Robot Controller (PC-AS)

This section describes Virtual Robot Controller.
The virtual robot controller is used to execute actual AS on software for simulation.
The virtual robot controller consists of virtual controller module, and operates per robot.
Examples of modules (asproc.exe, Panel.exe, PcAs.exe, user_as.exe, user_tp.exe)

*

- Confirmation by the firewall is displayed in the initial start. Select [Unblock].

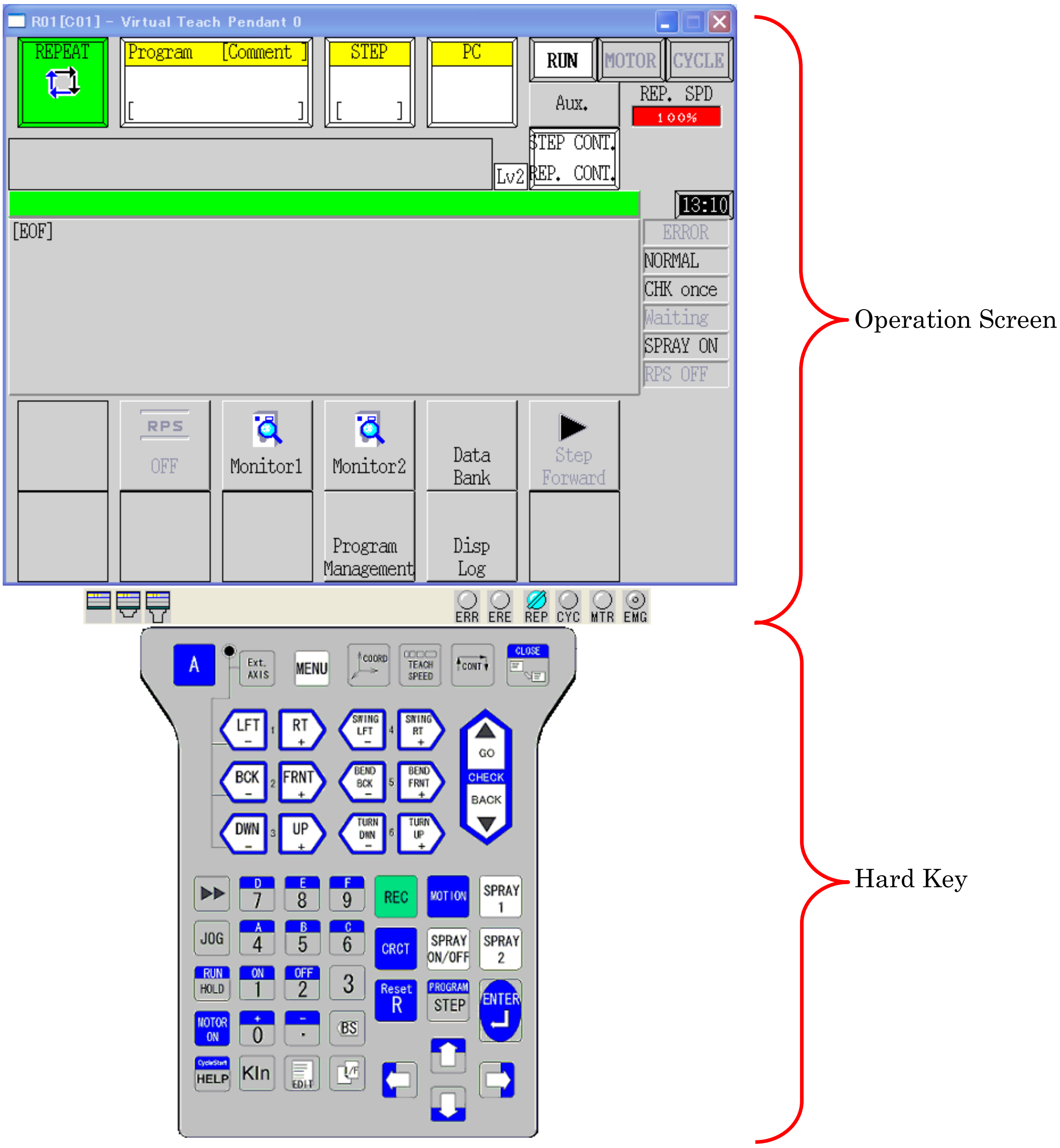
4.1.1.2 Virtual Teach Pendant (VTP)

This section describes Virtual Teach Pendant.
On Virtual Teach Pendant, advanced setting and monitoring motion similar to the actual Teach Pendant is available. It is operated by click operation of the mouse.

*

- Operation in Teach mode needs switching to teach mode as well as enabling robot animation.
- (For details, refer to the chapter of option settings.)
- Exceptionally, the robot is operated using the VTP interface panel in Repeat mode.

For the detail of operation of Teach Pendant, refer to robot operation manual.



- **Position Change of Hard Key**

  The position of the hard key can be changed by selecting [Position] from right-click menu.

- **PC-AS Link Exit**

  Click [Close] button on the Virtual Teach Pendant.

  Select [Exit] from right-click menu of the hard key.

- **Show and Hide of Pendant**

  Click [Minimize] button on Virtual Teach Pendant. (Displayed in toolbar)

  Click [Hide Pendant] of the controller. (Undisplayed in toolbar)

- **Controller**

  The controller has a function similar to the controller panel. (*Refer to “4 Robot Controller”.)

- **Hard key display switching**

The display of the hard key can be changed to hidden/simplified/normal.

- **Changing size of operation screen**

The size of the operation screen can be changed at 3 stages: small, medium, and large.
Refer to "5.11.1" for a changing method.

4.1.2 Online (Real robot)

Since V1.7.1, it is possible to connect with online robots.
Following functions can be used while connecting.

- Monitors real robot pose and conveyor location by displaying them on K-ROSET.
  Layout needs to be matched with the actual system.
- Monitor I/O signal status.
- Monitors condition of the controller operation panel.
- Monitors the information of the running program.
- Terminal operating system like KRterm and KCwin32.
- Obtain data from real robot controller.
- Transfers data in K-ROSET (program and variable) directly to real robot controller.

* Refer to the K-ROSET Online Function Manual for details.

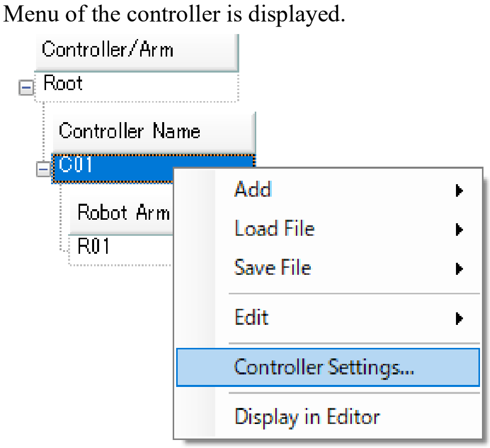
4.1.3 Connection with the controller

How to connect with the controller.

4.1.3.1 Connect through the controller setting

It can be connected with the controller from the setting screen of the controller.

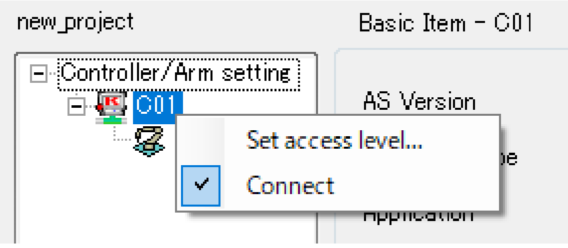
1 **Right-click Controller on the program table.**
Menu of the controller is displayed.



2 **Click [Controller Settings].**
Controller/Arm setting screen is displayed.

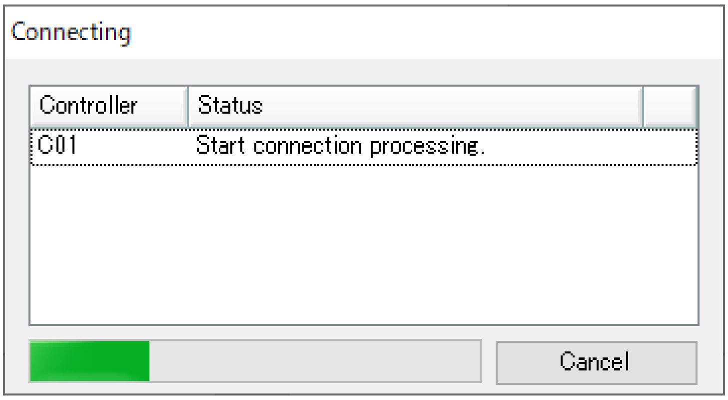
3 **Right-click on a controller name[C**] in [Controller/Arm Setting].**

Controller menu is displayed.



4 **Click Connect.**

It starts connection with the robot controller.



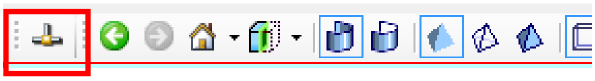
- Click Cancel in case you'd like to stop.

► 4.1.3.2 Connect through Connection settings screen

Since V1.7.1, it can be connected through Connection settings screen.

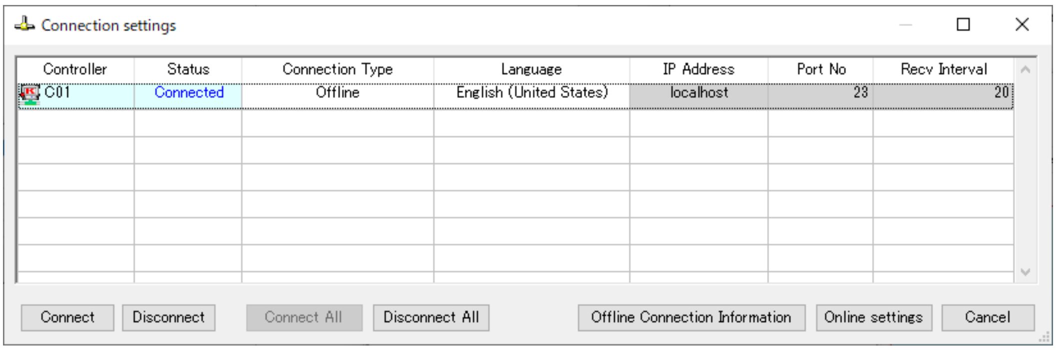
1 **Click Connection settings button.**

Connection setting screen is displayed.



2 **Click [Connect]**

Confirmation screen is displayed.



► List

- ➢ Controller/Status

  The name of the controller added to the project and its connection status will be displayed.

  For more information about icons, see 3.4 Layout Tab.

- ➢ Connection Type

  You can switch between offline and online.

- ➢ Language

  The language setting of the controller. The available languages for each controller will vary.

- ➢ IP address/Port No/Recv Interval

  Set or change for online connections. For details, see the K-ROSET Online Function Manual.

► Button

- ➢ Connect/Connect All

  Connect the selected controller or all controllers.

- ➢ Disconnect/Disconnect All

  Disconnect the selected connected controller or all controller connections.

- ➢ Offline Connection Information

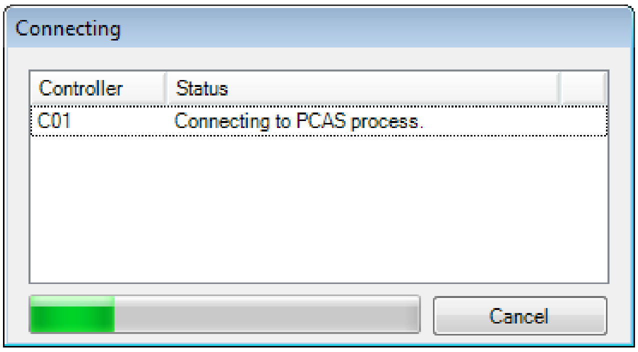
  Display a list of port numbers used for offline connections.

- ➢ Online Settings

  Set information to be monitored when connected online. For details, see the K-ROSET Online Function Manual.

3 Select [Yes] on the confirmation screen.

It starts connecting with robot controller.



4.1.4 AS version changing function

This function changes the AS version of a connected robot controller to another AS version. It can be changed to another AS version of the same application and controller type.

This function applies to controllers (PC-AS) connected offline. It is not available for controllers that are connected to the actual robot.

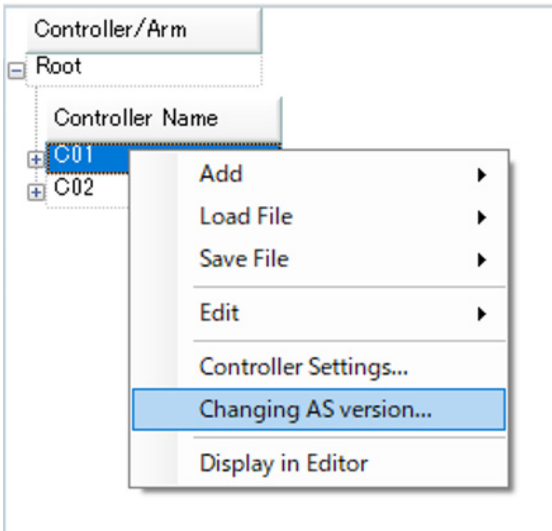
Also, if you change to an older version, normal operation is not guaranteed.

4.1.4.1 How to use the AS version changing function

This section explains how to use the AS version changing function.

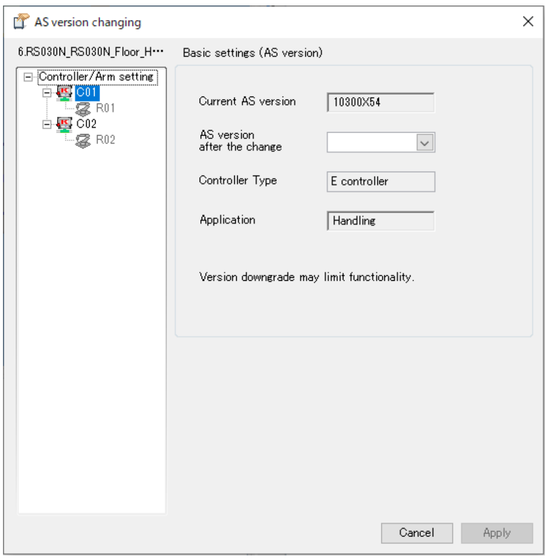
1 **Right click the controller in the program table.**

The controller menu appears.



2 **Click the “Changing AS version…”**

“AS version changing” screen appears.

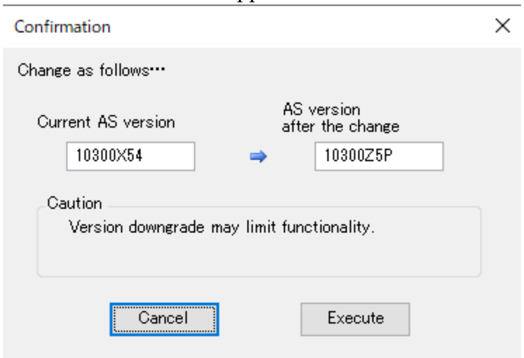


3 **Select the "AS version after the change."**

Apply button becomes clickable.

4 **Click the "Apply."**

"Confirmation" screen appears.



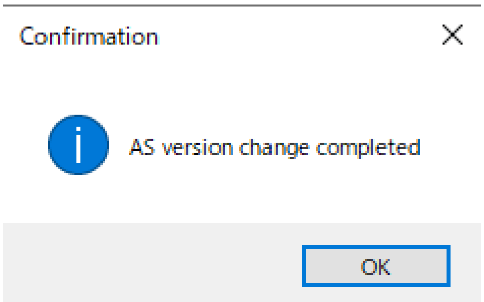
- Changing to an older version may result in limited functionality or errors.

5 **If you are satisfied with the contents of the "Confirmation" screen, click "Execute."**

AS version changing is performed.

The following completion pop-up appears when complete. Click OK to return to the "AS version changing" screen.

- When the AS version changing is performed, restart the controller twice.
  Aborting the restart interrupts the change process and does not change the version. If you want to change it again after an interruption, close the AS version changing screen once, reconnect the controller, and try again.



► 4.1.4.2 Backup of settings files

Refer to 1.5.5 about project folder structure.

➢ **Backup of controller settings**

The AS version changing function automatically creates a backup of the controller settings. Backups are stored in files with the date synced to each robot folder "¥Backup" in the project folder. Check the option settings (see 5.11.1.7) for the number of files to be backed up.

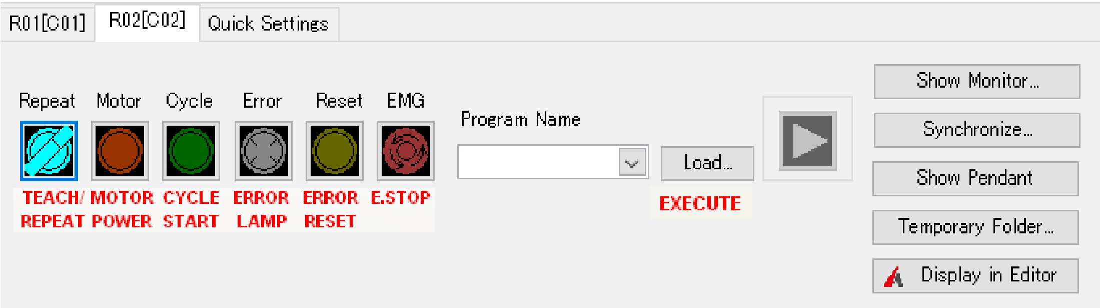
If you need to change the controller settings back to before the AS version changing, load the above backup file into the controller. After loading, synchronize the data from the controller to the K-ROSET side. Refer to 4.2 about synchronization.

4.2 Controller

This section describes Controller.

Controller is used to load a program created by the program table, or start/play/stop the terminal.

- It is necessary to start Virtual Robot Controller (PC-AS) when controller tab of robot name is disable. Refer to Controller settings.



➢ **TEACH/REPEAT (Teach/Repeat switch)**

Teach mode/Repeat mode is switched by clicking mouse.

➢ **Motor (Motor Power button/lamp)**

Motor power is on by clicking mouse.

➢ **Cycle (Cycle Start button/lamp)**

Lamp is lighted up when simulating in the state of repeat mode.

➢ **Error (Error lamp)**

Lamp is lighted up when errors occur.

➢ **Reset (Error Reset button)**

Clicking this button in the state of error, it can be awoken. However, the error continued can’t be awoken.

➢ **EMG (E.STOP)**

Clicking this button in emergency, Robot stops the motion.

➢ **Load…**

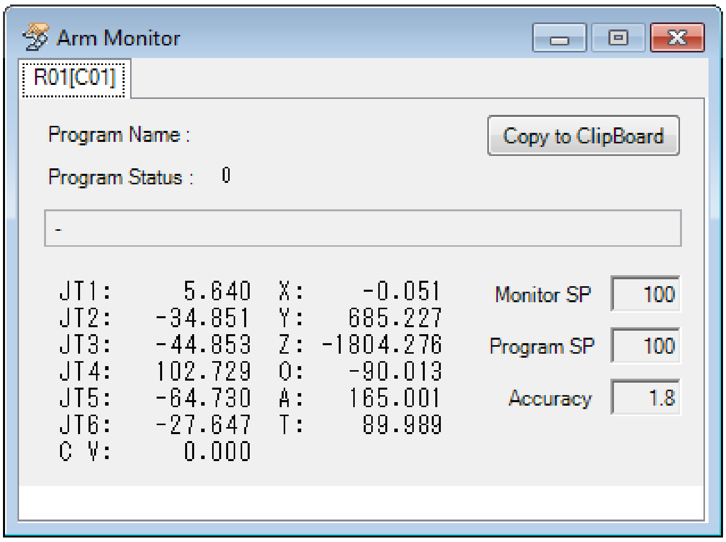
Forward program to the controller.

➢ **EXECUTE**

Click this button after forwarding program and then program is played.

Show Monitor

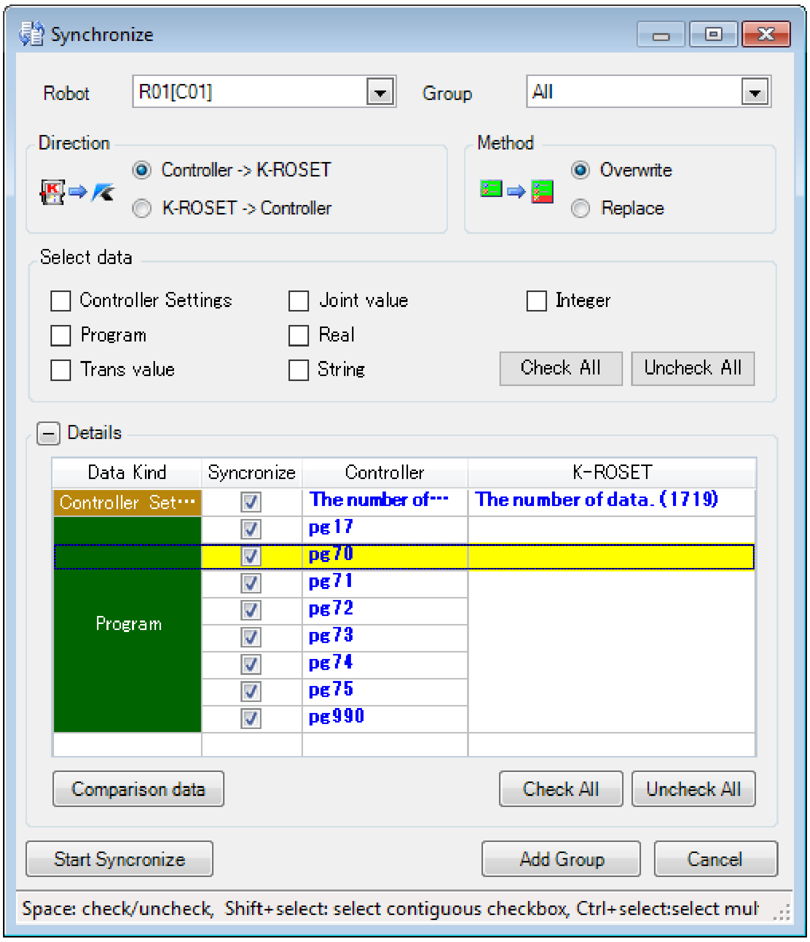
Status monitor for displaying value of joint value, step information is shown.



► Synchronize

It is possible to synchronize the settings made on the PC-AS side with those of the controller on the project side, and vice versa to reset the settings on the PC-AS side.

Since V1.7.1, screen operation of synchronize has been changed. There are 7 parts; [Controller settings], [Program], [Trans value], [Joint value], [Real] ,[String] and [Integer]. More detailed data can be forwarded and loaded.



➢ Robot

Select a target robot to synchronize.

- **Direction**

  [Controller-> K-ROSET]

  Synchronize from controller to K-ROSET project.

  [K-ROSET ->Controller]

  Synchronize from a K-ROSET project to controller

> * Since V1.7.1, when synchronizing from K-ROSET to controller, backup of controller side is automatically saved. It saved in each robot folder ¥Backup of project folder with synchronized date. File amount for backup can be checked in option settings.

- **Group**

  Select a group that has target program and variable to synchronize or save.

- **Add group**

  Create a group to save program and variable of target program to synchronize.

  When synchronizing K-ROSET and controller, a group of date name is not created automatically since V1.7.1 as basically the purpose is changing same program.

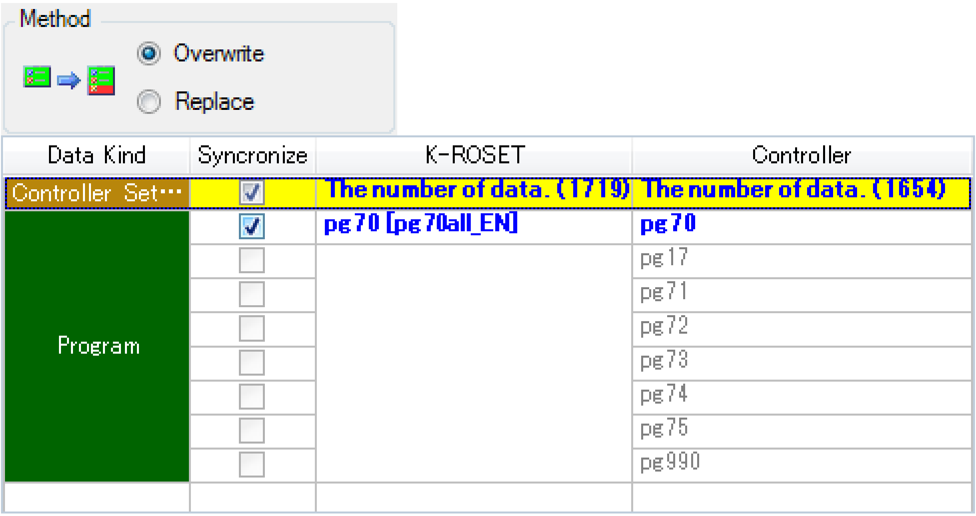
  It needs to be added in advance by group add button.

> * Group default name is date.

- **Method**

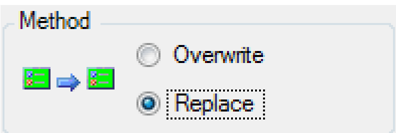
- Overwrite

  While keeping current data, update data of same name.



- Replace

  Delete current data and forward new data.



Data Kind	Syncronize	K-ROSET	Controller
Controller Set…	☑	The number of data.(1719)	The number of data.(1654)
Program	☑	pg70 [pg70all_EN]	pg70
	☐		pg17
	☐		pg71
	☐		pg72
	☐		pg73
	☐		pg74
	☐		pg75
	☐		pg990

⚠ Warning

Data might be lost. Make sure to have backup before executing.

➢ **Select Data**

Select category of data to be synchronized.

➢ **Details**

Mark items to be synchronized.

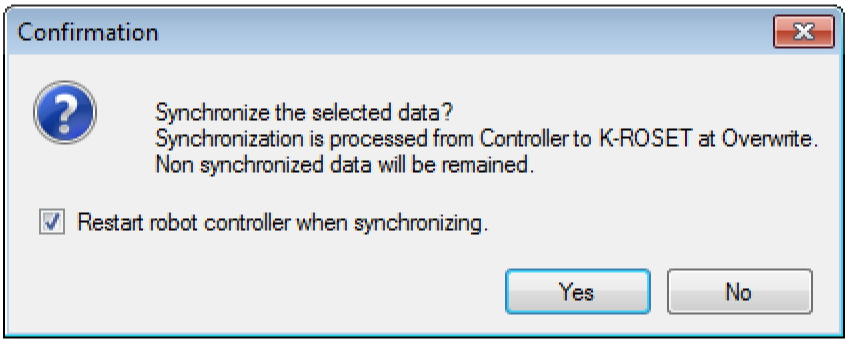
Data Kind	Syncronize	Controller	K-ROSET
Controller Settings	☑	The number of data.(1654)	The number of data.(1719)
Program	☑	pg17	pg17
	☑	pg70 [pg70all_EN]	pg70 [pg70all_EN]
	☐	pg71	pg71
	☐	pg72	pg72
	☑	pg73	pg73
	☐	pg74	pg74
	☑	pg75	pg75
	☑	pg990	pg990

*
- Multiple items can be selected by Ctrl and Shift key on the keyboard.
- Mark can be switched by Space key on the keyboard.

➢ **Start synchronize**

Start synchronization operation.

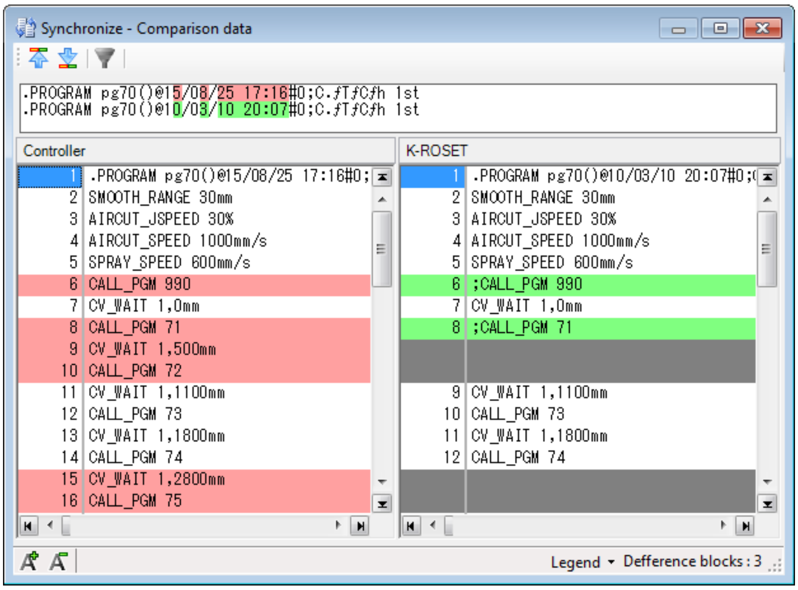
When controller ->layout, control power turns off/on by marking [Restart robot controller when synchronizing].



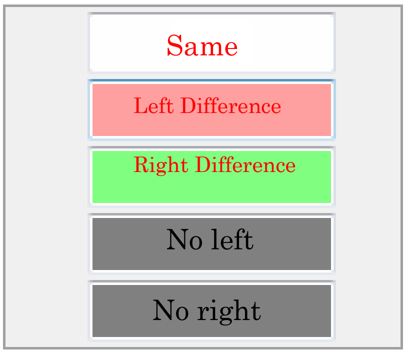
- **Comparison data**

Since V1.7.1, data of controller and K-ROSET can be compared. It can be checked in advance where to modify and what kind of program to forward.

Changing parts are shown in red and green background color like below.



Background colors have following meanings.



- Display when clicking legend in the lower right.

Move to the previous different block

Scroll text to the top of the closest different block in higher lines than current selected line.

- It can be moved by F7 key on the keyboard.

Move to the next different block

Scroll text to the top of the closest different block in lower lines than current selected line.

- It can be moved by F8 key on the keyboard.

Display only different blocks

Sort and display only different blocks of text.

-  icon is displayed while extracting.
- Omitted lines are shown as [---].

Expand font size

Expand displaying size of text.

- It can be expanded by Ctrl+Alt++ key on the keyboard.is

Contract font size

Contract displaying size of text.

- It can be contracted by Ctrl+Alt+- key on the keyboard.

Show Pendant

Switches whether to display or hide virtual teach pendant.

Work folder

Display the work directory which is used in Teach Pendant. The data will be stored in the following folder when entire data is saved on the Teach Pendant or data is saved in data storage. Work folder button in the controller tab can directly open the explorer dialog.

New)

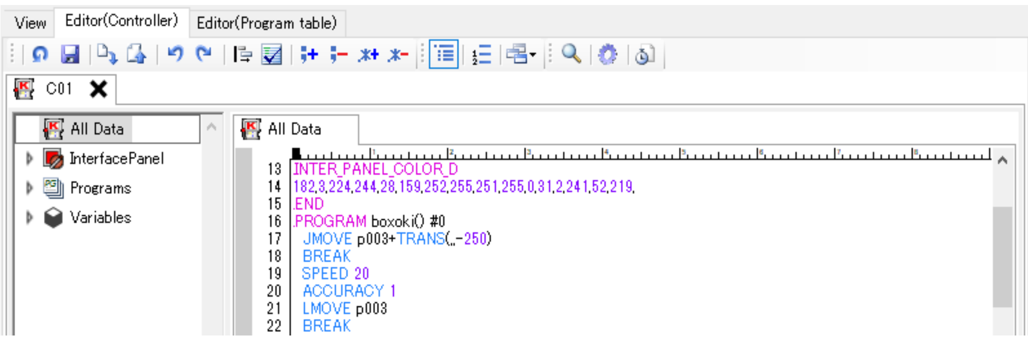
(Project folder which is currently in use) ¥temporary¥folder with last update date

Previous)

(K-ROSET installation folder) ¥system¥pcas¥temporary¥ folder with last update date

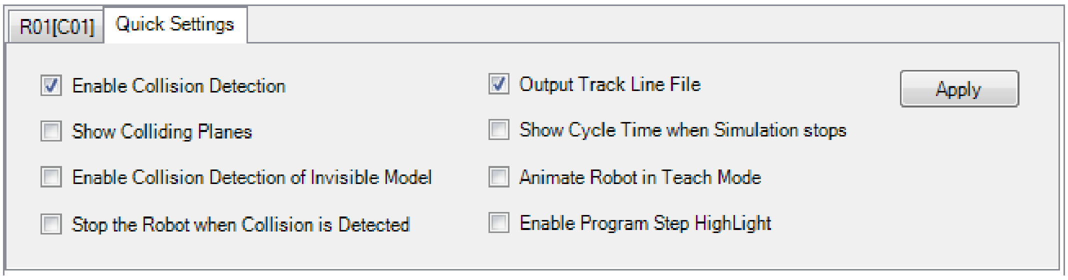
Display in Editor

Program, variable and interface panel data of the controller will be displayed in the Editor(Controller) view.



Quick Settings Synchronize

In Quick Settings Tab, the setting of the screen rendering in simulation is carried out.



- **Enable Collision Detection**

  Sets whether the point interfered during simulation are displayed.

- **Show Colliding Planes**

  Displays the detailed interfering part when interfering. The interfered model itself highlights when unchecked.

- **Enable Collision Detection of Invisible Model**

  Sets whether to include the invisible models to the collision check or not.

- **Stop the Robot when Collision is Detected**

  Stops the robot at the interfering position during simulation.

- **Output Track Line File**

  Sets whether the track line file is output after simulation exits.

- **Show Cycle Time when Simulation stops**

  After executing program, cycle time is automatically displayed.

  - A cycle time is displayed with placing this check mark.

- **Animate Robot in Teach Mode**

  When a check mark is placed, a robot can be stepped forward/backward with a virtual teach pendant by switching to a teaching mode.

- **Enable Program Step HighLight**

  When a check mark is placed, the program step of the program screen can be highlighted in simulation motion according to the running step.

4.2.1 Repeating Program

This section describes the method to replay an AS program.

1 **Select the Controller at the bottom of the screen.**

2 **Select the tab of a robot name.**

3 **Enter the REPEAT mode[ ](right side).**

4 **Turn ON the motor. [ ](light a lamp).**

5 **Press the [Load…] button.**

6 **A dialog to choose a file will be opened. Select a program file that you wish to execute.**

7 **Programs in the program file are listed. Select the target program.**

8 **Press the [ ] button.**
To repeat the AS programs for multiple robots simultaneously, execute extended applications simultaneously.
The turbo mode is usable as an advanced setting. Using this mode makes it possible to execute simulation at a high speed.
The procedure of setting the turbo mode is described below.

4.2.2 Control power OFF/ON

When a recommendation message is shown on the pendant to turn OFF/ON control power, operate as follows.

1 **Click synchronization button.**
Synchronization operation screen is displayed.

2 **Confirm controller -> K-ROSET and click controller settings and other necessary category for synchronization in data selection.**
Controller settings and designated categories are marked.

3 **Click start synchronization.**
Confirmation screen is displayed.

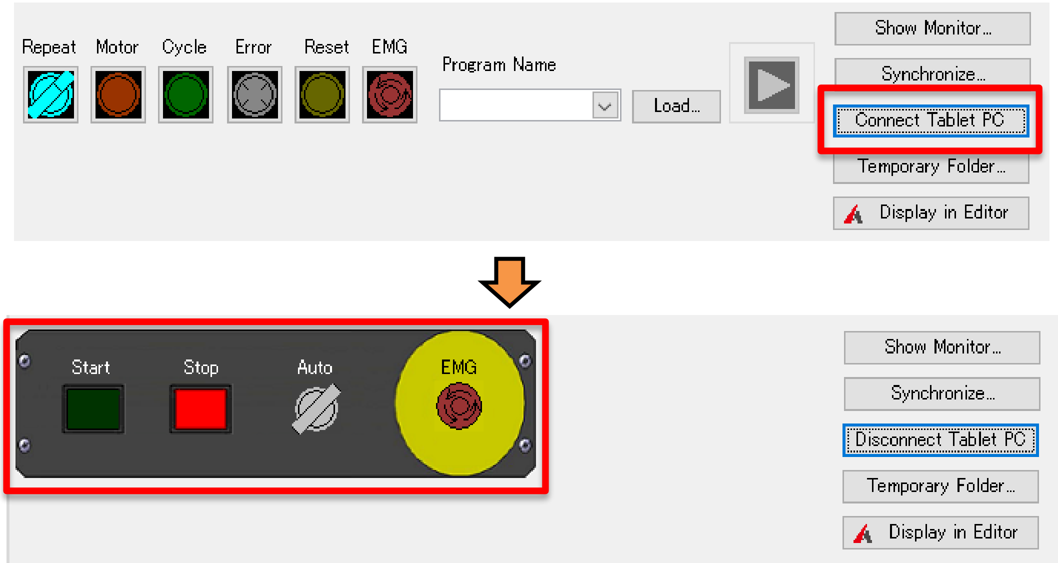
4 **Mark [Restart robot controller when synchronizing] and click [Yes].**
After forwarding controller settings to K-ROSET, virtual controller is restarted.

4.2.3 [duAro] for Tablet connection

A panel to connect duAro in K-ROSET with a tablet is displayed in V1.7.2 and later.

Clicking on the “Connect Tablet PC” will switch the panel display.

- duAro for tablet connection model is required to be added to the program in order to connect with a tablet.
- Please refer to the K-ROSET duAro Project Manual for detailed connection procedure.



- **Start**

  Click and hold on the button under Auto mode will execute a program which is created using a tablet.

- **Stop**

  Stops the running program.

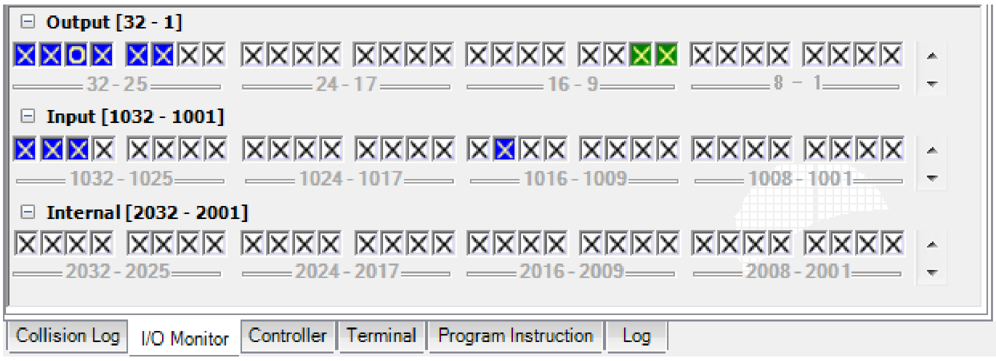
- **Auto/Manual**

  Manual: Allows user to operate a robot using tablet.

  Auto: Does not allow user to operate a robot using tablet.

4.3 I/O Monitor

This section describes IO Monitor.



In IO Monitor, input/output signal of each robot can be displayed and controlled.

- **Display**

Input signal [1-256], output signal [1001-1256] and internal signal [2001-2512] can be switched by clicking spin-control.

- **Control**

On/Off of signal can be switched by clicking each signal box.

- Moving mouse cursor to a signal box, signal number is popped up.
- There are previously-used signals as follow.

Green: Signal depended application (Robot controller).

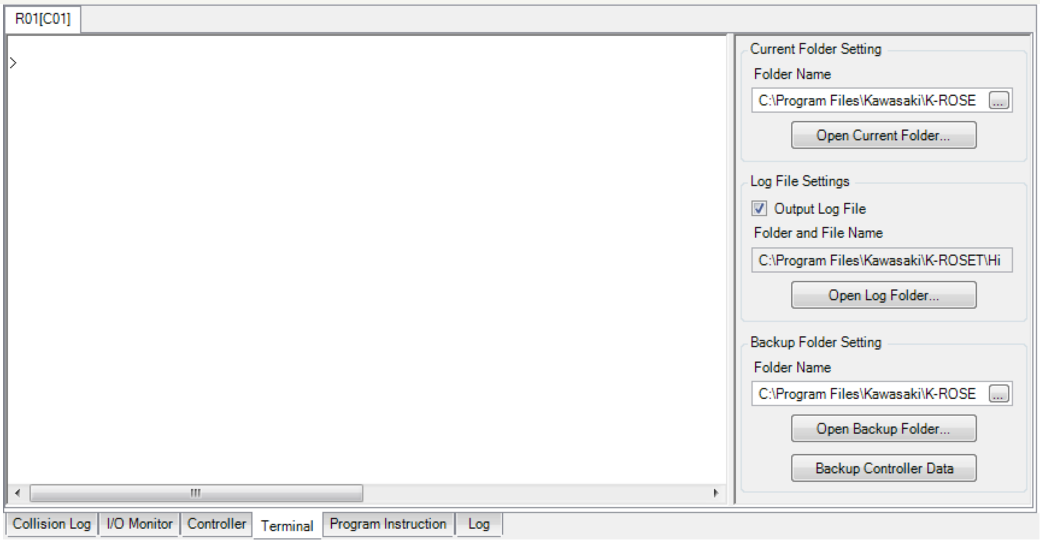
Blue: Signal defined as common dedicated output signal.

4.4 Terminal

This section describes Terminal.

In Terminal tab, AS commands can be executed.

- For details of AS Language, refer to "AS Language Practical Guide."



Current Folder Setting

- **Folder Name**

  Target path for saving/loading of the file used in terminal is set.

- **Display Explore..**

  Click to display Explore of the set path.

Log File Settings

- **Output Log**

  Data input in terminal is output. Place a check mark to output.

- **File and Folder Name**

  Target path and file name for outputting a terminal log is set.

- **Display Explore…**

  Click to display Explore of the set path. Default of file name is date of operation.

- Path is saved when the project is saved. When the project is read at other terminal, a folder is created at the specified folder.

Backup folder settings

- **Folder Name**

  Set target path to save backup.

- **Open Backup Folder**

By clicking, explorer of the set path is displayed.

- **Backup Controller Data**

Execute backup. File name is date of data capturing.

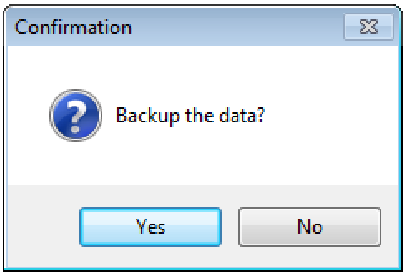
- Path is saved when project is saved. When project is loaded by other device, folder is created in the designated path.
- Backup data amount can be checked in option settings.

4.4.1 Backup

When a message is appeared on the pendant and suggest to turn OFF/ON control power, operate as follows.

1 Click data backup button.

Confirmation screen is displayed.



2 Click Yes.

Data is saved in the backup folder.

Memo

5 Extended applications

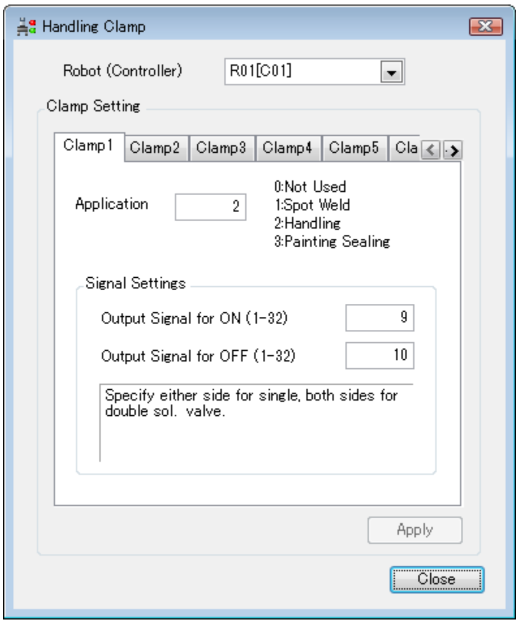
This section describes extended applications.

Extended applications are the extended functions which are usable in addition to the standard K-ROSET functions. Users are allowed to create extended applications by themselves in addition to accessory applications.

5.1 Handling

5.1.1 Handling clamp

Set clamp signal of the robot for handling application.



➢ **Robot (Controller)**

Select an object robot for setting.

Clamp setting

➢ **Application (Clamp setting)**

It is possible to check and set an application type of the object robot. The clamp animation setting is valid when there are 2 handling.

It sets application type to use clamp signals for.

“2:Handling” needs to be selected to “Application” of the [Clamp No. settings] in the [Setup of ClampZone] dialog.

➢ **“ON” definition signal**

Set signals to be used in clamp. Chuck motion is adjusted by clamp animation settings.

It assigns the signals to use for Clamp.

You can set detailed settings of the clamping in the ClampAnimation Setting.

➢ **“OFF” definition signal**

Set signals to be released at the time of double solenoid. With the setting signal ON, the attached workpiece is detached and released. Release motion is adjusted by clamp animation settings.

It assigns signals to release clamping for double solenoid.

When the assigned signal goes ON, the attached workpiece to the robot will be detached.

You can set the detailed settings of the clamp in the ClampAnimation Setting.

► 5.1.1.1 Clamp Settings

This section describes detailed settings of the workpiece clamping action.

➢ **Work nearest to parent model**

1 **Go to [Plug-ins] and then [Handling Clamp].**

Handling Clamp dialog will appear.

2 **Setup the settings of Clamp1 and Clamp2 in Clamp Setting to be as follows.**

Clamp1 ··· Application:2, Outoput Signal for ON:9, Output Signal for OFF:10

Clamp2 ··· Application:2, Output Signal for ON:11, Output Signal for OFF:12

3 **Click on [Apply] button for Clamp Setting.**

Calmp settings will be applied to controller.

4 **Right-click on the Tool icon [ ] in the tree.**

Tool menu will appear.

5 **Go to [Add]-[Environment]-[ClampZone] in the menu.**

Setup of ClampZone dialog will appear.

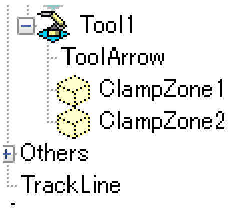
6 **Set the Signal Settings to Clamp No. 1.**

Click to select [Clamp No.] and select “1” from the dropdown list.

7 **Click to select [Work nearest to parent model] to [Method to Clamp] in ClampAnimation Setting.**

8 **Click [OK].**

ClampZone icon [ ] (1st) will be added as “ClampZone1” under the selected tool in the Layout and ClampZone model will appear in the View.



9 **Right-click on the Tool icon [ ] in the tree.**

Tool menu will appear.

10 **Go to [Add]-[Environment]-[ClampZone] in the**

Setup of ClampZone dialog will be displayed.

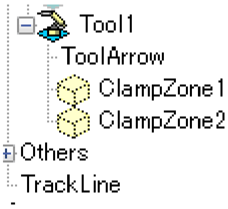
11 **Set the Signal Settings to Clamp No.2.**

Click to select [Clamp No.] and select “2” from the dropdown list.

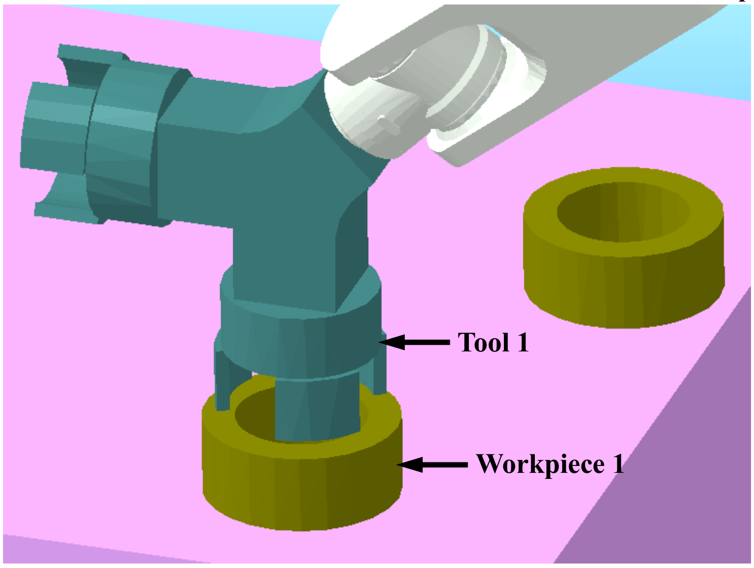
12 **Click to select [Work nearest to parent model] to [Method to Clamp] in ClampAnimation Setting.**

13 **Click [OK].**

ClampZone icon [ ] (2nd) will be added as “ClampZone2” under the selected tool in the Layout and ClampZone model will appear in the View.

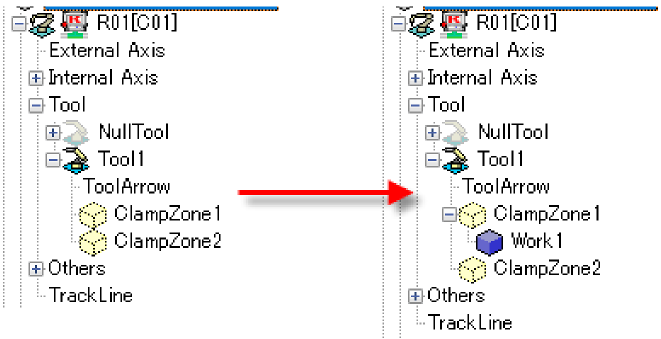


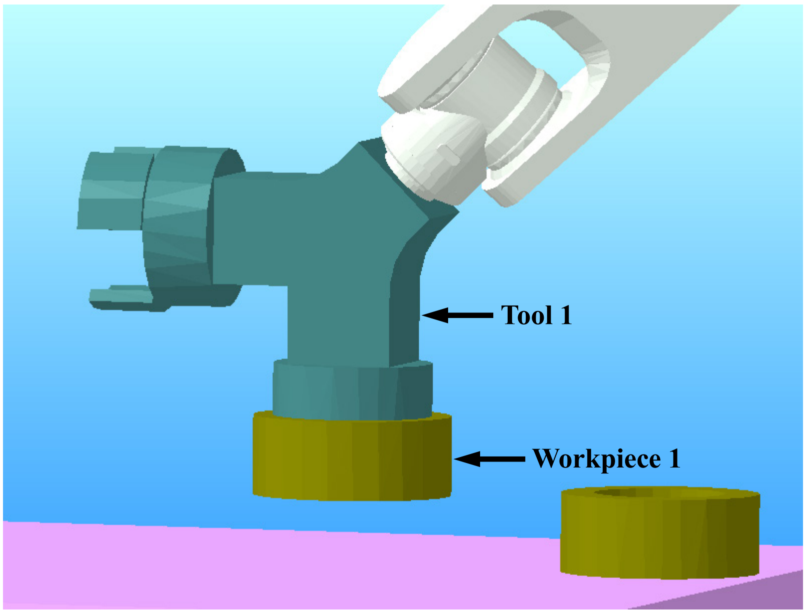
14 **Move the robot model in order for the Tool1 to be close to the Workpiece1.**



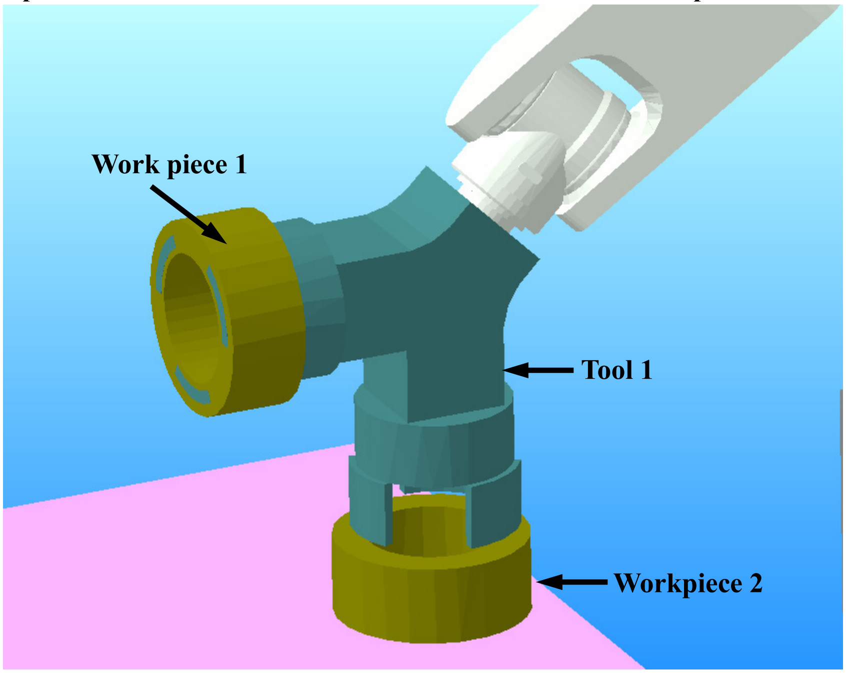
15 **Turn ON the signal No. 9 and OFF the signal No. 10 by using either Clamp command or IO monitor.**

Workpiece1 will be attached to the ClampZone1 (Clamped state).



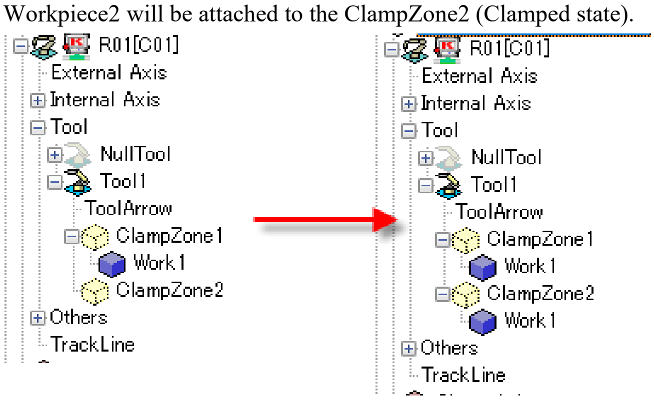


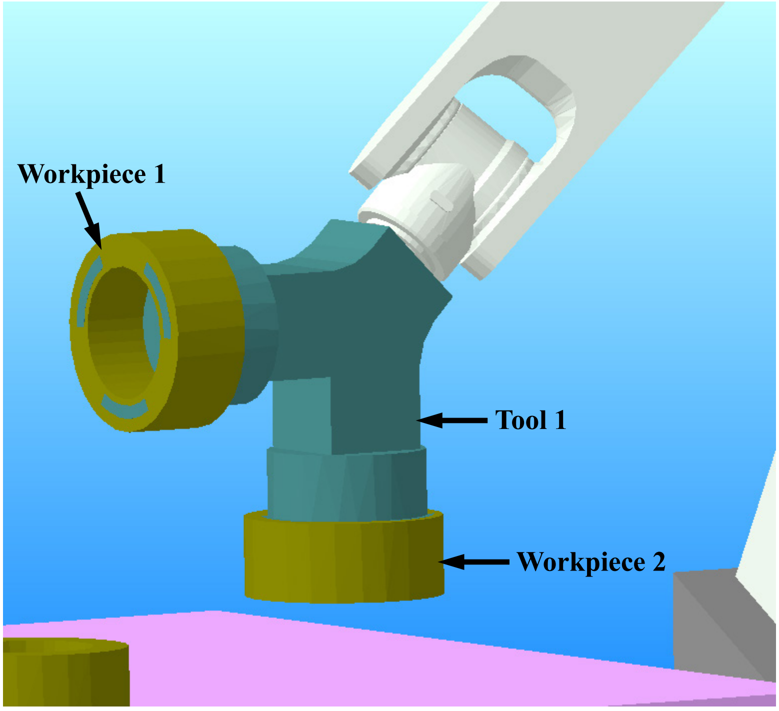
16 **Operate the robot in order for the Tool2 to be close to the Workpiece2.**



17 **Turn ON the signal No. 11 and OFF the signal No. 12 by using either Clamp command (Open/Close) in AS program or IO monitor.**

Workpiece2 will be attached to the ClampZone2 (Clamped state).





➢ **Work nearest the inside of ClampZone**

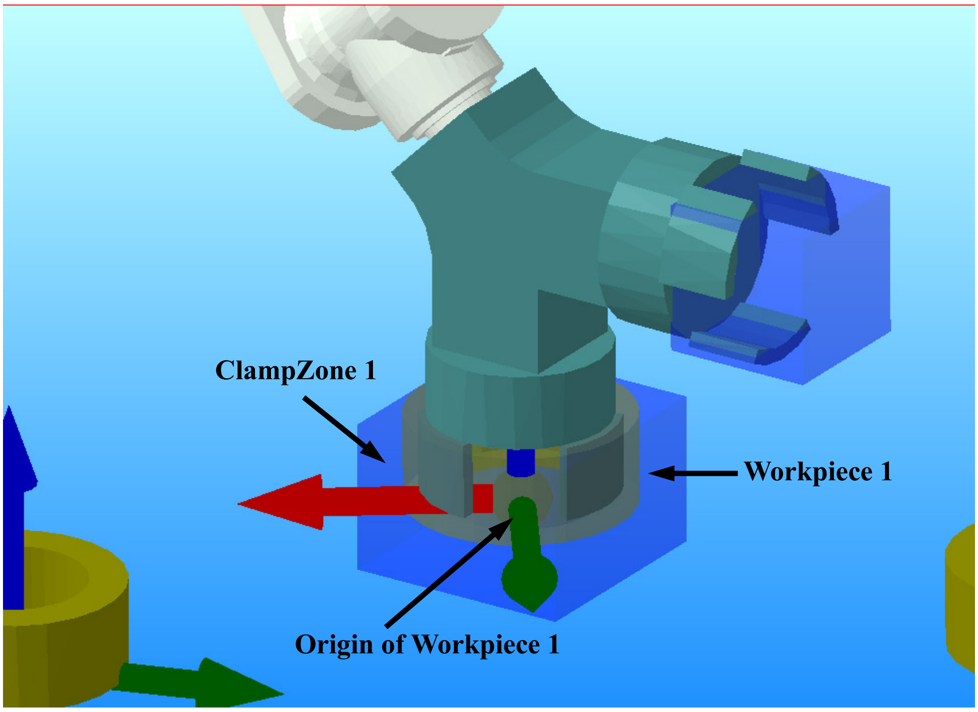
1 **Here use the "ClampZone1" created in the procedure for [Work nearest to parent model] to explain. Click to select [Work nearest the inside of ClampZone] in [Method of Clamp] in ClampAnimation Setting of the "ClampZone1".**

2 **Adjust value of Effective Zone in order for workpiece origin to be inside the cube of "ClampZone1" when clamp signal goes ON and click [OK].**
Size of the ClampZone model at the tool end in the View will be updated.

3 **Click to select [Work nearest the inside of ClampZone] in [Method of Clamp] in ClampAnimation Setting of the "ClampZone2".**

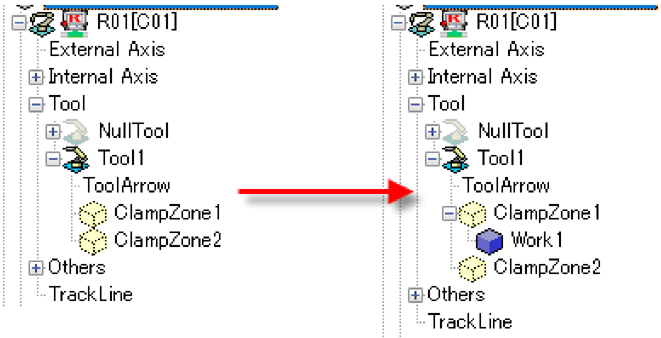
4 **Adjust value of Effective Zone in order for workpiece origin to be inside the cube of "ClampZone2" when clamp signal goes ON and click [OK].**
Size of the ClampZone model at the tool end in the View will be updated.

5 **Operate the robot in order for the origin of workpiece1 to be inside the cube of the "ClampZone1".**

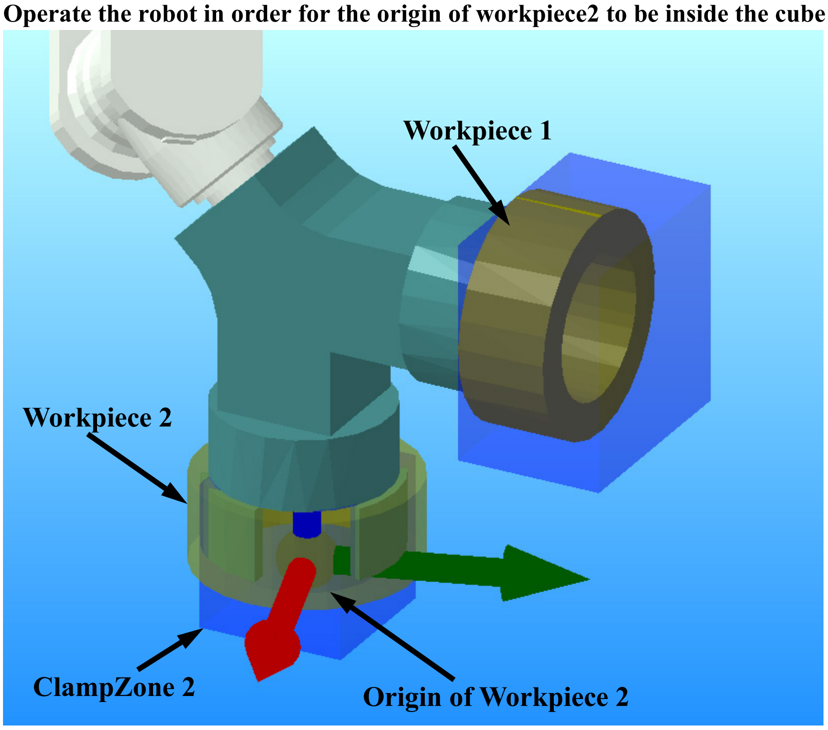


6 **Turn ON the signal No. 9 and OFF the signal No. 10 by using either Clamp command or IO monitor.**

Workpiece1 will be attached to the ClampZone1 (Clamped state).

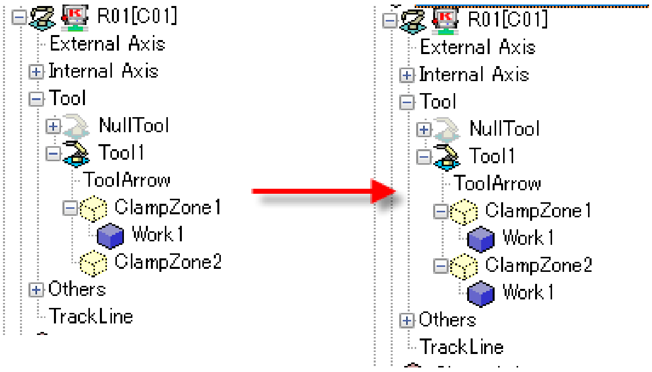


7 **Operate the robot in order for the origin of workpiece2 to be inside the cube of the “ClampZone2”.**



8 **Turn ON the signal No. 11 and OFF the signal No. 12 by using either Clamp command (Open/Close) in AS program or IO monitor.**

Workpiece2 will be attached to the ClampZone2 (Clamped state).



► 5.1.1.2 How to set the settings for unclamping

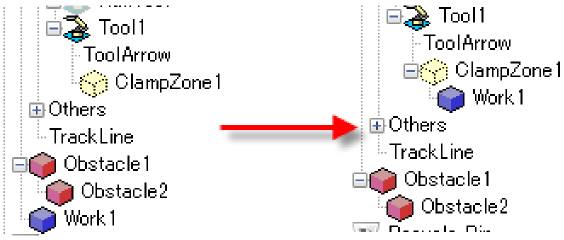
This section describes detailed settings of the clamped workpiece releasing action.

➢ **Original Position**

1 **Click to select [Original Position] in the ClampAnimation Setting section of the “Setup of the ClampZone” dialog for “ClampZone1” and click [OK].**

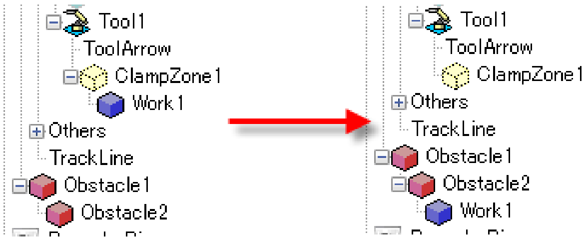
2 **Robot clamps the Workpiece1 by following the procedure described in [Work nearest to parent model].**

Workpiece1 will be attached to the ClampZone (Clamped state).



3 **Turn OFF the signal No. 9 and ON the signal No. 10 by using either Clamp command or IO monitor.**

Clamped workpiece will be attached back to the original parent model.

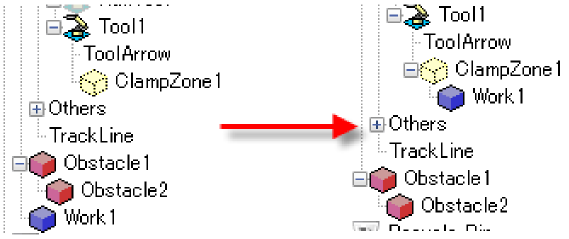


➢ **Conveyor or obstacle (Inside of ClampZone)**

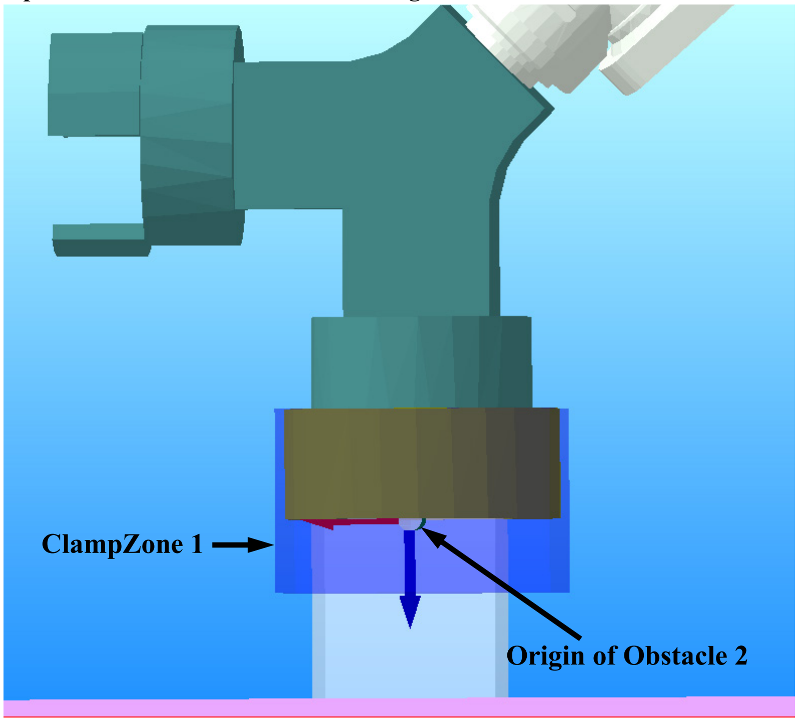
1 **Click to select [Conveyor or obstacle(Inside of ClampZone)] in the ClampAnimation Setting section of the “Setup of the ClampZone” dialog for “ClampZone1” and click [OK].**

2 **Make robot to clamp the Workpiece1 by following the procedure described in [Work nearest the inside of ClampZone].**

Workpiece1 will be attached to the ClampZone (Clamped state).

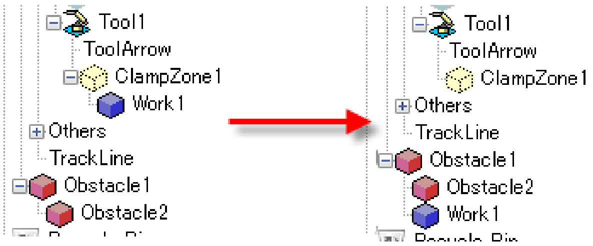


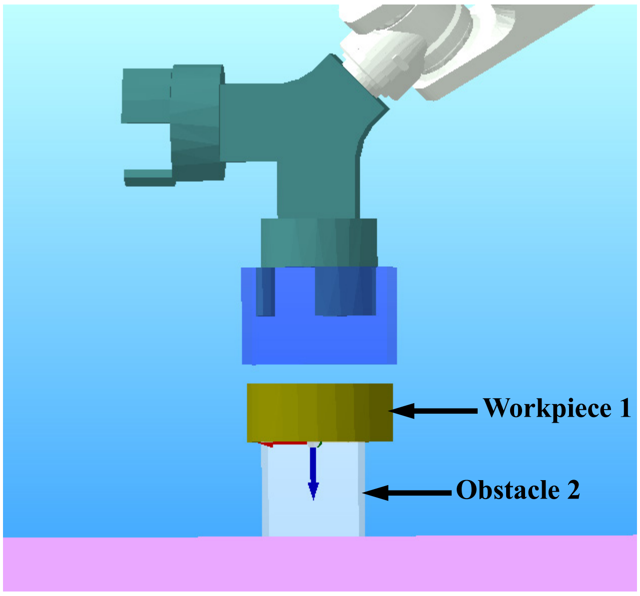
3 **Operate the robot in order for the origin of Obstacle2 to be inside the cube of the “ClampZone1”.**



4 **Turn OFF the signal No. 9 and ON the signal No. 10 by using either Clamp command or IO monitor.**

Clamped workpiece will be attached to the Obstacle2.



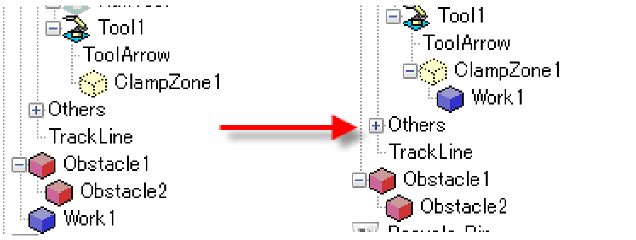


➢ **Conveyor or obstacle(Collision to Work)**

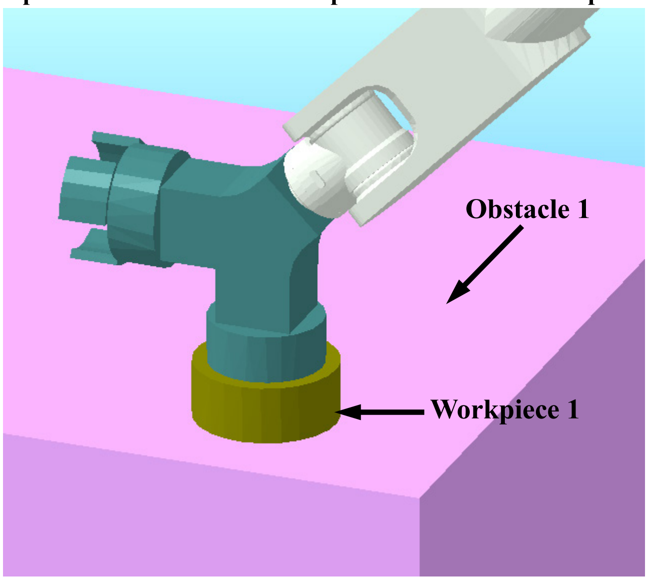
1 **Click to select [Conveyor or obstacle(Collision to Work)] in the ClampAnimation Setting section of the "Setup of the ClampZone" dialog for "ClampZone1" and click [OK].**

2 **Make robot to clamp the Workpiece1 by following the procedure of [Work nearest the inside of ClampZone].**

Workpiece1 will be attached to the ClampZone (Clamped state).



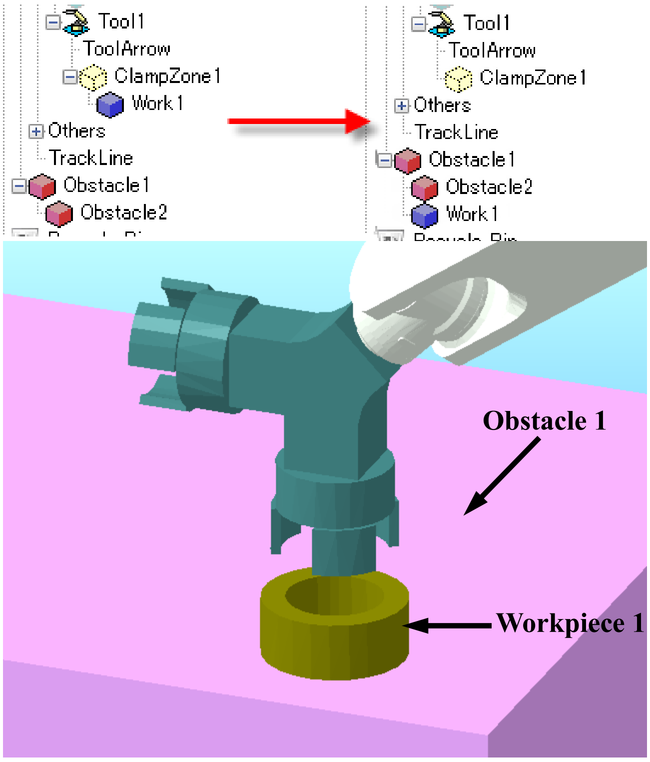
3 **Operate the robot to be in the position where the clamped workpiece and Obstacle1 to be collided.**



● Collision pair does not need to be registered in the Collision Check dialog.

4 Turn OFF the signal No. 9 and ON the signal No. 10 by using either Clamp command or IO monitor.

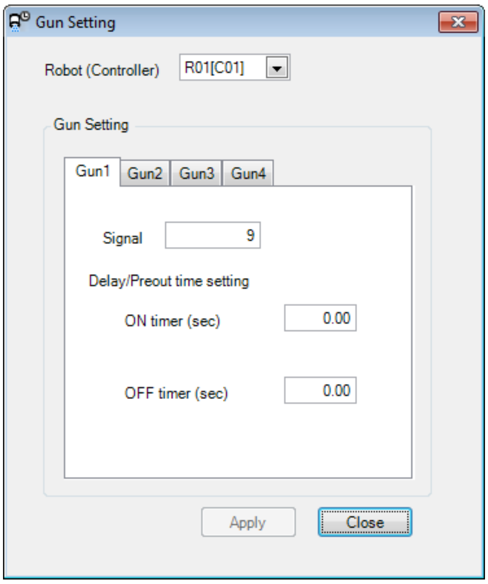
Clamped workpiece will be attached to the Obstacle1.



5.2 Paint/Sealing

5.2.1 Gun setting

In gun setting, precede/delay time of ON/OFF of paint signal can be set.



- **Robot (controller)**

  Select a target robot to set.

* Position can be adjusted by layout.

- **Gun**

  Select a tab of gun number to set.

- **Signal**

  Set ON definition signal of selected gun of target robot.

- **ON timer (sec)**

  Set time from sending ON signal of gun to the timing of start of paint/sealing. When value more than 0 is set, as delay time, paint/sealing is started after ON correction time of signal sending timing. When value less than 0 is set, as precede time, paint/sealing is started before ON correction time of signal sending timing. Range of set value is -9.99～9.99(sec).

- **OFF timer (sec)**

  Set time from sending OFF signal of gun to the timing of finish paint/sealing. When value more than 0 is set, as delay time, paint/sealing finish after OFF correction time of signal sending timing. When value less than 0 is set, as precede time, paint/sealing finish before OFF correction time of signal sending timing. Range of set value is -9.99～9.99(sec).

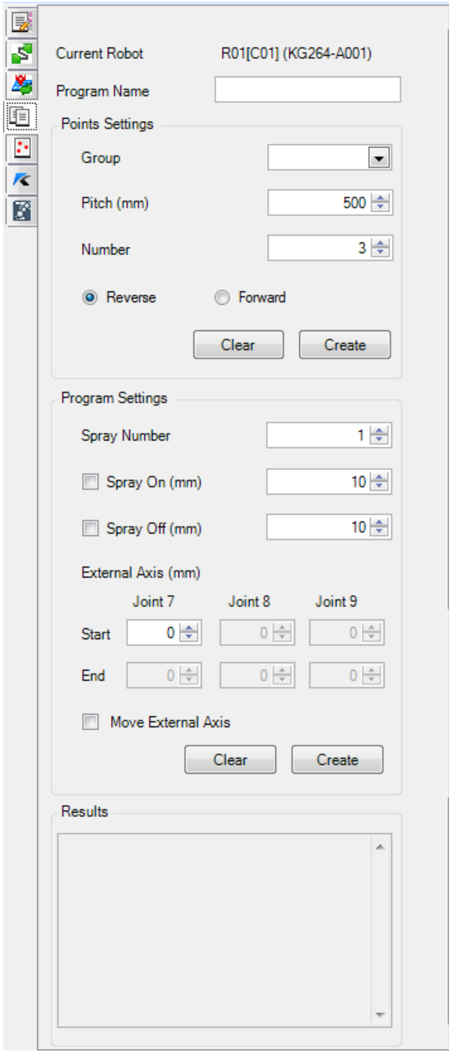
- **Apply**

  Decide settings.

* Required to restart controller to change settings.

5.2.2 Create Painting Program (Copy)

To create a teaching program which repeats the same pattern more than once, for example, painting a wall, using the PaintPathCopy function allows you to create a program easily.



This section describes each item.

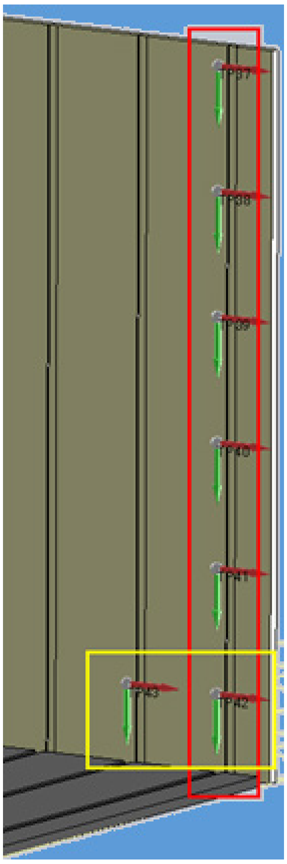
Current Robot : The target robot of creating a teaching point and a teaching program is displayed.

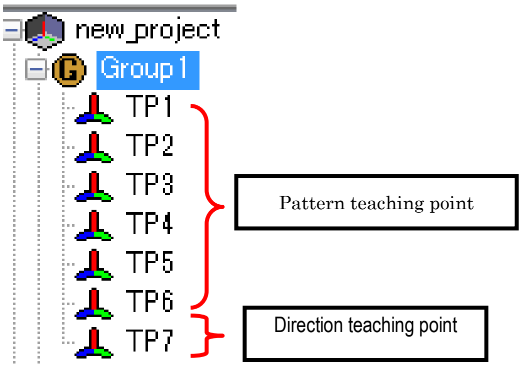
Program name : The name automatically assigned when a program is created. This is “(group name).NewGroup” by default.

Settings for teaching point automatic creation

group : Specify a group containing the teaching points that you wish to make a pattern. It is necessary to contain the teaching points that you wish to make a pattern (red frame), and the ones that specifies a direction (yellow frame) in the group.

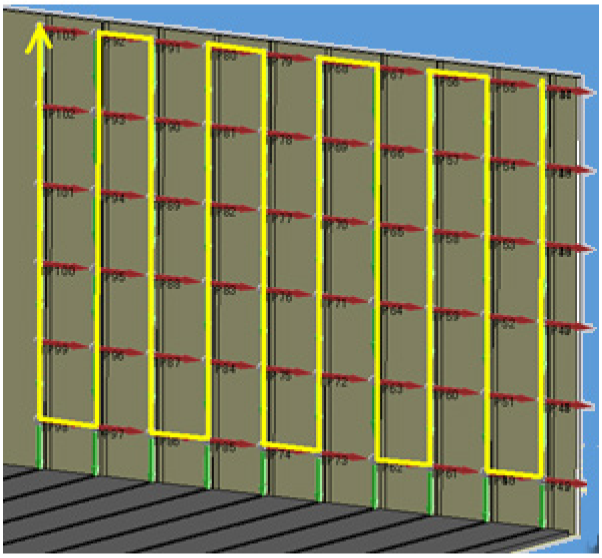
* Pattern teaching point comes top and direction teaching point comes bottom in layout of group.



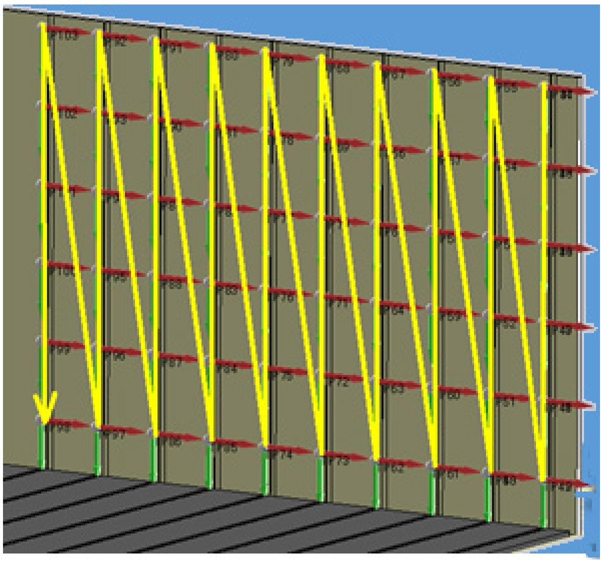

new_project
Group1
TP1
TP2
TP3
TP4
TP5
TP6
TP7
Pattern teaching point
Direction teaching point

Pitch (mm): Specify an interval of the target teaching points of patterning in mm.
Number: Set how many times the pattern is repeated.
Direction : For the direction taught in a pattern when the pattern is created repeatedly, select from reverse or normal direction.

Reverse direction A method to create teaching points so that teaching goes from the last point to the first point in the reverse direction after going from the first to the last points in a pattern.



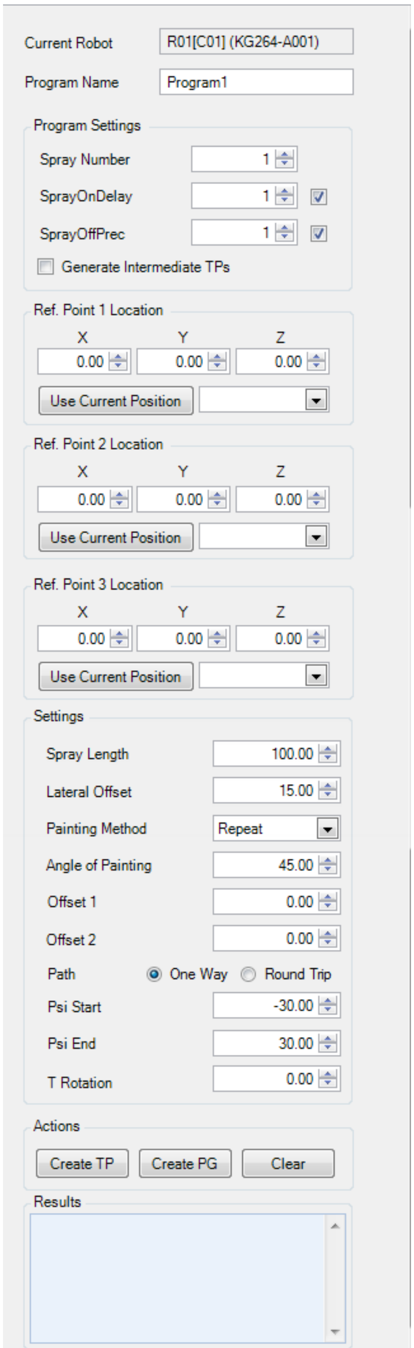
Normal direction A method to create teaching points so that teaching always goes from the first point to the last point in a pattern in a fixed direction (normal direction).



[Create] button Creates the group and teaching points contained in it according to the settings above.
[clear] button Erases all the created teaching points by group.

5.2.3 Create Painting Program (3 Points)

Only the teaching points belonging to the group directly below the project can be selected. Setting any three points, teaching point is created on the basis of three points teach method.



➤ **Setting of Program Create**

Current Robot……Target robot is displayed.

Program Name……Created teaching Point group or program name is displayed.

Spray Number……Signal number for spray instruction is set.

Spray On Delay……Injection delay of spray is set.

Spray Off Prec…… Off preceded time of spray is set.

Generate Intermediate TPs……Intermediate teaching point is outputted.

➤ **Ref. Point Location**

[Use Current Position]……Tool coordinate current robot is obtained.

- **Settings**

Splay Length……Pitch of creating teaching point is set.
Lateral Offset……Offset distance is set.
Painting Method……Type spray path is set.
Angle of Painting……Angle in spraying is set.
Offset1……Offset distance to cross direction is set.
Path……One way or Round Trip
Psi Start……Elevation angle of starting point is set.
Psi End……Elevation angle of ending point is set.
T Rotation……T coordinate of created teaching point is set.

- **Teaching point / Program Creating**

[Create TP]……Setting is executed.
[Create PG]……Setting is executed.
[Clear]……Program is cleared.

- **Results**

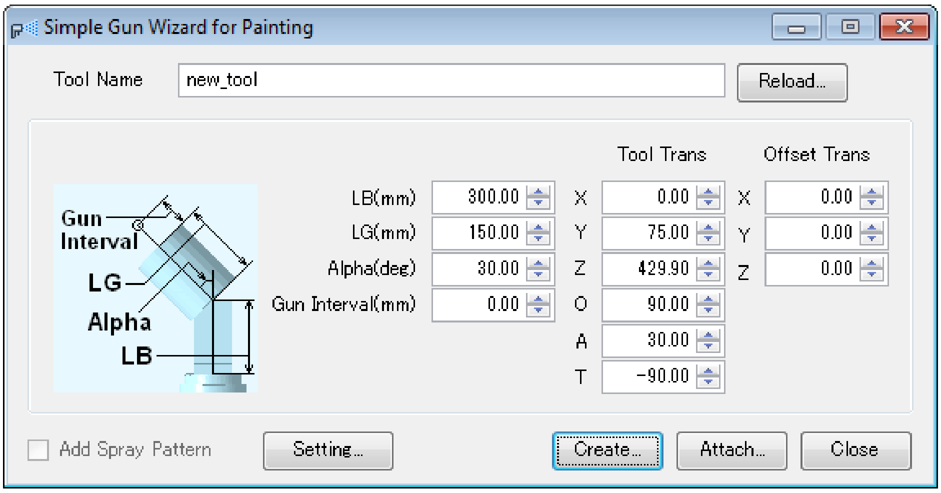
Log in creating program is displayed.

5.2.4 Simple Gun Wizard for Painting [for Paint]

By using the paint gun wizard, an original tool can easily be generated. In addition, it is also possible to generate the spray shape.

5.2.4.1 Paint Gun Wizard

By using the paint gun wizard, it is possible to generate an original tool by reading in a model of gun or bell, which is used as a base, and then changing the settings of length, angle, converted tool coordinate values, or coordinate values of the offset from the origin of the model.



The generated tool can be attached to the end of the robot arm by K-ROSET.

- **Tool name**

  Enter a tool name. A tool folder is created with this name.

- **Resetting**

  The tool file already created is read, and the setting is applied to each parameter below.

- **Bracket length**

  Length of the bracket.

- **Gun length**

  Length of the gun.

- **α**

  Angle of the bracket length and the gun length.

- **Distance of a gun**

  The distances from the tip of the gun to a painting target can be set.
  Change of this value changes tool transformation value automatically.

- **Tool transformation value**

  The position of the tool arrow can be changed.

- **Model zero offset**

  The position of an origin of the tool can be shifted.

- **Follow-on check of paint shape**

  When a check mark is placed and a gun is created, the paint shape set on the paint shape screen is also created concurrently.

- **Creation**

  A paint gun is created according to each parameter.
  The tool file is saved in MyKHIlibraries¥Tools.

- **Attachment**

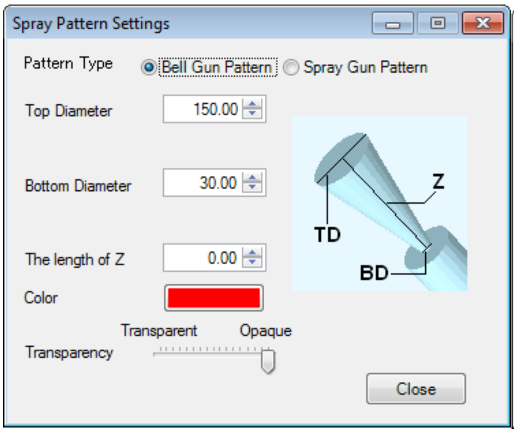
  A paint gun is created according to each parameter, and the tool file is saved in MyKHIlibraries¥Tools.
  The file is attached to the robot.
  When there are several robots, the screen selecting a target robot is displayed.

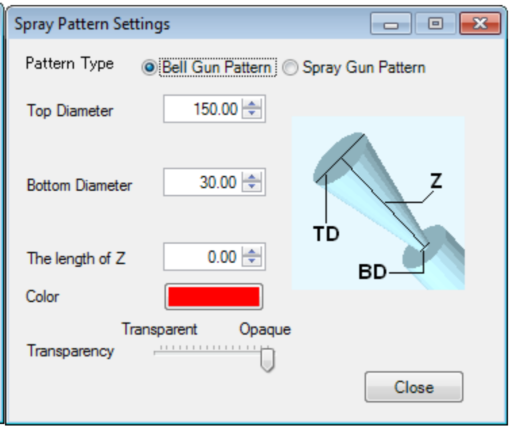
- **Setting**

  The paint shape setting screen is displayed.

► 5.2.4.2 Spray Shape Settings

On the spray gun wizard screen, press the [Spray Pattern Settings] button. The spray shape settings screen will appear. On this screen, it is possible to generate a spray shape model attached to the tool end by reading in a painting model of spray or bell, which is used as a base, and then changing the settings of parameters, colors, and so on.





On the setting screen of spray shape, various parameters or colors can be set, and a spray shape model to be attached to the tip of the tool can be created.

➢ Paint shape

Spray gun and a bell gun can be selected.

Upper side W, upper side H, lower base W, lower base H, and length Z are set for the spray gun.

Upper side radius, lower base radius, and length Z are set for the bell gun.

➢ Color

Press a color to display the color palette, and spray color can be set.

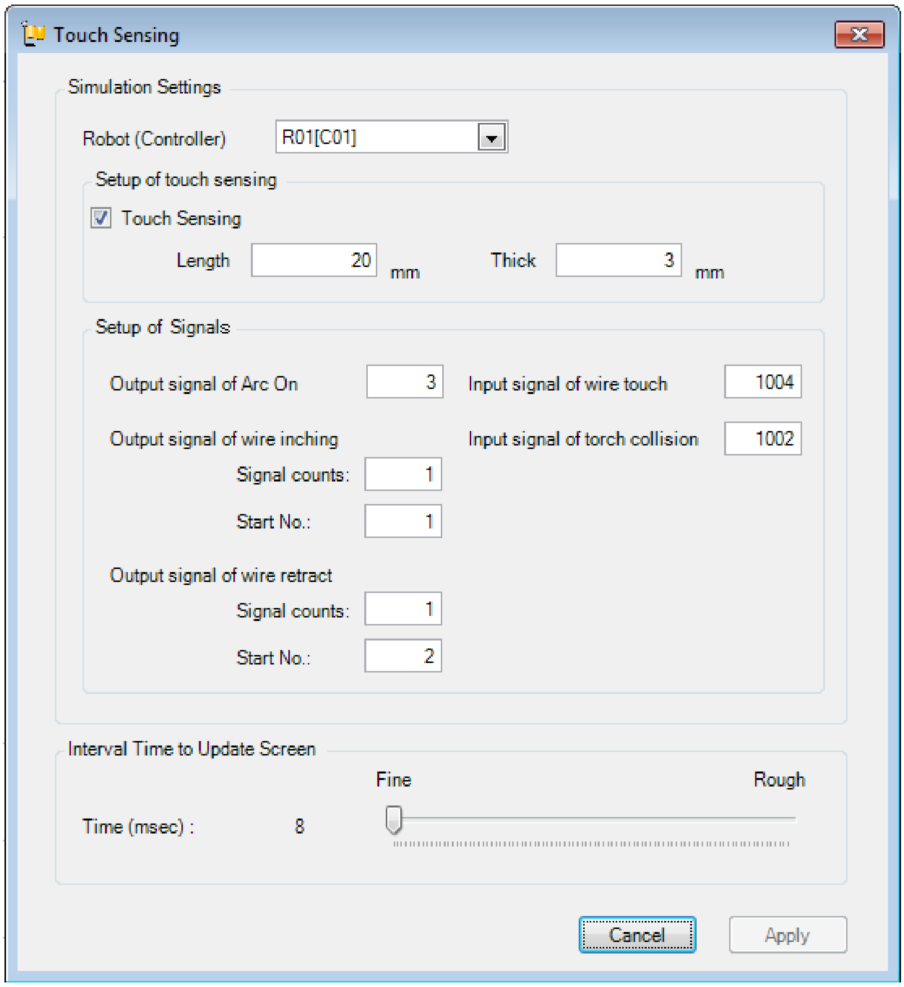
➢ Transparency

Transparency can be set.

5.3 Arc Welding

5.3.1 Touch Sensing

Set for the arc welding.



- **Robot (controller)**

  Select an object robot for the setting.

- Only welding robots can be selected.

- **Touch sensing**

  Set a wire model to imitate the actual welding status.

- **Extrusion length**

  Set length of the electrode wire being welded.

- **Thickness**

  Set the thinness of the electrode wire being welded.

- **Arc ON output signal**

  Set the signal interlocking to the program [Arc On] command.

- **Wire inching output signal**

  Set the signal used when extending the wire.

- **Wire retract output signal**

  Set the signal used when retracting the wire.

- **Wire touch input signal**

  Designated signal turns ON/OFF when the wire model touches other model.

- **Torch collision input signal**

  Designated signal turns ON/OFF when the torch model touches other model.

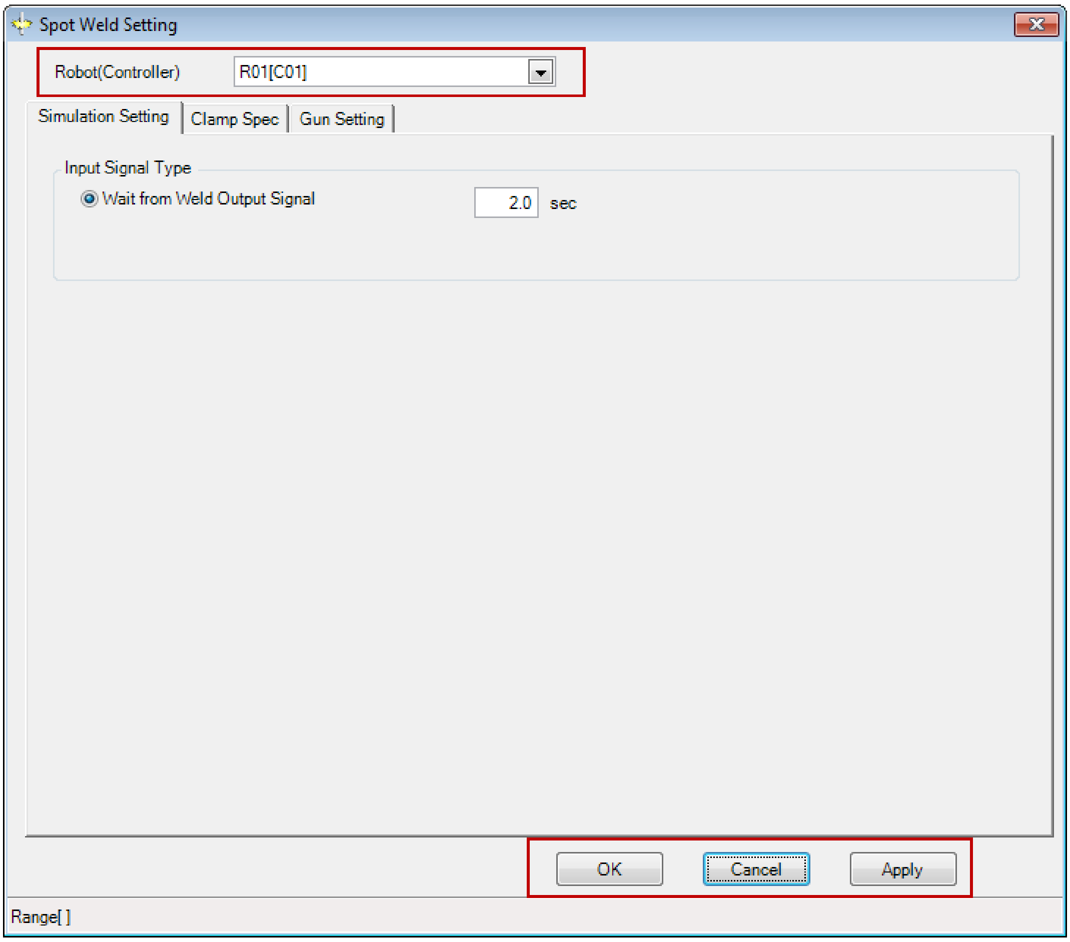
- **Screen update interval**

  Set the updating interval for the simulation screen.

5.4 Servo Welding

5.4.1 Spot Weld Setting

5.4.1.1 Common Items



➢ **Robot (Controller)**

Select an object robot to be set.

- Only servo weld gun robots can be selected.

➢ **OK button**

Save the changed contents and close the dialogue.

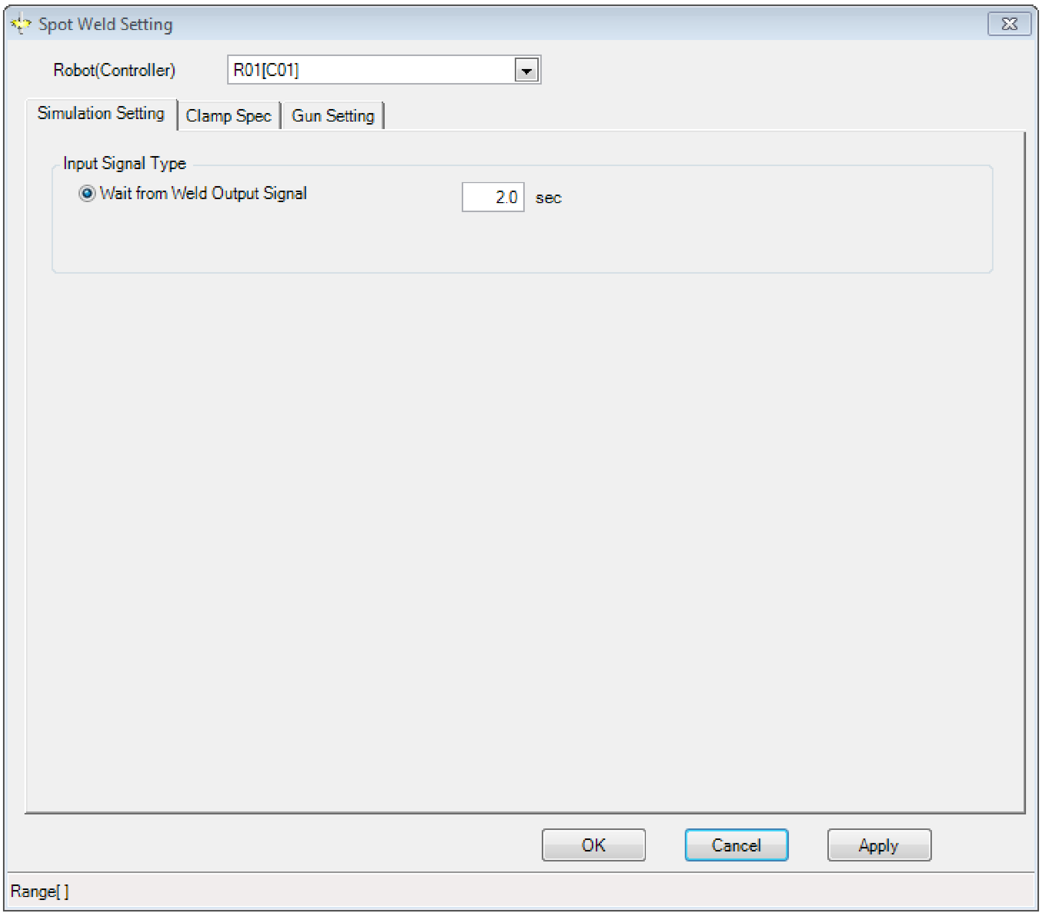
➢ **Close button**

Delete the changed contents and close the dialogue.

➢ **Apply button**

Save the changed contents and continue to set.

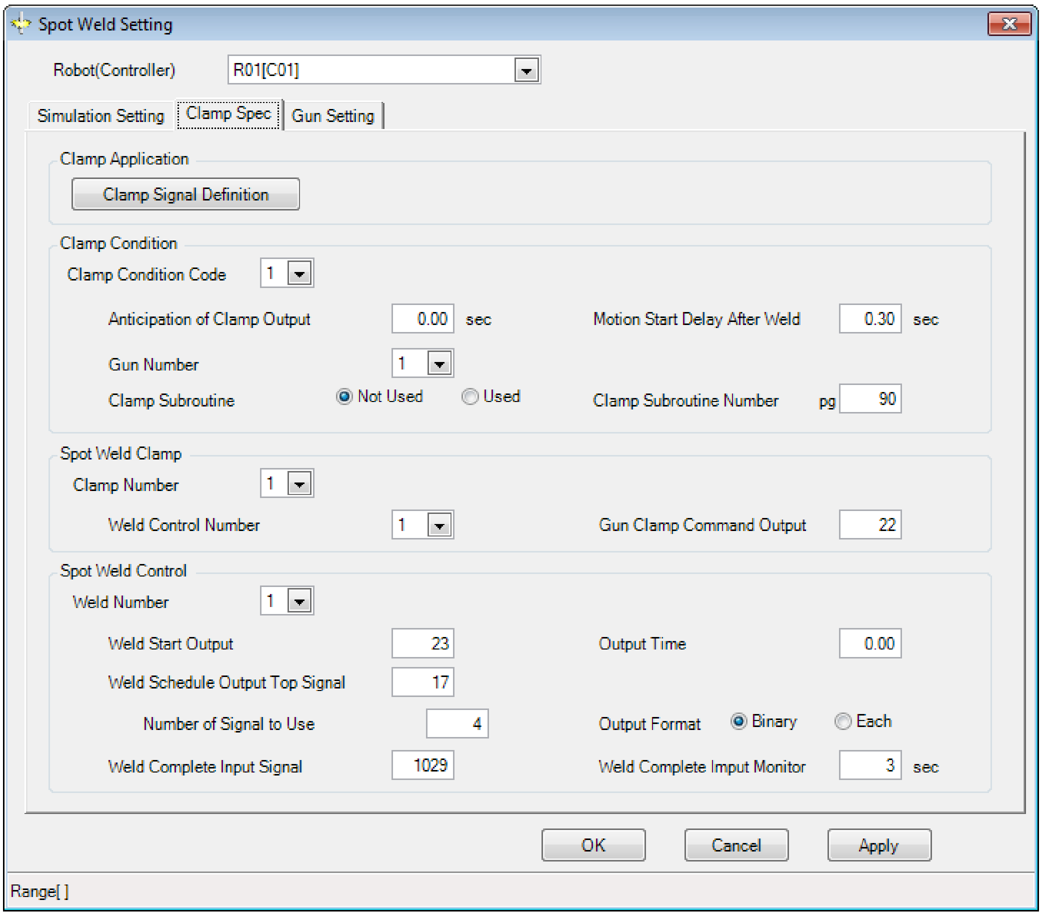
5.4.1.2 Simulation Weld Completion Setting



- **Input signal type**

Set a time from receiving the weld output signal to outputting the weld completion signal.

► 5.4.1.3 Clamp Specification



- **Call handling clamp**

  Call a dialogue of the handling clamp.

- **Clamp condition code**

  Select a clamp condition code to be set.

  Setting contents of the selected code are displayed in [Anticipation of Clamp Output], [Motion Start Delay After Weld], [Gun Number], [Clamp Subroutine] and [Clamp Subroutine Number].

*

- With OK or Apply button, only contents of the displayed clamp condition code are saved.

- **Anticipation of Clamp Output**

  Set when (how many seconds before a robot reaches to the teach point) to send a gun clamp command output to a spot weld gun.

- **Motion Start Delay After Weld**

  Set when (how many seconds after receiving a weld complete signal from a robot weld machine) to start moving to a next teach point.

- **Gun Number**

  Set 8 types of guns that can be used for spot weld. Set corresponding data for each gun number on the gun setting tab.

- **Clamp Subroutine**

  Select [Used] when not setting a gun.

- **Clamp Subroutine Number**

  Set subroutine to execute when not setting a gun.

- **Clamp Number**

  Select a clamp number to be set.

  Contents of the selected number is displayed on [Weld Control Number] and [Gun Clamp Command Output].

* With OK or Apply button, only contents of the displayed clamp number are saved.

- **Weld Control Number**

  Set 8 types of weld control number that can be connected by spot weld.

- **Gun Clamp Command Output**

  Set a gun clamp command output number to be used.

- **Weld Number**

  Select a weld number to be set.

  Contents of the selected number is displayed on [Weld Start Output], [Output Time], [Weld Schedule Output Top Signal], [Number of Signal to Use], [Output Format], [Weld Complete Input Signal] and [Weld Complete Input Monitor].

* With OK or Apply button, only contents of the displayed weld number are saved.

- **Weld Start Output**

  Set weld start output signal number for the weld control.

- **Output Time**

  Set output time of the weld start output. This is a level output signal.

- **Weld Schedule Output Top Signal**

  Set the top signal number of weld condition output to weld control.

- **Number of Signal to Use**

  Set number of signal to use for weld schedule output top signal.

- **Output Format**

  Set outputting signals set in [weld schedule output top signal] and [number of signal to use] either as binary or as each signal.

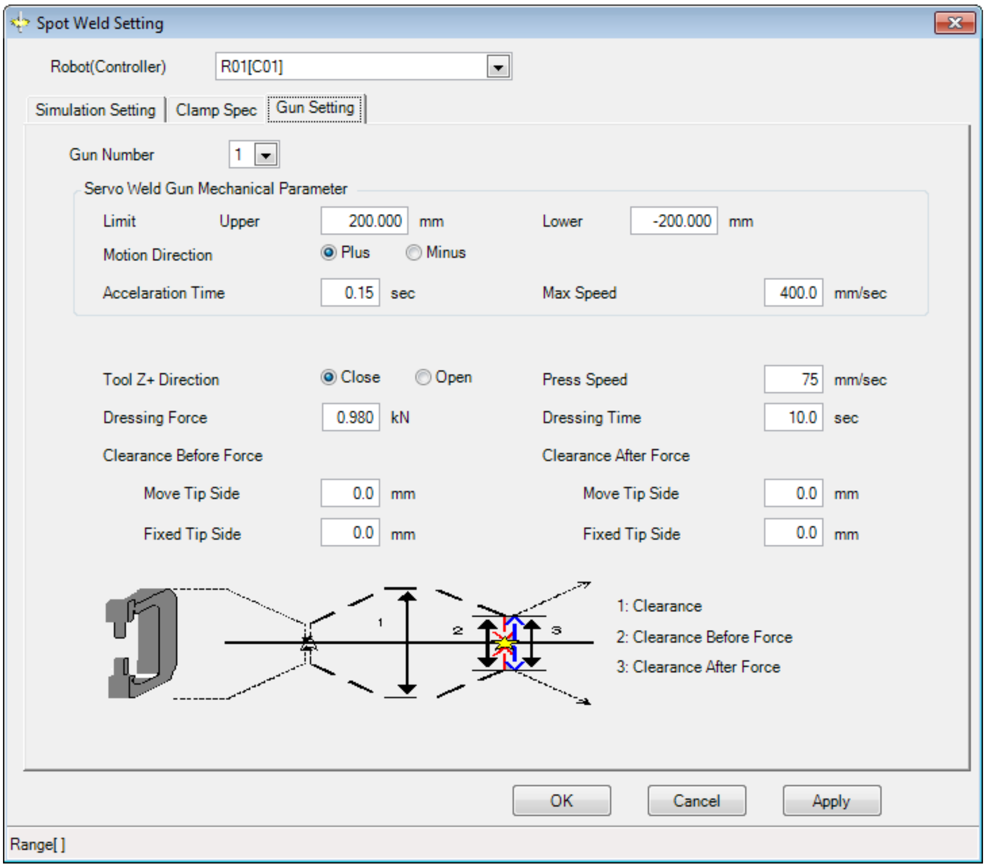
- **Weld Complete Input Signal**

Set input signal number of weld complete that is outputted from weld control to the robot.

- **Weld Complete Input Monitor**

  If weld complete input signal is not inputted within this setting time after weld start output, the robot stops by an error. When setting as 0, it doesn't operate the error detection.

5.4.1.4 Gun Setting



- **Gun Number**

  Set a gun number to be set.

  Corresponding setting for the selected gun number is displayed in each item within this tab.

* With OK or Apply button, only contents of displayed gun number are saved.

- **Upper Limit**

  Set the motion stroke 5mm when moving from gun close end to gun open end with a chip of abrasion loss zero installed.

- **Lower Limit**

  Set |tolerance abrasion loss + α| as the lower limit of gun motion.

- **Motion Direction**

When operating [+] key, match with the actual machine and set “positive” or “negative” in order to let the gun operate open motion.

- **Acceleration Time**

  Set time from stop condition to when reaching the max speed.

- **Max Speed**

  Set the max speed.

- **Press Force at Auto Zeroing**

  Set press force when opening the gun to the open end.

- **Tool Z＋Direction**

  Set tool coordinate Z + Direction either close or open.

- **Press Speed**

  At the welding point, press a chip of movable side with this speed until reaching to the set force in the last stage of that close motion.

- **Dressing Force**

  Dressing force is not the force of WS code which is taught to that point, but the force for abrasion which is set here.

- **Dressing Time**

  Open the gun axis at the time of receiving weld complete signal or passing the dressing time which is set here, whichever comes earlier, and move on to the next step.

- **Clearance Before Force**

  Set clearance distance before force with transfer motion to the next welding point.

- **Clearance After Force**

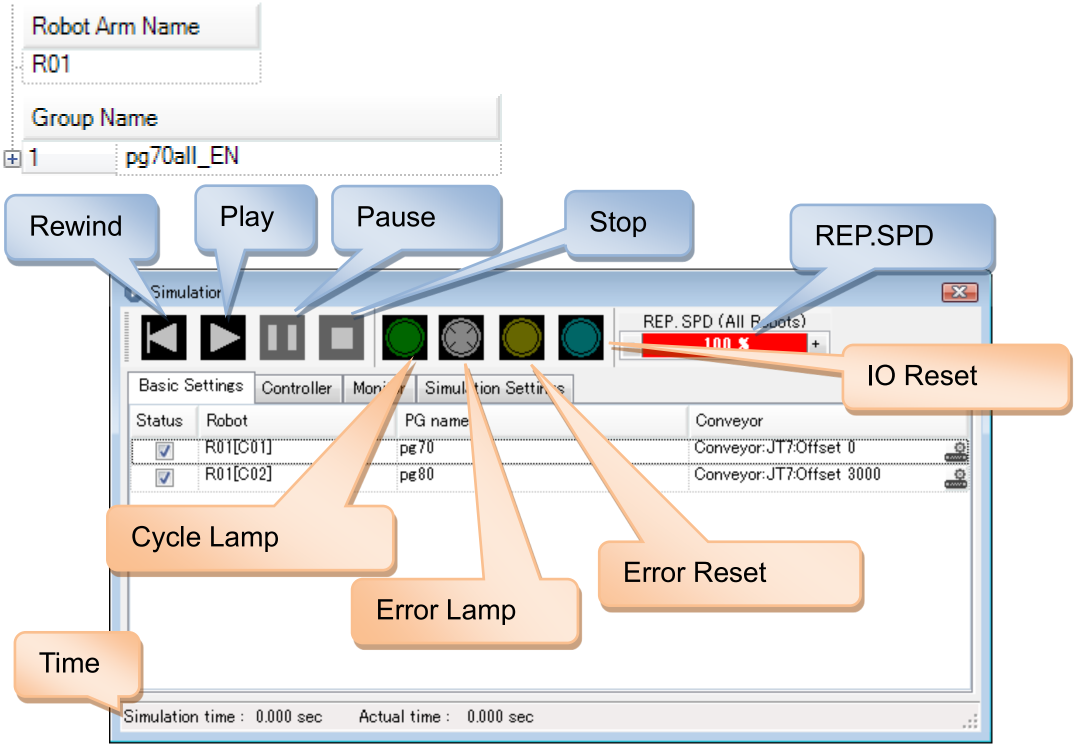
  Robot arm starts moving to the next welding point if the gun opens to the set “Clearance After Force.”.

5.5 Simulation

5.5.1 Simulation (including conveyor)

Several robots on carrying out a project can be simulated concurrently.

In addition, the outline of the procedure of the conveyor setting is described below.



- **Rewind**

  Restores all objects in the layout to the registered initial position. Program will be back to home position.

- **Play**

  Executes a program and starts simulation.

- **Pause**

  Pauses a running program.

- **Stop**

  Stops a running program.

- **Cycle Lamp**

  The lamp lights when more than one robot is moving.

- **Error Lamp**

  The lamp lights when system error is occurring more than one robot controller.

➢ **Error Reset**

Click on the button will release the error.

➢ **IO Reset**

Click on the button will turn OFF the dedicated signal.

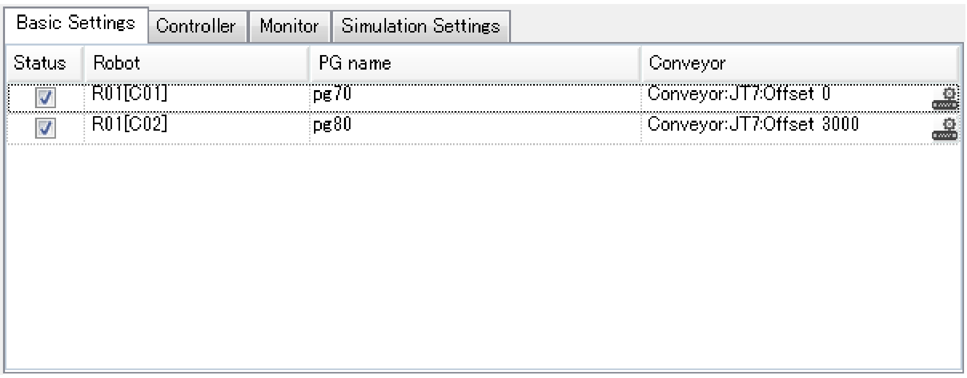
➢ **REP.SPD**

-and + button will change the repeating speed of the robot. Entering values directly can also change the speed.

➢ **Time**

Displays the elapsed time of the simulation and the elapsed time on the virtual controller (the time which takes for executing the program in the real robot.)

5.5.1.1 State Settings



➢ **Status**

Select an item to execute.

➢ **Robot**

Displays robot name.

➢ **PG name**

Selects main program to execute.

[Dropdown]

Program list which is added to the program table is displayed.

- Since V1.7.0.,when displaying programs of program tab on [PG name] list, [Group name] is displayed after program name

[Button]

Opens a program to execute via file select dialog.

[Check box]

Selects a program in the robot controller. Check marking in the check box on the left side of the PG name will display or select the program which is loading to the controller. A program in the controller can be executed directly when the program is edited using Teach pendant or the target program is executed once.

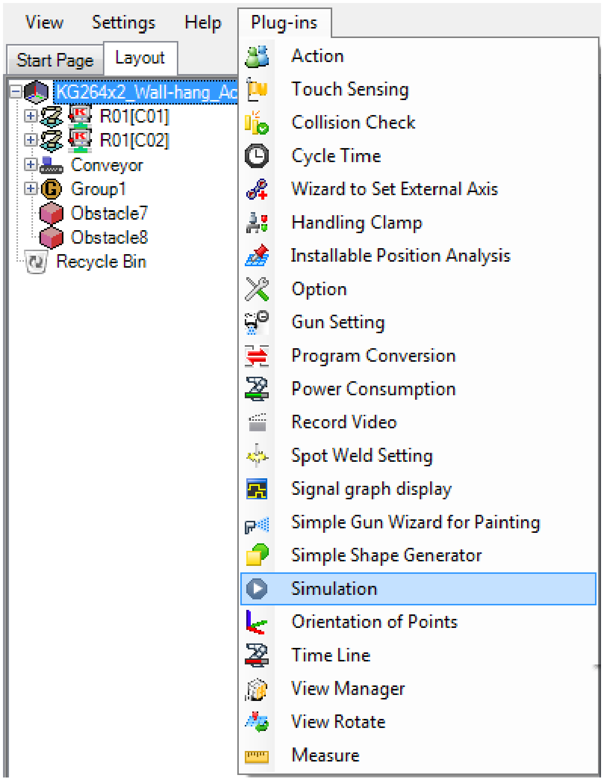
- **Conveyor**

Displays a conveyor object name which is set as pair with a robot conveyor axis and offset value for execution.
[Button]
Displays Conveyor Setting dialog.

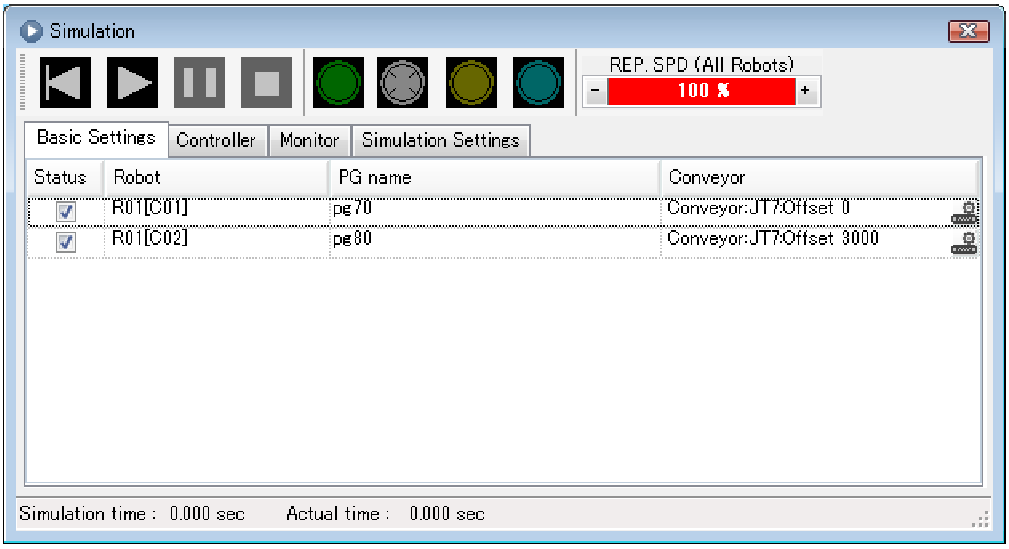
- Conveyor setting is set in the dedicated setting dialog but not in the Simulation dialog in V1.7.2 and later. Refer to the Layout tab for Conveyor setting.

Execute a program

1 **Go to [Plug-in] to access to the [Simulation] under the condition of having more than one robot in a project.**
Simulation dialog will appear.
Robot list in the project will be displayed.



A program in the program table will be selected as a default when any program is not selected. Click on dropdown button at [PG name] to display the created programs in program table and select one.



2 **Click on [Rewind] button after selecting a program.**

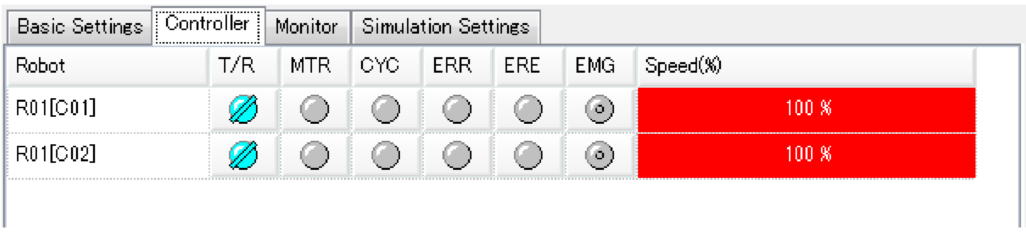
Robot moves to the home pose.

3 **Click on [Play] button.**

Starts concurrent execution of simulation.

Click on [Stop] to stop the running concurrent execution. Click on [Pause] to pause the execution. Click on [Play] to resume the paused execution.

► 5.5.1.2 Controller



➢ **T/R(Teach/Repeat switch)**

Switches the mode between Teach mode and Repeat mode.

➢ **MTR(Motor power button and lamp)**

Switches the ON/OFF of the motor power.

➢ **CYC(Cycle start button and lamp)**

Clicking the button while in repeat mode will light up the lamp and play the simulation.

➢ **ERR(Error lamp)**

Lights up when an error occurs.

➢ **ERE(Error reset button)**

Clicking this button while in error will release the error state. However, this button does not work for the continuous error.

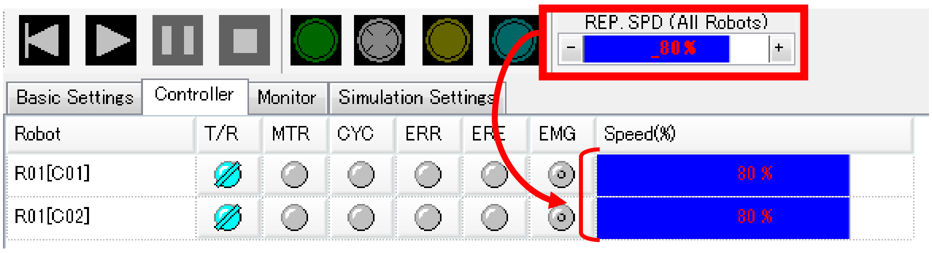
➢ **EMG(Emergency stop button)**

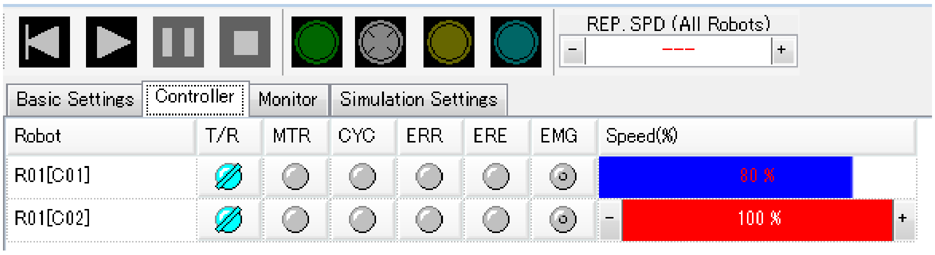
Clicking on this button while in emergency situation will cut off the motor power and robot will stop.

➢ **Speed**

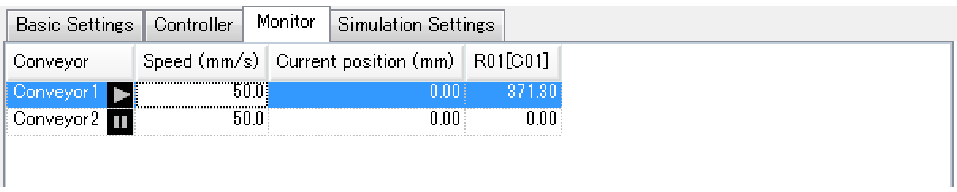
Set the speed for repeat mode for each robot.

The repeating speed (all robots) appears as [---] when the speed is set individually from the controller tab. Besides that, controller tab allows user to monitor and setup the Teach/Repeat, Motor, Cycle, Error, Error reset and the status of Emergency stop for each robot.





► 5.5.1.3 Monitor



➢ **Conveyor**

Displays the added conveyor object name.

The [Play] and [Pause] buttons will be displayed per conveyor while running a program and that enables to simulate a case when one of the conveyors is stopped by an error.

Stops conveyor per robot which is set as pair with the conveyor work object.

Executes conveyor simulation per robot which is set as pair with the conveyor work object.

➢ **Speed**

Displays conveyor speed which is set to each conveyor object.

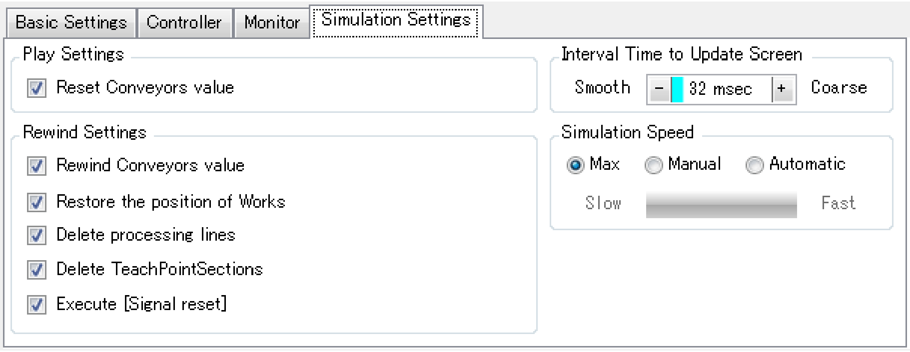
➢ **Current position**

Displays travel distance from the registered initial position.

- **Each robot name**

  Displays value for each robot conveyor axis.

5.5.1.4 Simulation Settings



[Play Settings]

- **Reset conveyor value and resume**

  Resets conveyor position and conveyor axis value for each robot to the initial position or to the position where is set in [Shift] and starts simulation when simulation play button is clicked.

[Rewind Settings]

- **Resets conveyor value**

  Resets conveyor value when rewind button is pressed. Restores the conveyor work which conveyor value is changed.

- In order to restore the workpiece position which layout configuration had changed, [Restore the position of Works] also needs to be check marked.

- **Restore the position of Works**

  Restores the workpiece position to the registered position when Rewind button is clicked.

- **Delete processing line**

  Deletes all the processing line data for painting, welding and welding points when Rewind button is pressed.

- **Delete Teach Point Sections**

  Deletes teach points data when Rewind button is pressed.

- **[Reset signal]**

  [Reset signal] will be executed when the rewind button is pressed.

[Screen update interval]

Update interval for the robot animation in the view can be changed.

The smaller the value, the smoother the animation. Processing time for simulation may be longer depends on the spec of your computer. The bigger the value, the rougher the animation.

[Simulation speed]

Sets the simulation speed. Changing simulation speed is to adjust the passage of time of the virtual controller. In general, since the passage of time of the virtual controller is faster than actual time, the simulation time will be shorter than the time which actually takes (cycle time).

Max speed: This setting is the shortest simulation time in your computer.

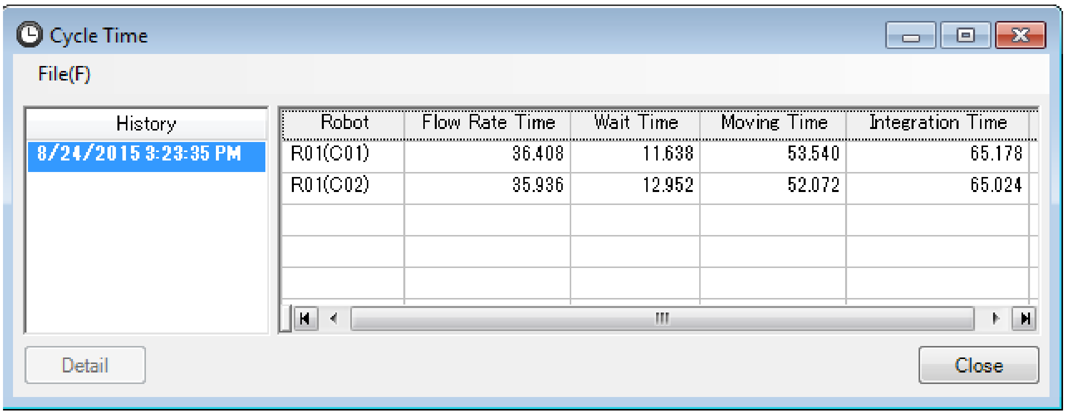
Manual: This setting allows user to adjust the speed by sliding control bar.

Auto: This setting enables to play the simulation in the similar speed as the actual robot motion.

- Since changing the screen update interval and simulation speed are not like changing the robot speed itself unlike the repeating speed, it does not affect cycle time.
- Note that the speed will not be same as the actual speed when the computer is low spec or the Interval Time to Update Screen is short even though the [Auto] is set for simulation speed. Adjust the time by checking the [Simulation time] and [Actual time] which are displayed in the bottom of the simulation screen.

5.5.2 Cycle Time

This section describes Cycle Time. Cycle Time displays a saved track line file.



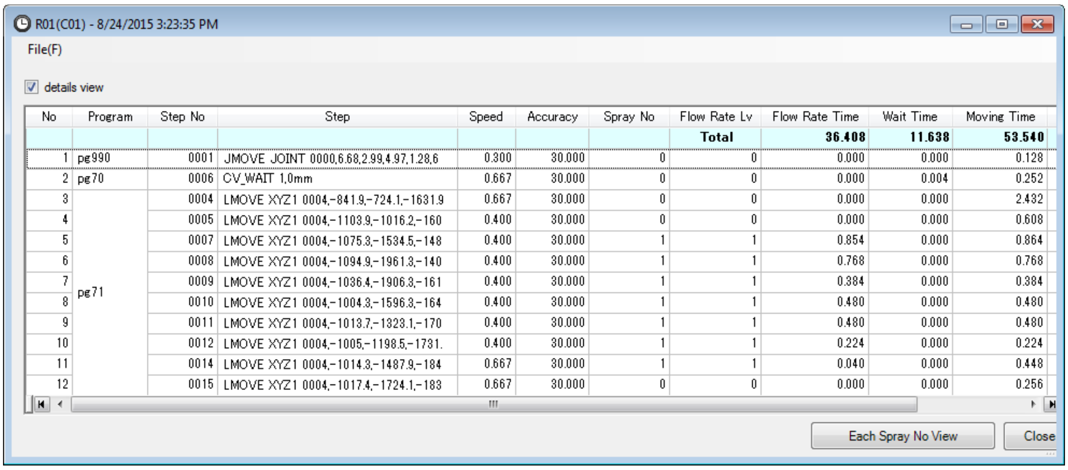
➤ **History**

Cycle Time displays a result by each robot. By selecting history list, a list of robots is displayed.

By selecting a history list, the detail button is available.

➤ **Details**

Cycle Time displays a detailed time by each steps by clicking Detail button.



➢ Export CSV file

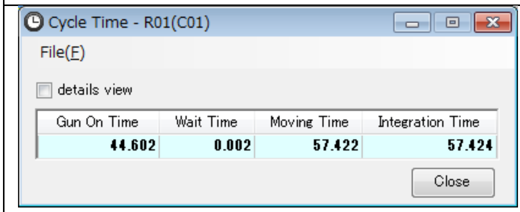
Cycle time can be saved in the CSV format by selecting [File] – [Export Csv file(S)].

➢ Detail view

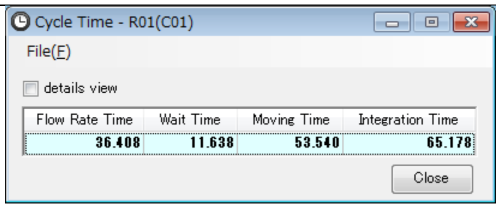
Displays details of a trajectory file. Removing checkmark will only display the total.

There are two methods to display Cycle Time.

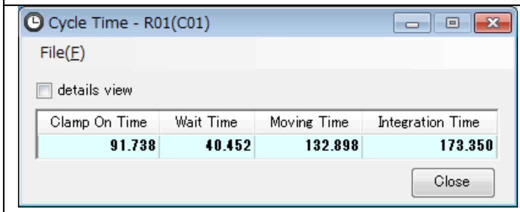
Paint



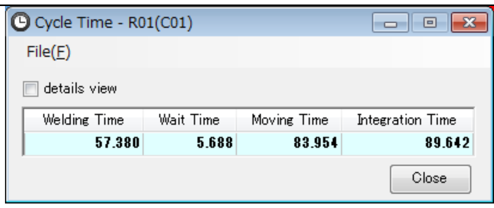
Sealing



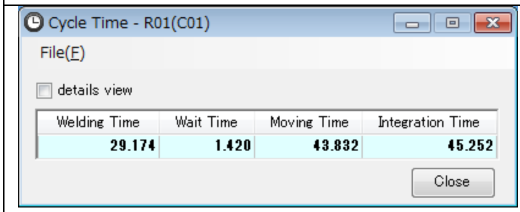
Handling



Servo Welding



Arc Welding



[Spraying time], [Gun On time], [Clamp On time] and [Welding time]

Displays integration time (seconds) for each application while application signals are ON.

[Waiting time]

Displays integration time (seconds) while robot is in wait condition.

E.g. Wait instruction or SWAIT state.

[Moving time]

Displays integration time (seconds) excluding the waiting time while running a program.

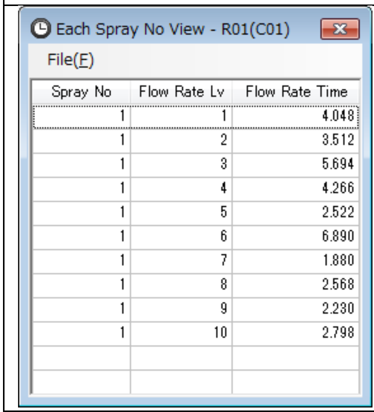
[Integration time]

Displays the total (seconds) of Waiting time and Moving time.

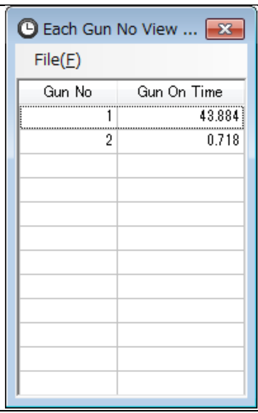
➢ Display cycle time for each SPRAY , Clamp No

By pressing the [Display cycle time for each spray No.] button, cycle time will be grouped and displayed for each discharge No.

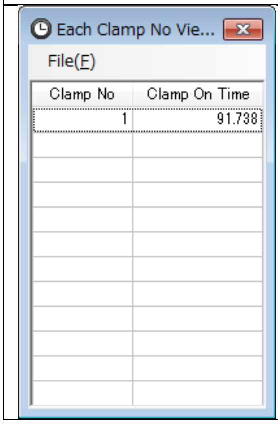
Paint



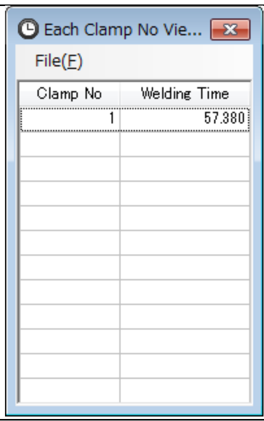
Sealing



Handling



Servo Welding



► 5.5.2.1 Show automatically

After a program is finished, the cycle time screen will appear.

Check [Setting] -> [Output Track Line File] in Controller.

A trajectory file will be output to the "My Document/MyKHILibraries/Projects/[Project name]/[Robot name]/Traj" folder when the program has been normally ended or abnormally ended due to an error etc., then the cycle time screen will appear.

► 5.5.2.2 Show manually

Start up from K-ROSET menu

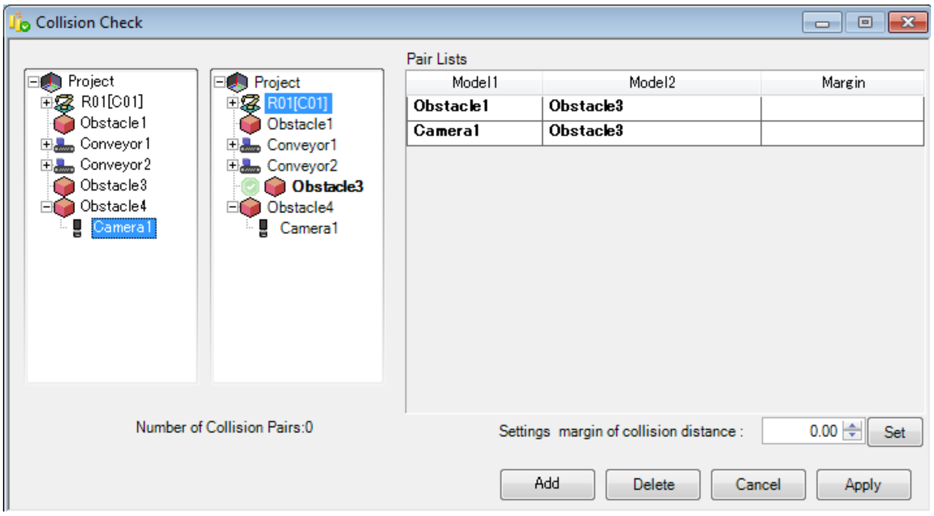
➢ **Read files**

Select [File] -> [Open] from the menu, and choose a trajectory file. The cycle time of the chosen trajectory file will appear.

5.6 Collision

5.6.1 Collision Check

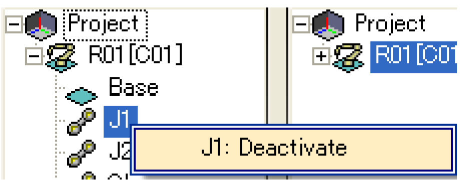
On the collision pair check settings screen, it is possible to set up to display when models are interfering with each other on the view.



To register a new collision pair, choose pairs of the models that you wish to register from the two trees on the left, and press the [Add] button.

To delete a registered collision pair, choose the pairs that you wish to delete from the collision pair registration list, and press the [Delete] button.

In addition, it is possible to switch the state of collision check between valid/invalid for each project or model.



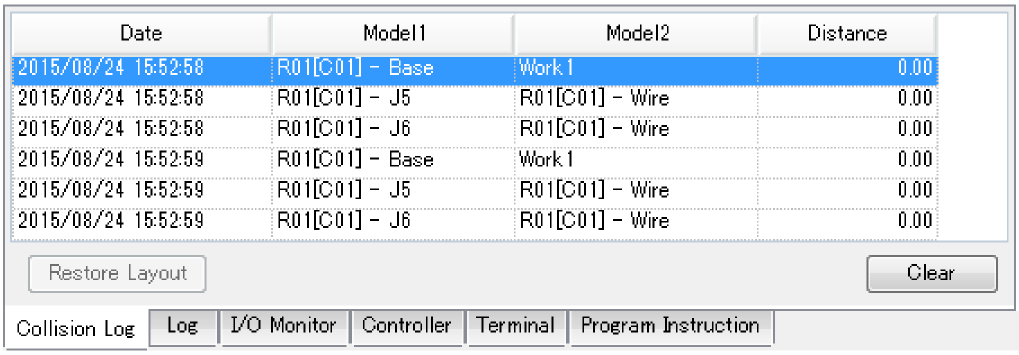
Since V1.7.1, distance for collision tolerance is now able to be set.

With this feature, system recognizes the condition as under collision when the model approaches to another model within the specified distance even before colliding to the models. And that allows user to consider margin easily.

- Use specified value in option settings when setting margin distance for whole collision pairs.

5.6.2 Collision log

The collision log displays the collision conditions of the robot teach operation and the simulation.



Date	Model1	Model2	Distance
2015/08/24 15:52:58	R01[C01] - Base	Work1	0.00
2015/08/24 15:52:58	R01[C01] - J5	R01[C01] - Wire	0.00
2015/08/24 15:52:58	R01[C01] - J6	R01[C01] - Wire	0.00
2015/08/24 15:52:59	R01[C01] - Base	Work1	0.00
2015/08/24 15:52:59	R01[C01] - J5	R01[C01] - Wire	0.00
2015/08/24 15:52:59	R01[C01] - J6	R01[C01] - Wire	0.00

➢ **Column double click**

Returns the layout condition when the collision occurred.

➢ **Restore Layout**

Turns enabled when the column is double-clicked and the layout is returned.

Returns to the posture before the column is double-clicked.

➢ **Clear**

Deletes all collision logs.

➢ **Distance**

Display distance at the time of collision.

Added since V1.7.1. Distance before model collides can be judged quantitatively.

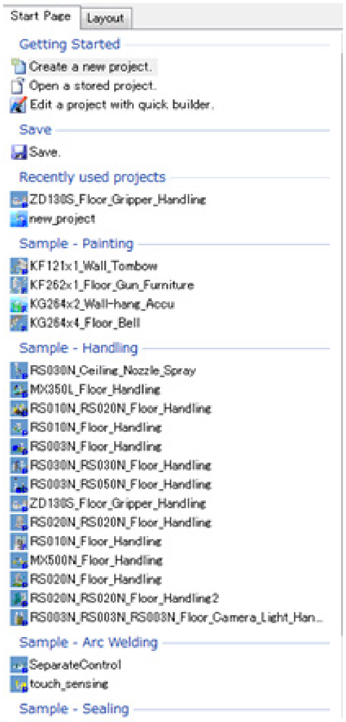
5.7 Layout

5.7.1 Start Page

The start page is available in order to make the project creation or edit easier.

With V1.6.8 or newer version, the start page is displayed when starting K-ROSET.

A screen example is as follows.



► **Create a new project**

Display a dialogue to input a new project name.

► **Open a stored project**

Display a project load dialogue.

► **Edit a project with quick builder**

Quick builder is a function to support project creation.

Exclusive dialogue is displayed and the basic project can be created according to the procedures. Refer to the next chapter for the functional explanation.

► **Save...**

Display a dialogue to overwrite the current project.

► **Recently used projects**

There are shortcut icons for recently edited projects. They can be deleted by DEL key.

Layout tab can also be selected. The object can be operated with layout tab when selecting stored projects or after creating a new project.

Since V1.7.1, it can be expanded and displayed when match a mouse cursor on an icon.

5.7.2 Quick Builder

Quick builder is a function to support project edit.

It is available with V1.6.8 or newer version.

A basic project can be created rapidly according to the guidance. Also, stored projects can be edited by quick builder.

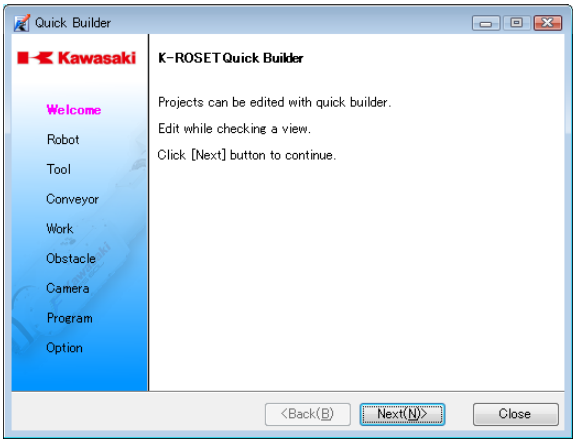
Refer to the following procedures.

1 Select start page tab on K-ROSET.

Following screen is displayed.

2 Start operations－Select project edit menu on quick builder.

Following screen is displayed.



The left side of the screen shows items for project settings. The item currently being edited is shown in pink. The basic setting of a project can be completed by setting all items from the top. Click Next button to jump to the setting screen of the next item. Click Back button to return to the previous setting screen.

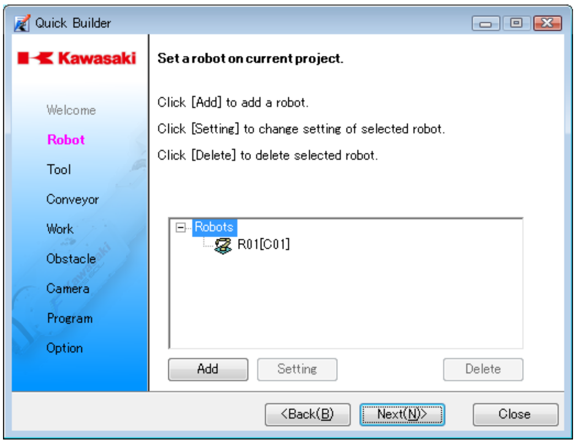
It is not necessary to edit each item in order. Unnecessary items can be skipped and only required items can be edited. It is not necessary to add every item. Setting screens can be edited always as necessary.
（However, tool and program cannot be edited unless the robot is added.）

Click Close button to finish quick builder.
Items that cannot be edited by quick builder can be edited with layout tab.

All the added items are displayed on the view. Proceed a project creation while checking items on the view.
Refer to the following explanation for each edit screen of quick builder.

5.7.2.1 Robot

Add a robot, delete a robot and edit an installation position of a robot.



Refer to the following method to add a robot.

There are two ways to add a robot; from library or from file.

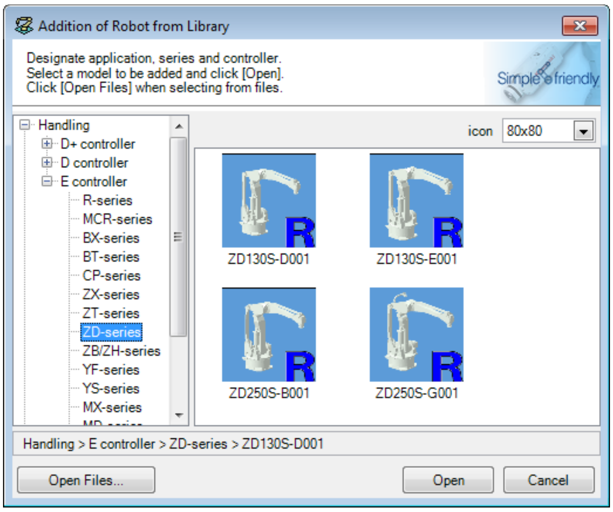
Add from library

1 **Click add button.**

A dialogue [Addition of Robot from Library] is open.

2 **Select an application, a controller and a model series.**

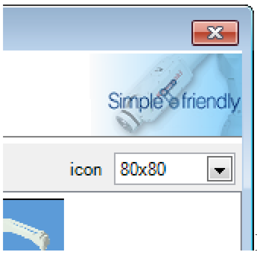
By select a series, model icons for that series are displayed on the right side of the screen.



3 **Select a model and click Open button.**

The selected robot is added on the view and the layout.

Use [icon] to change size of the icon.

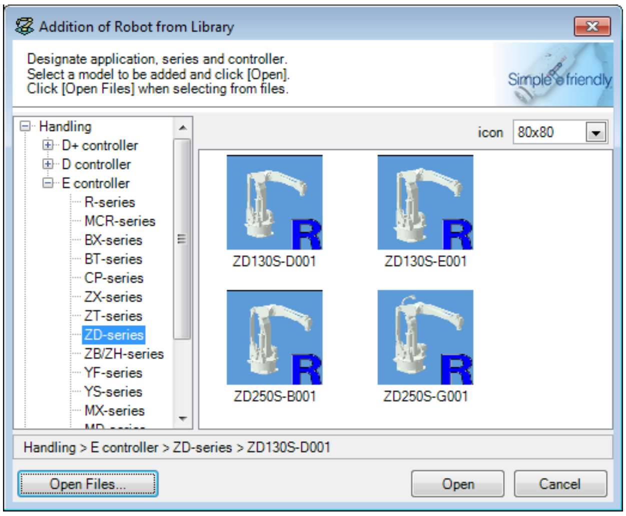


Icon size selection screen

► Select and add a file

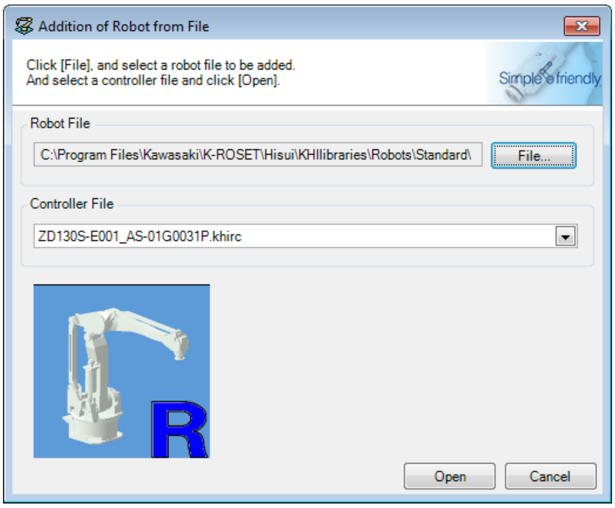
1 **Click Add button.**

A dialogue [Addition of Robot from Library] is open.



2 **Click Open Files button on the lower left of the screen.**

A dialogue [Addition of Robot from File] is open.



3 **Click Reference button on the model field.**

A dialogue [Open files] is open.

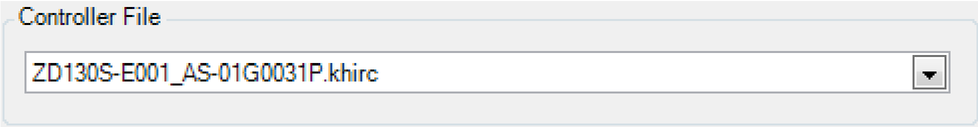
Select a folder with the robot file and select the robot file.

Installed robots are located in the install file folder ¥KHIlibraries¥Robots.

4 **Select a model and click Open button.**

A dialogue [Open files] is open.

5 Select a controller file list on the controller field.



A format of a file name is [Model name_Controller soft AS version.khirc].

AS version varies depend on the application or the controller.

6 Click Open button.

A robot is added.

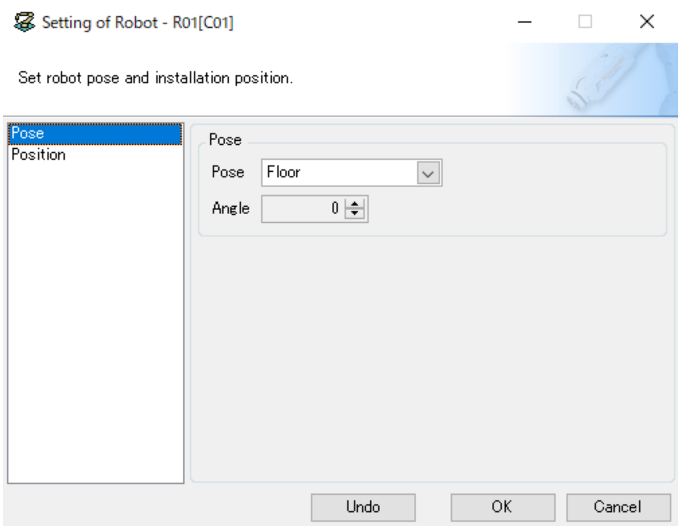
The operation is completed.

Refer to the following method to change a pose and an installation position of the robot.

► Set a pose

1 Select an object robot icon and click Setting button.

A dialogue [Setting of Robot] is open.



2 Click Pose on the left side of the screen.

A pose setting screen is displayed on the right side of the screen.

3 Select a pose.

Select one from Floor, Ceiling, Wall, Wall 2 or Angle specification.

At the time of selection, the robot on the view is positioned to that position.

Angle field is valid only when selecting Angle specification.

column

A pose

With K-ROSET, all poses can be selected for all models in order to consider various layouts. For some models, therefore, the pose that cannot be set with the actual machine can also be considered. Consult Kawasaki to find out whether the specific pose can be set with the actual machine.

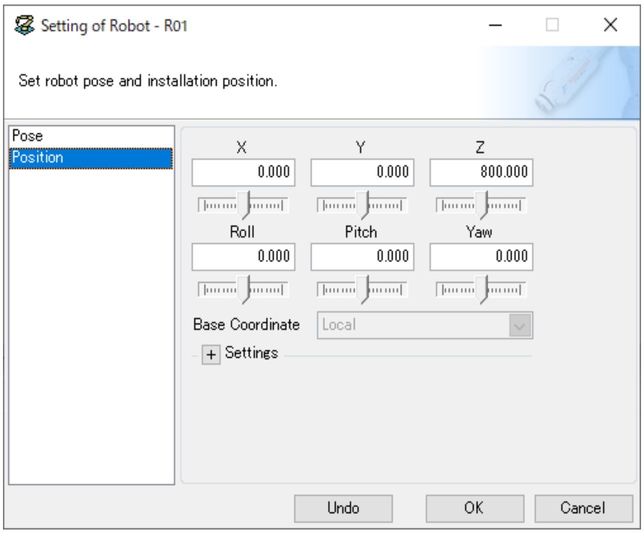
Change an installation position

1 **Select an object robot icon and click Setting button.**

A dialogue [Setting of Robot] is open.

2 **Click Position on the left side of the screen.**

A pose setting screen is displayed on the right side of the screen.



3 **Change an installation position and a pose.**

At the time of changing values, the robot on the view is located at the appointed position and pose.

4 **Click OK to confirm.**

Click Undo button to return to the previous position.

It is impossible to return after confirming by OK.

The operation is completed.

Refer to the following method to delete.

Delete a robot

1 **Select an object robot to be deleted.**

2 **Click Delete button.**

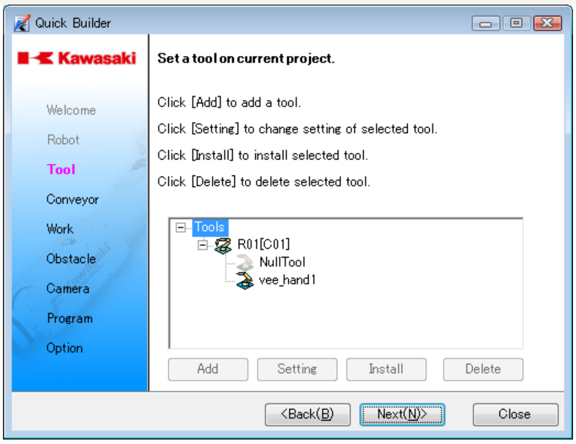
A confirmation dialogue is displayed.

Click Yes to delete or click No to cancel.

► 5.7.2.2 Tool

Add a tool, delete a tool or edit an installation position.

* ● At least a robot needs to be added before operating a tool.



Refer to the following method to add a tool.

There are two ways to add a tool; from library or from file.

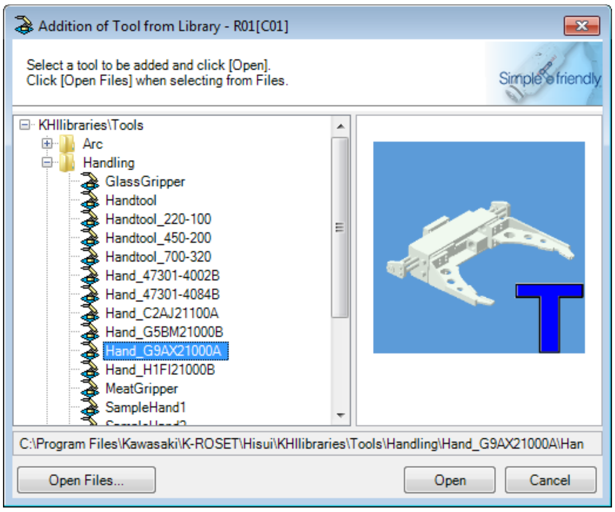
► Add from library

1 **Click Add button.**

A dialogue [Addition of Tool from Library] is open.

2 **Select an application.**

A thumbnail of the selected tool is displayed on the right side of the screen.



3 **Click Open button.**

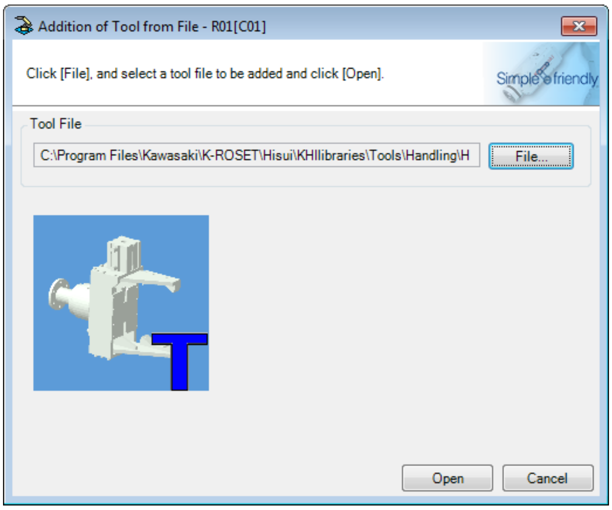
A tool is added.

The operation is completed.

► Add by selecting a file

1 Click Add button.

A dialogue [Addition of Tool from File] is open.



2 Click Reference button on the model field.

A dialogue [Open files] is open.

Select a folder with the tool file and select the tool file.

Installed tool is located in the install folder ¥KHIlibraries¥Tools.

Refer to the chapter of tool creation of the operation manual when creating a new tool.

3 Click Open button.

A tool is added to the wrist flange of the robot.

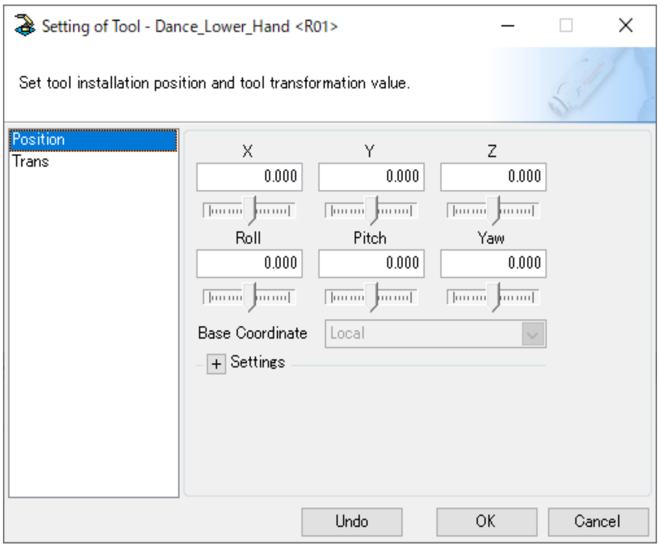
The operation is completed.

Refer to the following method to change the installation position of the tool.

► Change an installation position

1 Select an object tool icon and click Setting button.

A dialogue [Setting of Tool] is open.



2 **Click Position on the left side of the screen.**

A position setting screen is displayed on the right side of the screen.

3 **Change a position and a pose.**

At the time of changing values, a tool on the view is located in the appointed position and pose.

4 **Click OK to confirm.**

Click Undo button to return to the previous position.

It is impossible to return after confirming by OK.

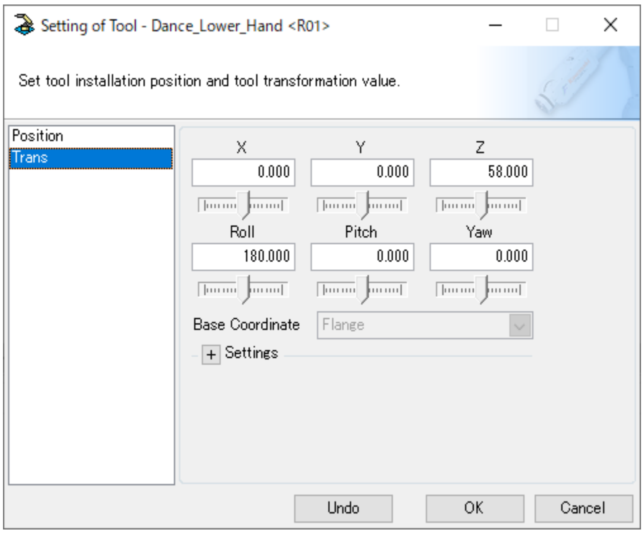
The operation is completed.

Refer to the following method to change a tool transformation value.

► Change a tool transformation value

1 **Select an object tool icon and click Setting button.**

A dialogue [Setting of Tool] is open.



2 **Click Trans on the left side of the screen.**

A position setting screen is displayed on the right side of the screen.

3 Change a position and a pose.

At the time of changing values, a tool arrow on the view is located in the appointed position and pose.

4 Click OK to confirm.

Click Undo button to return to the previous position.

It is impossible to return after confirming by OK.

The operation is completed.

Multiple tools can be added to a robot but only a tool can be installed to a robot.

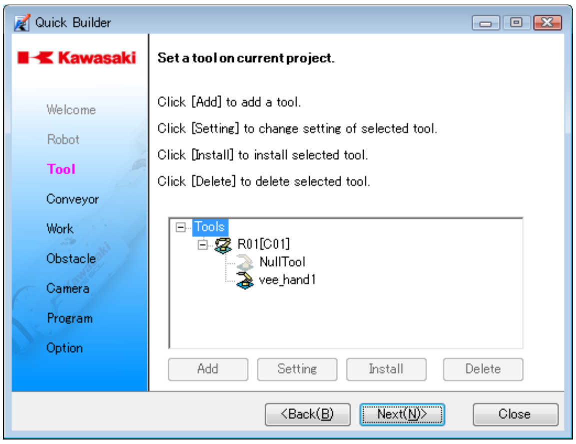
Refer to the following method to switch the tool.

Switch a tool to be installed

1 Select a tool icon to be installed.

Select an uninstalled tool to make its button valid.

The icons for uninstalled tools are translucent.



2 Click Install button.

Installation is switched and position setting screen is displayed on the right side of the screen.

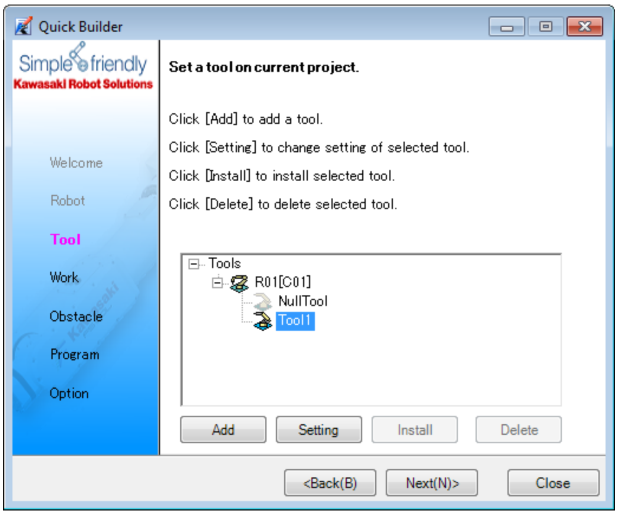
Refer to the following method to delete.

Delete a tool

- In order to delete the installed tool, it needs to be uninstalled. Also, at least a tool needs to be installed to a robot.

1 Select an object tool to be deleted.

Only uninstalled tools can be deleted.



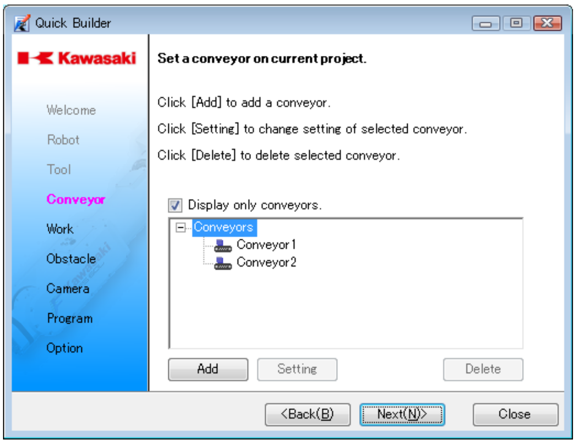
2 **Click Delete button.**

A confirmation dialogue is displayed.

Click Yes to delete or click No to cancel.

5.7.2.3 Conveyor

Enables to add and delete conveyor models as well as edit the installation position.



Following describes how to add conveyor.

There are two ways to add conveyor model. One is to add from library and the other is to add from a file.

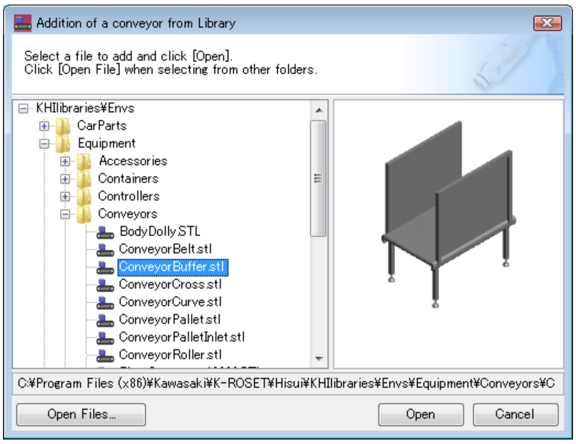
Add from library

1 **Select a target robot model in the directory tree to add a conveyor and click Add button.**

A dialog for Addition of a conveyor from Library will open.

2 **Select the application to use.**

Thumbnail of the selected tool will appear on the right side of the dialog.



3 Click on [Open].

Conveyor model will be added.

► Add by selecting a file

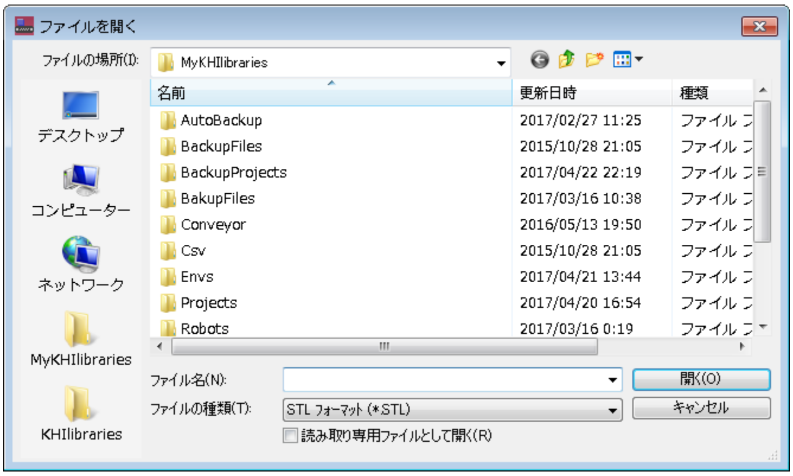
Use this function when selecting a file which is exported from a CAD.

1 Click on Add button.

A dialog for Addition of a conveyor from Library will open.

2 Click on "Open Files…" button.

Open file dialog will open.



Select the folder which stores the conveyor files and select the desired conveyor file.

Installed conveyor files are stored in the (Install folder) ¥K-ROSET¥Hisui¥KHIlibraries¥Envs folder.

3 Click Open.

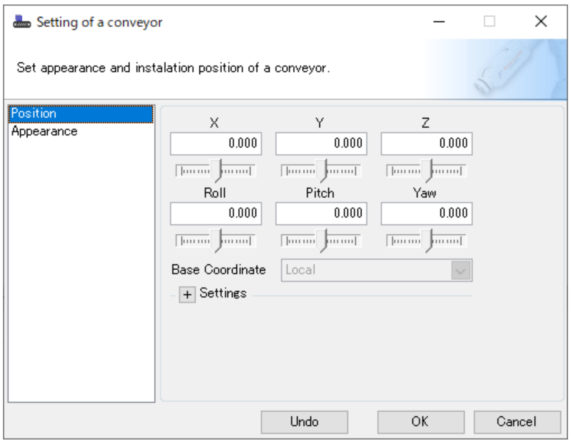
Conveyor model is added.

Next, change the settings for conveyor.

► Change conveyor installation position

1 Select the target conveyor icon and click on Settings button.

Setting of a conveyor dialog will open.



2 Click on position setting on the left side of the dialog.

Position setting screen will appear on the right side of the dialog.

3 Change the position and pose.

Changing the value will move the conveyor position and pose in the view.

4 Click OK.

The set position will be defined. Clicking the Undo button before clicking OK will move the position back to before the change.

Once the OK button is pressed, Undo button cannot change the position back to before.

Change the appearance of the conveyor

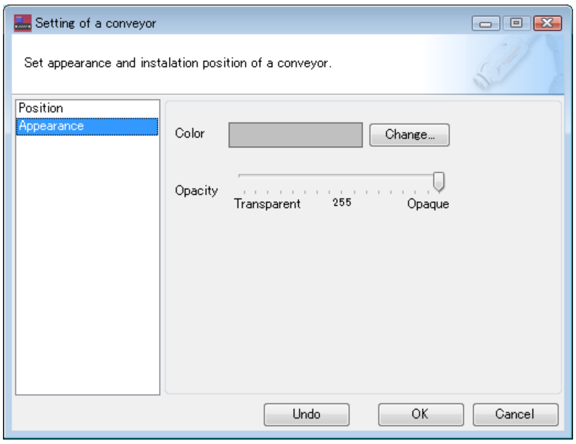
Conveyor color and transparency can be changed.

1 Select the target conveyor icon and click on Settings button.

Setting of conveyor dialog will open.

2 Click on the Appearance in the left side of the dialog.

Color setting and Opacity setting will appear on the right side of the dialog.



3 Click on [Change] button to change the color.

Color pallet will appear.

4 **Select the desired color in the pallet and click on OK.**

The color will be set.

5 **Sliding the gage will change the opacity.**

Sliding the gage towards the Transparent will increase the transparency of the conveyor model.

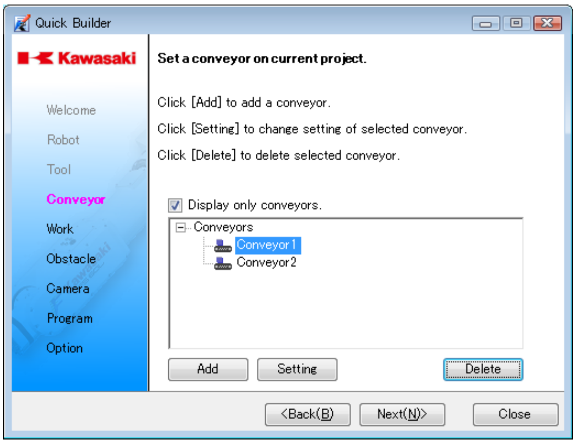
The value appears underneath the gage is indicating the transparency. Transparent is 0 and Opacity is 255.

Next explains how to delete the conveyor model.

Delete conveyor

1 **Select the target conveyor to delete.**

Delete button will be enabled.



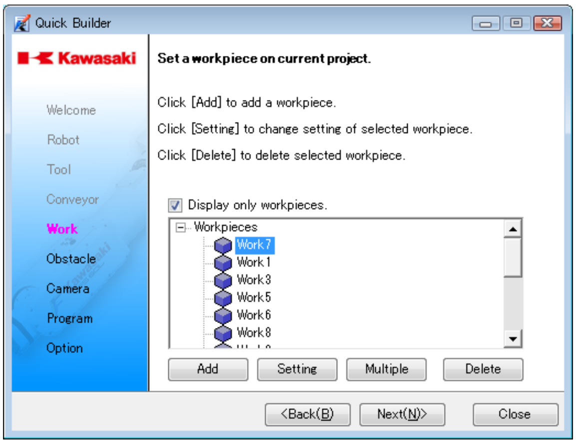
2 **Click on Delete.**

A confirmation dialog will appear.

Clicking on Yes will delete the selected model. Clicking on No will not delete.

5.7.2.4 Work

Add a work, delete a work or edit an installation position.



Refer to the following method to add a work.

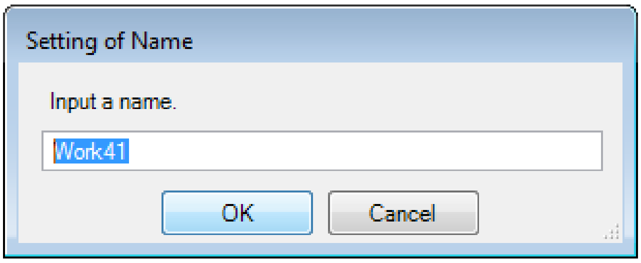
There are three ways to add; from library, from file or with quick generation.

Add from library

- It is added as a child object of the selected parent object. Before adding a work, decide where it would be added to on the tree.

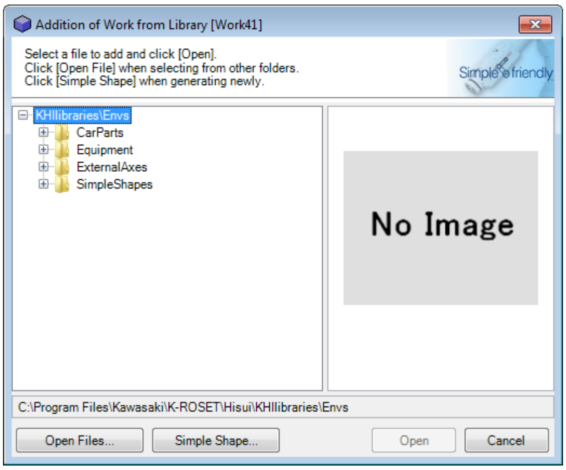
1 **Click Add button.**

A dialogue [Setting of Name] is displayed.



2 **Input a name and click OK.**

A screen [Addition of Work from Library] is displayed.



3 **Click a folder and select the work file.**

If the work file is STL, thumbnail in the right side of the screen is not displayed.

4 **Click Open button.**

A work is added.

Add by selecting a file

Use when selecting a file exported from CAD.

1 **Click Add button.**

A dialogue [Setting of Name] is displayed. Input a name and click OK.

2 **Click Reference button on the model field.**

A dialogue [Open files] is open.

Select a folder with the work file and select the work file.

The installed work is located in the install folder ¥KHIlibraries¥Envs.

3 Click Open button.

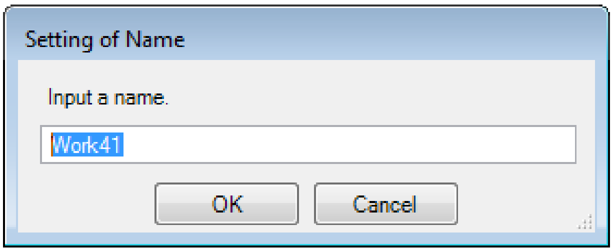
A work is added.

The operation is completed.

► Add with quick generation function

1 Click Add button.

A dialogue [Setting of Name] is displayed.

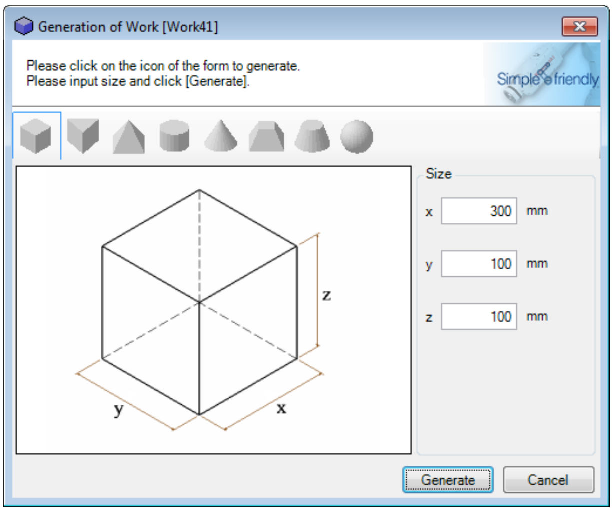


2 Click Simple generation button.

A dialogue [Generation of Work] is displayed.

3 Click an icon of the work shape.

Items of setting size vary depend on the selected shape. Refer to “5.7.4” for details.



4 Input the size and click Generate button.

A work with the set size is added.

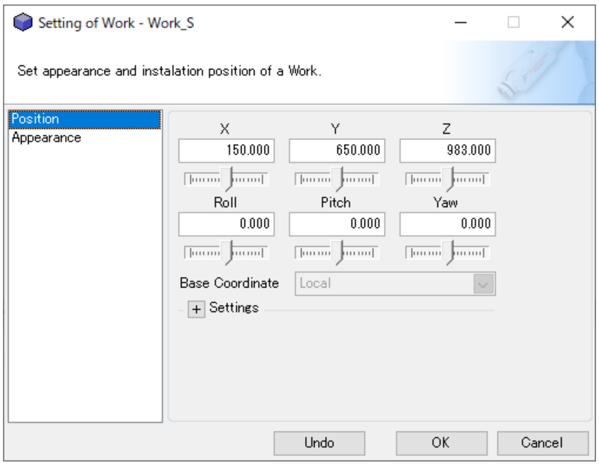
The operation is completed.

Refer to the following method to change the settings of the work.

► Change an installation position of a work

1 Select an object work icon and click Setting button.

A dialogue [Setting of Work] is open.



2 **Click Position on the left side of the screen.**

A position setting screen is displayed on the right side of the screen.

3 **Change a position and a pose.**

At the time of changing values, a work on the view is located in the appointed position and pose.

4 **Click OK to confirm.**

Click Undo to return to the previous position.

It is impossible to return after confirming by OK.

The operation is completed.

► Change appearance of a work

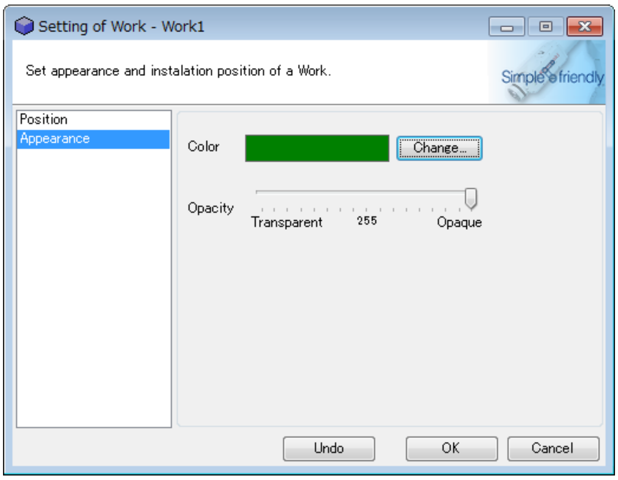
Set color and transparency of a work.

1 **Select an object work icon and click Setting button.**

A dialogue [Setting of Work] is open.

2 **Click Appearance on the left side of the screen.**

A setting screen of color and opacity is displayed on the right side of the screen.



3 **Click Change button to change color.**

A color selection pallet is displayed.

4 **Select a color.**

Select a color on the color selection pallet and click OK.

The color is set.

Drag the opacity gauge to set the opacity.

5 **When the gauge gets closer to the transparent side, the work would be more transparent.**

The indicated value shows the transparency. 0 means transparent and 255 means opaque.

The operation is completed.

Refer to the following method to delete a work.

Delete a work

- When there are child objects in a work to be deleted, all the child objects are deleted by deleting a parent. Before deleting, make sure that the work is the one to be deleted.

1 **Select an object work to be deleted.**

2 **Click Delete button.**

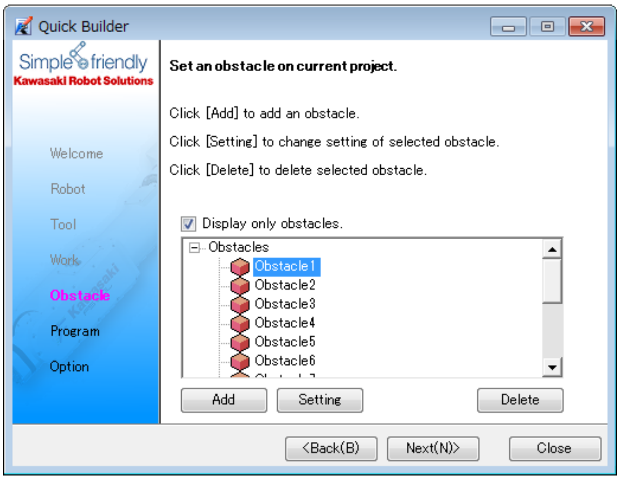
A confirmation dialogue is displayed.

Click Yes to delete or click No to cancel.

Remove a check mark in the option [Display only works] to display all the currently added objects. Keep this check mark to be ON normally.

5.7.2.5 Obstacle

Add an obstacle, delete an obstacle and edit an installation position.



Refer to the following method to add an obstacle.

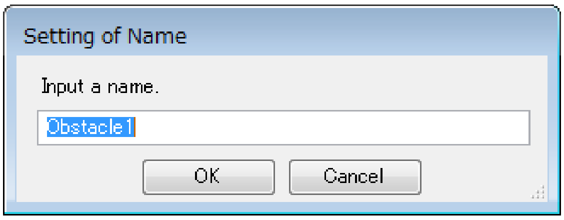
There are three ways to add; from library, from file or with quick generation function.

Add from library

* It is added as a child of the selected parent node. Before adding an obstacle, select a parent and decide where an object would be added to on the tree.

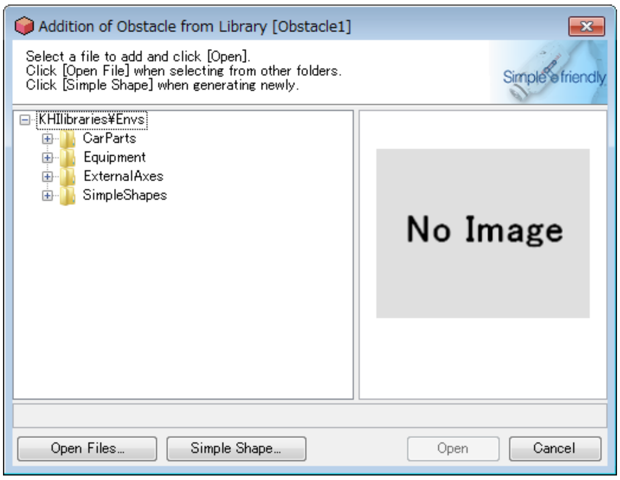
1 Click Add button.

A dialogue [Setting of Name] is displayed.



2 Input a name and click OK.

A screen [Addition of Obstacle from Library] is displayed.



3 Click a folder and select the obstacle file.

When the obstacle file is STL, thumbnail in the right side of the screen is not displayed.

4 Click Open button.

An obstacle is added and the operation is completed.

Add conveyor from a file

1 Click Add button

A dialogue [Setting of Name] is displayed. Input a name of an obstacle and click OK.

2 Click Reference button on the model field.

A dialogue [Open file] is open.

Select a folder with the obstacle file and select the obstacle file.

Installed obstacle is located in the install folder ¥KHIlibraries¥Envs.

3 Click Open button.

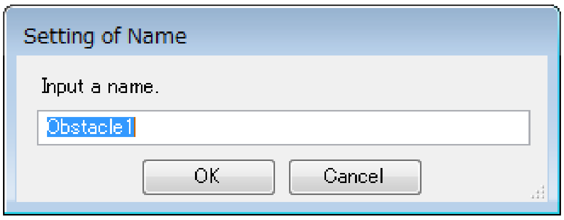
An obstacle is added.

The operation is completed.

► Add with quick generation function

1 **Click Add button.**

A dialogue [Setting of Name] is displayed.

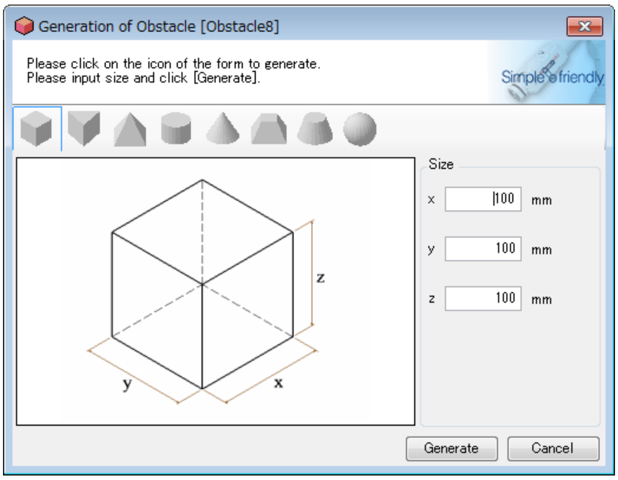


2 **Click Simple generation button.**

A dialogue [Generation of Obstacle] is displayed.

3 **Click an icon of the shape of an obstacle.**

Items of setting size vary depend on the selected shape. Refer to “5.7.4” for details.



4 **Input the size and click Generate button.**

An obstacle with set size is added.

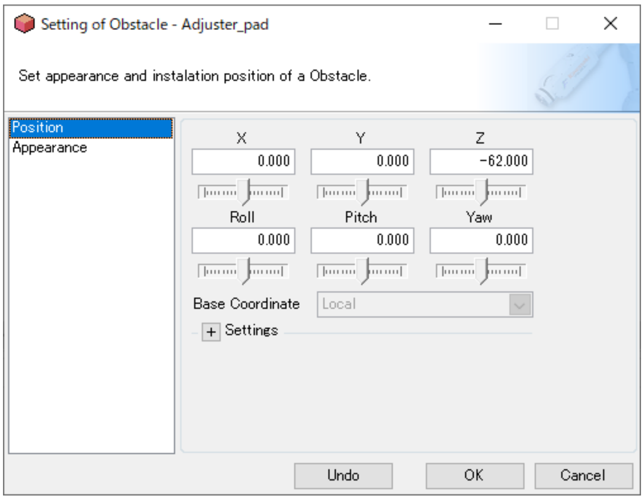
The operation is completed.

Refer to the following method to change settings of an obstacle.

► Change an installation position of an obstacle

1 **Select an object obstacle icon and click Setting button.**

A dialogue [Setting of Obstacle] is open.



2 **Click Position on the left side of the screen.**

A position setting screen is displayed on the right side of the screen.

3 **Change a position and a pose.**

At the time of changing values, an obstacle on the view is located in the appointed position and pose.

4 **Click OK to confirm.**

Click Undo to return to the previous position.

It is impossible to return after confirming by OK.

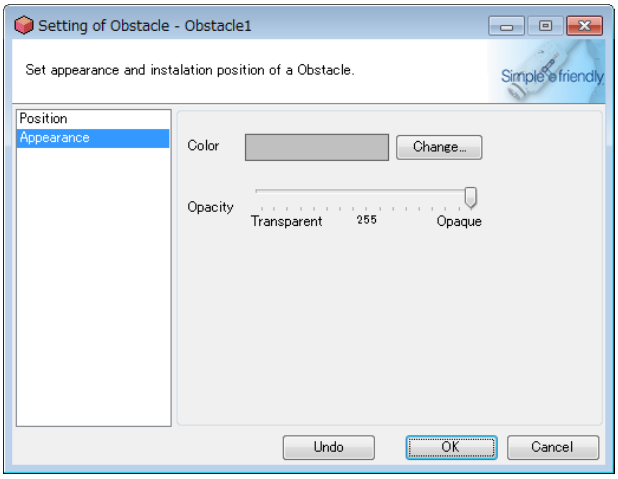
Change appearance of an obstacle

1 **Select an object obstacle icon and click Setting button.**

A dialogue [Setting of Obstacle] is open.

2 **Click Appearance on the left side of the screen.**

A setting screen of color and opacity is displayed on the right side of the screen.



3 **Click Change button to change color.**

A color selection pallet is displayed.

4 **Select a color.**

Select a color on the color selection pallet and click OK.
The color is set.

5 **Drag a gauge of opacity to set the opacity.**
When the gauge gets closer to the transparent side, the obstacle would be more transparent.
The operation is completed.

Refer to the following method to delete an obstacle.

► Delete an obstacle

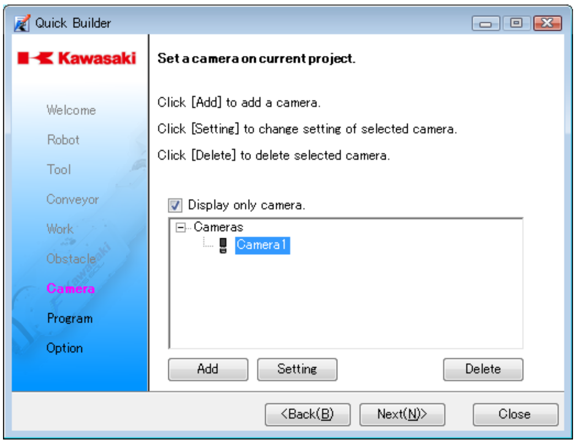
- When there are child objects in a work to be deleted, all the child objects are deleted by deleting a parent. Before deleting, make sure that the work is the one to be deleted

1 **Select an object obstacle to be deleted.**

2 **Click Delete button.**
A confirmation dialogue is displayed.
Click Yes to delete or click No to cancel.
The operation is completed.
Remove a check mark in the option [Display only obstacles] to display all the currently added objects. Keep this check mark to be ON normally.

► 5.7.2.6 Camera

Camera object can be add/delete and installation position can be edited.



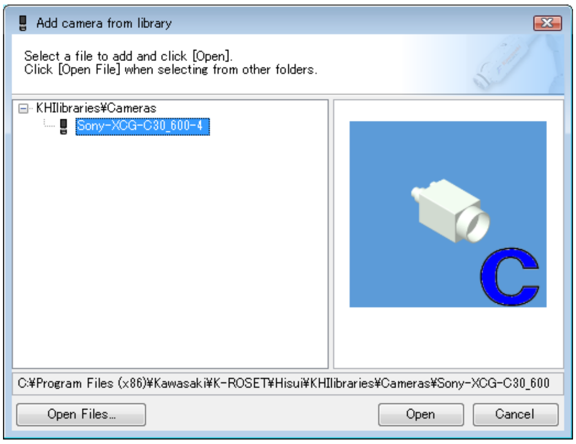
Following explains how to add camera object.
There are two ways to add a camera. One is to add from library and the other is to add from a file.

► Add from library

1 **Select the target robot to add a camera in the tree and click on Add.**
A dialog “Add camera from library” will open.

2 **Select the desired application.**

Thumbnail of the selected tool will appear in the right side of the dialog.



3 **Click on [Open].**

Camera object will be added.

Add camera from a file

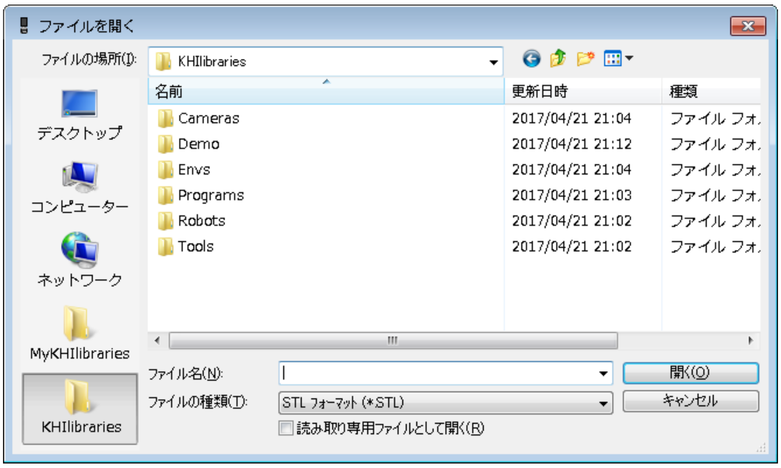
Use this function to add a camera object from a file which is exported from CAD.

1 **Click on Add button.**

Addition of a camera from Library dialog will open.

2 **Click on [Open Files…] button.**

Open file dialog will open.



Select the folder which stores the camera files and select the desired camera file in the folder.

Installed camera files are stored in the (Install folder) ¥K-ROSET¥Hisui¥KHIlibraries¥Envs folder.

3 **Click on Open.**

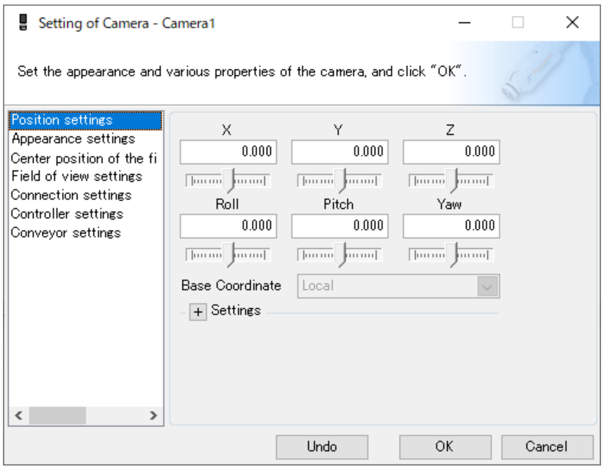
A camera model will be added.

Next, edit the camera settings.

► Chage installation position of the camera

1 **Select the target camera icon and click on Settings.**

Setting of Camera dialog will open.



2 **Click on "Position settings" on the left side of the dialog.**

Position setting screen will appear on the right side of the dialog.

3 **Change the camera position and pose.**

Editing the value will change the position and pose of the camera object in the view.

4 **Click OK.**

The set position will be defined. Clicking the Undo button before clicking OK will move the position back to before the change.

Once the OK button is pressed, Undo button cannot change the position back to before.

► Change appearance of the camera object

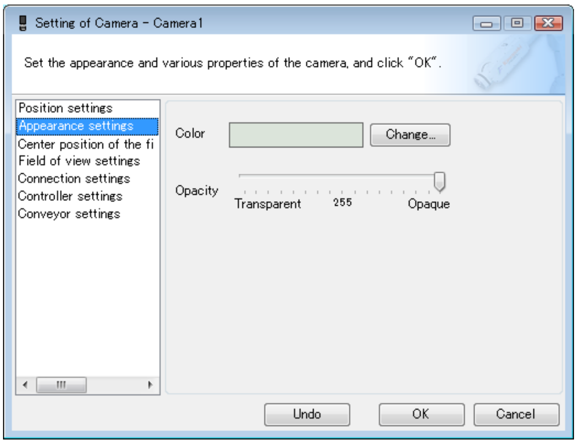
Color and transparency of the camera object can be set.

1 **Select the target camera icon and click on Settings.**

Setting of Camera dialog will open.

2 **Click on the "Appearance settings" in the left side of the dialog.**

Color and Opacity setting screen will appear in the right side of the dialog.



3 Click on [Change] button to change the color.

Color pallet will appear.

4 Select the desired color in the pallet and click on OK.

Color is set.

5 Sliding the gage will change the opacity of the camera object.

Sliding the gage towards the Transparent will increase the transparency of the conveyor model.

The value appears underneath the gage is indicating the transparency. Transparent is 0 and Opacity is 255.

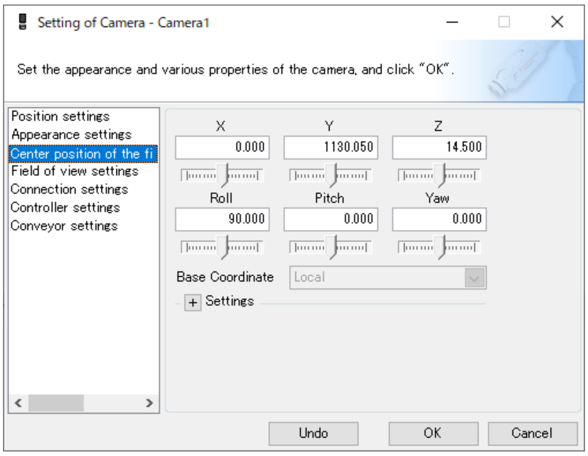
Change the center of the camera's filed of view

1 Select the target camera icon to change and click on Settings.

Setting of Camera dialog will open.

2 Click on "Center position of the field of view" in the left side of the dialog.

Position setting screen will appear in the right side of the dialog.



3 Change the position and pose.

Editing the value will change the center position of the camera's field of view.

> * The center position of the camera's field of veiw will be the reference of the displayed image.

4 Click OK.

The set position will be defined. Clicking the Undo button before clicking OK will move the position back to before the change.

Once the OK button is pressed, Undo button cannot change the position back to before.

Set the camera's field of view

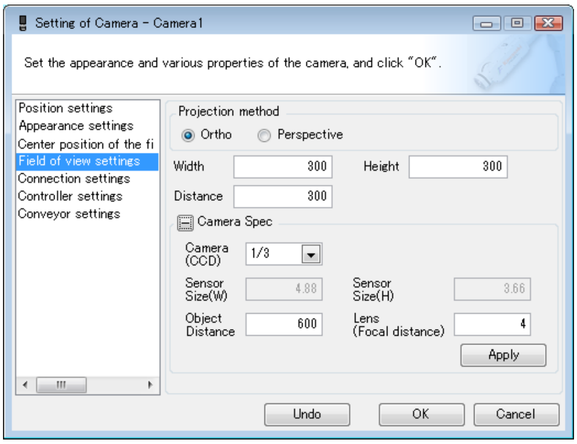
> * Specify the range of the view and distance based on the center of the field of view.

1 Select the target camera icon and click Settings.

Setting of Camera dialog will open.

2 Click on “Field of view settings” in the left side of the dialog.

View settings screen will appear in the right side of the dialog.



3 Edit the “Width”, “Height” and “Distance” and click on OK.

Settings will be set.

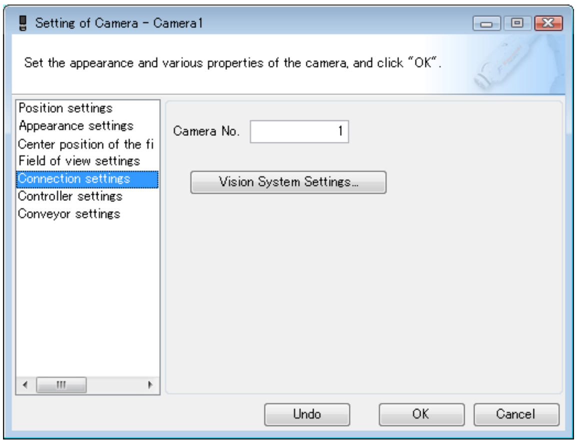
► Set the connection method of the camera

1 Select the target camera icon and click on Settings.

Setting of Camera dialog will open.

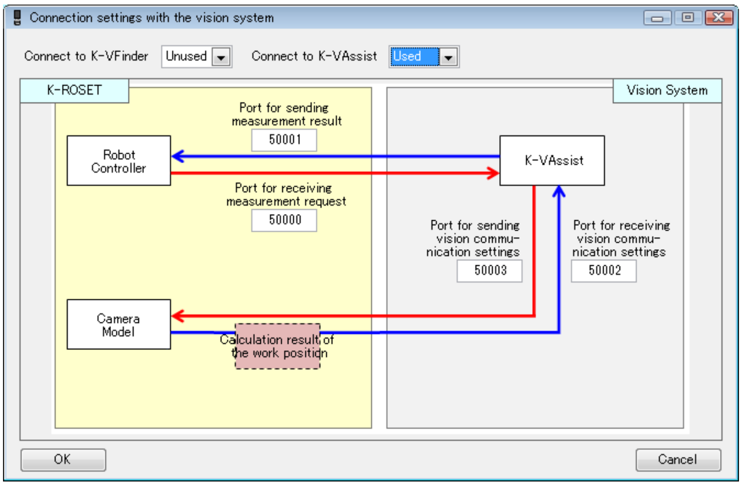
2 Click on “Correction settings” in the left side of the dialog.

Connection setting will appear in the right side of the dialog.



3 Change the camera No. and click on “Vision System Settings” button.

Connection settings with the vision system dialog will open.



4 **Select the software and port to connect and click OK.**
Settings will be set and the screen will change back to the Connection settings.

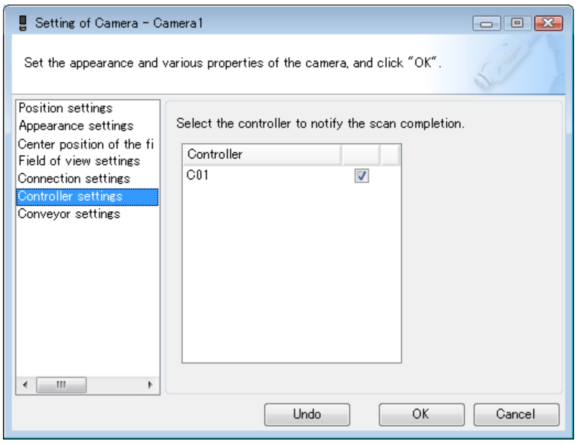
5 **Click on OK.**
Set settings will be defined.

► Set the pair of the camera and robot

* Skip this process if the capture image completion signal (conveyor reset) is not needed.

1 **Select the target camera icon and click on Settings.**
Setting of Camera dialog will open.

2 **Click on "Controller settings" in the left side of the dialog.**
Controller setting will appear on the right side of the dialog.



3 **Click in the check box for the controller to pair with a camera and click OK.**
Settings will be set.

► Set the pair of the camera and conveyor.

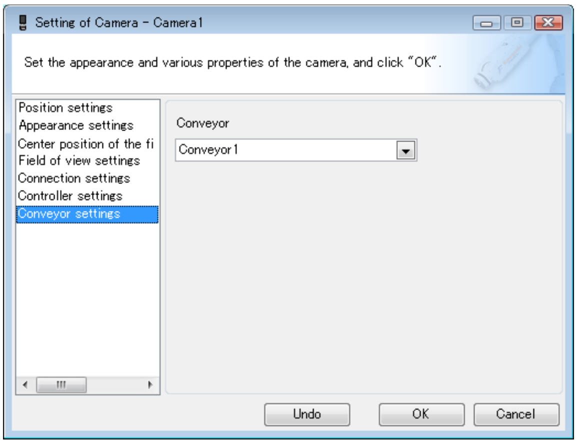
* Skip this process when the system is not for conveyor tracking.

1 **Select the target camera icon and click on Settings.**

Setting of Camera dialog will open.

2 **Click on “Conveyor settings” in the left side of the dialog.**

Conveyor settings will appear on the right side of the dialog.



3 **Select the conveyor to pair with the camera and click OK**

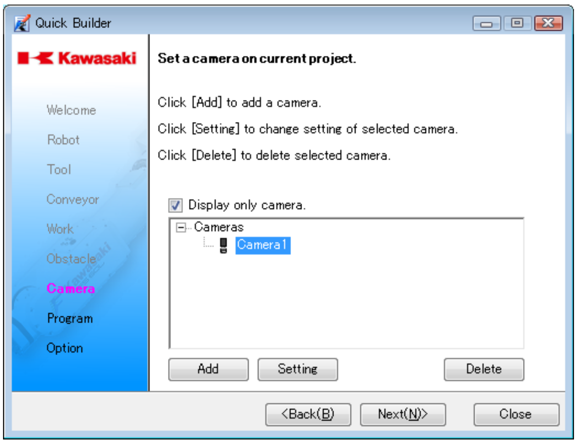
The settings will be set.

Next explains how to delete the camera object.

► Delete camera object

1 **Select the target camera to delete.**

Delete button will be enabled.



2 **Click on Delete.**

A confirmation dialog will appear.

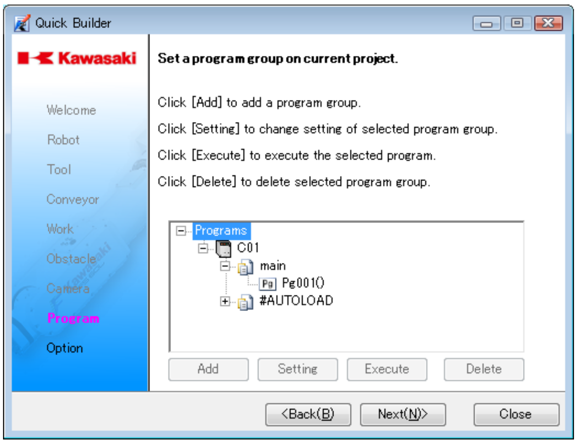
Clicking on Yes will delete the selected camera and selecting No will not delete the camera.

► 5.7.2.7 Program

Add a program, delete a program and edit an installation position.

Select and add a program template from file.

Only handling can be selected.



- The generated user programs can be added from the quick builder.
- Store program files in the install folder ¥KHIlibraries¥Program.
- Example）C:¥Program Files¥Kawasaki¥K-ROSET¥KHILibs¥KHIlibraries¥Programs¥Handling

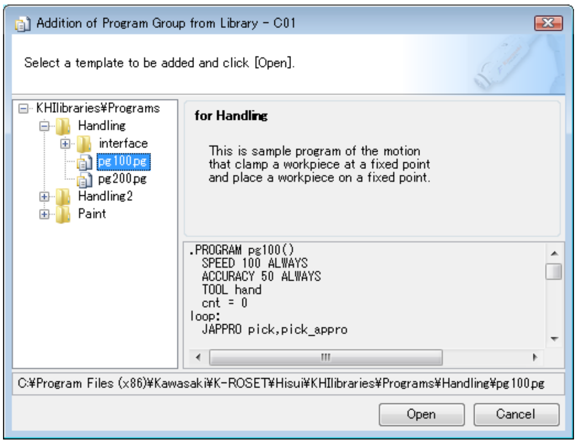
Refer to the following method to add a program.

► Add a program

A program is added under the controller.

1 Click Add button

Select application folder and select a program.



Only stored program in template can be selected.

2 Select a program from the list and click Open.

A program is added in the controller with a file name as a group name.

It is added to the program tab of K-ROSET.

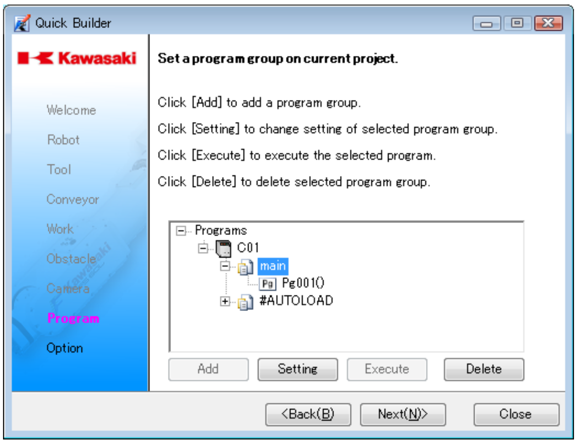
The operation is completed.

The added program contents can be displayed. Also, the variable can be displayed or changed.

Refer to the following method.

► Display a program list

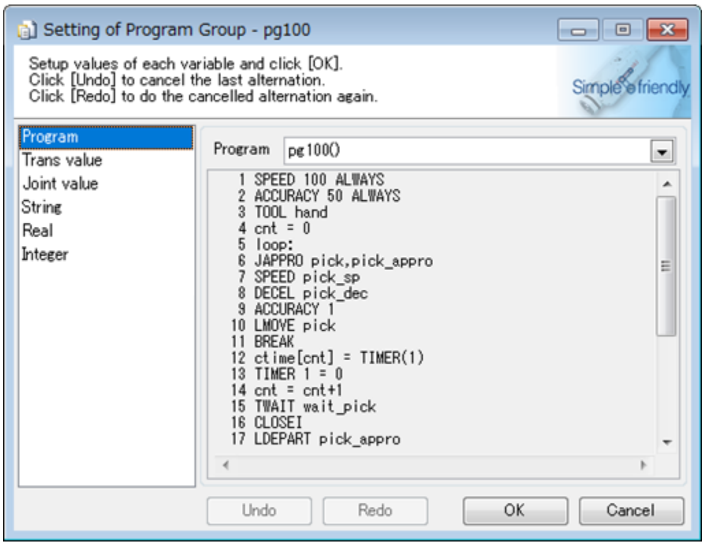
1 Select the added program group.



2 Click Setting button.

A dialogue [Setting of Program Group] is displayed.

Select Program in the left side of the screen. The program contents selected in the program selection box is displayed in the right side of the screen.



The operation is completed.

► Display or edit a variable of the program

Display the variable according to the selected variable and these values can be changed.

1 Select the added program.

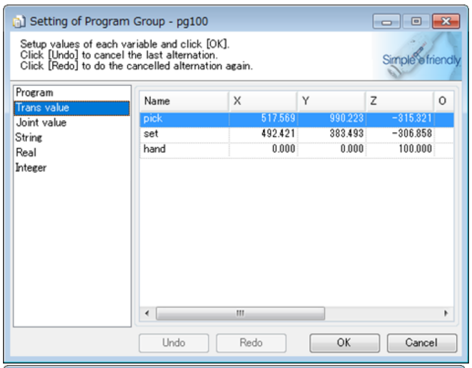
2 Select variables（Point variable, String, Real,Intger）on the left side of the screen.

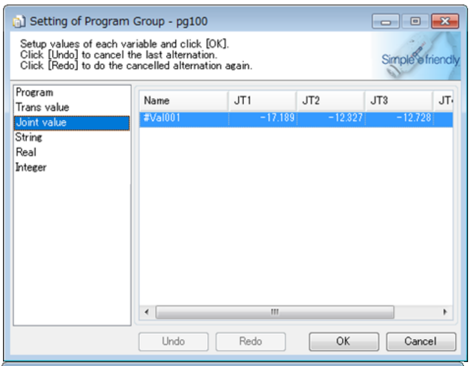
Description according to the selected variable is displayed.

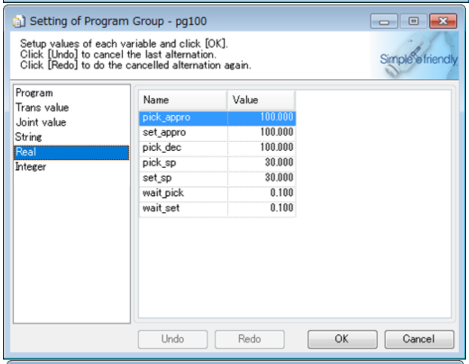
For point variable, click variable name on the right side of the screen to move a tool top of the robot on the view.

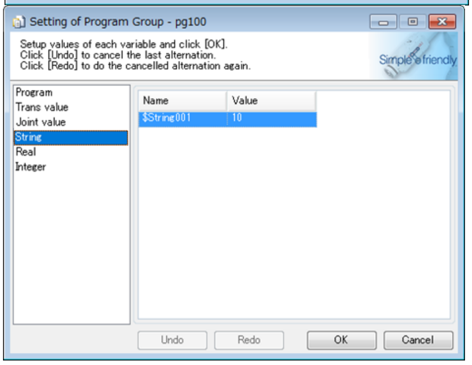
- If the robot cannot take that pose, transformation needs to be adjusted to the appropriate position.

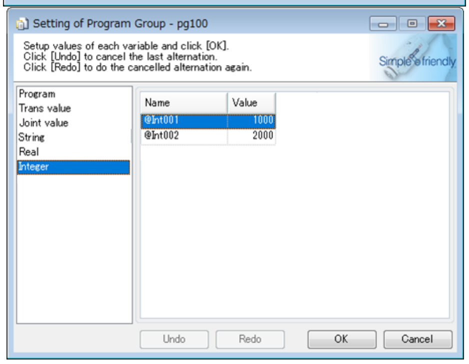
3 Edit the value and click OK to reflect.











► Execute a program

With quick builder, select a program of Pg icon on the program screen to select an execute button.

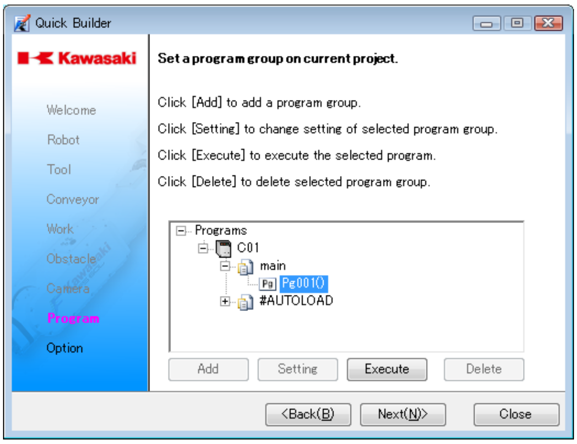
By executing, robot on the view operates.

*

- In order to execute a program appropriately, need to adjust to operate with a robot that a program and each variable are added in advance.
- Program can be edited by using a program tab. Refer to “5.8”.
- Each variable can be edited either with quick builder or program tab.

1 Select Pg icon.

An execute button becomes valid.



2 **Click Execute button.**

A program is executed.

The operation is completed.

► Delete a program

1 **Select an object program to be deleted.**

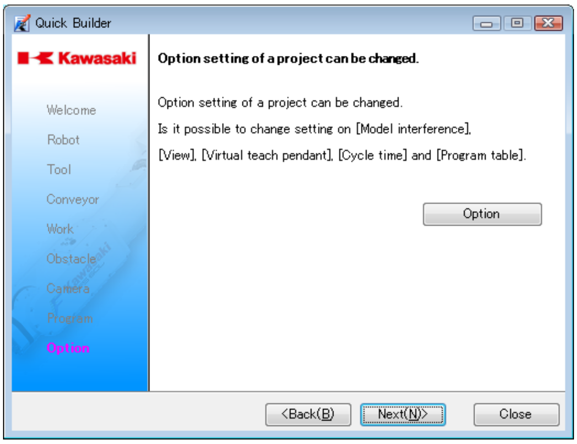
2 **Click Delete button.**

A confirmation dialogue is displayed.

Click Yes to delete or click No to cancel.

► 5.7.2.8 Option settings of a project

Set option settings of a project.



With quick builder, following options can be set.

- Collision settings
- View
- Virtual teach pendant
- Cycle time setting
- Program table setting

Items not available on quick builder can be set on option menu of K-ROSET.

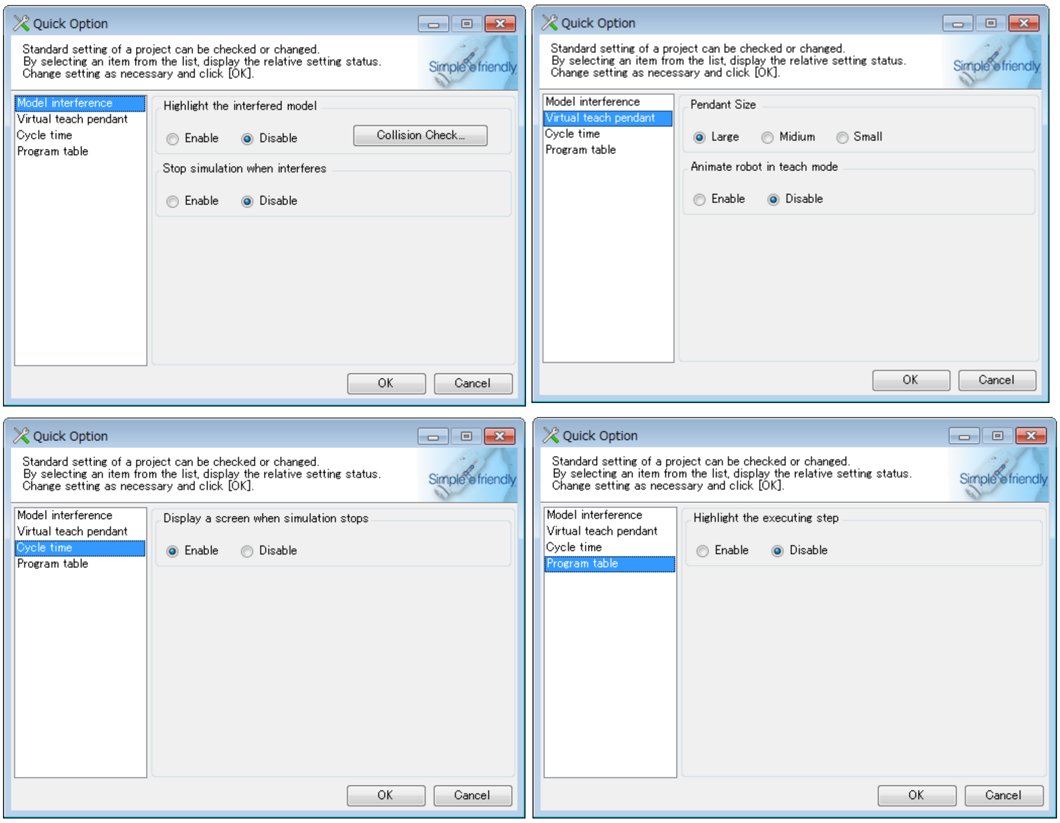
Refer to the following method to set options.

► Option settings

1 **Click Option button.**

A screen [Quick Option] is displayed.

Select items on the left side of the screen to display each setting screen on the right side of the screen.



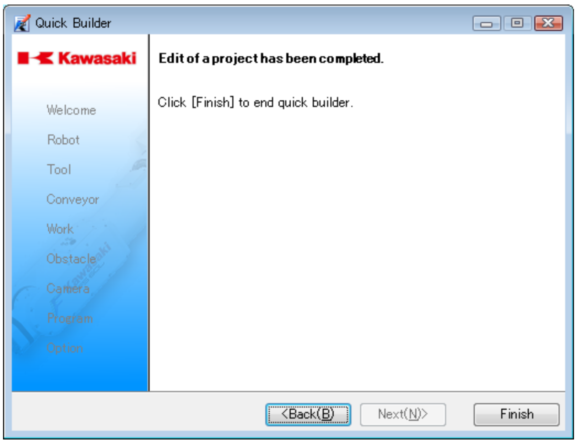
Refer to the chapter of option setting of the operation manual for details of each item.

For the collision item, collision pairs can be set.

► 5.7.2.9 Finish Quick Builder

After setting all items, click Finish button.

It can be finished by Close button located in the right below screen during settings. When starting the quick builder again, select an icon [Edit a project with quick builder] from the start page.

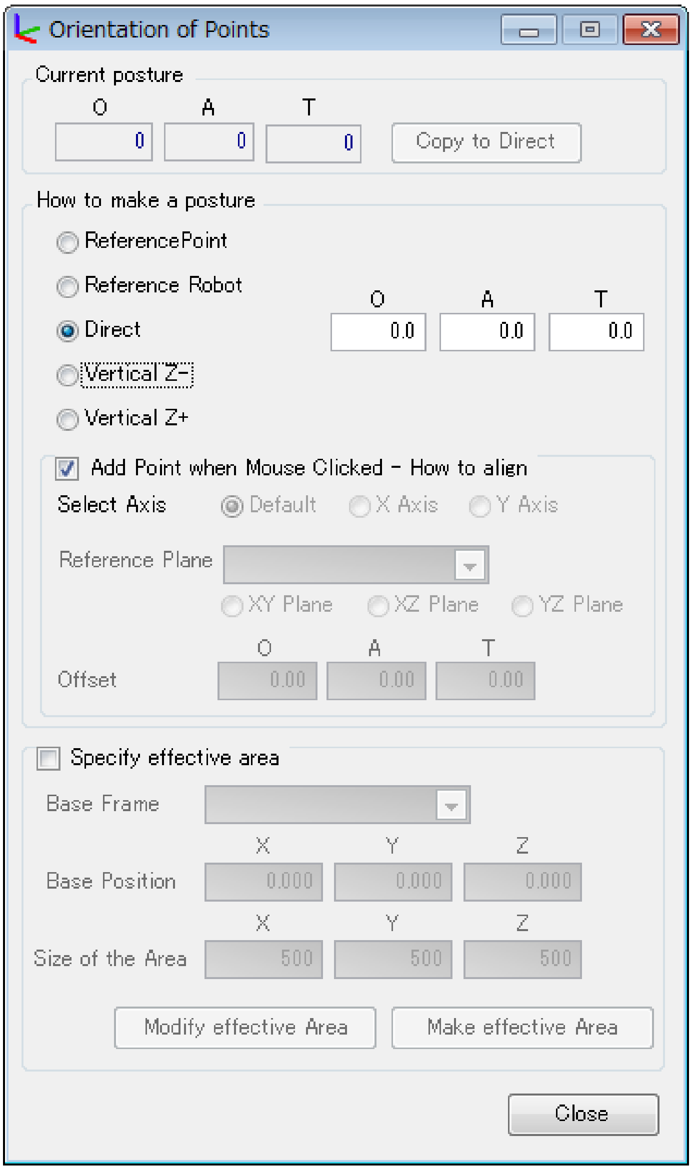


5.7.3 Teach Point Align

On the Teach Point Align dialog, it is possible to set a constant value to the orientation of a teaching point which is added to a project in the click teaching mode (each value of the OAT coordinate).

- This function is effective while the Teach Point Align dialog is being displayed.

Since V1.7.1, Pose for teaching point in the specified range which is set in the teaching point align can be controlled. In the older version, the teaching point which is added by click teach was able to control only Z direction and T rotation was depending on the surface information of workpiece object. However, alignment side is able to be specified in this latest version and which allows T rotation to be controlled any pose after specifying the Z direction.



To determine the orientation of the teaching point added, the following five methods are usable.

[Reference Point] The teaching point is added at the same orientation as the registered teaching point.

[Reference Robot] The teaching point is added at the same orientation as the current posture of the registered robot.

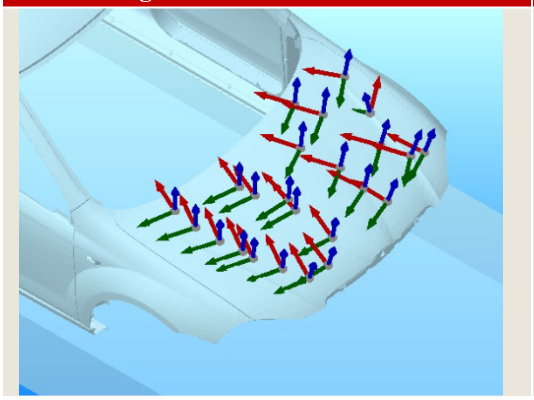
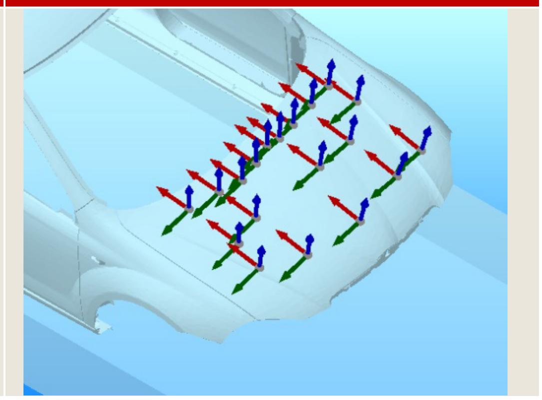
[Direct] The teaching point is added with the directly entered values. When [Reference Teach Point] or [Reference Robot] is selected, when the [Copy for Direct] button is pressed, the values of the current robot (or teaching point) will be reflected into the entry form of [Direct].

[None] — The teaching point is added with the Teach Point Align function not effective.

[Perpendicularly Z+,Z-] — When [Click and add teach point] is marked, invert positive and negative for normal direction + of model surface and teaching point Z.

► Alignment of click teach function

With status of adding teaching point by click, by selecting model plane by mouse, Z orientation toward normal vector orientation of model can be determined but XY orientation cannot be determined. By setting plane to determine orientation of X axis or Y axis, T rotational component of teaching point posture is determined.

Without alignment	With alignment
	

➢ Alignment base plane（XY plane, XZ plane, YZ plane）

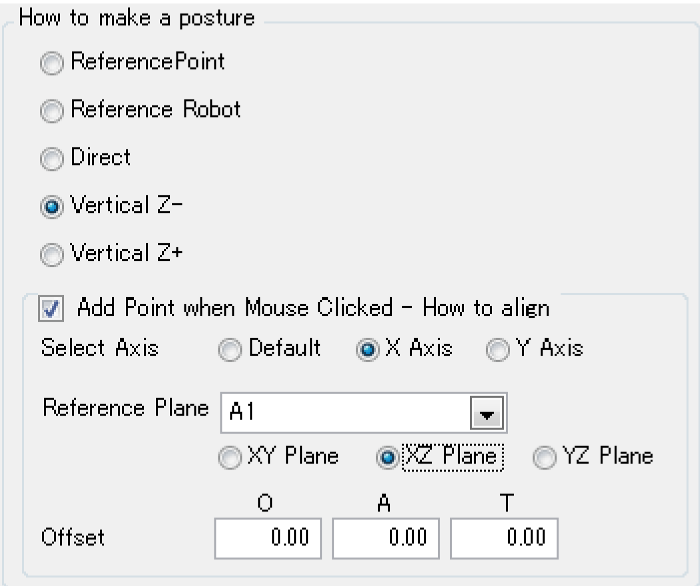
Select an object and plane of that coordinate system to be base for alignment.

When [Add point when mouse clicked] is marked, revert plus and minus of normal vector orientation + of model plane and a teaching point Z.

➢ Offset

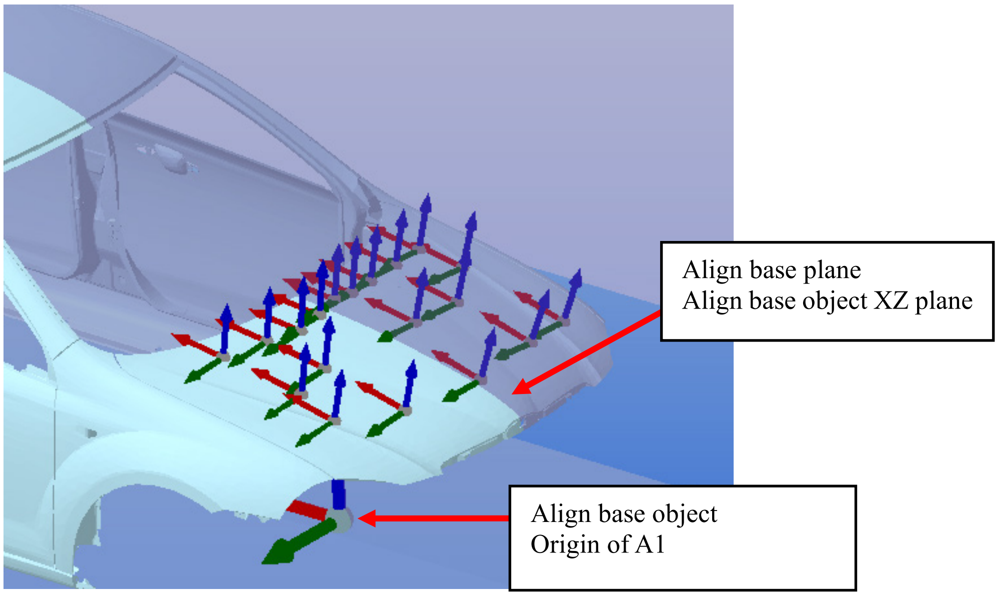
Alignment plane can be offset.

Example operaion is described with following settings.

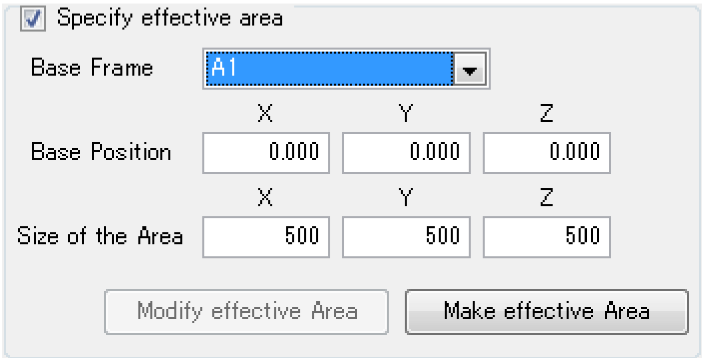


In below picture, plane for alignment is a plane which work model is divided lengthwise.

Teaching points are aligned to make X axis orientation parallel to this plane.



► Area settings



➢ **Specify effective area**

Display/Hide area list screen.

➢ **Base frame**

Specify origin position to be base of area creation. Origin of specified object is the base.

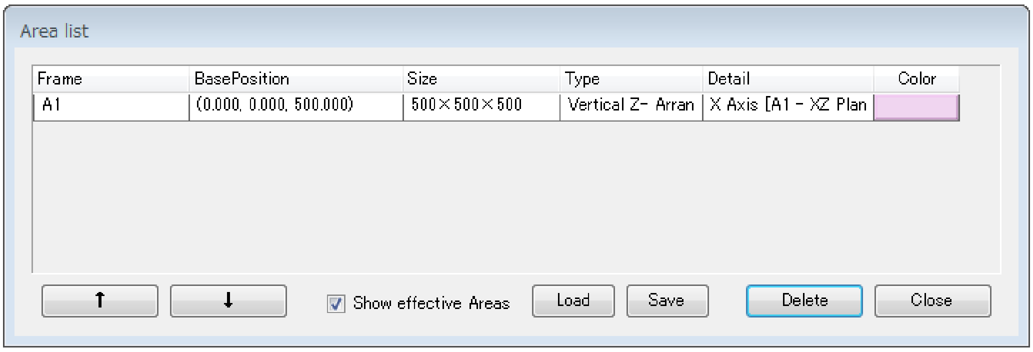
➢ **Base position**

Shift base position from origin position. Off position specified in base frame.

➢ **Size of the area**

Set size of the area.

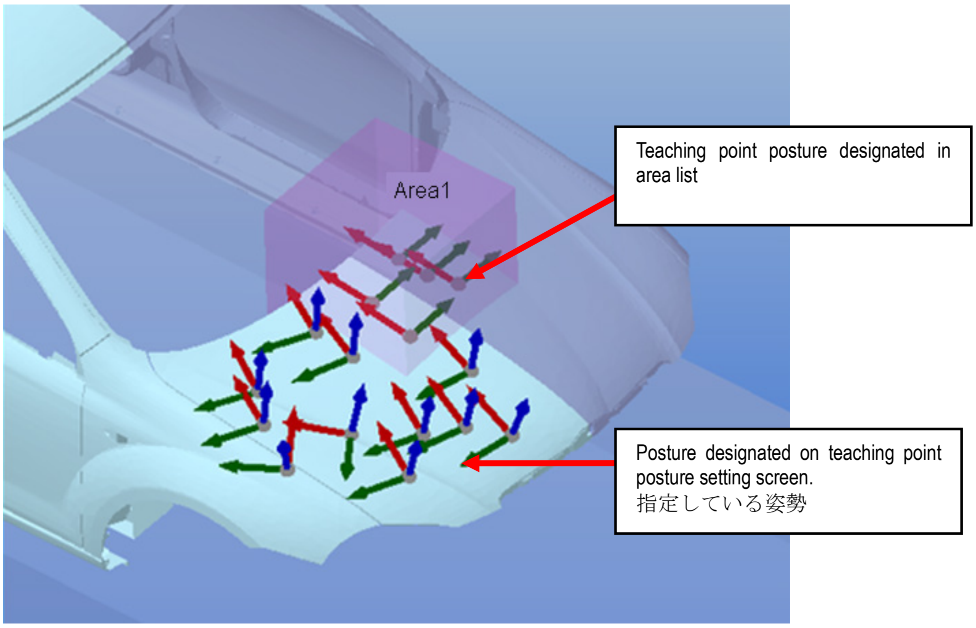
Example operation is described with following settings.



In below image, posture of teaching points in a cube area 1 are different. Teaching points is created by control of area list for within area, and by control of teaching point posture setting screen for other part.

- **Load/Save**

Area settings can be saved and used for other projects. Save files in xml format.



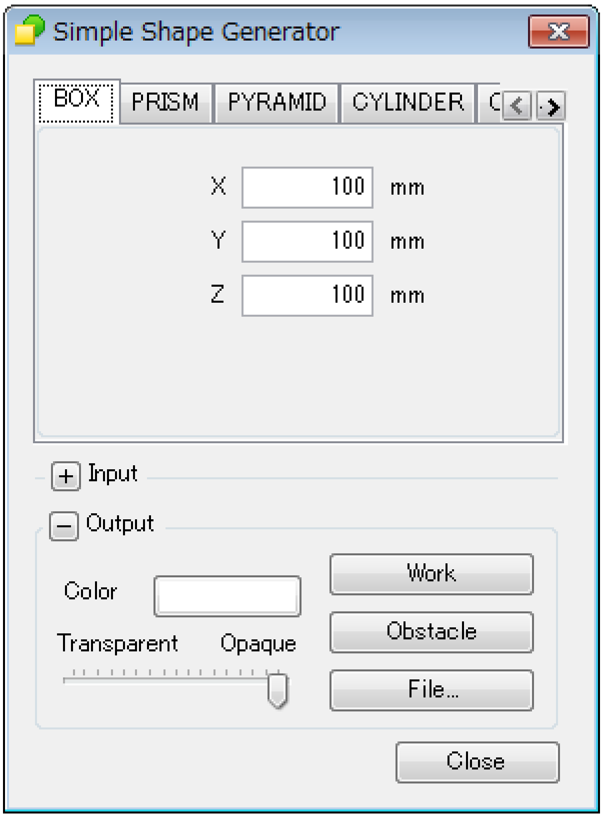
- **Show effective areas**

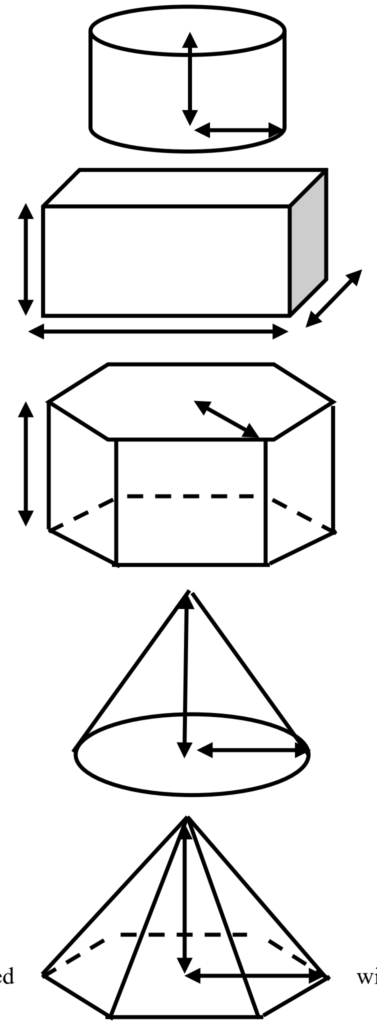
Mark and switch ON/OFF display of areas.

5.7.4 Simple Shape Generator

In the creation of the simplified shape, a simplified model moving on K-ROSET can be created.
Select creation of the simplified shape from a plug-in menu.

Select a tab from box shape/square column/pyramid/column/circular cone/box shape 2/column 2 tabs/Sphere, and specify the dimensions of the created model. Click the work button to create the model as a work, and click the obstruction button to create the model as an obstruction in the world origin.





- **File export**

  A file saving dialog is displayed, and a model of the parameter entered with any name is saved.

- The created file is saved as "Work + consecutive number" in MyKHILibrary folder

- **Work**

  A model of the entered parameter is added to a view as a work. (*)
  Immediately after creation of the model, the model is provided at the world origin.

- **Obstacle**

  A model of the entered parameter is added to a view as an obstacle. (*)
  Immediately after creation of the model, the model is provided at the world origin.

- **Input**

New : It adds the newly-created model.

Replace: It is able to modify the simple model. By clicking the Env model created by Simple Shape Generator, the model name is automatically added to the list. The model parameters are shown.

Immediately after creation of the model, the model is provided at the world origin.

► 5.7.4.1 Modify simple shape model

➢ **Modify model size on the layout.**

Change model size on the layout created by simple shape generator.

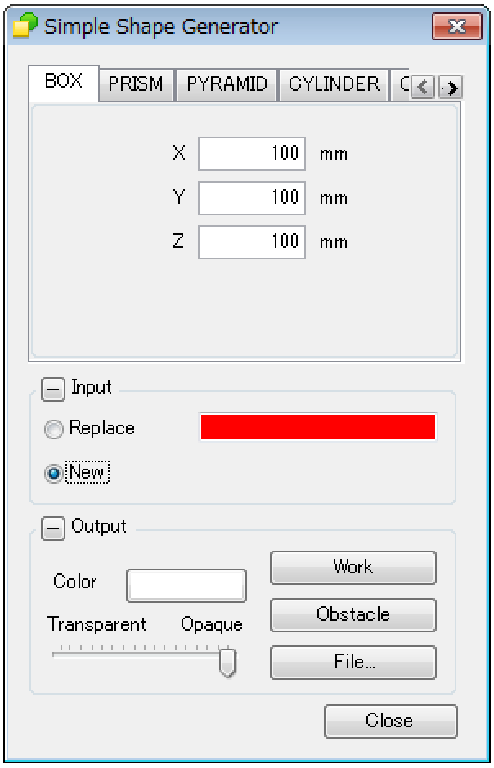
1 Click simple shape generator on plug-in menu.

Screen for simple shape generator is displayed.

2 Click replace of input.

Green check button is turned on.

If screen is closed, click + button to open.

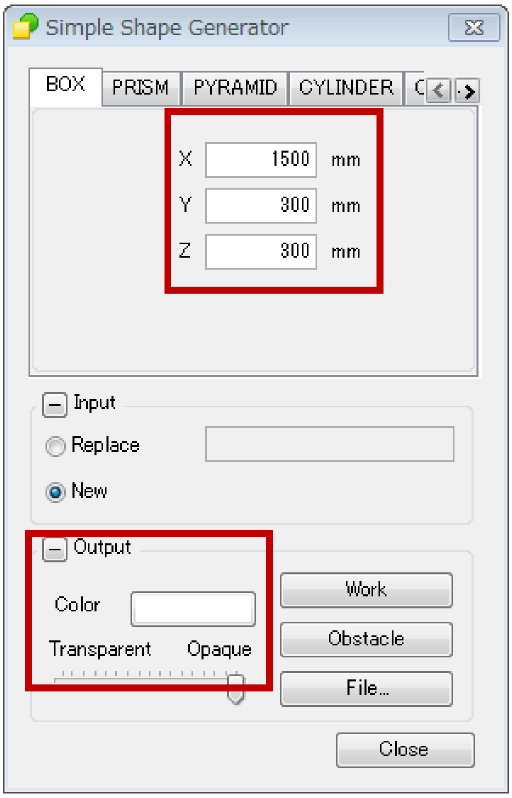


3 Select simple shape model to be changed from tree.

Selected object name is displayed in the replace box.

Shape size and a name in tree are reflected.

4 Input changing size and output condition (color, transparent).



Changes are not reflected yet.

5 Click work or obstacle button.

Selected model in 3 is modified. (This example shows work 1)

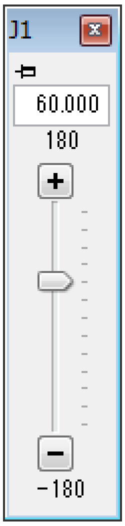
It is possible to modify work to obstacle, or obstacle to work.

*

- Only models generated by simple shape generator can be changed their size.
- Data of other software or output from CAD cannot be modified.

5.7.5 Simple Teach

This section describes the joint dialog that is displayed when a robot model is clicked.



This joint dialog is displayed at the bottom right of clicking point in the initial settings.

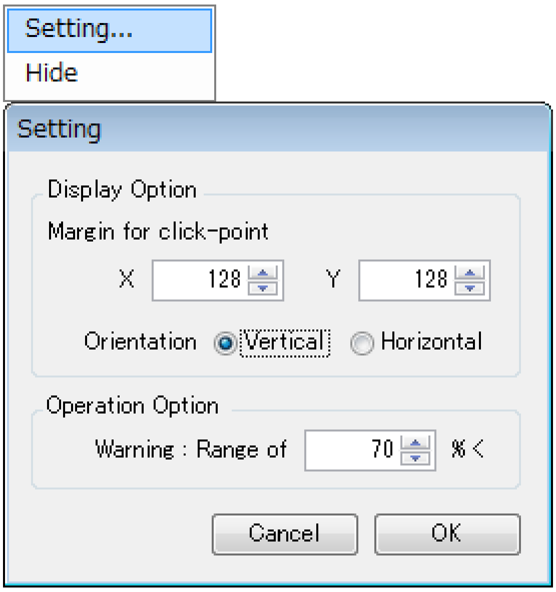
To fix the posture, please click the top left of the joint dialog.

- How to use

  Drag the track bar or input the value in the text box.

- How to set

  Clicking on the dialog, a menu is displayed.



Margin for click-point: Set the distance of dialog from the clicking point.

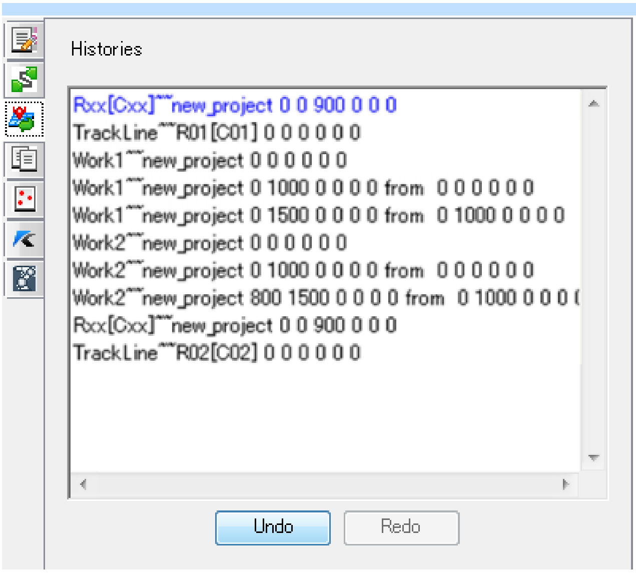
Orientation: Switch the displaying mode of the dialog.

Warning: When approaching the setting percentage of the motion range, the color changes.

- If Controller axes limit turn off on the Teach Panel, the value cannot set beyond the motion range.

5.7.6 Undo Relocation

When an entity such as a robot or a workpiece is repositioned by mistake, this function can return the entity to the previous position.



By pressing the [Undo] button, the latest reposition processing is canceled, so that the robot returns to the state before that processing was applied.

In addition, by pressing the [Redo] button, the reposition processing which was canceled by pressing the [Undo] button will be redone for one execution done just before pressing the [Undo] button.

This function can keep records for the latest 100 times of reposition processing.

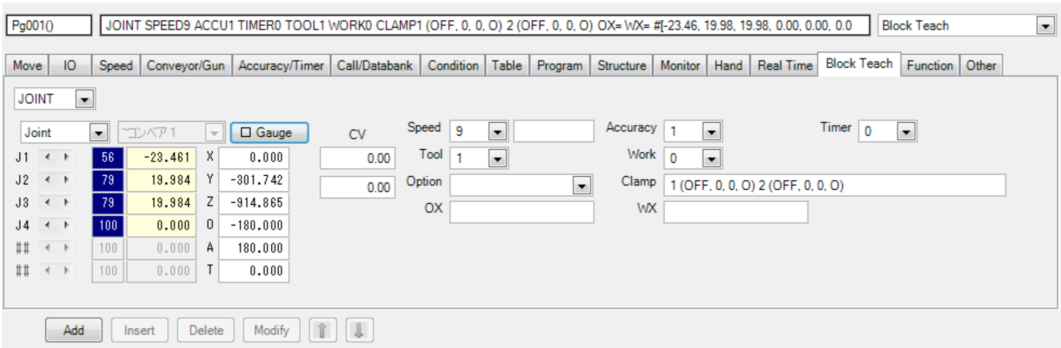
* When multiple entities have been repositioned, it is not possible to cancel only the reposition processing of the entities other than the one which was just repositioned

5.8 Program

5.8.1 Program instruction

Program instruction is a function to create the instruction on a program step of the selected program name on the program screen

Same instruction as a real machine can be input.
However, kind of instruction that can be set varies depend on options of the robot controller.



The buttons are described as follows.

➢ Changement of robot posture

It can change the posture of Robot like Teach Panel function.

- Please refer to Option setting in Teach Panel.

➢ Instruction tabs

Instructions are classified to each tab.

- Refer to the robot controller operation manual for detailed format and function of instructions.

[Add] :	The content of the current Paint is newly appended to the bottom of the program.
[Insert] :	The program instruction currently selected on the program table is inserted into the selected line on the program.
[Delete] :	The program instruction currently selected on the program table is deleted.
[Modify] :	The program instruction currently selected is corrected with the content specified on the Paint tab.
[↑] :	The program instruction currently selected on the program table is moved one line above on the program.
[↓] :	The program instruction currently selected on the program table is moved one line below on the program.
[Program language setting]	Set program language for adding and modifying program step. (AS language, AS ASCII, Explosion-proof ASCII Japanese, English)
[Joint interpolation]	Set program language for adding and modifying the selected step of the selected robot. (Explosion-proof ASCII Japanese, English)

5.8.1.1 Operation procedures

Add program step

Select the program name to which you wish to add a program instruction, and choose the [Program] tab at the bottom of the screen.

In the [Program] window, choose the target program instruction. Enter values, and press the [Add] button.

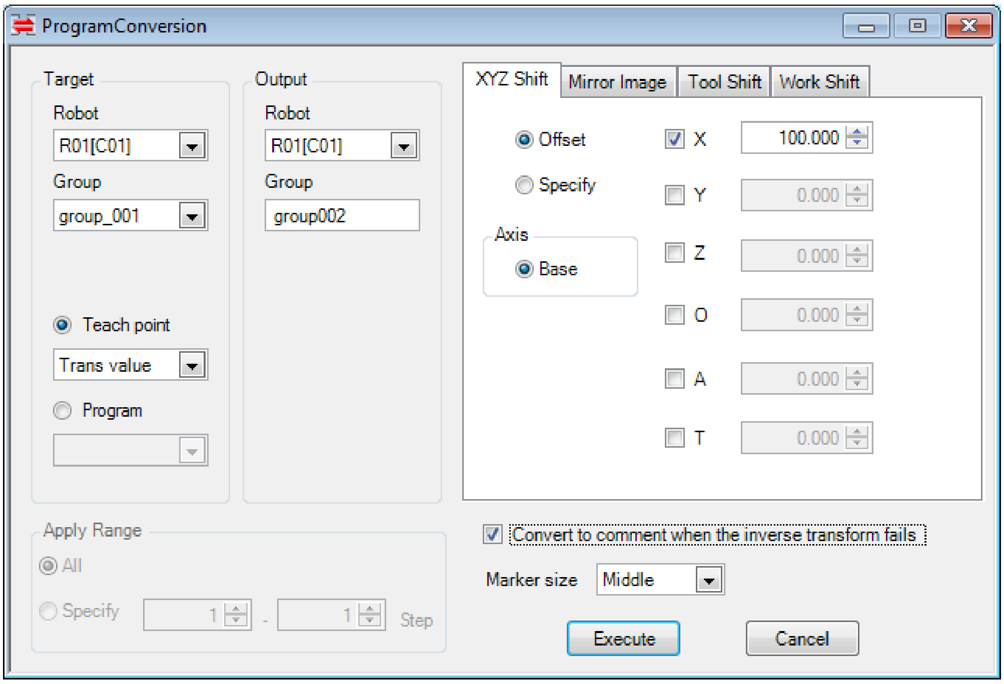
The selected program instruction will be added to the program.

Modify program step

The content of each program instruction can be edited using the function. On the program table, choose a program instruction that you wish to modify, and select the [Program] tab at the bottom of the screen. Then, it will be possible to modify the program being selected currently.

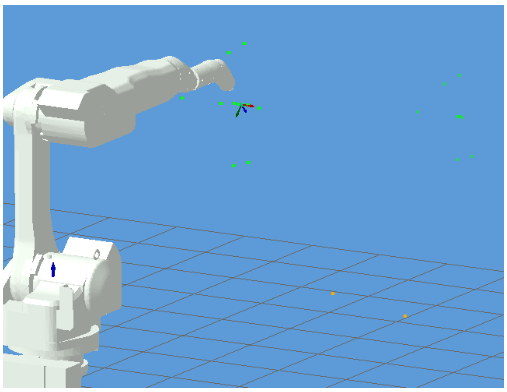
5.8.2 Program conversion

This section describes program conversion.



Motion commands of the program or points added to the program table can be converted with a specified method in the program conversion.

Preview (point marker) is displayed before execution.



Green ... Point of conversion source

Light green ... Point succeeded in conversion

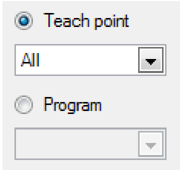
Orange ... Point failed in conversion

➢ **Target**

The program for the conversion is selected.

A robot, a group, and a program are selected from the combo box sequentially.

➢ Choose target for conversion

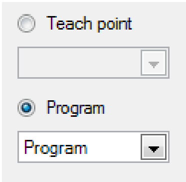


• Teach point

It converts all teach points in the same group at a time.

Select [Trans value] to convert only transformation value.

Select [Joint value] to convert only joint value.



• Program

It converts motion command or the teach points in the motion command of the selected program.

➢ **Apply Range**

Set this setting when Program is selected for the conversion target.

• **All**

Applied to all motion commands of the program of the selected source of conversion

• Specify

Applied to the motion commands in the specified column of the program of the selected source of conversion

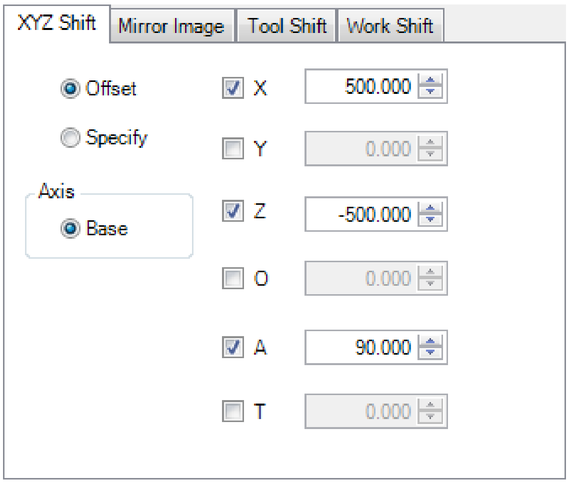
➢ **Output**

The method to add converted program to is specified.

Select a robot of destination of conversion from the combo box, and enter a program name with a keyboard in [Program] text box.

* The tab of the conversion method turns disabled until the Robots are selected.

► 5.8.2.1 XYZ shift



A program is converted into X, Y, Z, O, A and T direction with respect to the base transformation value of the robot. Select the conversion method (offset value, specified value), and enter a numeric value into X, Y, Z, O, A and T. Putting a mark into a check box enables the input box.

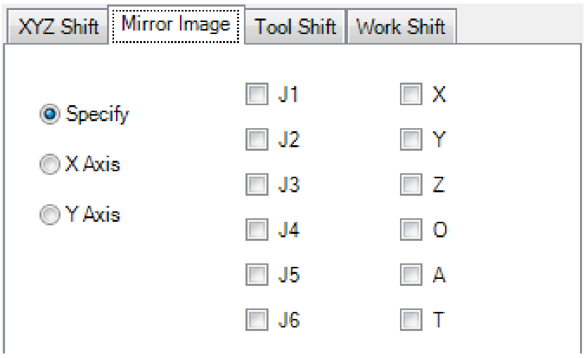
- Offset value

  A motion command is offset for the numeric value entered.

- Specified value

  Value of X, Y, Z, O, A and T of the motion command is specified in the entered value.

► 5.8.2.2 Mirror image



Motion command is mirrored with respect to the specified axis of the base transformation value.

- Specify

  Invert positive and negative of joint value.

  Invert positive and negative of each parameter for converted value.

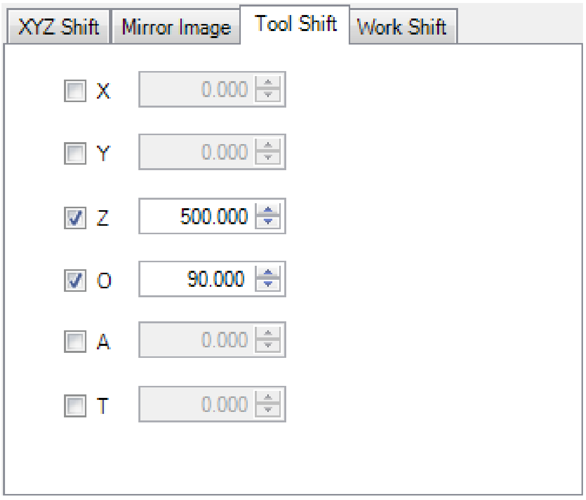
- X axis

  Mirror invert toward X axis of robot base coordinate

- Y axis

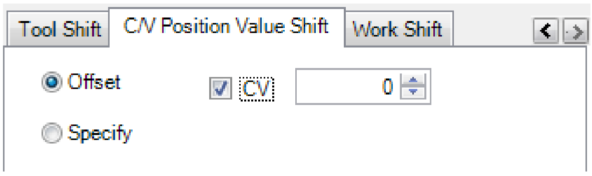
  Mirror invert toward Y axis of robot base coordinate.

5.8.2.3 Tool shift



Offsets for the numeric value entered into X, Y, Z, O, A and T direction of the tool transformation value.
Putting a mark into a check box enables the input box.

5.8.2.4 Conveyor Position Value shift



Conveyor value of the motion command is converted.
Select the conversion method (offset value, specified value), and enter a numeric value into the CV.
Putting a mark into a check box enables the input box.
The conveyor axis shift is displayed by selecting a robot with the conveyor axis as the robot of the source of conversion.

- Offset value

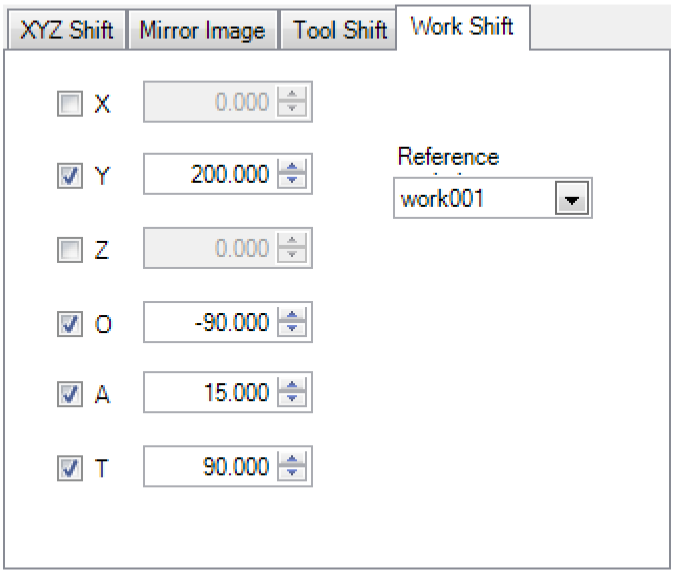
  Conveyor value of the motion command is offset for the entered numeric value. .

- Specified value

  Conveyor value of the motion command is specified in the entered value.

5.8.2.5 Work shift

It offsets by the entered value in X, Y, Z, O, A, T direction based on the world coordinate system of the specified workpiece.
Putting a mark into a check box enables the input box.



➢ **Convert to comment when the inverse transform fails. (Default: ON)**

Display of the motion command of the program after conversion is set.

When the operation to convert the converted values into each axis values is disabled during conversion work of the program (for example, the robot cannot posture), the commented command before the conversion is displayed.

- The case of the robot motion out of range is included.

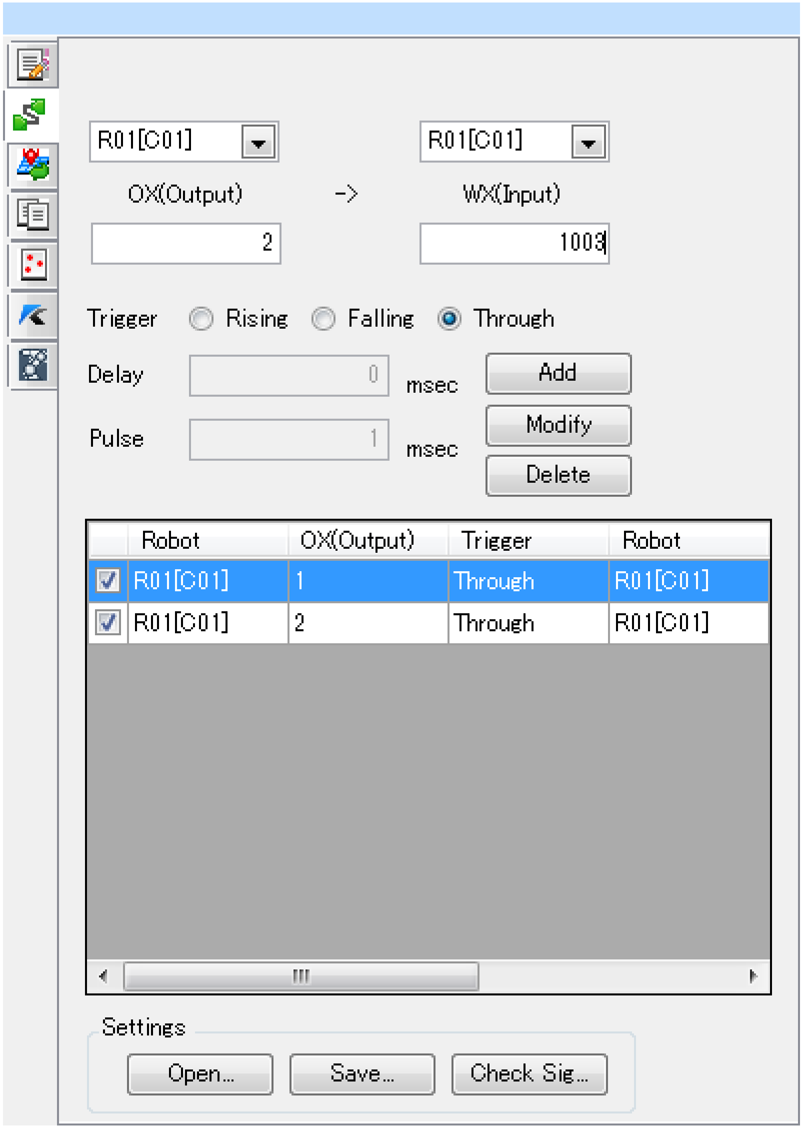
➢ **Marker size**

The marker size of the preview is set to Large (10 point), Middle (4 point), and Small (1 point).

5.9 I/O Signal

5.9.1 I/O Signal Connections

It is possible to connect the output signal of a robot (OX) with the input signal of another robot (WX).



To set up interlock, select [Setting] -> [Plug-ins Setting] from the menu, and confirm that [InterlockControlGUI.dll] is effective.

In the extended application menu in the right portion of the screen, select the [I/O Signal Connections] tab. Hereinafter, each item is described based on the screen above.

[Robot] : Select a robot to which the output signal is connected.

[OX(output)] : Enter an output/internal signal number.

[WX(input)] : Enter an input/internal signal number.

[Trigger] : The output condition of interlock can be selected from [Rising], [Falling], and [Through].

[Rising] : Output signal is output to the input signal when the former signal is turned ON.

[Falling] : Output signal is output to the input signal when the former signal is turned OFF.

[Through]: The change of the output signal is output to the input signal as it is.

[Delay] : Specify a delay time elapsing from the change of the output signal to output to the input signal.

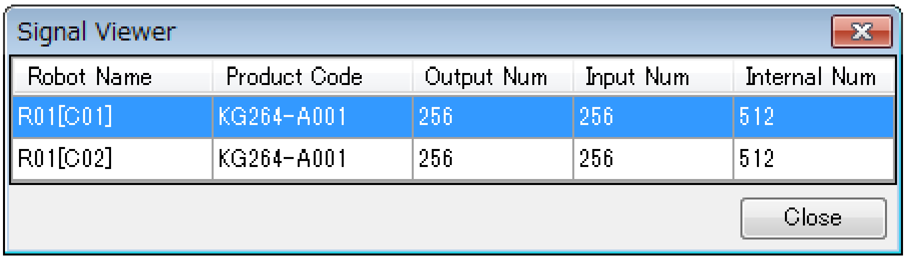
[Pulse] : Specify a pulse width to make the input signal effective.

➢ **Settings**

[Open…] : Able to read in the interlock settings file (with extension .iolock) which was saved by pressing the [Save...] button.

[Save...] : Able to output the interlock settings to a file to record them. The extension of the file saved is .iolock.

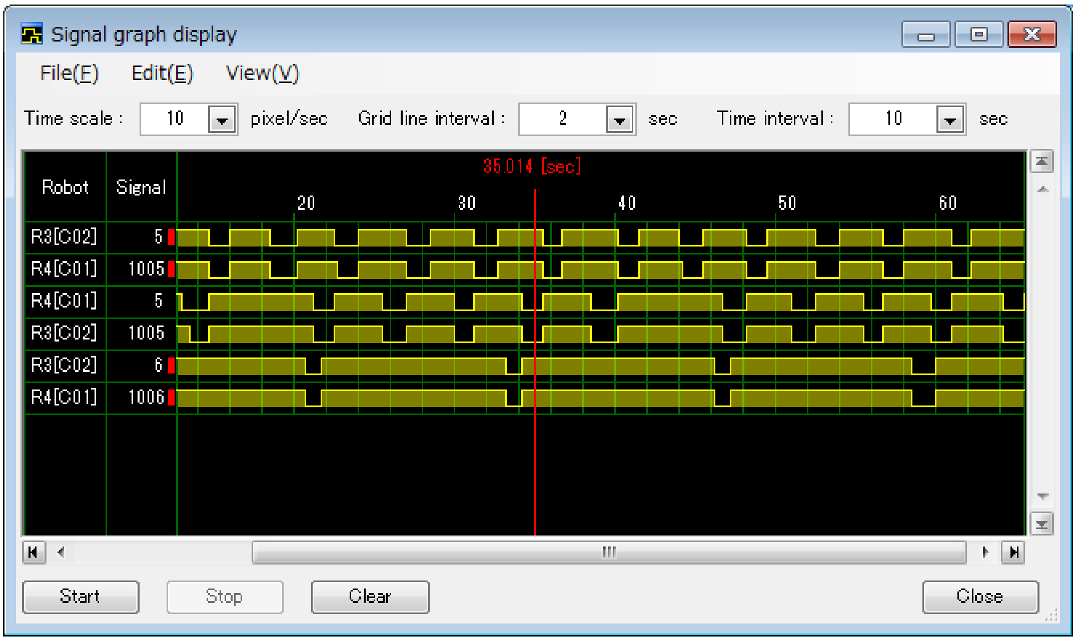
[Check Sig] : Able to check the upper signal value of robots.



* When a project is saved, the interlock settings are also saved automatically. Therefore, it is not necessary to save the interlock settings in another file except when they are diverted to some other project.

5.9.2 Signal Graph Display

This function is to monitor changes of robot I/O signal and display the graph.



Functions of each section are as follows.

➢ Time scale

Adjust the screen size (pixel) per second.

With smaller value, more data can be displayed on a screen.

➢ Grid line interval

Adjust the interval of the grid line width drawn on the graph.

With smaller value, more grid lines can be displayed on a screen.

➢ Time interval

Adjust the interval of the elapsed time display drawn on the graph.

With smaller value, more time can be displayed on a screen.

- Start button

  Start monitoring.

  Switch [Pause] or [Restart] during monitoring.

- Stop button

  Stop monitoring.

  Valid when monitoring is started.

- Clear button

  Clear the monitored results.

- Close button

  Close the screen.

  It is impossible to close during monitoring.

File Menu

- Export as CSV format

  Select [File]-[Export Csv file] to save the displayed signal data as CSV format. Files can be output during stop or pause.

- Read as CSV format

  Select [File]-[Import Csv file] to display the signal data saved as CSV format. Files can be read during stop.

  It is impossible to start monitoring when importing files.

  Select [File]-[Close Csv file] to switch screen to the monitor screen that of before file reading.

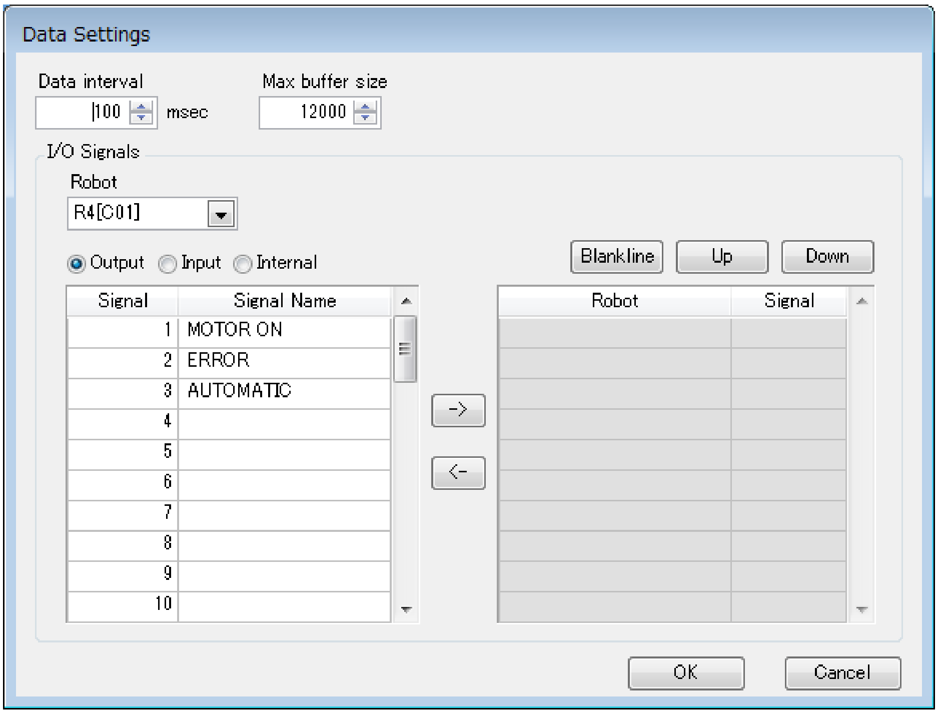
Edit Menu

- Data settings

  Select [Edit]-[Data settings] to set signal data to be monitored.

  Data settings can be operated during stop.

[Data settings screen]



- Data interval

  Set the interval to obtain data from the controller.

- Max buffer size

  Set the maximum data size that can be displayed on this screen.

When the data interval is 100 msec and the max buffer size is 12000, it is possible to display for approximately 20 minutes.

100(msec) × 12000 = 1200 sec (20 minutes)

- Signal addition

Add a signal to be monitored to the right side list on I/O signal settings.

Multiple signals to be monitored can be selected and added from the left side signal list.

Press [->] button on the center of the screen and add to the right side list.

Signal names are defined by the controller. It is impossible to edit them.

- Signal deletion

Select a signal to be deleted from the right side signal list and press [<-] button on the center of the screen.

- Signal display position change

Select a signal to be changed the display position from the right side signal list and press [Up] or [Down] button on the top of the list.

- Blankline addition

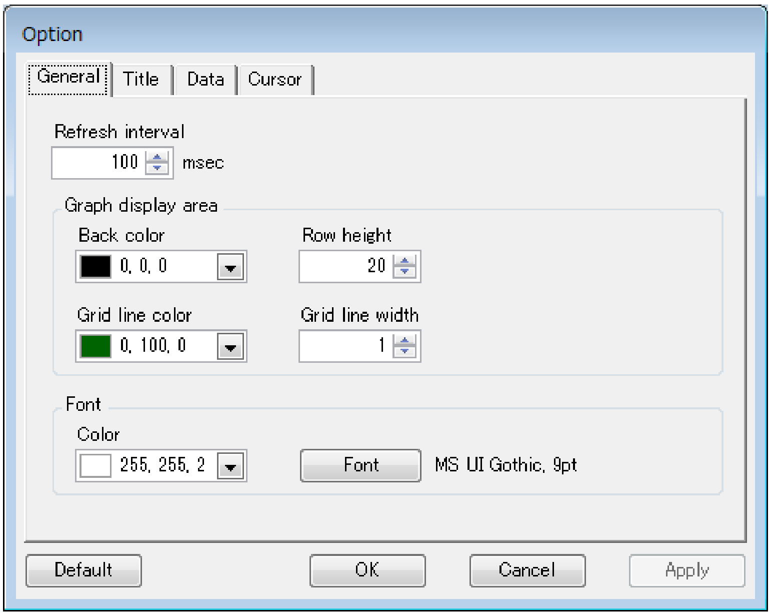
Press [Blankline] button on the top of the right list to add a blankline to the selected position.

Display Menu

- Display settings

Select [Display]-[Option] to change various settings related to display.

[Option]



- General tab

Set refresh interval of the screen, font and graph display area.

With larger refresh interval, flicker on the screen can be restrained.

- Title tab

Change the title display position or combine cells.

- Data display tab

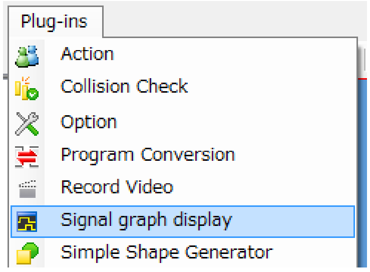
Set color or width of the data line, color or transparency of the stick chart, and display format.

- Cursor tab

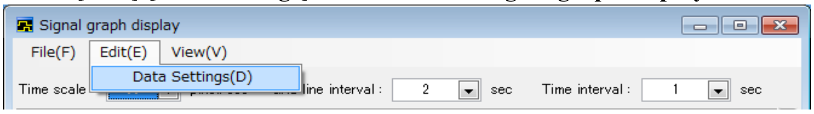
Set the cursor to be displayed during monitoring stop.

5.9.2.1 Operation Procedures

1 **Select [Signal graph display] on plug-ins menu.**



2 **Select [Edit]-[Data Settings] on menu bar of signal graph display.**

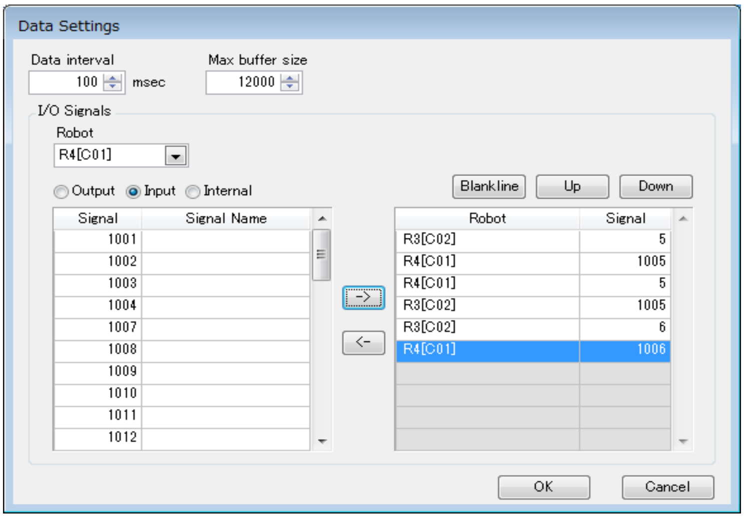


3 **On data settings screen, add a signal to be monitored to the right side list.**

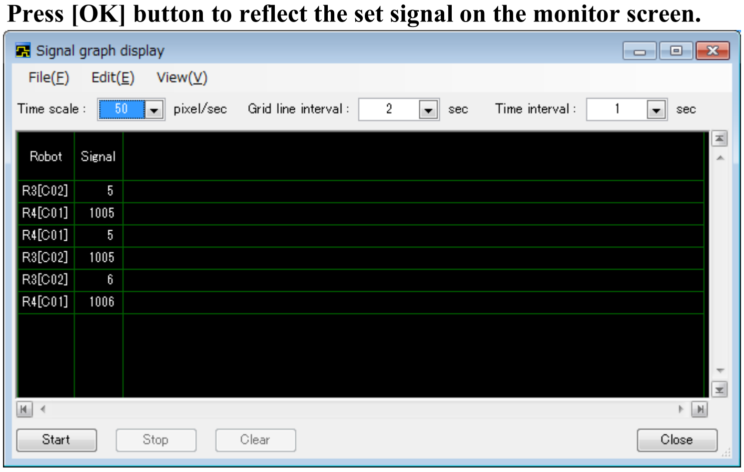
Select a signal to be monitored from the left side list and click [->] to add to the right side list.

Multiple signals can be selected and added at once.

Click while pressing [Ctrl] key to select and add signals that are not consecutive.

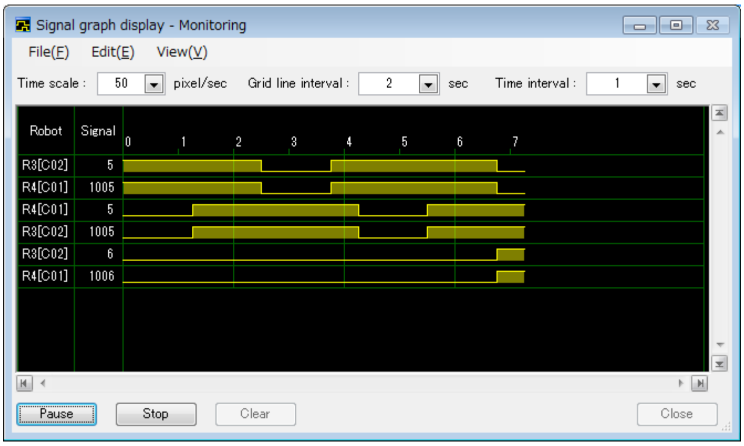


4 **Press [OK] button to reflect the set signal on the monitor screen.**



5 **Press [Start] button to start monitoring signals.**

Adjust time scale, grid line interval, and time interval to make the screen clear.

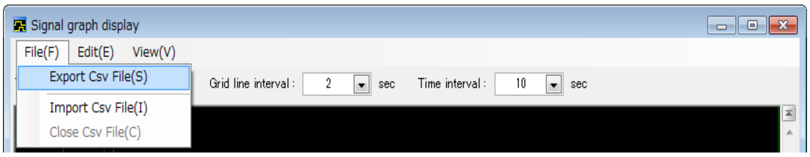


6 **Press [Pause] or [Stop] button to stop monitoring.**

Press [Pause] button to restart monitoring.

7 **Export the monitored results on CSV file.**

Export the monitored results on CSV file as necessary.

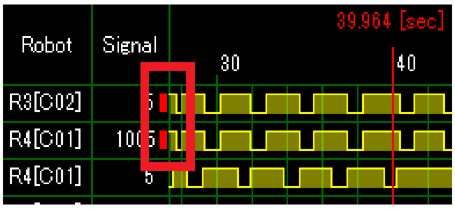


8 **Click the graph to display a cursor.**

Click the graph during pause or stop to display a cursor.

Also, signal status of the cursor position is displayed on the right side of signal number.

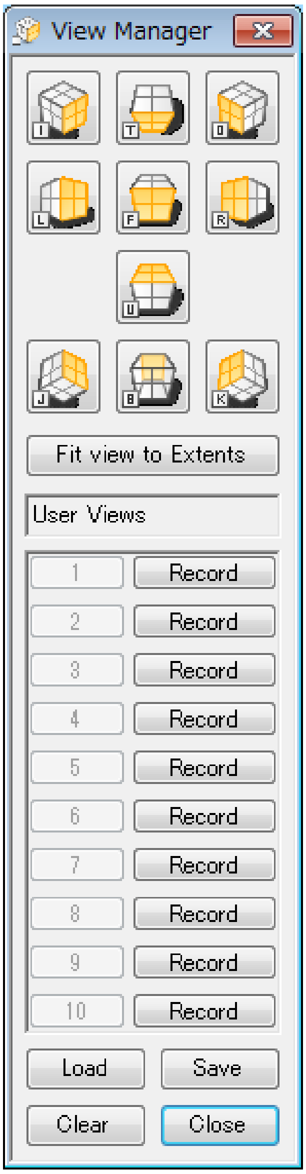
The indicator is displayed only when signal is ON.



5.10 View

5.10.1 View management

View management is the function to display in a registered viewpoint.



- An initial registered view

  Each viewpoint centering the world origin is prepared by default.

  Click the icon button or press the applicable shortcut key on display to change a viewpoint.

- User view

  Press the registration button with the viewpoint for registration to register the viewpoint, and to enable 1 to 10 buttons on the side.

  Press 1 to 10 buttons to change to the registered viewpoint.

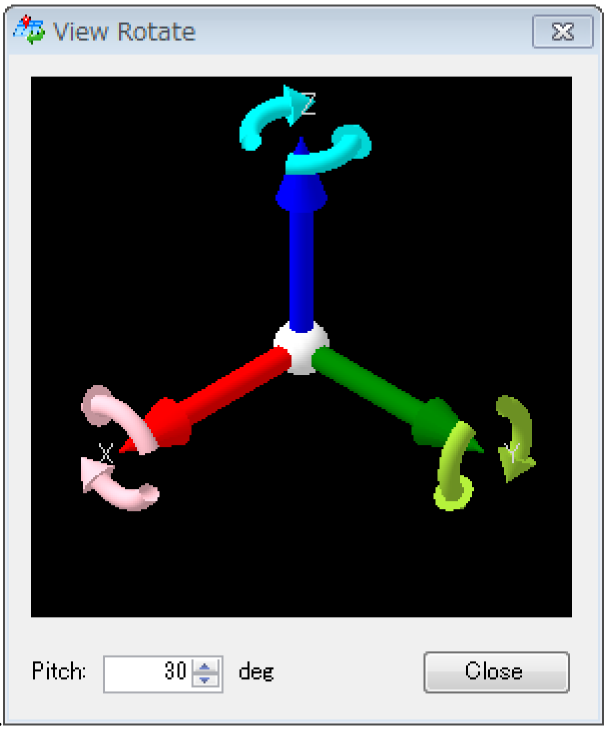
  [Load] ... Cancels the registered user view, and read to set the viewpoint setting file (*.xml).

  [Save] ... Saves the registered user view into the viewpoint setting file (*.xml).

  [Clear] ... Cancels the registered user view.

5.10.2 View Rotate

This function can revolve the view by specified degree as base on world.



- Pitch

  Set the increasing/decreasing degree.

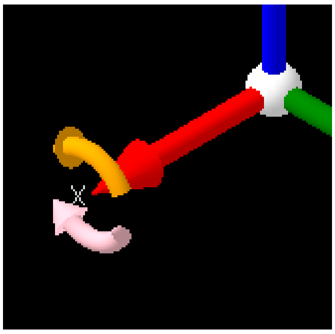
  The settings on Action are displayed.

- Close

  View Rotate dialog is closed.

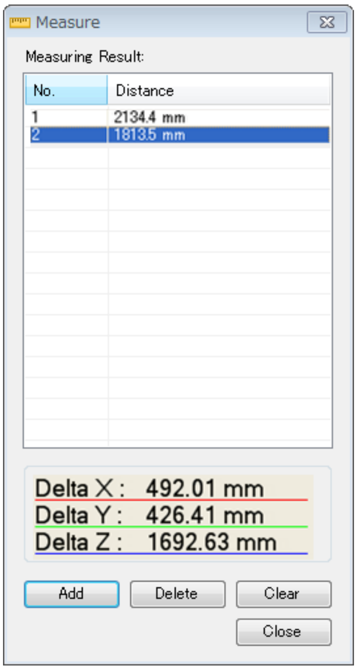
- Arrow

  Clicking the arrow, the view can be rotate.

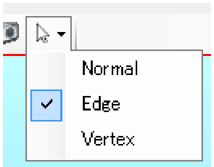


5.10.3 Measurement of distance

Measurement of distance is the function to measure the clicked direct distance of two points.



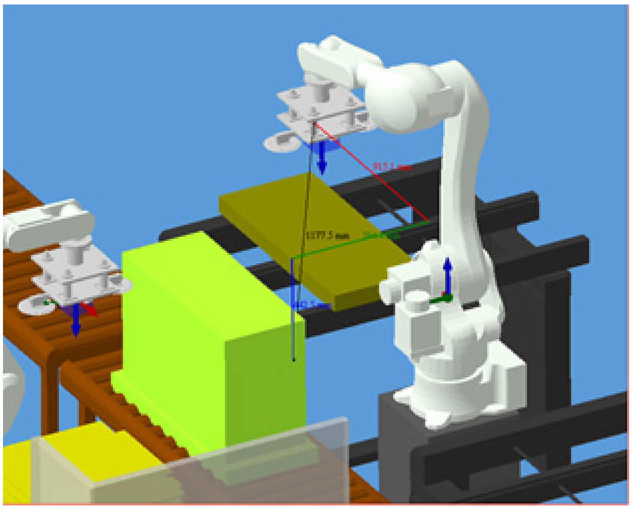
1 **Select the edge in Snap function in the view.**



2 **Press add button to change a cursor and to wait the measurement.**

3 **Click the first point to measure to display an auxiliary line from the clicked point to the current cursor.**

4 **Click the second point to measure to display a straight line to connect the first point and the second point on a view, and the distance.**



Contents of XYZ are displayed when adding newly and selecting a list.

[Delete] ... Result of the measurement selected from the list is deleted from the list and the view.

[Clear] ... All results of the measurement are deleted from the list and the view.

5.11 Other expanded functions

5.11.1 Option

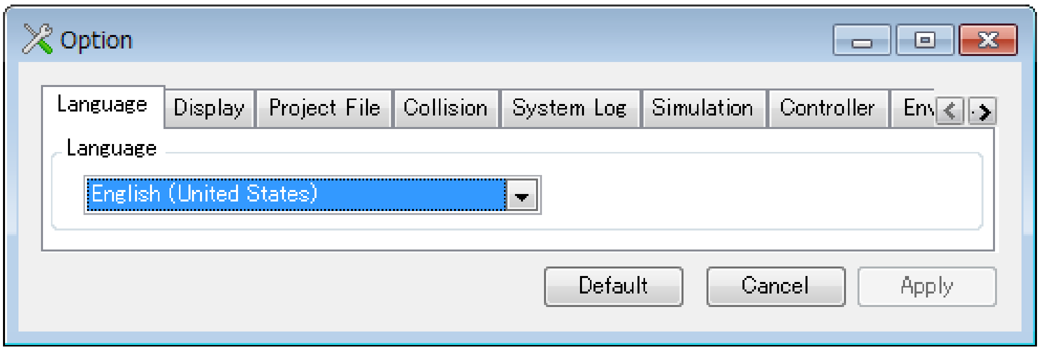
On the Option window, each item regarding K-ROSET can be set up.

Change the settings for each item, and press the [Apply] button. The change will be reflected to K-ROSET.
Press the [Default] button, and press [Apply] button again. The setting of each item will return to the state when the system was installed.

Hereinafter, this chapter describes the settings in each tab.

5.11.1.1 [Option Settings] -> [Language]

In the language tab, the language displayed by all parts/components of K-ROSET can be set up.



The applicable languages are as follows:
- English(United States)
- Japanese(Japan)
- Chinese(Simplified, PRC)
- German(Germany)

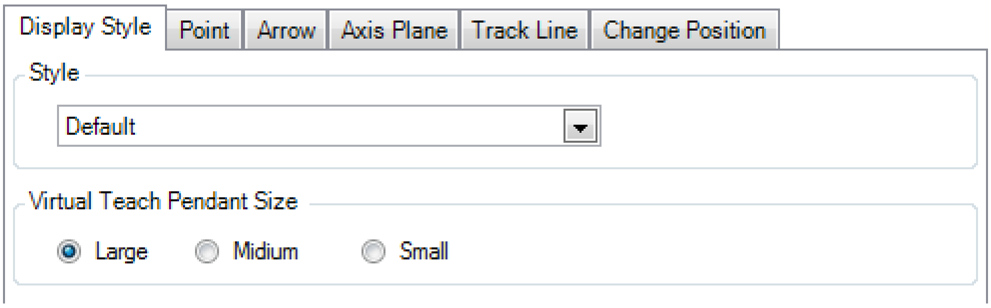
- Default display language is set based on your OS language.
- Some languages besides the above listed languages will also be available by installing the corresponding [Language pack] for K-ROSET. Contact your local sales representative for details about [Language pack].

5.11.1.2 [Option Settings] -> [Display]

In the Display tab, various types of display on K-ROSET can be set up.

➢ **[Option Settings] -> [Display] -> [Display Style]**

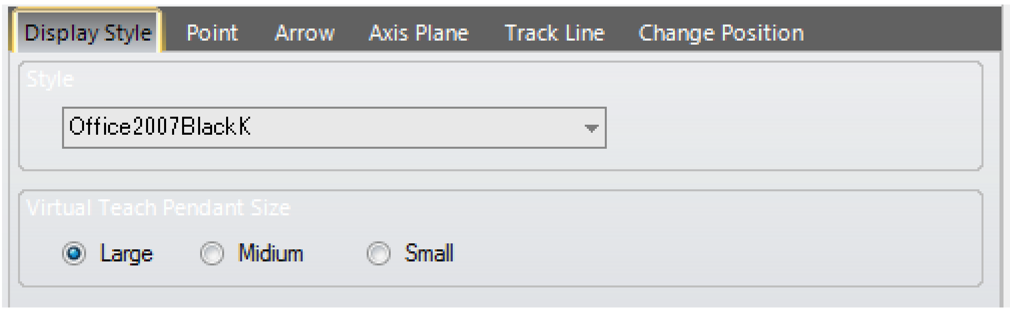
The style of the entire K-ROSET and the size of the virtual teaching pendant can be set up.



- Style

  It is possible to select the screen style of the entire K-ROSET.

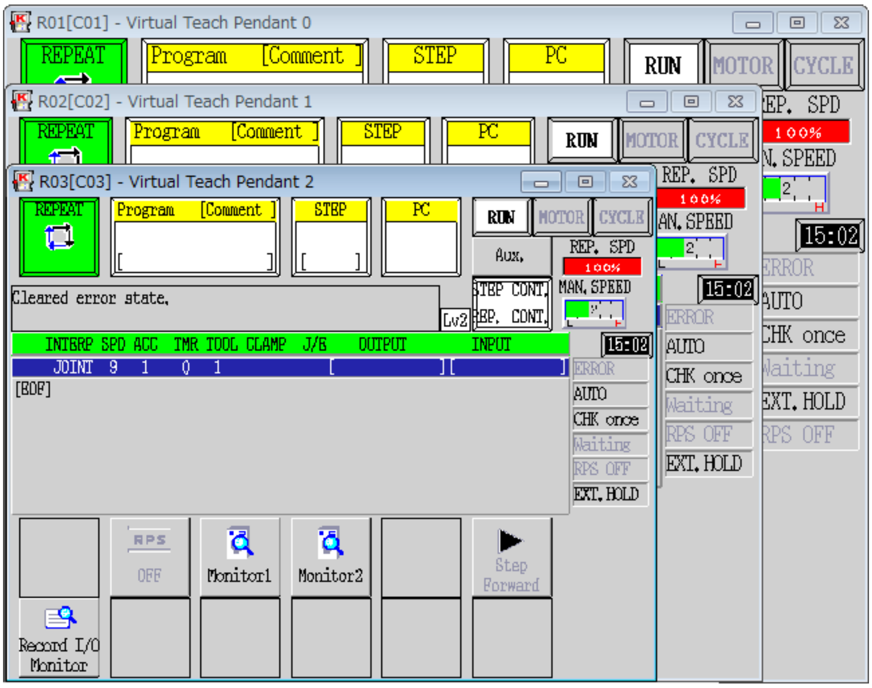
  Font and background are changed according to the selected style.



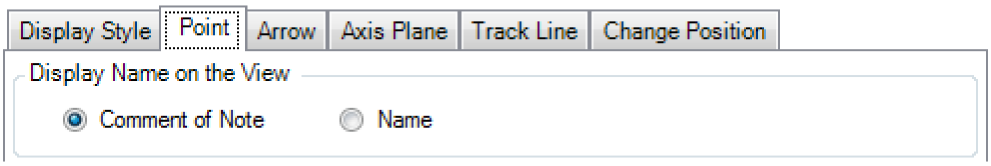
- Virtual teaching pendant size

  The size of a virtual teaching pendant can be selected from the three sizes of large, medium, and small.

  - Large (646 X512 pixels)
  - Medium (566 X452 pixels)
  - Small (486 X392 pixels)



- **[Option Settings] -> [Display] -> [Point]**

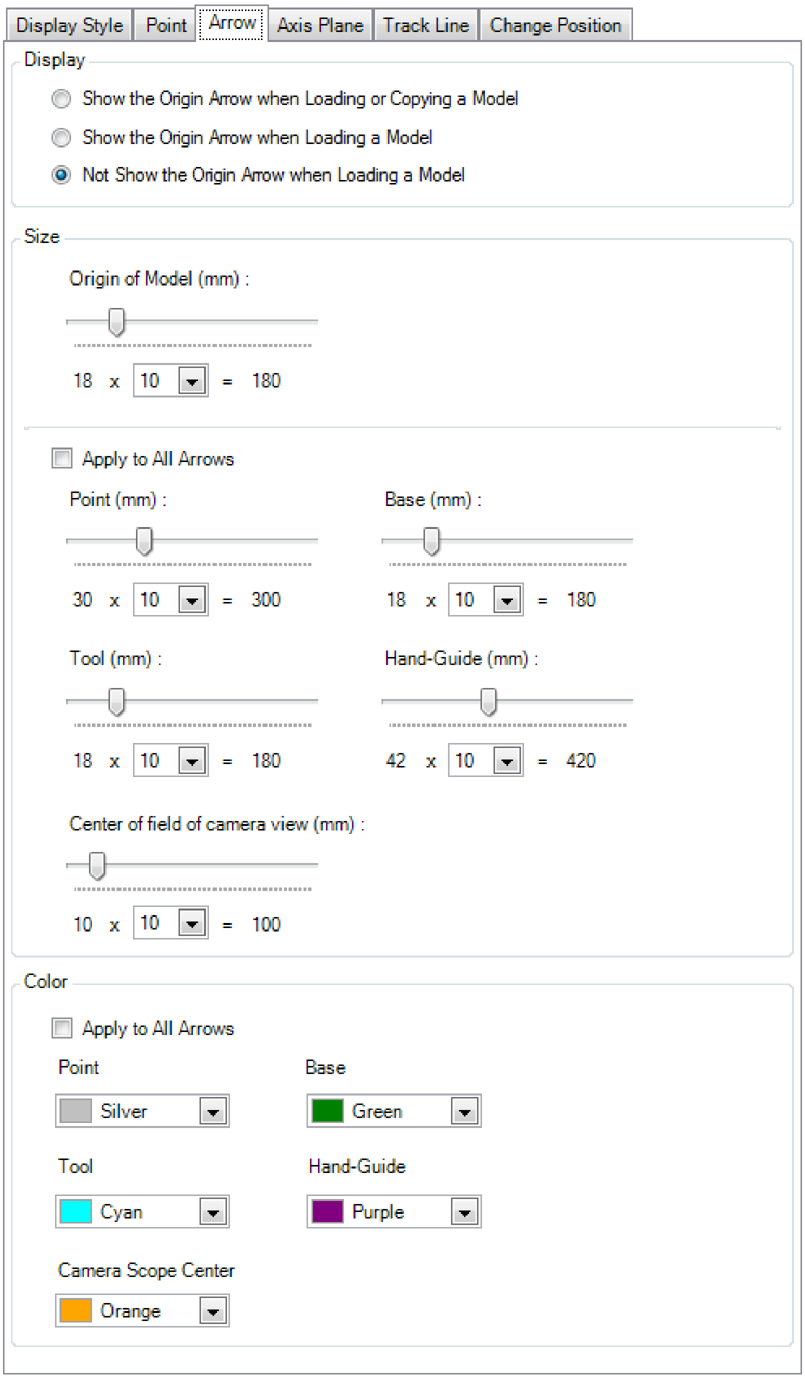


Display name on the view

Select whether or not to synchronize a point name and a comment of note.

➢ **[Option Settings] -> [Display] -> [Arrow]**

For the arrows which are displayed on the view such as a teaching point, base, tool, and gripper, the view of can be switched and the length and color properties can be set up.



➢ Display

It is possible to change the setting of view for each type of the arrow.

➢ Size

It is possible to change the setting of length (thickness) for each type of arrow.

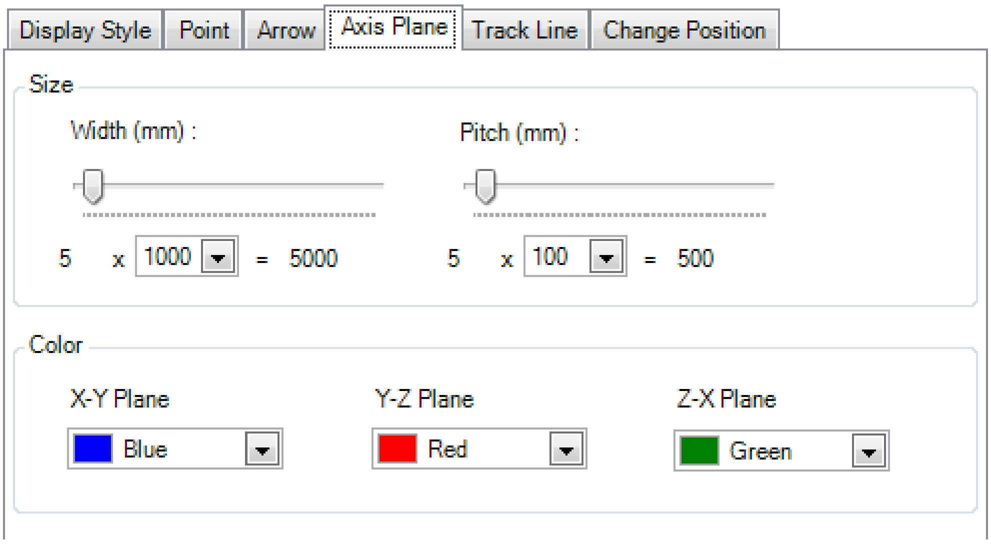
➢ Color

It is possible to change the setting of color for each type of the arrow.

- The object of model origin is all the arrows.

➢ **[Option Settings] -> [Display] -> [Axis Plane]**

For the grid displayed on the view, it is possible to set up display range, size, and color.



➢ Size

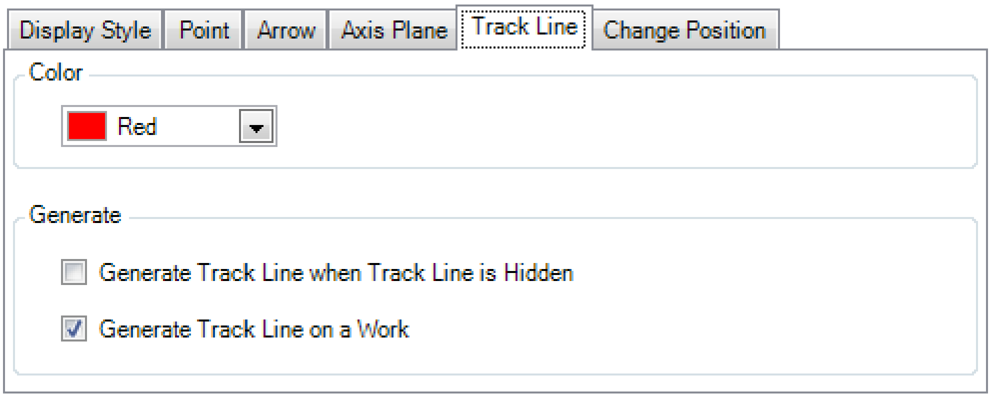
It is possible to change the display range and size of the grid.

➢ Color

It is possible to change the setting of color for each type of the arrow.

➢ **[Option Settings] -> [Display] -> [Track Line]**

For the track line displayed on the view, it is possible to switch show/hide of the view, and set up display range, size, and color.



➢ Color

It is possible to change the setting of color of the trajectory

➢ Generate

- Generate Track Line when Track Line is Hidden.

  In the state of hiding the track line, it is always drown.

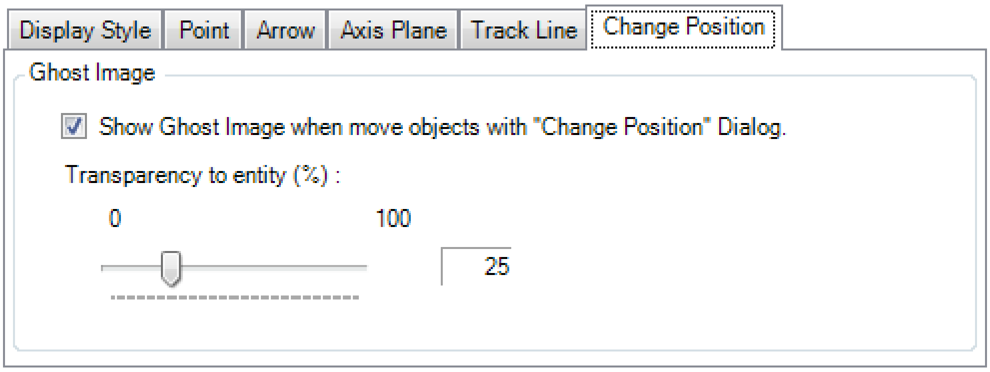
- Generate Track Line on a Work

  Track line on the work is generated.

➢ **[Option Settings] -> [Display] -> [Change Position]**

This setting enables to set whether to display or not to display, as well as the transparency of the image displays in the view for the Position dialog.

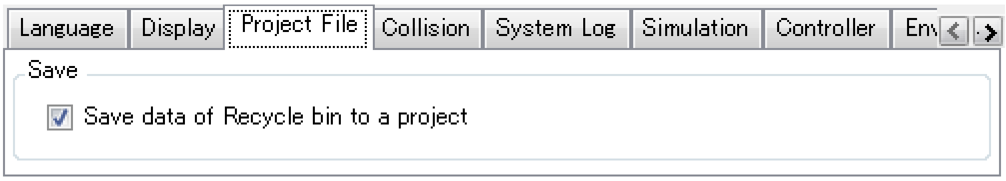
.



➢ Image before change

Allows user to select whether to display or not to display the ghost image. When it's set to display, transparency of the ghost image can also be set.

► 5.11.1.3 [Option Settings] -> [Project File]

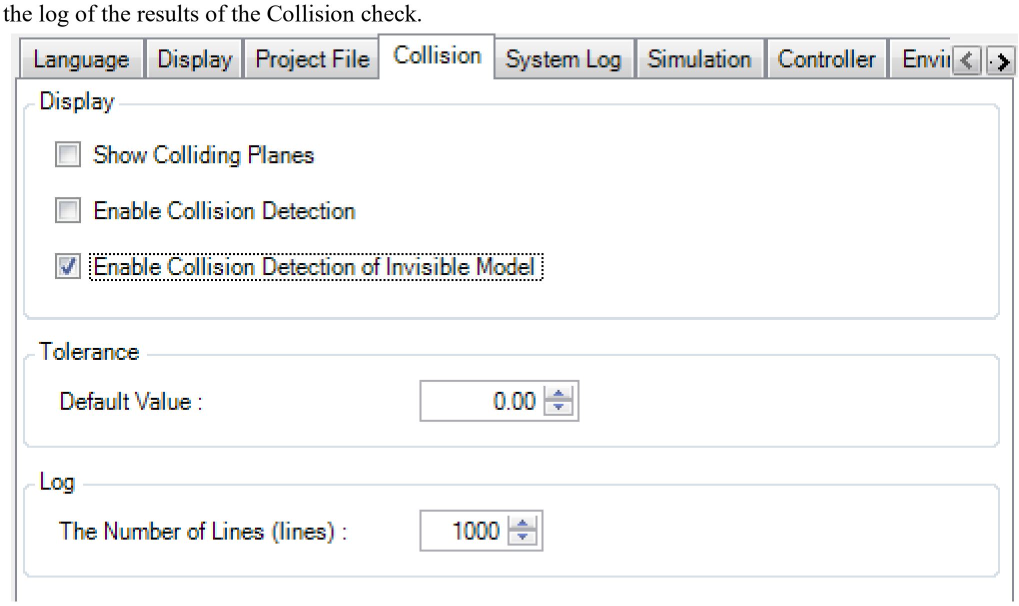


➢ Save

Mark when saving data of recycle bin to a project and use deleted objects when loading a project next time. Remove mark to clear recycle bin when saving a project.

► 5.11.1.4 [Option Settings] -> [Collision]

On the Collision tab, it is possible to switch the display of the Collision state on the view, and change the number of the log of the results of the Collision check.



➢ Display

Collision plane display/Collision check display can be changed.

Invisible model can be set to collision detection in V1.7.2 and later.

➢ Tolerance

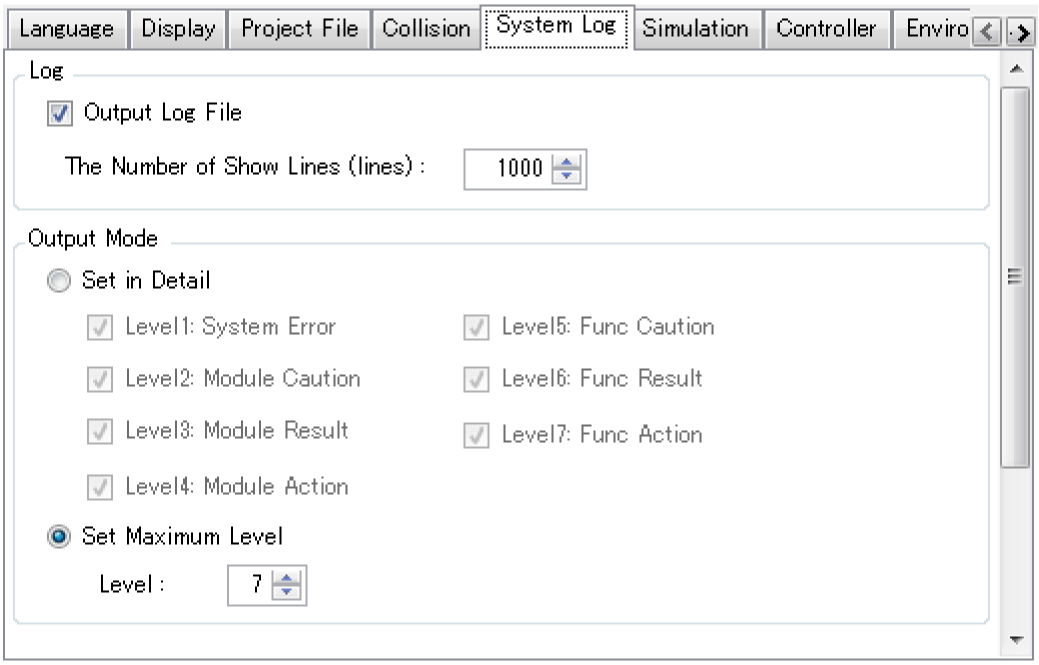
Since V1.7.1, specified value of margin distance setting in collision check can be set. If margin distance is blank in pair settings, specified value of this option is used.

➢ Log

Number of lines of logs about collision is set.

► 5.11.1.5 [Option Settings] -> [System Log]

On the log output tab, it is possible to set up execute/stop output K-ROSET's operational log and the level of the log.



➢ Log

Output and Display of log can be set.

Un-checking [Accept the System Default Path], any path is selected for output.

➢ Output Mode

It is allowed to select a log level from the following seven levels.

It is also possible to set up log level for each robot so that a log of a particular log level only is output.

Level 1: System Error (serious error related to the entire system)

Level 2: Module Caution (warning message of the entire system)

Level 3: Module Result (operational results of the entire system)

Level 4: Module Action (operational content of the entire system)

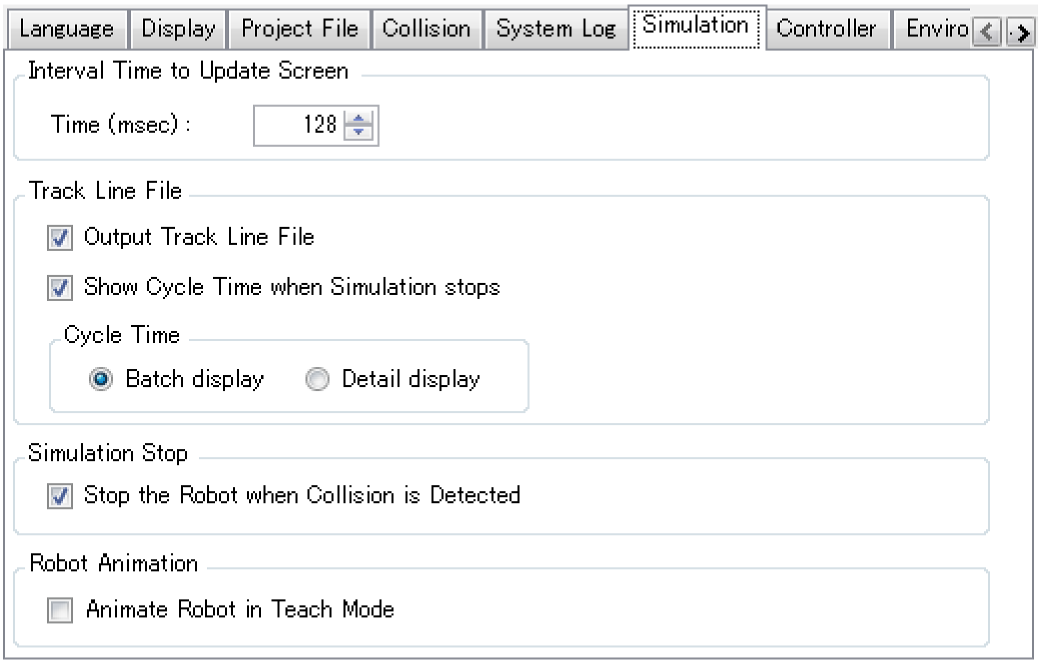
Level 5: Func Caution (warning message issued for each function)

Level 6: Func Result (operational results for each function)

Level 7: Func Action (operational content for each function)

► 5.11.1.6 [Option Settings] -> [Simulation]

On the simulation tab, it is possible to set up the output of simulation results, change of simulation speed for each robot, synchronization with the view, and replay mode (for replaying a program/trajectory).



- Interval Time to Update Screen

  Interval time to update screen can be changed. Animation is so smooth as to decrease value.

- Track Line File

  - Output Track Line File

    Track line file is output.

  - Show Cycle Time when Simulation stops

    When this setting is on, Cycle time starts up after simulating.

  - Cycle time – Batch display

    Cycle time is displayed after the cycle of all robots stopped.

  - Cycle time – Detail display

    Whenever the cycle of each robot stops, cycle time is displayed.

- Simulation Stop

  Show Colliding Planes while Simulation

  Parts collided is displayed while simulation.

  Stop the Robot when Collision is Detected

  Robot motion is stopped when parts is collided.

- Conveyor Stop

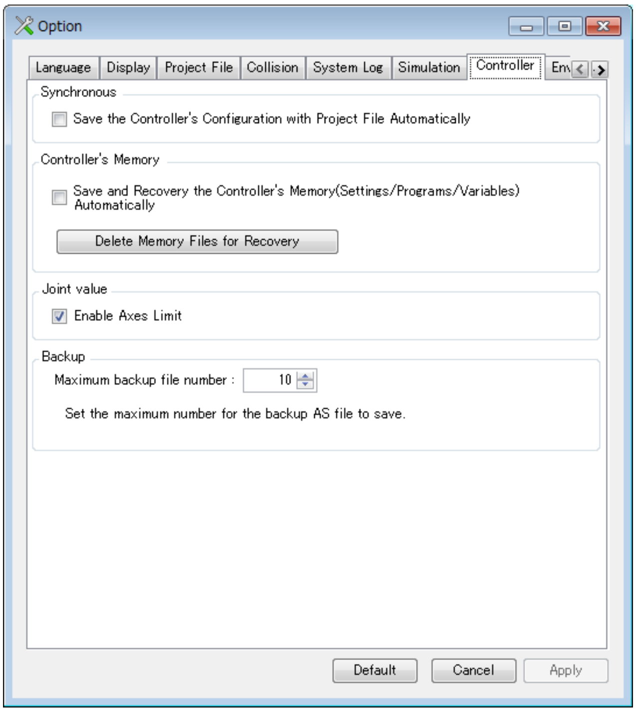
  Selection is made between "when a robot stopped, whether the conveyor input of the robot is only stopped," or "when all robots stopped, whether the conveyor input of all robots are stopped."

- Robot Animation

  Place a check mark to operate a robot on the main view with a virtual teach pendant.

  When unchecked the robot can be operated with the teaching panel plug-in.

5.11.1.7 [Option Settings] -> [Controller]



- Synchronous

  Selection is made whether the setting of the robot controller is saved into the project.

  When the box is checked, the setting of the controller side is reflected to the main application side every time when the project is saved.

  Uncheck to avoid synchronizing the setting of the main application with the controller setting.

- Controller memory

  Save all the saved data of controller when saving a project and synchronizing. Load the saved data of the last termination and start when opening a project or synchronizing.

- Joint value

  Robot posture can be changed only within upper and lower limit of controller joint

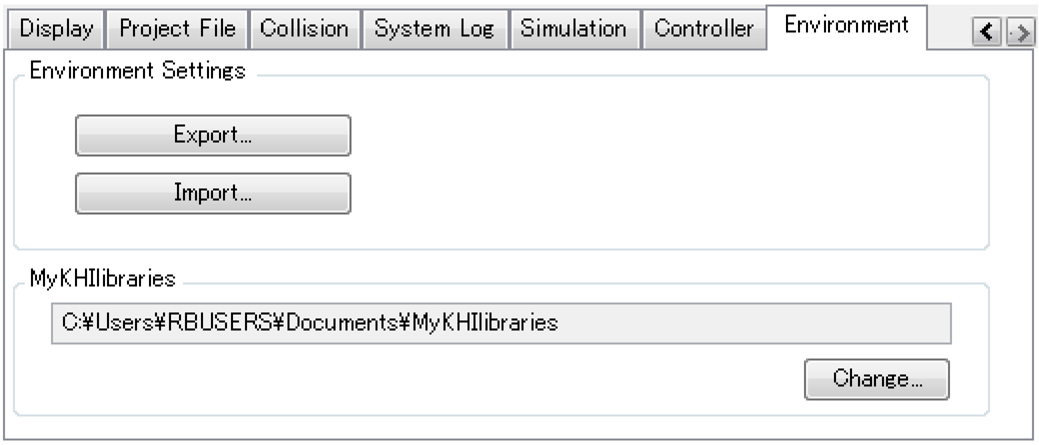
* Operate simultaneously with the switch of Teach Panel.

- Backup

  Specify maximum file amount to save backup when synchronizing a controller or in the terminal.

* It is possible to save backup data of a controller, not a project of K-ROSET.

5.11.1.8 [Option Settings] -> [Environment]



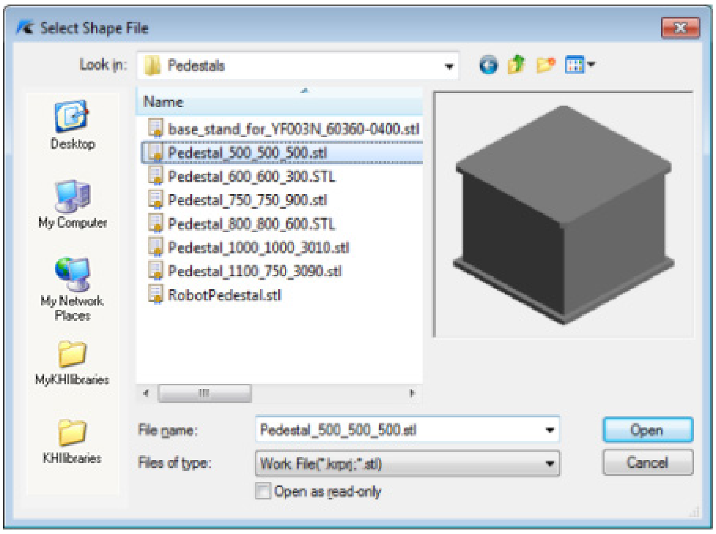
- Environment setting

  Set data by option can be saved in a file and read.

- MyKHIlibraries

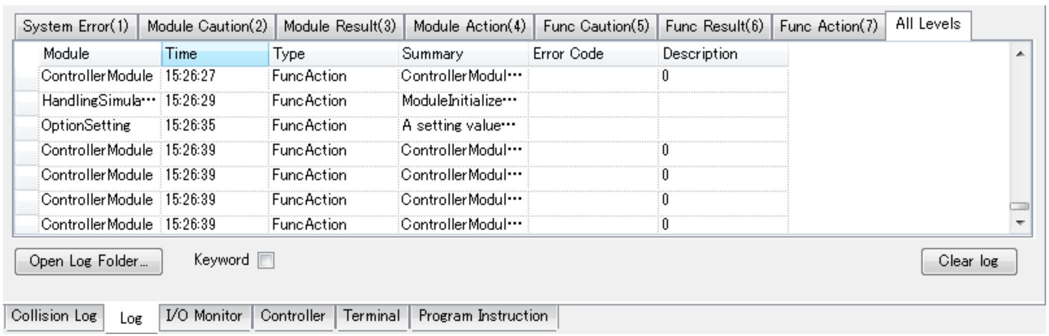
  Save destination of the data can be changed.

  The specified folder is displayed as the shortcut of a file selection screen.



5.11.2 Log

This section describes the log output window.



In the log output window, logs of operations and occurred errors are output.

The output log is saved in the following folder when the option setting is default:

<(System folder) logs>

* The destination is changed by optional setting.

For the option setting, refer to option setting of the plug-in application.

In addition, abnormality or warning can be displayed according to levels in the option.

- Clear

  Current display is cleared.

- Keyword

  Lists can be filtered.

5.11.3 Wizard to Set External Axis

This section describes the function to set an external axis by the wizard.

* Number of assignable axis depends on application or controller type. Handling Paint Econ:9, D,D+con:7, the other:8

V1.8.0 supports the controller which is capable of adding external axis up to 12th axis.

Handling

E controller with AS software 10100X3V or later.

Arc welding

E controller with AS software 30300W23 or later.

Other than the above mentioned AS version :

Handling

E controller with AS software up to 10100X3R, or F controller: up to 9 axes.

Painting E controller / Sealing / Handling (Special) : up to 9 axes.

* 09200007 does not support external axis.

Other: up to 8 axes.

* Following error occurs when conveyor axis is set to a robot model which supports servo spec 5.
[Path Constant Move] [Conveyor Synchro]

Conveyor axis

There is a limit to the number of axes and axis number that conveyor axis can be added and set.

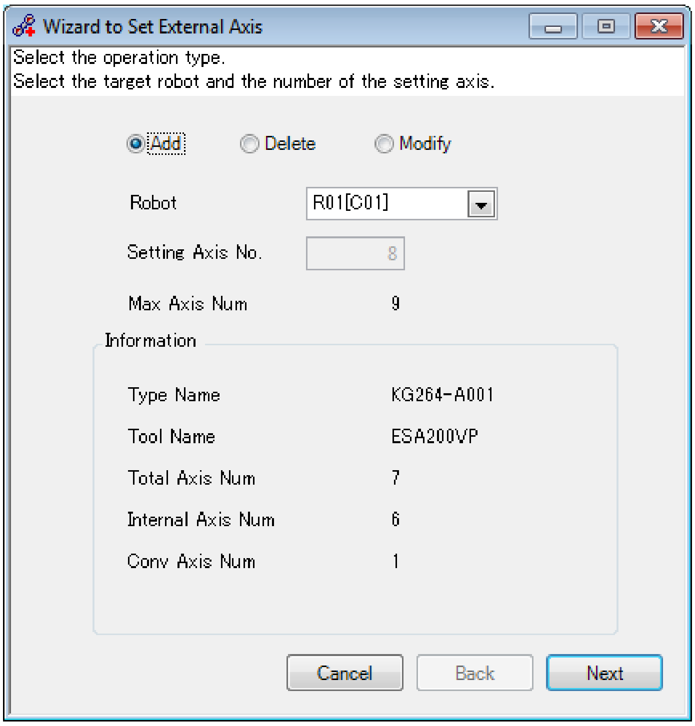
Handling E controller: Up to four axes (It has to be 7th, 8th, 9th, and/or 10th axis)

Arc welding and Servo welding: Conveyor axis is not supported.

Handling(Special): One axis (It has to be 9th axis)

Other aplications: One axis

► Selecting a robot

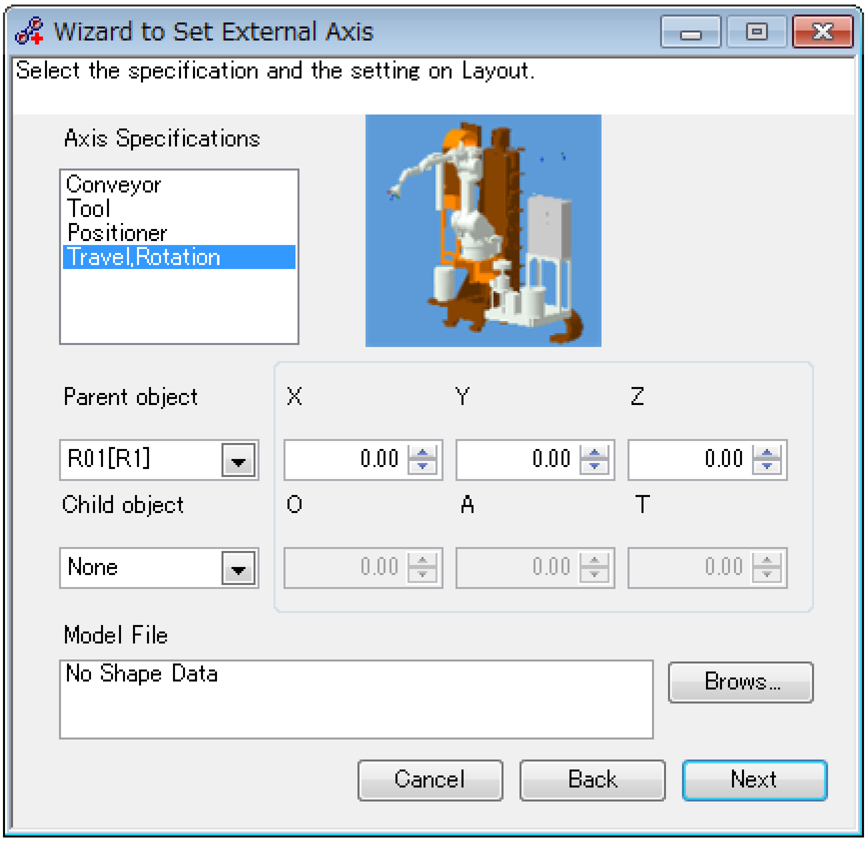


Select [Add] or [Delete] or [Modify].

[Delete] and [Modify] appear only when the selected robot has external axis.

Select a target robot to set. Axis number, type name, tool name, total axis number, internal axis number and conveyor axis number are displayed.

► Layout



- Axis Specifications
  - Conveyor

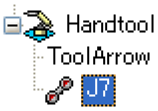
    The external axis is set as conveyor axis.

- This specification cannot add the model.

  - Tool/Fixed tool

    The external axis is set as tool for servo-hand, servo-gun and so on.

    The model is automatically added the tool of the robot.

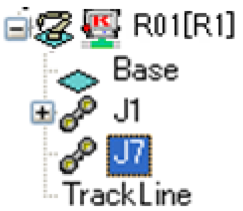


- Parent object is the attached tool.
- Since V1.7.1, fixed tool can be selected. It can be selected when fixed tool is installed.

  - Positioner

    The external axis is set as table positioning the workpiece.

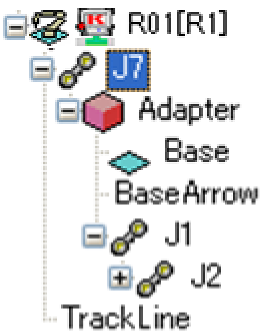
    The model is attached the selecting parent object.



  - Travel, Rotation

    The external axis is set as a truck of the robot.

    The model is attached the selecting parent object. And objects in the selecting parent object is attached the model.



- The orientation of the adding model depends on the base transformation of the robot.
- [Adapter] model is added. Positioning the adapter model can change the distance of the robot and the truck.

- Dual model

  Set dual servo mode
- Parent object

  Select the target object to attach the external axis model.
- Child object

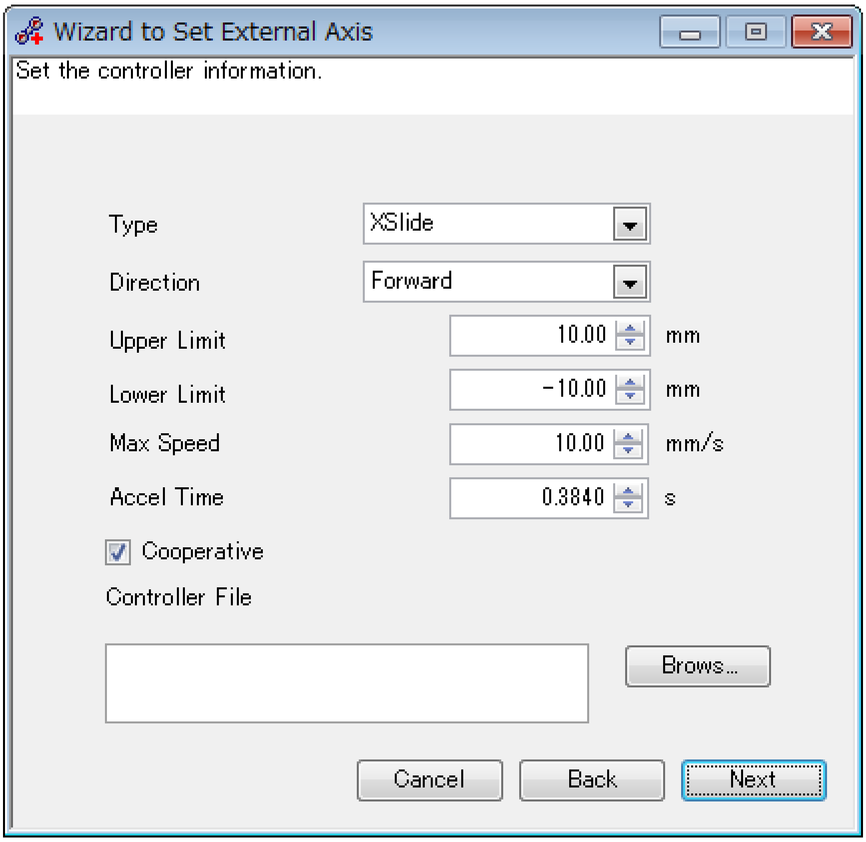
  Select the target object attach to the external axis model.

- XYZOAT

  Set the offset value to the parent object origin
- Model File

  Select the model file (*.stl) of the external axis with Selecting dialog.

Controller settings



- Type

  Set the target axis and how to move.
- Direction

  Set the direction with plus or minus.
- Upper Limit

  Set the upper limit of motion.
- Lower Limit

  Set the Lower limit of motion.
- Max Speed

  Set the max speed.
- Accel Time

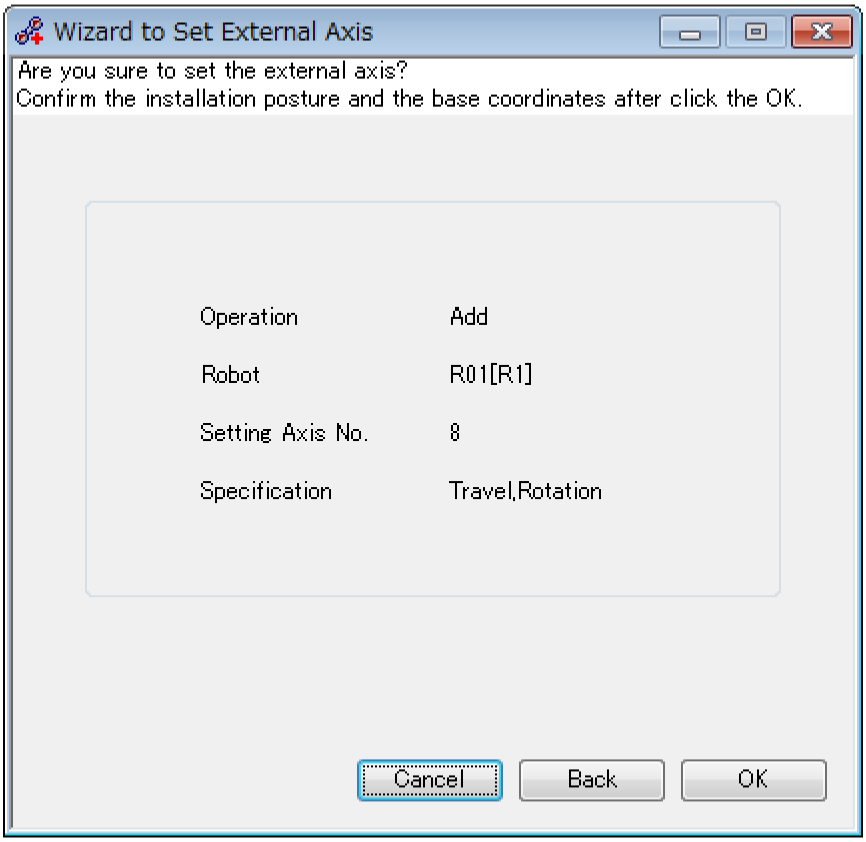
  Set the accelerate time to reaching max speed from stopping
- Cooperative

  Set the cooperative or synchronization
- Controller File

  Set the controller with AS file.

* All of setting depends on the file in case of loading AS file.

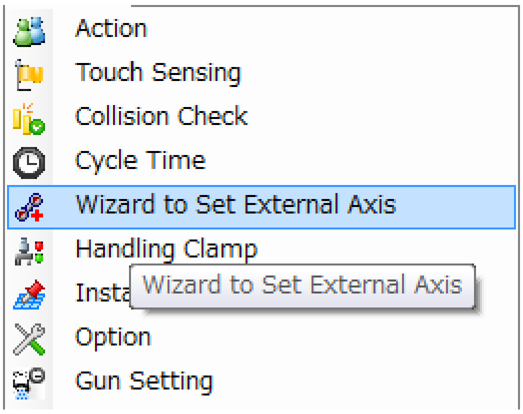
► Confirmation



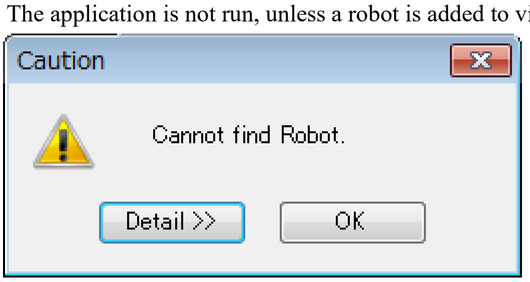
Confirm the setting items.

► 5.11.3.1 Operation(Add)

1 **Select [Wizard to Set External Axis] from menu.**

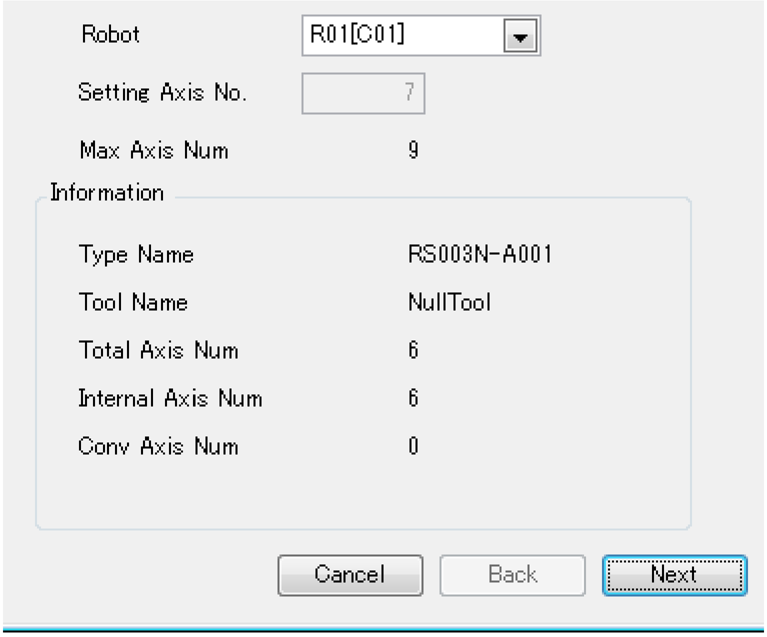


The application is not run, unless a robot is added to view.



2 **Select the operation type and the target robot after the dialog is opened.**

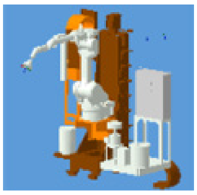
Selecting the robot, the type of the robot are the tool are displayed



3 **Click [Next]**

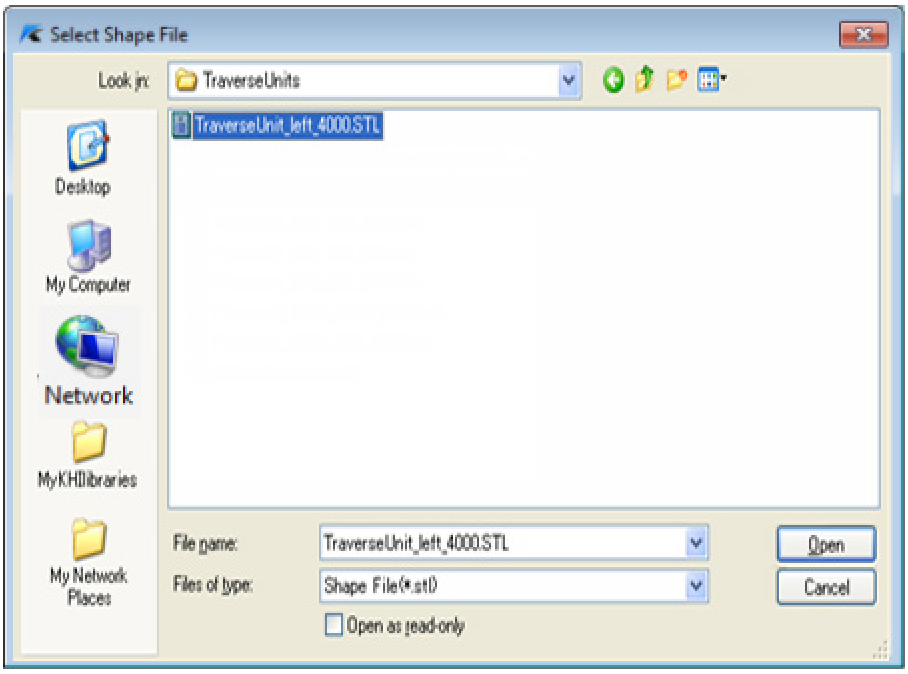
4 **Select the specification.**

Here describes travel-unit.



5 **Click the button of the model file.**

Select the model file(*stl) on the file selecting dialog.



● Unless the model file is selected, [No Shape Data] is applied.

Select the model file(*stl) on the file selecting dialog.

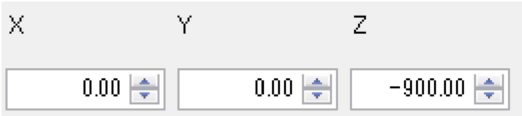
6 **Select the parent object.**

Select the target robot.

● Set the child object in case of attaching to the external axis.

7 **Set the distance of offset to the model origin of the parent object.**

Set the parameters as follow.

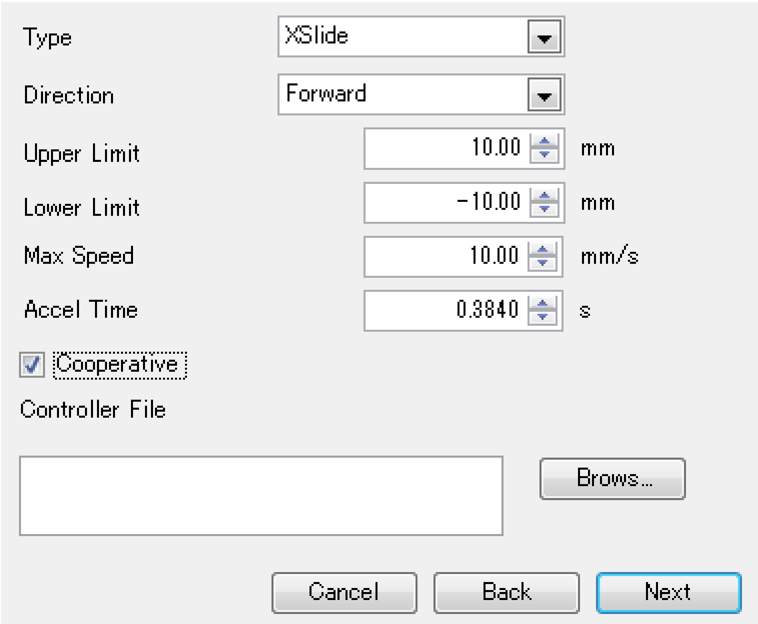


8 **Click [Next]**

Set the detail of motion.

Set the limit of the motion range and the max speed.

9 **Set the parameters as follow.**



Click [Next].

Confirm the settings.

Check the target robot, the axis number and the motion type.

If its settings are different, click [Back].

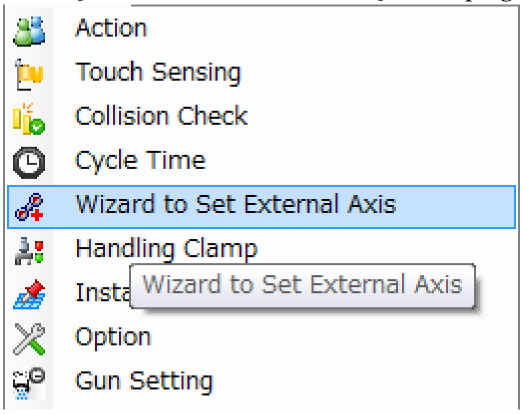
10 **Click [Ok].**

The Configuration on the Layout is changed.

PC-AS is rebooted, and the wizard dialog are closed.

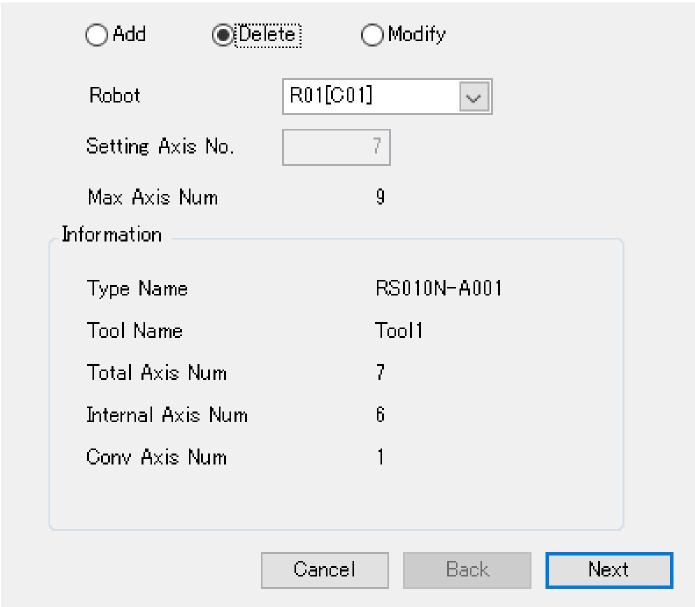
► 5.11.3.2 Operation(Delete)

1 **Select [Wizard to set external axes] on the plug-in menu.**



2 **Wizard to set external axes is displayed. Select an object robot and select [Delete].**

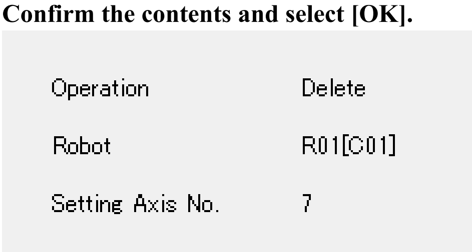
When a robot is selected, model name and tool name are displayed.



3 **Select [Next].**

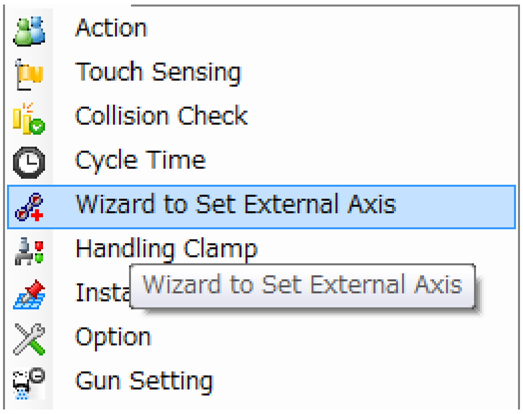
When a robot is selected, model name and tool name are displayed.

4 **Confirm the contents and select [OK].**



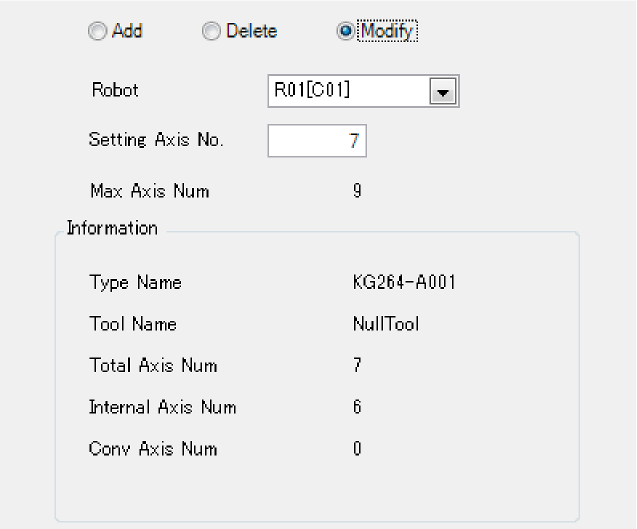
5.11.3.3 Operation(Modify)

1 **Select [Wizard to Set External Axis] from menu.**



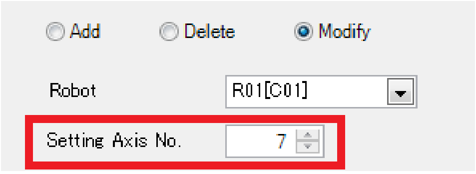
2 **Wizard to set external axes is displayed. Select an object robot and select [Modify].**

Selecting the robot, the type of the robot are the tool are displayed



3 **Specify the axis No. to the Setting Axis No.**

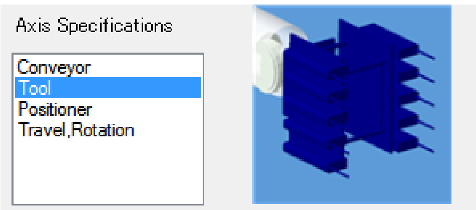
Specify the desired axis No. to change the setting to the [Setting Axis No.].



4 **Click [Next]**

5 Check current axis specifications.

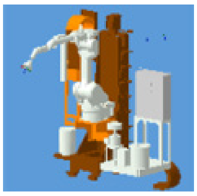
Confirm that the selected Axis Specifications is correct.



● Axis Specifications may not be recognized correctly depends on your robot model or AS version. If the specification is different from the actual one, please correct the setting in the following procedure.

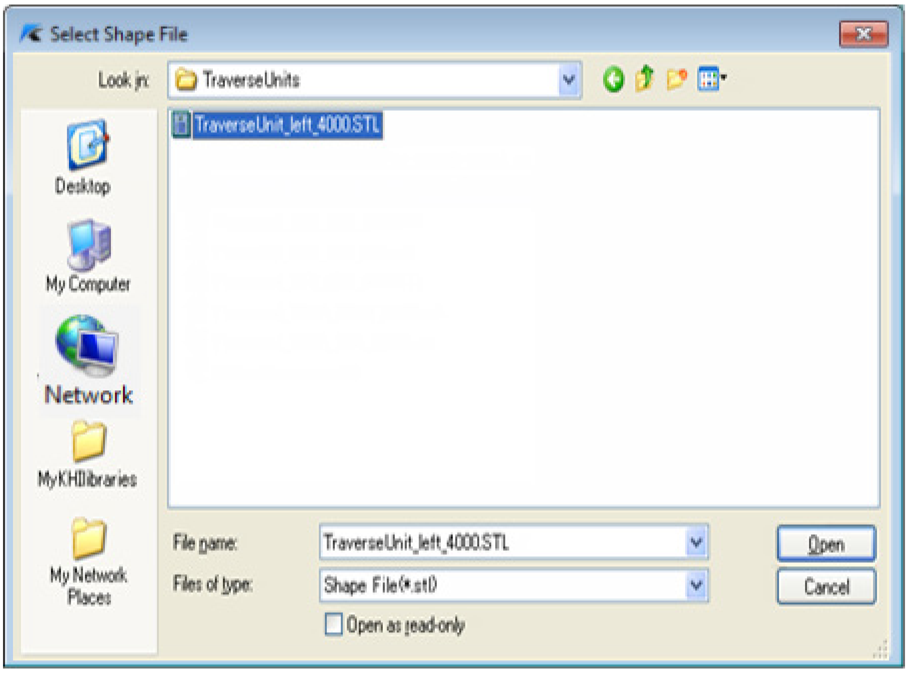
6 Select the specification.

Here describes travel-unit.



7 Click the button of the model file.

Select the model file(*stl) on the file selecting dialog.



● Unless the model file is selected, [No Shape Data] is applied.

Select the model file(*stl) on the file selecting dialog.

8 Select the parent object.

Select the target robot.

- Set the child object in case of attaching to the external axis.

9 **Set the distance of offset to the model origin of the parent object.**

Set the parameters as follow.

10 **Click [Next]**

Set the detail of motion.

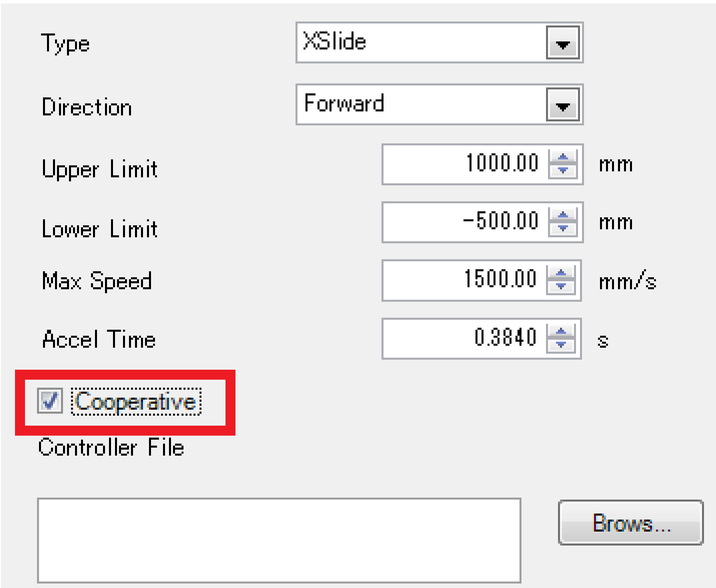
Set the limit of the motion range and the max speed.

11 **Set the parameters as follow.**

Sets the upper and lower limit as well as the speed of the robot motion.

Checkmark for the [Cooperative] might be deleted depends on the Axis Specification before the change.

Place a checkmark if necessary.



Click [Next].

Confirm the settings.

Check the target robot, the axis number and the motion type.

If its settings are different, click [Back].

12 **Click [Ok].**

The Configuration on the Layout is changed.

PC-AS is rebooted, and the wizard dialog are closed.

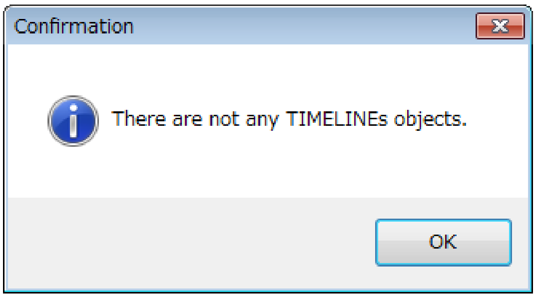
5.11.4 Time Line

When simulation is executed and cycle time data is output, trajectory file of the robot recorded at the time will be output. The timeline is an extended application using the file to check motion details focusing on the motion time. Posture of the robot at any timing within the motion time or conveyor information can be checked on easily. Open this dialog before starting simulation allows user to monitor data during the simulation.

5.11.4.1 Activation Method

1 Add a robot.

If there is no robot on the view, the following dialog box will appear and the timeline screen will not be activated

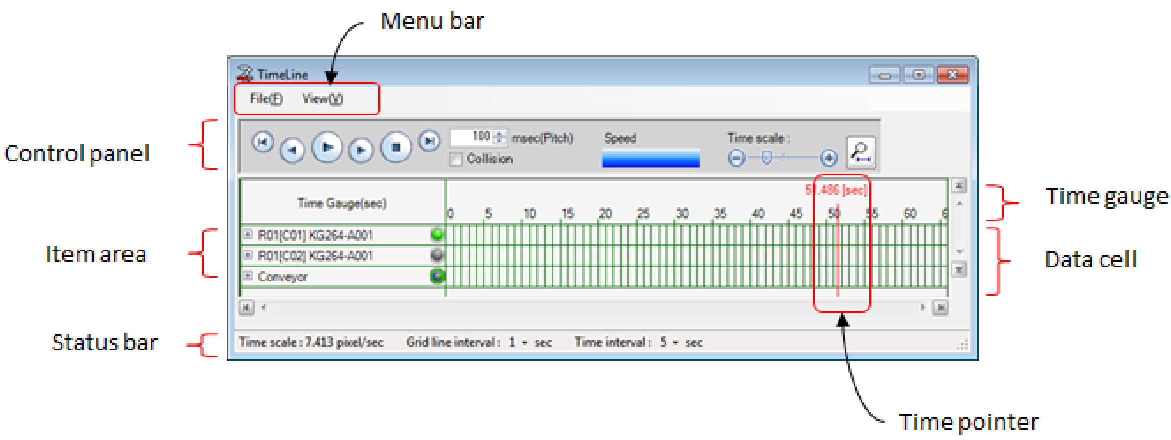


2 Click the [TimeLine] plug-in.

The timeline screen will be displayed.

All added robots, and conveyors if any, will also be activated with the conveyors in the states listed in the item area.

5.11.4.2 Main Screen Layout



- Menu bar

Houses drop-down menus that allow the user to input or output data files and edit display settings.

➢ Control panel

Button to execute each function and control for setting are disposed.

➢ Item area

The robot and conveyor on a view are listed. Double click this area to read any trace file.

➢ Time pointer

A pointer which moves when simulation is executed or left-clicked. Data of the position (time) of this pointer is applied to a robot and conveyor. Drag the pointer to the left or right will let the robot and conveyor in the view to move into the pose smoothly. [Shift] key with mouse wheel operation allows time pointer to move by 1msec.

* Workpieces and other obstacles cannot be moved with the Time Line function.

➢ Status bar

Displays Time scale, Grid interval and Time interval.

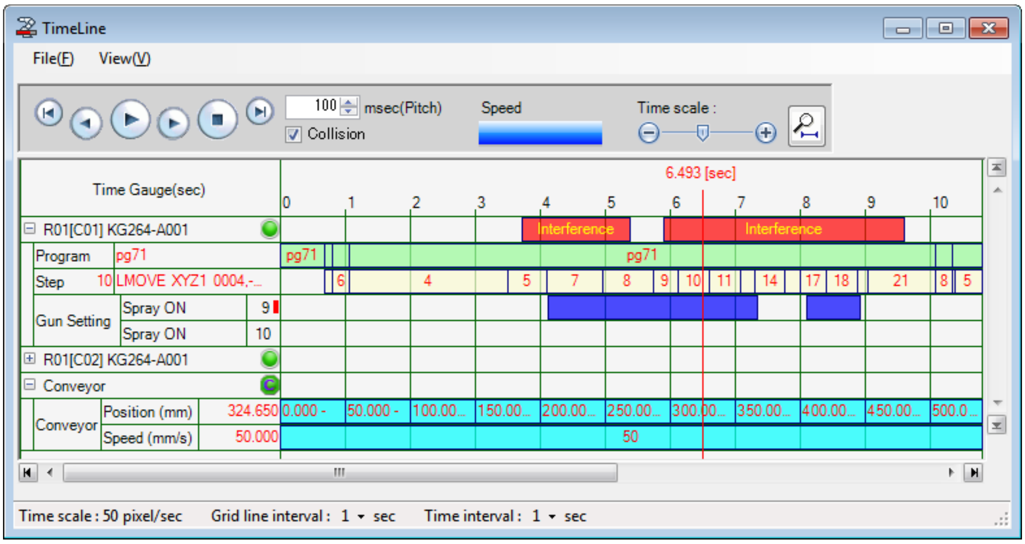
Progress bar and a message will appear when a process which takes time is executed.

➢ Time gauge

When a repeat start position is set to 0 seconds, timing information is displayed.

➢ Data cell

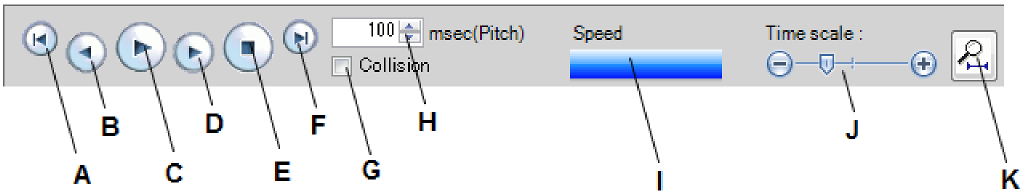
Displays data about robot and conveyor. For the robot, program, step, signal data and collision data, motor duty can be monitored. And for the conveyor, position and speed can be monitored. Expand the time scale if a program or step No. etc. cannot be shown due to lack of space.



Signal data of the following extension application can be monitored in this window.

• [Gun settings]
• [Handling Clamp]
• [Action]
• [I/O Signal Connection]
• [Touch Sensing]
• [Sport Welding Settings]

► 5.11.4.3 Control panel



A: Cue button

Moves a repeat pointer to the top.

B: Frame return button

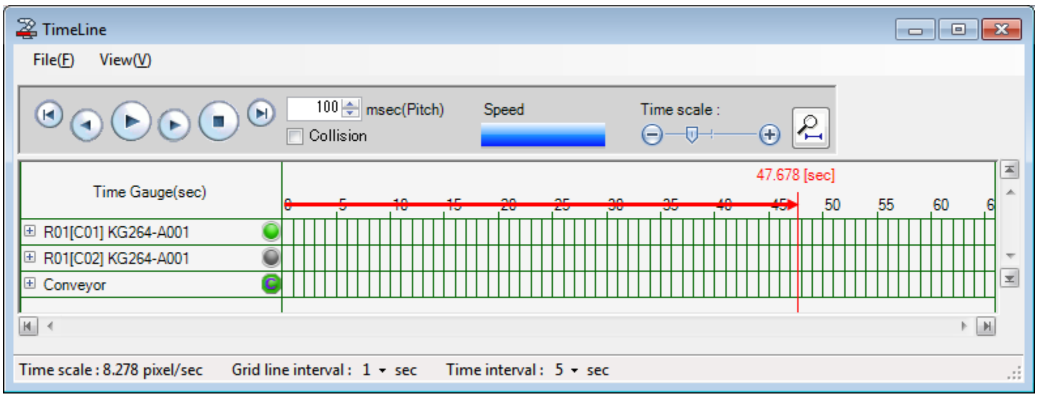
Returns a repeat pointer for 1 pitch.

C: Repeat button

Stars auto-repeat from the position of the repeat pointer to the end.

When the repeat button is pressed, this button turns into a pause button.

When the pause button is pressed during the playback, the robot stops temporarily. Press it again to resume the repeat.



Like above screen, time pointer in red moves repeat points one by one to the terminal.

Unnecessary buttons are invalid during the repeat.

- The repeat doesn't trace the actual time precisely. It is faster with the higher processing speed of the work station, and slower with the lower speed. In other words, if the processing speed is high enough, smooth repeat is possible even with short repeat interval. In case the processing speed is low, it can be repeated with feasible speed by setting longer interval. However, accuracy of the collision detection would be decline when setting a longer interval.
- It is possible to operate the main view during the repeat.

D: Frame advance button

Advances the repeat pointer for 1 repeat pitch.

E: A repeat stop button

Stops the repeat.

F: Termination button

Moves to the terminal point of data read in timeline.

G: Collision check On/Off check box

When this check is enabled, collision symbol is recorded at the position on the timeline when collision during reproduction occurs.

H: Reproduction pitch setting control

Minimum pitch is 2msec, however, appropriate pitch differs depends on the computer spec.

Setting smaller value will increase the frequency of the collision check.

The value set here will be the pitch of the data to output to CSV file.

I: Speed bar

Adjusts the speed to run the simulation.

J: Time scale

Changes the scale of the time line.

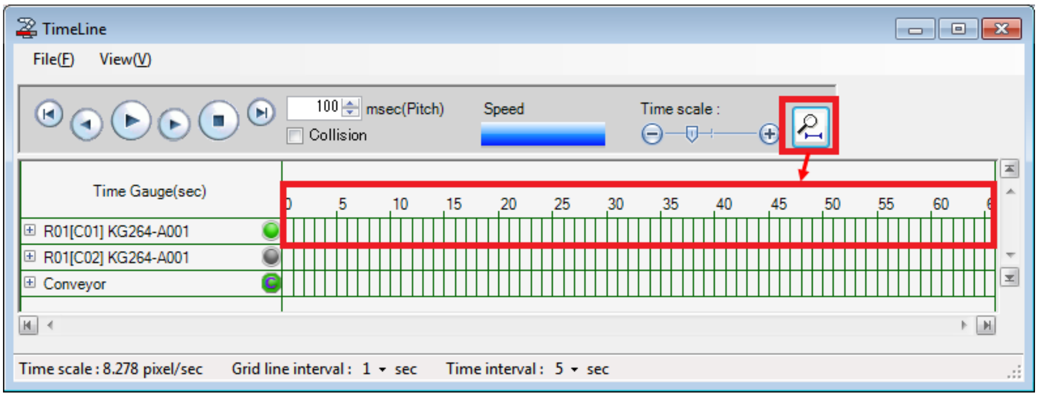
Adjust the screen size (pixel) per second.

With smaller value, more data can be displayed on a screen.

[Ctrl] key with mouse wheel operation can also change the time scale.

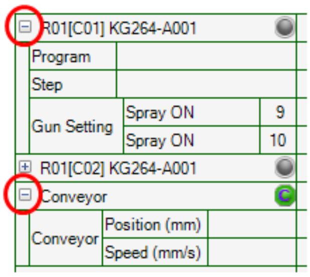
K: Automatic scaling button

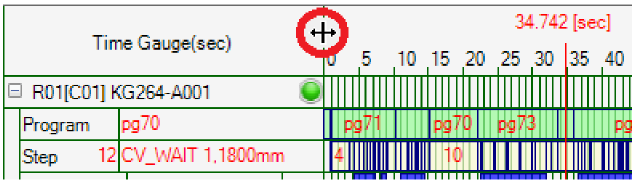
Adjusts the read trajectory file automatically so that it is displayed in full width of the display scale of the timeline.



► 5.11.4.4 Item area

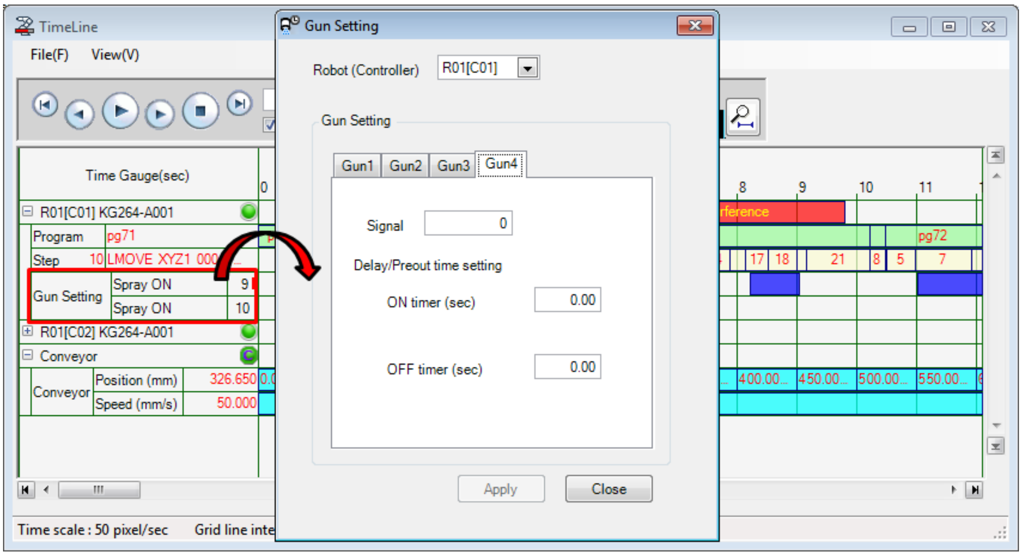
Click on the icon on the left side of the robot name or conveyor name will expand/collapse the node. Move the cursor on to the border between the title and data and drag the double-arrow cursor to the left or right allows the user to adjust the column size.





➤ Settings of each extension application

Double-click on the title in the item area or on the data in the data cell section will open each setting dialog.



• Program name

When the target program to be used in the Time line is in the program table, the target program name in the program table is highlighted.

● Please note that program name may not be displayed depends on the robot model and/or AS version you use.

• Step No. , Step

When the target program step is in the program table, that step in the program table is highlighted.

• Handling Clamp

Opens the Handling Clamp dialog. Double-click on a signal No. section will open the dialog with the corresponding tab opened.

• Gun setting

Opens the Gun setting dialog. Double-click on a signal No. section will open the dialog with corresponding tab opened.

• Action

Opens the Action dialog. Double-click on a signal No. section will open the dialog according to its action type.

• I/O Signal Connections

Enabling the I/O signal connections in the Plug-ins will activate the I/O signal connections tab in the main pane. Double-click on a signal No. section will highlight all data which uses the signal No.

• Touch Sensing

Opens the touch Sensing dialog.

• Spot Welding setting

Opens the Spot Welding setting dialog. Double-click on a signal No. section will open a settings dialog which includes clamp No. and welding No. etc.

• Conveyor

Opens the Conveyor setting dialog.

5.11.4.5 Data cell/Status bar

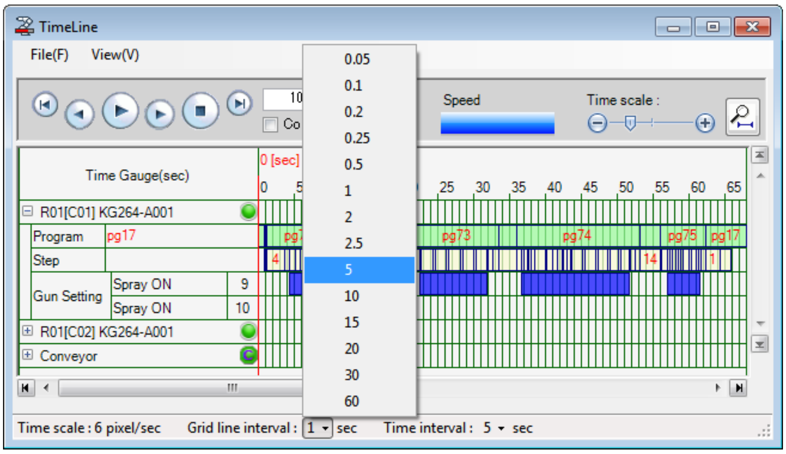
➤ Move using the mouse

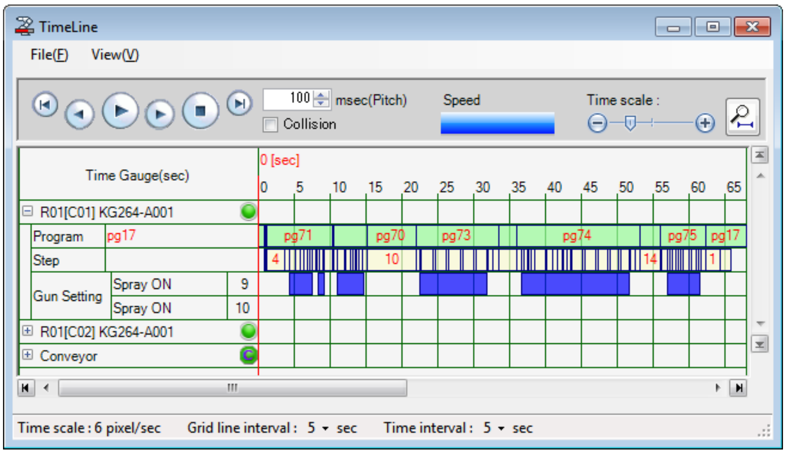
The display area can be moved back and forth by right-clicking and dragging left or right within the data cell area.

➤ Grid line interval

Adjust the interval of the grid line width drawn on the graph.

With smaller value, more grid lines can be displayed on a screen.

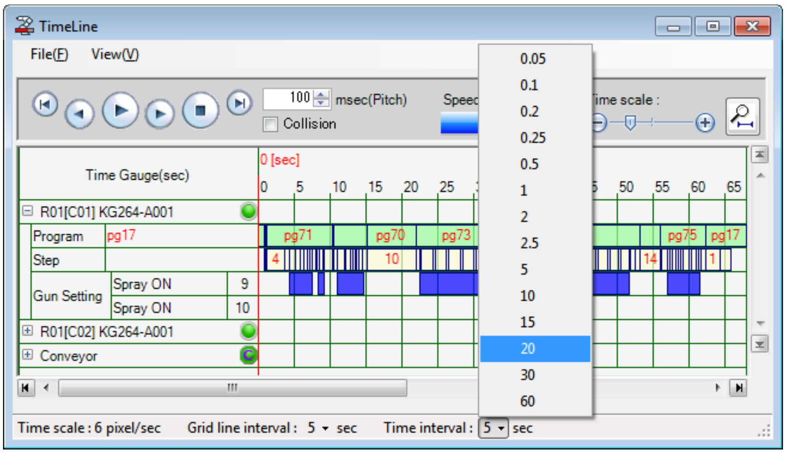


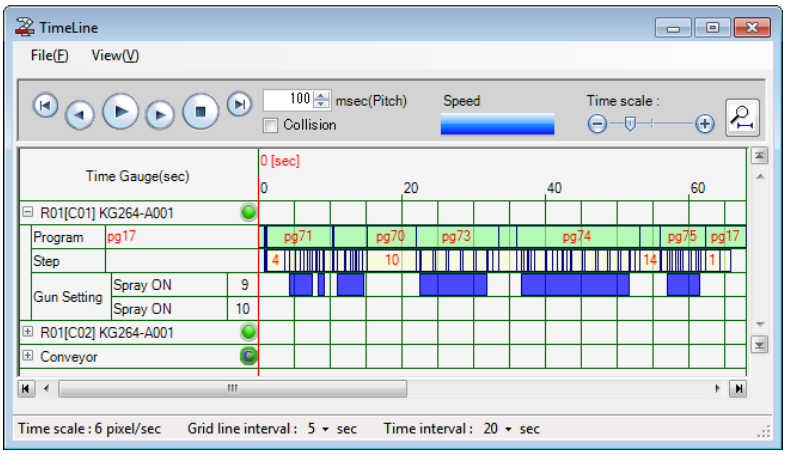


➢ Time interval

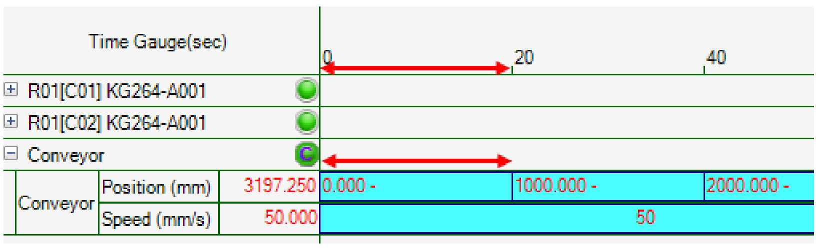
Adjust the interval of the elapsed time display drawn on the graph.

With smaller value, more time can be displayed on a screen.





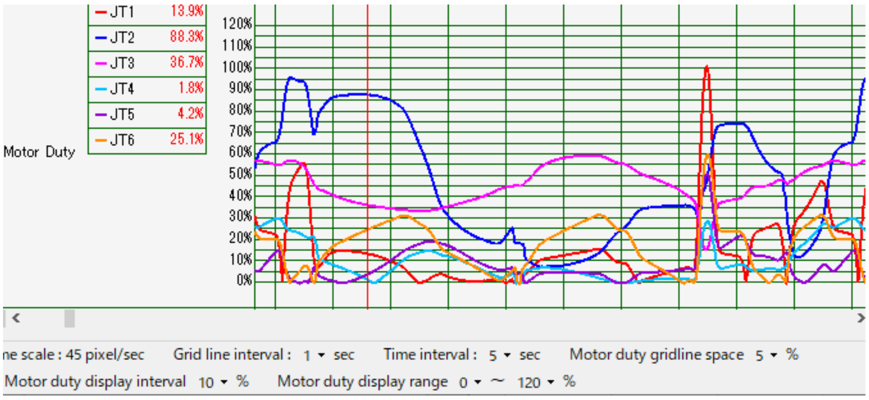
Conveyor position data will be separated and displayed in this pitch.

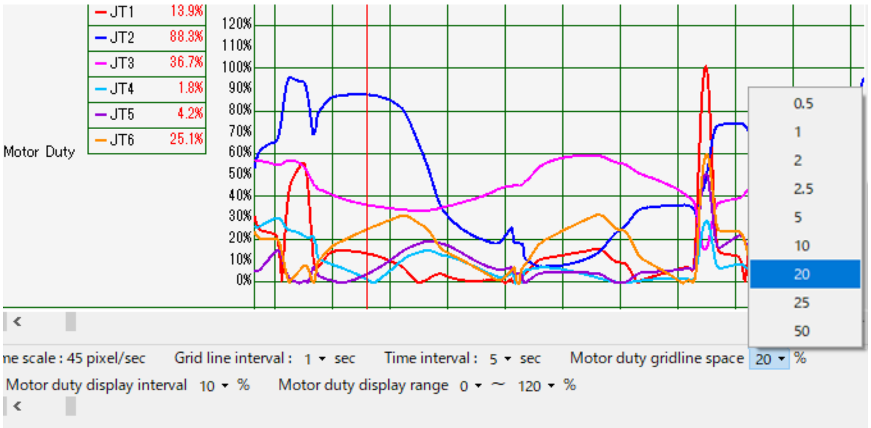


➢ Motor duty scale line interval

Adjust the interval of the horizontal scale lines in the motor duty graph.

Click on the value displayed on the status bar to change it.

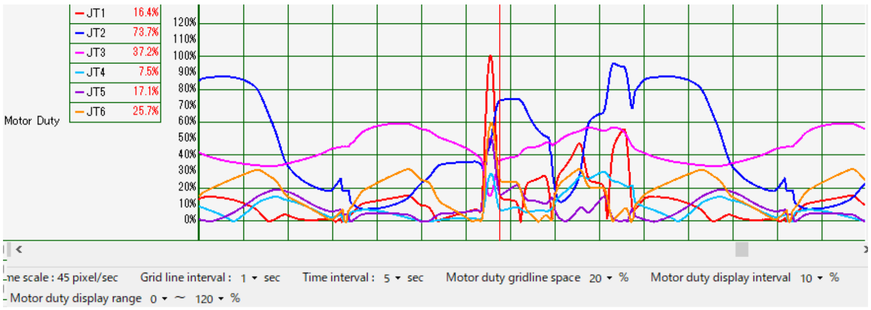


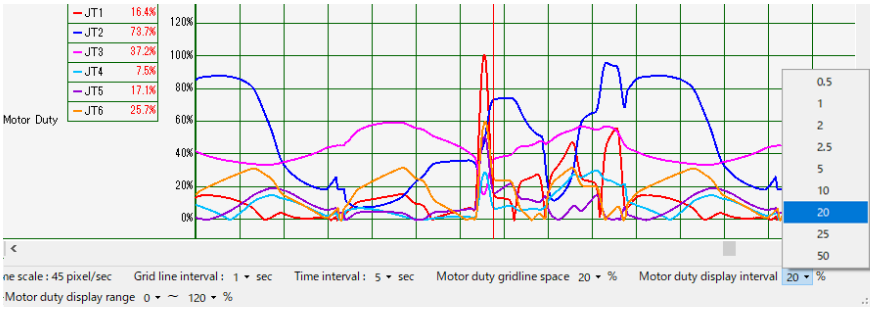


➢ Motor duty display interval

Adjust the scale interval of the vertical axis of the motor duty graph.

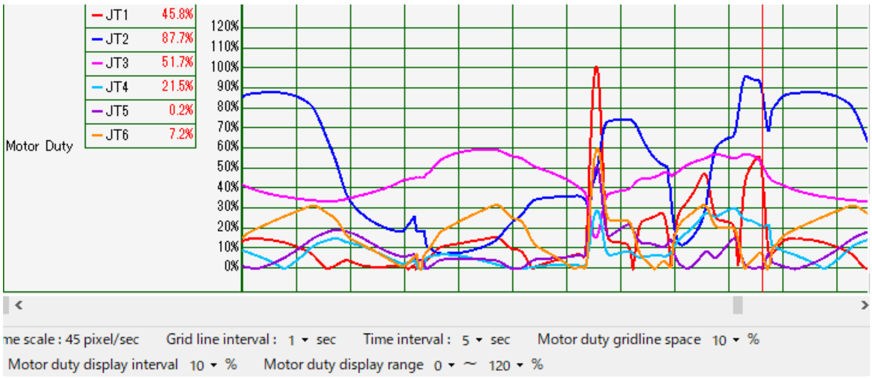
Click on the value displayed on the status bar to change it.

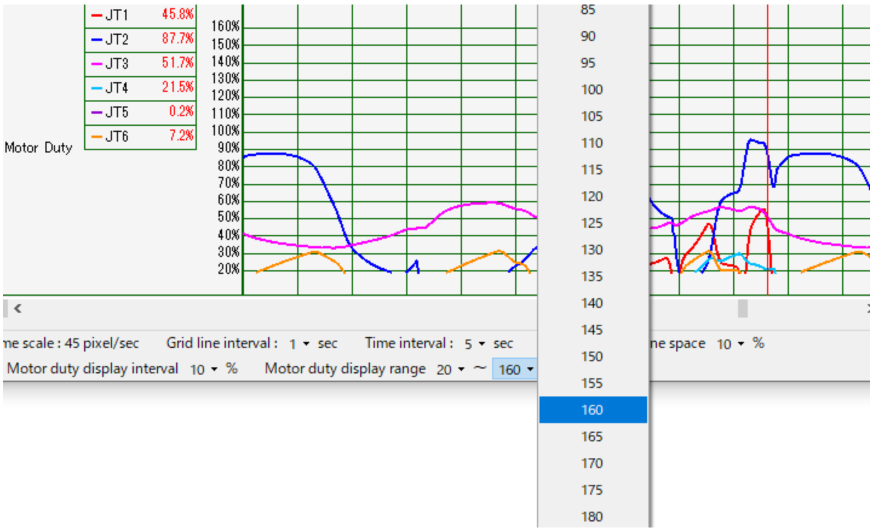




➢ Motor duty display range

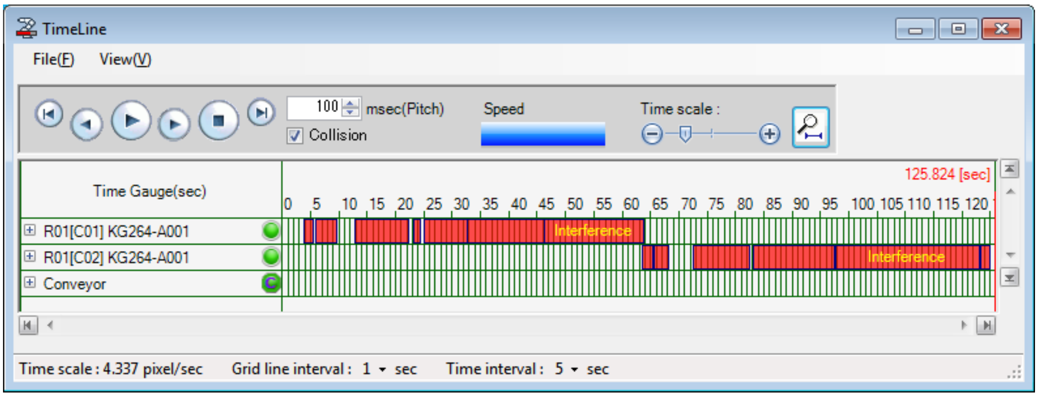
Adjust the scale range (min, max) of the vertical axis of the motor duty graph.
Click on the value displayed on the status bar to change it.

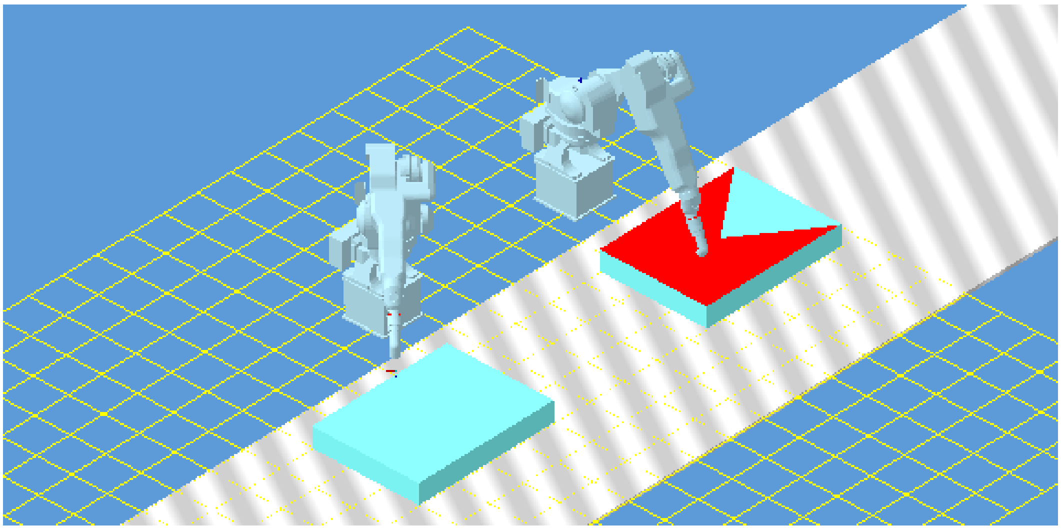




● Motor duty information is displayed only when a model that supports the failure prediction function is added. For details, see 5.11.9.

➢ Collision Detection





Place a check mark in Collision and execute repeating. In case any collision between robots is detected, the repeat points of collided positions are painted out in red.

When clicking Repeat button with a check mark in Collision, clear all the status before starting and then start repeating.

Though collision check in the simulation is executed in the interval which is set to [Screen update interval] during the simulation, collision check in this screen will be executed in the interval which is set to the [Reproduction pitch setting control]. In order to increase the frequency of the collision check, set a smaller value.

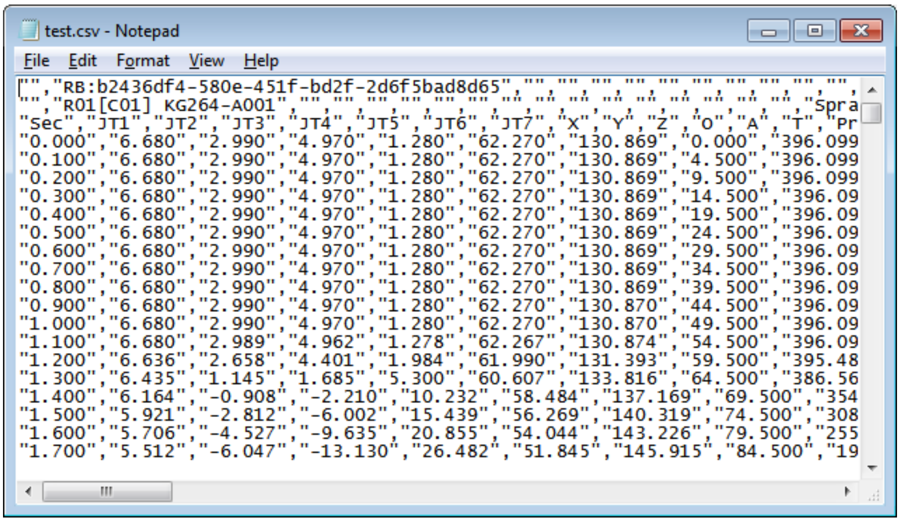
5.11.4.6 File Menu

- Export as CSV format

  Select [File]-[Export Csv file] to save the displayed data as CSV files.

  Data output interval of the CSV file is the one which is set in the [Reproduction pitch setting control].

- Comma is used for delimiter and period is used for decimal point when data is output in CSV format in order to match to the AS file output format.
- The first three lines are the header.
- Please note that transformation value may not be output depends on the robot model and/or AS version you use.


test.csv - Notepad

File Edit Format View Help

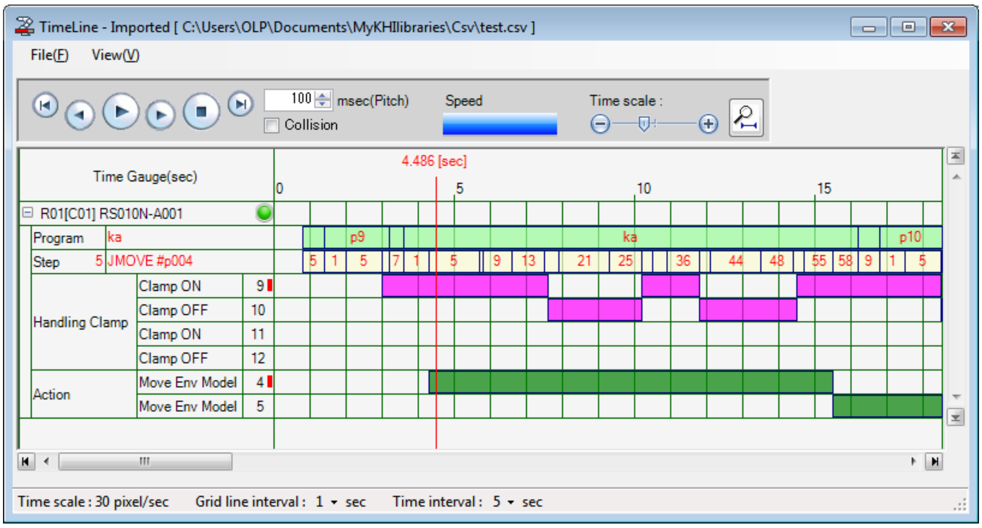
```
"","RB:b2436df4-580e-451f-bd2f-2d6f5bad8d65","","","","","","","","","",
"","R01[C01] KG264-A001","","","","","","","","","","","","","","Spra
"Sec","JT1","JT2","JT3","JT4","JT5","JT6","JT7","X","Y","Z","O","A","T","Pr
"0.000","6.680","2.990","4.970","1.280","62.270","130.869","0.000","396.099
"0.100","6.680","2.990","4.970","1.280","62.270","130.869","4.500","396.099
"0.200","6.680","2.990","4.970","1.280","62.270","130.869","9.500","396.099
"0.300","6.680","2.990","4.970","1.280","62.270","130.869","14.500","396.09
"0.400","6.680","2.990","4.970","1.280","62.270","130.869","19.500","396.09
"0.500","6.680","2.990","4.970","1.280","62.270","130.869","24.500","396.09
"0.600","6.680","2.990","4.970","1.280","62.270","130.869","29.500","396.09
"0.700","6.680","2.990","4.970","1.280","62.270","130.869","34.500","396.09
"0.800","6.680","2.990","4.970","1.280","62.270","130.869","39.500","396.09
"0.900","6.680","2.990","4.970","1.280","62.270","130.870","44.500","396.09
"1.000","6.680","2.990","4.970","1.280","62.270","130.870","49.500","396.09
"1.100","6.680","2.989","4.962","1.278","62.267","130.874","54.500","396.09
"1.200","6.636","2.658","4.401","1.984","61.990","131.393","59.500","395.48
"1.300","6.435","1.145","1.685","5.300","60.607","133.816","64.500","386.56
"1.400","6.164","-0.908","-2.210","10.232","58.484","137.169","69.500","354
"1.500","5.921","-2.812","-6.002","15.439","56.269","140.319","74.500","308
"1.600","5.706","-4.527","-9.635","20.855","54.044","143.226","79.500","255
"1.700","5.512","-6.047","-13.130","26.482","51.845","145.915","84.500","19
```

➤ Read as CSV format

Select [File]-[Import Csv file] to display the signal data saved as CSV file.

File name is displayed in the dialog title while loading a CSV file.

- Monitoring of a simulation cannot be started while loading a CSV file.
- To start the monitoring of a simulation, close a CSV file via file menu.
- Though it is possible to load CSV files which are output in different project, moving robot and conveyor models in the view are not possible.

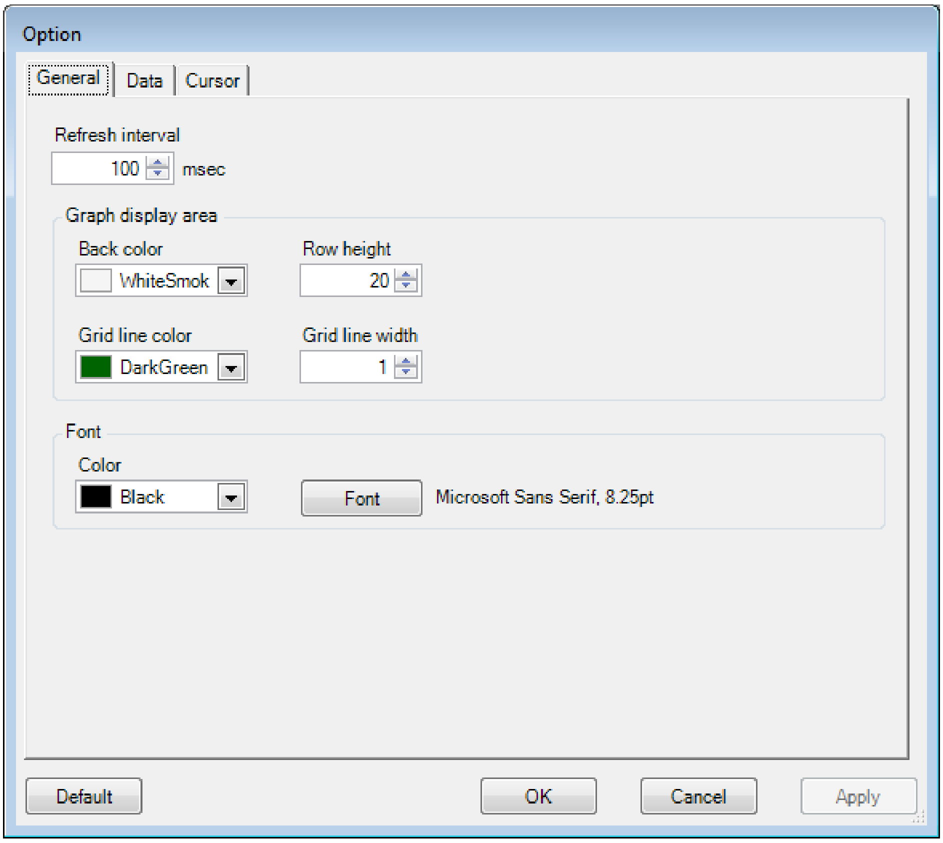


► 5.11.4.7 Display Menu

➢ Display settings

Select [Display]-[Option] to change various settings related to display.

[Option]



➢ General tab

Set refresh interval of the screen, font and graph display area.

With larger refresh interval, flicker on the screen can be restrained.

➢ Data display tab

Set color or width of the data line, color or transparency of the stick chart, and display format.

➢ Cursor tab

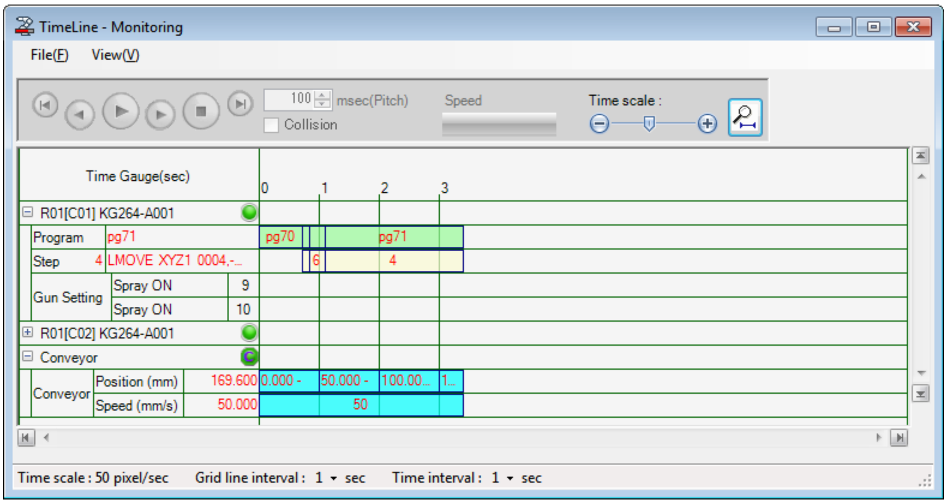
Set the cursor to be displayed during monitoring stop.

► 5.11.4.8 Monitoring

➢ Monitoring function during simulation

Once simulation is started, this screen starts monitoring the data during the simulation. File input/ouput function as well as the play function are disabled while it's in monitoring state.

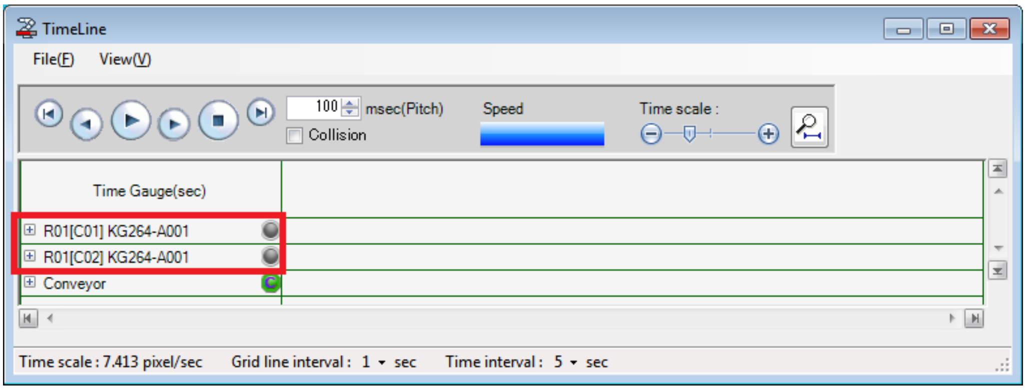
The data displayed on the screen are not saved unless you save it in CSV file format.



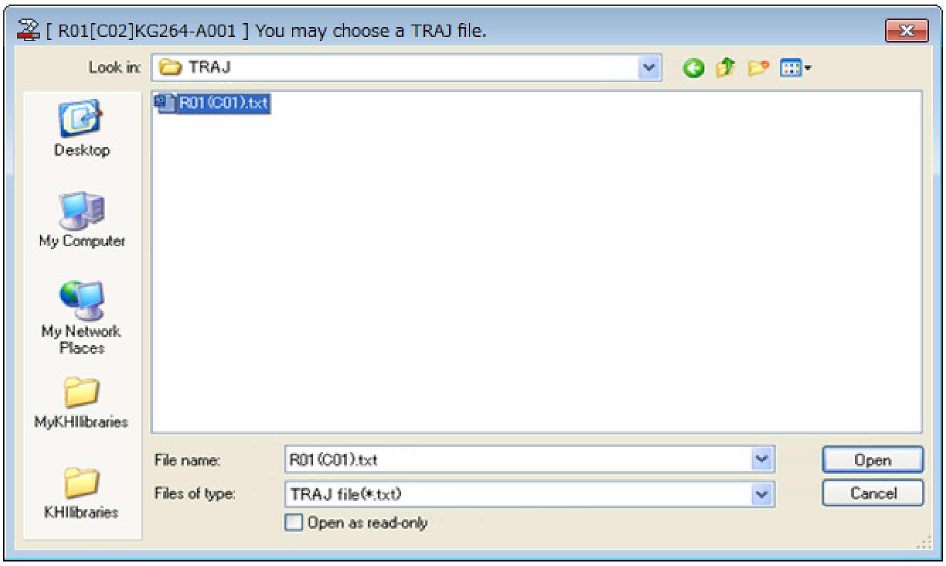
Caution

Be aware that your computer may not have enough memory depends on the length of monitoring time or the size of the data.

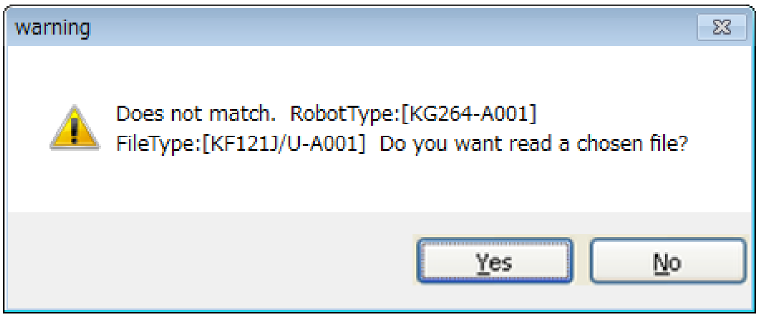
➢ Load trajectory file



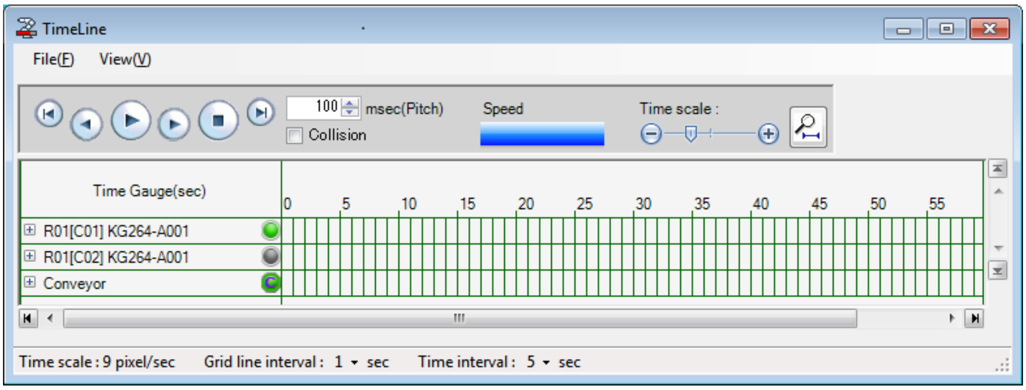
Double click the item area of timeline (above red-flamed). Following selection dialogue is displayed. Selected trajectory file is loaded to the robot at the double clicked position.



In case the robot and the trajectory file do not coincide, select either load or cancel in the following dialogue.



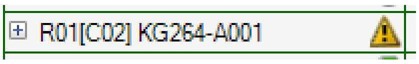
Display image for the case of loading a trajectory file to the first robot.



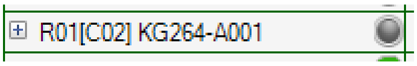
When a trajectory file is loaded to a robot, the lamp for the corresponding robot name in the list turns to green.

Green lamp is indicating that the robot has data to display.

The yellow icon shown below will be indicated when a data for different robot model is loaded.



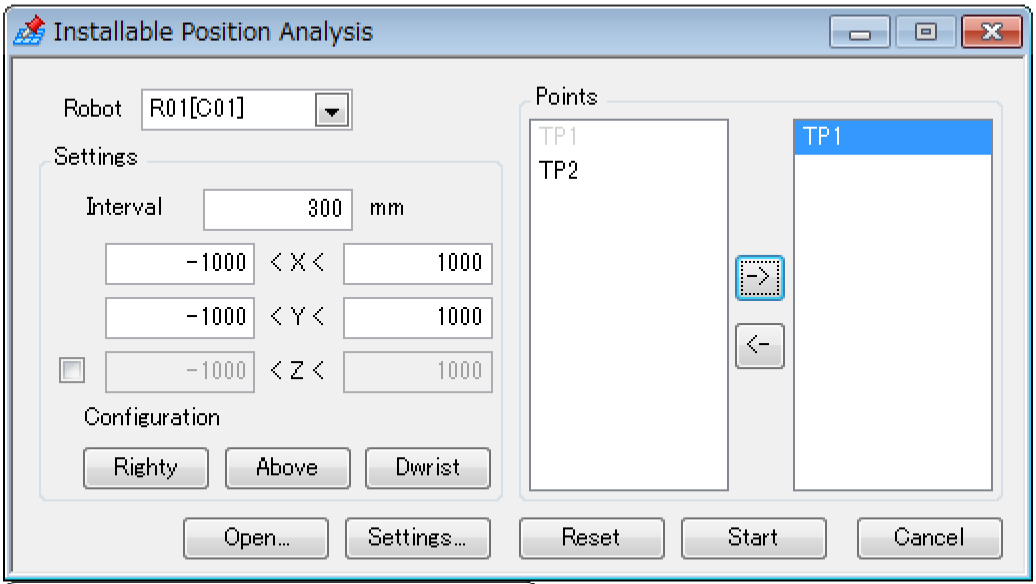
The lamp will be indicated in gray as shown below when there is no data to display.

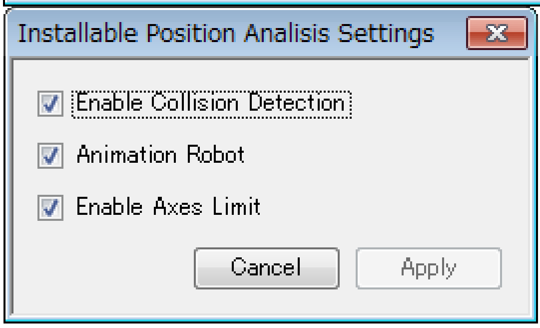


The letter C in green icon at the bottom line of item area indicates that there is a conveyor on the view. Unlike the robot, however, it is impossible to load a file by clicking.

5.11.5 Installable Position Analysis

For more than one teaching point, a position of the target robot usable for teaching can be analyzed.





- Robot
  Select an object robot to analyze installable position.
- Analysis interval
  Interval in the analysis range can be set. Smaller interval value enables detailed analysis but it takes longer to analyze.
- Analysis range
  Set XY coordinate range of the analysis range. In case there is no mark in Z, analyze Z coordinate as O. Z coordinate range can also be set by placing a check mark.
- Option
  By removing a check mark in [Check collision], disregard collision and display analyses result, succeeded or failed. By removing a check mark in [Animate robot], robot does not touch teaching point when executing analysis thus enable to shorten analysis time.

1 **On the plug-in menu, select [Installable Position Analysis].**

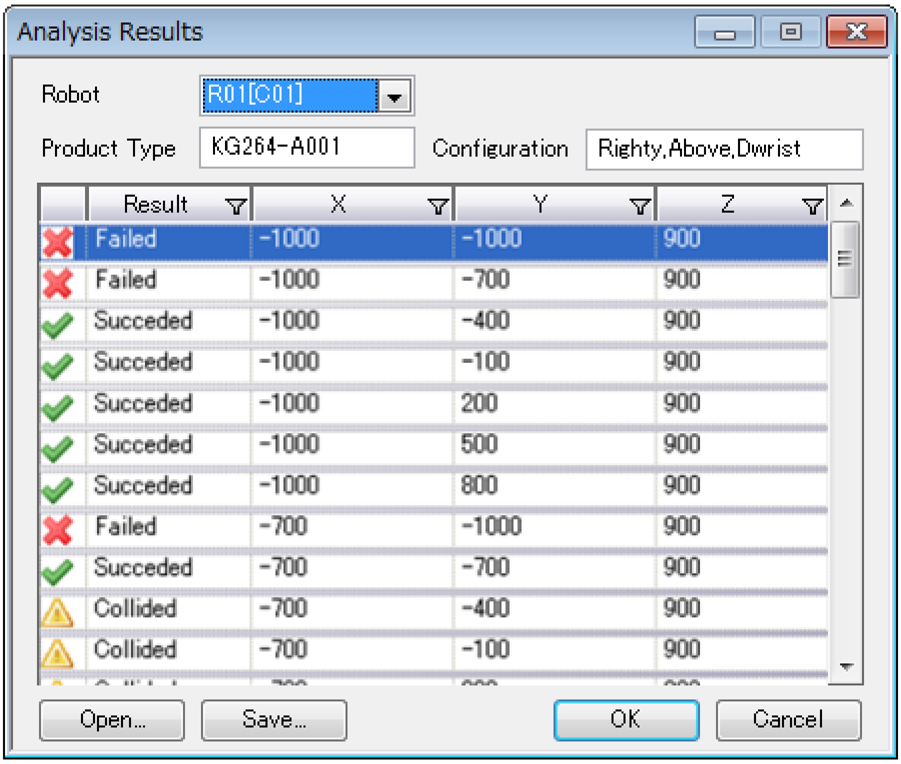
2 **The installable position analysis screen appears. Select a robot to be analyzed.**

3 **Enter analysis interval and analysis range at the [Settings] item.**

4 **It is possible to set up as an option whether to consider collision during analysis and whether to allow jumping during analysis.**

5 **At the [Teaching Point Setup] item, move the teaching points applicable to analysis from the left list box to the right one, and select the [Start] button.**

6 **When analysis has been completed, a list of the analysis results is displayed.**

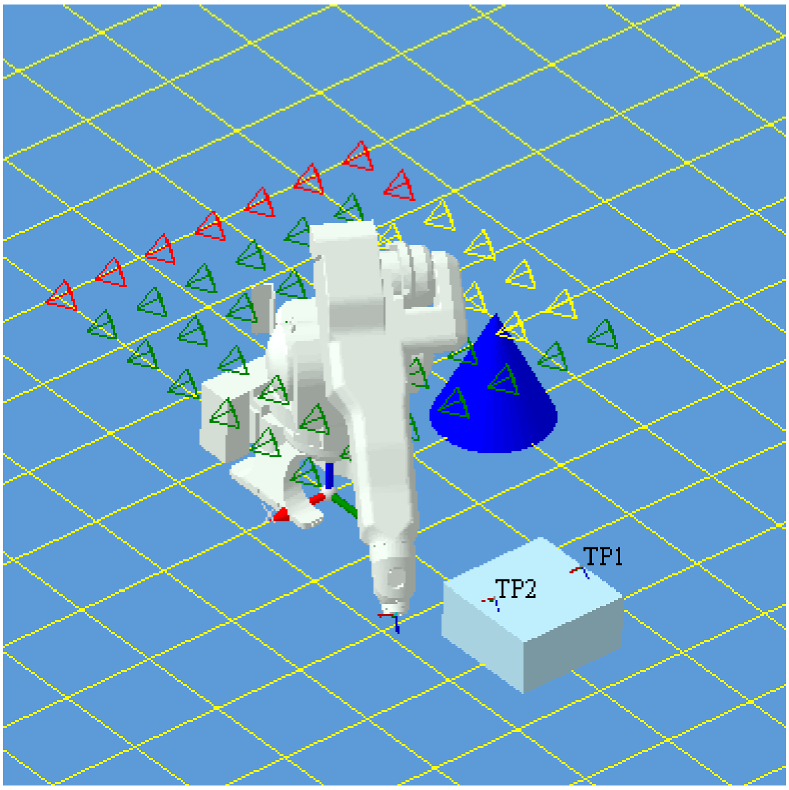


In the list of the analysis results, double-click a column. The robot will move to the coordinate of the column.

[ ]: Succeed, [ ]: Failed, [ ]: Collided

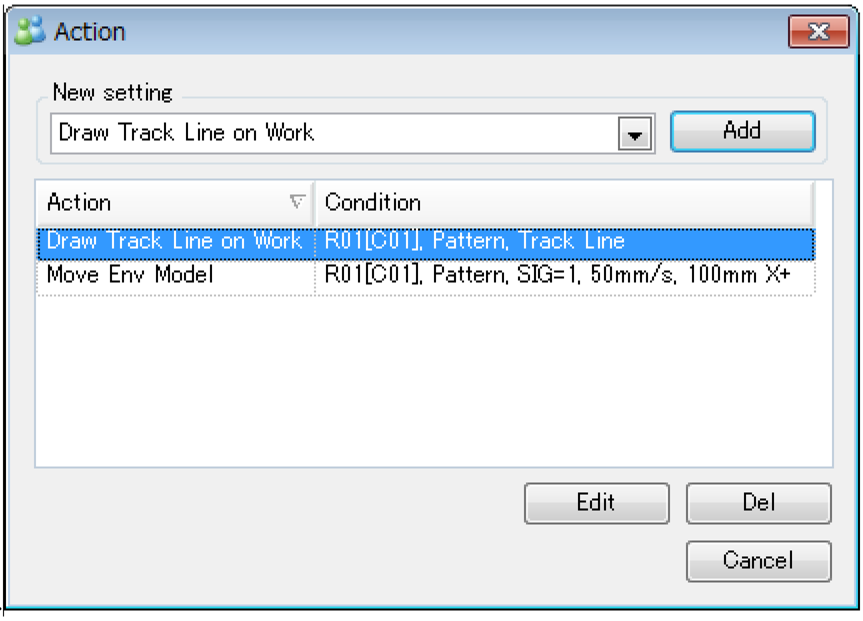
In addition, the analysis results are displayed as ▲ symbols on the view.

Each color is applied [ ]: Succeed, [ ]: Failed, [ ]: Collided



5.11.6 Action

This function can draw Pint and track line to a work- piece or move the model with robot signal.



- Action Type

  Select a type of action. Settings of each action describe as next term.

- List

  The settings on Action are displayed.

- Add

  New Action is created.

- Edit

  Selected action setting cans edit.(V169-)

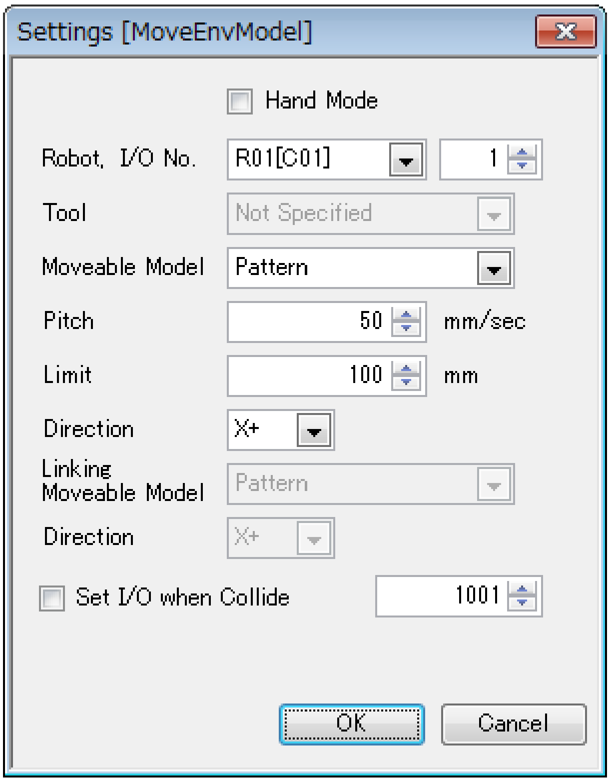
➢ Del

Selected action setting is deleted.

➢ Cancel

Action dialog is closed.

► 5.11.6.1 Model Move



➢ Hand Mode

If the term is valid, you can set the claw of hand.

➢ Robot, I/O No.

The target robot and the signal are set.

➢ Tool

Set the target tool in case of hand mode

➢ Moveable Model

Select the target obstacle model.

➢ Pitch

Set the speed of the model.

- Only positive integer can be entered.

➢ Limit

Set the limit of motion.

- Only positive integer can be entered.

➢ Direction

Select the direction of model.

➢ Linking Moveable Model

Select the obstacle model coupled motion.

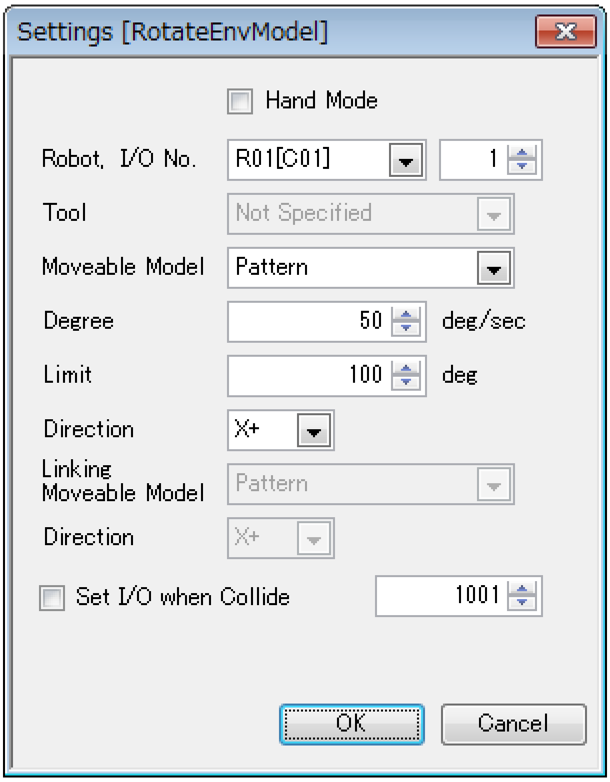
➢ Direction(Linking Moveable Model)

Select the direction of Linking model.

➢ Set I/O when Collide.

Colliding the model, the setting signal is turned on.

► 5.11.6.2 Model rotation



➢ Hand Mode

If the term is valid, you can set the claw of hand.

➢ Robot, I/O No.

The target robot and the signal are set.

➢ Tool

Set the target tool in case of hand mode

➢ Moveable Model

Select the target obstacle model.

➢ Pitch

Set the speed of the model.

➢ Limit

Set the limit of motion.

➢ Direction

Select the direction of model.

➢ Linking Moveable Model

Select the obstacle model coupled motion.

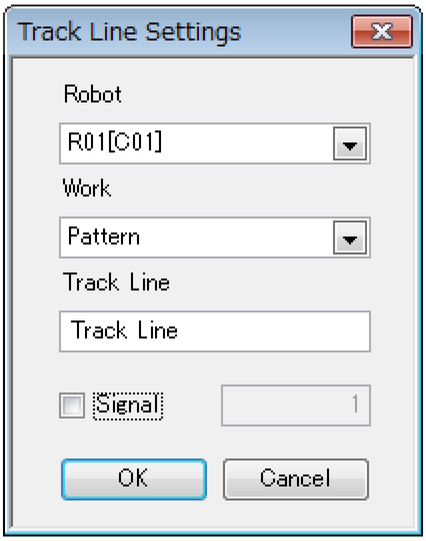
➢ Direction(Linking Moveable Model)

Select the direction of Linking model.

➢ Set I/O when Collide.

Colliding the model, the setting signal is turned on.

► 5.11.6.3 Track Line



➢ Robot

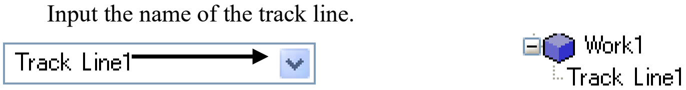
Set the target robot.

➢ Work

Select the environment coupled the track line.

➢ Track Line

Input the name of the track line.

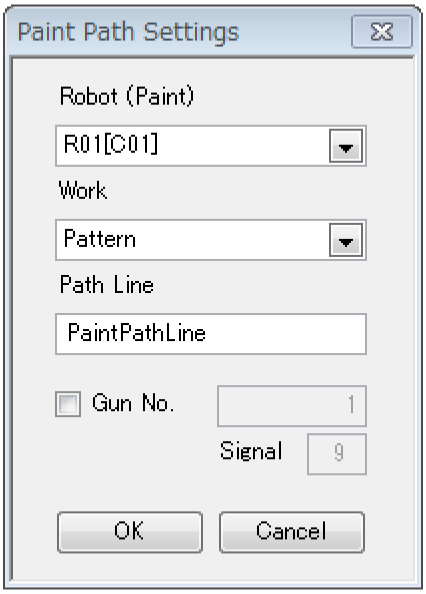


➢ Signal

When designated signal is ON, draw a track line.

In case no signal is designated, draw every time the robot changes posture.

► 5.11.6.4 Paint Path



- Robot

  Set the target robot.

● Paint robot only

- Work

  Select the environment coupled the Path Line.

- Path Line

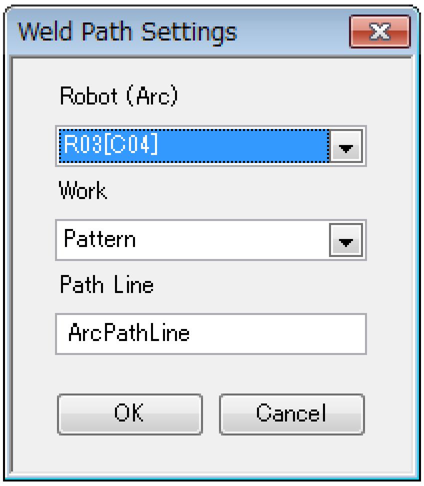
  Input the name of the Path line.

- Gun number

  Draw when the designated gun number turns ON.

  In case no gun number is designated, draw when any signal of gun #1, 2 ,3 or 4 turns ON.

5.11.6.5 Weld Path



- Robot

  Set the target robot.

- Arc robot only

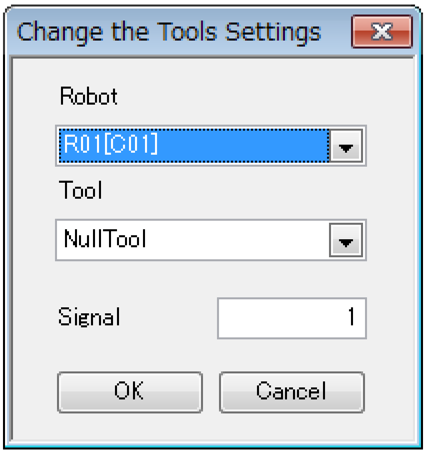
- Work

  Select the environment coupled the Path line.

- Path Line

  Input the name of the Path line.

5.11.6.6 Tool change



- Robot

  Set the target robot.

- Tool

  Select the attached tool model.

- Prepare to load the tool.

- Signal

  When designated signal is ON, change the tool.

5.11.7 Video recording

This section describes a method for recording moving images.

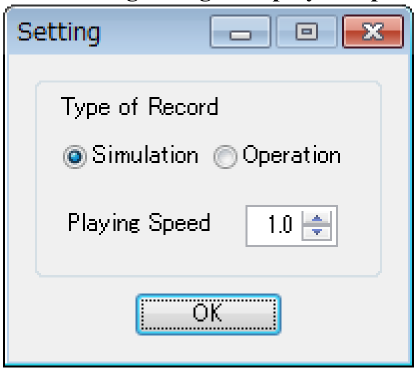
1 **Select [Record Video] of the plug-in.**

Screen for file saving is displayed.

2 **Select record button** 

Screen for file saving is displayed.

3 **The setting dialog is displayed. Specify recording type/repeating speed and press [OK] button.**



Simulation: A view screen is recorded after a cycle lamp lights up until it puts out the light.

Operation: The window of K-ROSET is recorded after a recording start setup is completed.

- Select [Simulation] to record a video at actual robot moving speed.

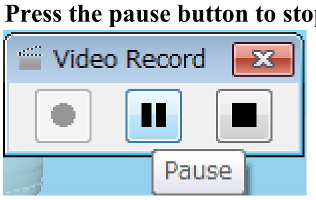
4 **The dialog of [Name and save] is displayed. Specify the destination/file name, and press [Save] button.**

5 **Set the compression format of the video, and select [OK].**

- Compression of recommendation is Microsoft Video1.

6 **Execute simulation.**

7 **Press the pause button to stop temporarily.**



Press the pause again to start recording.

8 **Click [stop] button**  **to stop the recording.**

5.11.8 Power Consumption

This chapter describes about Power Consumption Function.

When the robot executed a series of motion program, calculates and displays power consumption and motor current by steps and power consumption per a cycle.
Also, power consumption per day can be calculated or displayed by inputting running condition of a day.
Before explaining the function, refer to the following precondition for this edition.

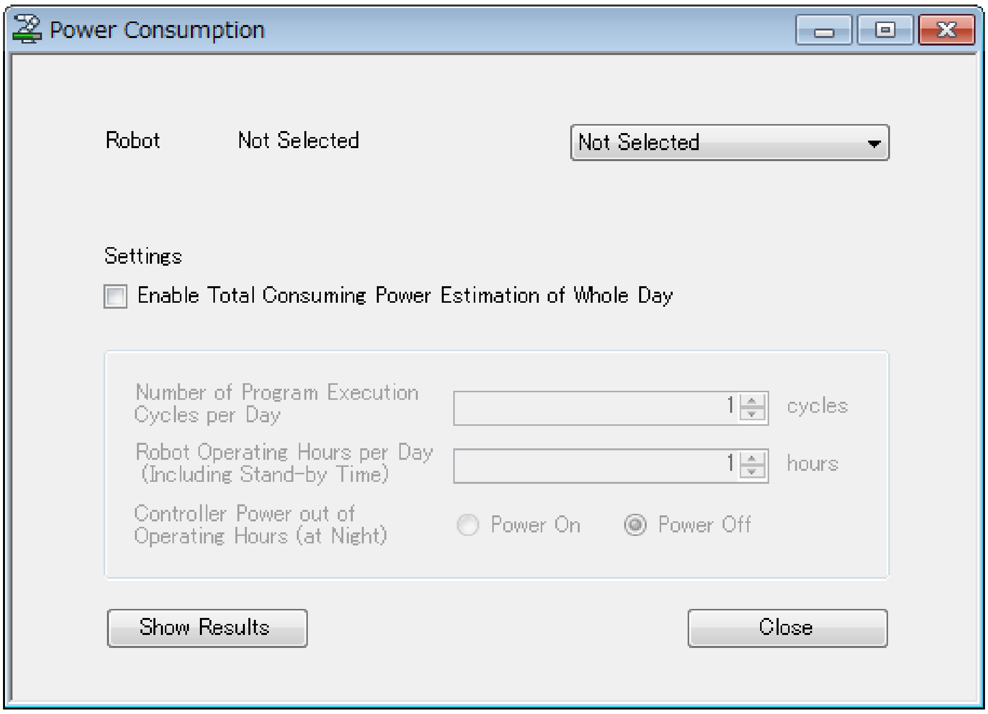
• Following three robots are applicable to this edition.

Model	Application	AS version
ZX165U-B501	Handling	10000V24
BX100N-B001	Servo welding gun	21300V0E
BX200L-B001	Servo welding gun	21300V0E

• Only 6 axes robot is applicable. External axis is not supported.
• The calculation object is one robot at a time.

5.11.8.1 Screen Structure

Set the running condition of robot and display the results.
Select main menu plug-ins - Power consumption calculation and click the setting dialogue.



Refer to the following function of this screen.

➢ Checkbox [Enable Total Consuming Power Estimation of Whole Day]
Valid：Includes total consuming power of whole day in the results display.
Invalid：Not includes total consuming power of whole day in the results display.
When the checkbox is valid, number of program execution cycles and robot operating hours need to be inputted.

- Operating hours = Program execution hours＋waiting hours
- Out of operating hours (night) = Hours except for operating hours

➢ Show Results button

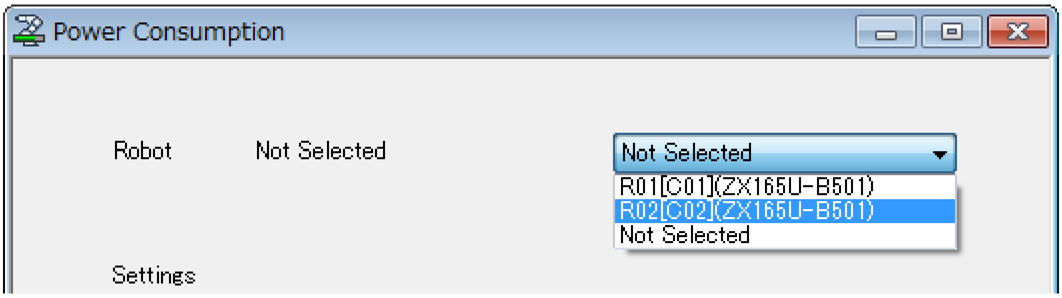
Close the setting dialogue and display a results dialogue.

- Close button

Close the setting dialogue. Calculating function of power consumption is valid even when closing a dialogue.

- Robot Pull-down list

Display a list of object robots for power consumption calculation among robots in the project. An object robot for calculation can be selected from the list and the selected robot is highlighted. Or, [Not select] can be selected. (Power consumption is not calculated with the status that the robot is not selected.

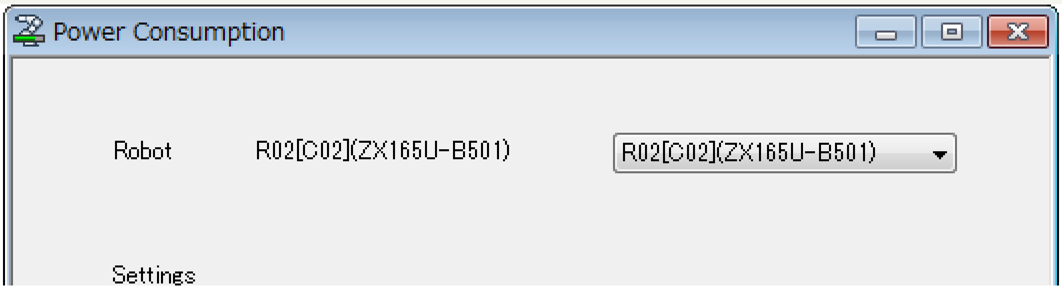


- Calculates only selected robots in the list.

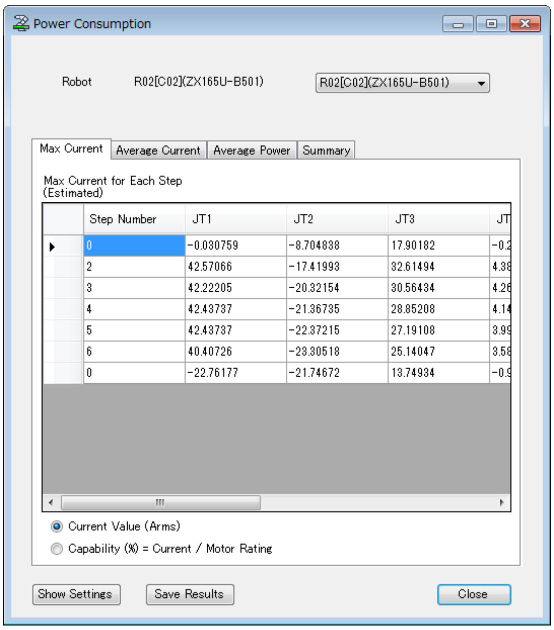
(Figure shows calculation for R02 [C02] ZX165U-B501.)

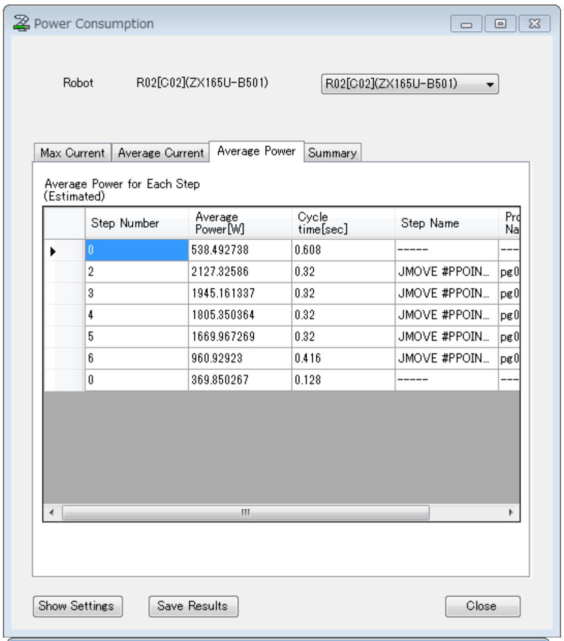
Select [Not selected] when not calculating any robot.

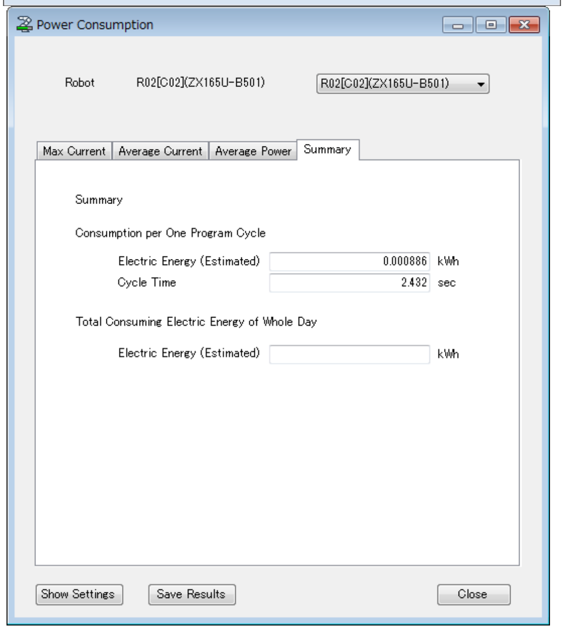
- Calculation estimates power consumption from the start of the motion program execution to the end of that. In case the motion program is executing, it estimates from the robot selection of pull-down list to the end of the motion program execution.



Below Figures show results display dialogue. When there is a calculated result of power consumption, that value is displayed.







Refer to the following function of this screen.

- Max Current tab

Display step number, joint maximum current for each step (Select with current value [Arms] and Capability [%]), step name and program name.

- Capability means capable value for motor rated current. (Divides current value with rated current)
- Current value means servo motor current of joint (q axis current) and a code is equivalent to the rotate direction which is defined to robot joint.
- For maximum current, the larger value is displayed with ± code as an absolute value.

- Average Current tab

Display step number, joint maximum current by step (Select with current value [Arms] and Capability [%]), step name and program name.

- Average current is the simple average of the value.

- Average Power tab

Display step number, average power for each step [W], cycle time [sec], step name and program name.

- Summary tab

Display electric energy and cycle time per a program, and total consuming electric energy of whole day (only when selected).

- Show Settings button

Close the results dialogue and display a setting dialogue.

- Save Results button

Output displayed joint maximum current etc. as a text file. Refer to Chart 5 for output items.

- Close button

Close the dialogue. (Calculating function of power consumption is valid even when closing the dialogue.)

- Robot Pull-down list

Display a list of object robots for power consumption calculation among robots in the project. Select either robot [Selected] or [Not selected] from the list. Power consumption is not calculated with the status that the robot is not selected.

5.11.8.2 Parameter

Below charts 1-4 show parameters required for calculation. Obtain these parameters from each applicable default file. Default files are stored in [K-ROSET install folder]¥system¥plugins.

Chart 1 Parameter Set as default file PwConsumptionMotor.xml

Item	Unit	Explanation
motorname	[−]	Motor type (Each joint has value)
pbcode	[−]	Power block code (Each joint has value)

Obtain motor type and power block code using model name and joint number as a key.

Chart 2 Parameter Set as default file PwConsumptionJointParam.xml

Item	Unit	Explanation
Resistance	[Ω]	Circuit resistance value for each joint
RatedCur	[Arms]	Motor rated current

Obtain motor type and power block code using model name and joint number as a key.

Chart 3 Parameter Set as default file PwConsumptionParam.xml

Item	Unit	Explanation
CONST_W0	[W]	Brake, Control power lost
muC	[μF]	Regenerating resistance circuit condenser capacity
Vlim	[V]	Voltage threshold of closing regenerating resistance circuit
Vdef	[V]	DC voltage applied to the drive system

Obtain value of chart 3 using model name as a key.

Chart 4 Parameter Set as default file PwConsumptionTable.xml

Item	Unit	Explanation
PwCalTable	Refer to the explanation	Motor TN characteristic Rotate number (motor axis) [rpm]-torque (motor axis) [Nm], and Rotate number (motor axis) [rpm]-motor current [Arms]

Obtain value of chart 4 using motor type as a key.

5.11.8.3 Output File Format

Output results as a text file by the results save button.

Refer to the following output format.

Default output path：

C:¥Documents and Settings¥[user name]¥My Documents¥MyKHIlibraries¥Projects¥[project name]¥[robot name]¥DAT

- Location of My Documents varies depending on Windows version.

Default output file name: PwCalData.txt

Output format: Tab breakpoint

Output items

Refer to the Chart 5.

Chart 5 Output items

Item	Unit	Explanation	Remarks
Program name	n/a	Program name	
Step number	n/a	Step number	
Step name	n/a	Step name	
Maximum current (current value)_JT number	[Arms]	Max current for each step (Output by JT)	
Average current (current value)_JT number	[Arms]	Average current for each step (Output by JT)	
Maximum current (capability)_JT number	[%]	Max current for each step (Output by JT)	Capability for motor rated current
Average current (capability)_JT number	[%]	Average current for each step (Output by JT)	Capability for motor rated current
Average electric power	[W]	Average power for each step	
Cycle time	[sec]	Execution hours for each step	

Only values for each step mentioned in the Chart 5 are saved. Results displayed on the summary tab are not saved.

5.11.9 Failure Prediction

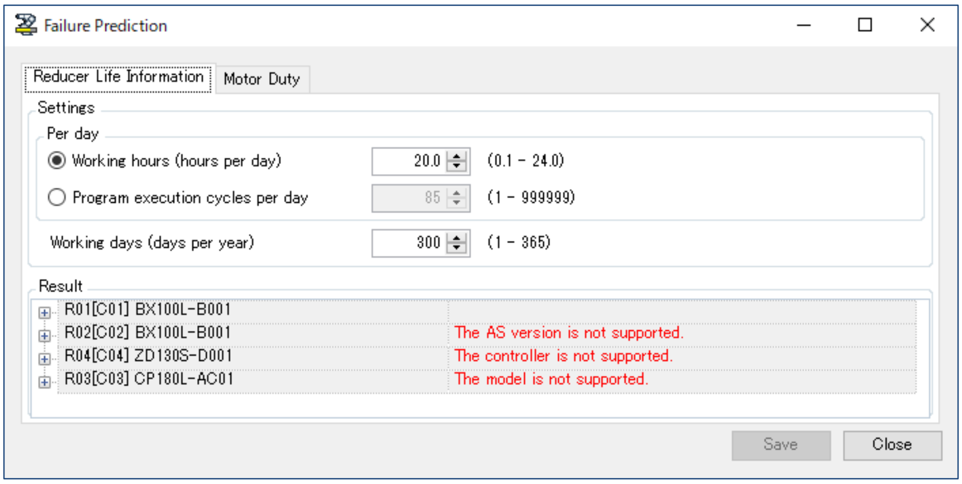
Displays information on the life of the reducer operating in the simulated program, as well as the measured motor load (duty) during program execution.

Caution

External axes are not supported.
Measurement is not possible with models or controllers that are not supported.

5.11.9.1 Screen Layout

1. Reducer Life Information



➢ Working hours (hours per day)

Set the number of hours the robot will operate per day. The value can be changed even after the measurement results are displayed.

➢ Program execution cycles per day

Set the number of program executions to run per day. The value can be changed even after the measurement results are displayed.

Either "Program execution cycles per day" or "Working hours (hours per day)" can be set.

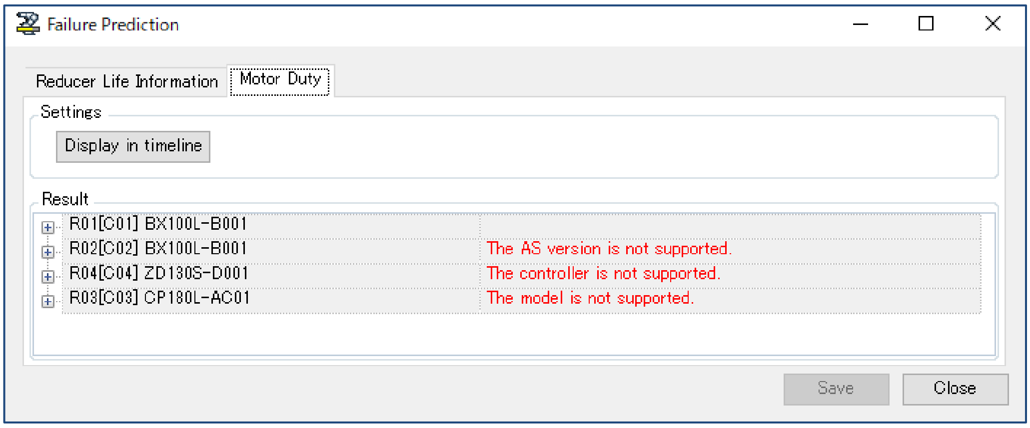
➢ Working days (days per year)

Set the number of days per year the robot will be in operation. The value can be changed even after the measurement results are displayed.

➢ Result

Displays reducer life information obtained by running the program. Nodes can be opened and closed by clicking the icon ⊞ to the left of the robot

2. Motor Duty



➢ Display in timeline

Open the timeline screen. Place a check in the timeline box in the plug-in settings screen beforehand.

➢ Result

Displays motor duty ratio information obtained by running the program. Nodes can be opened and closed by clicking the icon ⊞ to the left of the robot.

3. Other

➢ Save

Output measurement results in CSV file format.

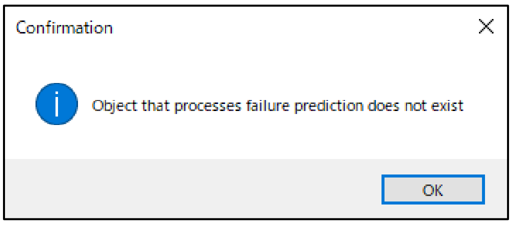
➢ Close

Close the screen.

► 5.11.9.2 Operation Method

1 Add a robot.

If there is no robot on the view, the following dialog box will appear and the failure prediction screen will not be activated.



2 Click the [Failure Prediction] plug-in.

The failure prediction screen will appear.

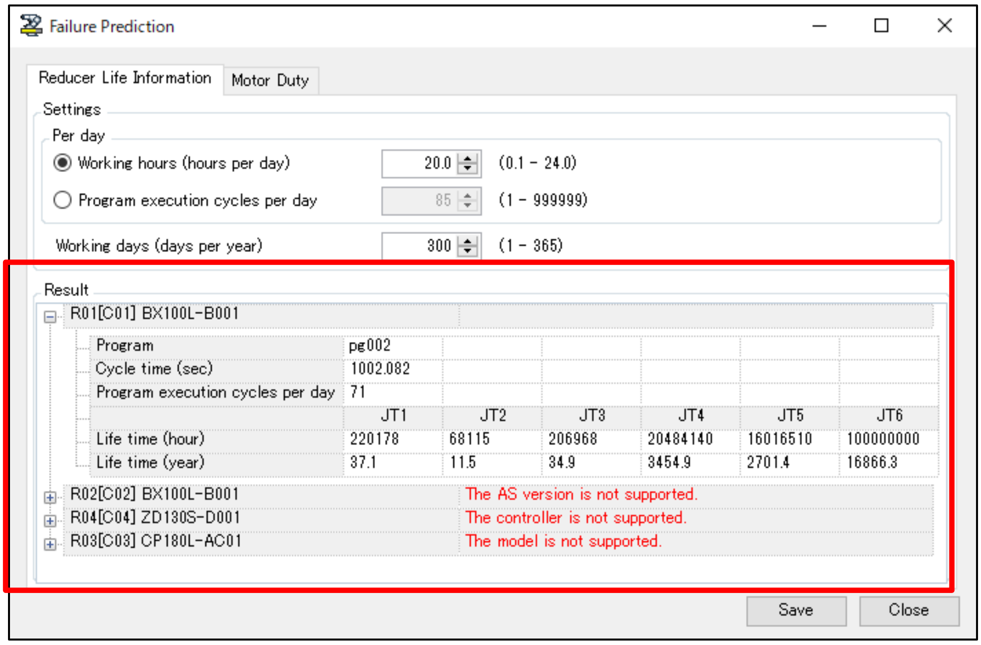
All added robots will be activated in the states listed in the results column.

3 Execute the simulation

Failure prediction results will be shown in the results column. To confirm duty trends on the timeline, open the timeline screen from the Motor Duty tab

For details, refer to 5.11.4 Time Line.

1. Reducer Life Information



➢ Program

The name of the program executed by the simulation will be displayed.

➢ Cycle time

The cycle time of the program executed by the simulation will be displayed.

➤ Program execution cycles per day

When the program is executed under the set conditions, the number of programs that can be executed per day will be displayed.
In the example, the calculation is based on 20 hours/day operation time ÷ cycle time (approx. 1000 seconds) = 71 cycles/day.

➤ Life time (hour)

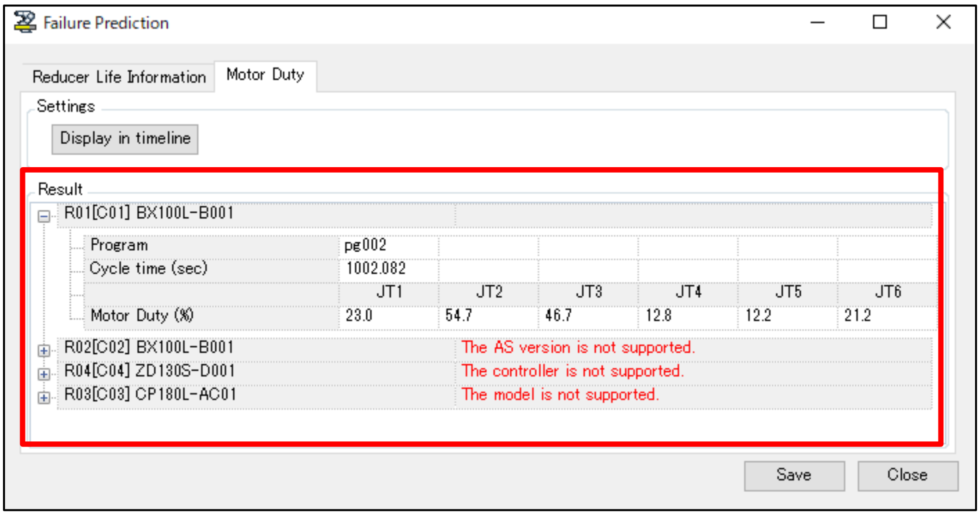
The lifetime (hours) of each reducer will be displayed.

➤ Life time (year)

The lifetime (years) of each reducer will be displayed.

Lifetime (Y) = Lifetime (H) ÷ (program executions/day × cycle time). After the results are displayed, they are recalculated by changing the setting values.

2. Motor Duty



➤ Program

The name of the program executed by the simulation will be displayed.

➤ Cycle time

The cycle time of the program executed by the simulation will be displayed.

➤ Motor Duty

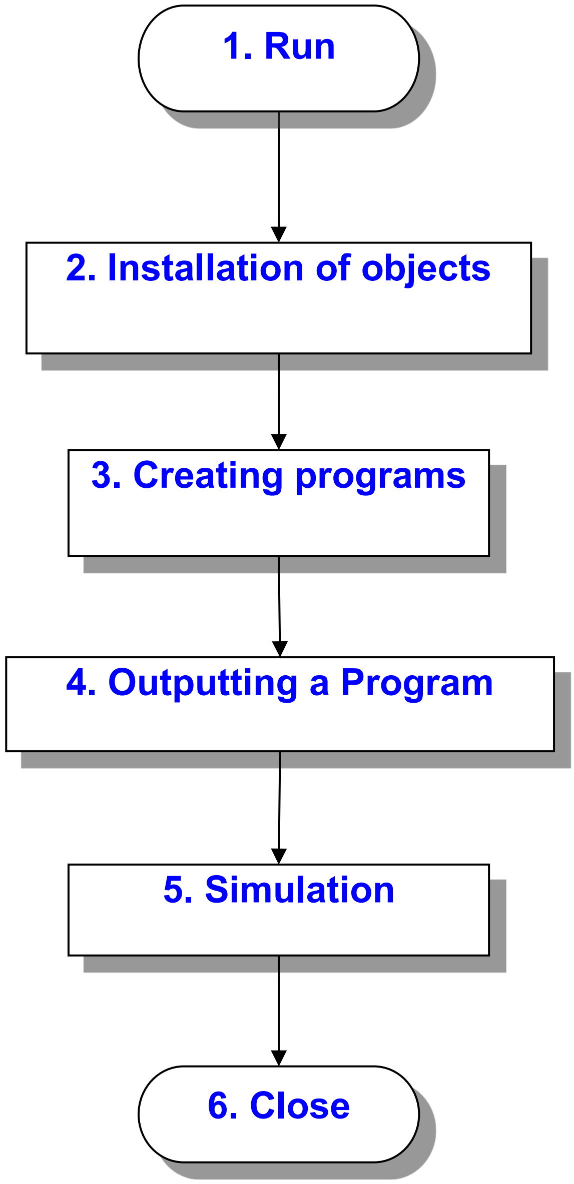
The duty cycle of the motor operated in the program executed by the simulation will be displayed.

6 Project Construction

This chapter explains project construction using sample model.

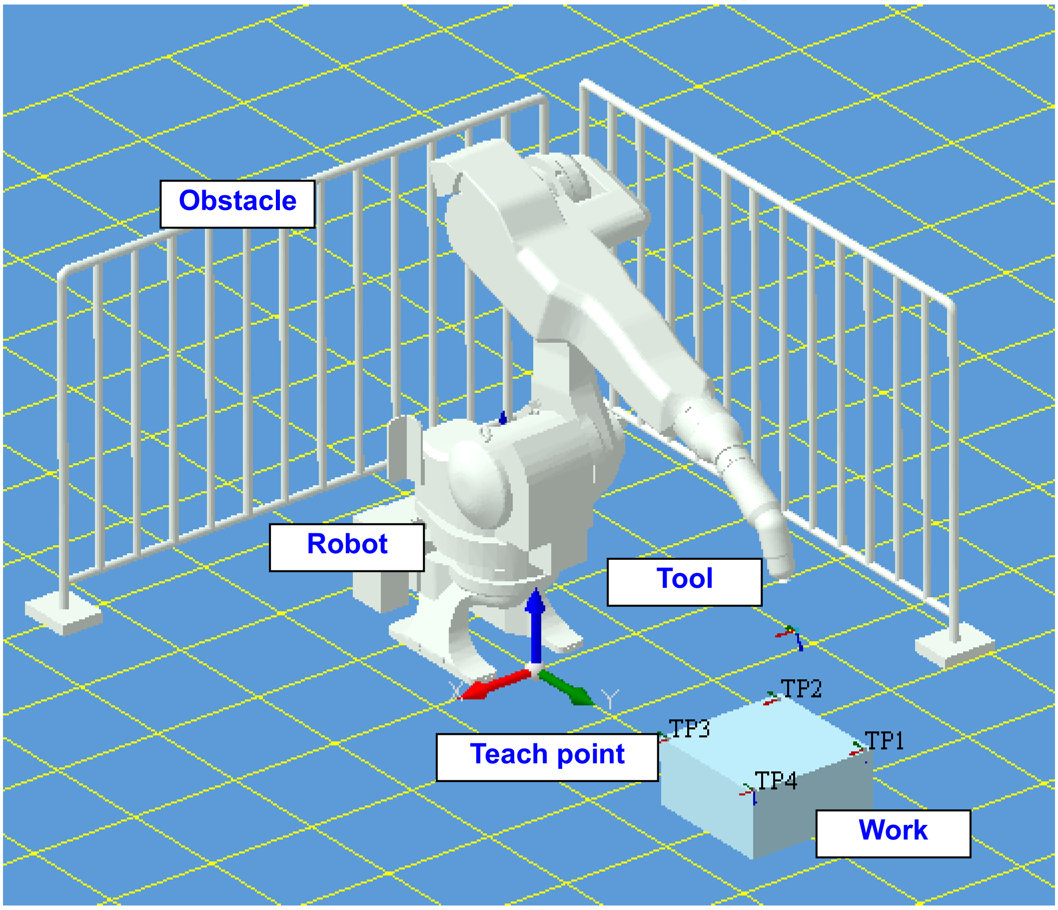
This section describes the flow of project construction using a flowchart.

6.1 Project Construction Work Flow



6.2 Paint sample

6.2.1 Installation of objects



6.2.1.1 Project setting

1 Select [setting] from project menu.

2 Set [Show position dialog and [Show origin of model when loaded].

6.2.1.2 Option setting

1 Select [Option] from [Plug-ins] of menu.

2 Set any term.

6.2.1.3 Installation of robots

1 Right-click a project icon [] on tree view.

Project menu screen is displayed.

2 **Click [Add]-[Robot] on menu.**
Robot selection dialogue is displayed.

3 **Select application [Paint], controller [E controller], series [KF series], library [Standard] and model [KF264-A001]. Click [OK].**
KF264-A001 is added in origin.

4 **Right-click robot icon [] on tree view.**
Robot menu is displayed.

5 **Click [Tool]-[Load] on menu.**
File selection screen is displayed.

6 **On the file selection dialogue, select [A-BELL] file and click [Open].**
A-BELL tool is added in flange position of robot.

7 **Right-click tool icon.**
Tool menu is displayed.

8 **Click [Add][Environment] [Obstacle].**
File selection screen is displayed.

9 **On the file selection screen, select** [BellOnPattern_80_01_250] **and click [Open].**
Shape of paint image is added.

10 **Left-double-click obstacle ion [] added on tree view.**
Position change dialogue is displayed.

11 **Change and set each coordinate manually or by the slide bar.**
Model on the view is moved.

12 **Click [Apply] to reflect the set value and click [Close].**
Position is fixed and screen is closed.

13 **Click twice a name of obstacle.**
A name can be edited.

14 **Input [Pattern] and press Enter key.**
A name is fixed.

15 **Right-click robot icon.**
Robot menu is displayed.

16 **Click [Tool Trans] [Change].**

Screen to change the installation position is displayed.

17 **Change and set each coordinate value manually or by the slide bar.**

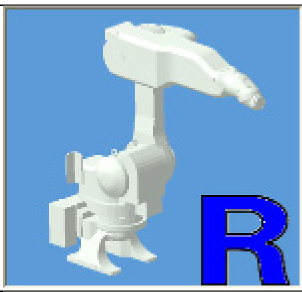
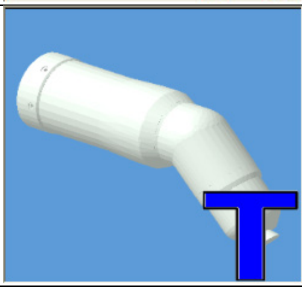
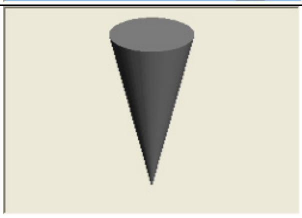
Arrow on the view is moved.

18 **Click [Apply] button to reflect the set value and click [Close].**

Position is fixed and screen is closed.

Other robot settings

1) Set base transformation value of a robot
2) Set track line
3) Set PC-AS language in controller settings
4) Set installation registration and other variables in arm settings.

Objects	File name	Image
Robot	KG264-A001	
Tool	A-BELL	
Splay image	BellOnPattern_80_01_250	

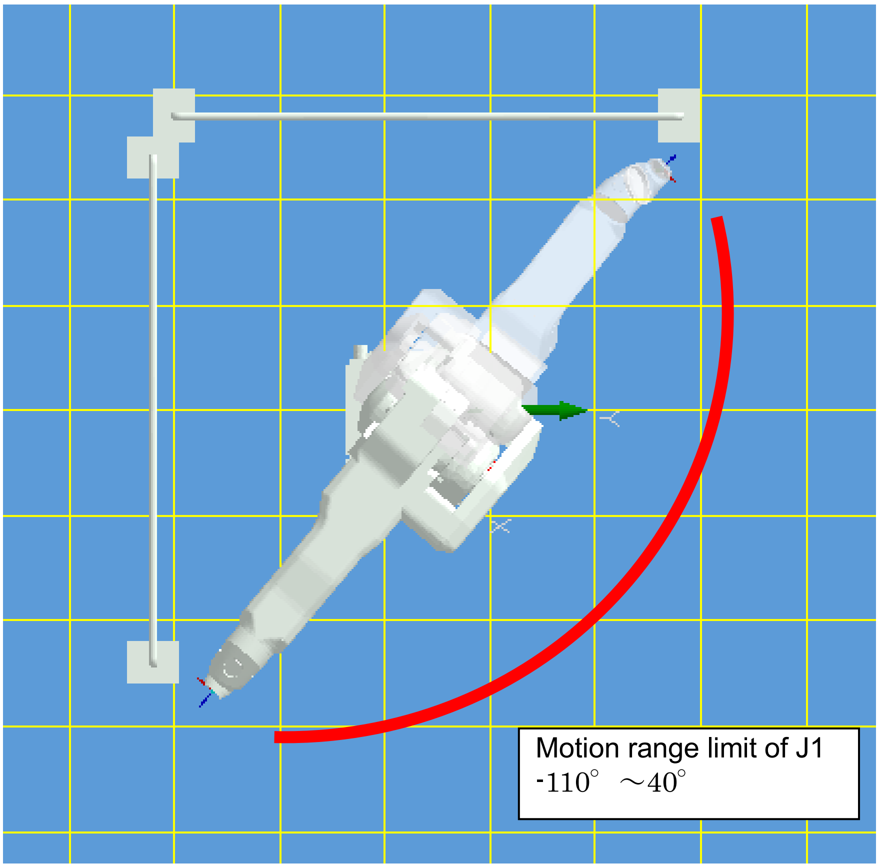
- Tool KHIlibraries/Tools
- Splay image KHIlibraries/Tools/Paint

Objects	X	Y	Z	O	A	T
Robot	0	0	710	0	0	0
Tool	0	1708.5	1943.4	90	90	-90
Spray image	0	2222	1782	90	135	-90
Trans	X	Y	Z	O	A	T
Base	0	0	0	0	0	0
Tool	0	337.5	689.5	90	45	-90

- Coordinate system is world.
- Coordinate of tool and spray image is world with the setting of all robot axes to be 0° .

Sample: Input [Expand Items] in Arm settings.

Parameters	J1		J2	J3	J4	J5	J6
	Before	After					
UP-LIM	150	40	150	90	720	720	410
LO-LIM	-150	-110	-60	-80	-720	-720	-410



► 6.2.1.4 Installation of works

1 **Right-click project icon [ ] on tree view.**
Project menu screen is displayed.

2 **On the project menu, click [Add]-[Environment]-[Work].**
File selection dialogue is displayed.

3 **Select [Box_L] file and click [Open].**
A model is displayed on the view.

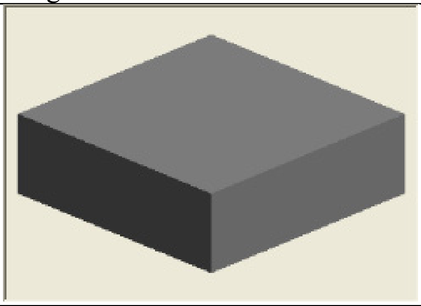
4 **Left-double-click work icon [ ] added on tree view.**
Position change dialogue is displayed.

5 **Change and set each coordinate value manually or bay the slide bar.**
A model on the view is moved.

6 **Click [Apply] to reflect the set value and click [Close].**

Screen to change installation position is closed.

Set displaying methods etc. on work menu.

Object	File name	Image
Workpiece	Box_ L	

* Workpiece KHIlibraries/Envs/SimpleShapes/Boxes

X	Y	Z	O	A	T
0	2000	0	0	0	0

* Coordinate system is world.

► 6.2.1.5 Installation of obstacles

1 Right-click project icon [ ] on tree view.

Project menu screen is displayed.

2 On the project menu screen, click [Add]-[Environment]-[Obstacle].

File selection dialogue is displayed.

3 Select [Safetyfence_1840_1565] file and click [Open].

A model is displayed on the view.

4 Left-double-click obstacle icon [ ] added on tree view.

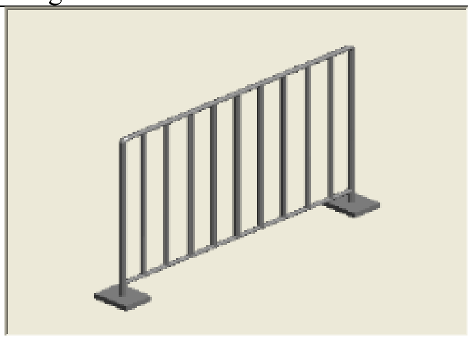
Position change dialogue is displayed.

5 Change and set each coordinate value manually or by the slide bar.

A model on the view is moved.

6 Click [Apply] to reflect the set value and click [Close].

Position is fixed and screen is closed.

Objects	File name	Image
Obstacle	Safetyfence_1840_1565	
Obstacle	Safetyfence_1840_1565	

* Obstacle: KHIlibraries/Envs/Equipment/Fences

X	Y	Z	O	A	T
1000	0	0	90	0	0
0	-1000	0	0	0	0

* Mentioned as world coordinate system.

6.2.1.6 Teaching

Teaching procedures are as follows.

1) Add a teaching point on the layout display.
2) Change robot posture using the teach panel and add a teaching point to robot hand
3) Create a teaching point perpendicular to a work.
4) Use other expanded application (Ex: Auto point creation, create point on edge)

Procedure no. 1 is describes in this section.

1 Right-click project icon [ ] on tree view.

Project menu screen is displayed.

2 Click [Add]-[Point]-[Assigned Position].

Position change dialogue is displayed.

3 On the position change dialogue, set the standard coordinate system as [World] and set value of each coordinate manually.

A model on the view is moved.

4 Click [Apply] to reflect the set value and click [Close].

Dialogue is closed.

Objects	X	Y	Z	O	A	T
Teaching Point1	220	1780	300	180	180	0
Teaching Point2	-220	1780	300	180	180	0
Teaching Point3	220	2220	300	180	180	0
Teaching Point4	-220	2220	300	180	180	0
Teaching Point5	220	1780	670	180	180	0

* Mentioned as world coordinate system.

6.2.1.7 Entry a home position

1 Select Home [setting] in Teach Panel.

2 Input coordinates to entry and Click [Apply].

6.2.1.8 Setting groups

1 **Right-click an object to add group.**
Menu of the selected object is displayed.

2 **Set objects to group by dragging or using edit function.**
Move teaching point to lower group.

6.2.1.9 Save a project

1 **Right-click project icon [ ] on tree view.**
Project menu is displayed.

2 **On the project menu, click [Project]-[Save].**
Project setting screen is displayed.

3 **Input a name of saving project and add comments as necessary. Click OK.**
A project is saved in MyKHIlibraries¥Projects¥{project name}.

6.2.2 Robot Programming

6.2.2.1 Adding a program

1 **Click program screen on the expanded application view.**
Program screen is displayed.

2 **Click [Setting] on the robot menu of the program table.**
Program setting screen is displayed.

3 **Set motion instruction as [LMOVE] in Drag and Drop setting. Click Apply and Cancel.**
D&D setting is registered and setting screen is closed.

4 **Right-click a controller name.**
Controller name menu is displayed.

5 **Click [Add]-[Program] on the menu.**
Program setting screen is displayed.

6.2.2.2 Adding program instructions

Program instructions are added to the created program in the following three ways.

- Add one directly on the program table.
- Use the TP_PAINT function to add one.
- Add one from a teaching point in the project.

1 **Drag a teaching point in layout and drop on a program name in the program tab.**
Linear move instruction is added.

2 **Click the first step of the program tab.**
A robot is moved to posture of the first step.

3 **Click > in Z on a base of the teach panel.**
A robot is shifted to the base Z orientation.

4 **Right-click a program name in the program tab.**
Program name menu is displayed.

5 **Click [Add] [Move] [JMOVE].**
Instruction of joint interpolation move is added.

6 **Drag a step of joint move instruction and drop before the first step.**
Joint instruction is moved to the first step.

Add speed, accuracy and spray instruction as necessary.

6.2.2.3 Editing/deleting a program instruction

For the editing methods of program instructions, the following four are typical.

- Edit on the program table.
- Use the TP_PAINT function to edit the instruction.
- Use a text editor to edit the program file (with extension .pg) directly.
- Edit the instruction on the real machine (controller) directly.

Sample

```
.PROGRAM Pg001()
SPRAY_SPEED 1100mm/s
SPRAY_JSPEED 100%
AIRCUT_SPEED 1100mm/s
AIRCUT_JSPEED 100%
FLOW_RATE 2
SHAPING 2
AIRMOTOR 2
SMOOTH_RANGE 50mm
JMOVE JOINT 0000,5.365,-5.449,-27.778,-73.52,-26.728,-16.215
LMOVE XYZ1 0000,220,1780,-410,-180,180,0
SPRAY #1,ON
LMOVE XYZ1 0000,220,2220,-410,-180,180,0
LMOVE XYZ1 0000,-220,2220,-410,-180,180,0
LMOVE XYZ1 0000,-220,1780,-410,-180,180,0
SPRAY #1,OFF
JMOVE JOINT 0000,5.365,-5.449,-27.778,-73.52,-26.728,-16.215
PGM_SELECT
.END
```

► 6.2.2.4 Saving a program

1 **Right-click a controller name or a program name.**

Menu is displayed.

2 **Click [Save file]-[Program( )*.pg].**

File saving screen is displayed.

3 **Input a file name in the file saving dialogue and save.**

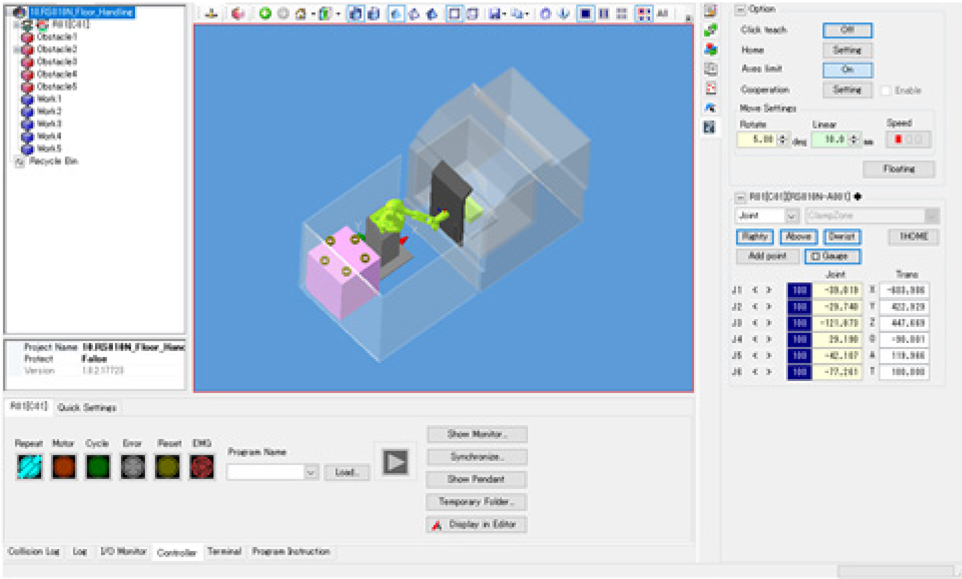
A program file is created in the specified folder.

*

- The file name is in explorer. Name displayed on Virtual teach Pendant is program name.
- Sample (Save as [TestProgram.pg])

6.3 Handling Sample

6.3.1 Layout of objects



6.3.1.1 Project Setting

1 **Click [Settings] on menu of the project name.**
Setting screen is displayed.

2 **Set to show origin and show position change dialogue automatically, then click OK.**
Settings are applied and screen is closed.

6.3.1.2 Option Setting

1 **Click [Option] of [Plug-ins] on menu.**
Option screen is displayed.

2 **Set required items then click Apply and Cancel.**
Settings are applied and screen is closed.

6.3.1.3 Installation of robots

1 **Right-click project icon [] on tree view.**
Project menu screen is displayed.

2 **Click [Add] – [Robot] on menu.**

Robot load dialogue is displayed.

3 **Select application [Handling], controller [E controller], series [ZX series], library [Standard] and model [ZX130S-B001]. Click [OK].**
ZX130S-B001 is added to the origin.

4 **Right-click robot icon [ ] on tree view.**
Robot menu is displayed.

5 **Click [Tool] – [Load] on menu.**
File selection screen is displayed.

6 **On file selection dialogue, select [Hand_G9AX21000A] file and click [Open].**
Tool is added on the flange position of robot.

7 **Right-click tool icon.**
Tool menu is displayed.

8 **Right-click robot icon.**
Robot menu is displayed.

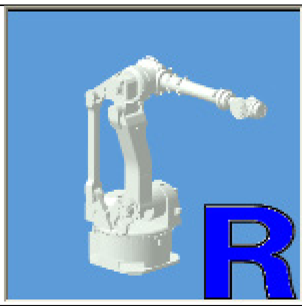
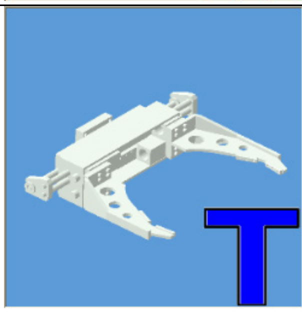
9 **Click [Tool Trans]-[Change].**
Position dialogue is displayed.

10 **Set each coordinate value manually or using slide bar.**
An arrow on the view moves.

11 **Click [Apply] to reflect the set value and click [Close].**
Position is fixed and screen is closed.

Other robot settings

- Set base transformation value of robot
- Add tool in [Tool] – [Load] on robot menu.
- Modify tool transformation value align with tool.
- Set trace line.
- In controller settings, set PC-AS version and language.
- In arm settings, set installation registration and valuables.

Object	File Name	Image
Robot	ZX130S-B001	
Tool	Hand_G9AX21000A	

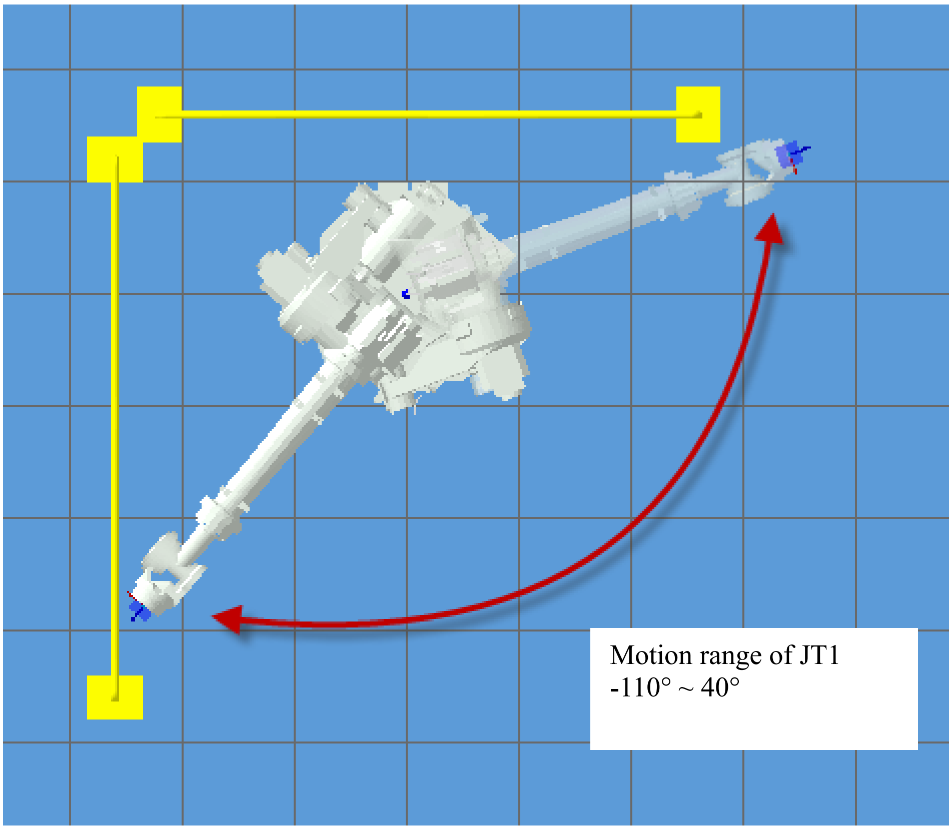
- Tool: KHIlibraries¥Tools

Object	X	Y	Z	O	A	T
Robot	0	0	500	0	0	0
Tool	0	0	0	0	0	0
Transformation value	X	Y	Z	O	A	T
Base	0	0	0	0	0	0
Tool	0	0	550	0	0	0

- Shown as world coordinate system.
- Tool coordinate is shown as world coordinate system when all robot axes are set to be 0° .

Input following values on [Expansion setting] of arm settings.

Variable	J1		J2	J3	J4	J5	J6
	To be Changed	Changed					
UP－LIM	180	40	75	250	360	130	360
LO－LIM	-180	-110	-60	-120	-360	-130	-360



► 6.3.1.4 Installation of works

➢ **Add works by library model.**

1 Right-click project icon [ ] on tree view.

Project menu is displayed.

2 On project menu, click [Add]-[Environment]-[Work].

File selection dialogue is displayed.

3 Select [Box_L] file and click [Open].

Model is displayed on the view.

4 Left-double click work icon [ ] added on tree view.

Position dialogue is displayed.

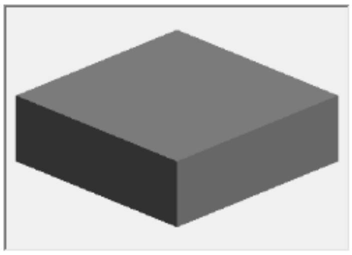
5 Change and set each coordinate value manually or by slide bar.

Model on the view is moved.

6 Click [Apply] to reflect the set value and click [Close].

Position dialogue is closed.

Set display method etc. on work menu.

Object	Type	Image
Work	Box_L	

* Work: KHIlibraries¥Envs¥SimpleShapes¥Boxes

X	Y	Z	O	A	T
0	2000	0	0	0	0

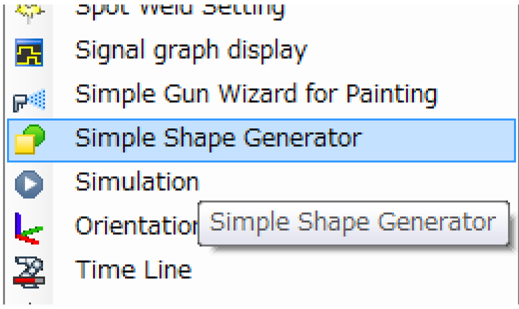
* Mentioned with world coordinate system.

➢ **Add works by Simple Shape Generator**

Works can be added using simple shape generator function.

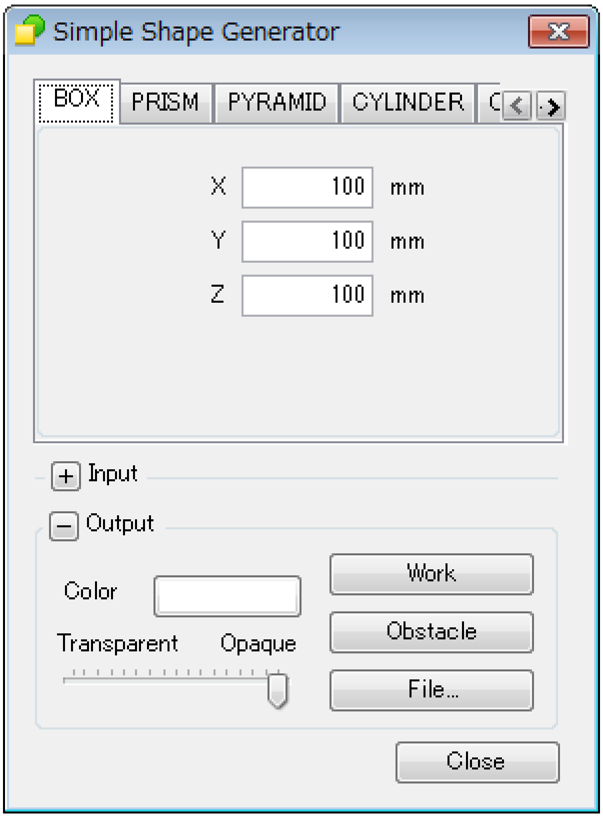
1 **Start Simple Shape Generator. On main menu, click 〔Plug-ins〕-〔Simple Shape Generator〕.**

Simple shape generator dialogue is displayed.



2 **Select Box tab and input X/Y/Z size as below.**

Designate color in output section.



* Designate size as world coordinate system.

3 **Click work button.**
A model of specified size is output on the view. It is output as work in layout.

* Model origin generated by simple shape generator can be set as the center of XY plane under a model.

► 6.3.1.5 Installation of obstacles

1 **Right-click project icon [ ] on tree view.**
Project menu screen is displayed.

2 **On the project menu screen, click [Add]-[Environment]-[Obstacles].**
File selection dialogue is displayed.

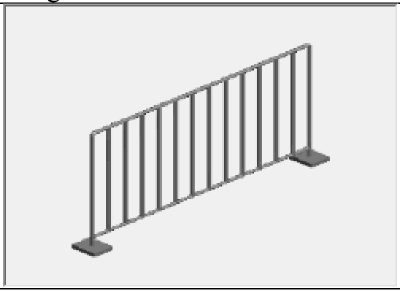
3 **Select [Safetyfence_1840_1565] file and click [Open].**
Model is displayed on the view.

4 **Left-double click obstacle icon [ ] added on tree view.**
Position change dialogue is displayed.

5 **Change and set each coordinate system value manually or by the slide bar.**
Model on the view is moved.

6 **Click [Apply] to reflect the set value and click [Close].**
Position is fixed and the screen is closed.

Sample

Object	Type	Image
Obstacle1	Safetyfence_2440_1565	
Obstacle2	Safetyfence_2440_1565	

- Obstacle: KHIlibraries¥Envs¥Equipment¥Fences

X	Y	Z	O	A	T
-2000	-1500	0	0	0	0
800	1300	0	90	0	0

*

- Mentioned as world coordinate system.

6.3.1.6 Teaching Operation

Teaching operation methods are as follows.

- Add teaching point on the layout display.
- Change robot posture using a teach panel and add teaching point to the hand position.
- Create teaching point perpendicular to the work.
- Use other expansion application. (Example: Auto teaching point creation, teaching point creation on edge.)

This chapter explains the method above 1.

1 Right-click project icon [] on tree view.

Project menu screen is displayed.

2 Click [Add]-[Point]-[Assigned Position]

Position dialogue is displayed.

3 On the position change dialogue, set the basic coordinate system as [World] and set each coordinate value manually.

Model on the view is moved.

4 Click [Apply] to reflect the set value and click [Close].

Dialogue is closed.

Sample

Object	X	Y	Z	O	A	T
HomeP	-1417	1417	1340	-135	180	0
Val01	-2000	0	680	90	180	0
Val02	-2000	0	0	90	180	0
Val03	0	2000	420	-90	180	0
Val04	0	2000	0	-90	180	0

* ● Mentioned as world coordinate system.

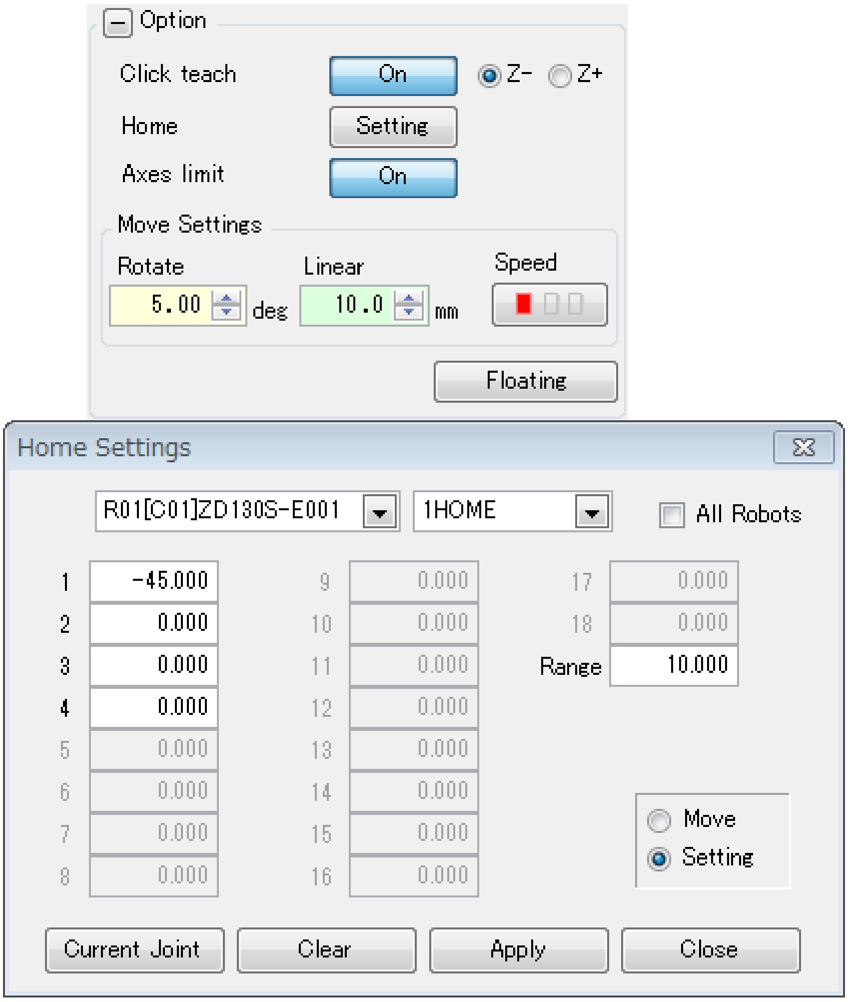
6.3.1.7 Home Registration

1 Click [Setting] on the teach panel.

Home setting dialogue is displayed.

2 Input posture to be registered to each value and click [Apply].

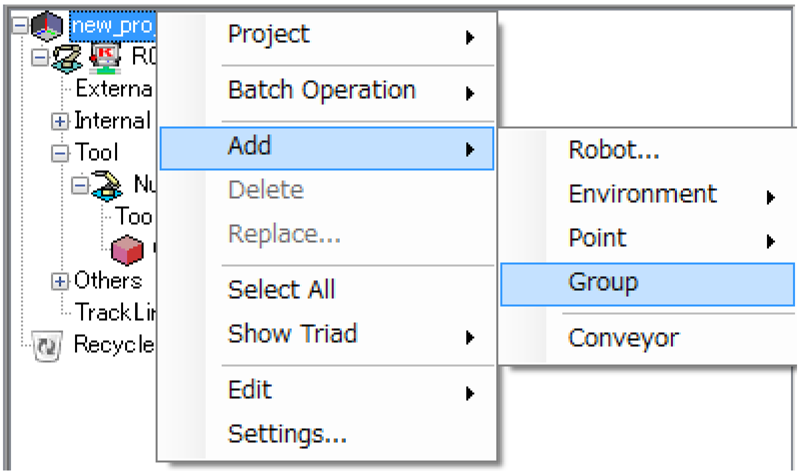
Home position is registered.



6.3.1.8 Group Settings

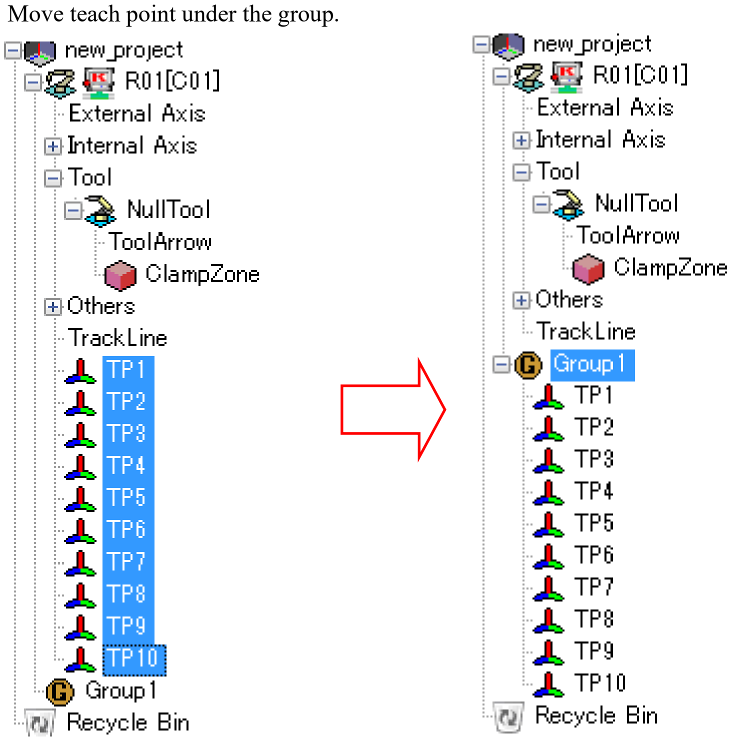
1 **Right-click an object to add group.**

Menu of the selected object is displayed.



2 **Drug teach point and set object as group.**

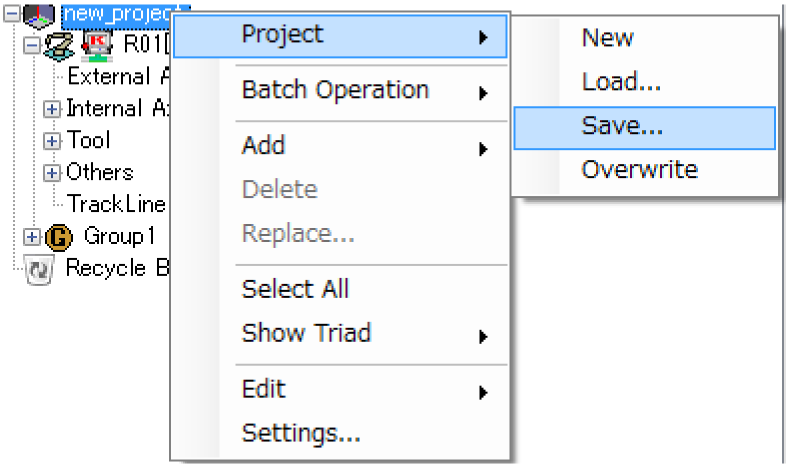
Move teach point under the group.



6.3.1.9 Save a project

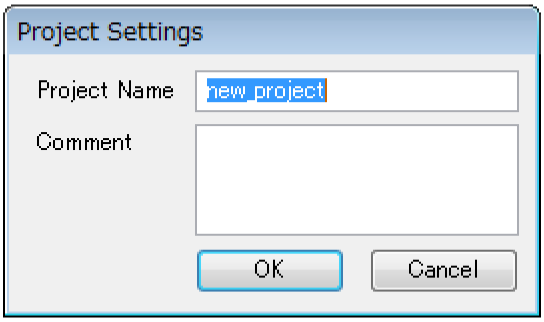
1 **Right-click project icon [ ] on tree view.**

Project menu screen is displayed.



2 **On the project menu, click [Project]-[Save].**

Project settings dialogue is displayed.



3 **Input a name of saving project and add comment as necessary. Click OK.**

Project is saved in MyKHIlibraries¥Projects¥{project name}.

6.3.2 Robot Programming

6.3.2.1 Program Creation

1 **Click a program tab on the expanded application view.**
Program screen is displayed.

2 **Click [Setting] on the robot menu of the program table.**
Program setting screen is displayed.

3 **Set Instruction of Drag and Drop Setting as [LMOVE]. Click Apply and Cancel.**
D&D setting is registered and the setting screen is closed.

4 **Right-click a controller name.**
Controller name menu is displayed.

5 **Click [Add]-[Program] on the menu.**
Program setting screen is displayed.

6.3.2.2 Adding program instruction

Add instructions to the program.

Following methods can be used to add program instructions to the created program.

- Directly add on the program table
- Add on teaching point of the project

1 **Drag teaching point of the layout and drop it on a program name of the program tab.**
Linear move instruction is added.

2 **Click the first step of the program tab.**
Robot is moved to the posture of the first step.

3 **Click “>” of Z as base standard on the teach panel.**
Robot is shifted to the base Z direction.

4 **Right-click a program name of the program tab.**
Program name menu is displayed.

5 **Click [Add]-[Move]-[JMOVE].**
Instruction of joint interpolation move is added.

6 **Drag a step of joint interpolation instruction and drop it before the first step.**
Joint instruction is moved to the first step.

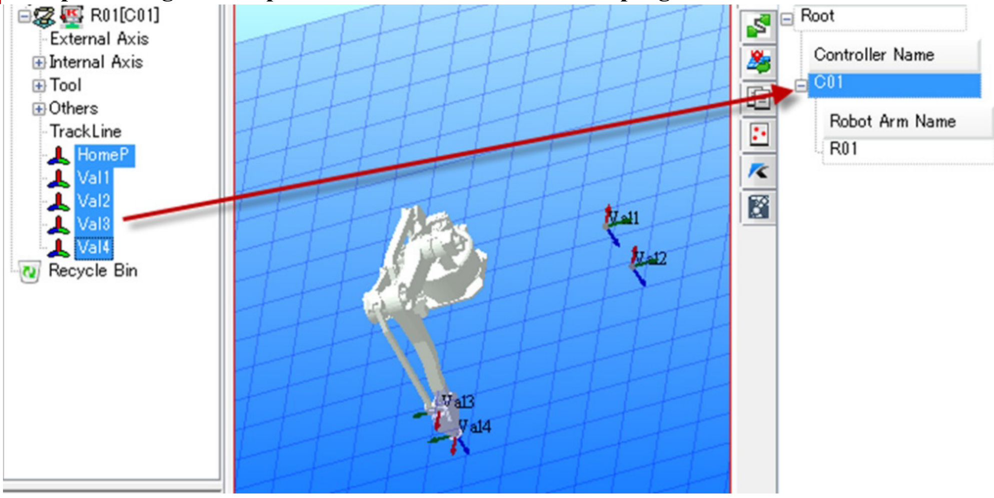
Add instruction for speed, accuracy and spray as necessary.

► 6.3.2.3 Create Trans value

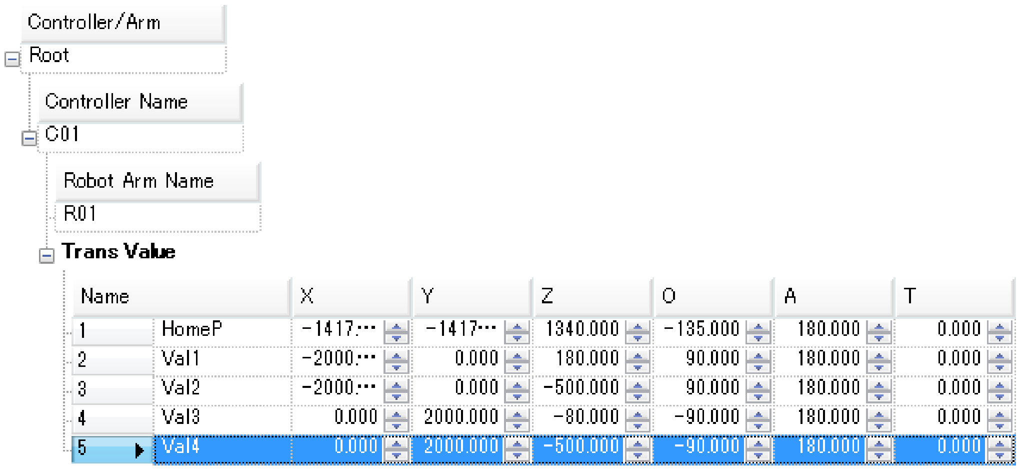
1 **Click the first node of teaching point located under robot node in layout. While clicking shift key, click the last node.**

Multiple teaching points are selected (Blue-highlighted).

2 **Keep selecting and drop them on the controller node of program screen.**



Trans value is created.



	Name	X	Y	Z	O	A	T
1	HomeP	-1417···	-1417···	1340.000	-135.000	180.000	0.000
2	Val1	-2000···	0.000	180.000	90.000	180.000	0.000
3	Val2	-2000···	0.000	-500.000	90.000	180.000	0.000
4	Val3	0.000	2000.000	-80.000	-90.000	180.000	0.000
5	Val4	0.000	2000.000	-500.000	-90.000	180.000	0.000

6.3.2.4 Edit program instruction

Program instruction can be edited by following methods.

- Edit on the program table.
- Directly edit a program file (file with extension*.pg)
- Directly edit on the robot (controller).

Sample

```
.PROGRAM Pg001()
LMOVE Val01
SPEED 100
ACCURACY 1
LMOVE Val02
DELAY 1
CLOSEI
LMOVE Val01
JMOVE Val03
SPEED 30
ACCURACY 2
LMOVE Val04
DELAY 0.5
OPENI
LMOVE Val03
HOME
.END
```

6.3.2.5 Save a program

1 **Right-click a controller name or a program name.**
Menu is displayed.

2 **Click [File save]-[Program()*.pg].**
File saving screen is displayed.

3 **Input a file name and save in the saving dialogue.**
A program file is created in the designated folder.

- File name is a name in Explorer. A name when using a program shown on the virtual teach pendant is a program name. Sample(Save as TestProgram.pg)

6.4 Collision Settings

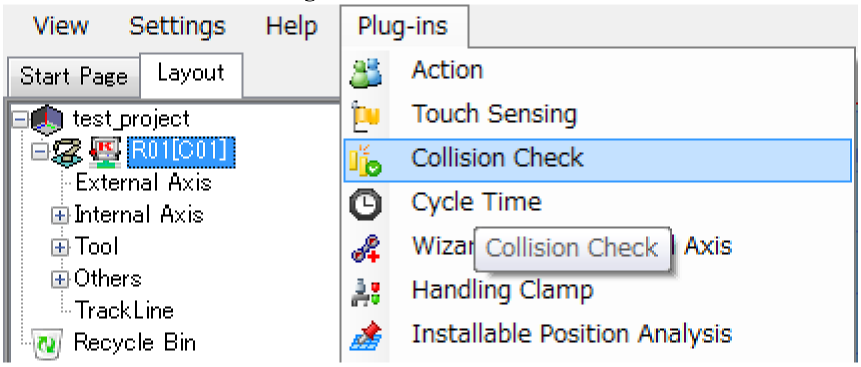
This section explains how to set combination of collision check.

When teaching and simulating, model color can be changed and displayed if robot and work / obstacle are colliding.

This requires collision pair setting between models.

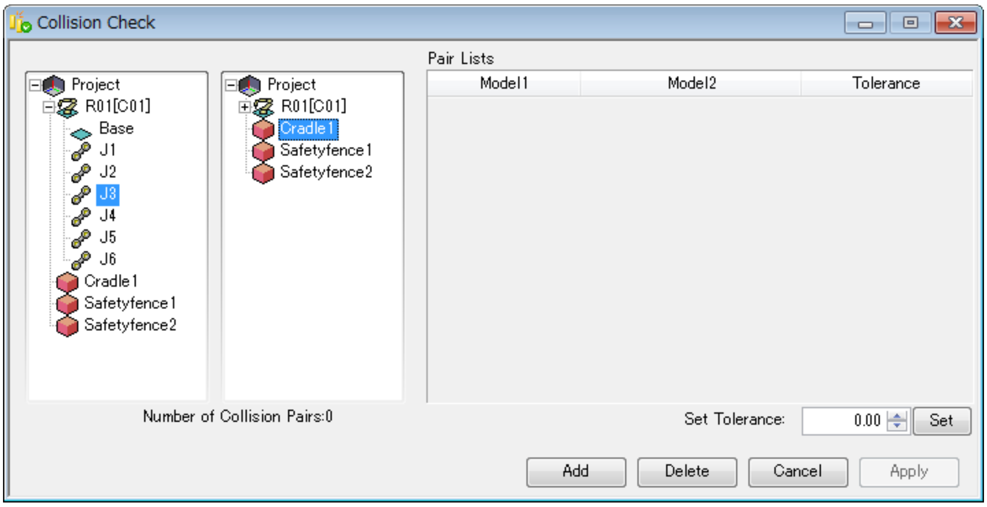
6.4.1 Set collision pair

1 **Select collision check in Plug-ins of main menu.**

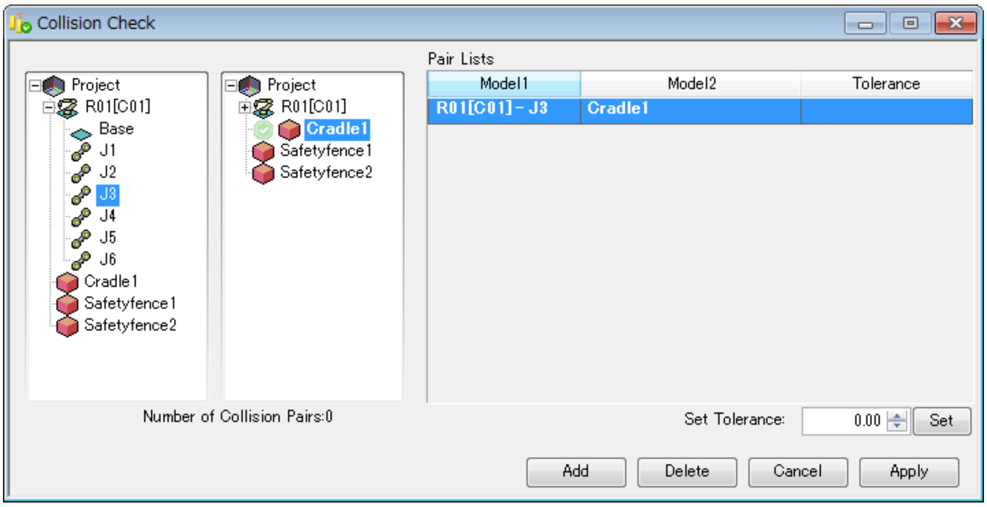


2 **Create and register pairs for collision check.**

Expand robot tree on the left side and select J3. Click safety fence 1 in the right tree.



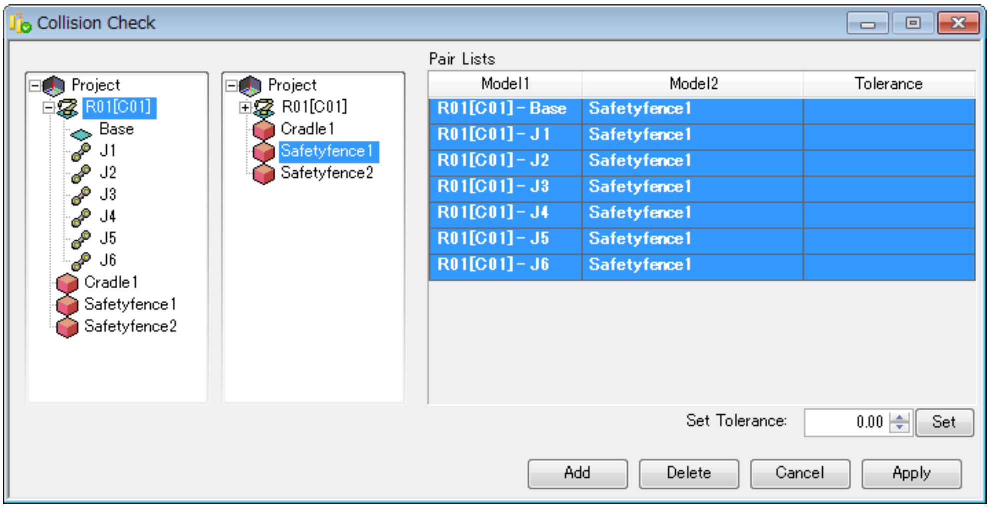
3 **Click Add.**



4 **Click Apply.**

Items registered as pair are marked.

- When parent is specified, all of lower child are added in pair list. For example, a robot（R01[C01]）is selected, combination with all robot axes are added.（Tools are also included in case tools are installed.）



- By limiting to required combinations, K-ROSET can achieve higher performance.

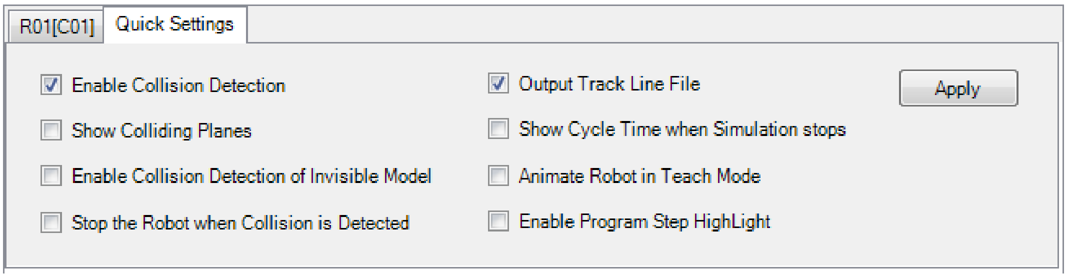
6.4.2 Enable Collision Detection

Collision status cannot yet be checked only by registering collision pair.

By activating collision check, collision status of paired model can be checked on the view.

1 **Click quick settings tab in controller tab.**

A screen is displayed.



2 **Mark [Enable Collision Detection] [Show Colliding Planes].**

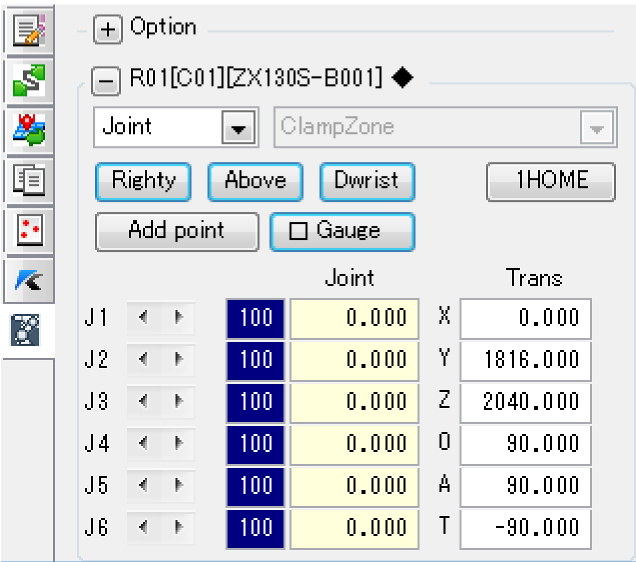
Apply button becomes valid.

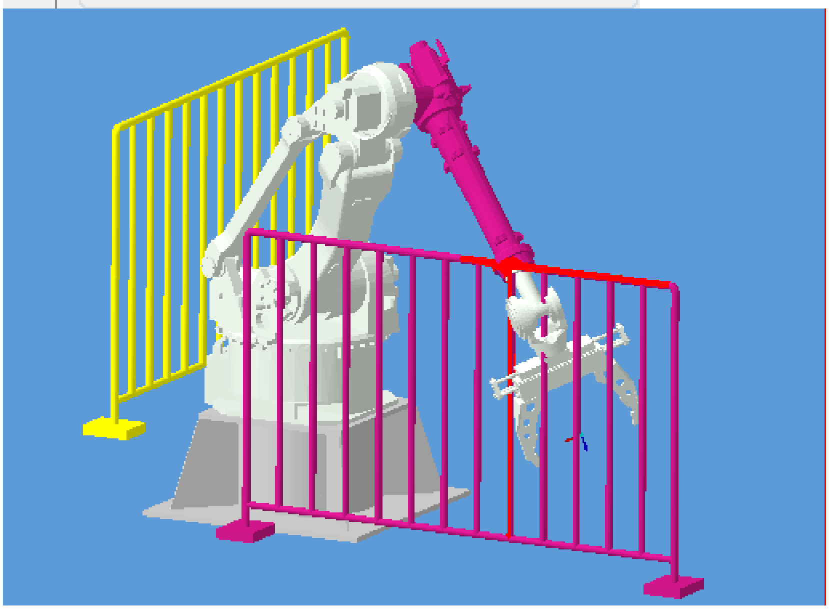
3 **Click Apply.**

Apply button becomes grayout.

4 **Move robot by the teach panel and let safety fence and J3 arm touch each other.**

Robot is moved.





[Enable Collision Detection] Colliding parts are shown in red-purple color.

[Show Colliding Planes] Colliding planes are shown in red color.

Collision is detected as J3 and safety fence are registered as collision pair.

Models without collision pair registration are not shown even when colliding.

- In setting, [Enable Collision Detection] is mandatory but [Show Colliding Planes] is optional.

6.4.3 Stop robot when colliding

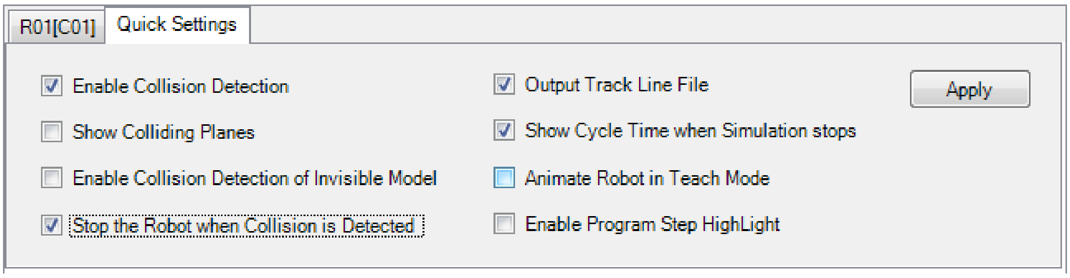
Robot motion can be stopped when collision is occurred during simulation.

1 **Click quick settings tab in controller tab.**

A screen is displayed.

2 **Mark [Enable Collision Detection] and [Stop the Robot when Collision is Detected].**

Apply button becomes valid.



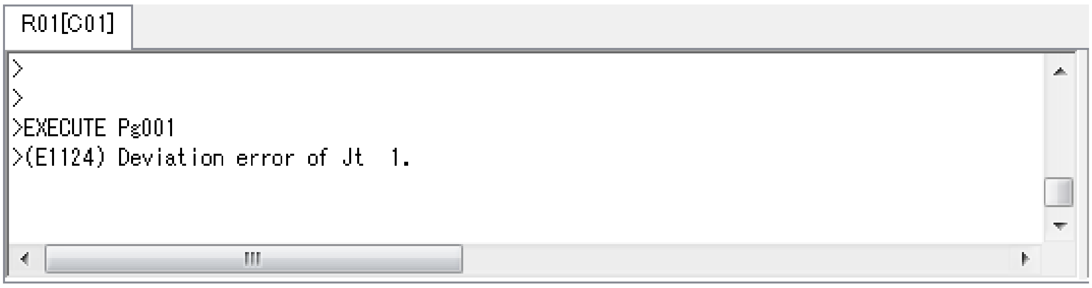
3 **Click Apply.**

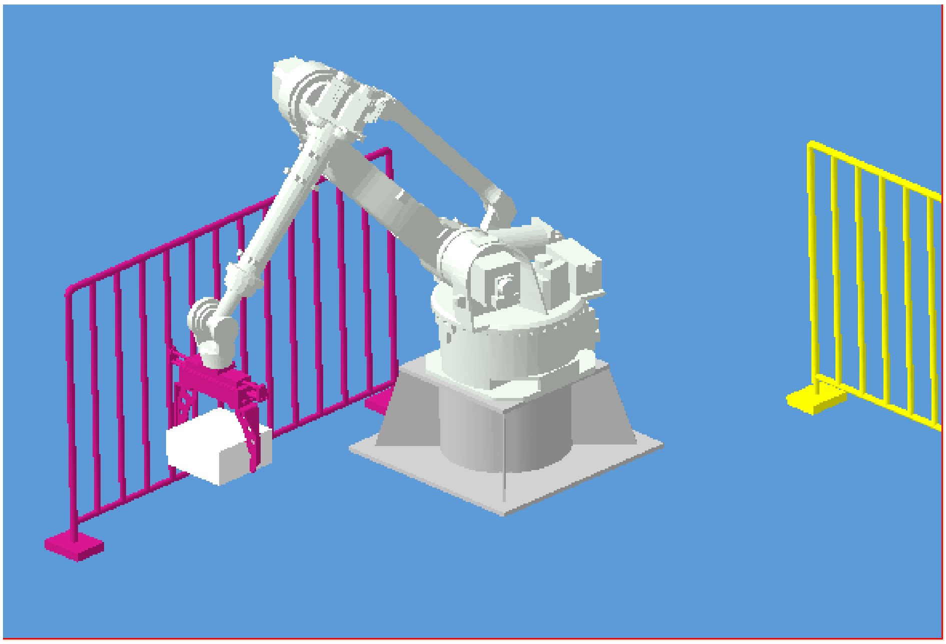
Apply button becomes grayout.

4 **Execute simulation.**

Simulation is stopped at the time of collision is detected.

Error ramp turns on the controller and a message is displayed on the terminal.





* This function is valid only for simulation using AS.Robot does not stop when operating by the teach panel or by the motion step (simple).
* In setting, [Enable Collision Detection] is mandatory but [Show Colliding Planes] is optional.

6.5 Simulation

This chapter describes a method to simulate robot's operations using prepared projects and AS programs, and calculate the cycle time or sense collision to verify operations.

6.5.1 Preprocess

1 **Select the tab of a robot name. (Ex.: R01 [C01])**

2 **Apply project data to PC-AS by selecting [Synchronize] of Controller Tab.**
Settings various simulation parameters

- Display Virtual Teach Pendant as appropriate.

6.5.2 Running a teaching program

This section describes the method to execute an AS program.

1 **Enter the repeat mode[ ](right side).**

2 **Turn ON the motor [ ](light a lamp).**

3 **Press the [Load PG] button..**
A dialog to choose a file will be opened.

4 **Select a program file that you wish to execute.**
Programs in the program file are listed.

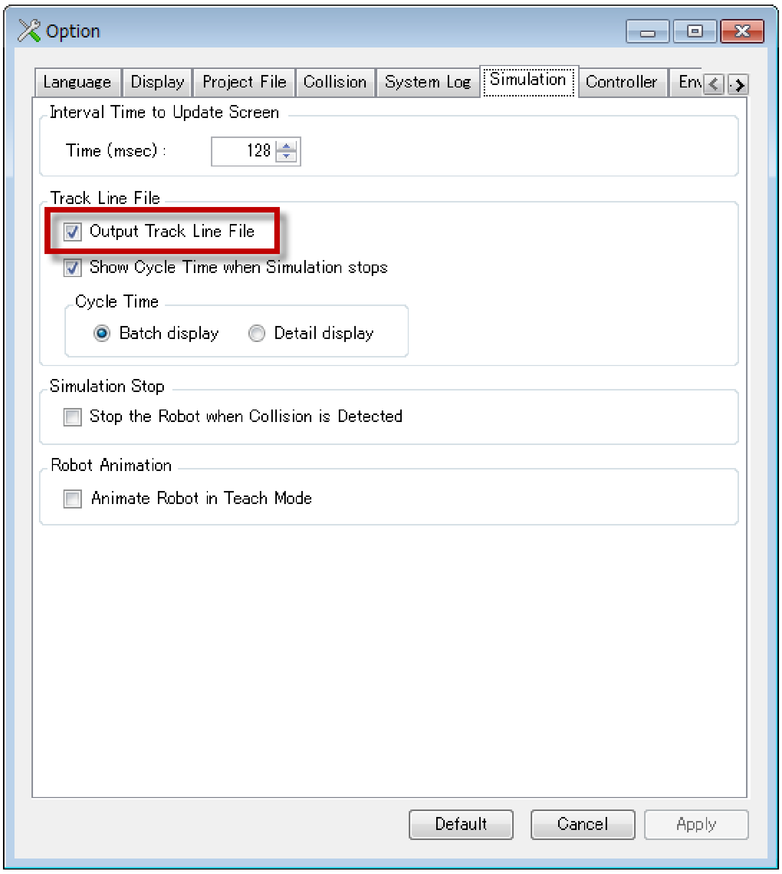
5 **Select the target program.**

6 **Press the [ ] button.**
To replay the AS programs for multiple robots simultaneously, execute extended applications simultaneously.

6.5.3 Display cycle time

It is necessary to output the track line file for measuring cycle time.

Making the setting of the [output trajectory file] valid.



After the program has been normally ended or abnormally ended due to an error etc., the cycle time screen will appear.

6.6 Record video

This section describes about recording videos.

1 **Select [Record Video] on the menu.**

2 **On the setting dialogue, specify recording type, playing speed and click [OK].**
File saving screen is displayed.

3 **Specify save destination and a file name and click [Save].**
Codec selection screen is displayed.

4 **Set compressing type of a video and click [OK].**
Codec selection screen is closed.

- Microsoft Video1 is recommended for compressing.

5 **Execute simulation.**
Recording is started.

6 **Select [Stop Video Record] and stop the record.**

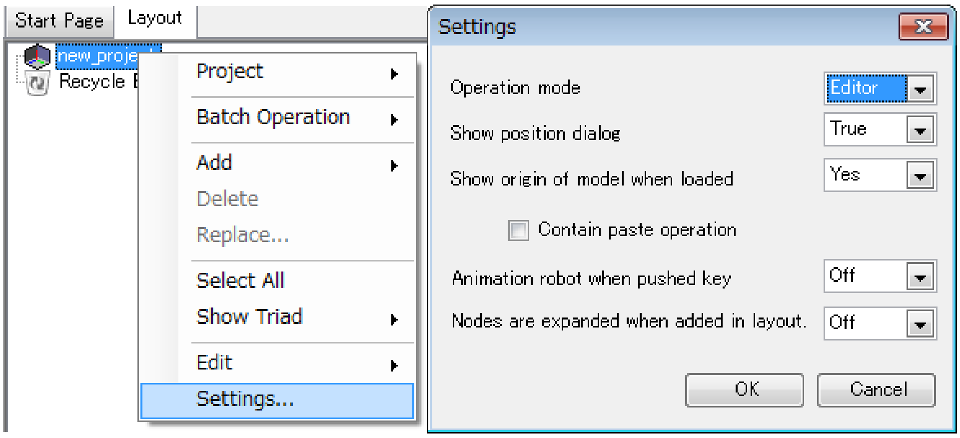
Memo

7 Appendix

Supplementarily about other functions is explained.

7.1 Editor Mode

This section describes the operation at the time of editor mode. This mode can deal in advanced functions in Layout Tab, Property Tab and Program Table.



7.1.1 Function in Tree pane

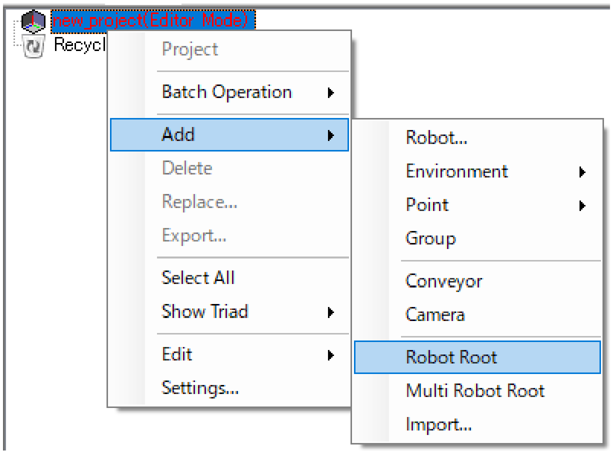
7.1.1.1 Add Robot Root

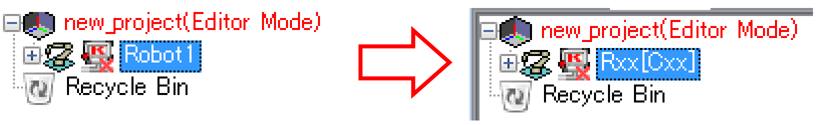
This adds the tree for robot configuration.

Adding the joint, the base and the flange, the robot can set in a variety of different configurations.

1 **In the tree pane, right-click the project icon [ ].**

2 **Select [Add] -> [Robot Root] from the robot menu.**





- Rename as R**[C**] after robot is set.

► 7.1.1.2 Multi robot root

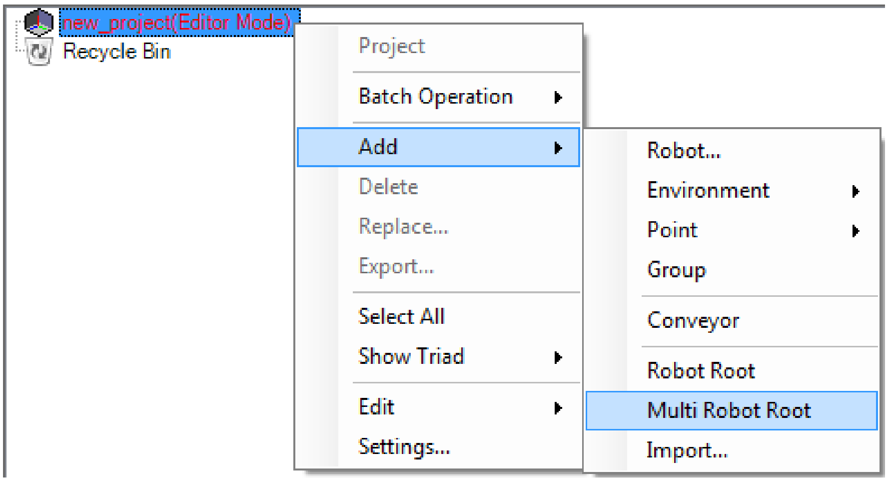
Adds a tree to configure a robot.
This allows creating a robot by adding axis, base and flange.

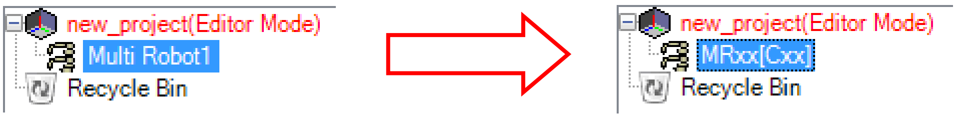
1 Right-click on the icon [ ] in the tree.

Context menu of the project will appear.

2 Select [Add] – [Multi Robot Root] in the context menu.

A tree to configure a robot will be added.

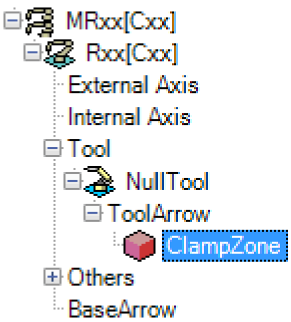




- Rename the robot name to be in MRxx[Cxx] after a robot is added.

3 Add a robot to Multi Robot Root.

Robot will be added as a child object of multi robot.



7.1.1.3 Add Tool

This adds the model as Tool type.

1 Right-click a robot.
Robot menu is displayed.

2 Select [Add] -> [Tool] from the robot menu.
The file selection dialog box will appear.

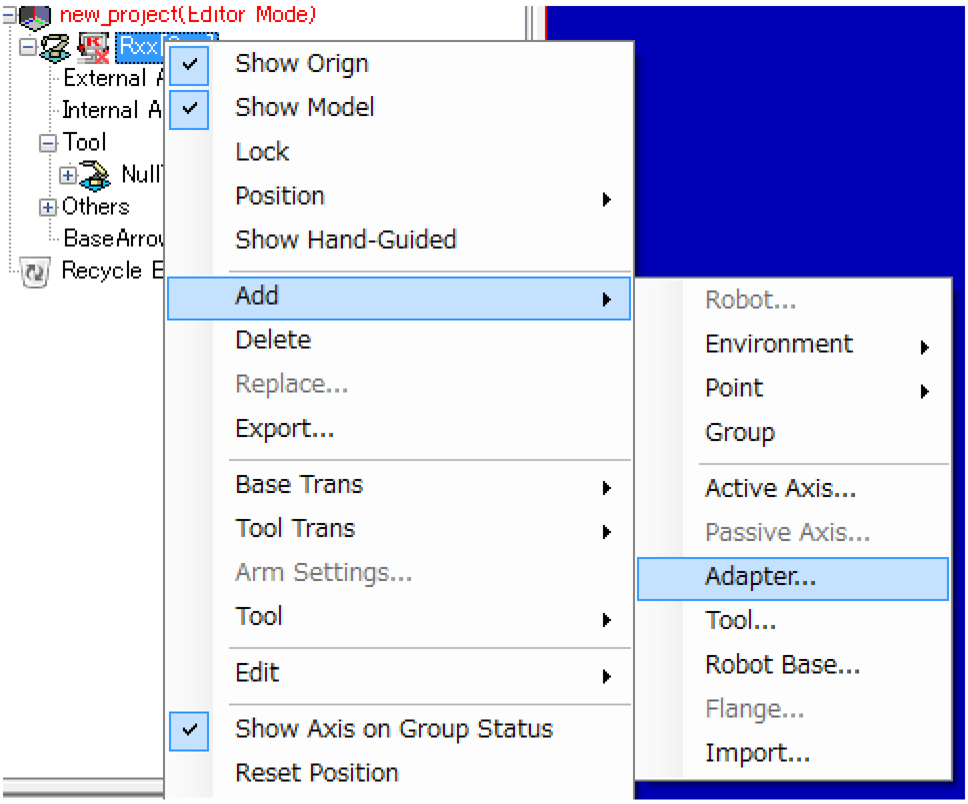
3 Select the target file, and press the [Open] button.
Tool is added on the robot flange.

7.1.1.4 Add Adapter

This adds the adapter of the robot.

1 Right-click a robot
Robot menu is displayed.

2 Select [Add] -> [Adapter] from the robot menu.
Adapter object is added.



7.1.1.5 Add Robot Base

This adds the base of the robot.

1 **Right-click a robot.**

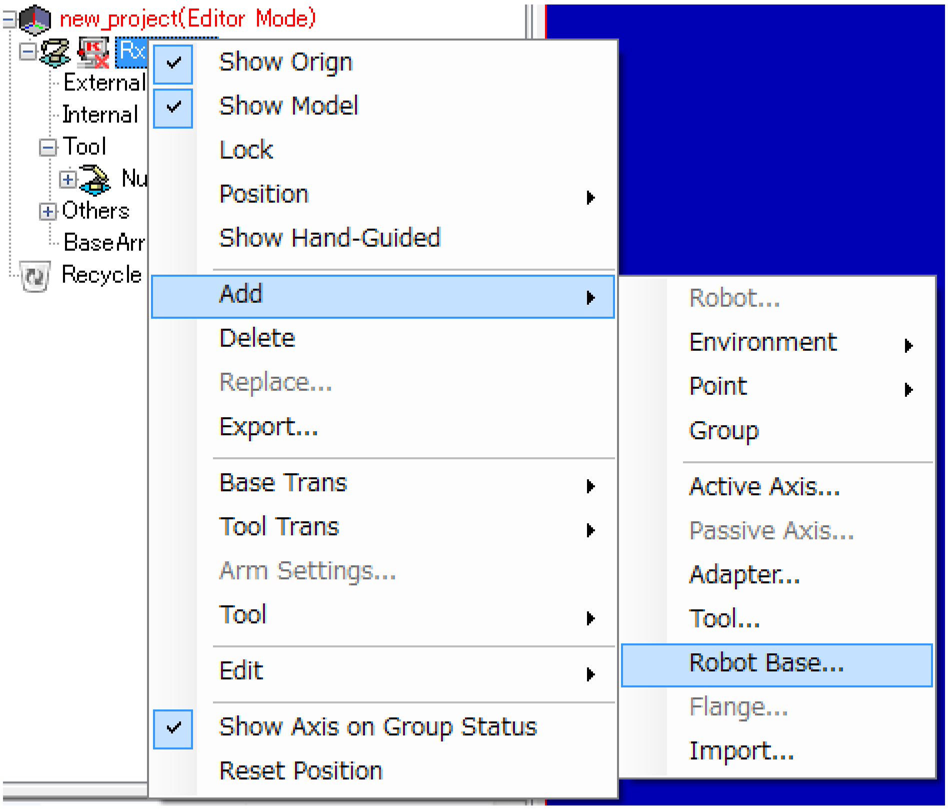
Robot menu is displayed.

2 **Select [Robot Base] -> [Add] from the robot menu**

The file selection dialog box will appear.

3 **Select the target file, and press the [Open] button.**

Robot base object is added in layout and the selected model is added on the view.



► 7.1.1.6 Add Joint

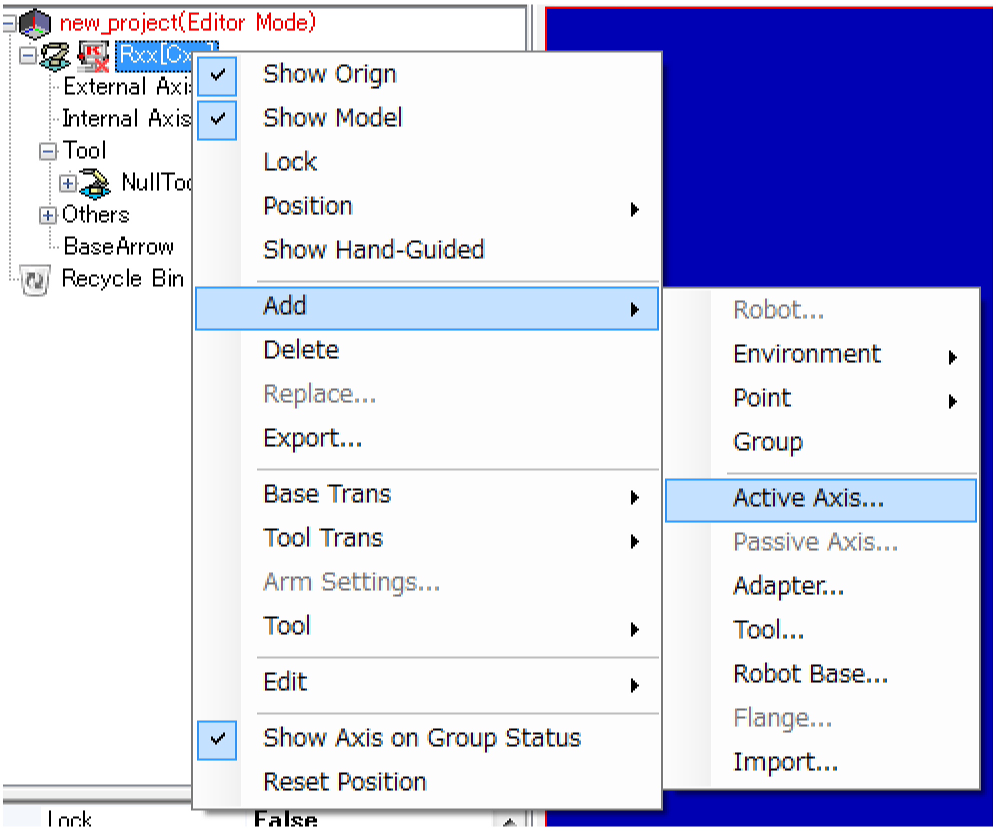
This adds the joint of the robot.

1 **Right-click a robot.**

Robot menu is displayed.

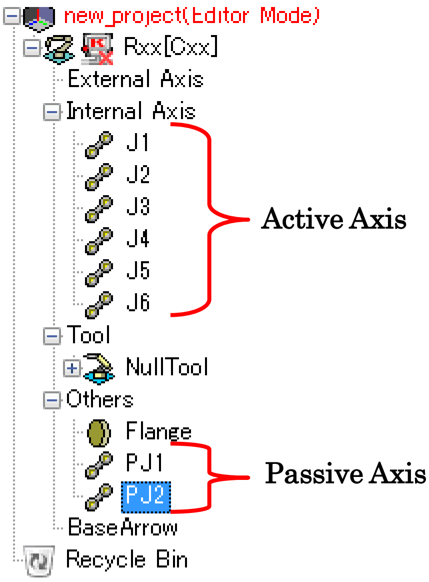
2 **select [Add] -> […Axis] from the robot menu**

The file selection dialog box will appear.



3 **Select the target file, and press the [Open] button.**

Axis object is added in layout and the selected model is displayed on the view.



- Active Axis

  This becomes operational after the action is set in Properties Tab.

- Passive Axis

  This becomes operational after Link Formula is set in Properties Tab.

7.1.1.7 Import

This adds the model made as the entity type of K-ROSET.

The robot is added without AS controller.

- The robot is only imported from only the robot menu.

1 **Right-click an icon**

Menu of the selected object is displayed.

2 **Select [Add] -> [Import] from the menu.**

A dialog will appear.

3 **Select a file to import it.**

It is added in layout as object format of the selected file.

7.1.1.8 Export

This saves the model made as the selected entity type. It also saves tree constitution.

1 **Right-click the icon of the data that you wish to export**

Menu of the selected object is displayed.

2 **Select [Export] from the menu.**

A dialog will appear

3 **Specify a destination to save data to execute export and click [save]**

Krprj file is output to the selected folder.

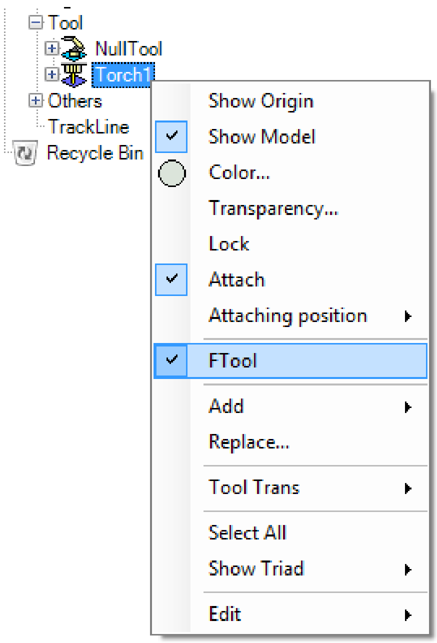
7.1.1.9 Reset Location

Recorded location data is cleared and the model is moved to the position of Local Trans.

7.1.1.10 Fixed tool

When a tool is moved from flange to under a robot object, menu of fixed tool is displayed.

- For simulation, option settings of fixed operation are required by a robot controller.



7.1.2 Function in Properties Tab

(1) Active axis

Parameter	Change	Description
Axis Group	✓	Setting of the inner axis or outer axis as configuration.
Type	✓	Setting of transfer or revolution and the target axis
Direction	✓	Setting of positive and negative of action

(2) Passive axis

Parameter	Change	Description
Link Formula	✓	Setting of synchronizing axis

(3) Robot object

Parameter	Change	Description
Category	✓	Categorizes a robot. Normal and Link robot
Link robot display	✓	Switches the coordinate system between Link robot and Normal robot when a robot is categorized as Link robot.

7.1.3 The procedures to entry a tool model

Add at least a robot in advance.

1 **Right-click project menu.**

Project menu is displayed.

2 **Click [Settings].**

Layout setting screen is displayed.

3 **Set the operation mode to editor and click OK.**

Setting screen is closed. A project name is shown in red and mode is switched to editor mode.

4 **Right-click a robot.**

Robot menu is displayed.

5 **Click [Add]-[Tool] on the menu.**

File selection dialogue is displayed.

6 **On the file selection dialogue, select a model file.**

A model is displayed in robot flange origin.

7 **Right-click a project name.**

Project menu is displayed.

8 **Click [Batch Operation]-[Show Model]-[All].**

All models are hidden.

In case all models are displayed, repeat above.

9 **Right-click a tool icon to output.**

Tool menu is displayed.

10 **Click display.**

Only too models are displayed.

Hide models except for tools in order to display only tools on thumbnail.

11 **Click twice on a tool name.**

A name can be edited.

12 **Input a changing name and press Enter.**

A name is fixed.

13 **Right-click a tool.**

Tool menu is displayed.

14 **Click Export on the menu.**

File selection screen is displayed.

15 **On the saving dialogue, input save destination and a file name. Click [Save].**

krprj file is output to the selected folder.

*

- Create a folder to store models. Create it before saving in order to keep with model files.

16 **Click [Batch Operation]-[Show Model]-[All] on the project menu.**

All models in layout are displayed.

Undo display of models.

17 **Click [Delete] on the added tool menu.**

Delete a tool.

18 Set operation mode to standard on the project setting screen.

A project name is shown in black and display of editor is disappeared.

Confirm if the created model operates normally on [Tool]-[Load] on the robot menu. The letter[T]when displaying thumbnail means that a model is registered as a tool.

7.2 Controller library

List of robot controllers that K-ROSET supports.
The models in red are controllers newly added in V 1.8.6.

7.2.1 Handling

F Controller

F1000000F, F1000000P, F10000018, F1000001A, F1000001G,
F10102001, F10102002, F10102003, F10102004, F10102007,

E Controller

10000014, 1000001M, 10000V24, 10100V2M, 10100X3D, 10100X3R, 10100X3V, 10100X3Z, 10100X4E,
10300X54, 10300X58, 10300Z5P,

D+ Controller

R1G0031N

D Controller

01G0031P

7.2.2 Handling (Special)

F Controller

F60000002, F60000009, F6000000E, F6000000J, F6000000N, F6000000Q

Clean D Controller

09200007, 09200018, 09200021, 09200023, 09200024, 09200025, 09200026

7.2.3 Explosion proof paint

E Controller

8000001E, 80000V2C, 80000V2P, 80000W36, 80000W3H, 80000W3T, 80000W48

C Controller

6H620VRJ

7.2.4 Sealing

E Controller

50000V0G, 50000W15, 50000X19, 50000Z1U

7.2.5 Arc Welding

F Controller

F30303002,

E Controller

30200V07, 30200V09, 30300V0J, 30300W23, 33300X3A, 33300Z4X

D+ Controller

R3G1001Z

7.2.6 Servo weld gun

F Controller

F2010000F,

E Controller

21200V0C, 21300V0E, 21300V0R, 21310X0E, 21310X0K, 23310X0T, 23310X17, 23310Z1W, 23310Z2E

7.3 Simulation Models

List of robots that K-ROSET supports.

The models in red are robots newly added in V 1.8.6.

7.3.1 Handling

F Controller

- **B Series**

  BX100N-B001, BX250L-B001, BX300L-B001, BX200X-C001,

- **CP Series**

  CP180L-AC01, CP300L-AC01, CP500L-AC01, CP700-AC01,

- **MCR Serie**

  MC004N-B004, MC004N-B044, MC004V-B004, MC004V-C004,
  MS005N-B001,

- **R Series**

  RS003N-A001, RS005N-A001, RS005L-A001, RS006L-A001, RS007N-A001,
  RS007N-B001, RS007L-A001, RS007L-B001, RS010N-A001, RS010L-A001,
  RS013N-A001, RS015X-A001, RS020N-A001, RS025N-A001, RS030N-A001,
  RS050N-A001, RS080N-A001,
  RC005L-A001, RF010N-A012, RF020N-A001, RD080N-A001,
  RS007L-B001 (T-Skin),

- **Y Series**

  YF002N-C001, YF003N-A001, YF003N-A101,

- **M Series**

  MX350L-A001, MX420L-A001, MX500N-A001, MX700N-A001,

  MT400N-A001,

- **BXP Series**

  BXP110L-A001, BXP110S-A001, BXP135X-A001, BXP165L-A001, BXP165N-A001,
  BXP210L-A001,

- **BTP Series**

  BTP165L-A001, BTP210L-A001,

E Controller

- **B Series**

  BX100L-B001, BX100N-A001, BX100N-B001, BX130X-B001, BX165N-B001,

  BX165L-B501, BX100S-B001, BX100L-C001, BX130X-C001, BX165L-C501,

  BX165N-C001, BX200L-A001, BX200L-B001, BX250L-B001, BX300L-B001,

  BX200X-C001, BX200L-C001,

  BT165L-A001, BT200L-A001, BT200L-A501,

- **CP Series**

  CP180L-AC01, CP300L-AC01, CP500L-AC01, CP700-AC01,

- **CX Series**

  CX110L-BC01, CX165L-BC01, CX210L-BC01,

- **MCR Series**

MC004N-A001, MC004N-A041, MC004N-B004, MC004N-B044,
MS005N-B001

- **R Series**

RS003N-A001, RS005N-A001, RS005L-A001, RS006L-A001, RS010N-A001,
RS010L-A001, RS015X-A001, RS020N-A001, RS030N-A001, RS050N-A001,
RS080N-A001,
RD080N-A001,
RC005L-A001,
RF010N-A001, RF020N-A001,

- **Y Series**

YS002N-B001, YF002N-B001, YF002N-C001, YF003N-A001, YF003N-A101,

- **Y Series (Defined robot model for picking system (7th and 8th conveyor axes))**

YF002N-C001-Picking, YF003N-A001-Picking, YF003N-A101-Picking,

- **Z Series**

ZX100L-S001, ZX130L-B001, ZX130S-B001, ZX130U-B001, ZX165L-B001,
ZX165L-B501, ZX165U-B001, ZX165U-B501, ZX200S-B001, ZX200S-B501,
ZX200S-S001, ZX200U-B001, ZX300S-B001,
ZT130L-C001, ZT130L-C501, ZT130S-C001, ZT130U-C001, ZT130Y-A001,
ZT165U-C001, ZT165X-A001, ZT165Y-A001, ZT200S-C001, ZT200U-C001,
ZT200Y-A001,
ZH100U-A001,
ZB150S-B001,
ZD130S-D001, ZD130S-E001, ZD250S-B001, ZD250S-G001,

- **M Series**

MX350L-A001, MX420L-A001, MX500N-A001, MX700N-A001,
MD400N-A001, MD500N-A001,
MG10HL-A001, MG15HL-A001, MG15HL-B501,

► D/D+ Controller

- **F Series**

FS002N-A001, FS003N-E001, FS006L-B001, FS006N-B001, FS010C-B001,
FS010E-B001, FS010N-B001, FS010L-A001, FS010X-A001, FS020C-A001,
FS020N-A001, FS030N-E001, FS030L-A001, FS045C-A001, FS045N-A001,
FS060L-C001,
FD050N-C001,

- **Z Series**

ZX130L-B001, ZX130S-B001, ZX130U-B001, ZX165L-B001, ZX165L-B501,
ZX165U-B001, ZX165U-B501, ZX200U-B001, ZX200S-B001, ZX200S-B501,
ZX200S-S001, ZX300S-B001,
ZT130L-C001, ZT130L-C501, ZT130S-C001, ZT130U-C001, ZT165U-C001,
ZT165X-A001, ZT200U-C001,
ZH100U-A001,
ZB150S-B001,
ZD130S-D001, ZD130S-E001, ZD250S-B001,

- **M Series**

MX350L-A001, MX420L-A001, MX500N-A001,
MD400N-A001,
MT400N-A001,

7.3.2 Handling (Special)

F Controller

- **W Series (duAro2)**

WD003H-F501-Base, WD003H-F501-Cart,
WD003H-F502-Base, WD003H-F502-Cart,

- **W Series (duAro1)**

WD002N-F501-Base, WD002N-F501-Cart,
WD002N-F502-Base, WD002N-F502-Cart,
WD002N-F5F1,

- **W Series (duAro2 (Defined robot model for Tablet communication))**

WD003H-F501-Tablet-Base, WD003H-F501-Tablet-Cart,
WD003H-F502-Tablet-Base, WD003H-F502-Tablet-Cart,

- **W Series (duAro1 (Defined robot model for Tablet communication))**

WD002N-F501-Tablet-Base, WD002N-F501-Tablet-Cart,
WD002N-F502-Tablet-Base, WD002N-F502-Tablet-Cart,
WD002N-F5F1-Tablet,

Clean D Controller

- **W Series (duAro1)**

WD002N-A202, WD002N-A2F4,

- **W Series (duAro1 (Defined robot model for Tablet communication))**

WD002N-A202-Tablet, WD002N-A2F4-Tablet,

7.3.3 Explosion proof paint

E Controller

- **KD Series**

KD010-B002,

- **KD Series (Conveyor predefined models)**

KD010-B002-CV,

- **KF Series**

KF121-A001, KF192-A001, KF192-B001, KF193-A001, KF194-A001,
KF262-A001, KF262-B001, KF263-A001, KF264-A001,

- **KF Series (Conveyor predefined models)**

KF121-A001-CV, KF192-A001-CV, KF192-B001-CV, KF193-A001-CV,

KF194-A001-CV, KF262-A001-CV, KF262-B001-CV, KF263-A001-CV,
KF264-A001-CV,

- **KF Series (Tombow predefined models)**

KF121-A001-Tombow1000_20, KF121-A001-Tombow1000_40,
KF121-A001-Tombow1200_20, KF121-A001-Tombow1200_40
KF192-A001-Tombow1400_20, KF192-B001-Tombow1400_20,
KF193-A001-Tombow1000_20, KF193-A001-Tombow1000_40,
KF193-A001-Tombow1200_40, KF193-A001-Tombow1400_20,
KF193-A001-Tombow1400_40, KF194-A001-Tombow1400_20,
KF262-A001-Tombow1400_20, KF262-A001-Tombow1400_40,
KF262-B001-Tombow1400_20, KF262-B001-Tombow1400_40,
KF263-A001-Tombow1400_20, KF263-A001-Tombow1400_40,
KF263-A001-Tombow1600_40, KF264-A001-Tombow1400_20,

- **KF Series (Tombow R predefined models)**

KF121-A001-TombowR1800_20,

- **KF Series (Twister predefined models)**

KF121-A001-Twister800, KF193-A001-Twister800,

- **KF Series (Spinner predefined models)**

KF193-A001-Spinner_20, KF193-A001-Spinner_60,
KF263-A001-Spinner_20, KF263-A001-Spinner_60,
KF262-A001-Spinner_20, KF262-A001-Spinner_60,
KF264-A001-Spinner_60,

- **KF Series (Turn table predefined models)**

KF262-A001-Turntable2000_500, KF262-B001-Turntable2000_500,
KF263-A001-Turntable650_500, KF263-A001-Turntable2000_500

- **KF Series (Shuttle predefined models)**

KF192-A001-Shuttle2700_60,
KF263-A001-Shuttle3200_60,

- **KG Series**

KG264-A001, KG264-A001-J3CoverL,

- **KG Series (Conveyor predefined models)**

KG264-A001-CV, KG264-A001-CV-J3CoverL,

- **KJ Series**

KJ194-A001, KJ194-A001-SHELF,
KJ194-A001-WALL1, KJ194-A001-WALL2,
KJ194-B001, KJ194-B001-SHELF,
KJ194-B001-WALL1, KJ194-B001-WALL2,
KJ264-A001, KJ264-A001-SHELF,
KJ264-A001-WALL1, KJ264-A001-WALL2,
KJ264-B001, KJ264-B001-SHELF,
KJ264-B001-WALL1, KJ264-B001-WALL2,
KJ314-A001, KJ314-B001,
KJ125-A001, KJ125-B001, KJ155-C001, KJ155-D001,

KJ244-C001, KJ244-C001-SHELF,
KJ244-C001-WALL1, KJ244-C001-WALL2,
KJ244-D001, KJ244-D001-SHELF,
KJ244-D001-WALL1, KJ244-D001-WALL2

- **KJ Series (Conveyor predefined models)**

KJ194-A001-CV, KJ194-A001-SHELF-CV,
KJ194-A001-WALL1-CV, KJ194-A001-WALL2-CV,
KJ194-B001-CV, KJ194-B001-SHELF-CV,
KJ194-B001-WALL1-CV, KJ194-B001-WALL2-CV,
KJ264-A001-CV, KJ264-A001-SHELF-CV,
KJ264-A001-WALL1-CV, KJ264-A001-WALL2-CV,
KJ264-B001-CV, KJ264-B001-SHELF-CV,
KJ264-B001-WALL1-CV, KJ264-B001-WALL2-CV,
KJ314-A001-CV, KJ314-B001-CV,

- **KJ Series (Tombow predefined models)**

KJ194-A001-TombowR2400_20, KJ264-A001-TombowR2400_20,

- **KJ Series (Spinner predefined models)**

KJ264-A001-Spinner_20, KJ264-A001-Spinner_60,

► C Controller

- **KF Series**

KF121-A001, KF192-A001, KF192-B001, KF193-A001, KF194-A001,
KF262-A001, KF262-B001, KF263-A001, KF264-A001,

- **K Series**

KE610H-A001, KE610L-A001,

7.3.4 Sealing

► E Controller

- **B Series**

BU015N-C001, BU015X-C001, BX200L-B001,

- **R Series**

RS003N-A001, RS005L-A001, RS005N-A001, RS006L-A001, RS010L-A001, RS010N-A001,
RS015X-A001, RS020N-A001, RS030N-A001, RS050N-A001, RS080N-A001,

- **R Series (Spin axis predefined models)**

RS050N-A001-Spin,

- **Z Series**

ZX130L-B001, ZX130S-B001, ZX130U-B001, ZX165L-B001, ZX165L-B501,
ZX165U-B001, ZX165U-B501, ZX200U-B001, ZX200S-B001, ZX200S-B501,
ZX200S-S001, ZX300S-B001,

7.3.5 Arc Welding

F Controller

- **BXP Series**

BXP200R-A001

E Controller

- **B Series**

BA006N-A001, BA006L-A001, BX100N-B001, BX200L-B001, BX200L-C001,
BX250L-B001, BX300L-B001,
BT200L-A001,

- **R Series**

RA005L-A001, RA006L-A001, RA010L-A001, RA010N-A001, RA020N-A001,
RS003N-A001, RS005N-A001, RS005L-A001, RS010N-A001, RS010L-A001,
RS015X-A001, RS020N-A001, RS030N-A001, RS050N-A001, RS080N-A001,

- **Z Series**

ZX130U-B001, ZX130L-B001, ZX130S-B001, ZX165L-B001, ZX165L-B501,
ZX165U-B001, ZX165U-B501, ZX200U-B001, ZX200S-B001, ZX200S-B501,
ZX200S-S001, ZX300S-B001, ZX300S-B001,
ZT130L-C001, ZT130L-C501, ZT130S-C001, ZT130U-C001, ZT130Y-A001,
ZT165U-C001, ZT165X-A001, ZT165Y-A001, ZT200S-C001, ZT200U-C001,
ZT200Y-A001,
ZB150S-B001,
ZH100U-A001,

- **M Series**

MX350L-A001, MX420L-A001, MX500N-A001, MX700N-A001,

D+ Controller

- **F Series**

FS002N-A001, FS003N-E001, FS003N-F001, FS006N-B001, FS010C-B001,
FS010E-B001, FS010N-B001, FS010L-A001, FS020N-A001, FS030N-E001,
FS030L-A001, FS045C-A001, FS045N-A001, FS060L-C001,
FA006E-B001, FA006N-B001, FA006L-B001, FA010N-B001, FA010L-A001,
FA020N-A001, FA030L-A001,

- **Z Series**

ZX130L-B001, ZX130S-B001, ZX130U-B001, ZX165U-B001,
ZX200S-B001, ZX200S-S001, ZX200U-B001, ZX300S-B001,
ZT130S-C001, ZT130U-C001, ZT165U-C001, ZT200U-C001,

7.3.6 Servo weld gun

F Controller

- **R Series**

RS003N-A001, RS005N-A001, RS007L-B001, RS006L-A001, RS010N-A001,
RS010L-A001, RS020N-A001, RS030N-A001, RS050N-A001, RS080N-A001,

- **M Series**

MX500N-A001, MX420L-A001, MX350L-A001, MX700N-A001,
MT400N-A001,

- **BX Series**

BX100N-B001, BX250L-B001, BX300L-B001, BX100S-B011, BX165N-C001,
BX165L-C501, BX200L-C001, BX200X-C001,
BT200L-A001,

- **BXP Series**

BXP110L-A001, BXP110S-A001, BXP135X-A001, BXP165L-A001, BXP165N-A001,
BXP210L-A001,

- **BTP Series**

BTP165L-A001, BTP210L-A001,

- **MXP Series**

MXP360L-A001,

E Controller

- **R Series**

RS006L-A001

- **B Series**

BX100L-B001, BX100N-A001, BX100N-B001, BX130X-B001, BX150L-B001,
BX165L-B001, BX100S-B001, BX100L-C001, BX130X-C001, BX165L-C501,
BX165N-C001, BX165N-B001, BX165L-B501, BX200L-A001, BX200L-B001,
BX200L-C001, BX200X-C001, BX250L-B001, BX300L-B001,
BT165L-A001, BT165L-B501, BX165L-C001, BT200L-A001, BT200L-A501

- **CX Series**

CX110L-BC01, CX165L-BC01, CX210L-BC01,

- **Z Series**

ZX130L-B001, ZX130S-B001, ZX130U-B001, ZX165L-B001, ZX165L-B501,
ZX165U-B001, ZX165U-B501, ZX200U-B001, ZX200S-B001, ZX200S-B501,
ZX200S-S001, ZX300S-B001,
ZT130L-C001, ZT130L-C501, ZT130S-C001, ZT130U-C001, ZT130Y-A001,
ZT165U-C001, ZT165X-C001, ZT165Y-C001, ZT200S-C001, ZT200U-C001,
ZB150S-B001, ZH100U-A001, ZD130S-E001

- **M Series**

MX320L-A001, MX350L-A001, MX420L-A001, MX500N-A001, MT400N-A001, MX700N-A001,

7.4 Program instructions

Refer to the list in the following pages for commands that K-ROSET supports.

Contact Kawasaki Robot Service for languages that are supported by each AS software version.

7.4.1 Instructions List

*Only the Painting application can use [KOBE_ASCII].

Type	Instruction	Language		
		AS language	KOBE_ASCII	Block Teach
Move	HOME	HOME	HOME(JOINT)	—
	HOME(LINEAR)	LMOVE #HOME	HOME(LINEAR)	—
	JMOVE	JMOVE	JMOVE JOINT	—
	LMOVE	LMOVE	LMOVE XYZ1	—
	HMOVE	HMOVE	LMOVE XYZ2	—
	C1MOVE	C1MOVE	CMOVE XYZ1	—
	C2MOVE	C2MOVE	C2MOVE XYZ1	—
	HC1MOVE	HC1MOVE	CMOVE XYZ2	—
	HC2MOVE	HC2MOVE	C2MOVE XYZ2	—
	JAPPRO	JAPPRO	—	—
	LAPPRO	LAPPRO	—	—
	JDEPART	JDEPART	—	—
	LDEPART	LDEPART	—	—
	DRIVE	DRIVE	—	—
	DRAW	DRAW	—	—
	TDRAW	TDRAW	—	—
	FJMOVE	FJMOVE	—	—
	FLMOVE	FLMOVE	—	—
	FC1MOVE	FC1MOVE	—	—
	FC2MOVE	FC2MOVE	—	—
	FJAPPRO	FJAPPRO	—	—
	FLAPPRO	FLAPPRO	—	—
	L3LMOVE	L3LMOVE	—	—
	L3C1MOVE	L3C1MOVE	—	—
	L3C2MOVE	L3C2MOVE	—	—
	ZL3LMOVE	ZL3LMOVE	-	—
	ZL3C1MOVE	ZL3C1MOVE	-	—
	ZL3C2MOVE	ZL3C2MOVE	-	—
Spray	SPRAY ON	GUNON	SPRAY #*,ON—	—
	PRE_SPRAY(D) ON	GUNON	PRE_SPRAY #*,*mm,ON	—
	DLY_SPRAY(D) ON	GUNON	DLY_SPRAY #*,*mm,ON	—
	PRE_SPRAY(T) ON	GUNONTIMER	PRE_SPRAY #*,*sec,ON	—
	DLY_SPRAY(T) ON	GUNONTIMER	DLY_SPRAY #*,*sec,ON	—
	SPRAY OFF	GUNOFF	SPRAY #*,OFF	—
	PRE_SPRAY(D) OFF	GUNOFF	PRE_SPRAY #*,*mm,OFF	—
	DLY_SPRAY(D) OFF	GUNOFF	DLY_SPRAY #*,*mm,OFF	—
	PRE_SPRAY(T) OFF	GUNOFFTIMER	PRE_SPRAY #*,*sec,OFF	—
	DLY_SPRAY(T) OFF	GUNOFFTIMER	DLY_SPRAY #*,*sec,OFF	—

*Only the Painting application can use [KOBE_ASCII].

Type	Instruction	Language		
		AS language	KOBE_ASCII	Block Teach
IO	DIN_WAIT	SWAIT	DIN_WAIT #*,**	—
	DOUT SIGNAL	SIGNAL	DOUT #*,*	—
	DLYSIG	DLYSIG	DLY_DOUT *sec,#*,*	—
	MUTUAL_WAIT	MUTUAL_WAIT	MUTUAL_WAIT	—
	RESET	RESET	—	—
	PULSE	PULSE	—	—
	BITS	BITS	—	—
	EXTCALL	EXTCALL	—	—
	ON	ON * CALL **	—	—
	ONI	ONI * CALL **	—	—
	IGNORE	IGNORE	—	—
	SCNT	SCNT	—	—
	SCNTRESET	SCNTRESET	—	—
	SOUT	SOUT	—	—
	STIM	STIM	—	—
	CLAMP	CLAMP	—	—
Speed	AIRCUT_SPEED	SPEED	AIRCUT_SPEED	—
	SPRAY_JSPEED	SPEED	SPRAY_JSPEED	—
	SPRAY_SPEED	SPEED	SPRAY_SPEED	—
	MOVING_TIME	SPEED	MOVING_TIME	—
Paint Signal Out	HIGH_VOLTAGE	SPR_HVOLT	HIGH_VOLTAGE	—
	HIGH_VOLTAGE2	SPR_HVOLT2	HIGH_VOLTAGE2	—
	HIGH_VOLTAGE3	SPR_HVOLT3	HIGH_VOLTAGE3	—
	SHAPING AIR PATTERN AIR	SPR_PATTERN	SHAPING PATTERN	—
	SHAPING AIR2 PATTERN AIR2	SPR_PATTERN2	SHAPING2 PATTERN2	—
	SHAPING AIR3 PATTERN AIR3	SPR_PATTERN3	SHAPING3 PATTERN3	—
	AIR MOTOR ATOMIZING AIR	SPR_ATOMIZE	AIRMOTOR ATOMIZING	—
	AIR MOTOR2 ATOMIZING AIR2	SPR_ATOMIZE2	AIRMOTOR2 ATOMIZING2	—
	AIR MOTOR3 ATOMIZING AIR3	SPR_ATOMIZE3	AIRMOTOR3 ATOMIZING3	—
	FLOW RATE	SPR_FRATE	FLOW_RATE	—
	FLOW RATE2	SPR_FRATE2	FLOW_RATE2	—
	FLOW RATE3	SPR_FRATE3	FLOW_RATE3	—
	PUSH_THINNER	SPR_PTHINNER	PUSH_THINNER	—
	FLUSHING START	SPR_FLUSH	FLUSHING	—

※Only the Painting application can use [KOBE_ASCII].

Type	Type	Language		
		AS language	KOBE_ASCII	Block Teach
Paint Signal Ratio	SHAPING AIR_RATIO PATTERN AIR_RATIO	SPR_PATTERN_R	SHAPING_RATIO PATTERN_RATIO	—
	SHAPING AIR2_RATIO PATTERN AIR2_RATIO	SPR_PATTERN2_R	SHAPING_RATIO2 PATTERN_RATIO2	—
	SHAPING AIR3_RATIO PATTERN AIR3_RATIO	SPR_PATTERN3_R	SHAPING3_RATIO PATTERN3_RATIO	—
	AIR MOTOR_RATIO ATOMIZING AIR_RATIO	SPR_ATOMIZE_R	AIRMOTOR_RATIO ATOMIZING_RATIO	—
	AIR MOTOR2_RATIO ATOMIZING AIR2_RATIO	SPR_ATOMIZE2_R	AIRMOTOR_RATIO2 ATOMIZING_RATIO2	—
	AIR MOTOR3_RATIO ATOMIZING AIR3_RATIO	SPR_ATOMIZE3_R	AIRMOTOR3_RATIO ATOMIZING3_RATIO	—
	FLOW RATE_RATIO	SPR_FRATE_R	FLOW_RATE_RATIO	—
	FLOW RATE2_RATIO	SPR_FRATE2_R	FLOW_RATE_RATIO2	—
	FLOW RATE3_RATIO	SPR_FRATE3_R	FLOW_RATE3_RATIO	—
	HIGH_VOLTAGE RATIO	SPR_HVOLT_R	HIGH_VOLTAGE_RATIO	—
	HIGH_VOLTAGE2 RATIO	SPR_HVOLT2_R	HIGH_VOLTAGE2_RATIO	—
	HIGH_VOLTAGE3 RATIO	SPR_HVOLT3_R	HIGH_VOLTAGE3_RATIO	—
Conveyor/Gun	CVSTART	CVSTART	TRACK_ON	—
	CVEND	CVEND	TRACK_OFF	—
	CVWAIT	CVWAIT	CV_WAIT	—
	CVSET	CVSET	—	—
	CVRESET	CVRESET	—	—
	CVXYSIGN	CVXYSIGN	—	—
	CVJMOVE	CVJMOVE	—	—
	CVLMOVE	CVLMOVE	—	—
	CVC1MOVE	CVC1MOVE	—	—
	CVC2MOVE	CVC2MOVE	—	—
	CVLAPPRO	CVLAPPRO	—	—
	CVLDEPART	CVLDEPART	—	—
	CVL3LMOVE	CVL3LMOVE	—	—
	CVDELAY	CVDELAY	—	—
	CVCOOPJT	CVCOOPJT	—	—
	SETLCVSLOPE	SETLCVSLOPE	—	—
	SETATOOL	SETATOOL	GUN	—
Cooperation	MASTER	MASTER	—	—
	SLAVE	SLAVE	—	—
	ALONE	ALONE	—	—
	MLJMOVE	MLJMOVE	—	—
	MLZL3LMOVE	MLZL3LMOVE	—	—
	CVMLJMOVE	CVMLJMOVE	—	—
	CVMLL3LMOVE	CVMLL3LMOVE	—	—

※Only the Painting application can use [KOBE_ASCII].

Type	Instruction	Language		
		AS language	KOBE_ASCII	Block Teach
Sensor	DOOR_COMPENSATION	XDELTA	DR_COMPEN	—
	START DOOR SENSE	XDSTART	START_DR_SENSE *mm+	—
	GET CLOSE DOOR POSITION	XD2START	DS_GET_CLSPOS	—
	MOVE CLOSE DOOR POSITION	LMOVE ZDCLSPOS+ZXDGETDET	DS_MOV_CLSPOS	—
Call/Databank	CALL DATABANK	SPRDB_CALL	CALL_DBK	—
	CALL PROGRAM	CALL	CALL_PGM	—
Condition (1/2)	RPSEND	RPSEND	PGM_SELECT	—
	TRUE JUMP	GOTO	TRUE_JUMP LABEL	—
	FALSE JUMP	GOTO	FALSE_JUMP LABEL	—
Condition (2/2)	GREATER COUNT	SYSFLAG 1 = SYSCOUNT(*,*) > *	GREATER	—
	LESS COUNT	SYSFLAG 1 = SYSCOUNT(*,*) < *	LESS	—
	GREATER/EQUAL COUNT	SYSFLAG 1 = SYSCOUNT(*,*) >= *	GREATER/EQU	—
	LESS/EQUAL COUNT	SYSFLAG 1 = SYSCOUNT(*,*) <= *	LESS/EQU	—
	LOAD	SYSCOUNT *,* = *	LOAD	—
	ADD	SYSCOUNT *,* = SYSCOUNT(*,*) + *	ADD	—
	SUBTRACT	SYSCOUNT *,* = SYSCOUNT(*,*) - *	SUBTRACT	—
	EQUAL COUNT	SYSFLAG 1 = SYSCOUNT(*,**) == *	EQU	—
	NOT EQAUL COUNT	SYSFLAG 1 = SYSCOUNT(*,*) <> *	NOT_EQU	—
	DIN_JUMP	SYSFLAG 1 = BITS(*,*) == *	DIN_JUMP #*,*PORT,*	—
Table	TABLE TRACK ON	COOPSTART	TBL_TRACK ON	—
	TABLE TRACK OFF	COOPEND	TBL_TRACK OFF	—
	TABLE WAIT	SPINBREAK	TBL_WAIT	—
	TABLE SELF TURN	SPINSPEED	TBL_SLFTRN *rpm, *	—
	TABLE SPINMOVE	SPINMOVE	TBL_SLFTRN *rpm, *sec, *	—
	TABLE SPINSTOP	SPINSTOP	TBL_SLFTRN_OFF	—
	TABLE ROTATION	RTSET	TBL_ROTCNT	—

*Only the Painting application can use [KOBE_ASCII].

Type	Instruction	Language		
		AS language	KOBE_ASCII	Block Teach
Program	IF GOTO	IF * GOTO *	—	—
	RETURN	RETURN	—	—
	WAIT	WAIT	—	—
	TWAIT	TWAIT	—	—
	PAUSE	PAUSE	—	—
	HALT	HALT	—	—
	STOP	STOP	—	—
Structure	IF THEN	IF * THEN	—	—
	ELSE	ELSE	—	—
	END	END	—	—
	WHILE_DO	WHILE * DO	—	—
	DO	DO	—	—
	UNTIL	UNTIL	—	—
	FOR	FOR *=* TO * *	—	—
Monitor	PRINT	PRINT	—	—
	TYPE	TYPE	—	—
	DELETE	DELETE	—	—
Hand	OPEN	OPEN	—	—
	OPENI	OPENI	—	—
	CLOSE	CLOSE	—	—
	CLOSEI	CLOSEI	—	—
ServoWeldGun	SRV1PRESS	SRV1PRESS	—	—
	SRV2PRESS	SRV2PRESS	—	—
	SGCLEARANS	SGCLEARANS	—	—
	SGREFLEX	SGREFLEX	—	—
	SGGUNNO	* = SGGUNNO(*)	—	—
	SGWORKGAP	* = SGWORKGAP(*)	—	—
	SGCHIP	* = SGCHIP(*, *)	—	—
	SPOTSTAT	* = SPOTSTAT(*)	—	—
	CLSUBBIT	* = CLSUBBIT	—	—

*Only the Painting application can use [KOBE_ASCII].

Type	Instruction	Language		
		AS language	KOBE_ASCII	Block Teach
Arc Welding	W1SET	W1SET	—	—
	W2SET	W2SET	—	—
	W3SET	W3SET	—	—
	W.INCHING	W.INCHING	—	—
	W.RETRACT	W.RETRACT	—	—
	WVSDIR	WVSDIR	—	—
	LTBLSET	LTBLSET	—	—
	OGSET	OGSET	—	—
	JWS	JWS	—	—
	LWS	LWS	—	—
	LWC	LWC	—	—
	C1WC	C1WC	—	—
	C2WC	C2WC	—	—
	LWE	LWE	—	—
	C2WE	C2WE	—	—
	STWC	STWC	—	—
	STWE	STWE	—	—
	JAS	JAS	—	—
	LAS	LAS	—	—
	DWC	DWC	—	—
	INSUL_CHK	INSUL_CHK	—	—
Real Time	PMODTXYZ	PMODTXYZ	—	—
	PMODXYZ	PMODXYZ	—	—
	PMODLIMIT	PMODLIMIT	—	—
	PMODSTART	PMODSTART	—	—
	PMODEND	PMODEND	—	—

***Only the Painting application can use [KOBE_ASCII].**

Type	Instruction	Language		
		AS language	KOBE_ASCII	Block Teach
Block Teach	JOINT	—	—	JOINT
	LINEAR	—	—	LINEAR
	CIR1	—	—	CIR1
	CIR2	—	—	CIR2
	FLIN	—	—	FLIN
	FCIR1	—	—	FCIR1
	FCIR2	—	—	FCIR2
	AIRCUT - JOINT	—	—	AC JOINT
	AIRCUT - LINEAR	—	—	AC LINEAR
	AIRCUT - CIR1	—	—	AC CIR1
	AIRCUT - CIR2	—	—	AC CIR2
	ARC SPOT - JOINT	—	—	AS JOINT
	ARC SPOT - LINEAR	—	—	AS LINEAR
	WELD START - JOINT	—	—	WS JOINT
	WELD START - LINEAR	—	—	WS LINEAR
	WELD CONTINUE - LINEAR	—	—	WC LINEAR WELD_COND
	WELD CONTINUE - CIR1	—	—	WC CIR1 WELD_COND
	WELD CONTINUE - CIR2	—	—	WC CIR2 WELD_COND
	WELD END - LINEAR	—	—	WE LINEAR WELD_COND
	WELD END - CIR2	—	—	WE CIR2 WELD_COND
Function	FN	—	—	FN* [*] KI* [*]

*Only the Painting application can use [KOBE_ASCII].

Type	Instruction	Language		
		AS language	KOBE_ASCII	Block Teach
*In Japanese, the [Type] of instruction is different by application.				
Speed	AIRCUT_JSPEED	SPEED	AIRCUT_JSPEED	—
Speed	SPEED			
Speed	PLAYBACK_RATE	BSPEED	PLYBK_RATE	—
Speed	BSPEED			
Speed Accuracy/Timer	ACCEL	ACCEL	ACCEL	—
Speed Accuracy/Timer	ACCURACY	ACCURACY	SMOOTH_RANGE	—
Accuracy/Timer	L3ACCURACY	L3ACCURACY	—	—
	ZL3ACCURACY	ZL3ACCURACY	—	—
Accuracy/Timer Accuracy/Timer	DELAY	DELAY	TIMER_WAIT	—
Speed Accuracy/Timer	DECEL	DECEL	—	—
Speed Accuracy/Timer	BREAK	BREAK	—	—
Speed Accuracy/Timer	BRAKE	BRAKE	—	—
Condition(1/2) Condition	GOTO	GOTO	UC_JUMP LABEL	—
Condition(1/2) Condition	LABEL	(Directly input)	LABEL	—

7.4.2 Explosion Instruction

Type	Instruction	KOBE_ASCII	Application Painting
Move	HOME	HOME(JOINT)	✓
	HOME(LINEAR)	HOME(LINEAR)	✓
	JMOVE	JMOVE JOINT	✓
	LMOVE	LMOVE XYZ1	✓
	HMOVE	LMOVE XYZ2	✓
	C1MOVE	CMOVE XYZ1	✓
	C2MOVE	C2MOVE XYZ1	✓
	HC1MOVE	CMOVE XYZ2	✓
	HC2MOVE	C2MOVE XYZ2	✓
Spray	SPRAY ON	SPRAY #*,ON—	✓
	PRE_SPRAY(D) ON	PRE_SPRAY #*,*mm,ON	✓
	DLY_SPRAY(D) ON	DLY_SPRAY #*,*mm,ON	✓
	PRE_SPRAY(T) ON	PRE_SPRAY #*,*sec,ON	✓
	DLY_SPRAY(T) ON	DLY_SPRAY #*,*sec,ON	✓
	SPRAY OFF	SPRAY #*,OFF	✓
	PRE_SPRAY(D) OFF	PRE_SPRAY #*,*mm,OFF	✓
	DLY_SPRAY(D) OFF	DLY_SPRAY #*,*mm,OFF	✓
	PRE_SPRAY(T) OFF	PRE_SPRAY #*,*sec,OFF	✓
	DLY_SPRAY(T) OFF	DLY_SPRAY #*,*sec,OFF	✓
IO	DIN_WAIT	DIN_WAIT #*,**	✓
	DOUT	DOUT #*,*	✓
	DLYSIG	DLY_DOUT *sec,#*,*	✓
	MUTUAL_WAIT	MUTUAL_WAIT	✓
Speed	AIRCUT_SPEED	AIRCUT_SPEED	✓
	SPRAY_JSPEED	SPRAY_JSPEED	✓
	SPRAY_SPEED	SPRAY_SPEED	✓
	AIRCUT_JSPEED	AIRCUT_JSPEED	✓
	PLAYBACK_RATE	PLYBK_RATE	✓
	ACCEL	ACCEL	✓
	ACCURACY	SMOOTH_RANGE	✓
	MOVING_TIME	MOVING_TIME	✓

Type	Instruction	KOBE_ASCII	Application Painting
Paint Signal Out	HIGH_VOLTAGE	HIGH_VOLTAGE	✓
	HIGH_VOLTAGE2	HIGH_VOLTAGE2	✓
	HIGH_VOLTAGE3	HIGH_VOLTAGE3	✓
	SHAPING AIR	SHAPING	✓
	PATTERN AIR	PATTERN	
	SHAPING AIR2	SHAPING2	✓
	PATTERN AIR2	PATTERN2	
	SHAPING AIR3	SHAPING3	✓
	PATTERN AIR3	PATTERN3	
	AIR MOTOR	AIRMOTOR	✓
	ATOMIZING AIR	ATOMIZING	
	AIR MOTOR2	AIRMOTOR2	✓
	ATOMIZING AIR2	ATOMIZING2	
	AIR MOTOR3	AIRMOTOR3	✓
	ATOMIZING AIR3	ATOMIZING3	
	FLOW RATE	FLOW_RATE	✓
	FLOW RATE2	FLOW_RATE2	✓
	FLOW RATE3	FLOW_RATE3	✓
	PUSH_THINNER	PUSH_THINNER	✓
	FLUSHING START	FLUSHING	✓
Paint Signal Ratio	SHAPING AIR_RATIO	SHAPING_RATIO	✓
	PATTERN AIR_RATIO	PATTERN_RATIO	
	SHAPING AIR2_RATIO	SHAPING_RATIO2	✓
	PATTERN AIR2_RATIO	PATTERN_RATIO2	
	SHAPING AIR3_RATIO	SHAPING3_RATIO	✓
	PATTERN AIR3_RATIO	PATTERN3_RATIO	
	AIR MOTOR_RATIO	AIRMOTOR_RATIO	✓
	ATOMIZING AIR_RATIO	ATOMIZING_RATIO	
	AIR MOTOR2_RATIO	AIRMOTOR_RATIO2	✓
	ATOMIZING AIR2_RATIO	ATOMIZING_RATIO2	
	AIR MOTOR3_RATIO	AIRMOTOR3_RATIO	✓
	ATOMIZING AIR3_RATIO	ATOMIZING3_RATIO	
	FLOW RATE_RATIO	FLOW_RATE_RATIO	✓
	FLOW RATE2_RATIO	FLOW_RATE_RATIO2	✓
	FLOW RATE3_RATIO	FLOW_RATE3_RATIO	✓
	HIGH_VOLTAGE RATIO	HIGH_VOLTAGE_RATIO	✓
	HIGH_VOLTAGE2 RATIO	HIGH_VOLTAGE2_RATIO	✓
	HIGH_VOLTAGE3 RATIO	HIGH_VOLTAGE3_RATIO	✓

Type	Instruction	KOBE_ASCII	Application Painting
Conveyor/ Gun	CVSTART	TRACK_ON	✓
	CVEND	TRACK_OFF	✓
	CVWAIT	CV_WAIT	✓
	CVSET	CVSET	✓ (AS)
	CVRESET	CVRESET	✓ (AS)
	CVXYSIGN	CVXYSIGN	✓ (AS)
	CVDELAY	CVDELAY	✓ (AS)
	SETATOOL	GUN	✓
Sensor	DOOR_COMPENSATION	DR_COMPEN	✓
	START DOOR SENSE	START_DR_SENSE *mm+	✓
	GET CLOSE DOOR POSITION	DS_GET_CLSPOS	✓
	MOVE CLOSE DOOR POSITION	DS_MOV_CLSPOS	✓
Call/ Databank	CALL DATABANK	CALL_DBK	✓
	CALL PROGRAM	CALL_PGM	✓
Condition (1/2)	RPSEND	PGM_SELECT	✓
	TRUE JUMP	TRUE_JUMP LABEL	✓
	GOTO	UC_JUMP LABEL	✓
	LABEL	LABEL	✓
	FALSE JUMP	FALSE_JUMP LABEL	✓
Condition (2/2)	GREATER COUNT	GREATER	✓
	LESS COUNT	LESS	✓
	GREATER/EQUAL COUNT	GREATER/EQU	✓
	LESS/EQUAL COUNT	LESS/EQU	✓
	LOAD	LOAD	✓
	ADD	ADD	✓
	SUBTRACT	SUBTRACT	✓
	EQUAL COUNT	EQU	✓
	NOT EQAUL COUNT	NOT_EQU	✓
	DIN_JUMP	DIN_JUMP #*,*PORT,*	✓
Table	TABLE TRACK ON	TBL_TRACK ON	✓
	TABLE TRACK OFF	TBL_TRACK OFF	✓
	TABLE WAIT	TBL_WAIT	✓
	TABLE SELF TURN	TBL_SLFTRN *rpm, *	✓
	TABLE SPINMOVE	TBL_SLFTRN *rpm, *sec, *	✓
	TABLE SPINSTOP	TBL_SLFTRN_OFF	✓
	TABLE ROTATION	TBL_ROTCNT	✓
Accuracy/ Timer	DELAY	TIMER_WAIT	✓

7.4.3 Non Explosion Instruction

Type	Instruction	Language		Application				
		AS language	Block Teach	Handling	Handling (Special)	Sealing	Servo Welding Gun	Arc Welding
Move	HOME	HOME	–	✓	✓	✓	✓	✓
	HOME(LINEAR)	LMOVE #HOME	–	✓	–	✓	✓	✓
	JMOVE	JMOVE	–	✓	✓	✓	✓	✓
	LMOVE	LMOVE	–	✓	–	✓	✓	✓
	HMOVE	HMOVE	–	✓	–	✓	✓	✓
	C1MOVE	C1MOVE	–	✓	–	✓	✓	✓
	C2MOVE	C2MOVE	–	✓	–	✓	✓	✓
	JAPPRO	JAPPRO	–	✓	–	✓	✓	✓
	LAPPRO	LAPPRO	–	✓	–	✓	✓	✓
	JDEPART	JDEPART	–	✓	–	✓	✓	✓
	LDEPART	LDEPART	–	✓	–	✓	✓	✓
	DRIVE	DRIVE	–	✓	–	✓	✓	✓
	DRAW	DRAW	–	✓	–	✓	✓	✓
	TDRAW	TDRAW	–	✓	–	✓	✓	✓
	FJMOVE	FJMOVE	–	✓	–	✓	✓	✓
	FLMOVE	FLMOVE	–	✓	–	✓	✓	✓
	FC1MOVE	FC1MOVE	–	✓	–	✓	✓	✓
	FC2MOVE	FC2MOVE	–	✓	–	✓	✓	✓
	FJAPPRO	FJAPPRO	–	✓	–	✓	✓	✓
	FLAPPRO	FLAPPRO	–	✓	–	✓	✓	✓
	L3LMOVE	L3LMOVE	–	–	✓	–	–	–
	L3C1MOVE	L3C1MOVE	–	–	✓	–	–	–
	L3C2MOVE	L3C2MOVE	–	–	✓	–	–	–
	ZL3LMOVE	ZL3LMOVE	–	–	✓	–	–	–
	ZL3C1MOVE	ZL3C1MOVE	–	–	✓	–	–	–
	ZL3C2MOVE	ZL3C2MOVE	–	–	✓	–	–	–
Spray	SPRAY ON	GUNON	–	–	–	✓	–	–
	PRE_SPRAY(D) ON	GUNON	–	–	–	✓	–	–
	DLY_SPRAY(D) ON	GUNON	–	–	–	✓	–	–
	PRE_SPRAY(T) ON	GUNONTIMER	–	–	–	✓	–	–
	DLY_SPRAY(T) ON	GUNONTIMER	–	–	–	✓	–	–
	SPRAY OFF	GUNOFF	–	–	–	✓	–	–
	PRE_SPRAY(D) OFF	GUNOFF	–	–	–	✓	–	–
	DLY_SPRAY(D) OFF	GUNOFF	–	–	–	✓	–	–
	PRE_SPRAY(T) OFF	GUNOFFTIMER	–	–	–	✓	–	–
	DLY_SPRAY(T) OFF	GUNOFFTIMER	–	–	–	✓	–	–

Type	Instruction	Language		Application				
		AS language	Block Teach	Handling	Handling (Special)	Sealing	Servo Welding Gun	Arc Welding
IO	DIN_WAIT	SWAIT	—	✓	✓	✓	✓	✓
	SIGNAL	SIGNAL	—	✓	✓	✓	✓	✓
	DLYSIG	DLYSIG	—	✓	✓	✓	✓	✓
	MUTUAL_WAIT	MUTUAL_WAIT	—	—	—	✓	—	—
	RESET	RESET	—	✓	✓	✓	✓	✓
	PULSE	PULSE	—	✓	✓	✓	✓	✓
	BITS	BITS	—	✓	✓	✓	✓	✓
	EXTCALL	EXTCALL	—	✓	✓	✓	✓	✓
	ON	ON * CALL **	—	✓	✓	✓	✓	✓
	ONI	ONI * CALL **	—	✓	✓	✓	✓	✓
	IGNORE	IGNORE	—	✓	✓	✓	✓	✓
	SCNT	SCNT	—	✓	✓	✓	✓	✓
	SCNTRESET	SCNTRESET	—	✓	✓	✓	✓	✓
	SOUT	SOUT	—	✓	✓	✓	✓	✓
	STIM	STIM	—	✓	✓	✓	✓	✓
	CLAMP	CLAMP	—	✓	✓	✓	✓	✓
Conveyor/ Gun	CVSTART	CVSTART	—	✓	—	✓	—	—
	CVEND	CVEND	—	✓	—	✓	—	—
	CVWAIT	CVWAIT	—	✓	—	✓	—	—
	CVSET	CVSET	—	✓	—	✓	—	—
	CVRESET	CVRESET	—	✓	—	✓	—	—
	CVXYSIGN	CVXYSIGN	—	—	—	✓	—	—
	CVJMOVE	CVJMOVE	—	✓	—	✓	—	—
	CVLMOVE	CVLMOVE	—	✓	—	✓	—	—
	CVC1MOVE	CVC1MOVE	—	✓	—	✓	—	—
	CVC2MOVE	CVC2MOVE	—	✓	—	✓	—	—
	CVLAPPRO	CVLAPPRO	—	✓	—	✓	—	—
	CVLDEPART	CVLDEPART	—	✓	—	✓	—	—
	CVL3LMOVE	CVL3LMOVE	—	—	✓	—	—	—
	CVDELAY	CVDELAY	—	✓	—	✓	—	—
	CVCOOPJT	CVCOOPJT	—	✓	—	—	—	—
	SETLCVSLOPE	SETLCVSLOPE	—	✓	—	—	—	—
Cooperation	MASTER	MASTER	—	—	✓	—	—	—
	SLAVE	SLAVE	—	—	✓	—	—	—
	ALONE	ALONE	—	—	✓	—	—	—
	MLJMOVE	MLJMOVE	—	—	✓	—	—	—
	MLZL3LMOVE	MLZL3LMOVE	—	—	✓	—	—	—
	CVMLJMOVE	CVMLJMOVE	—	—	✓	—	—	—
	CVMLL3LMOVE	CVMLL3LMOVE	—	—	✓	—	—	—

Type	Instruction	Language		Application				
		AS language	Block Teach	Handling	Handling (Special)	Sealing	Servo Welding Gun	Arc Welding
Call/ Databank	CALL PROGRAM	CALL	—	✓	✓	✓	✓	✓
Table	TABLE WAIT	SPINBREAK	—	✓	—	✓	✓	✓
	TABLE SELF TURN	SPINSPEED	—	✓	—	✓	✓	✓
	TABLE SPINMOVE	SPINMOVE	—	✓	—	✓	✓	✓
	TABLE SPINSTOP	SPINSTOP	—	✓	—	✓	✓	✓
	TABLE ROTATION	RTSET	—	✓	—	✓	✓	✓
Program	IF GOTO	IF * GOTO *	—	✓	✓	✓	✓	✓
	RETURN	RETURN	—	✓	✓	✓	✓	✓
	WAIT	WAIT	—	✓	✓	✓	✓	✓
	TWAIT	TWAIT	—	✓	✓	✓	✓	✓
	PAUSE	PAUSE	—	✓	✓	✓	✓	✓
	HALT	HALT	—	✓	✓	✓	✓	✓
	STOP	STOP	—	✓	✓	✓	✓	✓
Structure	IF THEN	IF * THEN	—	✓	✓	✓	✓	✓
	ELSE	ELSE	—	✓	✓	✓	✓	✓
	END	END	—	✓	✓	✓	✓	✓
	WHILE_DO	WHILE * DO	—	✓	✓	✓	✓	✓
	DO	DO	—	✓	✓	✓	✓	✓
	UNTIL	UNTIL	—	✓	✓	✓	✓	✓
	FOR	FOR *=* TO * *	—	✓	✓	✓	✓	✓
Monitor	PRINT	PRINT	—	✓	✓	✓	✓	✓
	TYPE	TYPE	—	✓	✓	✓	✓	✓
	DELETE	DELETE	—	✓	✓	✓	✓	✓
Hand	OPEN	OPEN	—	✓	✓	✓	✓	✓
	OPENI	OPENI	—	✓	✓	✓	✓	✓
	CLOSE	CLOSE	—	✓	✓	✓	✓	✓
	CLOSEI	CLOSEI	—	✓	✓	✓	✓	✓
Servo Welding Gun	SRV1PRESS	SRV1PRESS	—	—	—	—	✓	—
	SRV2PRESS	SRV2PRESS	—	—	—	—	✓	—
	SGCLEARANS	SGCLEARANS	—	—	—	—	✓	—
	SGREFLEX	SGREFLEX	—	—	—	—	✓	—
	SGGUNNO	* = SGGUNNO(*)	—	—	—	—	✓	—
	SGWORKGAP	* = SGWORKGAP(*)	—	—	—	—	✓	—
	SGCHIP	* = SGCHIP(*, *)	—	—	—	—	✓	—
	SPOTSTAT	* = SPOTSTAT(*)	—	—	—	—	✓	—
	CLSUBBIT	* = CLSUBBIT	—	—	—	—	✓	—

Type	Instruction	Language		Application				
		AS language	Block Teach	Handling	Handling (Special)	Sealing	Servo Welding Gun	Arc Welding
Arc Welding	W1SET	W1SET	—	—	—	—	—	✓
	W2SET	W2SET	—	—	—	—	—	✓
	W3SET	W3SET	—	—	—	—	—	✓
	W.INCHING	W.INCHING	—	—	—	—	—	✓
	W.RETRACT	W.RETRACT	—	—	—	—	—	✓
	WVSDIR	WVSDIR	—	—	—	—	—	✓
	LTBLSET	LTBLSET	—	—	—	—	—	✓
	OGSET	OGSET	—	—	—	—	—	✓
	JWS	JWS	—	—	—	—	—	✓
	LWS	LWS	—	—	—	—	—	✓
	LWC	LWC	—	—	—	—	—	✓
	C1WC	C1WC	—	—	—	—	—	✓
	C2WC	C2WC	—	—	—	—	—	✓
	LWE	LWE	—	—	—	—	—	✓
	C2WE	C2WE	—	—	—	—	—	✓
	STWC	STWC	—	—	—	—	—	✓
	STWE	STWE	—	—	—	—	—	✓
	JAS	JAS	—	—	—	—	—	✓
	LAS	LAS	—	—	—	—	—	✓
	DWC	DWC	—	—	—	—	—	✓
	INSUL_CHK	INSUL_CHK	—	—	—	—	—	✓
Real Time	PMODTXYZ	PMODTXYZ	—	✓	—	—	—	—
	PMODXYZ	PMODXYZ	—	✓	—	—	—	—
	PMODLIMIT	PMODLIMIT	—	✓	—	—	—	—
	PMODSTART	PMODSTART	—	✓	—	—	—	—
	PMODEND	PMODEND	—	✓	—	—	—	—

Type	Instruction	Language		Application				
		AS language	Block Teach	Handling	Handling (Special)	Sealing	Servo Welding Gun	Arc Welding
Block Teach	JOINT	—	JOINT	✓	—	✓	✓	—
	LINEAR	—	LINEAR	✓	—	✓	✓	—
	CIR1	—	CIR1	✓	—	✓	✓	—
	CIR2	—	CIR2	✓	—	✓	✓	—
	FLIN	—	FLIN	✓	—	✓	✓	—
	FCIR1	—	FCIR1	✓	—	✓	✓	—
	FCIR2	—	FCIR2	✓	—	✓	✓	—
	AIRCUT - JOINT	—	AC JOINT	—	—	—	—	✓
	AIRCUT - LINEAR	—	AC LINEAR	—	—	—	—	✓
	AIRCUT - CIR1	—	AC CIR1	—	—	—	—	✓
	AIRCUT - CIR2	—	AC CIR2	—	—	—	—	✓
	ARC SPOT - JOINT	—	AS JOINT	—	—	—	—	✓
	ARC SPOT - LINEAR	—	AS LINEAR	—	—	—	—	✓
	WELD START - JOINT	—	WS JOINT	—	—	—	—	✓
	WELD START - LINEAR	—	WS LINEAR	—	—	—	—	✓
	WELD CONTINUE - LINEAR	—	WC LINEAR WELD_COND	—	—	—	—	✓
	WELD CONTINUE - CIR1	—	WC CIR1 WELD_COND	—	—	—	—	✓
	WELD CONTINUE - CIR2	—	WC CIR2 WELD_COND	—	—	—	—	✓
	WELD END - LINEAR	—	WE LINEAR WELD_COND	—	—	—	—	✓
	WELD END - CIR2	—	WE CIR2 WELD_COND	—	—	—	—	✓
Function	FN	—	FN* [*] KI* [*]	✓	—	✓	✓	✓

Type	Instruction	Language		Application				
		AS language	Block Teach	Handling	Handling (Special)	Sealing	Servo Welding Gun	Arc Welding
*In Japanese, the [Type] of instruction is different by application.								
Speed	SPEED	SPEED	–	✓	✓	✓	✓	✓
	BSPEED	BSPEED	–	✓	–	✓	✓	✓
	DECEL	DECEL	–	✓	✓	✓	✓	✓
	BRAKE	BRAKE	–	✓	✓	✓	✓	✓
	BREAK	BREAK	–	✓	✓	✓	✓	✓
Accuracy/ Timer	ACCEL	ACCEL	–	✓	✓	✓	✓	✓
	ACCURACY	ACCURACY	–	✓	–	✓	✓	✓
	L3ACCURACY	L3ACCURACY	–	–	✓	–	–	–
	ZL3ACCURACY	ZL3ACCURACY	–	–	✓	–	–	–
	DELAY	DELAY	–	✓	✓	✓	✓	✓
Condition	GOTO	GOTO	–	✓	✓	✓	✓	✓
	LABEL	(Directly input)	–	✓	✓	✓	✓	✓

Memo

8 FAQ/Troubleshooting

This chapter describes FAQ and troubleshooting about installation/start-up.

For inquiry about K-ROSET function or trouble, please contact [support_roset@khi.co.jp].
For inquiry about robot operation and AS language, please contact Kawasaki Robot Services.

The most frequently asked questions and solutions for K-ROSET are summarized in K-ROSET Frequently Asked Questions (FAQ).

8.1 FAQ/Troubleshooting about Installation/Start-up

Q1. When trying to start two K-ROSET at a time, the second one cannot be started.
A1. Same project cannot be started at a time. Since Ver1.7.0, other project that is not executed can be started as ViewerMode.

Q2. When language settings are changed in a multi-user environment, multiple languages may be present in the environment of a user other than the one who performed the change.
A2. To start up K-ROSET using the account of a user other than the one who performed the change, please set up the language again.

Q3. K-ROSET does not start up when using a user account with only user authority.
A3. Please grant authority equal to or higher than that of the power user to the user account by which you wish to start up K-ROSET.

Q4. Some functions are not displayed in plug-in settings.
A4. In K-ROSET, available applications vary depending on license. Please check license type you have purchased.

Q5. Opening the software and displaying a Plug-in dialog takes long time compares to other computer.
A5. Execute the HASPUserSetup.exe in the [Driver] folder in the DVD and then execute [Recpvery]. If that does not make any difference, it could be because of the performance capability of your computer.

Q6. K-ROSET cannot be installed or opened in the computer which is running WindowsXP.
A6. K-ROSET uses Net4.5 from V1.8.0. therefor K-ROSET cannot be run on WindowsXP. Please install to a computer which runs Windows7 or Windows10.

Q7. Open K-ROSET and CS-Configurator simultaneously.
A7. You can now open the K-ROSET and the CS-Configurator simultaneously in V1.8.1.

8.2 FAQ/Troubleshooting about User Operations

This chapter describes FAQ/troubleshooting about user operations.

Q1. When I added a teaching point on the tree, I could not add by specifying each joint value.

A1. On the tree, it is not possible to add a teaching point by specifying each joint value.
On the program table, however, it is possible to add a teaching point by specifying values to be trans or each joint value.

Q2. When more than one model is added from Explorer using the drag-and-drop operation, the sequence of the models added onto the tree (Work1, Work2, ...) does not match the sequence viewed on Explorer.

A2. To match the sequence between the view of Explorer and the tree, please select a file and add it one by one.

Q3. When using hand-grip teaching, I can’t tell when objects are interfering with each other.

A3. The collision checking function is not valid when using hand-grip teaching.

Q4. When simulation is executed repeatedly, the size of the project file increases when it is saved.

A4. The size of the project file increases by the size of the drawn trajectory lines when simulation is executed repeatedly.
By saving a project file after deleting the trajectory lines, it is able to avoid this phenomenon of increased size can be avoided.

Q5. As the number of robots in a project increases, the size of the project file increases when it is saved.

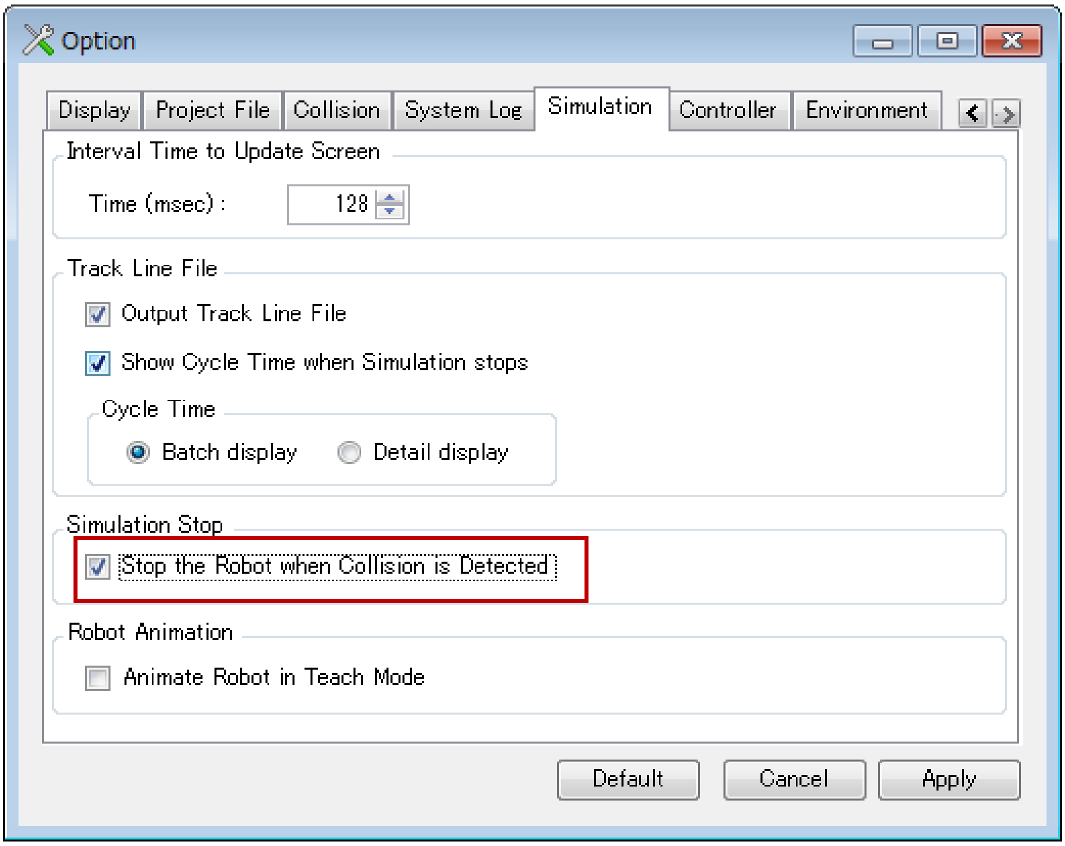
A5. For the current version, the more robots contained in a project, the more the size of the project file increases.
When there is a robot which is no longer used in a project, delete the robot and then save the project.

Q6. The edges of the grid displayed on the view do not appear.

A6. Because of K-ROSET’s restrictions, the edges of the grid may not be displayed when the display range of the grid is enlarged.
They may be displayed correctly when the angle of the view is changed or the display range of the grid is reduced.

Q7. When I tried to execute simulation, the message “The X-axis shows abnormal deviation” is displayed, so that simulation cannot be executed correctly.

A7. Simulation cannot continue by default while collision is being caused among the models.
By unchecking the item below on the Option Settings screen, simulation can be executed even while models are interfering with each other.



Q8. When a character is entered in a property item, "xx is not a valid value of the Double attribute " is displayed.

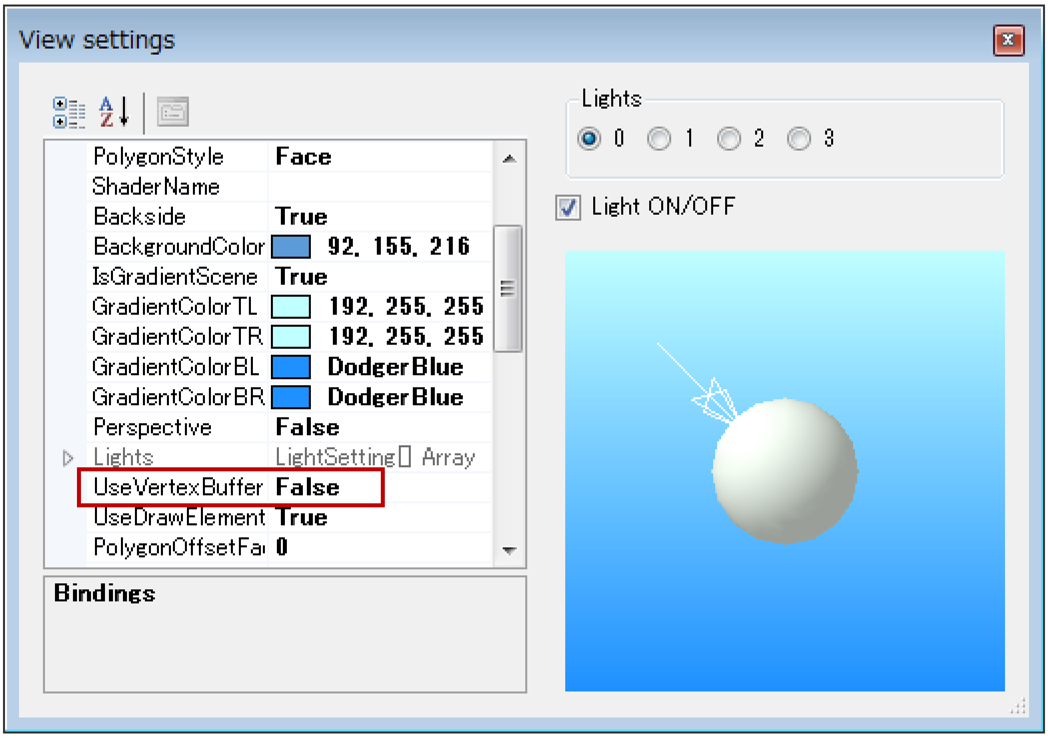
A8. Such a message is displayed when a character is entered in an item to which only numerical values are allowed.

Q9. An error occurs when adding a robot on K-ROSET with the status that PC-ROSET has started.
Fail to start PC-AS itself with the status that K-ROSET has started.
An error occurs when adding a robot on K-ROSET after completing the start of PC-ROSET.

A9. It is impossible to start K-ROSET and PC-ROSET at a same time.
Start above each application separately. Confirm the task manager at the end and terminate following process.
user_tp.exe / asproc.exe / panel.exe

Q10. Sometimes an internal error occurs when displaying a compass.

A10. There is a possibility to cause an error depend on the graphic board.
Set [UseVertexBuffer] on the view setting menu as "False" and then operate.
Updating the driver software of the graphic board may improve the issue.



Q11. When executing click teach with the status of compass display, the compass disappears.

A11. This phenomenon may occur depend on the graphic board. By switching compass Show/Hide several times, the compass would not disappear.
Updating the driver software of the graphic board may improve the issue.

Q12. By click teach, teach points are created in different positions as those clicked.

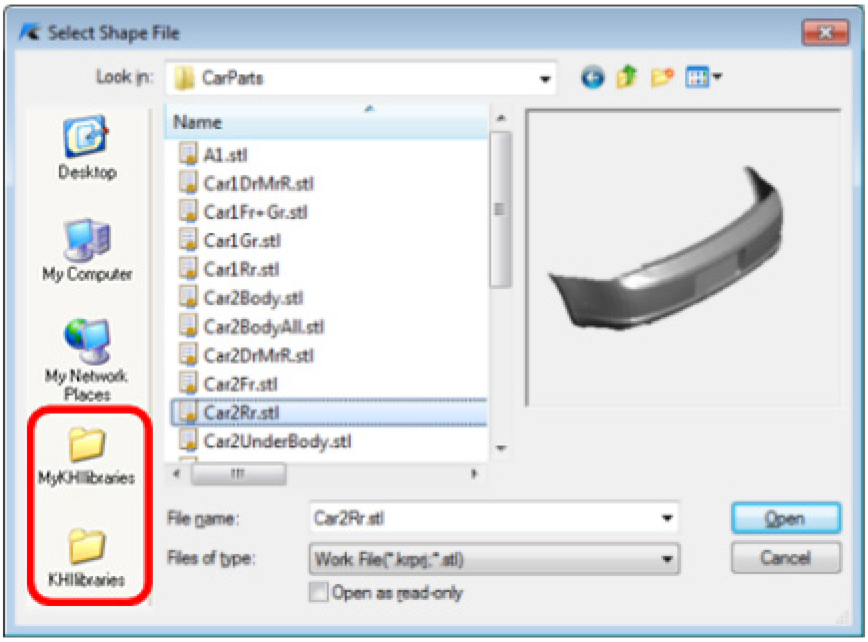
A12. There is a possibility that teach points are created in unintended positions depend on the graphic board. In case of this, place the surface where teach points to be created parallel to the display screen as much as possible and then click.

Q13. Option and home set menu are hidden on the teach panel.

A13. There is a possibility that Option – Display – Style – Display style of K-ROSET is not the Default one. Or, the Meiryo font is designated for the menu of Windows screen design.
Set the display style of K-ROSET as Default or change the font on the screen setting as follows.
Right-click on the desktop and select Property from menu. Property dialogue of the screen is displayed. Select the design tab and click detail setting button. Detail dialogue of the setting is displayed. Select [Menu] on [Designated part] and select the font except for Meiryo. Click OK to apply.

Q14. Shortcuts for MyKHIlibraries and KHIlibraries are not displayed on the file selection screen.

A14. There is a possibility that these shortcuts are not displayed with Windows7 PC. Please prepare shortcut folders for MyKHIlibraries and KHIlibraries. We do apologize for any inconvenience.



Q15. Is there any different point between the setting of K-ROSET controller and that of the actual machine?

A15. K-ROSET uses the default value in a controller. In case the customer has customized the actual machine, the setting would be different. Please be careful.

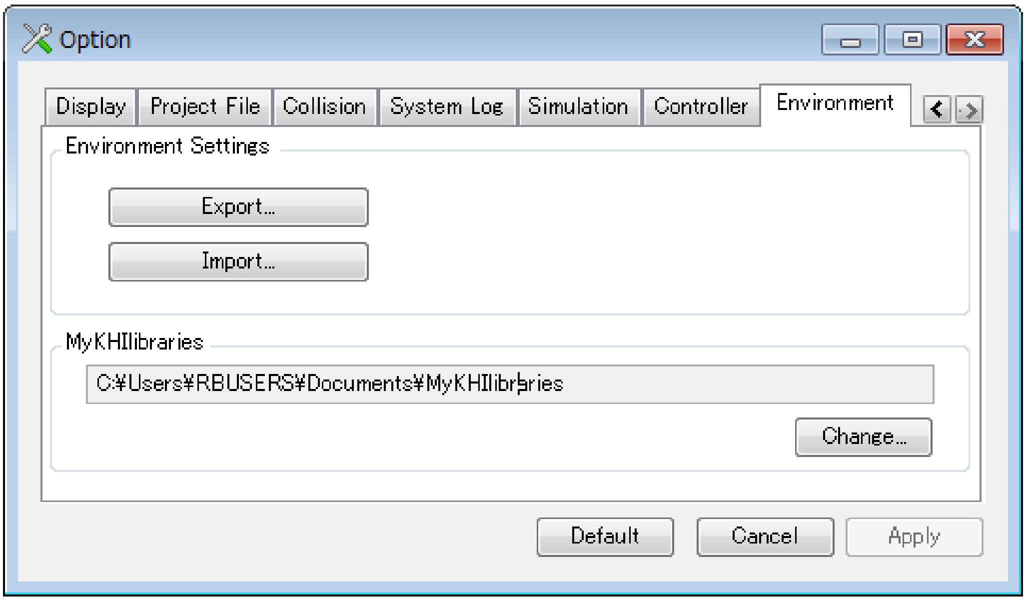
Please contact to Kawasaki Robot Service for actual robot setup.

Besides, the default value at the time of adding robots has been changed since V1.6.9 so that following sections can be considered easily.

- ✧ Data storage valid
- ✧ Set the page number of I/F panel as 8
- ✧ Set I/O signal number as 256 and internal signal number as 512

Q16. Is it possible to change the saving destination of K-ROSET project?

A16. Since V1.6.9, it is possible to change MyKHIlibraries folder by the option setting.



Q17. Robot doesn't jump when selecting the teach point.

A17. It should be the posture that the robot cannot perform such as out of the motion range. See the log tab and make sure that there is no error message saying [It is impossible to change the robot posture.]

- Since V1.6.9, an error message is also displayed on the lower left of the window. Please check.

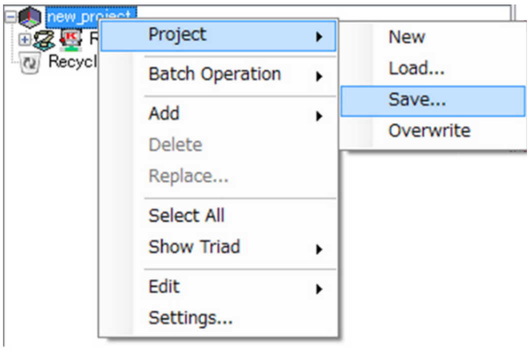
Q18. We would like to change background of the view.

A18. Since V1.6.9, it is possible to change background colors. In case you would like to set it back as default color, refer to "2.12" and input the following value.

BackgroundColor 92, 155, 216

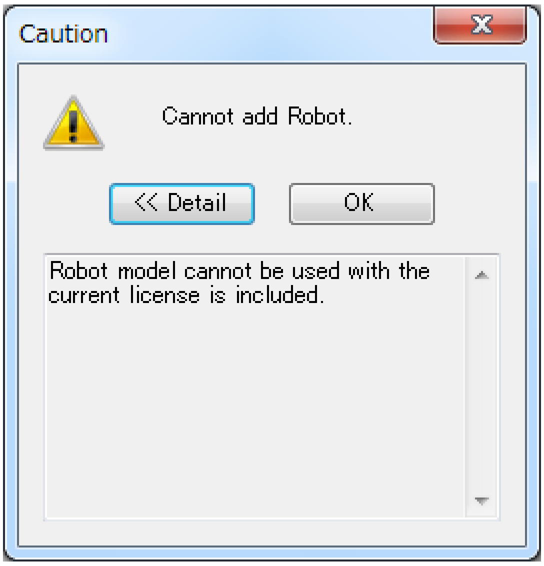
Q19. When it is named, and it was saved, a project name does not change it.

A19. Because a project save function of K-ROSET was an export (the output) function, the project saves back came to display a used project name than V1.7.0.



Q20. Only specific robots can be added.

A20. Since V1.7.1, a license that can add specific models is available. In case below caution screen is displayed, please contact our support and confirm the license type.



Q21. Please advise the supported robot models.

A21. Please refer to the "7.2 Controller library" and "7.3 Simulation Models".

Q22. Can simulation and timeline motion be done same speed as actual motion?

A22. Motion speed may vary depending on PC function. As PC throughput gets higher, the speed gets faster. Confirm cycle time and adjust option settings of drawing update speed and timeline play pitch. If PC throughput is high enough, short value can allow smooth play. In other words, longer value can allow reasonable speed even with low throughput. However, long value may drop accuracy of collision detection.

Q23. Is there possibility to collide if layout is exactly same as reviewed data?

A23. Actual installation may create gap and also K-ROSET models have slight differences. Please design layout considering allowance.
Collision margin can be set in V1.7.1 and later. It allows you to design a system with considering the set margin.

Q24. Motion is very slow or does not move.
A24. The reason might be low PC function, large project data or large STL data. Please check if PC function meets the system requirements of K-ROSET. Project size depends on number of object items added in layout, track line data or numbers of program/variable in the program table.
Save unnecessary items in file and keep project data light. For STL, most PC tends to get slower when total data used in the project is around 50M. It may be solved by using 64 bit PC. Please keep data size light when outputting STL.

Q25. Language is unknown on the program table.
A25. Judge on the program table shows if language change or robot jump function can be used. Refer to the "7.4 Program instructions" for instructions supported by K-ROSET. Some instructions may be able to use in simulation even not supported by K-ROSET. Please contact Kawasaki Robot Services.

Q26. We would like to use the robot data.
A26. Refer to the program table chapter for input/output of program and variable. Controller settings can be captured from terminal by load and save command. However, Kawasaki cannot guarantee any motion when capturing controller settings to K-ROSET or forwarding them to robot.

Q27. Internal error or fatal error happened with K-ROSET.
A27. Run KrosetErrorInfoCollector.exe from the installation folder.
Logs and other information are collected to analyze error information generated by K-ROSET. Follow the instructions from the tool, attach the file output by the tool, and contact.
support_roset@khi.co.jp

Q28. Loaded a project by other PC but a model is not displayed.
A28. Model drawing use STL data in Model folder in project folder. When moving a project, copy a whole project folder not only KRPRJ.

Q29. Cycle time does not match to the robot
A29. Confirmed that there is not big gap if there is no difference in controller settings. However, simulator is ideal status without calculating any load, also measurement timing of cycle time varies depending on specification. These might cause some gap. A robot is often measured by writing Timer function in a program while cycle time of K-ROSET captures from cycle ON to OFF. Thus, start and finish timing of measurement is different. Use Timer function to measure under the same condition.

Q30. It is slow to capture data in synchronized screen.
A30. It captures data to compare with data of a robot controller. It takes longer if a controller has plenty of data.

Q31. Robot name cannot be renamed to [R01-C01-CELL1].
A31. Robot name has to be in the form of [Robot arm[controller]] like R01[C01] which appears when robot is added.

Q32. Cannot use SPR_PATTERN2 with explosion proof AS ASCII.

A32. Please use SPR_SHAPING2 instead.

Q33. Despite I made a change on dedicated signal for external hold (EXT_IT), it changes back even when synchronized with the controller.

A33. Currently dedicated signal for external hold (EXT_IT) in K-ROSET is fixed to 1015 for specification reason. Please specify 1015 to the signal and make sure that you do not use 1015 for other signal.

Q34. Can K-ROSET simulate the operation with spin axis?

A 34. Instructions for spin motion including SpinMove cannot be displayed in the K-ROSET view.
*Same thing for the table instruction for explosion proof ASCII.

Q35. Robot does not move.

A35. Please make sure that “Start a controller when a robot is added.” in the Plug-ins is check marked as well as the values set to [Interval Time to Update Screen] in the [Simulation] tab is bigger than control cycle.
Control frequency E and T controller: 2msec, D+ controller: 8msec and D and C controller: 16msec.

Q36. Some of the check boxes in the Plug-ins settings are disabled.

A36. Please check the title appears in the K-ROSET window. [K-ROSET LITE] has limited use of expansion application.

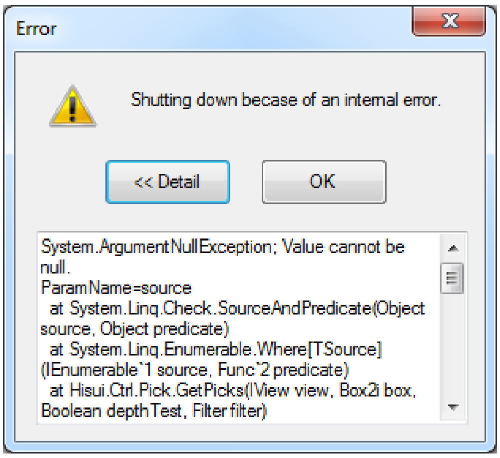
Q37. I would like to display cycle time.

A37. Checkmark the [Cycle time] in the Plug-ins settings and go to the Controller tab in the bottom to access to the [Quick Settings] tab to checkmark the [Output Track Line File] and click on [Apply]. Cycle time dialog will appear once cycle lamp goes off when running a simulation.
*There is a setting [Show Cycle Time when Simulation stops] below the [Output Track Line File] in V1.7.0 and later.

Q38. Display on Windows8.1,10 is messed up.

A38. Access to [Control Panel] – [All Control Panel Items] – [Display] –[Change the size of all items] to set the font size to Smaller.
Windows10->Set [Display settings] and [Edit size of the text, application and other items] to 100%.

Q39. Following error message appears.



A39. This is an error in graphic view.

Please update your driver first. If your computer uses dual graphics, open K-ROSET with the settings to use [NVIDIA] or [AMD].

Procedure:
For the computer with dual graphics, right-click on KrHsMain.exe will open a context menu and go to "Run with graphics processor" allows you to switch between Intel and NVIDIA.

Q40. I would like to use the fixed tool function.
A40 .Please enables the option setting.

Q41. Newly added robot color does not change to Munsell 10GY9/1.
A41. Go to [View] – [Setting] to check the [Color] item. If the setting is different from [219,228,218], please change the setting back to be [219,228,218].

Q42. Tried to open a project file by selecting a zip file *krprj, but an error occurs with an error message [File cannot be imported.].
A42. Zip file cannot be opened in K-ROSET. Please unzip the file first before opening the project file.

8.3 Restrictions

- Restriction on the project

When saving a project, it is not allowed to enter a project name whose absolute path name on the Windows system exceeds 255 bytes.

- Restrictions on message that it is displayed when K-ROSET is quitted.

After saving the project, a message "Do you want to save changes" is displayed even if you have not changed anything. A message is always displayed at the end in order not to fail to save.
If you have already saved before terminating, there is no need to save again. Click [No] to terminate.

- Restrictions on the handling simulation

Since V1.6.9, it is possible to set the clamp range. Also, it is possible to simulate faster at the time of the origin display OFF than that of ON.
You can add multiple ClampZone models from V1.8.2. You will need Handling Simulation application to use ClampZone, therefore add [Handling Simulation] from Plug-ins.

- Restrictions on the arc simulation

The touch sensing function doesn’t work properly when there is no wire model which is automatically created by the welding simulation application.

- Restrictions on the paint simulation

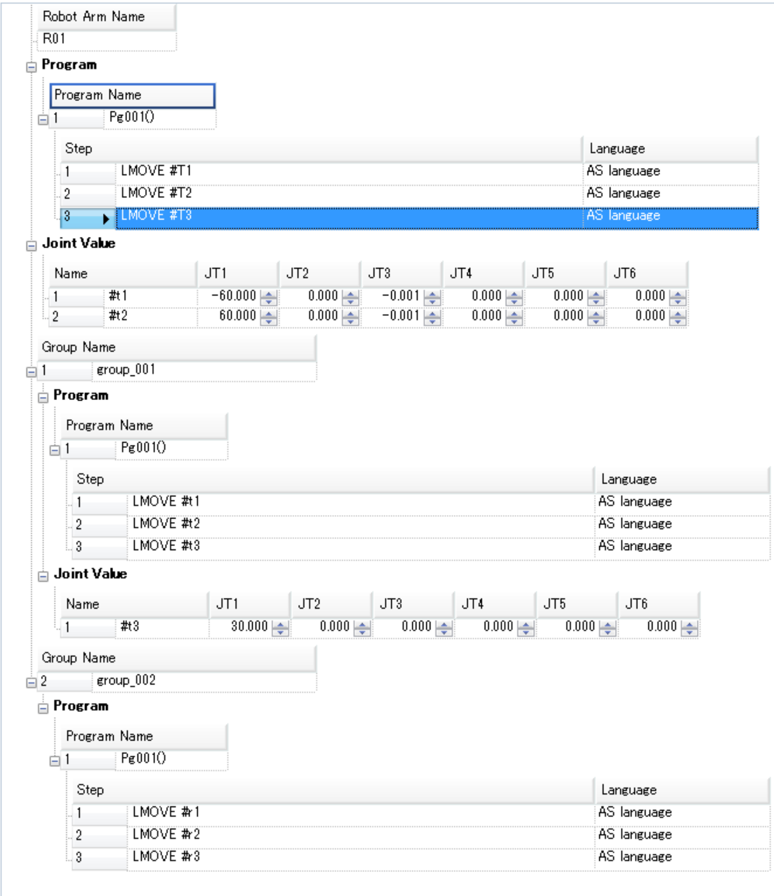
When there is an obstacle model named [Pattern] as child model of the tool, it is possible to switch Show/Hide of [Pattern] model by ON/OFF of spray and gun command.

- Restrictions on the servo welding simulation

When there is an obstacle model named [tip] as child model of movable axis of the tool, it is possible to draw a trajectory line of movable axis at [tip] origin.

- Restrictions on the program table

K-ROSET used to identify the capital letter and small letter in the variable name in the program tab and robot jumped accordingly, however, now K-ROSET ignores the difference in letter case as same as the AS program. And it used to search for the target variable name through the entire program but not by group and jumped to the first result found. V1.7.1 or later allows to search by group and it does not jump when the target variable name was not found in the target group.
The variable which is right underneath the controller can be referred from any program in any group.
In the following example, “LMOVE #t3” in the [group002-Pg001] does not jump.



• Restrictions upon option feature

Instructions for spin motion including SpinMove cannot be displayed in the K-ROSET view.

*Same thing for the table instruction for explosion proof ASCII.

• Restrictions upon instructions

Cannot use SPR_PATTERN2 with explosion proof AS ASCII. Please use SPR_SHAPING2 instead.

• Restrictions upon signals

Dedicated signal for external hold (EXT_IT) in K-ROSET is fixed to 1015. Please specify 1015 to the signal and make sure that you do not use 1015 to other signal and be careful when loading a data from real robot.

• Restrictions upon conveyor

Controller for handling except for [10100X3R, F1000000F] or later cannot monitor the multiple conveyor axes by simulation dialog or controller tab.

• Restrictions upon highlight on program step

Highlighting feature highlights both currently executing step and the previous step.

• Restrictions upon Time Line

Please note that program name may not be displayed depends on the robot model and/or AS version you use.

• Restrictions upon Robot Color setting

Even though Color is selected in the View settings, some model does not change its color when added to a project. To change robot color, change from Joint model Color setting after adding a model.

• Restrictions upon KJ314

Traverse axis is supported from V1.7.2. Though traverse axis + conveyor supports both following and tracking, only in version 80000W3T and 80000W3H.

• Restrictions upon MS005

Please note that there might be some deviations in motion between actual robot and simulation model due to deference in OS calculation process.

• AS version of explosion proof E controller

It is impossible to put paint E controller AS version 8000001E and 80000V2C in the same project.
If putting them in the same project, virtual controller terminates inadequately and not able to start controller.

• OX/WX signal expansion

Settings for the AS version 80000W36, 50000W15, 10100X3D, 30300W23, 21310X0E or later can be saved.
For other versions, please set option settings every time open K-ROSET as it has been in the older version.
Please set the OX/WX signal expansion to be ON in Zoption_4 every time opening a project.

• Explosion-proof ASCII command

Painting signal output and ratio instruction supports SHAPING3, FLOW_RATE_RATIO2, SHAPING_RATIO2 and AIRMOTOR_RATIO2.
But SHAPING_AIR3, FLOW_RATE2_RATIO, SHAPING2_RATIO and AIRMOTOR2_RATIO are not supported.
Please edit in the program table before use.
Newly added AS version 80000V2P or later needs to be adjusted.

• Restrictions upon duAro

Default setting of the height from the ground to the top cart panel of duAro is set to 800mm. Change the value to be same height as the actual robot. Height for the food edition is set to 1050mm. Provided Tablet software, AS application and AS software as of standard are as follows. Please check your software versions when connecting to a tablet.

F-Controller

AS software	AS application	Tablet
F6000000Q	ADU0F032	RobotTeacher2 Ver.20.1
F6000000N	ADU0F029	RobotTeacher2 Ver.18.2
F6000000J	ADU0F026	RobotTeacher2 Ver.17.1
F6000000E	ADU0F022	RobotTeacher2 Ver.15.0
F60000009	ADU0F020	RobotTeacher2 Ver.13.0

D-Controller

AS software	AS application	Tablet
09200026	ADU00032	RobotTeacher2 Ver.20.1
09200025	ADU00031	RobotTeacher2 Ver.19.1
09200024	ADU00020	RobotTeacher2 Ver.13.0
09200023	ADU00017	RobotTeacher2 Ver.11.0
09200021	ADU00016	RobotTeacher2 Ver.10.0
09200018	ADU00015	RobotTeacher2 Ver.9.0
09200007	ADU00005	RobotTeacher2 Ver.4.0

Conveyor: J9 is the only axis which can be added as conveyor axis. Setup the J7 and J8 as tool axis in the external axis wizard and then select conveyor for the 9^{th} axis to add.
External axis: Adaptable motor is up to 80W. Contact our sales department for further info.

・Restrictions upon Multi arm
A project including multi arm model cannot be opened in K-ROSET with V1.7.1 and earlier.

・Restrictions upon Touch operation
Please note that touch operation is available only for certain functions such as operation in the View and some features are not supported.

・Restrictions upon behavior depends on the computer environment
When K-ROSET is responding slow or an error message [Task cannot be continued due to an error. Save and close the project.] appears, proper processing cannot be guaranteed due to lack of memory. Install the latest driver or reduce 3D data and number of programs. If that does not help, use computer with bigger size memory or with NVIDIA graphic board.

・Vision function
A project which includes camera object cannot be opened in the K-ROSET V1.7.2 or earlier. As long as the camera object is deleted from the project, the same project can be opened in the older version of the K-ROSET.

・External axis wizard
In recent AS version, up to 12 axes can be added using external axis wizard.
Handling
E controller with AS software 10100X3V or later.
Arc welding
E controller with AS software 30300W23 or later.

Other than the above mentioned AS version :
Handling
E controller with AS software up to 10100X3R, or F controller: up to 9 axes.
Painting E controller / Sealing / Handling (Special) : up to 9 axes.
* 09200007 does not support external axis
Other: up to 8 axes.

* Following error occurs when conveyor axis is set to a robot model which supports servo spec 5.
[Path Constant Move] [Conveyor Synchro]

Conveyor axis
There is a limit to the number of axes and axis number that conveyor axis can be added and set.
Handling E controller: Up to four axes (It has to be 7^{th}, 8^{th}, 9^{th}, and/or 10^{th} axis)
Arc welding and Servo welding: Conveyor axis is not supported.
Handling(Special): One axis (It has to be 9^{th} axis)
Other applications: One axis

• Restrictions on communication between K-ROSET and K-VFinder/K-VAssist

Tested AS software version that K-ROSET can communicate with K-VFinder/ K-VAsist are F1000000F, 10100X3Z and 09200018.

Vision feature is available on K-ROSET (UDP communication) only when cycle is ON. K-ROSET Software versions that support vision feature on K-ROSET are K-VFinder [2.1.0.6] or later and K-VAssist [1.1.5.4].

Simulation and case study of multiple robots pick and place applications are not available without K-VAssist. Refer to the table below for further restrictions.

[Restrictions on K-ROSET simulation with the use of K-VFinder and/or K-VAssist]

K-VFinder	K-VAssist	Restrictions
✓	✓	Equivalent to real robot environment. Simulation for applications that involve multiple robots is possible.
✓	✘	Communication command needs to be changed to [VIS,1,1,] for conveyor picking application.
✘	✓	It is possible to simulate applications that involve multiple robots. Recognition result may be different when K-VFinder is used or not used because K-ROSET uses the origin of a workpiece as recognition result when K-VFinder is not used.
✘	✘	Only one robot per camera can be used for simulation. Recognition result may be different when K-VFinder is used or not used because K-ROSET uses the origin of a workpiece as recognition result when K-VFinder is not used.

Memo