## K-ROSET How to make Handling project

Kawasaki Heavy Industries, Ltd.

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## 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.		

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## **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.



# **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. MeMo



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

- $\star$  The robot RS010N is disposed on the pedestal (floor-standing setting).
- $\star$  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.

$\boldsymbol{k}$
K-ROSET

Example of shortcut icon

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

K-ROSET Lite		
View Settings Help		
Layout		
New Project		Controller/Arm Root
Protect False Version 1.629703		
Enable Collision Detection     Show Colliding Planes      Stop the Robot when Collision is Detected	Output Track Line File Apply Animate Robot in Teach Mode Enable Program Step HighLight	
Collision Log Terminal Paint Controller		

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.

K-ROSET Lite			
View	Settings	Help	_
Layout	🥵 Plue	-ins Setting	GÐ
- 🌧 Ne	w Project		

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.

Plug-ins			
System User			
Function	Floating	Description	
Layout		Show layout status in view.	
Hand-Guided Direct Move		Show arrow for hand-guided direct robot motion.	
Convert node names		Convert node names in a layout window according to	
Program		Edit robot programs.	
Action		Change the action settings.	
🖊 Collision Log		Show collision log information.	
Collision Check		Change configurations of collision check.	
CS-Configurator		Parameter settings function for Cubic-S.	
Cycle Time		Show a cycle time table.	
Log		Show error log information.	
🗌 Handling Clamp		Change the clamp I/O signal settings.	
Handling Simulation		Clamp a workpiece according to the signal status.	
Installable Position Anal…		Analyze installable position of a robot.	
I/O Signal Connections		Connect I/O signals between controllers.	
I/O Monitor		Show and set I/O status of controllers.	
System Development Tool		ModuleConfigEditor for developers.	
Undo Relocation		Show operation history of relocation and undo.	
Option		Change the settings of K-ROSET.	
Create Painting Program…		Create a painting program copying selected points.	
Create Painting Program…		Create a painting program using 3 points on a plane.	
Paint Simulation		Show paint path and paint effect (cone).	
Program Conversion		Convert the program with shift or mirror method.	
Record Video		Record the view in the simulation.	
Teach Panel		Move robots manually.	
Simple Gun Wizard for P···		Create simple painting guns.	
Simple Shape Generator		Create a simple shape on view.	
Controller		Operate a controller.	
Automatic Start of Cont…		Start a controller when a robot is added.	
Simulation		Operate simulation for the selected robots.	
Simple Teach		Move a axis of a selected robot.	
Orientation of Points		Set an orientation of points.	
Draw Teach Point		Draw teach points when a robot moves.	
Terminal		Show terminal of the controllers.	
Time Line		Move robots according to trajectory files.	
Paint		Edit instructions for Explosion-proof paint application.	
View operation plug-ins		Enable View Manager and Measure function.	
Draw Track Line		Draw track lines when a robot moves.	
<			
🛯 Available All	OK	Cancel	

## 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 [<a>[</a>) 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.

Project Settings		
Project Name	new_project	
Comment		

\*

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.

Project Settings		
Project Name	test	
Comment	Handling test 4/25	
	OK Cancel	

## Click OK button.

The project with the specified project name is newly created.

🛣 K-ROSET Lite			
View	Settings	Help	Plug-ins
Layout			i 🔾 🕤 🟠
- 🌏 tes	t		

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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 [<br/>
</br>
in the layout, and select [Add] - [Robot] from menu.

The robot load screen is displayed.



 $\mathbf{2}$  Select the selection items as follows (shown on the right), and click OK button.

Load Robot	
Application	Preview
Handling 🔽	0
Controller	
E controller 🛛 🔽	
Series	
R-series 🔽	
Library Type	
Standard 🔽	
Product Code	AS Version
RS010N-A001 🗸	1000001M 🔽
	OK Cancel

#### Selection of items

ApplicationHandling		
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** [**4**] **in the layout.** Position screen is displayed. 5 Set the value shown on the following screen to each coordinate value, and click OK button.

🍫 Position <r< th=""><th>01 [C01 ]&gt;</th><th></th></r<>	01 [C01 ]>	
Х	Y	Z
0.000	-215.000	1272.400
[lonner]		
0	A	Т
-90.000	30.000	-90.000
Base Coordinate	Local	~
		×
– 🕂 Settings		
Undo	OK Cance	I Apply

The robot is disposed at the specified position.





**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.

Select Shape F	ile			? 🔀
Look in:	🚞 Pedestals		💌 🧿 🖻 🖻	
Desktop Desktop My Computer	Pedestal_500_5	00_500.stl 00_300.STL 50_900.stl 00_600.STL 750_3090.stl	No Im	age
<b>)</b> MyKHIlibraries	File name:	Pedestal_750_750_900.stl	~	Open
C KHIlibraries	Files of type:	Work File(*.krprj;*.stl)  Open as read-only	<u>~</u>	Cancel

#### **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.

🤌 Position <p< th=""><th>edestal&gt;</th><th></th></p<>	edestal>	
Х	Y	Z
0.000	0.000	0.000
In Internet		Turner Jacob
Ó	A	Т
-90	0.000	0.000
Base Coordinate	Local	~
		×
- (+) Settings		
Undo	OK Cance	I Apply

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 [46] 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 Tool Fil	e		? 🔀
Look in:	🚞 SampleHandi		<ul> <li>3 🌶 📂</li> </ul>
Desktop	MODEL	abi)	
My Computer			
My Network Places			
D MyKHIlibraries			
	File name:	SampleHand1.krprj	V Open
2	Files of type:	Tool File(*.krprj)	Cancel
KHIlibraries		Open as read-only	

\*

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.

Confirm	ation 🔀
2	Syncronizing the Controller Settings. Are you sure?
	Yes No Cancel



## 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 [<a>[</a>) 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.

Select Shape F	ile		? 🛛
Look in:	🗀 HollowCylind	ei	3 Ø 🕫 📰 •
Desktop	HollowCylinder	_150_100_60.stl	
My Computer			No Image
My Network Places			
Ø			
MyKHIlibraries	File name:	HollowCylinder_150_100_60.stl	V Open
C KHIlibraries	Files of type:	Work File(*.krprj;*.stl)  Open as read-only	✓ Cancel

#### **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.

🍫 Position <p< th=""><th>arts1&gt;</th><th></th></p<>	arts1>	
Х	Y	Z
-1175.105	-408.156	1000
0	A	Т
-36	0.000	0.000
Base Coordinate	Local	~
		$\mathbf{\mathbf{v}}$
– 🕂 Settings		
Undo	OK Cance	Apply

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).



	Х	Y	Ζ	0	А	Т
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.

es un p	ie shap	e (	Gene	rator	
BOX	PRISM	P	YRAM	ID C	YLINDER C <
		v		850	20.00
		Y		850	mm
		Ζ		1000	mm
Output Color					Work
Output Color Transp	Darent	Op	Daque		Work Obstacle File

\*

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.

🤌 Position <w< th=""><th>ork Pedestal&gt;</th><th>×</th></w<>	ork Pedestal>	×
Х	Y	Z
-970.000	-125.000	0.000
	house house	
0	A	Т
0.000	0.000	0.000
Base Coordinate	Local	*
		~
– 🕂 Settings		
Undo	OK Cance	Apply

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.

Simp	e Shape Ge	nerator		(
BOX	PRISM PYR	AMID C'	YLINDER	C < 3
	X Y	300 500 150	mm mm mm	
Output			W- 4	
Color			WOrk	
Trans	arent Opaq	ue	Obstacle	
			File	
		•		

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.
- 1 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.

🍫 Position <work pedestal2=""> 🛛 🗙</work>							
Х	Y	Z					
1215.000	-680.000	900.000					
Imme Junnet		Inne Journel					
0	A	т					
0.000	0.000	0.000					
Base Coordinate	Local	~					
Settings		~					
Undo OK Cancel Apply							

The work pedestal 2 is disposed at the specified position.





This chapter describes a procedure to add obstacles.

#### **1** Right-click Project icon [<a>[</a>) in the layout.

The menu related to the project is displayed.

🗶 K-RC	)SE	Γ Lite					
View	Sett	ings Help Plug-	ins				
Layout	i O O 🛆 • 🗗 • 🗗 🖉 📣 🖉 🛛						
⊐€ test ∋© R	9	Project	•	1			1
Ext ∎Inte		Batch Operation	۲				<u></u>
⊞ Too		Add	•		Robot		
Tra		Delete			Environment	•	Work
		Replace			Point	•	Obstacle
		Select All			Group		
		Show Triad	۲		Conveyor		
		Edit	۲				
		Settings					

### 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.

Look in: Oth	ers over arConveyorJig1.STL arConveyorJig1_2.STL erJigforFloor.stl	✓ Ø Ø №
Desktop	over arConveyorJig1.STL arConveyorJig1_2.STL erJigforFloor.stl	
My Network Places	hutter.stl	No Image
MyKHIlibraries File name Files of ty	MC.stl  Work File(".krpi;".st)  Open as read-only	Open Cancel

#### **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.

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.

🍫 Position < Machining Center> 🛛 🔀						
Х	Y	Z				
1480.000	-680.000	0.000				
		There are a second				
0	A	Т				
90.000	0.000	0.000				
Base Coordinate	Local	~				
- (+) Settings		~				
Undo OK Cancel Apply						

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.
- 1 Click KHIlibraries folder icon on the left of the screen. Select KHIlibraries¥Envs¥Equipment¥Others folder.
- 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.

	Х	Υ	Z	0	А	Т
MC	1480	-735	0	90	0	0
shutter						
Safety	680	-600	0	180	0	0
fence						


# 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.

K-ROSET Lite				
View	Settings	Help	Plue	g-ins
Layout			83	Action
🖃 🌑 tes	st		1jo	Collision Check
8	R01[C01]		Θ	Cycle Time
External Axis ⊕Internal Axis		<u>2</u> 8	Handling Clamp	
⊕ Tool		6	System Development Tool	
		X	Option	
Pedestal		¥	Program Conversion	
🍑 Parts1		2	Simple Shape Generator	
Parts2		L	Orientation of Points	
Parts3				- /

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

The setting menu of Collision check is displayed.

l <mark>is</mark> Collision Check					
Pair Lists					
🖃 🔿 Project 📃 🗖	ស Project 📃 🔒	Model1	Model2		
🖃 🥵 R01 [C01]	E R01[C01]	R01[C01] - Base	R01[C01] - J2		
Base	Base	R01[C01] - Base	R01[C01] - J3		
	U 	R01[C01] - Base	R01[C01] - J4		
		R01[C01] - Base	R01[C01] - J5		
🖉 J4	ی ا پی ا	R01[C01] - Base	R01[C01] - J6		
J5	🥜 J5	R01[C01] - Base	R01[C01] - SampleHand1		
9_J6	jg₽ J6	R01[C01] - Base	Machining Center		
SampleHan	SampleHan	R01[C01] - Base	MC Shutter		
Machining Ce	Machining Ce	R01[C01] - Base	Pedestal		
Pedestal	Pedestal	R01[C01] - Base	Work Pedestal		
🞽 Work Pedest 🝸	🎽 Work Pedest 🍸	R01[C01] - Base	Work Pedestal2		
	< >	R01[C01] - Base	Safety Fence 💌		
		Add Delete	Cancel Apply		

\*

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.

l <mark>i</mark> o Gallisian Gheck			
		Pair Lists	
🖃 🌒 Project 📃 🔒	🖃 🧑 Project	Model1	Model2
🛱 🖉 R01 [C01]	🕂 🖀 R01 [C01]	R01[C01] - J3	MC Shutter
🔶 Base	Machining Cente		
- <b>∂</b> J1	🕑 📦 MC Shutter		
J2	Pedestal		
	Work Pedestal		
of <sup>1</sup> /2 J4	Work Pedestal2		
0 <sup>67</sup> J0	Bart1		
SampleHan	Part2		
Machining Ce	Part3		
MC Shutter	Part4		
Pedestal	Part5		
🍎 Work Pedest 🍸	Ť		
Number of	Collision Pairs:0		
		Add Delete	Cancel Apply

- **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.

I Collision Check			
Image: Collision Check         Image: Collision Ch	Project R01[C01] Machining C MC Shutter Pedestal Work Pedestal Work Pedestal2 Safety Fence Part1 Part2 Part3 Part4	Pair Lists Model1 Part1 Part1 Part2 Part2 Part2 Part2 Part3 Part3 Part4 Part4	Model2 Part3 Part4 Part5
Work Pedest		R01[C01] - SampleHand1	MC Shutter
Number of Collision Pairs:0 Add Delete Cancel Apply			

# 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.

Controller/RobotArm Configuration				
test	Basic Item - R01			
⊡-Controller/Arm setting ⊡-C01	Product Code	RS010N-A001		
<mark>R01</mark>	Number of Axes	6		
	Number of External Axes	0		
	Support Kinematics	Enabled		
	Posture of installation	Floor	~	
	Angle	0		
	Expand Item - R01			
	1 HOME		~	
	100000000000000000000000000000000000000	00000010		
	Delete			
	Create	Cancel	Apply	

- **3** Left-click the R01 icon from the left tree.
- **4** Select UP-LIM from the drop-down list of the extension setting column.

Expand Item - R01	Select UP-LIM and click the button in red circle
UP-LIM	✓
180 145 150 270 145 3	360 10 10 10 10 10 10 10 10 10
Delete	
Create	Cancel Apply

#### **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.

Working Area Limitation Setting 🛛 🛛 🔀					
Worki	ng Area Limitation				
Upper	·				
	Hard Limit		Soft Limit	Alt JI	
JT1	0.000 🛨	deg	180.000 🛨	deg	
JT2	0.000 🛨	deg	145.000 🛨	deg	
JT3	0.000 🛨	deg	150.000 🛨	deg	
JT4	0.000 🚍	deg	270.000 🛨	deg	
JT5	0.000 🛨	deg	145.000 🛨	deg	
JT6	0.000 🛨	deg	360.000 🛨	deg	
JT7	0.000 🛨	deg	10.000 ≑	deg	
Lower	Lower				
	Hard Limit		Soft Limit	Alt JT	
JT1	0.000 🛨	deg	-180.000 🛨	deg	
JT2	0.000 🛨	deg	-105.000 🛨	deg	
JT3	0.000 🛨	deg	-163.000 🛨	deg	
JT4	0.000 🛨	deg	-270.000 🗧	deg	
JT5	0.000 🛨	deg	-145.000 ≑	deg	
JT6	0.000 🛨	deg	-360.000 🗧	deg	
JT7	0.000 📩	deg	-10.000 🛨	deg	
			ок 🗌	Cancel	

# **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.

Working Area Limitation Setting 🛛 🛛 🕅				
Working Area Limitation				
Upper				
	Hard Limit		Soft Limit	Alt JT
JT1	0.000 🛨	deg	120.000 🛨	deg
JT2	0.000 🛨	deg	145.000 🛨	deg
JT3	0.000 🛨	deg	150.000 🛨	deg
JT4	0.000 🛨	deg	270.000 🛨	deg
JT5	0.000 🛨	deg	130.000 🛨	deg
JT6	0.000 🛨	deg	360.000 🛨	deg
JT7	0.000 🛨	deg	10.000 ≑	deg
Lower				
	Hard Limit		Soft Limit	Alt JT
JT1	0.000 🛨	deg	-120.000 🛨	deg
JT2	0.000 🛨	deg	-75.000 🛨	deg
JT3	0.000 🛨	deg	-163.000 🛨	deg
JT4	0.000 🛨	deg	-270.000 🛨	deg
JT5	0.000 🛨	deg	-130.000 ≑	deg
JT6	0.000 🛨	deg	-360.000 🛨	deg
JT7	0.000 🛨	deg	-10.000 ≑	deg
OK Cancel				
Expand Item - R01				

UP-LIM	· · · · · · · · · · · · · · · · · · ·
120 145 150 270 130 360 10 1	0 10 10 10 10 10 10 1 🝺
Delete	
Create	Cancel Apply

- **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.

Confirmation 🛛 🔀		
Restarting Controller. Are you sure?		
Yes No		

\*

\*

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.

Option	
Click teach	Off
Home	Setting
Controller axes limit	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)

Joint	✓ Part	ls1		Y
Righty	Above	Dwrist	C	1 HOME
Add po	int [	🗆 Gauge		
		Joint		Trans
J1 < >	100	-39.019	X	-603.986
12 < >	100	-29.740	Y	422.929
13 < >	100	-121.873	Z	447.669
J4 < >	100	29.190	0	-90.001
15 < >	100	-42.107	A	119.966
State of the party of	-	77 001	T	100 000

#### **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.

Option	
Click teach	On
Home	Setting
Controller axes limit	On

## **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.

🍫 Position <t< th=""><th>X</th></t<>	X	
Х	Y	Z
0	0	69.998
	Inner Jacob	Inner Januar
0	A	Т
126	90	-90
Base Coordinate	Parent	~
		~
_ + Settings		
Undo	OK Cance	el Apply

#### **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).





# **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).

Crientation of Points			
O A 0	T 0	Copy to	Direct
O Reference Point			
🔘 Reference Robot			~
<ul> <li>Direct</li> </ul>	O 90.000	A 0.000	T 0.000
🔿 Vertical			
✓ Add Point when Mouse Clicked			
			ОК

## **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.

	🍫 Position <*	>	×
	Х	Y	Z
	*0.0	*0.0	*0.0
📩 👝 Davita (	Inne Januar	Inner Januar	
	0	A	Т
Parts5	0.000	0.000	0.000
L T[5]	In Internet		
↓ p_u[1]	Base Coordinate	Local	~
p_u[2] p_u[3] p_u[4]	– (+) Settings		×
<b>1</b> p_u[5]	Undo	OK Cance	Apply

## 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.

Participa 44	(3) P= <sup>14</sup> [2]		u(4) Dati(1) Dati(1)
X	Y	Z	
0.000	-150	1000	
There are for and	Gumm Journal	Time James	
Ó	A	Ť	
0.000	0.000	0.000	
n== j===	Denne James		
Base Coordinate	Local		
+ Settings	OK Cano	el Apply	

- 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.
- **1** 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.
----------	-------------	-------------	-----------------

🍫 Position <p< th=""><th>×</th></p<>	×	
Х	Y	Z
-970.000	-125.000	1000.000
	Turne Jacob	
0	A	Т
0.000	0.000	0.000
Base Coordinate	Local	~
		×
– 🕂 Settings		
Undo	OK Cance	el Apply

- **1** 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.

🍫 Position <p< th=""><th>X</th></p<>	X	
Х	Y	Z
-970.000	-125.000	1000.000
	Terrer Januar	Inner Januar
Ó	A	Т
0.000	0.000	-36
Base Coordinate	Local	~
		~
– 🕂 Settings		
Undo	OK Cance	el Apply

# **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]  $\rightarrow$  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.

🍫 Position <*:		
Х	Y	Z
*0.0	*0.0	*0.0
[lonner]		Turne Jacob
0	A	Т
0.000	0.000	0.000
		Imm Jamme
Base Coordinate	Local	~
		V
– 🕂 Settings		
Undo	OK Cance	Apply

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.

Program Table Settings	
Tree View Settings	
🔿 Common 💿 Separate	
Controller	Language
C01	AS language 🛛 🔽
Handling E controller en-US	
Drag and Drop Setting	
O Instruction JMOVE	×
Point     Joint value	
Pasting Order Setting	
● Ascending ○ Descending ○ Selected	
Program Step HighLight Settings	
Enable Active	
	Cancel Apply

**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.

ntroller/	Arm											
ot												
Controlle	r Name											
01												
Robot	Arm Name											
R01												
Progra	m Name	1										
1	Pe0010											
Name	JTI		JT2		JT3		JT4	1	JT5	j.	JT6	
shome	-39.019	0	-29.740	0	-121.873	¢	29.190	¢	-42.107	0	-77.261	1
\$p001	-39.019	0	-29.740		-121.873	\$	29.190	÷	-42.107	\$	102,739	-
\$p002	-71.540	0	34.761	0	-54.885	0	-10.202	÷	-38.854	÷	153.756	ć
\$p003	-68.135	0	38.400	0	-59.897	0	-7.454	6	-29.781	\$	150.153	-
\$p004	-71.540		34.761		-54,885		-10202	÷	-38.854	•	-26244	-
\$p005	-68.135	0	38.400	0	-59.897	0	-7,454	ē.	-29.781	0	-29.847	-
\$p006	-62.100	-	31.103	0	-70.695	ċ.	-29.501	ĉ	-30.866	ċ.	-1.613	2
\$p007	-78.347		35.568		-74.940	0	-33.557	ċ.	-21.555	0	1.730	-
\$p008	-82.100	0	31.103	6	-70.695	-	-29.501	ē.	-30,866	\$	178.387	è
\$p009	-78.347	-	35.568		-74.940	0	-33.558	6	-21.554	-	181.730	-
\$p010	-62.843	0	-45.172	-	-138.839	-	0.868		-34.114	\$	139.712	1
	10.040		-45172	-	-138.840	-	0.868	0	-34,114	-	-40.288	2
#p011	-62.843	1.000				_		_		_		_

<sup>\*</sup> 

E.

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].

Program Name						
1 🕨 Pe0010						
		Add 🕨 🕨		Program Step 🛛 🕨	Move 🕨	JMOVE
		Delete		Program	IO 🕨	LMOVE
	ŝ	Save File 🕨 🕨		Point 🕨	Speed 🕨	HMOVE
		Load		String Value	Conveyor/Gun 🕨 🕨	C1 MOVE
		Execute		Real Value	Accuracy/Timer 🕨	C2MOVE
		Language Converter		Group	Call/Databank 🕨 🕨	HC1 MOVE
			-		Condition 🕨 🕨	HC2MOVE
		cont 🕨			Program 🕨	JAPPRO
	(	Oreate TrackLine			Structure	LAPPRO

Joint values are registered in the program as shown below.

Joint Value	s are registered in the program a	is shown below.	
Program Nam 1 PgOl Step	e 110	Language	
.1 ▶ J	Move #Ppoint(-120.00, 36.79, -94.76, 270.00, ->	48.10, 210.71) AS language	
1 Click the	nrogram sten to change the v	variable to $\mathbf{n}$ u[1].	
Delete the	# PPOINT and afterward and e	dit variables to grasp waiting position	וו מו
Sten			- P
1 ►⁄⁄ JM	OVE p_u	AS language	
-			
<b>)</b> Right-clic	k p1, and then click [Add] - [	[Program Step] - [Move] - [JMOV	VE].
Click the	program step to change the v	variable to p[1].	
Delete the	FRANS and afterward, and edit	the variable to grasp waiting position	n p[1]
			1
7			
Right-clic	k LMOVE step, and click [E	dit] - [Copy].	
<b>Right-clic</b>	k LMOVE step, and click [E	dit] - [Paste].	
Change the	variable to p u[1].		
U	1-13	1	
Step	F. p. u[1]		
2 JMOV	E p[1]	AS language	
3 🦻 JMOV	E p_u[1]	AS language	
Add speed	l instruction. Right-click p1,	and then click [Program Step] -	Snoo
Set the spe	ed to 10.		lohee
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~			lohee
			lohee
_			[Spec
) Drag the s	peed instruction to move to	the front of the clamping position	1.
<b>Drag the s</b> Control the	<b>peed instruction to move to</b> clamping speed to 10.	the front of the clamping position	1.
<b>Drag the s</b> Control the Step	<b>peed instruction to move to</b> clamping speed to 10.	the front of the clamping position	1.
Drag the s Control the Step	<b>peed instruction to move to</b> clamping speed to 10. $E_{p_u}[1]$	the front of the clamping position Language AS language	<u>l</u> opec
Drag the s Control the Step 1 JMOV 2 SPEED	speed instruction to move to a clamping speed to 10.	the front of the clamping position Language AS language AS language	<u>l</u> opec
Drag the s Control the Step Step SPEEL 3 JMOV	<b>speed instruction to move to</b> clamping speed to 10. $E_{p,u[1]}$ 10 $E_{p[1]}$	the front of the clamping position          Language         AS language         AS language         AS language         AS language	<u>l</u> opec

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

- [SPEED].

Set the accuracy to 1.

1

**12 Drag the accuracy instruction to move to the front of the clamping position.** Control the accuracy of position of grasp to 1.

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

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

Program Name				
E 1 P20010 Step 1 JMOVE 2 SPEED 3 ACCUF 4 JMOVE 5 JMOVE	Add  Delete Save File Load Execute Language Converter Edit Create TrackLine	Program Step   Program Point String Value Real Value Group	Move ) IO ) Speed ) Conveyor/Gun ) Accuracy/Timer ) Call/Databank ) Condition ) Program ) Structure )	
			Hand  Other	OPEN OPENI CLOSE 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.

oot /	Arm Name	
)1		
ograr	n Name	
-	p10	
~.		1.
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
в	CLOSEI	AS language
9	BREAK	AS language
	IMO) (T [3]	

- 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.  $p[1] \rightarrow p[6] p_u[1] \rightarrow p_u[6]$
- 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	Step		Language
1	SIGNAL 4,-5	AS language	. 30	LMOVE #p006	AS language
2	HOME	AS language	. 31	BREAK	AS language
3	BREAK	AS language	. 32	SPEED 10	AS language
4	SPEED 20	AS language	. 33	ACCURACY 1	AS language
5	JMOVE #p001	AS language	. 34	LMOVE #p007	AS language
6	BREAK	AS language	35	BREAK	AS language
7	LMOVE #p002	AS language	36	TWAIT 0.5	AS language
8	BREAK	AS language	. 37	OPENI	AS language
9	SPEED 10	AS language	. 38	BREAK	AS language
10	ACCURACY 1	AS language	. 39	LMOVE #p006	AS language
11	LMOVE #p003	AS language	40	BREAK	AS language
12	BREAK	AS language	. 41	SPEED 20	AS language
13	TWAIT 0.5	AS language	42	JMOVE #p008	AS language
14	OPENI	AS language	43	BREAK	AS language
15	BREAK	AS language	. 44	SPEED 10	AS language
16	LMOVE #p002	AS language	45	ACCURACY 1	AS language
17	BREAK	AS language	. 46	LMOVE #p009	AS language
18	SPEED 20	AS language	47	BREAK	AS language
19	JMOVE #p004	AS language	. 48	TWAIT 0.5	AS language
20	BREAK	AS language	49	CLOSEI	AS language
21	SPEED 10	AS language	. 50	BREAK	AS language
22	ACCURACY 1	AS language	. 51	LMOVE #p008	AS language
23	LMOVE #p005	AS language	. 52	BREAK	AS language
24	BREAK	AS language	53	LMOVE #p010	AS language
25	TWAIT 0.5	AS language	. 54	BREAK	AS language
26	CLOSEI	AS language	55	JMOVE #p011	AS language
27	BREAK	AS language	56	BREAK	AS language
28	LMOVE #p004	AS language	57	SIGNAL -4,5	AS language
29	BREAK	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.

_					
3	Controller/Arm				
5	⊟ Root				
2	Controller Na	ame			
-	i ⊂01		)		
	Robot /	Add	•		Program
	R01	Load File	•		Point 🕨
	÷	Save File	•		String Value
		Edit	•		Real Value
		Controller Settings			Group
				-	
0					
	ontroller/Arm				
	Controller Name				
Ē	C01				
	Robot Arm Nan	ne			
	R01				
	Program Name				
	1 Pe001	0			

- **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].

Step		Language
1	SPEED 100 always	AS language
2	ACCURACY 50 always	AS language
з 🕨	HOME	AS language

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.

Program Name							
2 Main					 		1
	Add 🕨		Program Step	- <b>F</b>	Move	•	
	Delete		Program		ю	•	
	Save File 🕨 🕨		Point	•	Speed	•	
	Load		String Value		Conveyor/Gun	•	
	Execute •		Real Value		Accuracy/Timer	•	
	Language Converter		Group		Call/Databank	•	CALL PROGRAM
		-		-	Condition	•	
	Edit +				Program	•	
	Create TrackLine	ι.			Structure	•	
		_			Monitor	•	
					Hand	•	
					Other	•	

#### 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.

Step		Language
1	SPEED 100 always	AS language
2	ACCURACY 50 always	AS language
3	НОМЕ	AS language
4 🕐	CALL p1	AS language

- 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.

- **1 ()** Right-click the CALL instruction, and then click [Edit] [Copy].
- **1 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 lapeuage mu

		$\sim \sim \sim \sim$
33 ັ	MOVE #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.

System User		
Function	Floating	Description
🔽 Layout		Show layout status in view.
▼ Hand-Guided Direct Move		Show arrow for hand-guided direct robot motion.
Convert node names		Convert node names in a layout window according to :
🔽 Program		Edit robot programs.
Action		Change the action settings.
🔽 Collision Log		Show collision log information.
🔽 Collision Check		Change configurations of collision check.

**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.

8	Action		×
	Action	Condition	Δ
	Move Env Model	<b>v</b>	Setting
	Add Del		Cancel

# **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.

Y-

700

Sett	ings [Movel	EnvModel]	×			
		Hand Mode				
Rob	oot, I/O No.	R01[C01]	\$			
Too	bl	Not Specified				
Мол	veable Model	MC Shutter	/			
Pito	ch	1,400.00 📚 mm/	sec			
Lim	iit	700.00 📚 mm				
Dire	ection	X+ 💌				
Link Mov	king Veable Model	Machining Center	2			
Dire	ection	X+ 👻				
		OK C	ancel			
	Signal	Movable Mo	del	Pitch	Limit	Directi
1	4	MC shutter		1400	700	Y+

# **5** lick OK button.

2 5

6 Click the Add button on the dialog of the action screen. Add the details set in the model movement.

MC shutter

1400

Action	
Action	Condition 🛆
Move Env Model	R01[C01], Processing door, SIG=4…
Move Env Model	R01[C01], Processing door, SIG=5***
Move Env Model	Setting
Move Env Model	Setting
Move Env Model R01[C01], Processing	Setting door, SIG=5, 1400mm/s, 100mm X+
Move Env Model R01[C01], Processing	door, SIG=5, 1400mm/s, 100mm X+

# 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.

Function	Floating	Description
Collision Check		Change configurations of collision check.
THE R. P. LEWIS CO., LANSING MICH.		The second second restricts in the second
Cycle Time		Show a cycle time table.
Log		Show error log information.
✓ Handling Clamp		Change the clamp I/O signal settings.
Handling Simulation		Clamp a workpiece according to the signal status.

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



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

Å	f Handling Clamp 🛛 🗙	)
	Robot (Controller) R01[C01]	
	Clamp1 Clamp2 Clamp3 Clamp4 Clamp5 < >	
	Application 2 2 3:Not Used 1:Spot Weld 2:Handling 3:Painting Sealing	
	Signal Settings	
	Output Signal for ON (1-32) 9	
	Output Signal for OFF (1-32) 10	
	Specify either side for single, both sides for double sol. valve.	
	Cancel	

#### **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.

🚑 Handling Olamp	×
Robot (Controller) R01[C01]	
Clamp1 Clamp2 Clamp3 Clamp4 Clamp5 <	>
Application 2 2 2 2 2 2 2 2 2 2 2 3 Painting Sealing	
Signal Settings	
Output Signal for ON (1-32)	
Output Signal for OFF (1-32) 14	
Specify either side for single, both sides for double sol. valve.	
	_
Cancel Apply	

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.

	🗅 Simu	lation					(	×
					$\bigcirc$			
1	Basic S	ettings	Conveyor Settin	es Monitor				
	Status	Robot		PG name		Conveyor	LS offset	٦
		R01 [C0	)1]	Main	. ~	~		0
	Conveyo	or speed	0.0 r	nm/sec		Cancel	Apply	

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.

Status	Robot	PG name	Conveyor	LS offset
<b>V</b>	R01[C01]	Main 🛄 🗸	~	0



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.

Program Name	nitor
Group Name	PG name I
🖻 Test	Pg001 🛛 🗸 🗸
Program Name	Pg001 Pg001 Pg001 Pg004 Pg005

# 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.

🕅 Teach Panel	
- R01 [C01][RS010N-A001] ◆	
Joint 💌 Parts1 💌	]
Righty Above Dwrist 1HOM	1HOME
Add point Gauge	2HOME
JointTra	Setting
J1 <b>( )</b> 100 0.000 X 0	

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.


- **1** Move the work to the repeat start position by the setting position change.
- **2 Right-click the Project icon** [**1**] **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.

Layout	Layout					Θ	🗳 • 🗊 •		Ð	000	0   🖬 🖻   🔅 🔍
	Project	•									
E> ⊕ In	Batch Operation	•		Position	•		Record	•		All	
⊞ Te	Add	•		Show Origi	n 🕨		Restore	•		Robot	
⊞01 Tr	Delete			Show Mode	el 🕨					Environment 🕨	Work
Q	Replace									Point	Obstacle
	C 1 1 AU								-		

\*

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.

- 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.

Synchronize	×
Controller Settings	
🗹 Program	
Variable)	
Layout <- Controller	ר
Layout -> Controller	
Cancer	

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

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

Confirmation 🔀
Discarding Setting Values. Are you sure?
Yes No Cancel

\*

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.

🕌 R01 [C01] - Virtual Teach Pendant 0		
REPEAT       Program       [Comment]         []       []       []         []       []       []	PC RUN MOTO Aux. STEP CONT. Lv2 REP. CONT.	R CYCLE EP. SPD 00% N. SPEED
INTERP SPD ACC TMR TOOL CLAMP J/E OU JOINT 9 1 0 1 [ [EOF]	Specify % ▲ + 10 % ▼ - 10 % Repeat: Cont/Once Step: Cont/Once RPS: ON/OFF Dry Run: ON/OFF Manual Wold Mode	20:05 ERROR AUTO CHK once Maiting RPS OFF EXT. HOLD
RPS A Monitor1 Monitor2	Step Forward	

- **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.

System User		
Function	Floating	Description
🗹 Handling Clamp		Change the clamp I/O signal settings.
Handling Simulation		Clamp a workpiece according to the signal status.
🔲 Installable Position Anal…		Analyze installable position of a robot.
📃 I/O Signal Connections		Connect I/O signals between controllers.
🔽 I/O Monitor		Show and set I/O status of controllers.
🔲 System Development Tool		ModuleConfigEditor for developers.
<		

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.

Function	Floating	Description
🗸 Layout		Show layout status in view.
✓ Hand-Guided Direct Move		Show arrow for hand-guided direct robot motion.
Convert node names		Convert node names in a layout window according to
✓ Program		Edit robot programs.
🔽 Cycle Time		Show a cycle time table.
Log		Show error log information.
🗹 Handling Clamp		Change the clamp I/O signal settings.
🗹 Handling Simulation		Clamp a workpiece according to the signal status.

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

R01[C01] Quick Settings		
Enable Collision Detection	✓ Output Track Line File	Apply
Show Colliding Planes	📃 Animate Robot in Teach Mode	
✓ Stop the Robot when Collision is Detected	📃 Enable Program Step HighLight	

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.

System User		
Function	Floating	Description
🔽 Layout		Show layout status in view.
✓ Hand-Guided Direct Move		Show arrow for hand-guided direct robot motion.
Convert node names		Convert node names in a layout window according to
🗹 Program		Edit robot programs.
Action		Change the action settings.
🗹 Collision Log		Show collision log information.
🗹 Collision Check		Change configurations of collision check.
CS-Configurator		Parameter settings function for Cubic-S.
🔲 Cycle Time		Show a cycle time table.

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

ſ	R01[C01]	Quick Settings			
	💌 Enat	le Collision Dete	etion	✓ Output Track Line File	Apply
	🔄 Shov	v Colliding Planes		🔲 Animate Robot in Teach Mode	
	🛃 Stop	the Robot when	Collision is Detected	📃 Enable Program Step HighLight	

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.

R01[C01]	Quick Settings			
💌 Enat	ole Collision Detec	otion	✓ Output Track Line File	Apply
📃 Shov	v Colliding Planes		🔲 Animate Robot in Teach Mode	
🗹 Stop	the Robot when (	Collision is Detected	📃 Enable Program Step HighLight	

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.

	Simu	lation									×
					$\supset$	۲	$\bigcirc$	$\bigcirc$			
ſ	Basic S	Settings	Conveyor S	ettings	Mor	nitor					
	Status	Robot				PG n	ame		Conveyor	LS offset	
		R01 [C01	1]			Pg001		. 🗸	~		0
	Convey	or speed	0.	0 mm/	/sec				Cancel	Apply	

## **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.





## **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.

# **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.

System User		
Function	Floating	Description
🔽 Layout		Show layout status in view.
✓ Hand-Guided Direct Move		Show arrow for hand-guided direct robot motion.
Convert node names		Convert node names in a layout window according to
🔽 Program		Edit robot programs.
Installable Position Anal…		Analyze installable position of a robot.
🔽 I/O Signal Connections		Connect I/O signals between controllers.
🔽 I/O Monitor		Show and set I/O status of controllers.
System Development Tool		ModuleConfigEditor for developers.
Undo Relocation		Show operation history of relocation and undo.

## **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.

Load Project			×
Projects		View Mode Preview	~
J P	P	ada a	
RS010N_RS020N_Floor_H···	new_project	test1	
			~
Open Project File Dele	te	Load Cancel	

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.

Open					? 🗙
Look in:	C RS010N_R	S020N_Floor_Handling	<ul> <li>G</li> </ul>	) 🗊 🗁 🖽 -	
My Computer My Network Places	Control Contro	20N_Floor_Handling.krprj			B
Mykmillbraries	File name:	RS010N_RS020N_Floor_Handling.kr	prj	~	Open
0	Files of type:	Project File(*.krprj)		~	Cancel
KHIlibraries		Dpen as read-only			

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.

Project Settings				
Project Name	A1			
Comment				
	OK Cancel			

#### **3** Click Project and then Load.

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

Load Project		X
Projects		View Mode Preview 💌
	3 P	P
KG264x4_Floor_Bell	RS010N_RS020N_Floor_H···	new_project
		✓
Open Project File	Delete	Load Cancel

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