K-ROSET
How to make
Handling project

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.

1. Robot Instruction manual
2. Option Manual
3. AS language reference Manual

The contents of this manual are described on condition that installation and connection of the robot are done in accordance with the above listed manuals.

This manual provides as much detailed information as possible on the standard operating methods for the Kawasaki robot. However, not every possible operation, condition or situation that should be avoided can be described in full. Therefore, should any unexplained questions or problems arise during robot operation, please contact Kawasaki Machine Systems. Refer to the contact information listed on the rear cover of this manual for the nearest Kawasaki Machine Systems office.

The explanations in this manual include information on optional functions, but depending on the specification of each unit, not every optional function detailed here may be included with the robot. Also, note that figures given here may differ partially from 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 Machine Systems.**
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 General Description

This manual describes directions and precautions of a handling function of K-ROSET robot.
For details on the functions of the robot unit and the procedure to create a program for handling, refer to an instruction manual of the robot.

1.1 Outline of Handling application

The simulation of the handling motion is carried out with controlling a Clamp signal, as is the case with the actual robot. Therefore, adding the following instructions are needed.

- CLOSEI [WORK CLAMP START]

At the teaching point after this instruction, the work is repeated following the motion of the tool tip of the robot so that the work appears to be clamped.

- OPENI [WORK CLAMP EXIT]

After this instruction, the clamped work does not follow the motion of the robot. This instruction is used for allocation of the work clamped by CLOSEI.

- TWAIT [TIME (sec)]

This instruction is added just before clamp instruction for adjustment of the clamping position in a view. When this instruction is not added, clamping and allocation of the work at the assumed position will not be allowed. The time period should be set longer than the optional screen update period.

2 Procedure to Create Project

This chapter describes a procedure to simulate the handling of the robot with K-ROSET.

2.1 Target System

Figure 2.1 shows the specification of the project to be created.

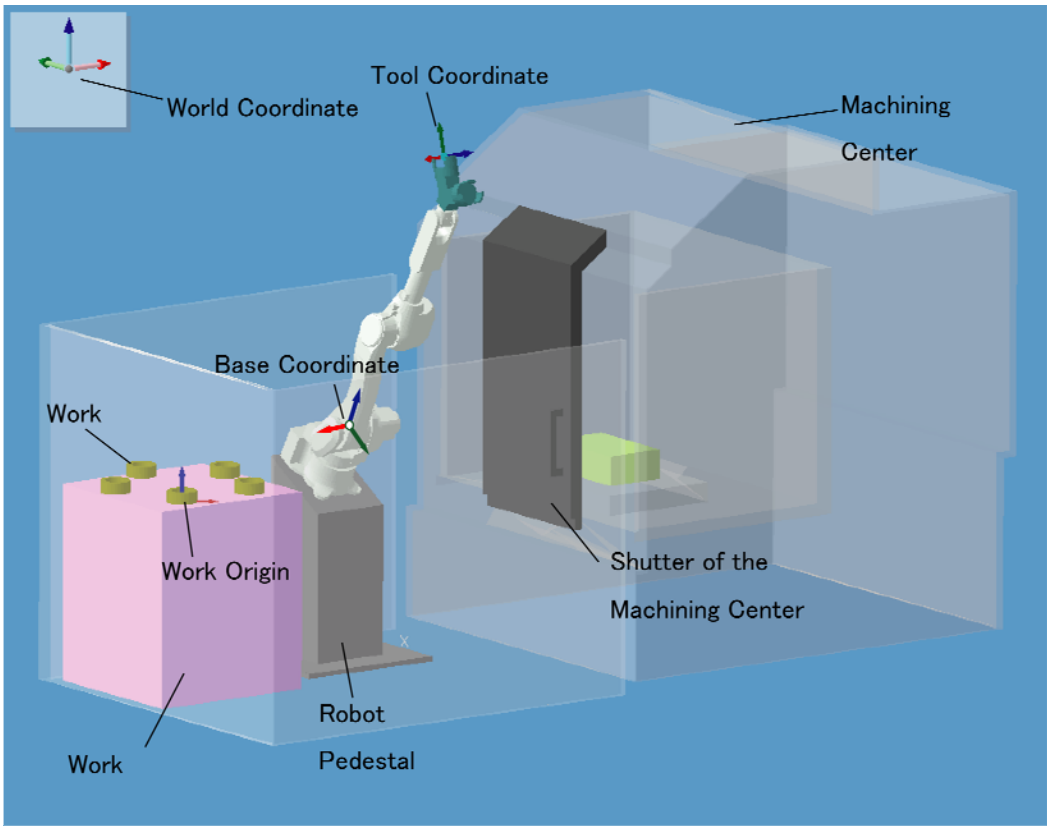


Figure 2.1: Target System of Handling Simulation

Brief description of Figure 2.1

★ The robot RS010N is disposed on the pedestal (floor-standing setting).

★ The origin of the work model to be clamped has been created to be a center of the model.

2.2 Start

This chapter describes a procedure to start K-ROSET.

1 Double-click the shortcut icon on the Desktop.

Example of shortcut icon

K-ROSET starts. The screen after the start appears figure 2.2, for example.

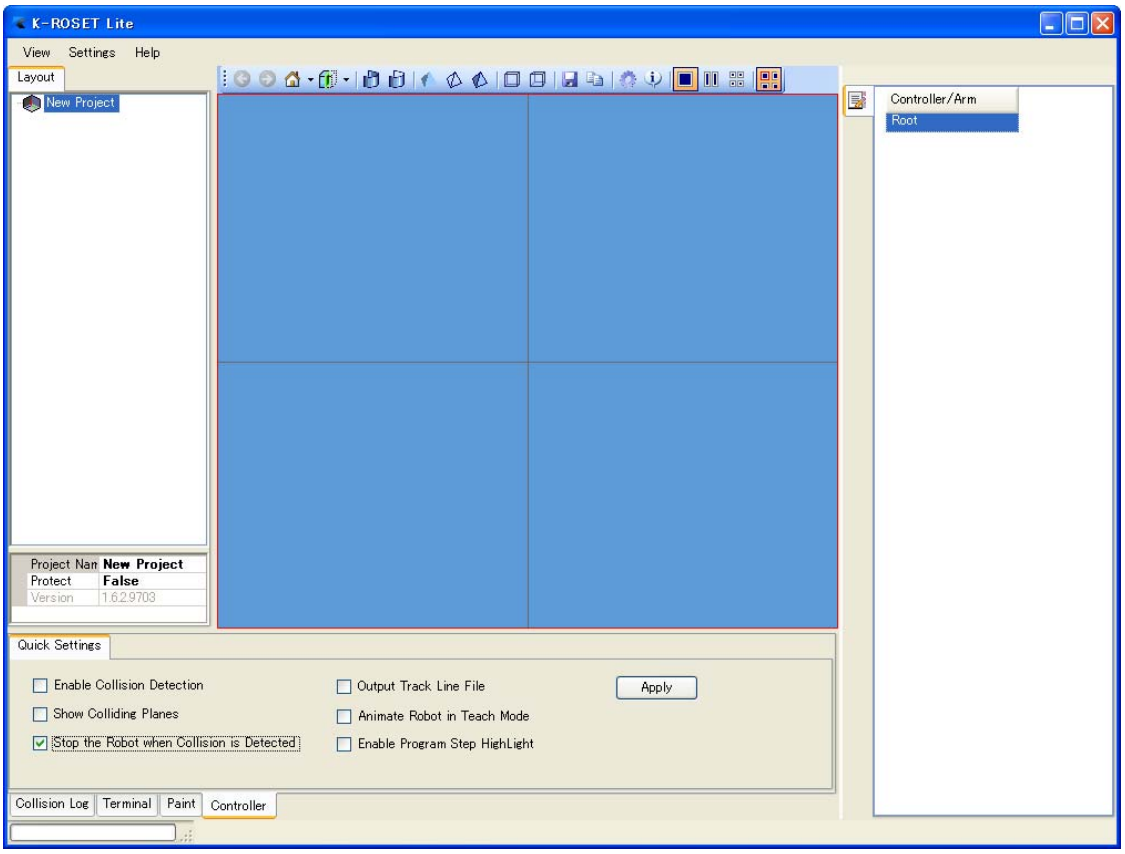


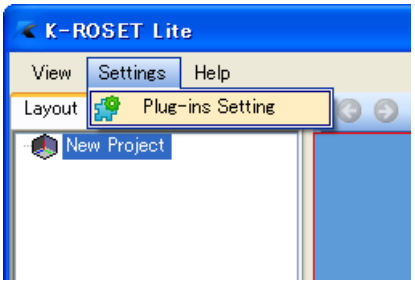
Figure 2.2: Example of screen after start

- When the shortcut icon is not on the desktop, select Start - Programs - Kawasaki - K-ROSET Lite.

2.3 Plug-ins Settings

This chapter describes a procedure to specify the Plug-ins necessary for handling simulation.

1 Select Plug-ins Setting from Settings menu.

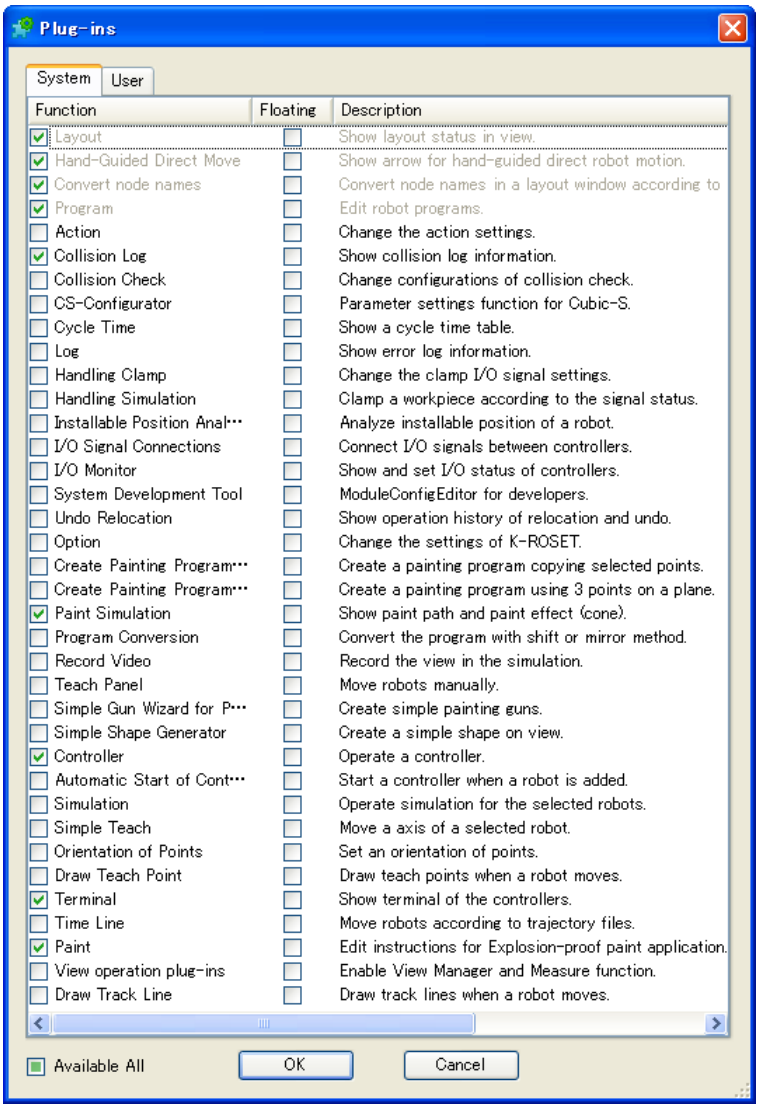


Plug-ins starts.

2 Place a check mark as follows in the function column of the Plug-ins screen.

When a check mark has already been placed, you do not have to place.

For details of functions, refer to the K-ROSET instruction manual.



2.4 Creation of Project

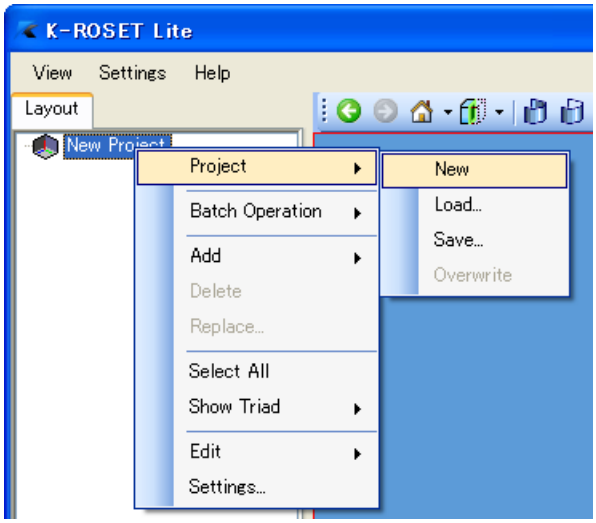
This chapter describes creating procedure of the project.

Creating a New Project

- Make sure to save the project before this operation.

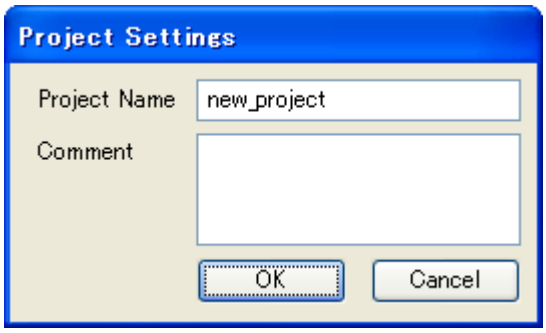
1 Right-click the Project icon [] in the layout.

The menu related to the project is displayed.



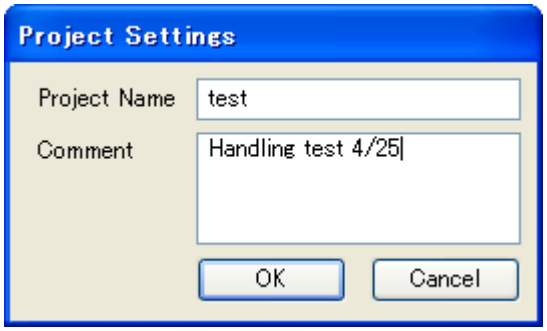
2 Click [Project] - [New] from the menu.

The view is cleared, and Project Setting screen is displayed.



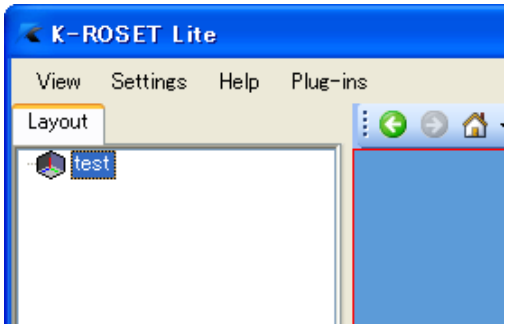
- In Project Name, "new_project" is specified by default.
- When a project already exists at the time of clicking OK, a confirmation message asking to overwrite is displayed.

3 Enter a project name in the Project Name column. Enter a description of the project in comment column.



4 **Click OK button.**

The project with the specified project name is newly created.



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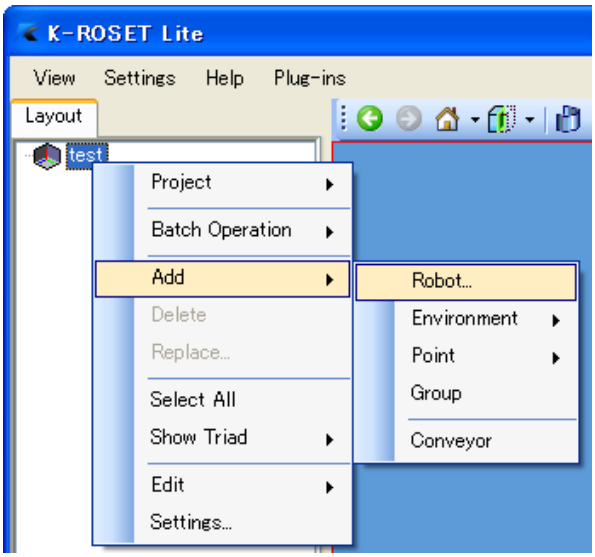
2.5 Addition of Robot and Pedestal

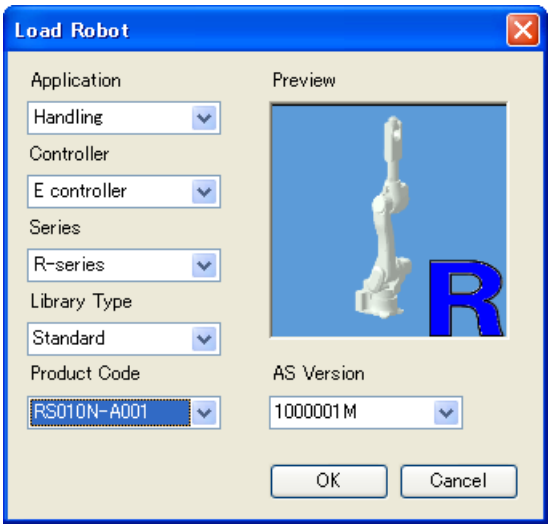
This chapter describes a procedure to a robot and an obstacle (pedestal).

Addition of Robot

1 **Right-click the Project icon [ ] in the layout, and select [Add] - [Robot] from menu.**
The robot load screen is displayed.



2 **Select the selection items as follows (shown on the right), and click OK button.**



Selection of items

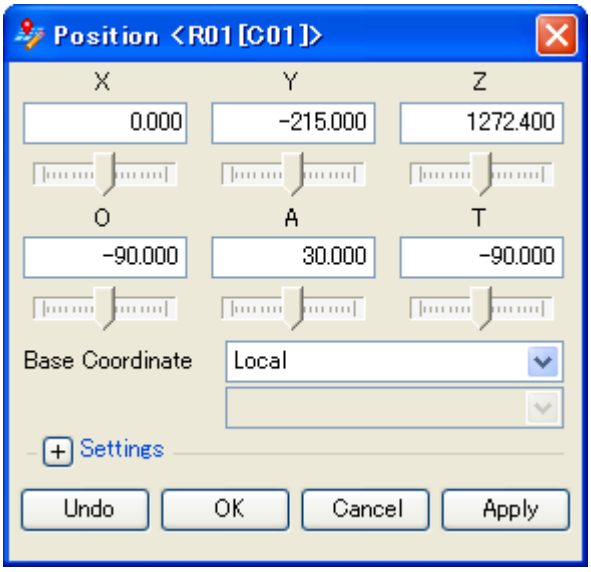
Application	Handling
Controller	E Controller
Series	R Series
Library	Standard
Model	RS010N-A001
AS Version	1000001M

- For details of items, refer to the K-ROSET instruction manual.

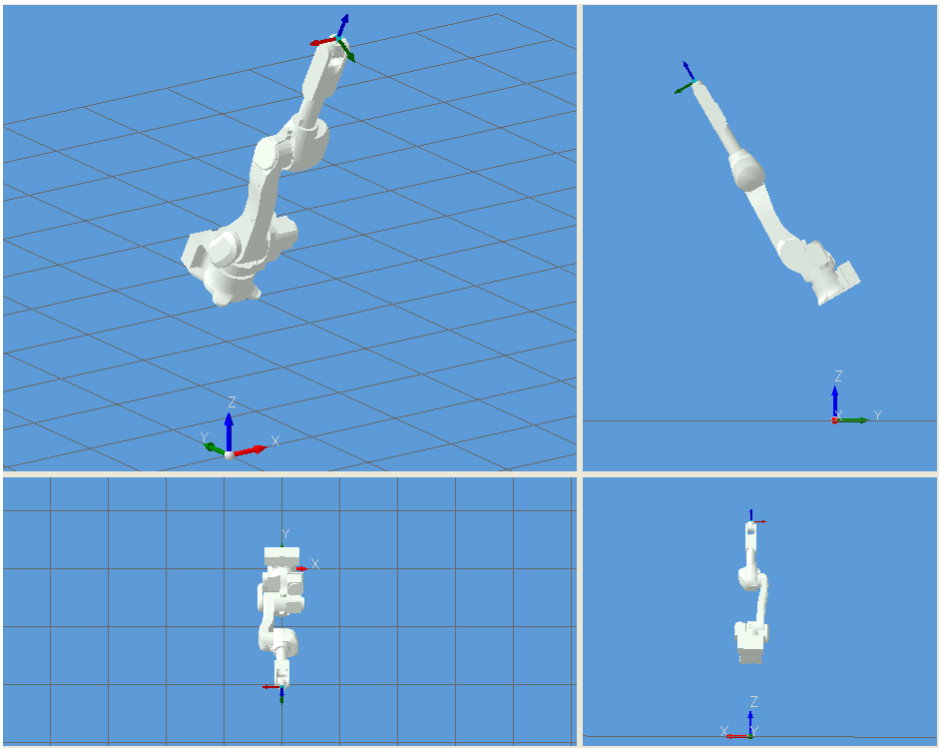
3 **Display a Position screen to allocate a robot.**

4 **Double-click the robot icon [ ] in the layout.**
Position screen is displayed.

5 **Set the value shown on the following screen to each coordinate value, and click OK button.**



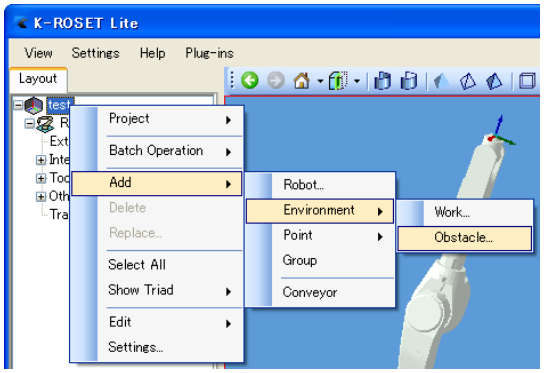
The robot is disposed at the specified position.



Addition of Robot Pedestal

1 **Right-click the Project icon [ ] in the layout.**

The menu related to the project is displayed.

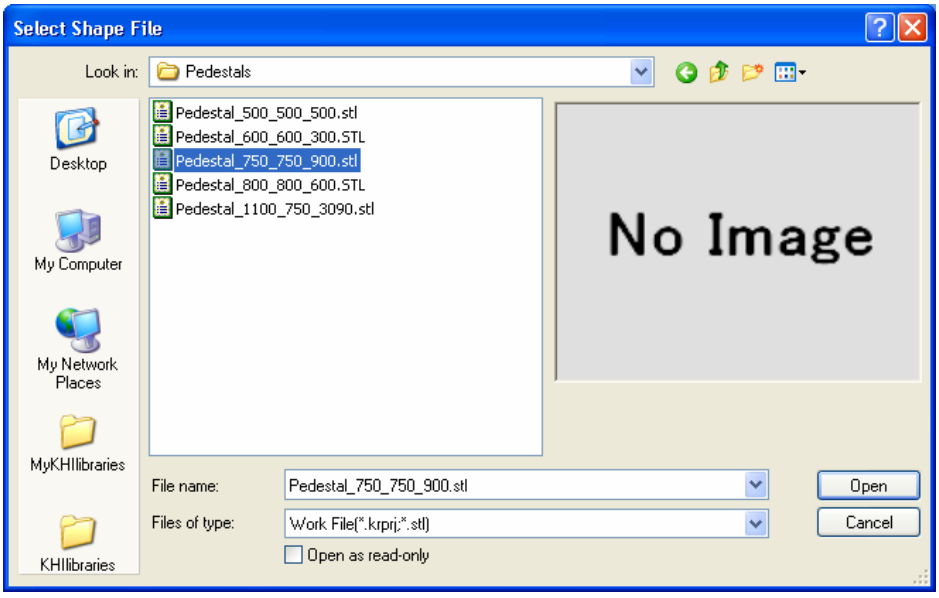


2 Click [Add] - [Environment] - [Obstacle…] from menu.

A shape file selection screen is displayed.

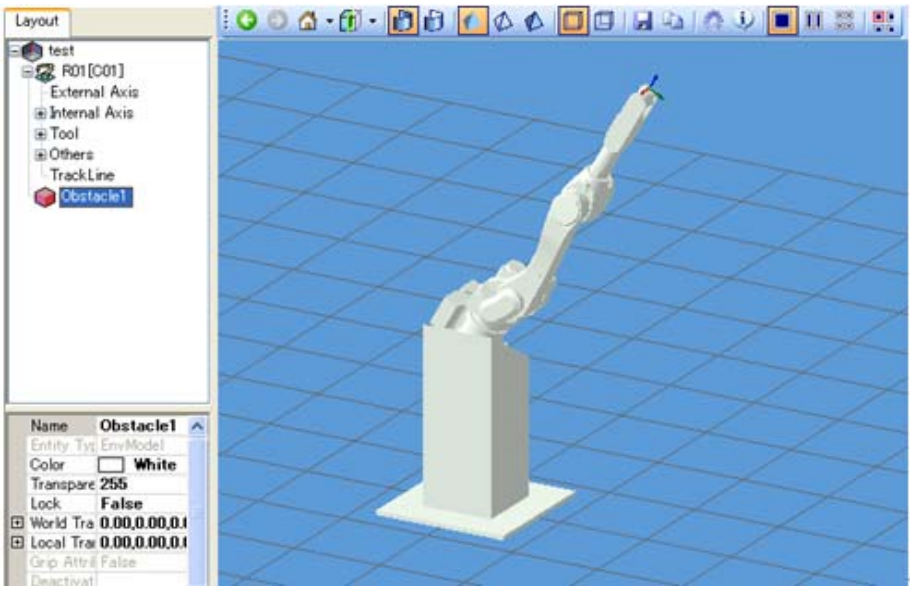
3 Click KHIlibraries folder icon on the left of the screen.

Select KHIlibraries¥Envs¥Equipment¥Pedestals folder.



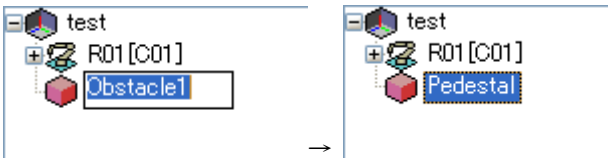
4 Select Pedestal_750_750_900.stl file, and click Open button.

The robot pedestal is added to the layout as Obstacle 1. A robot pedestal of 900mm in height is added.



5 **Left-click the Obstacle 1 in the layout to change the name.**

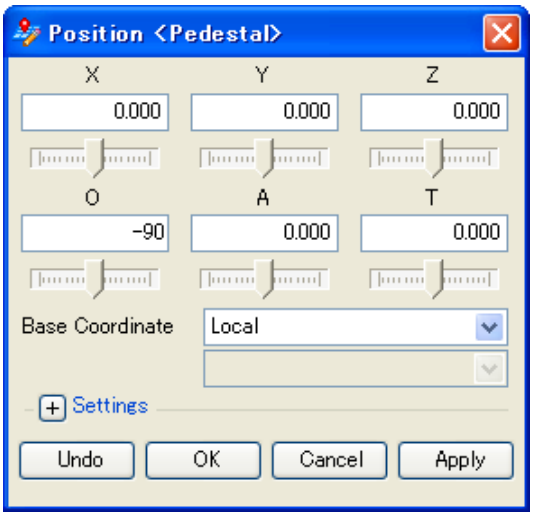
You can enter a name. Enter "Pedestal" and press Enter key to fix.



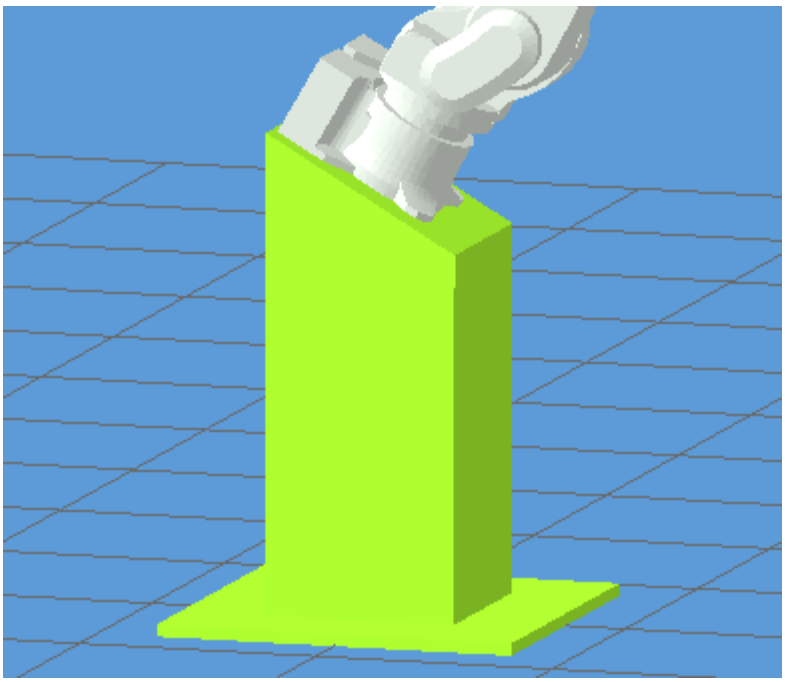
6 **Allocate the pedestal. Double-click the pedestal in the layout (Obstacle icon [ ]).**

The position change screen is displayed.

7 **Set the value shown on the following screen to each coordinate value, and click OK button.**



The pedestal is disposed at the specified position.



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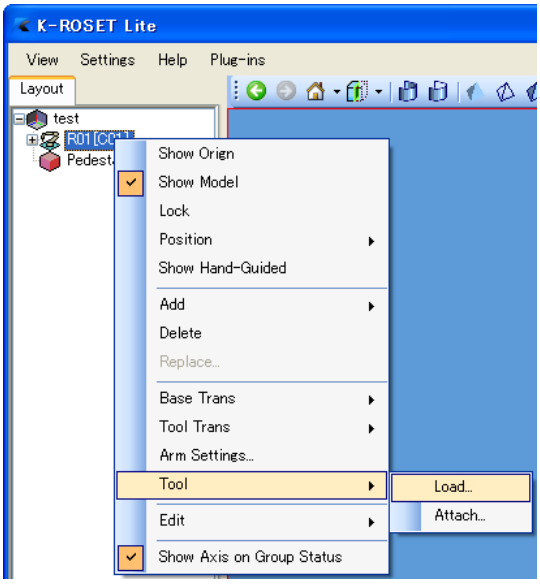
2.6 Addition of Hand Tool

This chapter describes a procedure to add a robot hand. The procedure to load the hand already registered is described.

1 Right-click the robot icon [ ] in the layout.

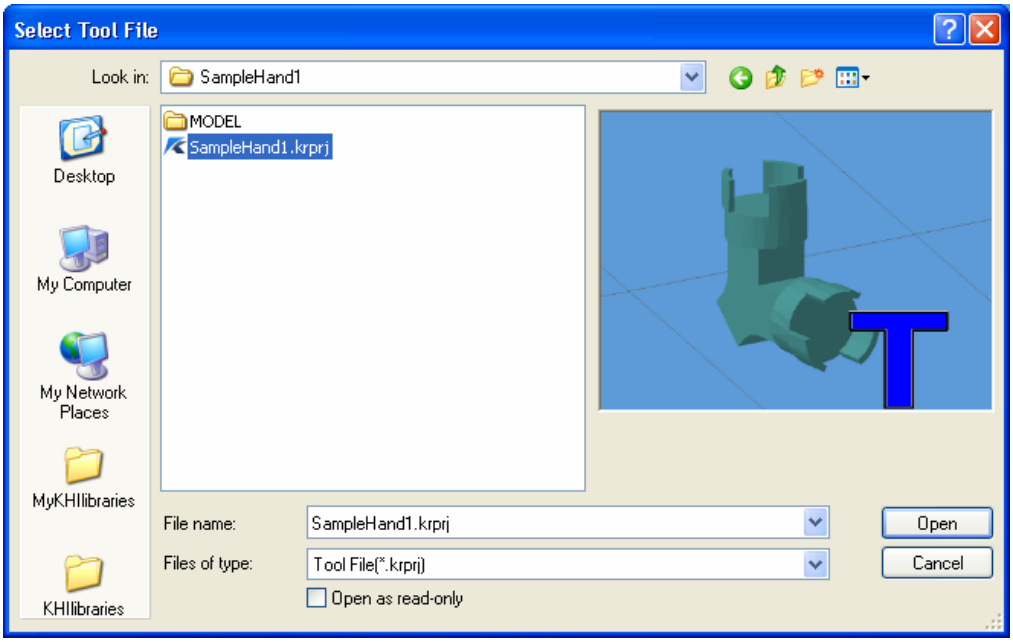
The menu related to the robot is displayed.



2 Click [Tool] - [Load..].

A file selection screen is displayed.

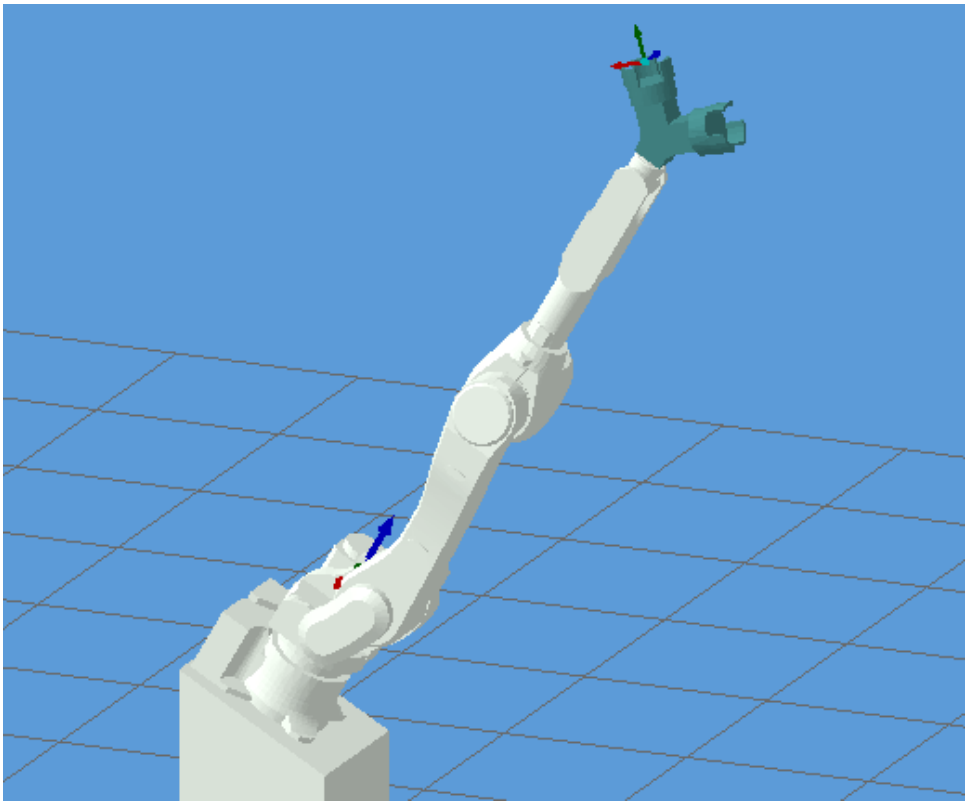
3 Click KHIlibraries folder icon on the left of the screen, and select Tools¥Handling¥SampleHand1 folder.



- Select the file registered as a tool to display the Thumb nail with T.

4 **Select SampleHand1.krprj, and click [open] button.**

The tool file is loaded, and a hand tool is attached to the wrist flange of the robot.



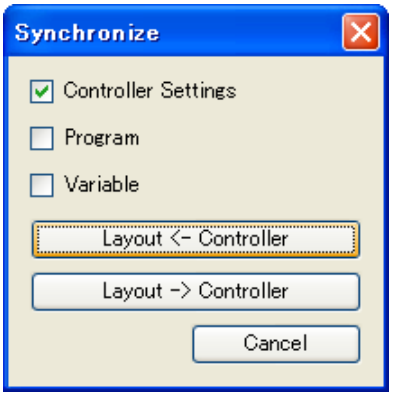
- When a tool has been already attached, the attachment of the tool is released, and the loaded tool is attached.
- When this tool is loaded, the tool transformation value is already registered at the tool tip.
- Make sure to carry out a synchronous operation after the change of tool transformation value. Synchronization of [Layout -> Controller] is carried out on the synchronization screen.

5 **Click the robot R01[C01] tab of the controller tab.**

6 **Click synchronization button of the R01[C01] tab.**

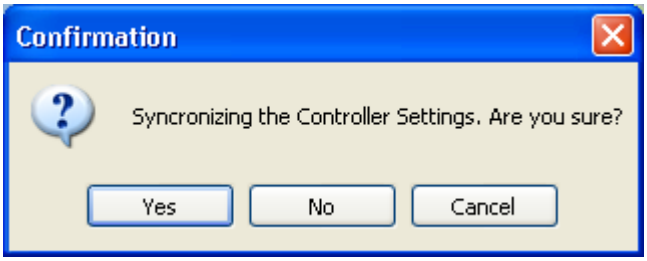
Synchronize screen is displayed.

7 **Place a check mark in the Controller Settings.**



8 **Click Layout -> Controller button.**

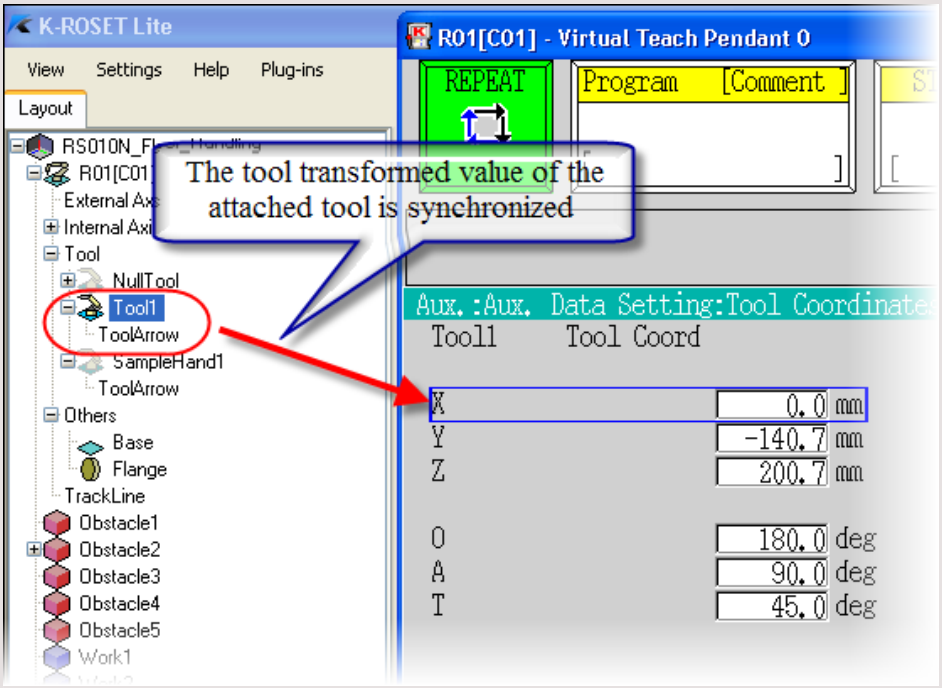
The synchronization screen is displayed. Click Yes.



column

Synchronous operation of tool transformation Value

When linear interpolation step and converted value variables are added to a certain program, recording is carried out according to the tool transformation value of the tool attached at the time of addition. When this program is transferred to the controller and executed, the tool transformation value of the attached tool should be set to the controller.



When several tools are loaded, pay a special attention to execute the program with the tool attached again.

After attachment of the tool or modification of the tool transformation value, we recommend that you make sure to carry out a synchronous operation of Layout -> Controller on the synchronization screen.

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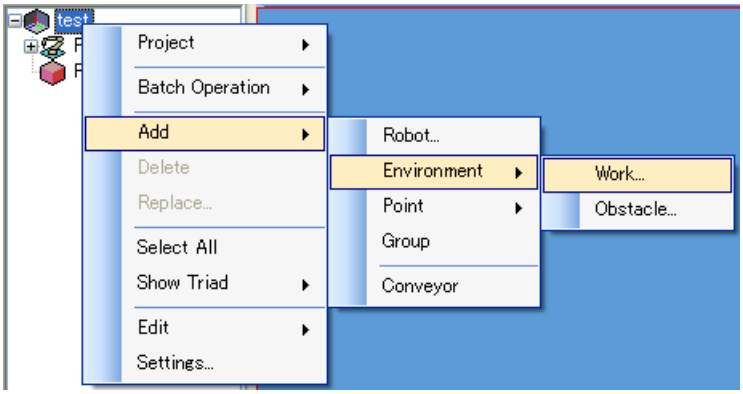
2.7 Addition of Work

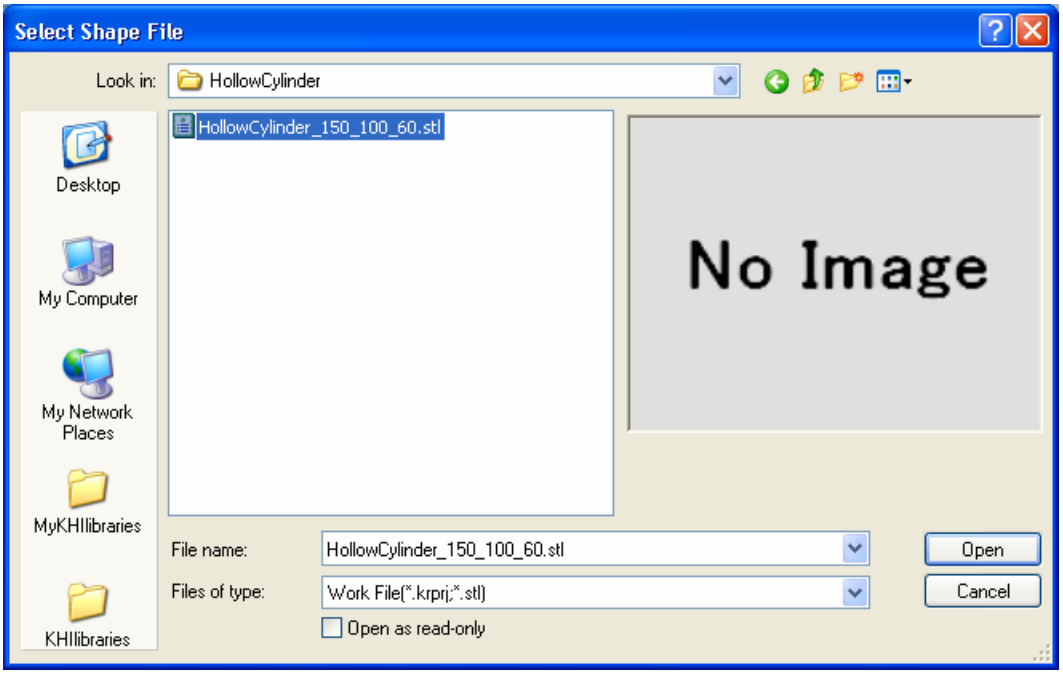
This chapter describes a procedure to add a work.

1 Right-click the Project icon [] in the layout.
The menu related to the project is displayed.



2 Click [Add] - [Environment] - [Work].
A shape file selection screen is displayed.

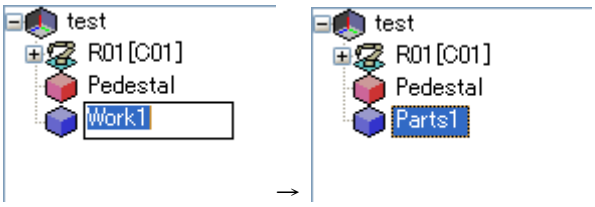
3 Click KHIlibraries folder icon on the left of the screen.
Select KHIlibraries¥Envs¥SimpleShapes¥HollowCylinder folder.



4 Select HollowCylinder_150_100_60.stl file and click [Open] button.
The model is loaded in the world origin and added as Work 1[] in the layout.

5 **The name is changed. Left-click the Work 1 icon [] under the conveyor in layout.**

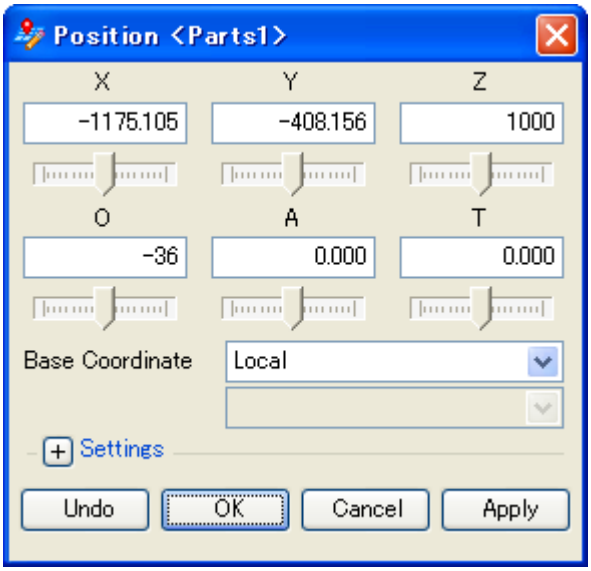
You can enter a name. Enter "Part 1" and press Enter key to fix.



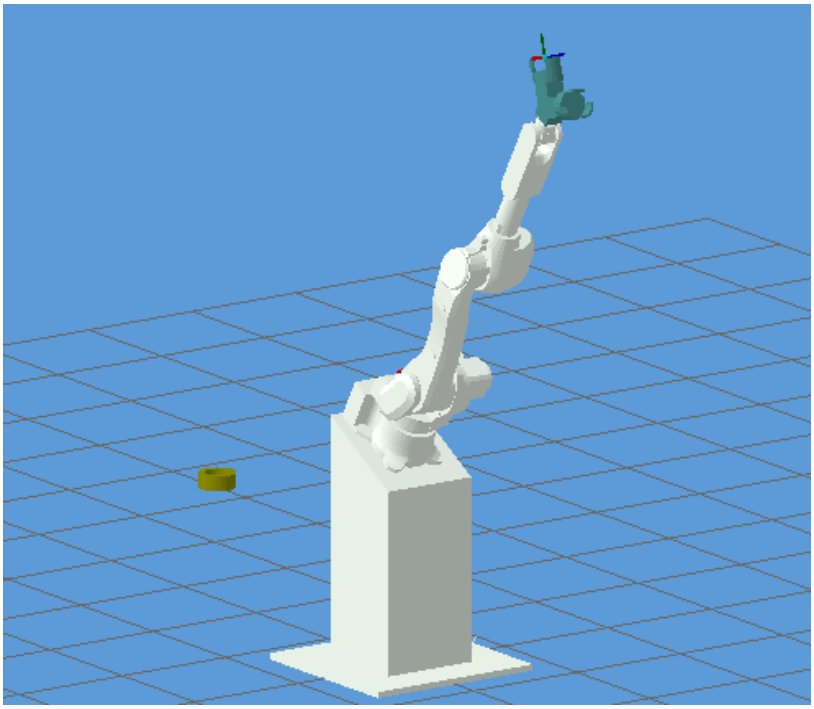
6 **Change the layout. Left double-click Part 1 [] in the layout.**

Position screen is displayed.

7 **Set the values shown in the following screen to each coordinate values, and then click OK button.**



The Part 1 is disposed at the specified position.



8 **Add the rest of the works. Right-click Project icon [], and then click [Add] - [Environment] - [Work].**

A shape file selection screen is displayed.

9 **Click KHIlibraries folder icon on the left of the screen.**

Select KHIlibraries¥Envs¥SimpleShapes¥HollowCylinder folder.

10 **Select HollowCylinder_150_100_60.stl file, and then click [Open] button.**

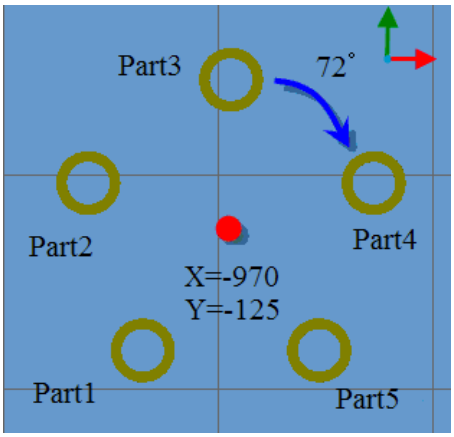
The model is loaded in the world origin.

11 **Change the layout. Left double-click Work 1 [] under hanger in the layout.**

Position screen is displayed.

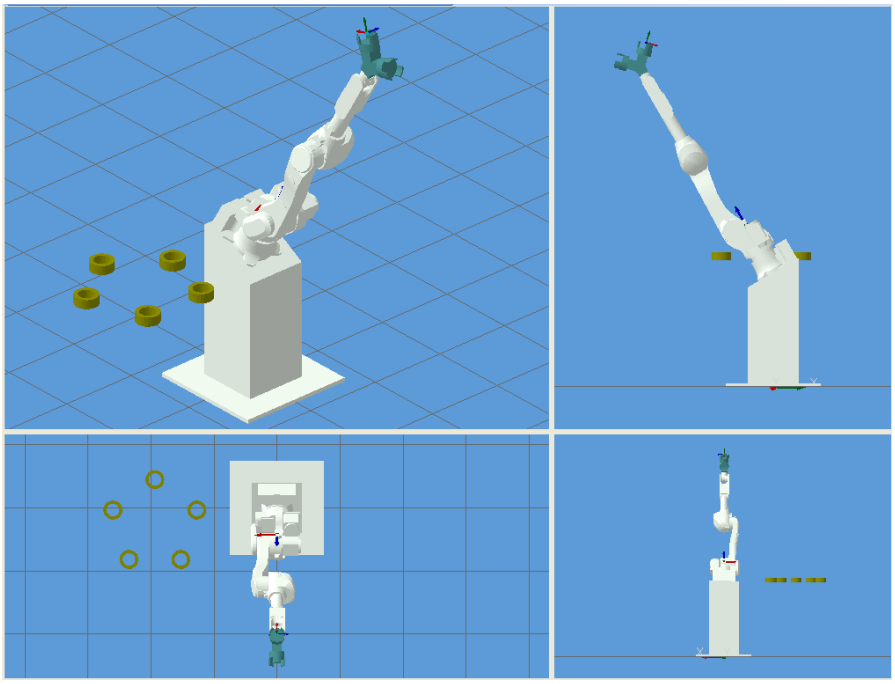
12 **Set the values shown in the following screen to each coordinate values, and then click OK button.**

The works after the first work are allocated at intervals of 72 degrees centering (x,y) = (-969.375,-125).



	X	Y	Z	O	A	T
Part 1	-1175.725	-408.156	1000	-36	0	0
Part 2	-1302.87	-16.844	1000	-108	0	0
Part 3	-970	225	1000	-180	0	0
Part 4	-637.13	-16.844	1000	108	0	0
Part 5	-764.275	-408.156	1000	36	0	0

The parts are allocated as follows.



- Instead of the left double-click on the icon of the work, double-clicking on the work model on the view or selecting [Position] - [Change] from the menu of the work can also display the position change screen.

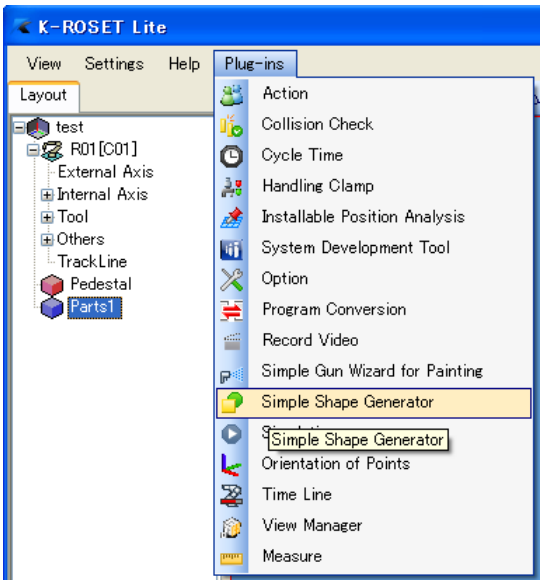
2.8 Addition of Obstacle

This chapter describes a procedure to add obstacles. An obstacle is added using a simplified shape creating function.

Addition by Simple Shape Generator Function

This section describes a procedure to add an obstacle.

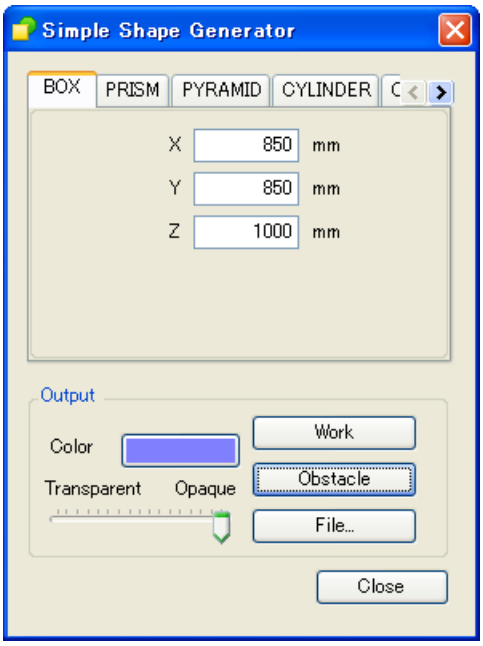
1 Start a simplified shape creating screen. Click Plug-ins, and then Simple Shape Generator from the main menu.



2 Create a work pedestal.

The simple shape generator screen starts. Select box form tab, and enter the dimensions of X/Y/Z as shown below.

Specify a color in the output column.



- Specify the dimensions in world coordinate.

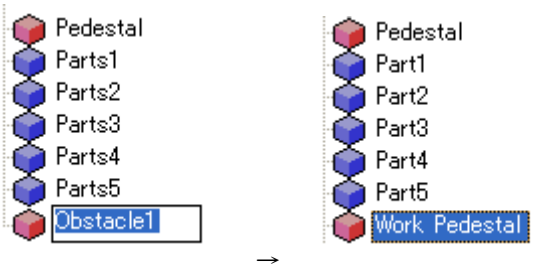
3 Click the obstacle button.

The model is output in the size specified in the view. The model is output as Obstacle 1 in the layout.

- The origin of the model created by the simplified shape creation is located at the center of the XY plane under the model.

4 Change the name for simple recognition. Left-click Obstacle 1 in the layout.

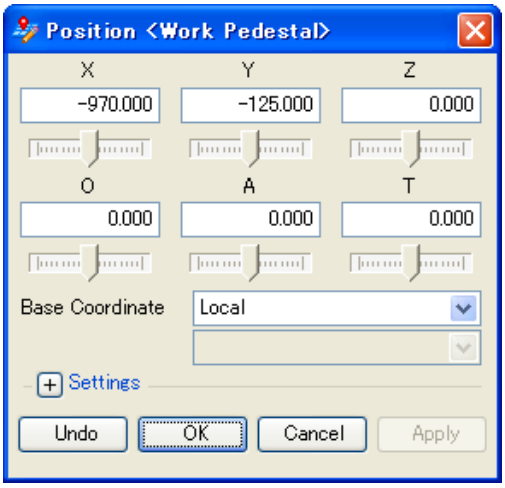
You can enter a name. Enter "Work Pedestal" and press Enter key to fix.



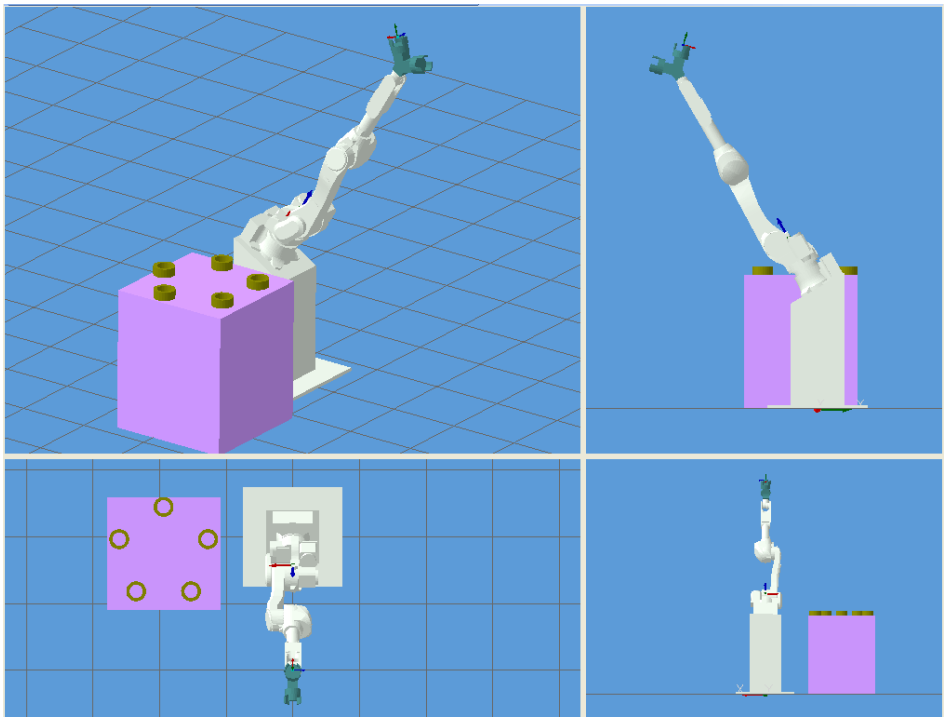
5 Allocate the work pedestal. Double-click the work pedestal in the layout (Obstacle icon [ ]).

Position screen is displayed.

6 Set the values shown in the following screen to each coordinate values, and then click OK button.



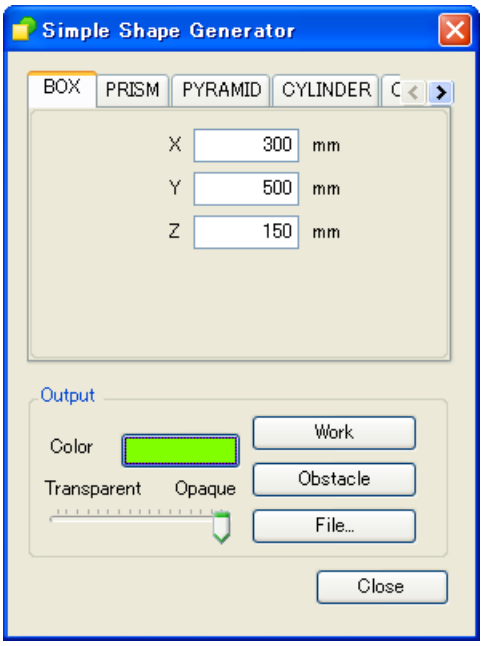
The work pedestal is disposed at the specified position.



7 **Create a work pedestal.**

The Simple shape generator screen starts. Select box form tab, and enter the dimensions of X/Y/Z as shown below.

Specify a color in the output column.



- Specify the dimensions in world coordinate.

8 Click the obstacle button.

The model is output in the size specified in the view. The model is output as Obstacle 1 in the layout.

- The origin of the model created by the simplified shape creation is located at the center of the XY plane under the model.

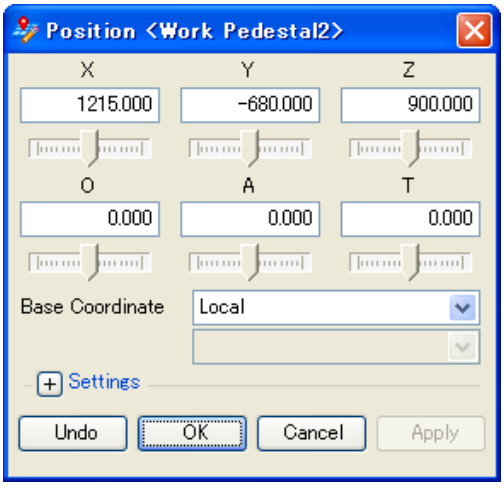
9 Change the name for simple recognition. Left-click Obstacle 1 in the layout.

You can enter a name. Enter "Work Pedestal 2" and press Enter key to fix.

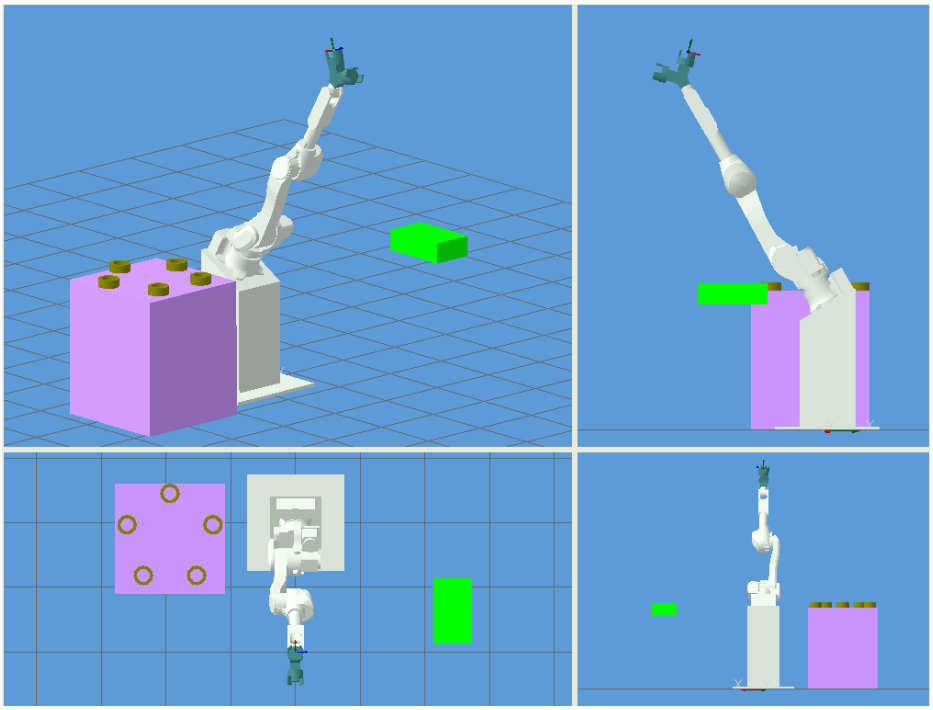
10 Allocate the work pedestal 2. Double-click the work pedestal 2 in the layout (Obstacle icon [ ]).

Position screen is displayed.

11 Set the values shown in the following screen to each coordinate values, and then click OK button.



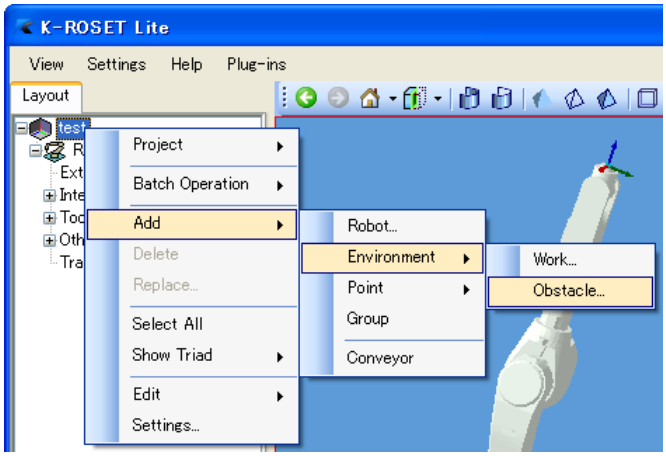
The work pedestal 2 is disposed at the specified position.



Addition of Obstacle

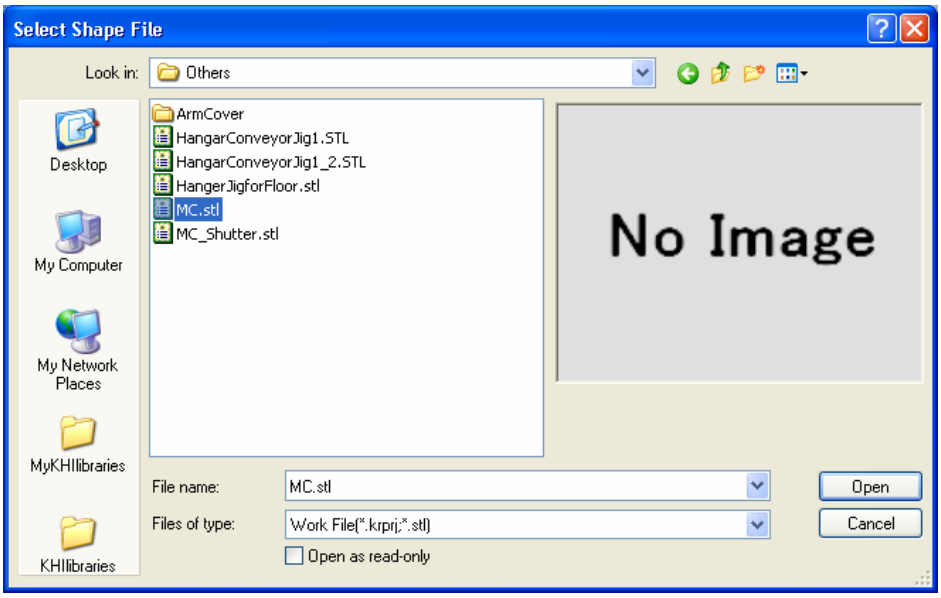
This chapter describes a procedure to add obstacles.

1 **Right-click Project icon [] in the layout.**
The menu related to the project is displayed.



2 **Click [Add] - [Environment] - [Obstacle..].**
A shape file selection screen is displayed.

3 **Click KHIlibraries folder icon on the left of the screen.**
Select KHIlibraries¥Envs¥Equipment¥Others folder.



4 Select MC.stl file and click [Open] button.

The model is loaded in the world origin and added as Obstacle 1 in the layout.

5 Change the name for simple recognition. Left-click Obstacle 1 in the layout.

You can enter a name. Enter "Machining Center" and press Enter key to fix.

Specify rency from the obstacle menu.

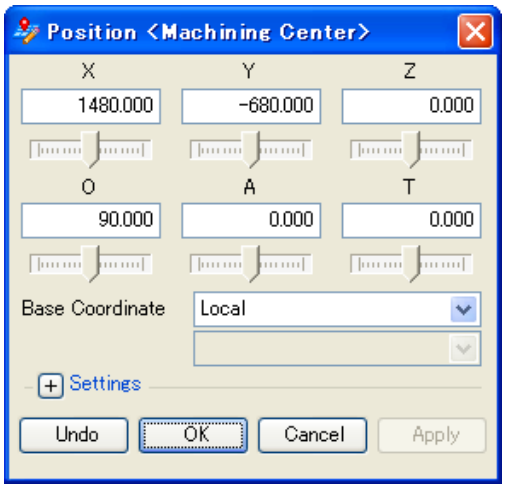
6 Right-click the Machining Center in the layout (Obstacle icon [ ]) and select [Transparency].

Scroll the bar and set 60.

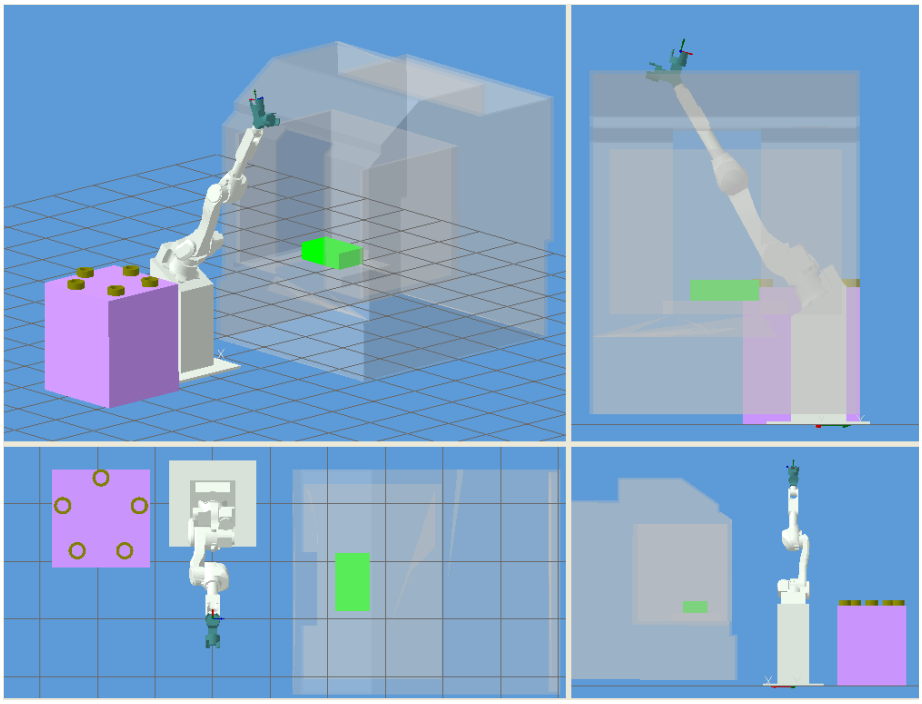
7 Allocate the Machining Center. Double-click the Machining Center in the layout (Obstacle icon [ ]).

Position screen is displayed.

8 Set the values shown in the following screen to each coordinate values, and then click OK button.



The Machining Center is disposed at the specified position.



9 **Add the rest of the obstacles. Right-click Project icon [], and then click [Add] - [Environment] - [Obstacle.].**
A shape file selection screen is displayed.

10 **Click KHIlibraries folder icon on the left of the screen.**
Select KHIlibraries¥Envs¥Equipment¥Others folder.

11 **Select MC_Shutter.stl file, and then click [Open] button.**
The model is loaded in the world origin and added as Obstacle 1 in the layout.

12 **Change the name for simple recognition. Left-click Obstacle 1 in the layout.**
You can enter a name. Enter "MC shutter" and press Enter key to fix.

13 **Right-click Project icon [], and then click [Add] - [Environment] - [Obstacle..].**
A shape file selection screen is displayed.

14 **Click KHIlibraries folder icon on the left of the screen.**
Select KHIlibraries¥Envs¥Equipment¥Fences folder.

15 **Select SafetyFence_2150_2000_1800.stl file, and then click [Open] button.**
The model is loaded in the world origin and added as Obstacle 1 in the layout.

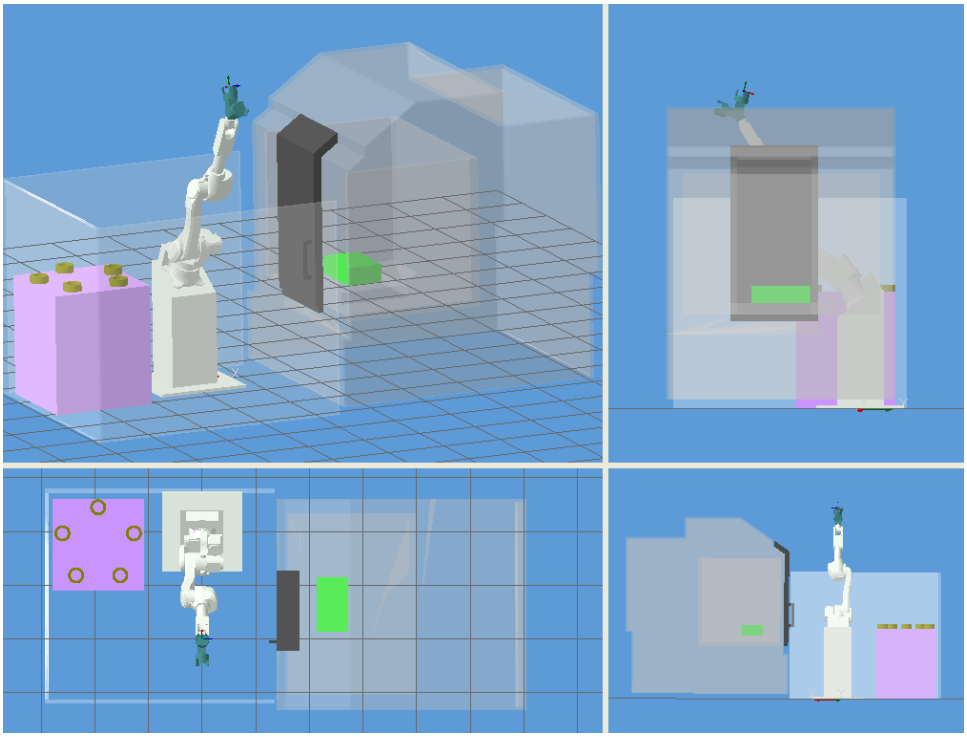
16 **Change the name for simple recognition. Left-click Obstacle 1 in the layout.**
You can enter a name. Enter "Safety Fence" and press Enter key to fix.
Specify transparency from the obstacle menu.

17 **Allocate the safety fence. Double-click the MC shutter and safety fence in the layout (Obstacle icon [ ]).**

Position screen is displayed.

Allocate as shown in the following table.

	X	Y	Z	O	A	T
MC shutter	1480	-735	0	90	0	0
Safety fence	680	-600	0	180	0	0



2.9 Teaching

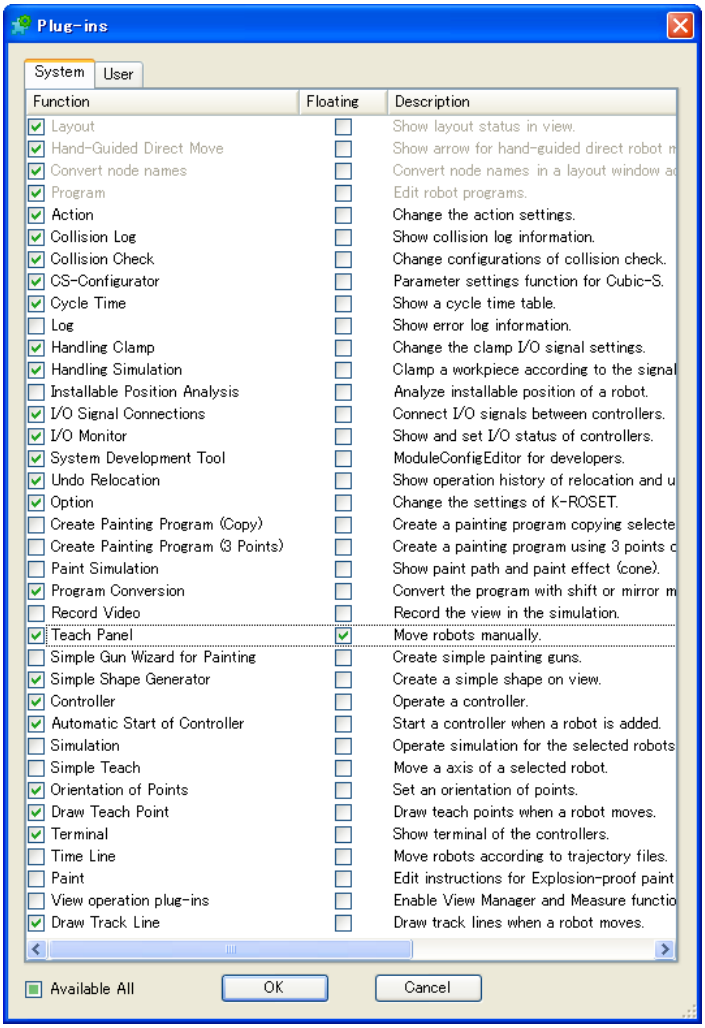
This chapter describes a procedure to teach with a Teach panel.
Preliminary preparation work is described.

Set Teach panel to Floating

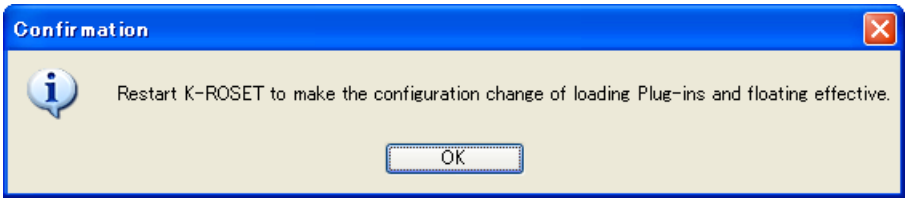
Floating of the Teach panel removes the panel from the right task panel. In addition, simultaneous checking with the program screen is allowed, and the usability is improved. When this clause is unneeded, please skip.

- Restart of K-ROSET is needed to enable the floating setting. When the project is opened, make sure to save the project before this work.

1 Click the setting of main menu, and then the setting menu of Plug-ins.
The setting menu of Plug-ins is displayed.

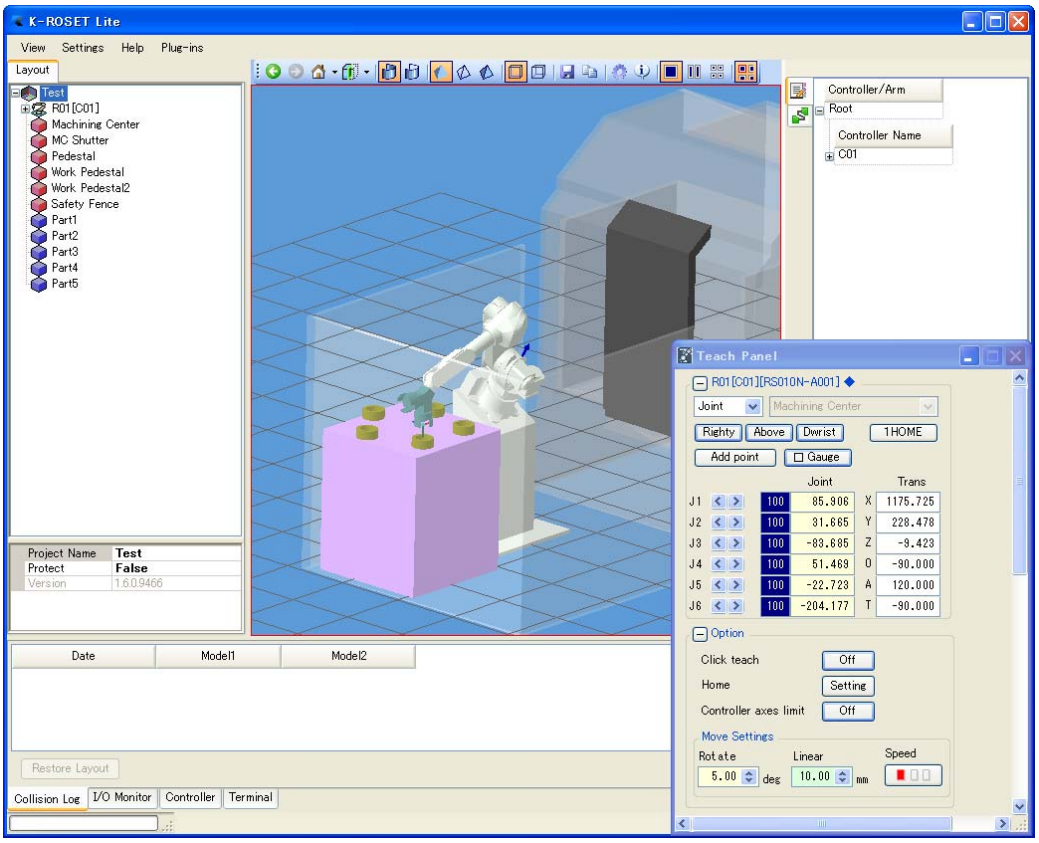


2 Place a check mark in a Floating column of the Teach panel, and then click OK button.
A confirmation screen is displayed. Click OK button.



3 Restart the K-ROSET.

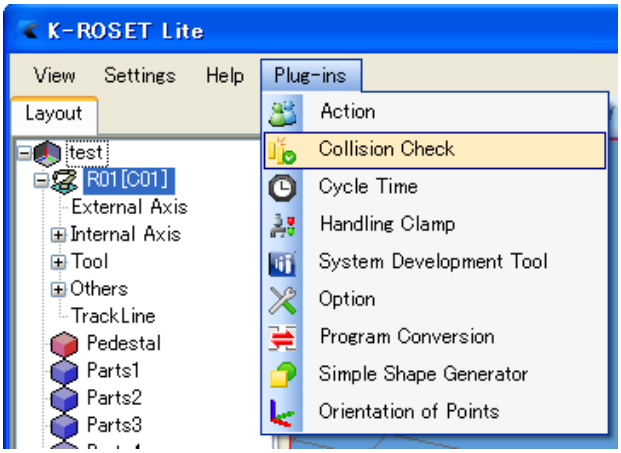
The Teach panel is displayed as floating from the right task panel. Since the Teach panel can be separated from the program, a program step can be created with changing a posture of the robot.



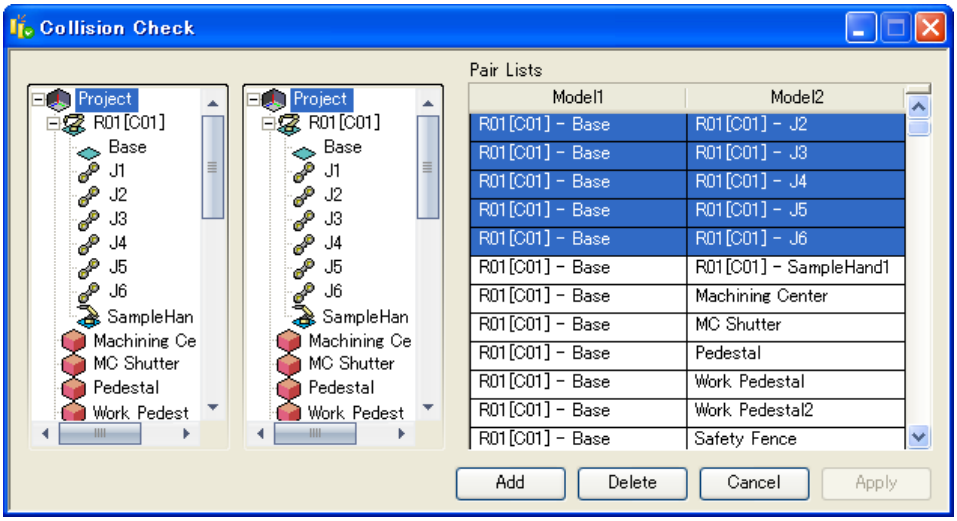
Setting of the pair of Collision

During the teaching, when Collision between a robot, a work, and an obstacle occurs, the model can be displayed in different color.
The setting of Collision pair between models is needed for the display. When this clause is unneeded, please skip.

1 Click Plug-ins of main menu, and then click Collision Check.



The setting menu of Collision check is displayed.



- Limitation to the necessary model improves performance of the K-ROSET.

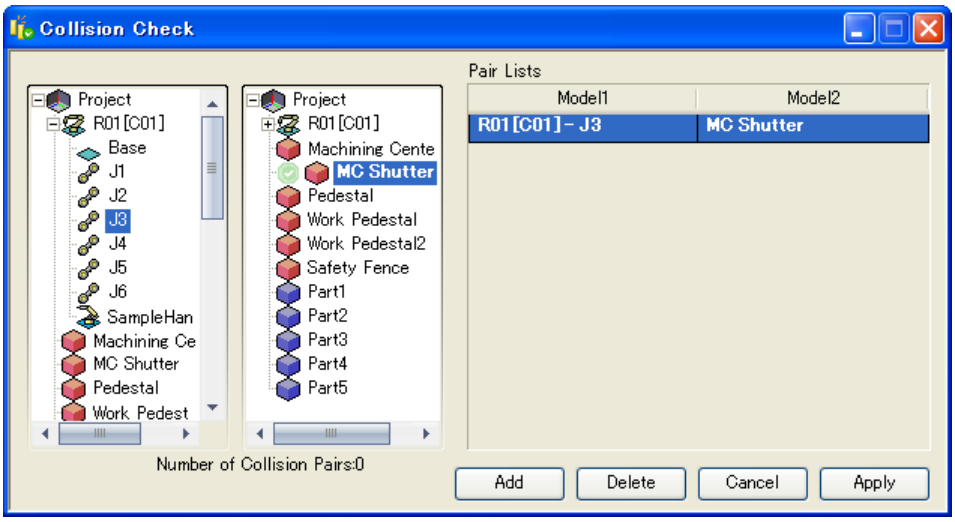
2 Create the pair of Collision.

Setting of the pair of Collision below which may possibly occur in this system is carried out.

J3 to J6	Machining Center
	MC shutter
	Work pedestal 1
	Work pedestal 2
Tool	Machining Center
	MC shutter

3 **Expand a tree of the robot in the left tree, and select J3. Click the Machining Center in the right tree. Click Add button.**

The pair is added to the list of Collision pair. When a parent is specified, all the following children are added to the list of pair.



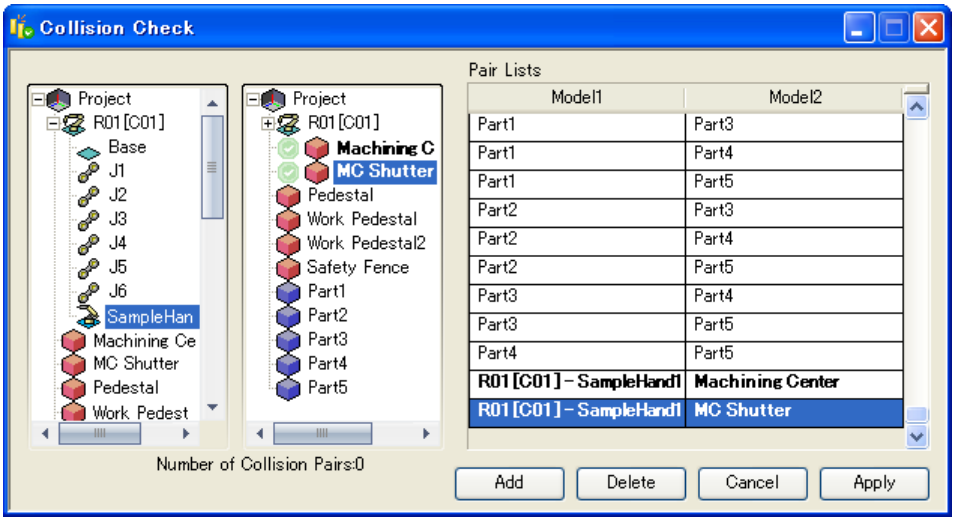
4 **Repeat the similar procedure to add pairs of J3 to J6 and the Machining Center.**

5 **Add pairs of the tool (SampleHand1) and the Machining Center.**

6 **Select J3 to J6 and MC shutter/Work Pedestal 1/Work Pedestals 2 to add pairs. Add the tool and the MC shutter.**

7 **The list of pair is ready. Click the Application button to fix.**

Bold face disappears from the list of pair. In addition, the items registered as pair are placed with a check mark.



Setting of Motion Limits

The movable range of each joint of the robot is set. In the real system, the mechanical stopper and bounds pair of user operation are provided to prevent a Collision with walls, etc. caused by evolution of JT1 of the robot.

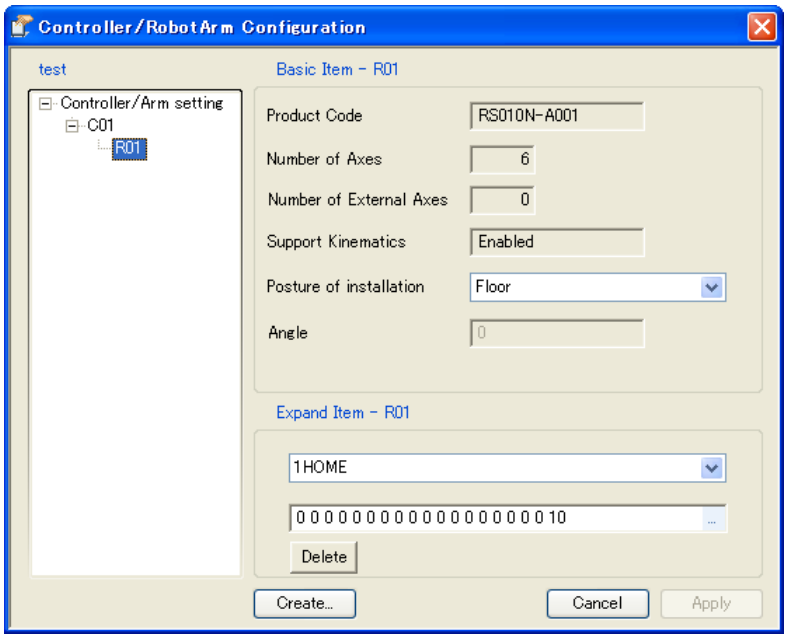
In K-ROSET, upper/lower limit of user operation can be set. When this clause is unneeded, please skip.

1 Right-click the robot icon in the layout.

The menu of the robot is displayed.

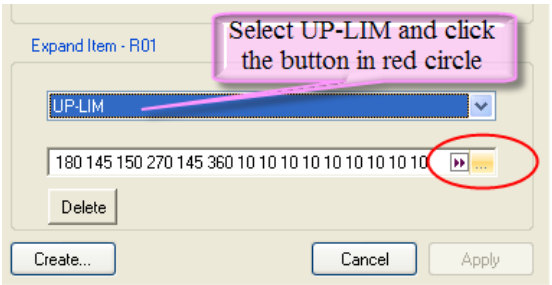
2 Click the RobotArm Configuration menu.

The RobotArm Configuration menu is displayed.



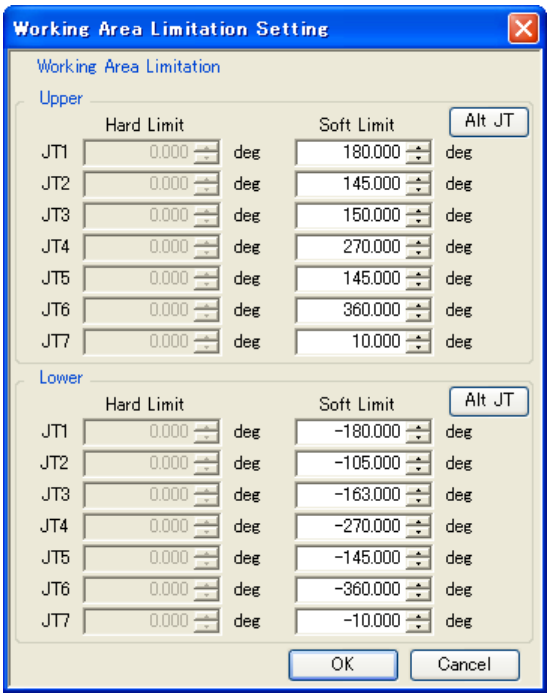
3 Left-click the R01 icon from the left tree.

4 Select UP-LIM from the drop-down list of the extension setting column.



5 Left-click ... at the rightmost of the numeric input field.

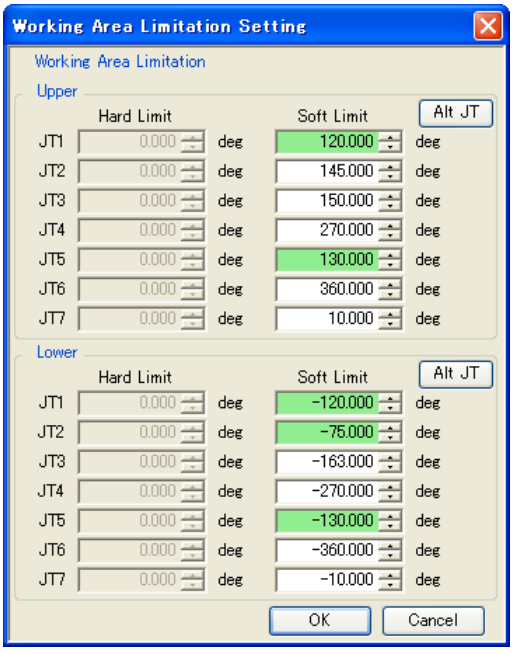
The Working Area Limitation Setting screen is displayed. Set the upper limit and the lower limit.

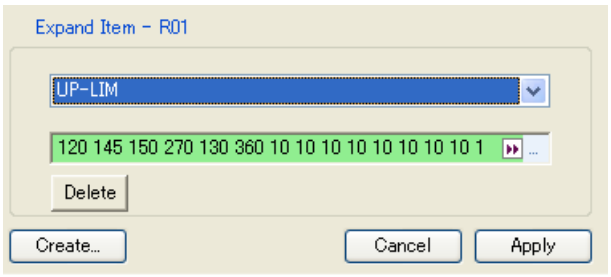


6 **In the layout, carry out the user setting of the each joint as follows.**

Enter 120 degrees into the upper/lower limit of JT1, -75 degrees into the lower limit of JT2, and 130 degrees into the upper/lower limit of JT5, respectively.

The unfixed numeric-field because of change is displayed in green.

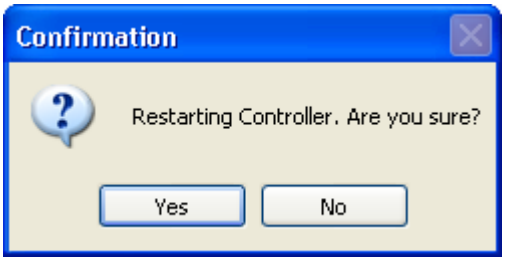




7 **Click OK button to return to the Working Area Limitation Setting screen.**

8 **Click Application button, and a confirmation message asking to restart the controller is displayed.**

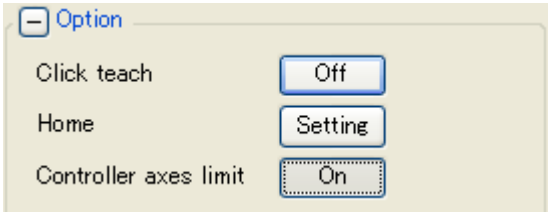
Click Yes to reflect the set value of the layout to the controller.



- System data of the robot can be set in the RobotArm setting. When the details changed on this screen should be also reflected to the virtual controller, restart of the controller is needed to reflect to the controller.

9 **Click Controller each joint limiting value button on the optional screen of the Teach panel.**

The button sinks down, and the display turns to ON.



- Turning this option to On prevents the robot from the operation exceeding upper/lower limits of each joint when the robot is operated on the Teach panel.

Memo

2.10 Creation of Teaching Point

This chapter describes a procedure to create a teaching point on the layout and teach.
Before creating the teaching point, handling operation to create here is described. Refer to Figure 2.10.1 below.
The work starts after setting a home position. After staring a motion, the robot changes its posture to the work pedestal, and moves the tool to the center of the part. When the tool moves to the part, the part is clamped. After clamping, the robot moves to the home position and waits till the shutter of the Machining Center is opened. When the shutter is opened, the robot transfers the part in the Machining Center. After the work in the Machining Center is completed, the robot moves to a waiting point and waits until the shutter is closed. The robot disposes the part on the work pedestal, and transfers the next part. The robot repeats the same process to each part and returns to the home position.

The teaching points needed to be created from the work details are as follows:
1. Home position
2. Position of parts center x number of parts
3. Waiting position before parts are clamped (Point offset from the center of parts to z direction)
4. Waiting point
5. Working point in the Machining Center

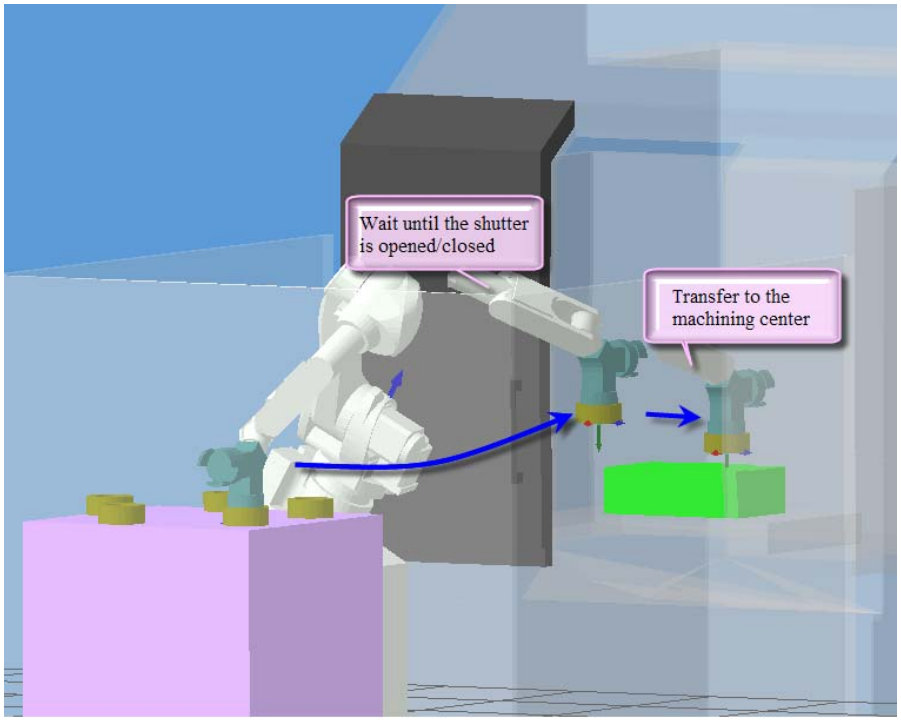


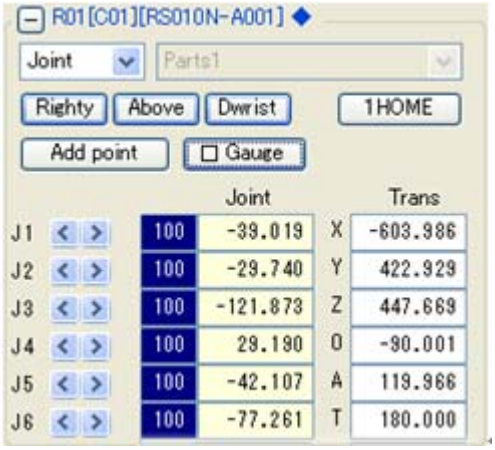
Figure 2.10.1

Change of Posture of Robot and Adding Teaching Point

Teaching point is created with the Teach panel.

1 The posture of the robot is changed on the Teach panel.
The posture of the robot is moved by operating the Teach panel.
Here, enter values to each joint.

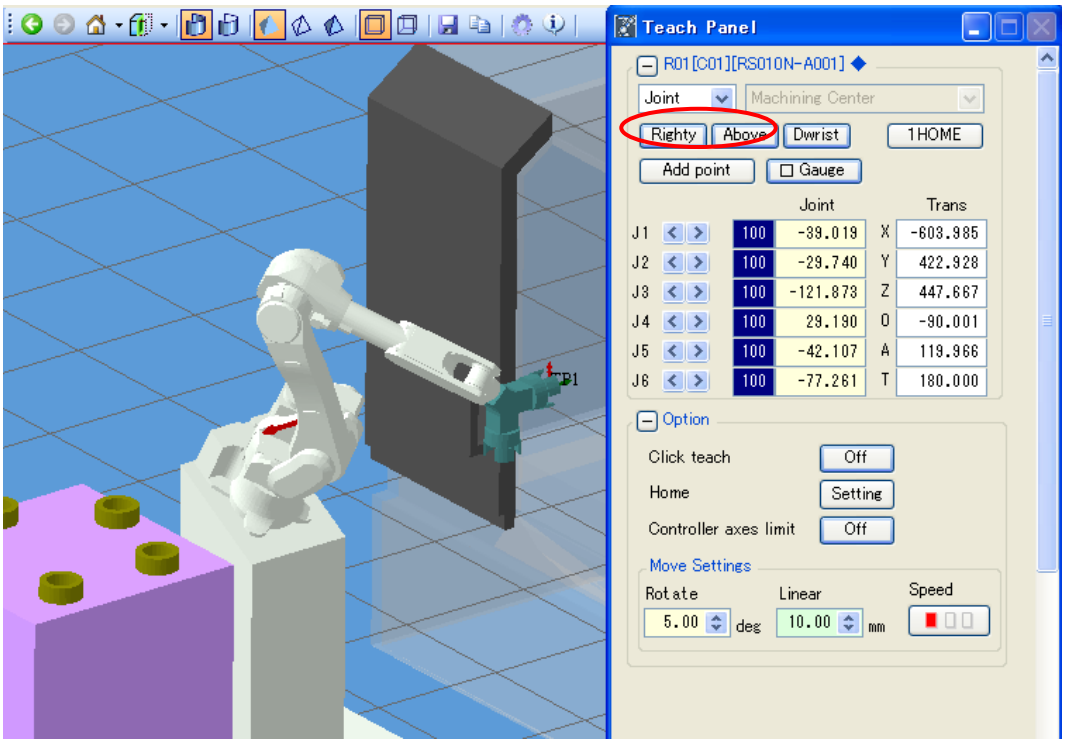
(J1 to J6) = (-39.019,-29.74,-121.873, 29.19,-42.107,-77.261)



2 Click Add point button.

A teaching point is added at the present posture of the robot.

Click the button in a red circle in the figure below. The teaching point is added to the position of the tool tip of the robot (tool converted value).



- The teaching point is added under the robot icon in the layout.

3 Change the name. Left-click the Teaching Point 1 in the layout.

You can enter a name. Enter "#home" and press Enter key to fix.

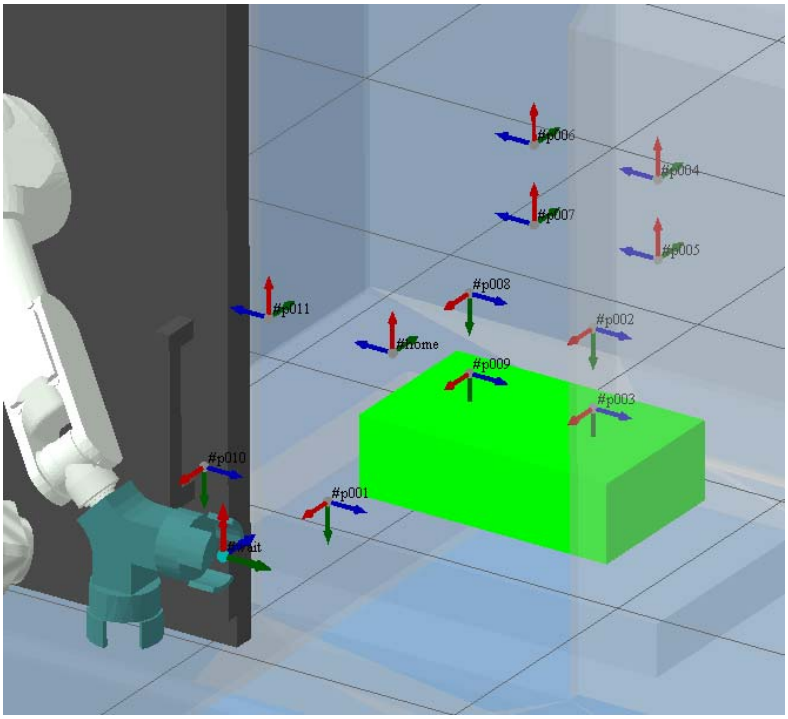
- The name displayed in the view can be changed from the comment of the menu displayed by right-click on the teaching point.

4 **Repeat the procedure 1 to 3 to create teaching points.**

Add teaching points with the value in the table below.

Name	J1	J2	J3	J4	J5	J6
#p001	-39.019	-29.74	-121.873	29.19	-42.107	102.739
#p002	-71.54	34.761	-54.885	-10.202	-38.854	153.756
#p003	-68.135	38.4	-59.897	-7.545	-29.781	150.153
#p004	-71.54	34.761	-54.885	-10.202	-38.854	-26.244
#p005	-68.135	38.4	-59.897	-7.454	-29.781	-29.847
#p006	-82.1	31.103	-70.695	-29.501	-30.866	-1.613
#p007	-78.347	35.568	-74.94	-33.557	-21.555	1.73
#p008	-82.1	31.103	-70.695	-29.501	-30.866	178.387
#p009	-78.347	35.568	-74.94	-33.557	-21.555	181.731
#p010	-62.843	-45.172	-138.839	0.868	-34.114	139.712
#p011	-62.843	-45.172	-138.839	0.867	-34.114	-40.288
#wait	37.519	-43.429	-132.282	64.967	-40.478	-69.717

The view after the addition is as follows.



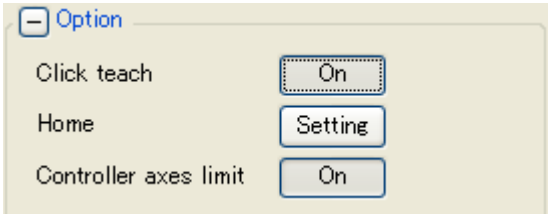
Addition of Teaching Point by Click

Teaching point is created with the Teach panel.

1 **Click the Click teach button on the optional screen of the Teach panel.**

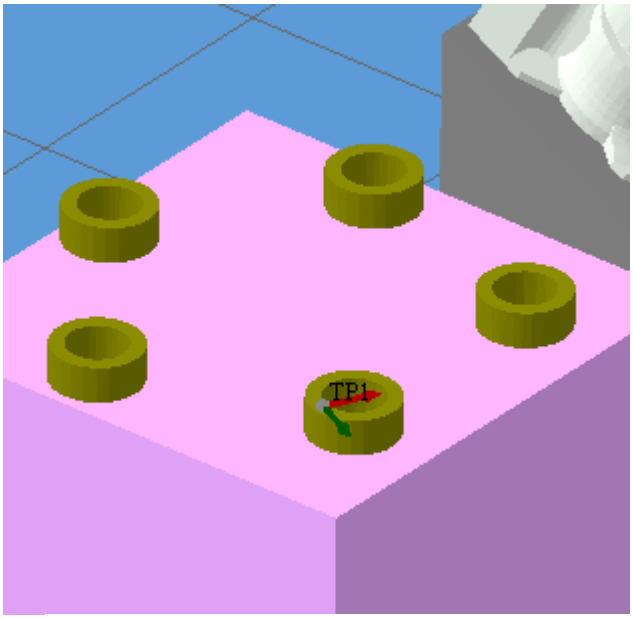
The button sinks down, and the display turns to ON to enable Click teach.

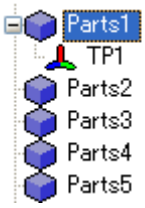
After this, teaching points are added by each left click of a mouse on the model in the view.



2 Add a teaching point to the work.

Move the viewpoint to the position where a teaching point should be created, and left-click the work. A teaching point arrow is added on the work plane. A teaching point is also added under the conveyor work of the layout. The figure below shows the example of creating Teaching point 1.



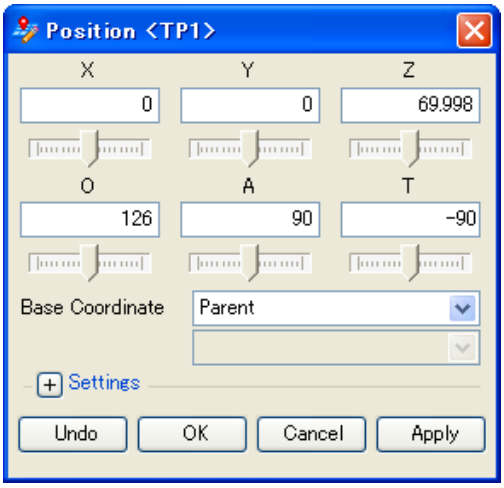


- When a safety fence prevents a smooth operation, you can hide the safety fence. Right-click the safety fence in the layout, and click the display of the menu. The check mark is removed, and the safety fence is hidden.
- When a teaching point has been already created, the teaching point may not be created with the name of Teaching Point 1. The number increases consecutively by every creation.

3 Change a position of TP1. Double-click TP1 icon created on the layout.

Position screen is displayed.

Change the Base Coordinate to Parent and set as (X,Y, Z) = (0,0,0). In the click teaching, add a teaching point under the model in the configuration of the layout. Reset of the value with keeping the base coordinates to Parent model can move the teaching point to the origin of parts.



4 **Move the robot to TP1. Left-click the Teaching Point 1 icon created in the layout.**

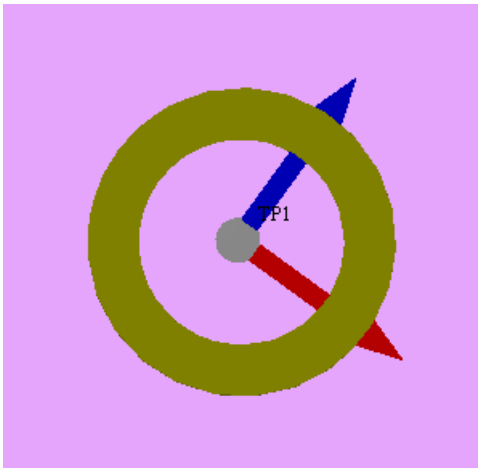
The robot and tool arrow move (jump) to match the coordinate of TP1. When they do not move, the robot cannot take the posture for the teaching point.

To take the posture, set the direction of the teaching point adequately.

5 **When the robot cannot take the posture, change the direction of the teaching point. Double-click Teaching Point 1 in the layout.**

Position screen is displayed.

Increase/decrease the value of O, A, and T with the base coordinate as a local coordinate. Change of the T value rotates the Z-axis of the teaching point (a blue arrow).



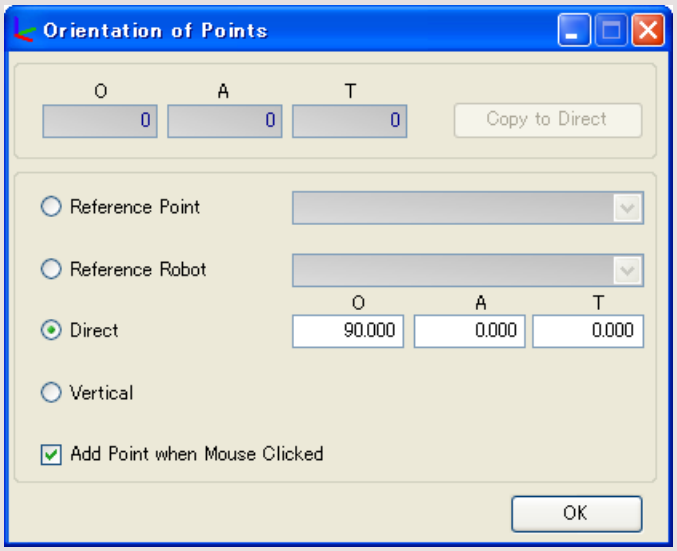
column

Setting of Posture at Teaching Point

When a new teaching point is added, O, A, and T can be added with a specified value. In the click teaching, add a teaching point perpendicular to the clicked model; that is, z direction is toward the inside of the model. When a teaching point is added in other directions, the posture setting should be displayed for operation.

In the addition of the teaching point, the position as well as the direction is an important parameter to change the posture of the robot so that the position and direction of the teaching point match the position and direction of the tool transformation value of the robot.

Click Plug-ins from main menu, and then Setting of posture at teaching point.
Ensure that a check mark is placed to Add a teaching point by click, and specify the value to the specified items of O, A, and T directly. Since the tool transformation value here is registered so that y is directed downward, set as (O,A,T) = (90,90,-90).



6 Change the name. Left-click the TP1 in the layout.

You can enter a name. Enter "p[1]" and press Enter key to fix.

- The name displayed in the view can be changed from the comment of the menu displayed by right-click on the teaching point.

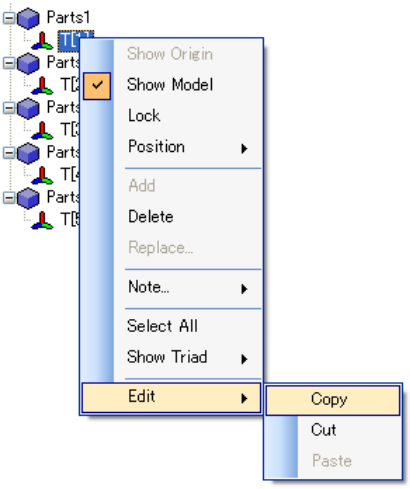
7 Add teaching points in the number of parts.

Click the work and repeat the procedure 2 to 6 to create for five parts.

Copy of Teaching Point

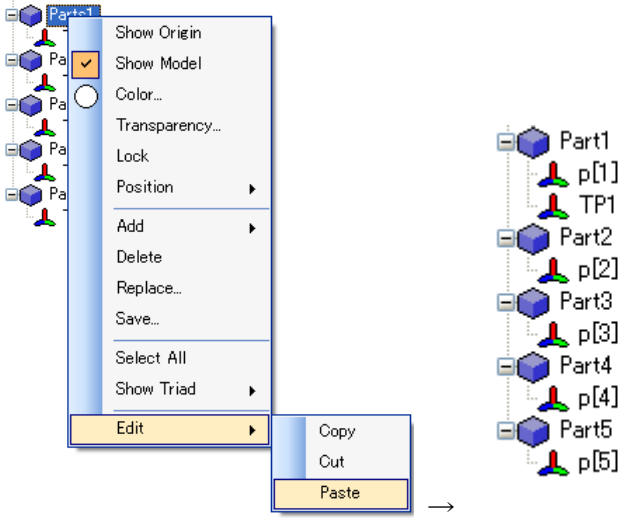
Copy the teaching point created by clicking a model to create a waiting point before grasp.

1 Right-click the added Teaching Point p[1], and then click [Edit] - [Copy].



2 Right-click the parent model (Part 1 for p[1]) of the copied teaching point, and then click [Edit] - [Paste].

A teaching point is added to Part 1.



- You can use "Ctrl+C" for copy, and "Ctrl+V" for paste.

3 Change the name. Left-click the teaching point in the layout.

You can enter a name. Enter "p_u[1]" and press Enter key to fix.

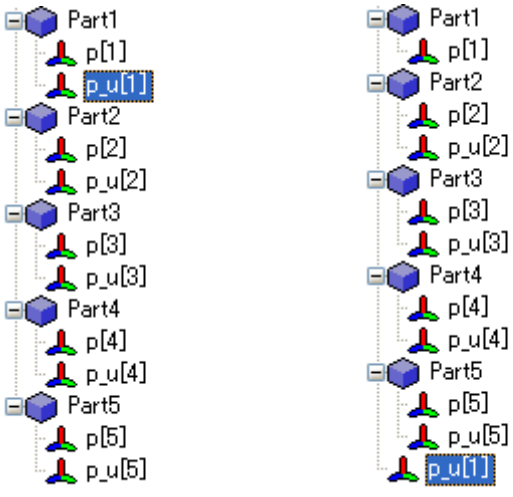
- The name displayed in the view can be changed from the comment of the menu displayed by right-click on the teaching point.

4 Copy the teaching points in the number of parts.

Repeat the procedure 1 to 3 to create the teaching point of p[*] for each part.

5 Drag the teaching point in the layout to move under the project.

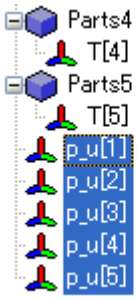
Drag the copied teaching point of p_u[*] on the layout to move under the project icon.

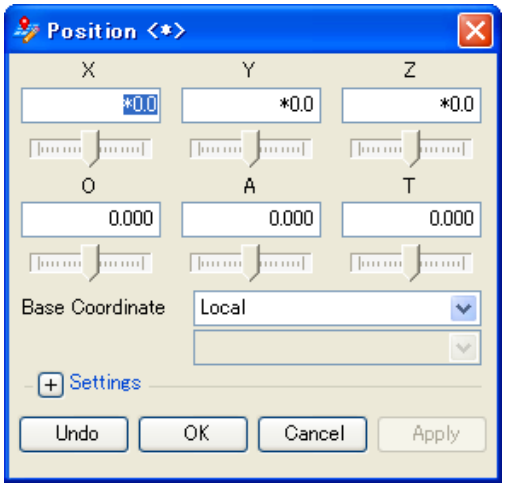


- Drag to move in order to avoid changing the world coordinate.
- Copy operation can also change the configuration of the layout similarly, but the operation afterward changes since the local coordinate is fixed.

6 **Click the top teaching point, and double-click the last teaching point while pressing the shift key.**

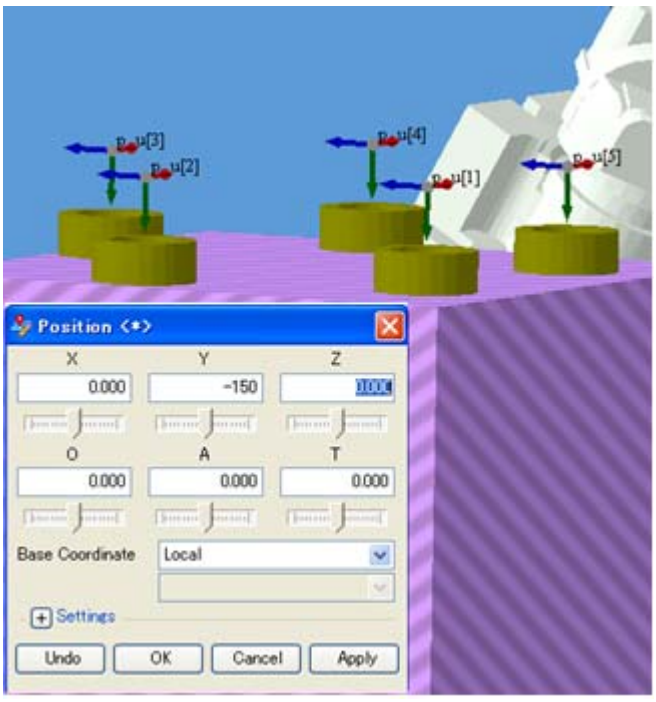
Title is displayed as <*>, and * mark is displayed in the numeric-field. This display indicates that several objects are selected, and several different positions coexist. Operation when <*> is displayed can offset the selected items simultaneously.





7 **Enter -150 in Y and click OK button.**

The position moves -150 from p[*] in Y coordinate system of the teaching point; Z direction in the world coordinate.



8 **Right-click the project icon [ ] in the layout, and click [Add] - [Group].**

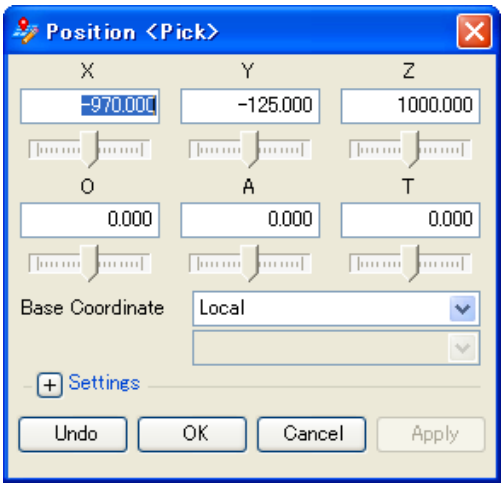
Add Group 1 in the project.

9 **Change the name. Left-click the Group 1 in the layout.**

You can enter a name. Enter "Pick" and press Enter key to fix.

10 **Double-click Pick to change the setting position.**

Allocate in the center of the works in a circular arrangement.
Refer to Disposition of work for the coordinate.

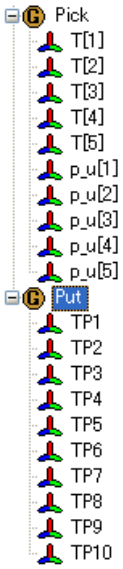


11 **Move the teaching point of the clamp position under Pick.**

12 **Right-click Pick, and then click [Edit] - [Copy].**

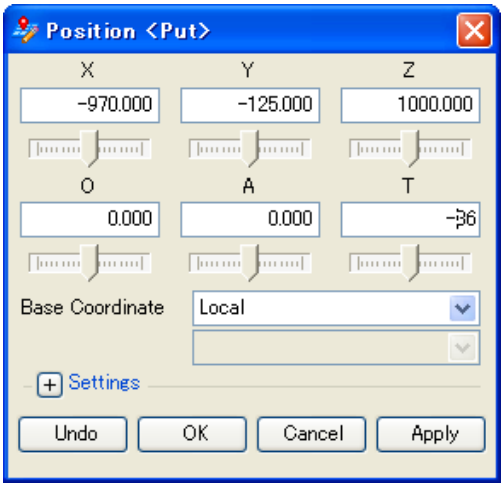
13 **Right-click Pick, and then click [Edit] - [Paste].**

14 **Change the name. Left-click the Group 1 in the layout.**
You can enter a name. Enter "Put" and press Enter key to fix.



15 **Change the allocation. Left double-click Put in the layout.**
Position screen is displayed.

16 **Enter -36 in the value of T.**
The teaching point is allocated at the position rotated 36 degrees around the Z-axis.



17 **Change the name. Left-click the teaching point under Put in the layout.**

You can enter a name. Change the name.

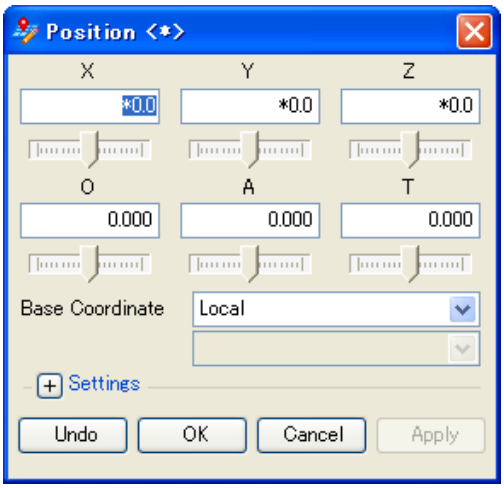
Example: Collecting position of Part 1 p[1] →Placing position of Part 1 p[6]

18 **Select all teaching points in Put and double-click.**

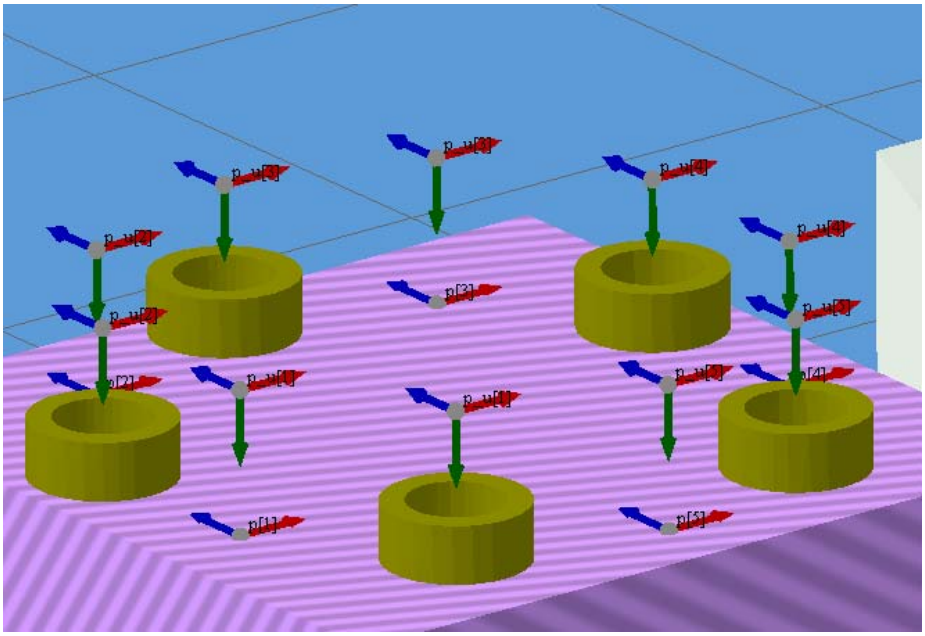
Position screen is displayed.

19 **Set the posture O of the teaching point to 90.**

Return the posture changed by the setting of the group to previous posture.



When the setting is completed, the display will be as follows.



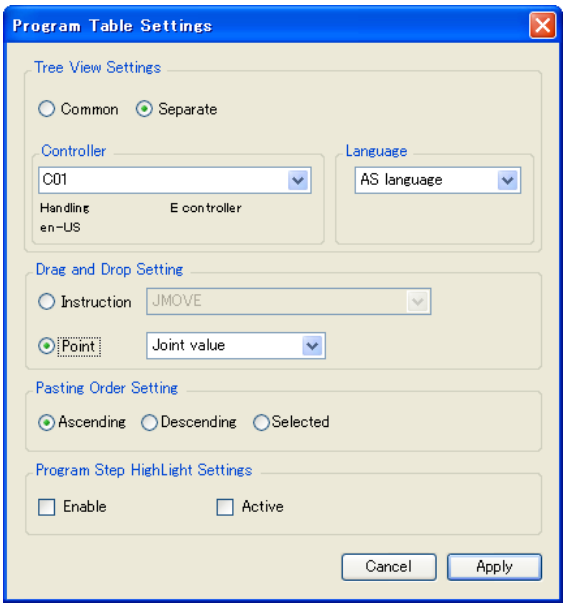
2.11 Creation of Teaching Program

This chapter describes a procedure to create a teaching program.
A registration of a teaching point and a creation of a program are described. The registration of the teaching point is created according to the teaching point created in advance.

Registration of teaching Point

1 **Right-click the root node of the program. Click the setting.**
The setting screen is displayed.

2 **Select the teaching point in the Drag and Drop Setting column, and select "Joint Value".**
Click the Application button to fix.

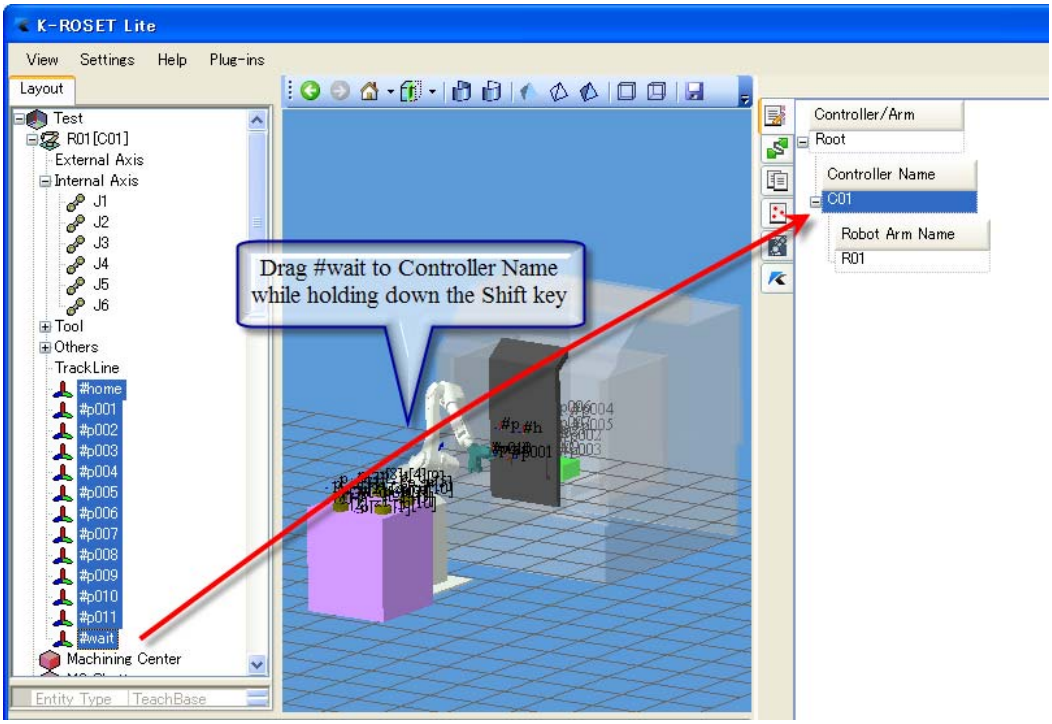


3 **After clicking the first node of # teaching point under the robot node of the layout, click the last node with pressing the shift key.**

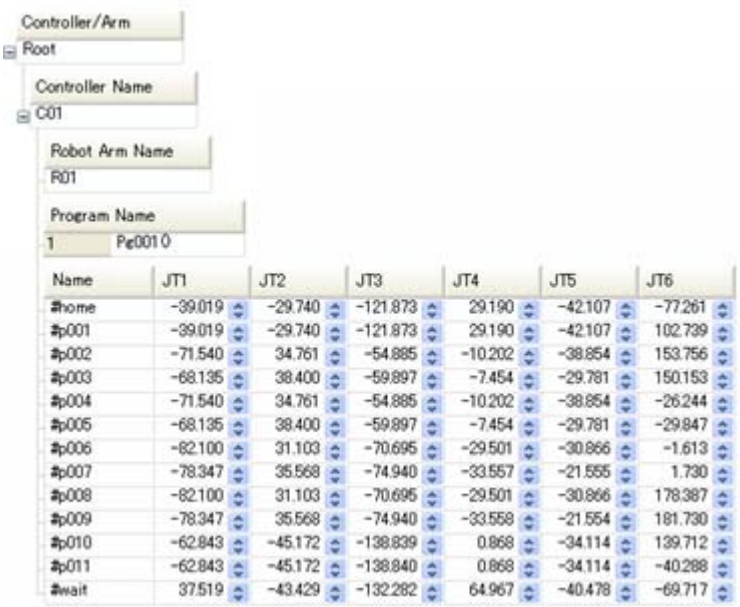
All teaching points are selected.

4 **Drag the last node of the # teaching point with pressing the shift key, and drop to the controller node on the program screen.**

Bring a mouse cursor on the controller name to display + mark. Release the mouse button there.



Joint values are registered in the program as shown below.



- Ensure that the added joint values are correct.

5 **Right-click the root node of the program. Click the setting.**

The setting screen is displayed.

6 **Select the teaching point in the Drag and Drop Setting column, and select "Converted Value".**
Click the Application button to fix.

7 **After clicking the first node of the teaching point under the group of layout (Pick, Put), click the last node with pressing the shift key.**
All teaching points are selected.

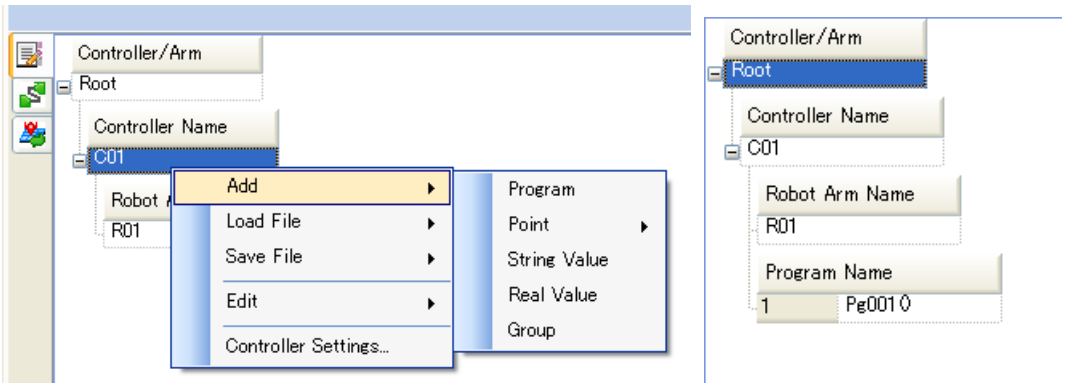
8 **Drag the last node of the teaching point with pressing the shift key, and drop to the controller node on the program screen.**
Bring a mouse cursor on the controller name to display + mark. Release the mouse button there.

Creation of Program

A new program is created on a program screen.

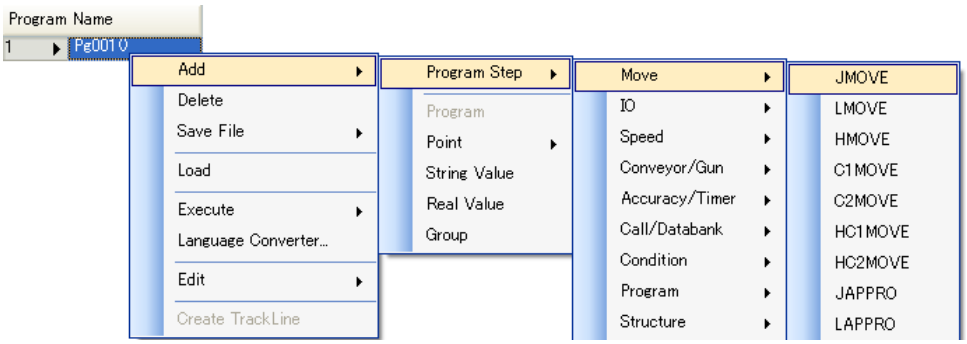
Creation of Pick and Place Program

1 **Right-click the controller node, and then click [Add] - [Program].**
A program node is created with a name of Pg001 under the controller.

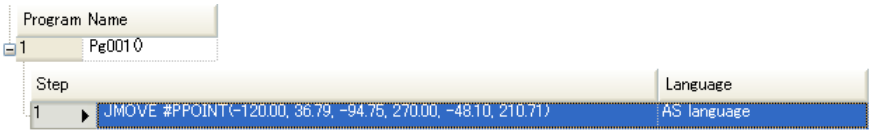


2 **Change the name. Click program name node.**
You can enter a name. Enter "p1".

3 **Right-click p1, and then click [Add] - [Program Step] - [Move Instruction] - [Move in Joint Interpolation Function].**

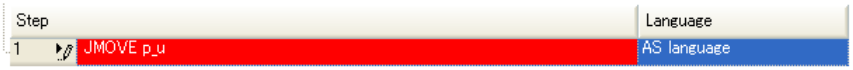


Joint values are registered in the program as shown below.



4 Click the program step to change the variable to p_u[1].

Delete the # PPOINT and afterward, and edit variables to grasp waiting position p_u[1].



5 Right-click p1, and then click [Add] - [Program Step] - [Move] - [JMOVE].

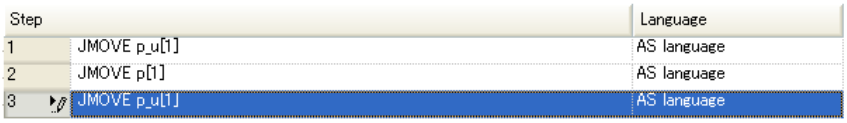
6 Click the program step to change the variable to p[1].

Delete the TRANS and afterward, and edit the variable to grasp waiting position p[1].

7 Right-click LMOVE step, and click [Edit] - [Copy].

8 Right-click LMOVE step, and click [Edit] - [Paste].

Change the variable to p_u[1].

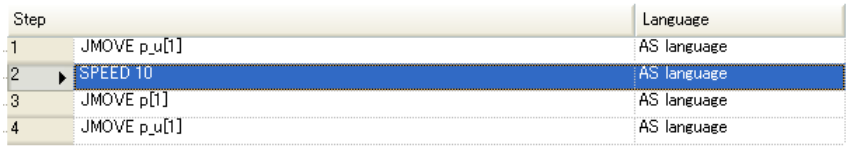


9 Add speed instruction. Right-click p1, and then click [Program Step] - [Speed] - [SPEED].

Set the speed to 10.

10 Drag the speed instruction to move to the front of the clamping position.

Control the clamping speed to 10.

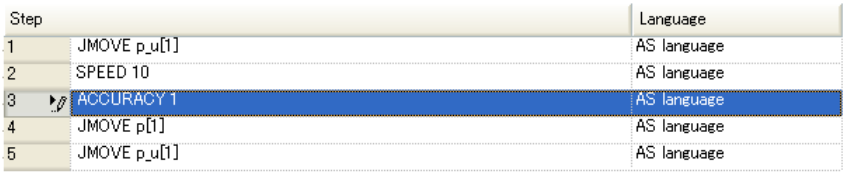


11 Add accuracy instruction. Right-click p1, and then click [Program Step] - [Speed] - [ACCURACY].

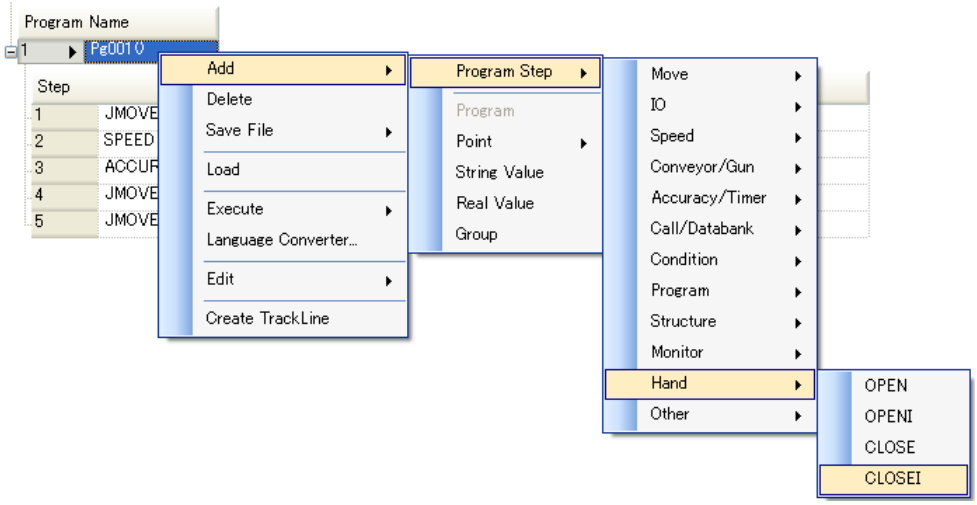
Set the accuracy to 1.

12 Drag the accuracy instruction to move to the front of the clamping position.

Control the accuracy of position of grasp to 1.



13 **Add a hand control instruction. Right-click p1, and then click [Program Step] - [Hand] - [CLOSEI].**



14 **Drag a hand control instruction to move to the back of the clamping position.**

The hand is to clamp after the robot moves to the clamping position.

Step		Language
1	JMOVE p_u[1]	AS language
2	SPEED 10	AS language
3	ACCURACY 1	AS language
4	JMOVE p[1]	AS language
5	CLOSEI	AS language
6	JMOVE p_u[1]	AS language

15 **Add the time waiting instruction. Right-click p1, and then click [Program Step] - [Others].**

16 **Click the step, and enter TWAIT 0.5 under editing state.**

- The value of TWAIT is set in time with the screen update interval in K-ROSET. In the actual robot, reset the TWAIT in time with the opening/closing time of the hand (hardware).

17 **Add BREAK instruction. Right-click p1, and then click [Program Step] - [Others].**

18 **Click the step, and enter BREAK under editing state.**

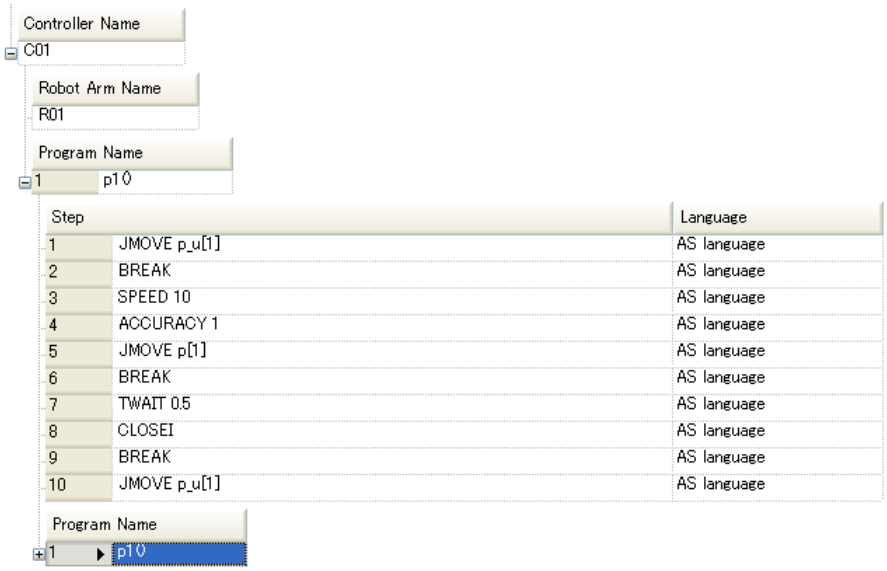
Stop temporarily the continuous motion between the motion instructions. Add BREAK after the step of each motion instruction.

Refer to AS Language Instruction Manual for details.

Step		Language
1	JMOVE p_u[1]	AS language
2	BREAK	AS language
3	SPEED 10	AS language
4	ACCURACY 1	AS language
5	JMOVE p[1]	AS language
6	BREAK	AS language
7	TWAIT 0.5	AS language
8	CLOSEI	AS language
9	BREAK	AS language
10	JMOVE p_u[1]	AS language

19 **Create a program for allocation. Right-click p1 and then click [Edit] - [Copy].**

20 **Right-click the controller node, and then click [Edit] - [Paste].**
Copy the program p1 to the controller.



21 **Change the name. Click program name node.**
You can enter a name. Enter "p6".

22 **Expand the node of p6, and edit variables of each motion step.**
p[1] →p[6] p_u[1] →p_u[6]

23 **Add a hand control instruction. Right-click p6, and then click [program Step] - [Hand] - [OPENI].**

24 **Right-click the CLOSEI instruction, and then click Delete.**

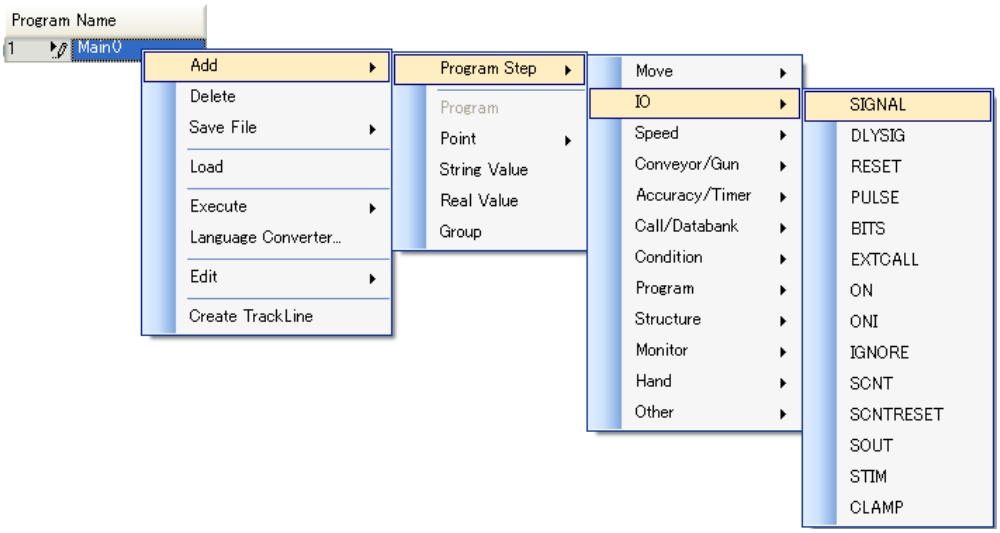
25 **Copy the program to create the transfer program of the each part.**

► Creation of processing Program

1 **Right-click the controller node, and then click [Add] - [Program].**
The program node is created with a name of Pg001 under the controller.

2 **Change the name. Click program name node.**
You can enter a name. Enter "process".

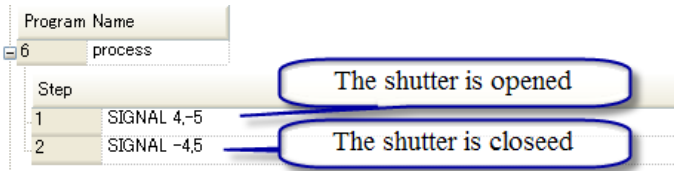
3 **Right-click Main, and then click [Add] - [Program Step] - [IO] - [SIGNAL].**



4 Click input/output instruction to edit.

Enter an output signal number used for opening and closing of the MC shutter.

Assign one signal each to open/close the shutter. When one signal is turned ON as shown in the figure below, turn the opposite signal OFF to prevent the state from remaining ON.



- The setting to move a shutter model of the Machining Center on the view is described in the setting item of the action function of the simulation.
- Using the signal already used as a dedicated signal of the robot will prevent the execution of simulation.

5 Add the step in the similar way as the pick and place program.

Add motion instruction, speed instruction, and accuracy instruction to create the motion program after the transfer to the Machining Center.

The following setting is an example.

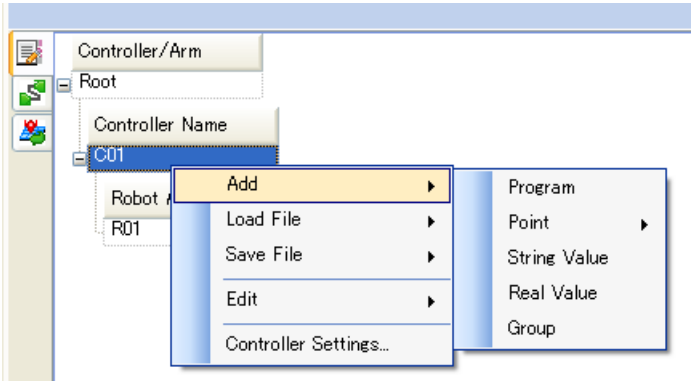
Step		Language
1	SIGNAL 4,-5	AS language
2	HOME	AS language
3	BREAK	AS language
4	SPEED 20	AS language
5	JMOVE #p001	AS language
6	BREAK	AS language
7	LMOVE #p002	AS language
8	BREAK	AS language
9	SPEED 10	AS language
10	ACCURACY 1	AS language
11	LMOVE #p003	AS language
12	BREAK	AS language
13	TWAIT 0.5	AS language
14	OPENI	AS language
15	BREAK	AS language
16	LMOVE #p002	AS language
17	BREAK	AS language
18	SPEED 20	AS language
19	JMOVE #p004	AS language
20	BREAK	AS language
21	SPEED 10	AS language
22	ACCURACY 1	AS language
23	LMOVE #p005	AS language
24	BREAK	AS language
25	TWAIT 0.5	AS language
26	CLOSEI	AS language
27	BREAK	AS language
28	LMOVE #p004	AS language
29	BREAK	AS language

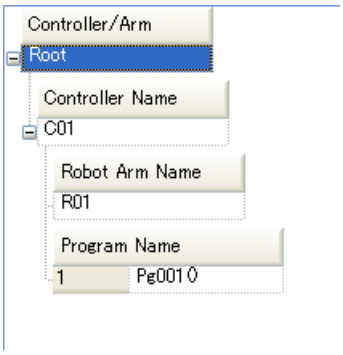
Step		Language
30	LMOVE #p006	AS language
31	BREAK	AS language
32	SPEED 10	AS language
33	ACCURACY 1	AS language
34	LMOVE #p007	AS language
35	BREAK	AS language
36	TWAIT 0.5	AS language
37	OPENI	AS language
38	BREAK	AS language
39	LMOVE #p006	AS language
40	BREAK	AS language
41	SPEED 20	AS language
42	JMOVE #p008	AS language
43	BREAK	AS language
44	SPEED 10	AS language
45	ACCURACY 1	AS language
46	LMOVE #p009	AS language
47	BREAK	AS language
48	TWAIT 0.5	AS language
49	CLOSEI	AS language
50	BREAK	AS language
51	LMOVE #p008	AS language
52	BREAK	AS language
53	LMOVE #p010	AS language
54	BREAK	AS language
55	JMOVE #p011	AS language
56	BREAK	AS language
57	SIGNAL -4,5	AS language

► Creation of Main Program

1 Right-click the controller node, and then click [Add] - [Program].

A program node is created with a name of Pg001 under the controller.





2 **Change the name. Click program name node.**

You can enter a name. Enter "Main".

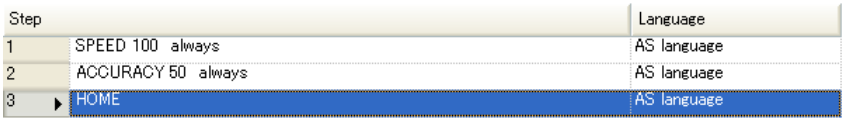
3 **Right-click Main, and then click [Add] - [Program Step] - [Speed] - [SPEED].**

Enter SPEED 100 always to set the operating speed of the robot (except the specified motion instruction).

4 **Right-click Main, and then click [Add] - [Program Step] - [Speed] - [ACCURACY].**

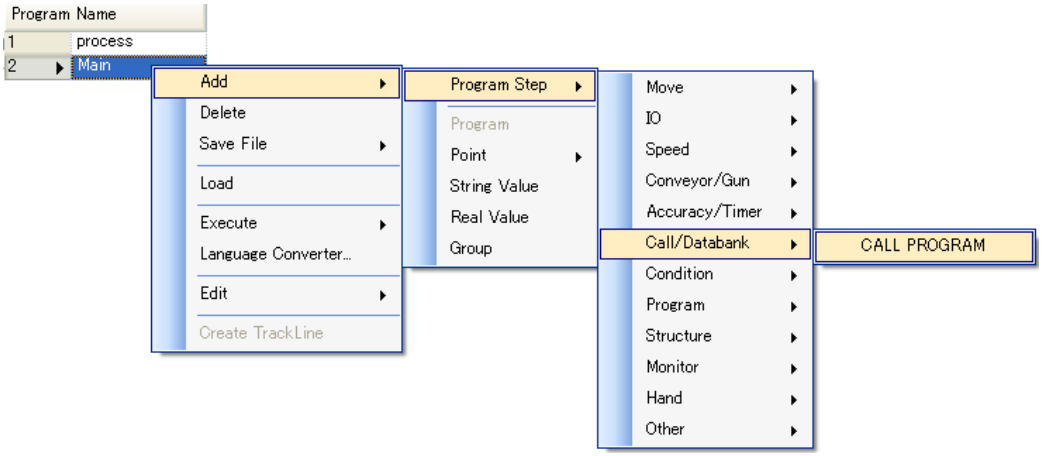
Enter ACCURACY 50 always to set the accuracy of position (except the specified motion instruction).

5 **Right-click Main, and then click [Add] - [Program Step] - [Move] - [HOME].**



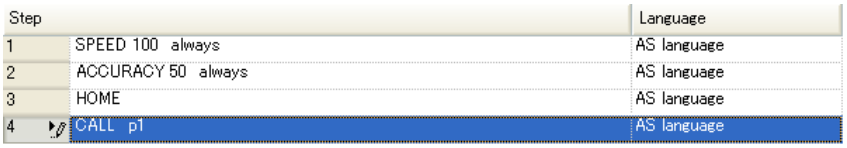
6 **Right-click Main and then click [Add] - [Program Step] - [Call/DataBank] - [CALL PROGRAM].**

The process can be branched to the program written after CALL. Refer to AS Language Instruction Manual for details.



7 **Left-click the program call up instruction, to edit to CALL p1.**

Modify the CALL variable name, and call the subprogram (p1 - p10) created in the pick and place program. The program of parts 1 is described as an example here.



8 **Right-click the CALL instruction, and then click [Edit] - [Copy].**

9 **Right-click the CALL instruction, and then click [Edit] - [Paste].**

Change the call up program to process.

10 **Right-click the CALL instruction, and then click [Edit] - [Copy].**

11 **Right-click the CALL instruction, and then click [Edit]- [Paste].**
Change the call up program to p6.

12 **Right-click JMOVE #home step, and then click [Edit] - [Copy].**

13 **Right-click the last program step, and then click [Edit] - [Paste].**
Before the program exits, add the instruction to move to home position.

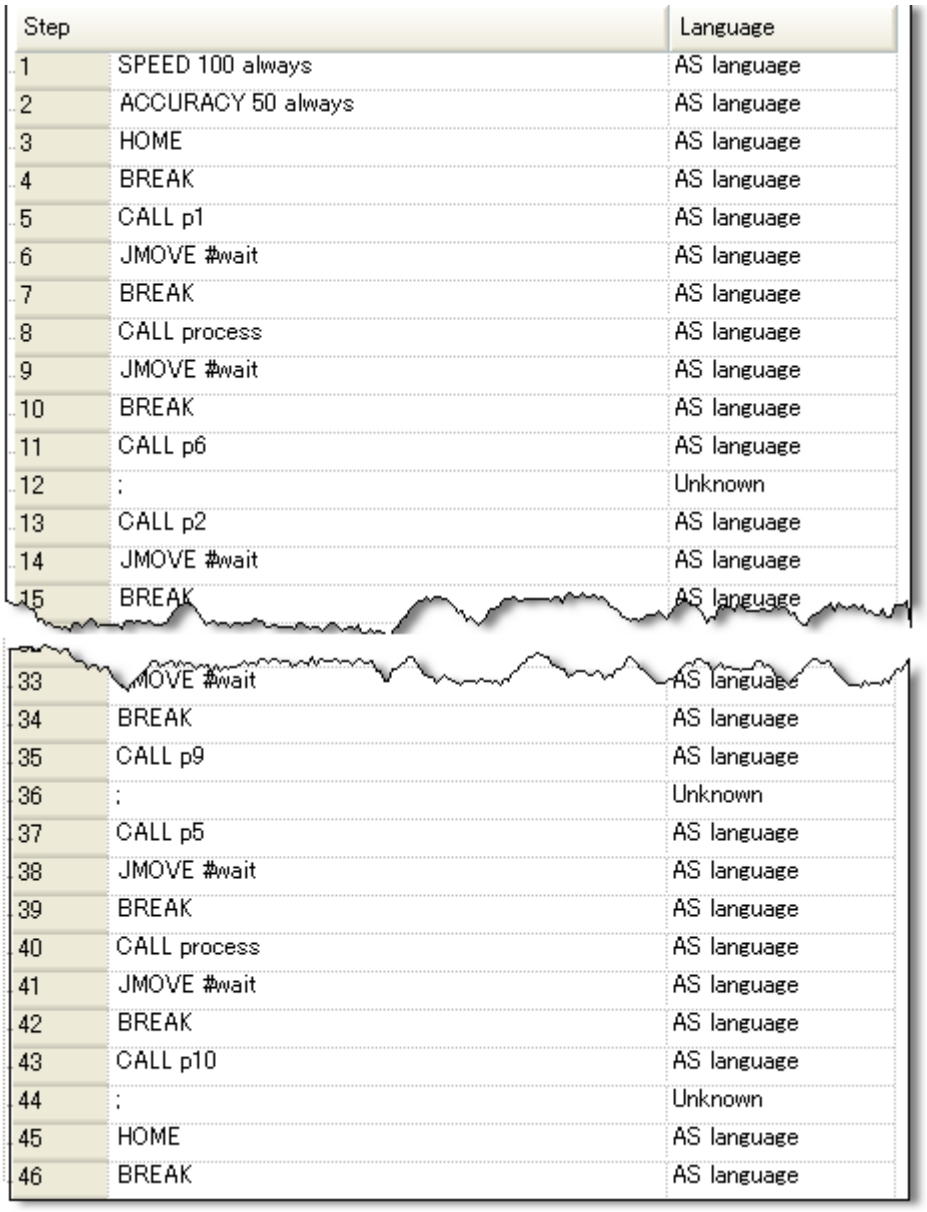
Step		Language
1	SPEED 100 always	AS language
2	CALL p1	AS language
3	HOME	AS language
4	CALL p1	AS language
5	JMOVE #wait	AS language
6	CALL process	AS language
7	JMOVE #wait	AS language
8	CALL p6	AS language

14 **Repeat the procedure 6 to 11 to add a subprogram for each part.**

15 **Right-click on JMOVE step, and then click [Edit] - [Copy].**

16 **Right-click on JMOVE step, and then click [Edit] - [Paste].**
Change the variable name to #wait, and add before and after shutter Open/Close (call up of the subprogram process) so that a robot moves to a waiting position before and after opening or closing of the shutter.

17 **Add BREAK instruction after joint motion instruction.**



Step		Language
1	SPEED 100 always	AS language
2	ACCURACY 50 always	AS language
3	HOME	AS language
4	BREAK	AS language
5	CALL p1	AS language
6	JMOVE #wait	AS language
7	BREAK	AS language
8	CALL process	AS language
9	JMOVE #wait	AS language
10	BREAK	AS language
11	CALL p6	AS language
12	;	Unknown
13	CALL p2	AS language
14	JMOVE #wait	AS language
15	BREAK	AS language
33	JMOVE #wait	AS language
34	BREAK	AS language
35	CALL p9	AS language
36	;	Unknown
37	CALL p5	AS language
38	JMOVE #wait	AS language
39	BREAK	AS language
40	CALL process	AS language
41	JMOVE #wait	AS language
42	BREAK	AS language
43	CALL p10	AS language
44	;	Unknown
45	HOME	AS language
46	BREAK	AS language

- The symbols ";" described in program are comments. They are used to divide the display of the program into each part.
- The comment is skipped in the execution of simulation.

The creation of the program is completed.

Subsequently, repeat the program to ensure that it operates properly.

Memo

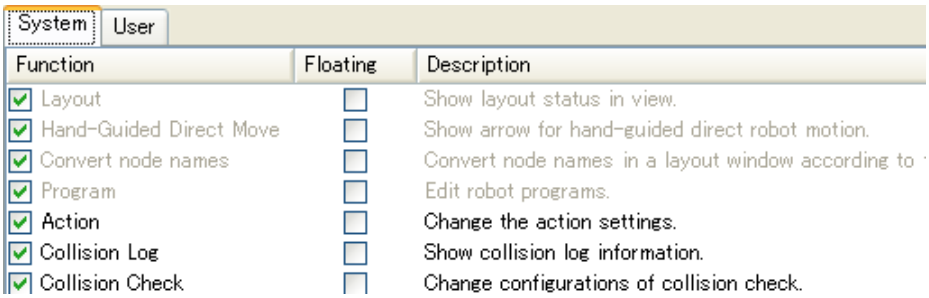
2.12 Simulation

This chapter describes a procedure to repeat a program for handling a work with a simulation screen.

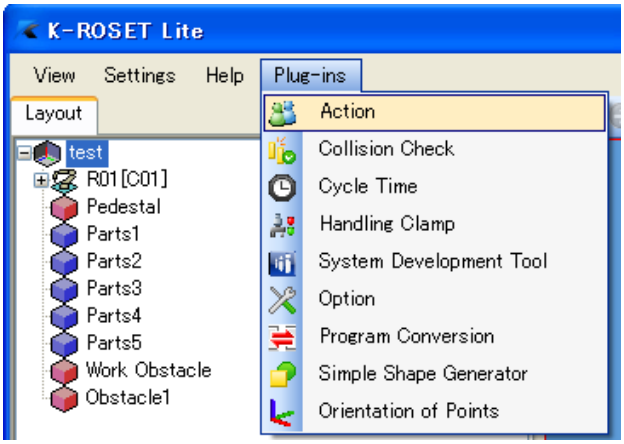
Setting of Action Function

Setting to control peripheral devices according a robot output signal is described.
The shutter of the Machining Center is opened/closed here.

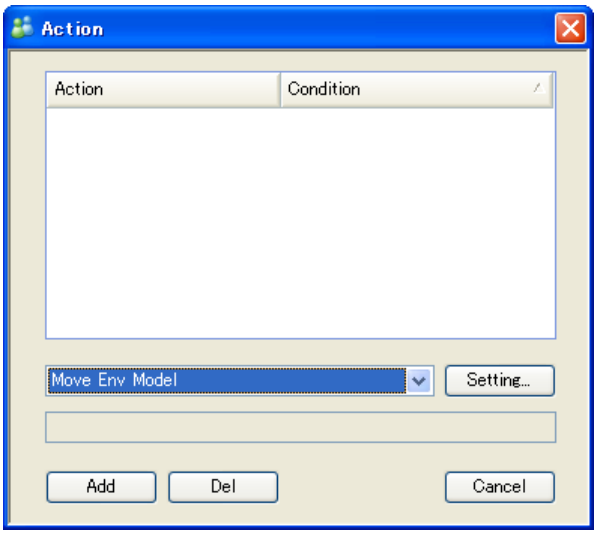
1 **Ensure that the Action on the Plug-ins setting screen is checked a box.**
When this function is enabled, the setting is correct.



2 **Start an Action. Click Plug-ins, and then Action from the main menu.**

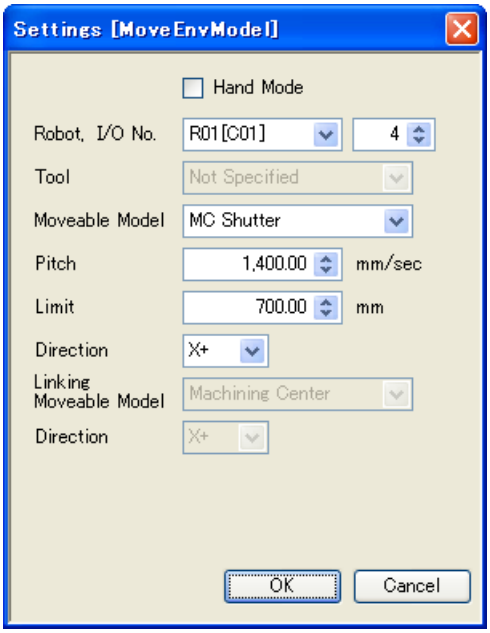


3 **The Action screen is displayed. Select the function to “Move Env Model”, and click Setting button.**



4 The setting screen for the Move Env Model is displayed.

Enter the signal for Open/Close described in the program to set moving interval, moving upper limit, and moving direction.

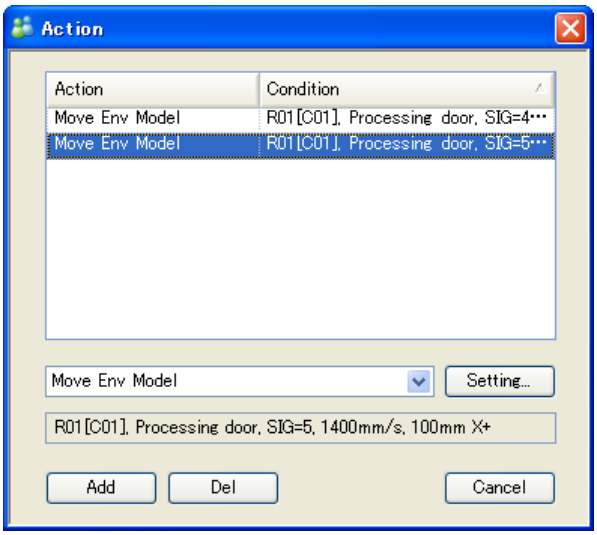


	Signal	Movable Model	Pitch	Limit	Direction
1	4	MC shutter	1400	700	Y+
2	5	MC shutter	1400	700	Y-

5 lick OK button.

6 Click the Add button on the dialog of the action screen.

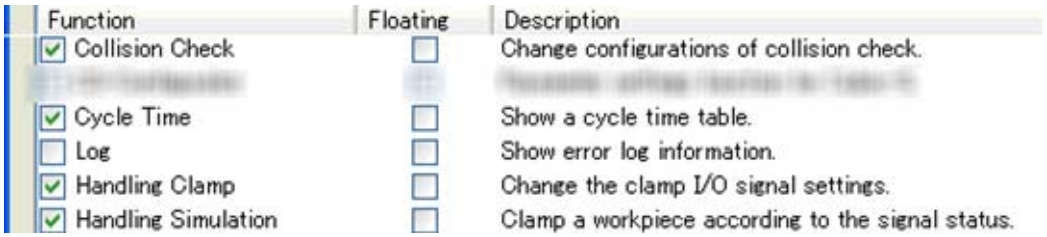
Add the details set in the model movement.



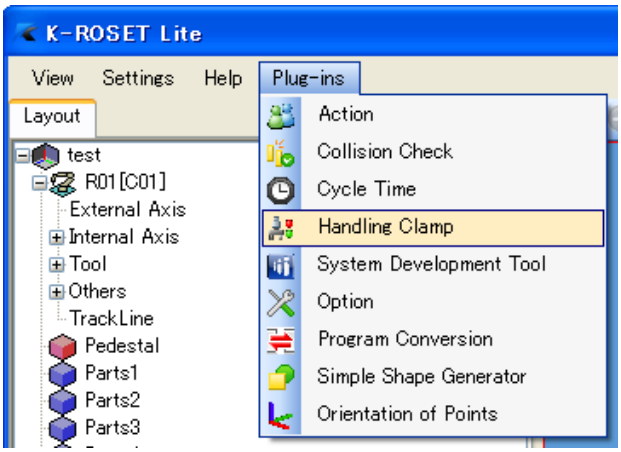
Check for handling Clamp Setting

Check the handling clamp setting before execution of the program.

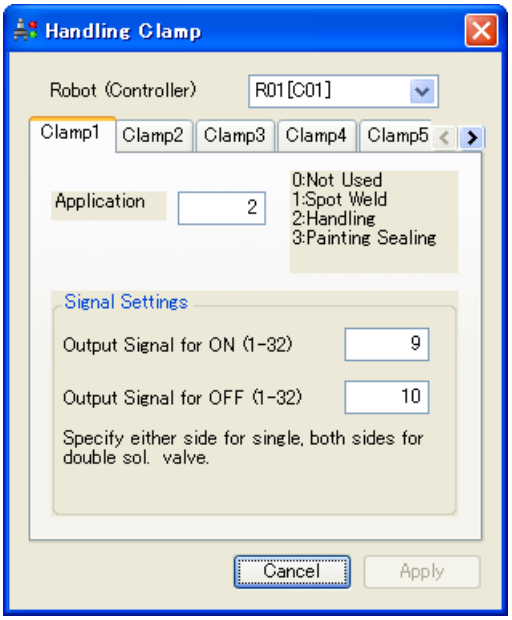
1 **Ensure that the handling clamp on the Plug-ins setting screen is placed with a check mark.**
When this function is enabled, the setting is correct.



2 **Start a handling clamp. Click Plug-ins, and then Handling Clamp from the main menu.**



3 **The handling clamp screen is displayed.**



4 Check the application number.

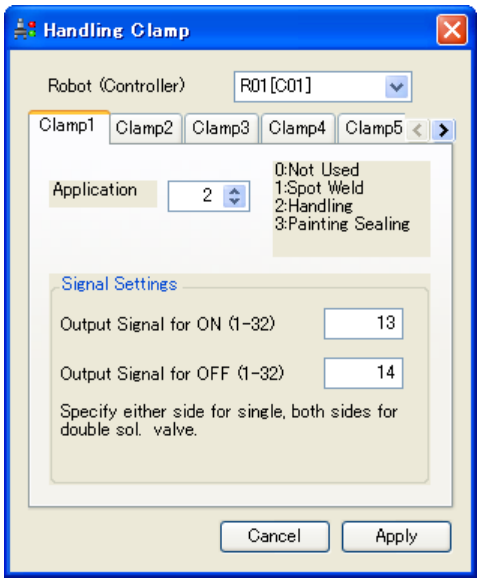
Ensure that the application of the robot for handling is "2".

- When other number is applied, the work is not clamped even when OPENI/CLOSEI instruction is described in the program.

5 Check the signal setting.

Ensure that the clamp signal is set properly. For allocating a different signal for clamp, enter signal numbers used for “Output Signal for ON" and "Output Signal for OFF" here.

Enter as shown on the following screen, and press Apply button.



The setting of the actual robot when shipping is as shown below.

	ON	OFF
Clamp1	9	10
Clamp2	11	12

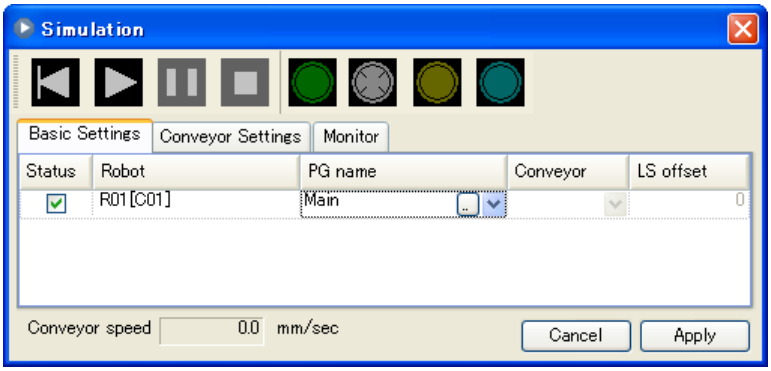
Use the setting of shipping "9""10" here.

- For single solenoid, set "ON" definition signal. For double solenoid, both signals of "ON" and "OFF" should be set.

Setting of Simulation Screen

Set the robot and the program.

1 Select a Basic Settings tab on the Simulation screen.



Click the state column of R01[C01], and place a check mark.

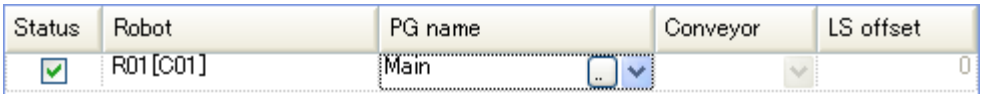
- The robot with a check mark is for repeat. The robot without a check mark is not repeated.

2 Click the PG name column of R01[C01].

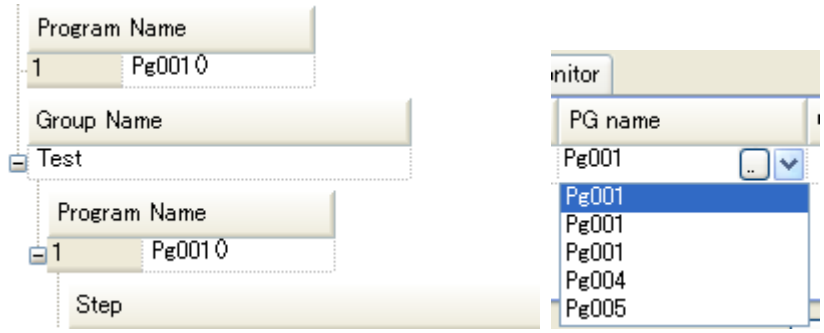
3 mark is displayed. Click it.

4 The created list is displayed on the R01[C01] of the program screen. Select "main".

The "main" is selected.



- As for the program list displayed with the PG name column, the same name may be displayed.
- The program screen can be created with the same program name. In addition, a group can be created for containing the programs in it. The same program names are displayed in the list, but they are displayed on the tree in order. Be careful when selecting.



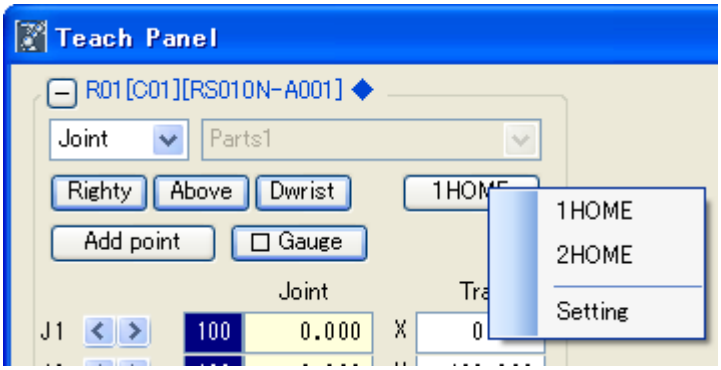
Register an initial position of the robot.

A procedure is described to register a returning repeat start position when rewinding in simulation.

1 Click joint values to register as home on the program screen.

The robot jumps to the specified step position.

2 Right-click the 1HOME button on the Teach panel, and click the setting of the menu.

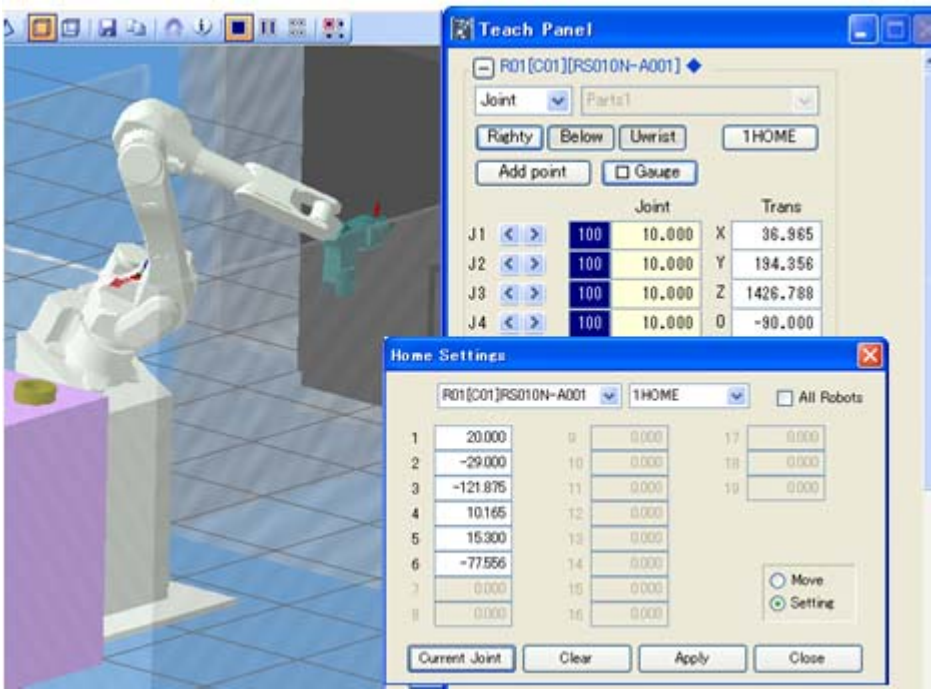


The home setting screen is displayed.

3 Select the robot on the Home Settings screen, and select 1HOME.

4 Click the current position button, and then click Application button.

The joint values of the robot are loaded, and this position is registered.



Click Close button, and close a screen.

5 Click the rewind button.

* When a cursor is placed on the button, the button name is displayed on a tool tip.

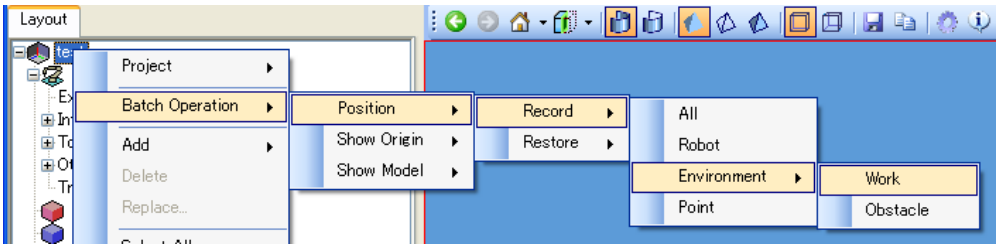
Register an initial position of the work.

A procedure is described to register a repeat start position of the work to be handled.

1 **Move the work to the repeat start position by the setting position change.**

2 **Right-click the Project icon [ ] in the layout.**
The menu related to the project is displayed.

3 **Click [Batch Operation] - [Position] - [Record] - [Environment] - [Work].**
The position of the work currently in the layout is recorded.



* Clicking [Position] - [Record] of work icons in the layout allows individual setting.

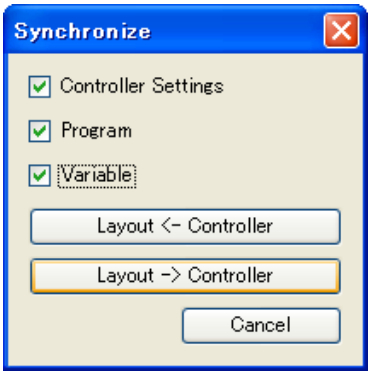
Synchronization of Program and Variables

Synchronization of the created program and variables to the controller is described.

1 **Synchronization of Layout -> Controller is carried out.**

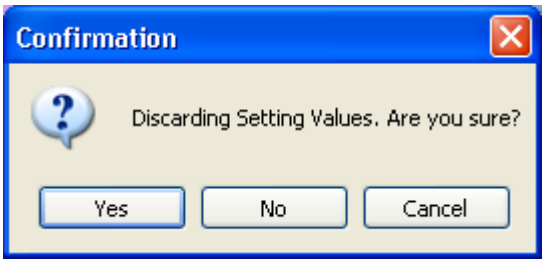
2 **Click the robot R01[C01] tab of the controller tab. Click the synchronization button of the R01[C01] tab.**
The Synchronize screen is displayed.

3 **Check a box in Controller setting, Program, and Variables.**



4 **Click Layout -> Controller button.**

A Sychronize screen and an overwrite confirmation are displayed for each item. Click YES.



- When there are several robots, Carry out a synchronous operation with the controller tab of each robot.

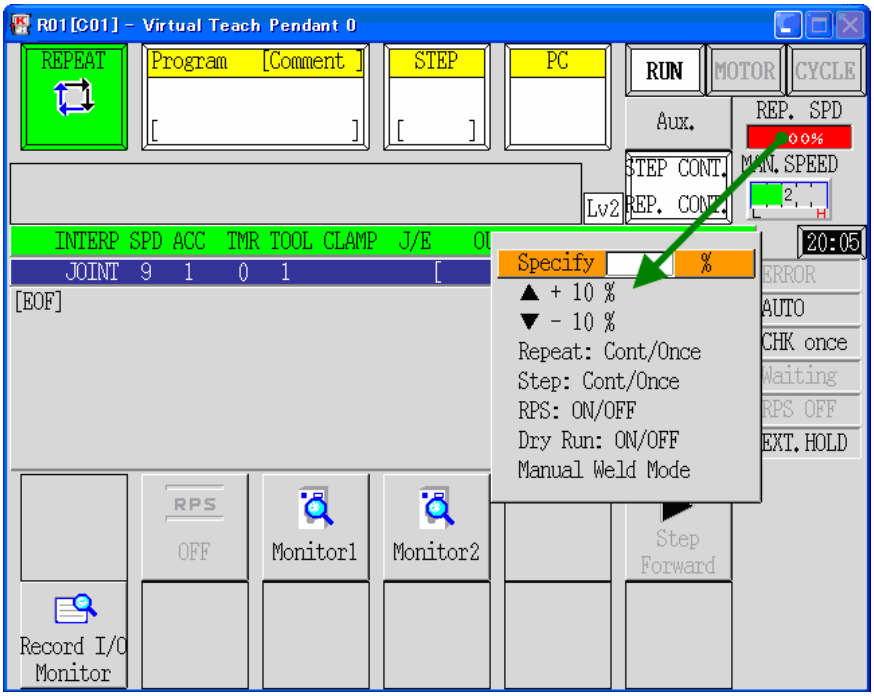
Settings of Repeat

Preparations for repeat are completed by the descriptions above. K-ROSET has several animation effects at the time of repeat. Check the setting of each effect here.
The effects are repeat speed, handling clamp, cycle time, and Collision check settings.

Repeat Speed

Check the speed during repeat.

1 **Click the pendant display on the controller screen.**
The Virtual Teach Pendant is displayed.



2 **Ensure 100% is indicated.**

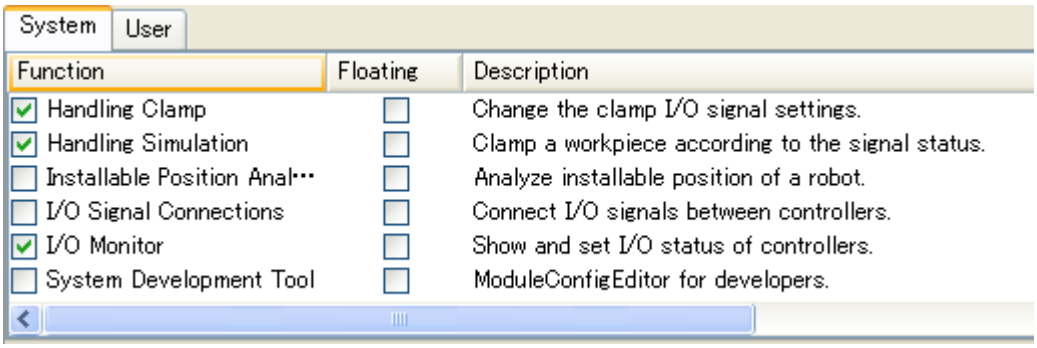
3 **To indicate 100%, click the gauge of the repeat speed, and set speed on the speed specification screen.**

Handling

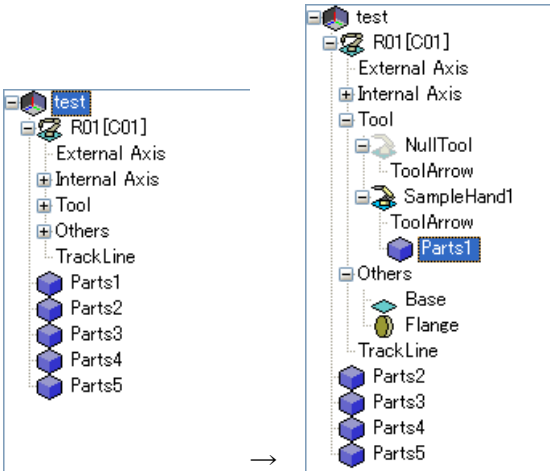
Moving the work position on the layout during repeat to the tool tip allows moving the work following the motion of the robot.

1 Ensure that the Handling simulation on the Plug-ins setting screen is checked a box.

When this function is enabled, the setting is correct.



When the clamp signal is turned ON, the work icon moves under the tool icon on the layout.
When the work is under the tool icon, the work is clamped on the view.

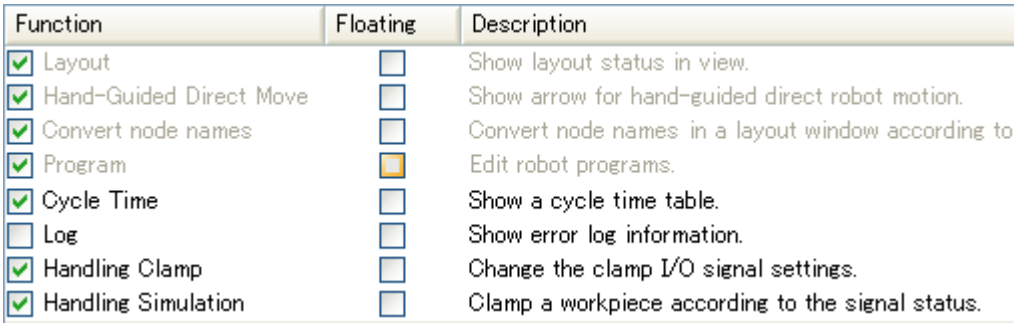


- When the tree of the robot is closed, the work icon moves under the closed state.
- The work icon closest to the tool transformation value of a robot turning the signal ON moves.

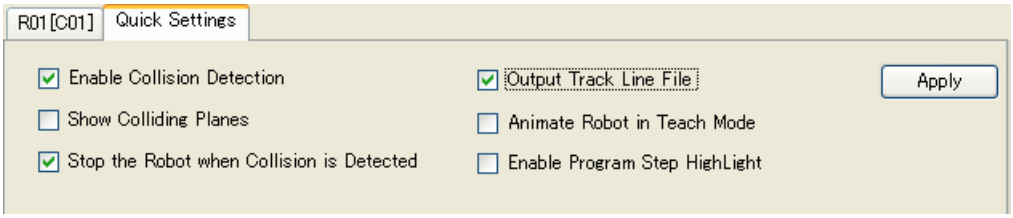
Cycle Time Display

Repeat time is displayed when repeat is completed.

1 Ensure that a check mark is placed in the cycle time of the Plug-ins setting screen.



2 **Ensure that a check mark is placed to Output Trace File with the quick setting on the controller screen.**

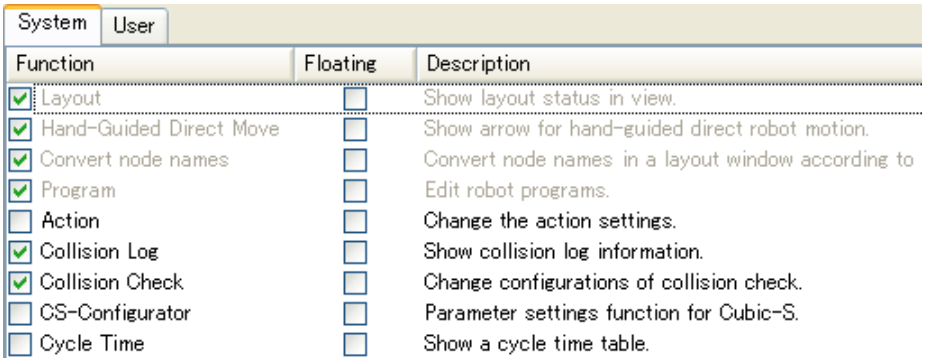


Cycle time is not displayed when a check mark is not placed.

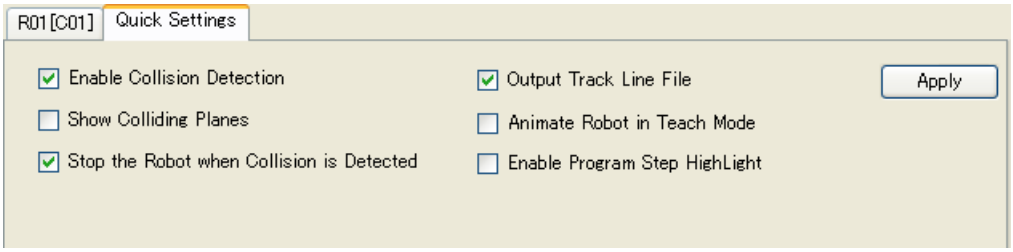
► Collision Check Display

When the model with Collision pair setting interferes during REPEAT, the result of the Collision is displayed. In addition, repeat can be stopped at the interfered point.

1 **Ensure that a check mark is placed in the Collision check of the Plug-ins setting screen.**
To display the Collision log, place a check mark to the Collision log.



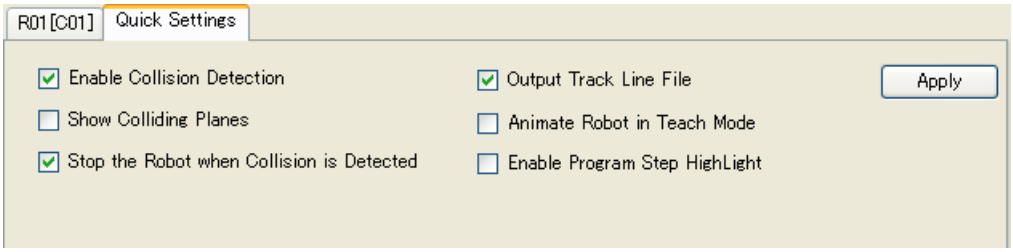
2 **Ensure that a check mark is placed to "Enable Collision Detection" with the Quick Settings tab on the Controller screen.**



Collision Check is not active when this check box is checked off.

- When checking/unchecking a check mark, make sure to click Apply button on the right side of the screen to reflect the change.

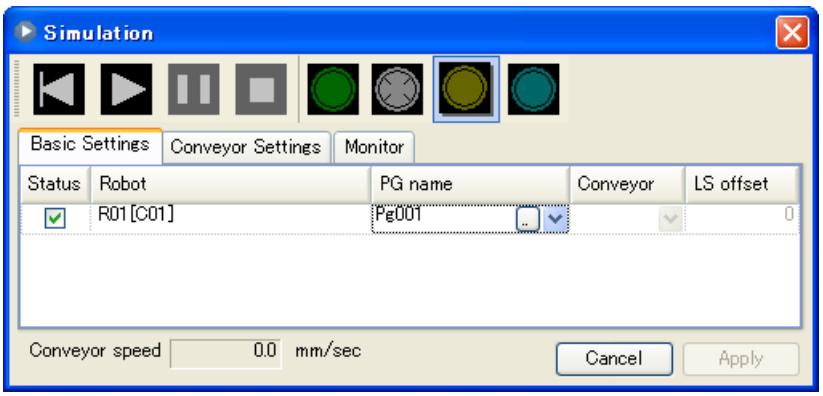
3 When the robot is stopped if the Collision occurs, ensure that a check mark is placed to "Stop the Robot when Collision is Detected" with the Quick settings tab on the Controller screen.



- When the robot interfered and stopped after this setting is enabled, the robot cannot be start again.

Repeat

Execute a program with a simulation screen.



1 Click the rewind button on the simulation screen.

The robot moves to the posture of home position.

2 Click [Batch Operation] - [Position] - [Restore] - [Environment] - [Work].

The work moves to a repeat start position.

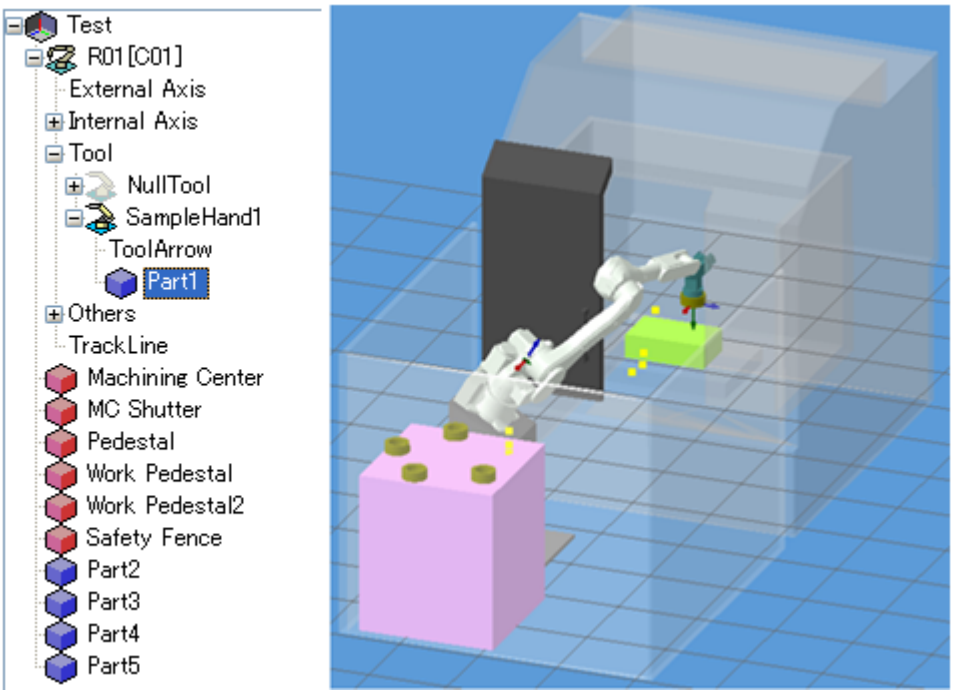
- A work in the tool icon prevents a correct restoration.

3 **Click Repeat button.**

The part is handled at the right moment when the clamp signal is turned ON, and transferred to the Machining Center. The shutter of the Machining Center is opened at the right moment when the signal ON set by an action is turned ON. When a processing process is completed, the shutter is closed by turning the signal ON set by an action, and a part is placed at the right moment when the clamp signal is turned OFF.

Clicking the pause button to stop repeat temporarily. Press the repeat button to start again.

Press the stop button to exit. The robot will be in the same state as turning on an emergency stop. The robot cannot be start again. Return the robot to the home position with a rewind button, and start again with a repeat button.



After repeat, a TrackLine is displayed with a point.

The teach point section of the layout [program name] indicates a program step position.

Right-click the TrackLine icon line to display the menu related to TrackLine. A point of the track line can be changed to a line, and a color of the track line and a size of a point can be changed.

3 Various Setting Procedures

This chapter describes various setting procedures used frequently.
For details of functions of the robot main unit, refer to an instruction manual of the robot.

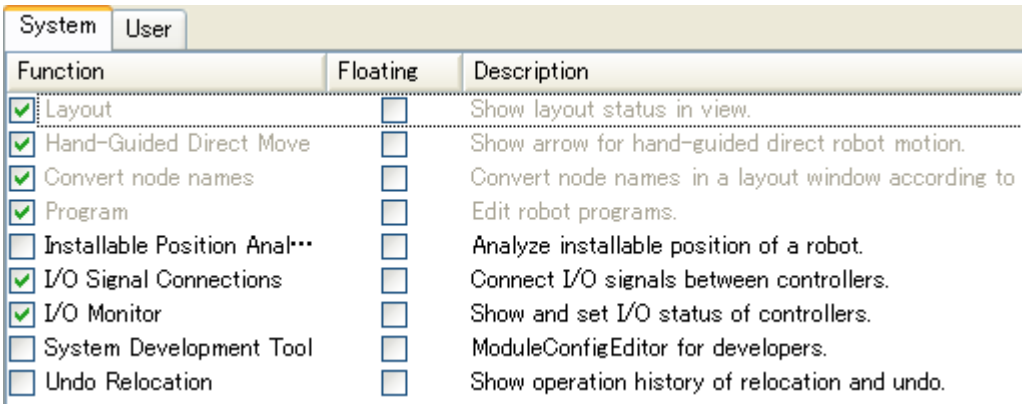
3.1 A procedure to Check I/O Signal Connection

For the procedure to check I/O signal connection, a sample project where I/O signal connection is set is used for description.

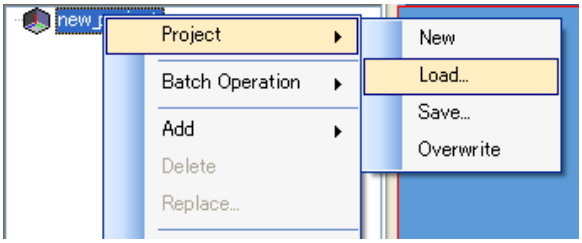
1 **Ensure that the I/O Signal Connections on the Plug-ins setting screen is placed with a check mark.**

For checking by turning the manual signal ON/OFF, also place a check mark in the I/O Monitor.

2 **Load project of the sample of the I/O connection setting.**

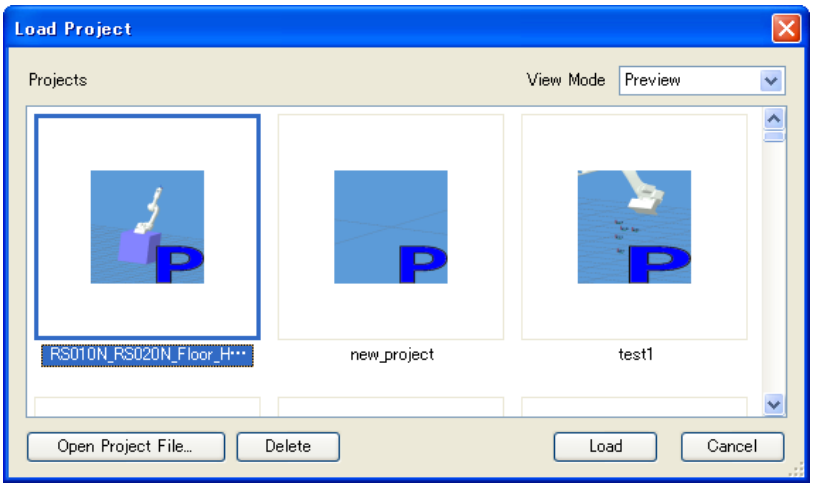


3 **Right-click the project icon, and then click Load.**



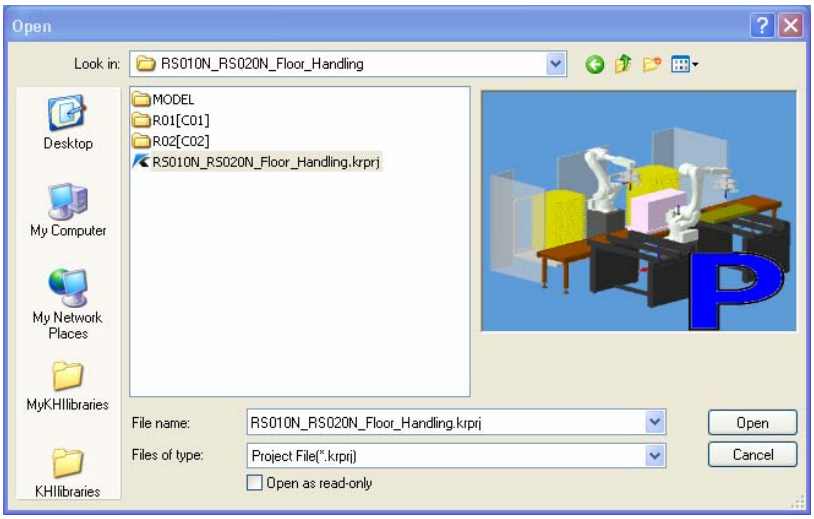
4 **The project icons are displayed. Specify RS010N_RS020N_Floor_Handling, and click Load button.**

The project is loaded.



5 When RS010N_RS020N_Floor_Handling is not included in the list, specify the file, and click Load... button.

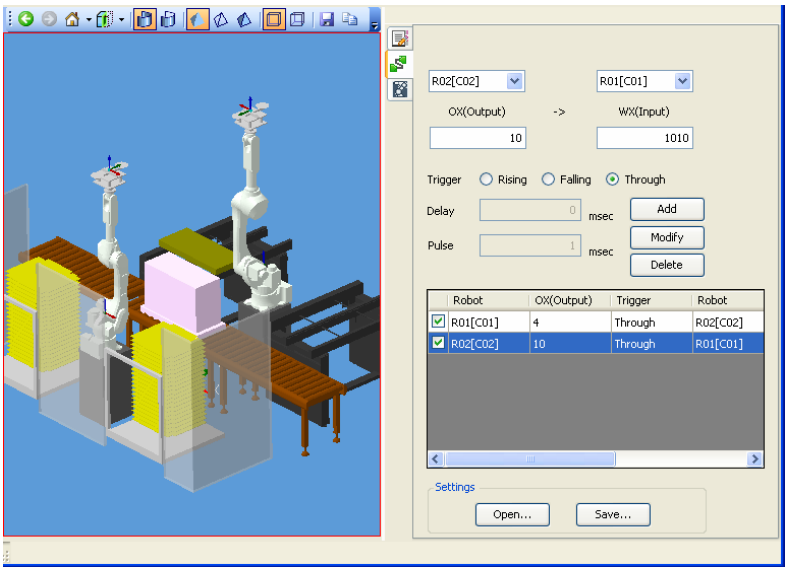
Click KHIlibraries icon, and specify Demo¥Handling¥RS010N_RS020N_Floor_Handling.krprj.



Click Open button to load.

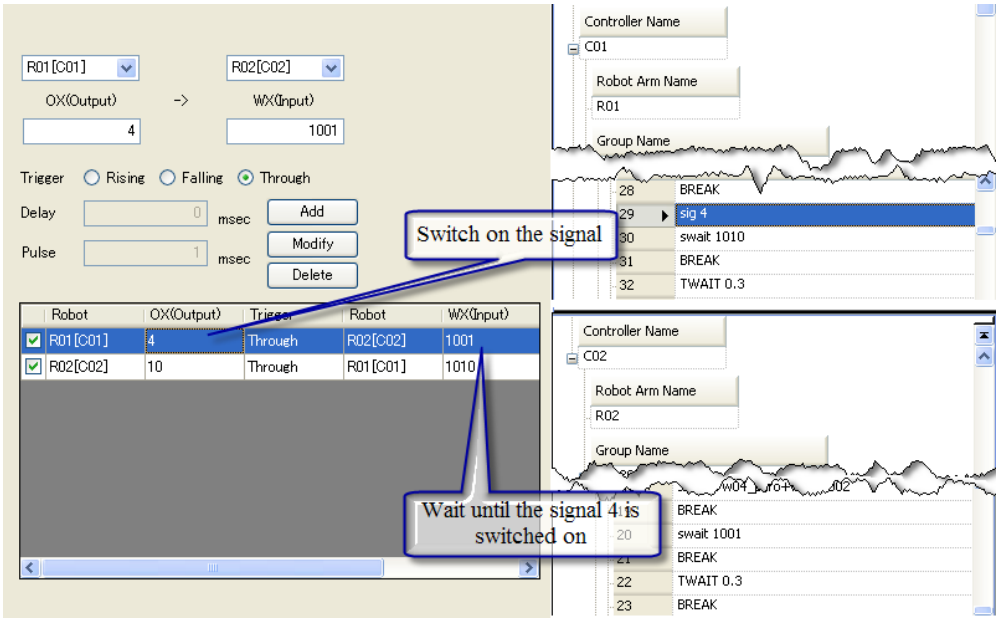
6 Check the setting of the I/O signal connection.

When the loading of the project is completed, the I/O signal connection of the task panel is displayed.



7 **Compare with the program and check if the assumed motion appears by the setting of the I/O signal connection.**

The R02 robot waits until the signal of the R01 robot is turned ON. Ensure that the output signal of the I/O signal connection matches the signal described in the program.



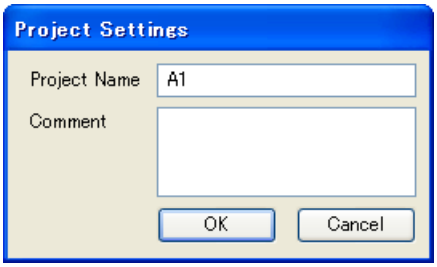
3.2 Notice When Saving a Project

- After having saved the project with a different name, make sure to load again the project for the continuous work. The procedure is shown below.

1 **As an example, when a project A should be saved in a project A1, select Project and then save to open the project setting screen.**

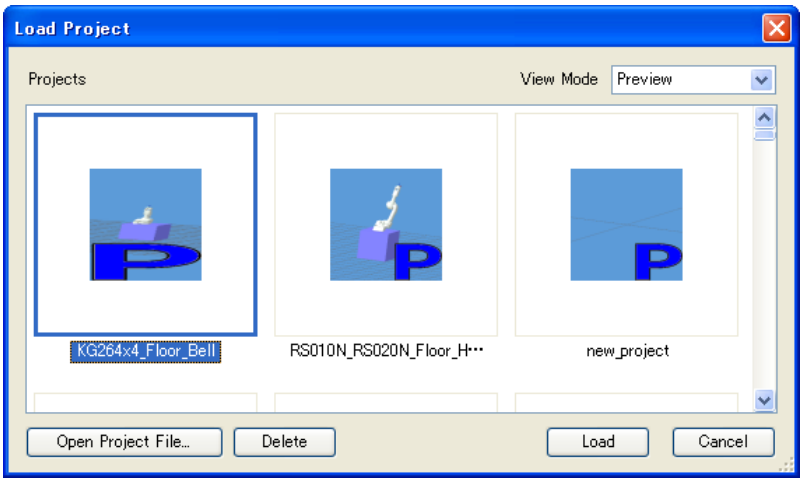
2 **Save the project A as Project A1.**

The project name becomes A1. Click OK button.



3 **Click Project and then Load.**

The layout becomes a new project, and a project loading screen is opened.



4 **Select the A1 project saved previously, and click Load button.**
Project A1 is load.