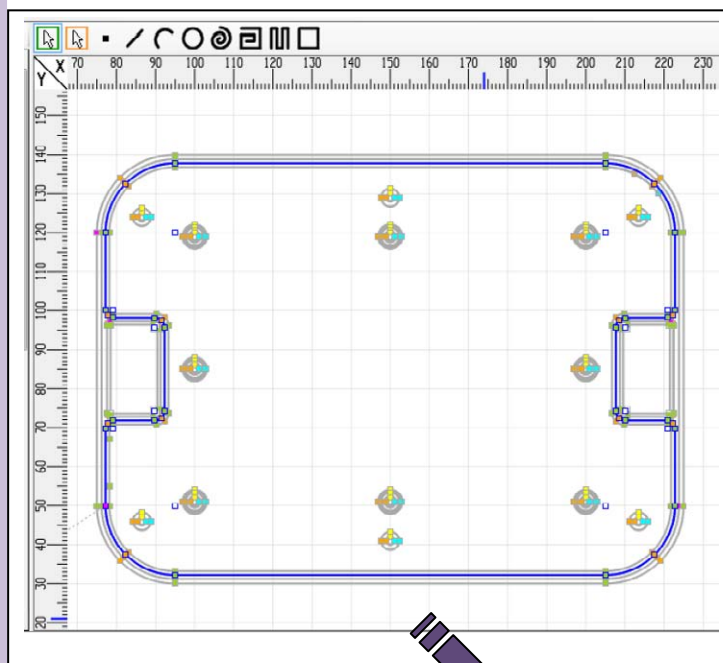


SEL Program Generator (Dispensing Type)

Operation Manual Third Edition



No.	B	E	N	Code	Operand 1	Operand 2	Pst	Comment	Vel	Acc	Dcl
1				*****							
2				* This program was generated				*			
3				* by SEL program generator.				*			
4				* 2015/10/30 09:59:49				*			
5				*****							
6											
7				*****							
8				*Initialize							
9				*****							
10				BT0F	300						
11				ACHZ	3			Z-axis for arch			
12				*****							
13				*Home return				*			
14				*****							
15				HOME	100						
16				HOME	11						
17											
18											
19											

16	321.000	89.500	143.000				
17							
18	407.300	83.500	143.000				
19	448.000	90.000	143.000				

IAI Corporation



Please Read Before Use

Thank you for purchasing our product.

This manual explains how you can use this feature and necessary information to use it safely. Before the operation, read this manual carefully and fully understand it to operate this product. The enclosed DVD in this product package includes the Instruction Manual for this product.

For the operation of this product, print out the necessary sections in the Instruction Manual or display them using the personal computer.

After reading through this manual, keep this Instruction Manual at hand so that the operator of this product can read it whenever necessary.

[Important]

- This Manual is original.
- The product cannot be operated in any way unless expressly specified in this Manual. IAI shall assume no responsibility for the outcome of any operation not specified herein.
- Information contained in this Manual is subject to change without notice for the purpose of product improvement.
- If you have any question or comment regarding the content of this manual, please contact the IAI sales office near you.
- Using or copying all or part of this Manual without permission is prohibited.
- The company names, names of products and trademarks of each company shown in the sentences are registered trademarks.

Safety Guide

“Safety Guide” has been written to use the machine safely and so prevent personal injury or property damage beforehand. Make sure to read it before the operation of this product.

Safety Precautions for Our Products

The common safety precautions for the use of any of our robots in each operation.

No.	Operation Description	Description
1	Model Selection	<ul style="list-style-type: none">• This product has not been planned and designed for the application where high level of safety is required, so the guarantee of the protection of human life is impossible. Accordingly, do not use it in any of the following applications.<ol style="list-style-type: none">1) Medical equipment used to maintain, control or otherwise affect human life or physical health.2) Mechanisms and machinery designed for the purpose of moving or transporting people (For vehicle, railway facility or air navigation facility)3) Important safety parts of machinery (Safety device, etc.)• Do not use the product outside the specifications. Failure to do so may considerably shorten the life of the product.• Do not use it in any of the following environments.<ol style="list-style-type: none">1) Location where there is any inflammable gas, inflammable object or explosive2) Place with potential exposure to radiation3) Location with the ambient temperature or relative humidity exceeding the specification range4) Location where radiant heat is added from direct sunlight or other large heat source5) Location where condensation occurs due to abrupt temperature changes6) Location where there is any corrosive gas (sulfuric acid or hydrochloric acid)7) Location exposed to significant amount of dust, salt or iron powder8) Location subject to direct vibration or impact• For an actuator used in vertical orientation, select a model which is equipped with a brake. If selecting a model with no brake, the moving part may drop when the power is turned OFF and may cause an accident such as an injury or damage on the work piece.

No.	Operation Description	Description
2	Transportation	<ul style="list-style-type: none"> • When carrying a heavy object, do the work with two or more persons or utilize equipment such as crane. • When the work is carried out with 2 or more persons, make it clear who is to be the leader and who to be the follower(s) and communicate well with each other to ensure the safety of the workers. • When in transportation, consider well about the positions to hold, weight and weight balance and pay special attention to the carried object so it would not get hit or dropped. • Transport it using an appropriate transportation measure. The actuators available for transportation with a crane have eyebolts attached or there are tapped holes to attach bolts. Follow the instructions in the instruction manual for each model. • Do not step or sit on the package. • Do not put any heavy thing that can deform the package, on it. • When using a crane capable of 1t or more of weight, have an operator who has qualifications for crane operation and sling work. • When using a crane or equivalent equipments, make sure not to hang a load that weighs more than the equipment's capability limit. • Use a hook that is suitable for the load. Consider the safety factor of the hook in such factors as shear strength. • Do not get on the load that is hung on a crane. • Do not leave a load hung up with a crane. • Do not stand under the load that is hung up with a crane.
3	Storage and Preservation	<ul style="list-style-type: none"> • The storage and preservation environment conforms to the installation environment. However, especially give consideration to the prevention of condensation. • Store the products with a consideration not to fall them over or drop due to an act of God such as earthquake.
4	Installation and Start	<p>(1) Installation of Robot Main Body and Controller, etc.</p> <ul style="list-style-type: none"> • Make sure to securely hold and fix the product (including the work part). A fall, drop or abnormal motion of the product may cause a damage or injury. Also, be equipped for a fall-over or drop due to an act of God such as earthquake. • Do not get on or put anything on the product. Failure to do so may cause an accidental fall, injury or damage to the product due to a drop of anything, malfunction of the product, performance degradation, or shortening of its life. • When using the product in any of the places specified below, provide a sufficient shield. <ol style="list-style-type: none"> 1) Location where electric noise is generated 2) Location where high electrical or magnetic field is present 3) Location with the mains or power lines passing nearby 4) Location where the product may come in contact with water, oil or chemical droplets

No.	Operation Description	Description
4	Installation and Start	<p>(2) Cable Wiring</p> <ul style="list-style-type: none"> ● Use our company's genuine cables for connecting between the actuator and controller, and for the teaching tool. ● Do not scratch on the cable. Do not bend it forcibly. Do not pull it. Do not coil it around. Do not insert it. Do not put any heavy thing on it. Failure to do so may cause a fire, electric shock or malfunction due to leakage or continuity error. ● Perform the wiring for the product, after turning OFF the power to the unit, so that there is no wiring error. ● When the direct current power (+24V) is connected, take the great care of the directions of positive and negative poles. If the connection direction is not correct, it might cause a fire, product breakdown or malfunction. ● Connect the cable connector securely so that there is no disconnection or looseness. Failure to do so may cause a fire, electric shock or malfunction of the product. ● Never cut and/or reconnect the cables supplied with the product for the purpose of extending or shortening the cable length. Failure to do so may cause the product to malfunction or cause fire. <p>(3) Grounding</p> <ul style="list-style-type: none"> ● The grounding operation should be performed to prevent an electric shock or electrostatic charge, enhance the noise-resistance ability and control the unnecessary electromagnetic radiation. ● For the ground terminal on the AC power cable of the controller and the grounding plate in the control panel, make sure to use a twisted pair cable with wire thickness 0.5mm² (AWG20 or equivalent) or more for grounding work. For security grounding, it is necessary to select an appropriate wire thickness suitable for the load. Perform wiring that satisfies the specifications (electrical equipment technical standards). ● Perform Class D Grounding (former Class 3 Grounding with ground resistance 100Ω or below).

No.	Operation Description	Description
4	Installation and Start	<p>(4) Safety Measures</p> <ul style="list-style-type: none">• When the work is carried out with 2 or more persons, make it clear who is to be the leader and who to be the follower(s) and communicate well with each other to ensure the safety of the workers.• When the product is under operation or in the ready mode, take the safety measures (such as the installation of safety and protection fence) so that nobody can enter the area within the robot's movable range. When the robot under operation is touched, it may result in death or serious injury.• Make sure to install the emergency stop circuit so that the unit can be stopped immediately in an emergency during the unit operation.• Take the safety measure not to start up the unit only with the power turning ON. Failure to do so may start up the machine suddenly and cause an injury or damage to the product.• Take the safety measure not to start up the machine only with the emergency stop cancellation or recovery after the power failure. Failure to do so may result in an electric shock or injury due to unexpected power input.• When the installation or adjustment operation is to be performed, give clear warnings such as "Under Operation; Do not turn ON the power!" etc. Sudden power input may cause an electric shock or injury.• Take the measure so that the work part is not dropped in power failure or emergency stop.• Wear protection gloves, goggle or safety shoes, as necessary, to secure safety.• Do not insert a finger or object in the openings in the product. Failure to do so may cause an injury, electric shock, damage to the product or fire.• When releasing the brake on a vertically oriented actuator, exercise precaution not to pinch your hand or damage the work parts with the actuator dropped by gravity.

No.	Operation Description	Description
5	Teaching	<ul style="list-style-type: none">• When the work is carried out with 2 or more persons, make it clear who is to be the leader and who to be the follower(s) and communicate well with each other to ensure the safety of the workers.• Perform the teaching operation from outside the safety protection fence, if possible. In the case that the operation is to be performed unavoidably inside the safety protection fence, prepare the “Stipulations for the Operation” and make sure that all the workers acknowledge and understand them well.• When the operation is to be performed inside the safety protection fence, the worker should have an emergency stop switch at hand with him so that the unit can be stopped any time in an emergency.• When the operation is to be performed inside the safety protection fence, in addition to the workers, arrange a watchman so that the machine can be stopped any time in an emergency. Also, keep watch on the operation so that any third person can not operate the switches carelessly.• Place a sign “Under Operation” at the position easy to see.• When releasing the brake on a vertically oriented actuator, exercise precaution not to pinch your hand or damage the work parts with the actuator dropped by gravity. <p>* Safety protection Fence : In the case that there is no safety protection fence, the movable range should be indicated.</p>
6	Trial Operation	<ul style="list-style-type: none">• When the work is carried out with 2 or more persons, make it clear who is to be the leader and who to be the follower(s) and communicate well with each other to ensure the safety of the workers.• After the teaching or programming operation, perform the check operation one step by one step and then shift to the automatic operation.• When the check operation is to be performed inside the safety protection fence, perform the check operation using the previously specified work procedure like the teaching operation.• Make sure to perform the programmed operation check at the safety speed. Failure to do so may result in an accident due to unexpected motion caused by a program error, etc.• Do not touch the terminal block or any of the various setting switches in the power ON mode. Failure to do so may result in an electric shock or malfunction.





No.	Operation Description	Description
7	Automatic Operation	<ul style="list-style-type: none">• Check before starting the automatic operation or rebooting after operation stop that there is nobody in the safety protection fence.• Before starting automatic operation, make sure that all peripheral equipment is in an automatic-operation-ready state and there is no alarm indication.• Make sure to operate automatic operation start from outside of the safety protection fence.• In the case that there is any abnormal heating, smoke, offensive smell, or abnormal noise in the product, immediately stop the machine and turn OFF the power switch. Failure to do so may result in a fire or damage to the product.• When a power failure occurs, turn OFF the power switch. Failure to do so may cause an injury or damage to the product, due to a sudden motion of the product in the recovery operation from the power failure.

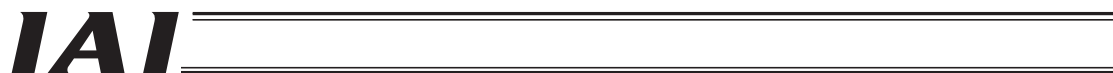
No.	Operation Description	Description
8	Maintenance and Inspection	<ul style="list-style-type: none"> • When the work is carried out with 2 or more persons, make it clear who is to be the leader and who to be the follower(s) and communicate well with each other to ensure the safety of the workers. • Perform the work out of the safety protection fence, if possible. In the case that the operation is to be performed unavoidably inside the safety protection fence, prepare the "Stipulations for the Operation" and make sure that all the workers acknowledge and understand them well. • When the work is to be performed inside the safety protection fence, basically turn OFF the power switch. • When the operation is to be performed inside the safety protection fence, the worker should have an emergency stop switch at hand with him so that the unit can be stopped any time in an emergency. • When the operation is to be performed inside the safety protection fence, in addition to the workers, arrange a watchman so that the machine can be stopped any time in an emergency. Also, keep watch on the operation so that any third person can not operate the switches carelessly. • Place a sign "Under Operation" at the position easy to see. • For the grease for the guide or ball screw, use appropriate grease according to the Instruction Manual for each model. • Do not perform the dielectric strength test. Failure to do so may result in a damage to the product. • When releasing the brake on a vertically oriented actuator, exercise precaution not to pinch your hand or damage the work parts with the actuator dropped by gravity. • The slider or rod may get misaligned OFF the stop position if the servo is turned OFF. Be careful not to get injured or damaged due to an unnecessary operation. • Pay attention not to lose the cover or untightened screws, and make sure to put the product back to the original condition after maintenance and inspection works. Use in incomplete condition may cause damage to the product or an injury. <p>* Safety protection Fence : In the case that there is no safety protection fence, the movable range should be indicated.</p>
9	Modification and Dismantle	<ul style="list-style-type: none"> • Do not modify, disassemble, assemble or use of maintenance parts not specified based at your own discretion.
10	Disposal	<ul style="list-style-type: none"> • When the product becomes no longer usable or necessary, dispose of it properly as an industrial waste. • When removing the actuator for disposal, pay attention to drop of components when detaching screws. • Do not put the product in a fire when disposing of it. The product may burst or generate toxic gases.

No.	Operation Description	Description
11	Other	<ul style="list-style-type: none">• Do not come close to the product or the harnesses if you are a person who requires a support of medical devices such as a pacemaker. Doing so may affect the performance of your medical device.• See Overseas Specifications Compliance Manual to check whether complies if necessary.• For the handling of actuators and controllers, follow the dedicated instruction manual of each unit to ensure the safety.

Alert Indication

The safety precautions are divided into “Danger”, “Warning”, “Caution” and “Notice” according to the warning level, as follows, and described in the Instruction Manual for each model.

Level	Degree of Danger and Damage	Symbol
Danger	This indicates an imminently hazardous situation which, if the product is not handled correctly, will result in death or serious injury.	 Danger
Warning	This indicates a potentially hazardous situation which, if the product is not handled correctly, could result in death or serious injury.	 Warning
Caution	This indicates a potentially hazardous situation which, if the product is not handled correctly, may result in minor injury or property damage.	 Caution
Notice	This indicates lower possibility for the injury, but should be kept to use this product properly.	 Notice



Construction of Instruction Manual and This Manual

● Basic Specifications

• Tracking Control

(Dispensing) Operation — ■ SEL Program Generator (this manual) ME0351

★ Program

• SEL Program Language — ■ SEL Language Programming Manual ME0224

■ Applicable Controller (including actuator integrated type)

• TTA — ■ TTA Instruction Manual ME0320

• MSEL — ■ MSEL Instruction Manual ME0336

■ Teaching Tool

• PC Software — ■ PC Software ME0154

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1. What is SEL Program Generator

SEL Program Generator is software which enables you to have the SEL program and the position data generated easily from the figures drawn on the screen or CAD data only by tracking them. This makes dispensing operation so easy.

2. Applicable Controller

SEL Program Generator is applicable for the following controller.

- Table-Top Type Robot TTA (with built-in controller)
- MSEL-PC/PG/PCF/PGF (Cartesian Single-axis Robot Control Type)
(It is applicable only for those with the same construction as TTA has, which is 1st axis = X-axis, 2nd axis = Y-axis, 3rd axis = Z-axis and 4th axis = R-axis)



Caution:

SEL program generator is not applicable for the work and tool coordinate system features.

When the TTA and MSEL controller to be used is applicable for the work and tool coordinate system features*1, set the of the work coordinate offset and tool coordinate offset to "0.000mm" for all the axes before executing the program.

When the work coordinate offset and tool coordinate offset are not set to "0.000mm" for all the axes, unexpected operation may occur, which could cause interference of robot, tool, workpiece, etc., and cause malfunction.

*1 Supported versions of work and tool coordinate systems

TTA : Main Application Part V2.00 and later

MSEL : Main Application Part V2.00 and later

The SEL programs, position data and simulations generated in SEL program generator should be applicable only when using the table top type robot and cartesian robot.

They are not applicable when using only the single axis (including gripper, rotary, etc.), wrist unit (including cartesian robot combined) or SCARA Robot (IXP).

3. How to Acquire SEL Program Generator

There are ways as shown below to acquire it.

1) Download from IAI homepage

* In addition, it is necessary prepare a personal computer that possesses an environment that allows IAI PC software to operate so that SEL Program Generator is able to work.

3.1 Installation of SEL Program Generator

Install it by double-clicking the downloaded file.

4. Interface to Dispensing Device

PIO (24V input and output) is to be used for the interface with the dispensing device. Connect the dispensing command input signal of the dispensing device to TTA output signal. Also, when the quantitative dispensing which dispenses for fixed amount is to be selected, connect also between the complete response signal of the dispensing device and TTA input signal.

Assignment setting of each connected signal is to be conducted in Section 5.4.6 Dispensing Setting.

Refer to TTA Instruction Manual (ME0320) for details for such as the specifications of PIO.

5. Explanation of Windows

The main consists of the following parts;

- Menu Bar
- Drawing Area
- Figure List Display

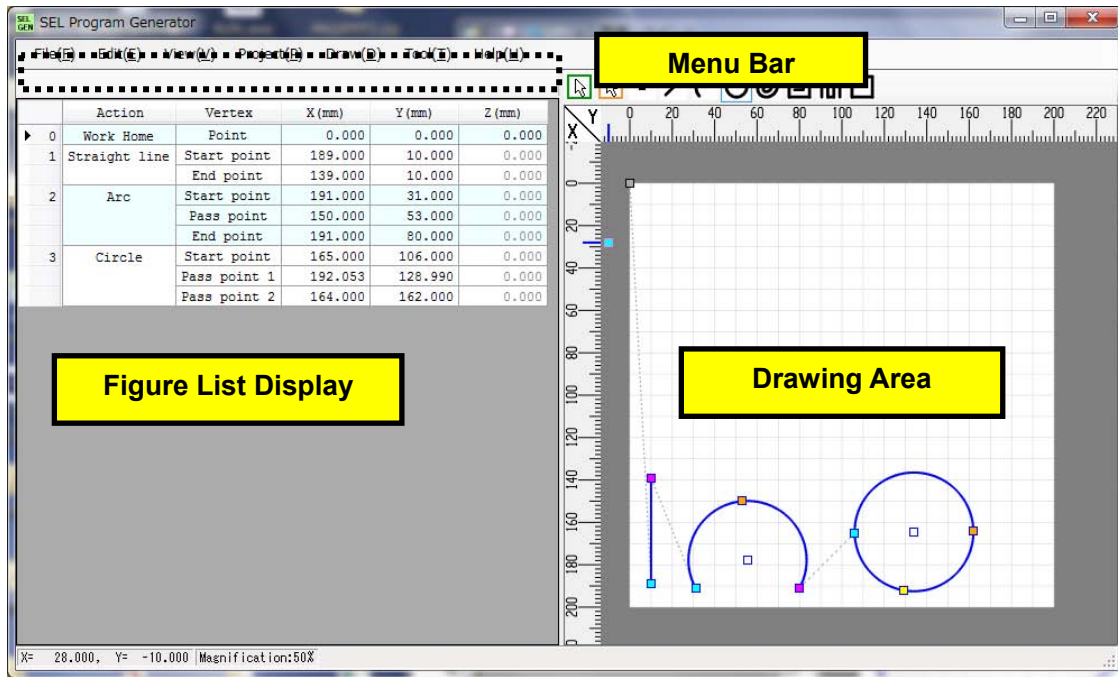


Figure 1 Main Window

5.1. Menu Bar

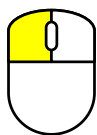
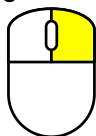
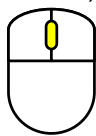
Menu	Sub Menu	Functions
File (F)	Create a New Project (N)	A new project can be created.
	Open Existing Project (O)	An existing project can be opened.
	Save As (A)	An edited project can be saved with a name
	Save (S)	An edited project can be saved by overwriting.
	DXF Figure Data (D)	<ul style="list-style-type: none"> • Read (R) DXF figure data can be read out from a file. • Clear (C) The DXF figure already read in can be cleared.
	Reference Figure Data (F)	<ul style="list-style-type: none"> • Read (R) Figure data for reference can be read out from a file. • Clear (C) The figure data for reference already read in can be cleared.
	Background Image Data (B)	<ul style="list-style-type: none"> • Read (R) (.jpg Data) Background image data can be read out from a file. • Clear (C) The image data for background already read in can be cleared.
	Track Data (T)	<ul style="list-style-type: none"> • Read (R) (.csv Data) Track data can be read out from a file. • Clear (C) The data for track already read in can be cleared.
	Close (X)	The application can be closed.
Edit (E)	Undo (U)	The figure editing operation can be undone.
	Redo (R)	The figure editing operation can be redone.
	Cut (T)	The selected figure can be cut.
	Copy (C)	The selected figure can be copied.
	Paste (P)	The figure which was cut or copied can be pasted.
	Delete (D)	The selected figure can be deleted.
	Select All (A)	All of the figure can be selected.

Menu	Sub Menu	Functions
Display (V)	Created Figure (W)	Created figure can be selected whether to show or hide.
	DXF Figure (X)	DXF figure can be selected whether to show or hide.
	Reference Figure (R)	Reference figure can be selected whether to show or hide.
	Track Data (T)	Track data can be selected whether to show or hide.
Project (P)	Generate SEL Program (G) [Refer to Section 5.7 for detail]	SEL program and position data can be generated.
	Simulate (S)	Simulation should be performed to check the operation track and cycle time.
	Property (P) [Refer to Section 5.4 for detail]	Property setting of a project can be established.
Drawing (D) [Refer to Section 5.5 and 5.6 for detail]	Select Created Figure (W)	The edit mode can be changed to "Created Figure Select Mode".
	Select DXF Figure (X)	The edit mode can be changed to "DXF Figure Select Mode".
	Point (P)	The edit mode can be changed to "Point Drawing Mode".
	Line (L)	The edit mode can be changed to "Line Drawing Mode".
	Arc (A)	The edit mode can be changed to "Arc Drawing Mode".
	Circle (C)	The edit mode can be changed to "Circle Drawing Mode".
	Involute (Circle) (S)	The edit mode can be changed to "Involute (Circle) Drawing Mode".
	Involute (Rectangle) (E)	The edit mode can be changed to "Involute (Rectangle) Drawing Mode".
	Zig-Zag (Z)	The edit mode can be changed to "Zig-Zag Drawing Mode".
	Rectangle (Q)	The edit mode can be changed to "Rectangle".
	Move (T)	The selected figure can be moved.
	Rotate (R)	The selected figure can be rotated.
Tool (T)	Option (O)	Tool option setting can be established.
Help (H)	About (A)	The version information of this application can be shown.








5.2 Drawing Area

Figures (point, line, arc and circle) can be drawn.







(1) How to Operate

Mouse Button	Operation	Functions
Left  button	Click	[In figure select mode] A figure (point or line) at the cursor location can be selected.
		[In each drawing mode] Location of a point can be indicated.
	Drag	[When a figure is selected] The position of the selected figure (point or line) can be moved.
		[When no figure is selected] Range of a figure can be selected.
Right button 	Click	Popup menu can be displayed.
Wheel (Middle Button) 	Rotate	[When Ctrl key is held down] Display can be zoomed in and out.
		[When Shift key is held down] Display can be scrolled right and left.
		[In condition other than above] Display can be scrolled up and down.
	Drag	Display can be scrolled to the direction that you dragged.

(2) Sorts of Displayed Points

Display	Contents				
	Work Origin	Points	Line	Arc	Circle
	Work Origin	-	-	-	-
	-	Point	Starting Point	Starting Point	Starting Point / End Point
	-	-	-	Pass Point	1 st Pass Point
	-	-	-	-	2 nd Pass Point
	-	-	End Point	End Point	-
	-	-	-	Center Point	Center Point
	-	-	Figure Joint Point		


(3) Sorts of Displayed Lines

Display	Contents
	Non-Applicable Figure
	Applicable Figure
	Selected Figure
	Selected DXF Figure
	Figure under created or edited
	Movement Route between Figures

5.3 Figure List Display

In this section, shows the list of the information of figures that were drawn in the drawing area.

Click  button, and the order for operation for the selected figure goes up.

Click  button, and the order for operation for the selected figure goes down.

5.4 Menu [Project] → Sub Menu [Property]

Settings related to project can be established.


The set contents should be reflected when SE program or position data is generated except for some items.

Conduct Menu ⇒ Project ⇒ Property.

5.4.1 Coordinate System

(1) X/Y axis

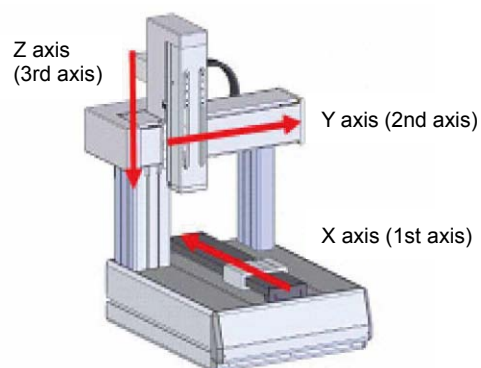
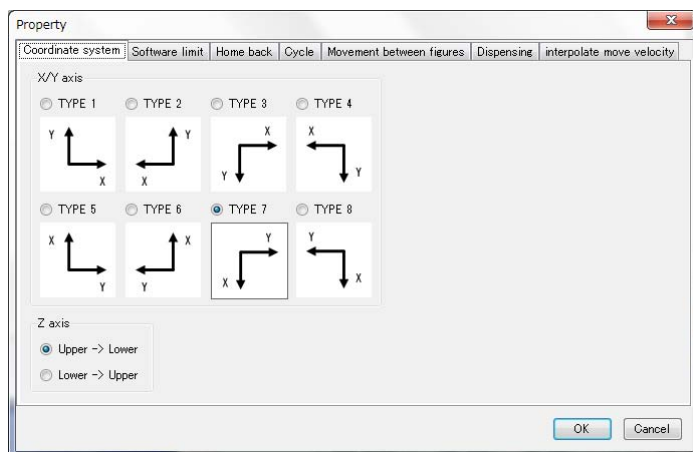
Set the coordinates direction of X and Y axes to display in the drawing area.

 **Caution:** This setting will be reflected to the drawing area and the soft limit range display in the movement route display window.

(2) Z axis

Set the upper end coordinates of the Z-axis.

 **Caution:** This setting will be reflected to the SEL program and position data.



* The direction of X-axis is opposite for the cantilever type.

5.4.2 Software Limit

Set the software limit (negative side and positive side) for each axis.

Caution: This setting will be reflected to the drawing area and the soft limit range display (reference in drawing) in the movement route display window.


	Minus side	Plus side
X-axis	0.000	200.000
Y-axis	0.000	200.000
Z-axis	0.000	100.000
R-axis		

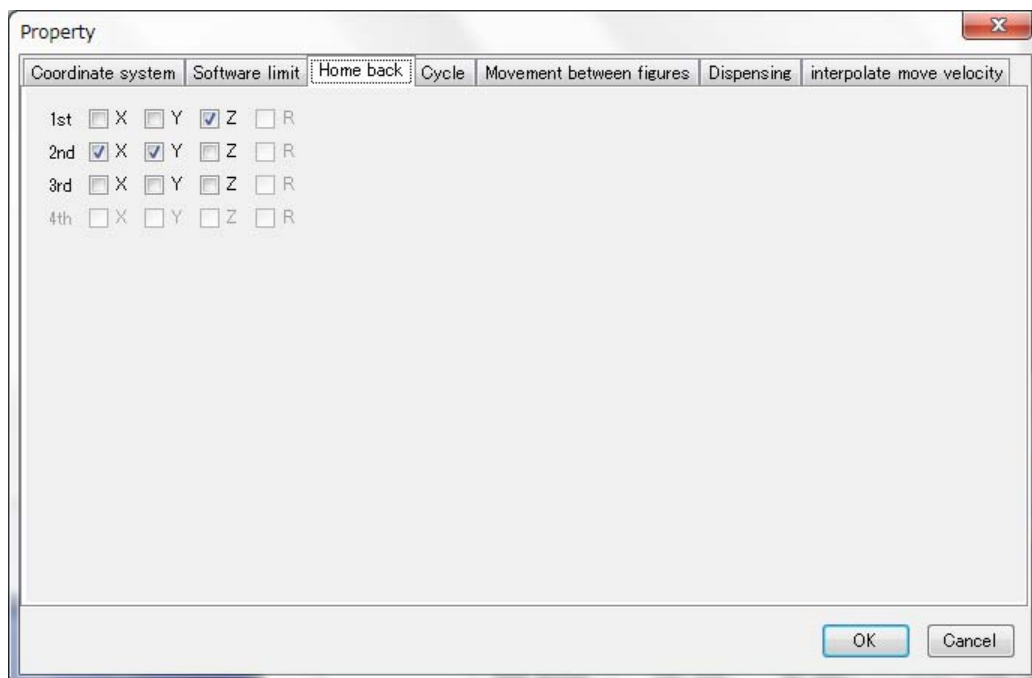
5.4.3 Home Back

Set the order to perform home back operation.

- (1) 1st
Put a check mark to the axis you would like to have home back operation first.
- (2) 2nd
Put a check mark to the axis you would like to have home back operation second.
- (3) 3rd
Put a check mark to the axis you would like to have home back operation third.
- (4) 4th
Put a check mark to the axis you would like to have home back operation forth.

Remove a check mark for the axis that does not require home back operation.

 Caution: This setting will be reflected to SEL program.



5.4.4 Cycle


(1) Count

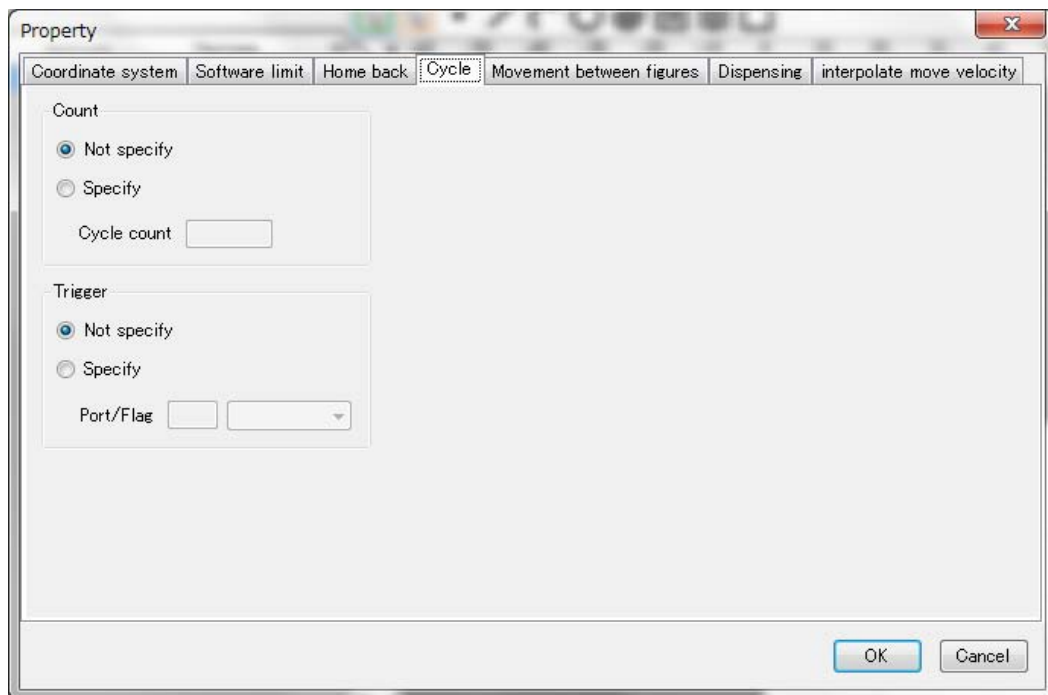
- Not specify
Select this when repeating the cycles infinitely.
- Specify
Select this when indicating the number of cycles, and input the number of times to execute.

(2) Trigger

After moving to the working home point, indicate the condition to start the cycles.

- Not specify
Select this when starting cycles without any specified condition.
- Specify
Select this when indicating conditions, and indicate the trigger port number / flag number and their conditions (OFF-level, ON-level, OFF-edge and ON-edge).

 Caution: The settings in (1) and (2) will be reflected to SEL program.

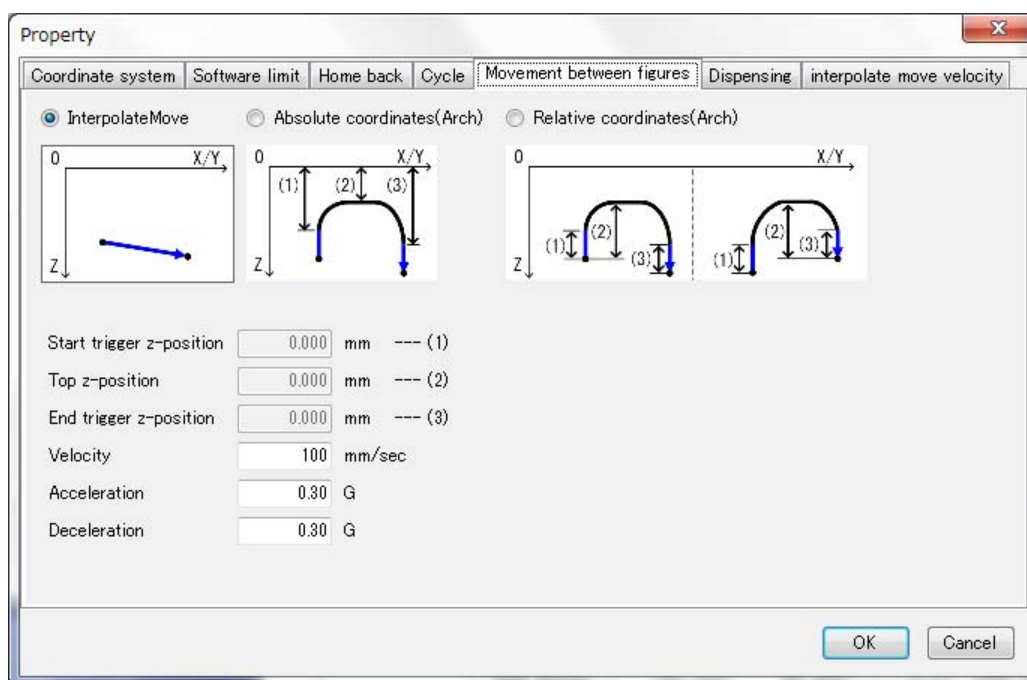


5.4.5 Movement Between Figures

Set the arch motion condition for when moving from each figure to another.

- **InterpolateMove**
CP movement is performed from the end point of the previous figure to the start point of the next figure without having the arch motion.
- **Absolute coordinates(Arch)**
Indications of the Z-axis for the start trigger z-position, end trigger z-position and the top z- position are made with the absolute coordinates.
- **Relative coordinates(Arch)**
Indications of the Z-axis for the start trigger z-position, end trigger z-position and the top z- position t are made with the relative coordinates.

 **Caution:** This setting will be reflected to the SEL program and position data.



5.4.6 Dispensing

Establish the settings related to dispensing operation.

- (1) Dispenser I/F
 - Command output port
Set the port number for the dispensing command signal output to the dispensing device.
 - Response input port
Set the port number for the complete reply signal input from the dispensing device.
* It is not necessary to establish the settings if the operation mode of the dispensing device is "Continuous Discharge".
- (2) Point dispensing
In case the operation mode of the dispensing device is "Continuous Discharge", the point dispensing time should be set. (0.00 to 99.00sec)
* It is not necessary to establish the setting in case the operation mode of the dispensing device is "Constant Discharge".
- (3) Dispensing time
 - Prevent Fragmented Dispensing
Set the standby time since the dispensing command signal is turned on till dispensing movement is started. (0.00 to 99.00sec)
 - Prevent Spraying
Set the standby time since the dispensing command signal is turned off till returning movement is started. (0.00 to 99.00sec)
- (4) Dispense Back
 - X-dispense
Set the movement distance of the X-axis. (-99999.999 to 99999.999mm)
 - Y-dispense
Set the movement distance of the Y-axis. (-99999.999 to 99999.999mm)
 - Z-dispense
Set the movement distance of the Z-axis. (-99999.999 to 99999.999mm)
 - R-dispense
Set the movement distance of the R-axis. (-99999.999 to 99999.999mm)
 - Velocity
Set the speed. (1 to 9999mm/sec)
 - Acceleration
Set the acceleration. (0.01 to 9.99G)
 - Deceleration
Set the deceleration. (0.01 to 9.99G)

 Caution: This setting will be reflected to the SEL program and position data.

Property

Coordinate system Software limit Home back Cycle Movement between figures **Dispensing** interpolate move velocity

Dispenser I/F

Command output port 300

Response input port 0

Point dispensing

Dispensing time sec

Prevent Fragmented Dispensing

Waiting time from exhalation instruction ON to axis movement 0.00 sec

Prevent snraving

Waiting time from exhalation instruction OFF to axis movement 0.00 sec

Prevent stringing movement(Dispense Back)

X-distance 0.000 mm

Y-distance 0.000 mm

Z-distance 0.000 mm

R-distance deg

Velocity 100 mm/sec

Acceleration 0.30 G

Deceleration 0.30 G

After movement wait time 0.00 sec

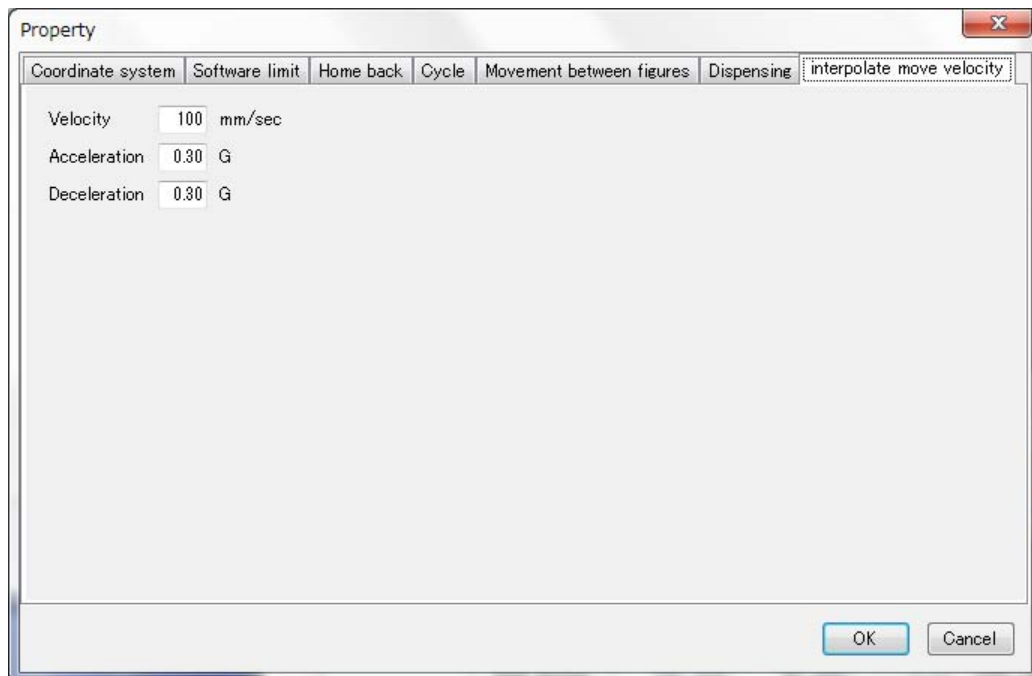
OK Cancel

5.4.7 Interpolate Move Velocity

Establish the settings for the velocity, acceleration and deceleration in line, arc and circle movements (interpolate move velocity).

- Velocity
Set the speed. (1 to 9999mm/sec)
- Acceleration
Set the acceleration. (0.01 to 9.99G)
- Deceleration
Set the deceleration. (0.01 to 9.99G)

 Caution: This setting will be reflected to the SEL program and position data.



5.4.8 Output Setting

Settings related to the output data when SEL program / position data get generated should be established.

Position No.

Item	Contents
Position No.	Set the top position number.

5.4.9 Simulation

Settings should be established regarding simulation.

(1) Parameter

Controller parameters in simulation should be set up. It is available establish the setting by reading in values from another project file or controller parameter file by using the import button.

* In case the parameter setting values differ from the actual device, dispersion in simulation for the cycle time and operation track may get large.

Property

Software limit Home back Cycle Movement between figures Dispensing Interpolate move velocity Output Simulation

Parameter Track data

Common to All Axes Parameters

No.	Name	Value	Unit
22	Acceleration max	999	0.01G
23	Deceleration max	999	0.01G

Axis-Specific Parameters

No.	Name	X-axis	Y-axis	Z-axis	R-axis	Unit
6	Select act direction	1	1	1	1	
28	Max speed axis	3000	3000	3000	3000	mm/sec, deg/sec
42	Encoder resolution	131072	131072	131072	131072	pulse/rev
43	Rate of encoder dividing frequency	3	3	3	3	
44	Measure revise	0	0	0	0	0.001mm/1M
47	Screw lead	16000	16000	6000	360000	0.001mm
50	Gear ratio numerator	1	1	20	16	
51	Gear ratio denominator	1	1	24	96	
60	Position gain	30	30	30	30	/s
66	Rotation move axis mode select	0	0	0	0	
67	Rotation move axis short-cut select	0	0	0	0	

Import

OK Cancel

[Details of Common to All Axes Parameters Contents]

No.	Parameter Name	Input Range	Unit	Remarks
22	Acceleration max	1 to 999	0.01G	
23	Deceleration max	1 to 999	0.01G	

[Details of Axis-Specific Parameters Contents]

No.	Parameter Name	Input Range	Unit	Remarks
6	Select act direction	0 to 1		Do not attempt to change the initial values or the values in the parameter file.
28	Max speed axis	1 to 3000	mm/s	
42	Encoder resolution	800, 131072	pulse/rev	Set it to 800 in incremental and to 131072 in battery-less absolute.
43	Rate of encoder dividing frequency	0, 2 to 5		Set it to 0 in incremental, to 4 in battery-less absolute and pulse motor at the same time and to 3 in battery-less absolute and AC servomotor at the same time.
44	Measure revise	-99999999 to 99999999	0.001mm/1M	It changes coordinates in proportion. Valid only for linear drive axes
47	Screw lead	1 to 99999999	0.001mm	Make sure to establish the setting to satisfy "Lead Described in Catalog or Instruction Manual" = "Screw Lead" × "Numerator of Gear Ratio" / "Denominator of Gear Ratio" for X, Y and Z-axes. *
50	Gear ratio numerator	1 to 99999999		
51	Gear ratio denominator	1 to 99999999		Do not attempt to change the initial value or the values in the parameter file for R-axis.
60	Position gain	1 to 9999	/s	
66	Rotation move axis mode select	0 to 5		
67	Rotation move axis short-cut select	0 to 5		0: Not Selected, 1: Selected (Valid only in index mode and INC encoder at the same time)

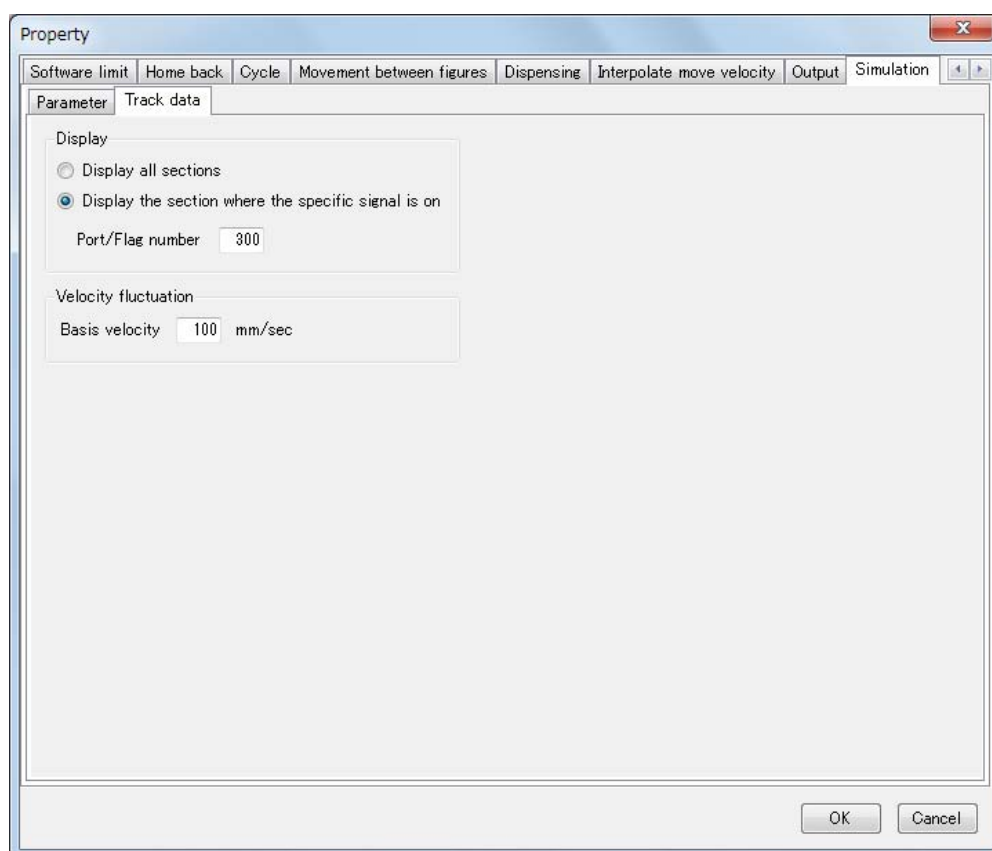
* Example of Setting for Axis-Specific Parameters 47, 50 and 51

Lead [mm]	Axis-Specific Parameters setting value		
	47	50	51
24 or equivalent	16000	36	24
16	16000	1	1
3	3000	1	1

(2) Track data

Display settings for the operation track in simulation should be established.

- Display
Select "Display all sections" or "Display the section where the specific signal is on".
- Velocity fluctuation
It is necessary to establish the standard velocity when you would like to change the track line thickness in response to the operation velocity. (Unit: mm/sec)
The operation track should be shown thin in the area faster than the standard while the track shown thick in the area slower than the standard.
The track line should be shown in constant width when the parameter is set to "0".



* The settings above should be reflected only to the simulation track display (not to the track display in the actual device servo monitor data).

5.5 Drawing

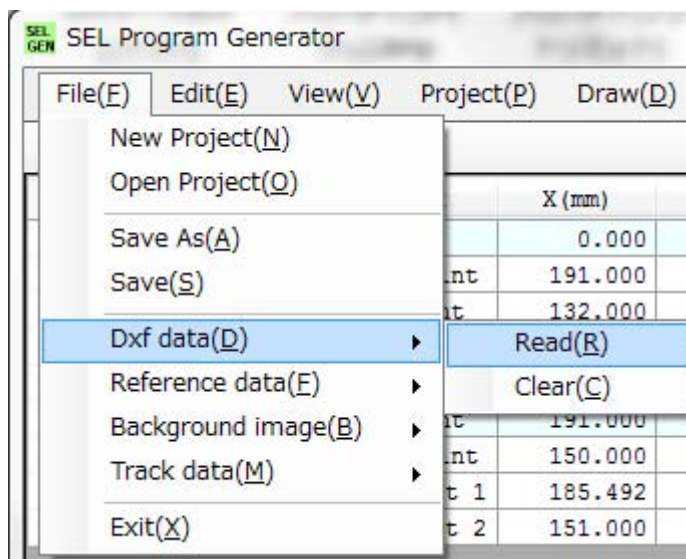
There are two types as described below for how to draw figures.

- Reading figures in from DXF data
- Drawing by mouse operation

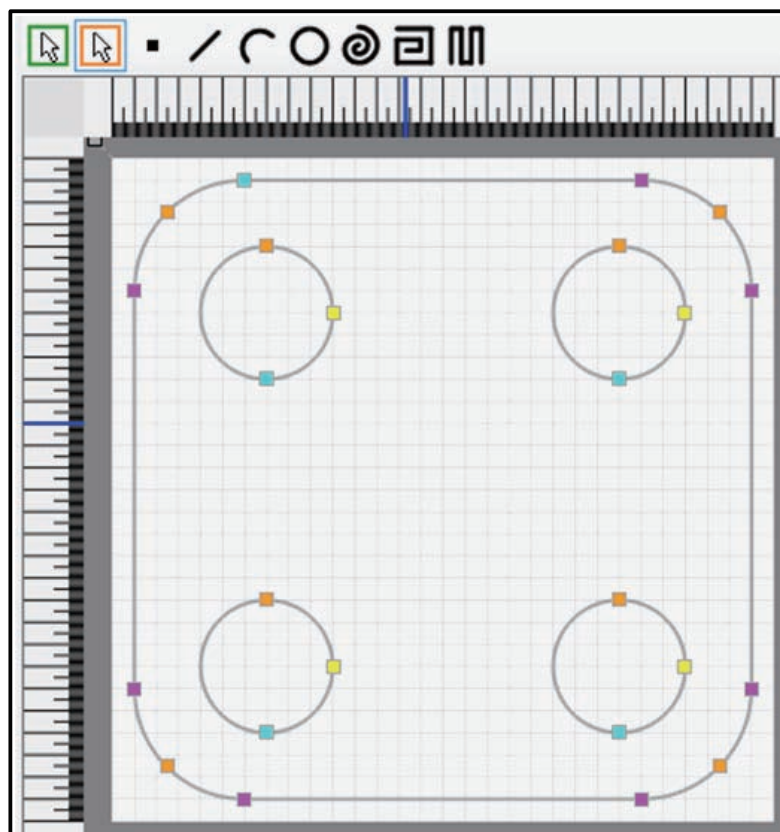
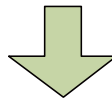
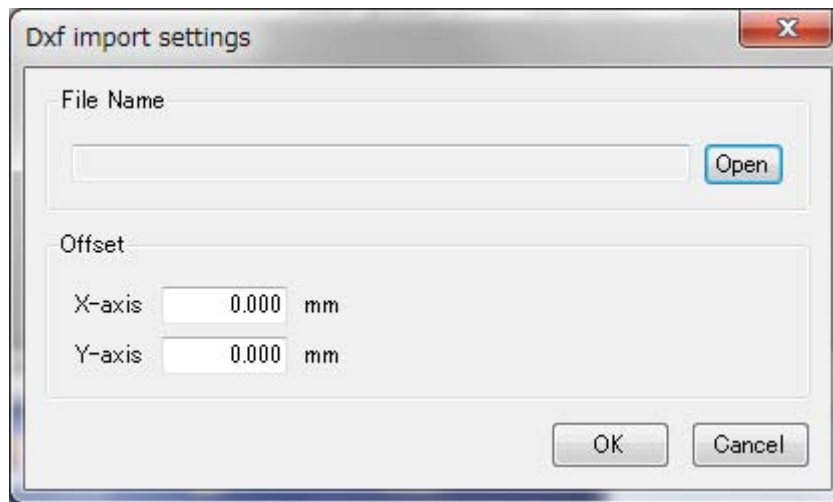
5.5.1. Reading Figures in from DXF Data

Figures can be read in from DXF data with the following steps.

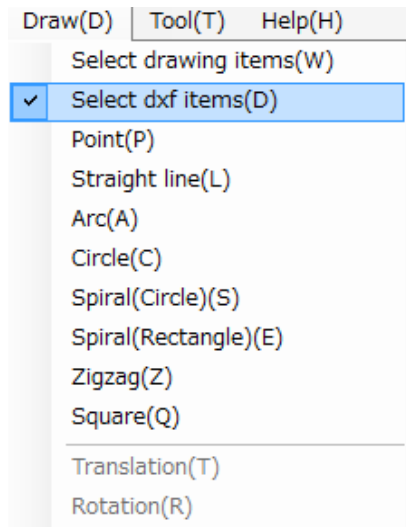
- 1) Execute [File (F)] – [Dxf Data (D)] – [Read (R)] from the menu bar.



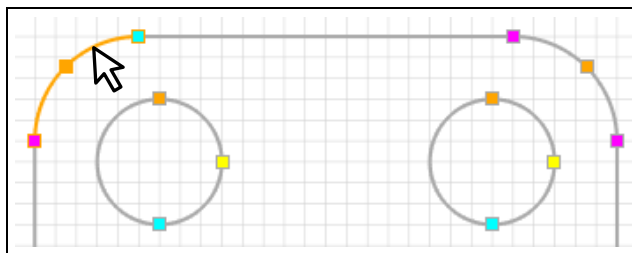
- 2) Indicate a DXF file name and the display offset volume to read DXF data.



- 3) The edit mode can be changed to "Select dxf items (D)".



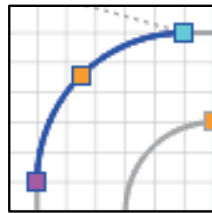
- 4) Select the figure that you would like to read in by clicking on the left mouse button.



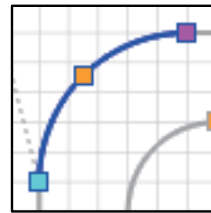
- 5) Click on the right mouse button to open the popup menu and execute [Import (I)].
By executing [Import (I)] with holding down [Ctrl] key, start point and end point (1st pass point and 2nd pass point for a circle) can be swapped to each other to be read in.



In normal



With [Ctrl] held down



Start and end points
swapped to each other

If you wish to continue to read in other figures, repeat 4) and 5).

5.5.2 Drawing by mouse operation

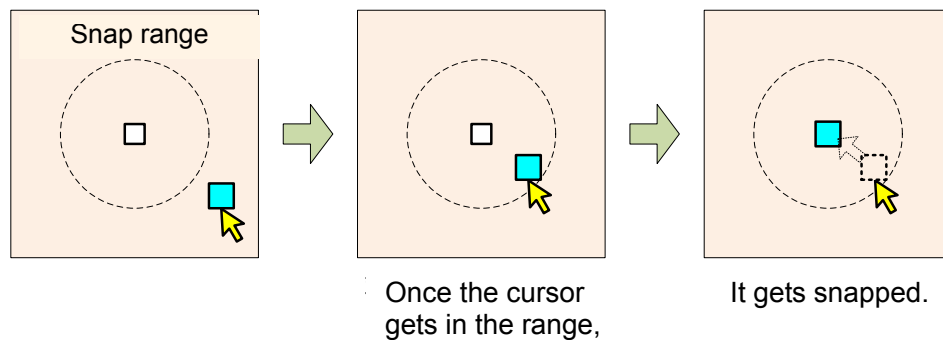
In this section, explains how to draw by mouse operation.

5.5.2.1 Common Items

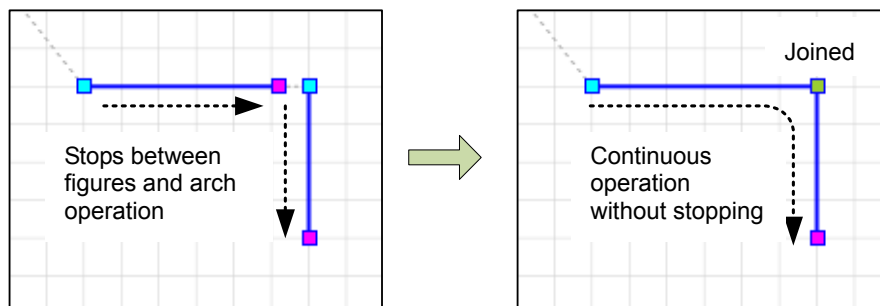
(1) Peak Snap

When you put the mouse cursor near a peak point of a figure while in drawing, it gets snapped (gripped) to the peak point. (The snapping range can be changed in the tool option.)

* When you desire not to have the cursor snapped, hold down [Ctrl] key and [Shift] key while you move the mouse cursor.













By snapping the start point of a figure (line, arc or circle) to the end point of another figure, the figures can be joined.
At the joined point of the figures, operation can be performed continuously without making a stop.



(2) How to Change Edit Mode

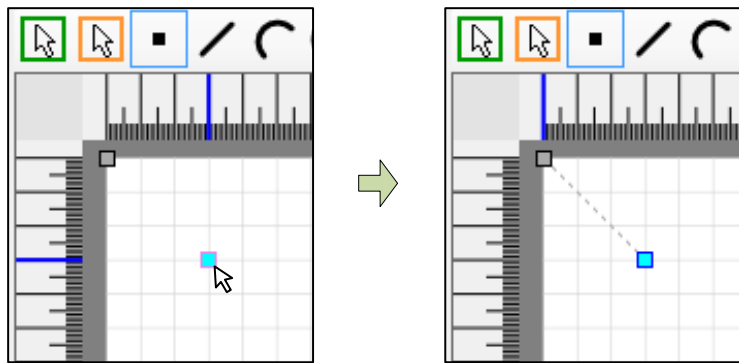
There are two types for how to change the edit mode.

- Selection in [Drawing (D)] menu on the menu bar
- Selection by tool button

Mode	Change Method	
	Menu Bar [Drawing (D)] Menu	Tool Button
Created Figure Select	[Created Figure Select (W)]	
DXF Figure Select	[DXF Figure Select (X)]	
Point Drawing	[Point (P)]	
Line Drawing	[Line (L)]	
Arc Drawing	[Arc (A)]	
Circle Drawing	[Circle (C)]	
Involute (Circle) Drawing	[Involute (Circle) (S)]	
Involute (Rectangle) Drawing	[Involute (Rectangle) (E)]	
Zig-Zag Drawing	[Zig-Zag (Z)]	
Rectangle Drawing	[Rectangle (Q)]	

5.5.2.2 Point Drawing

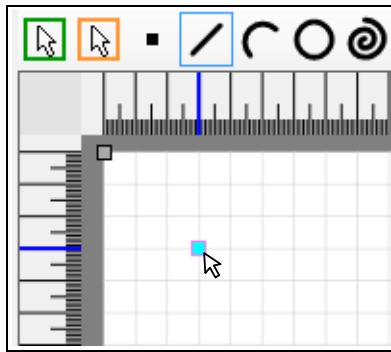
- 1) The edit mode can be changed to "Point Drawing Mode".
- 2) Click at a position you would like to start drawing.
 - * Press [ESC] and drawing word finishes, and the mode changes to the created drawing select mode.



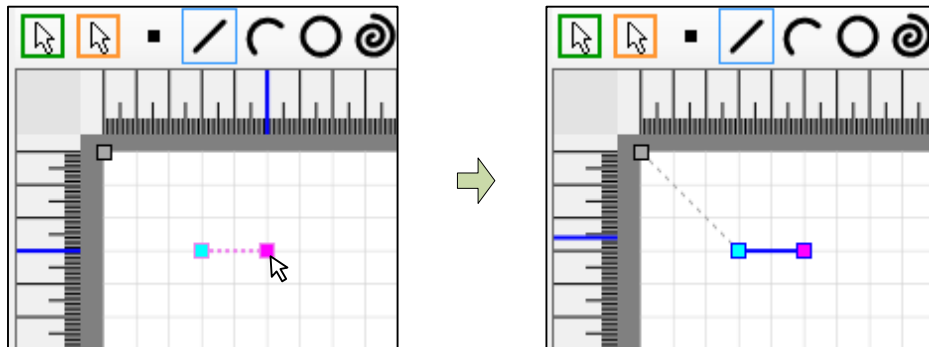
Repeat 2) when it is necessary to continue drawing a point.

5.5.2.3 Line Drawing

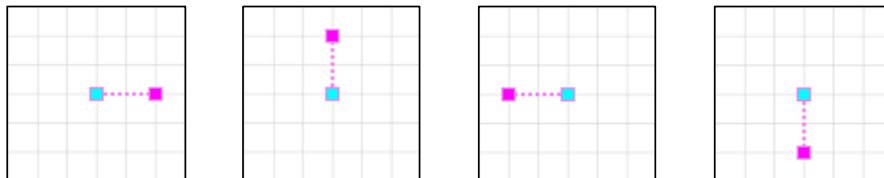
- 1) The edit mode can be changed to "Line Drawing Mode".
- 2) Click at a position you would like to start drawing.
* Press [ESC] and drawing word finishes, and the mode changes to the created drawing select mode.



- 3) Click at a position you would like to have the end point of drawing.
* Press [ESC] key and it goes back to 2) (Start Position Select).



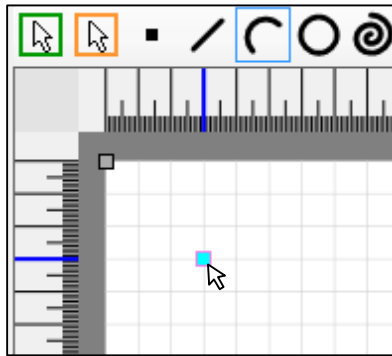
Hold down [Ctrl] key when you move the mouse cursor, and the direction of the end point can be fixed at 0deg, 90deg, 180deg and 270deg.



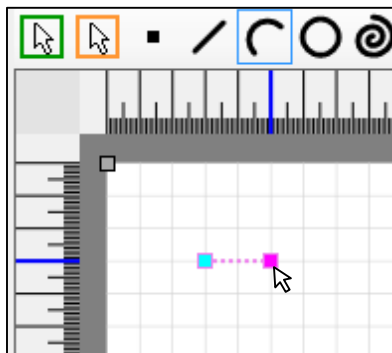
Repeat 2) to 3) when it is necessary to continue drawing a line.

5.5.2.4 Arc Drawing

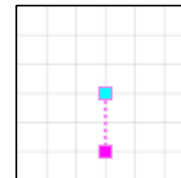
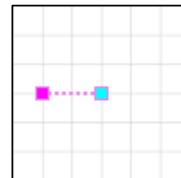
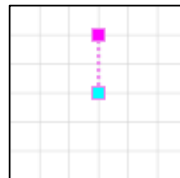
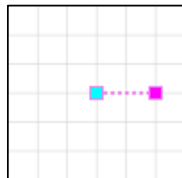
- 1) The edit mode can be changed to "Arc Drawing Mode".
- 2) Click at a position you would like to start drawing.
* Press [ESC] and drawing word finishes, and the mode changes to the created drawing select mode.



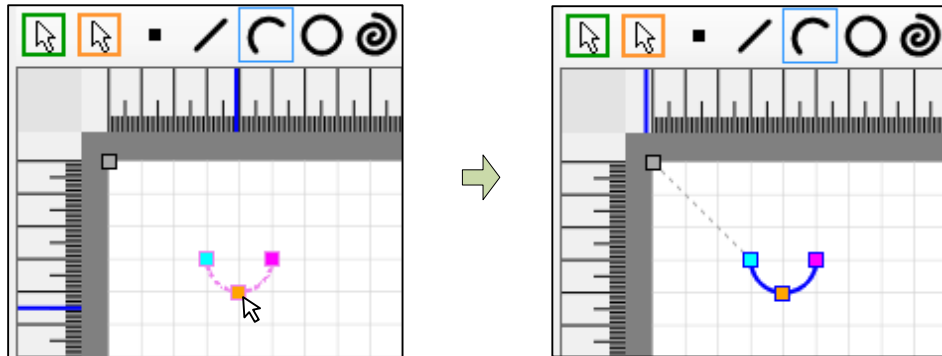
- 3) Click at a position you would like to have the end point of drawing.
* Press [ESC] key and it goes back to 2) (Start Position Select).



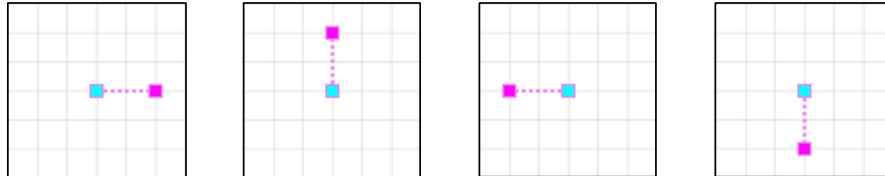
Hold down [Ctrl] key when you move the mouse cursor, and the direction of the end point can be fixed at 0deg, 90deg, 180deg and 270deg.



- 4) Click at a position you would like to have the waypoint of drawing.
 * Press [ESC] key and it goes back to 3) (Start Position Select).



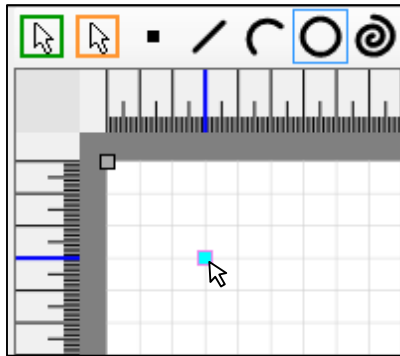
Hold down [Ctrl] key when you move the mouse cursor, and the angle of the arc center can be fixed at 180deg (semicircle).



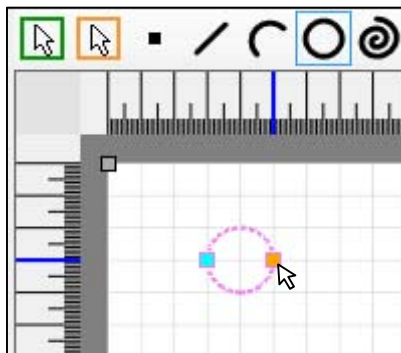
Repeat 2) to 4) when it is necessary to continue drawing an arc.

5.5.2.5 Circle Drawing

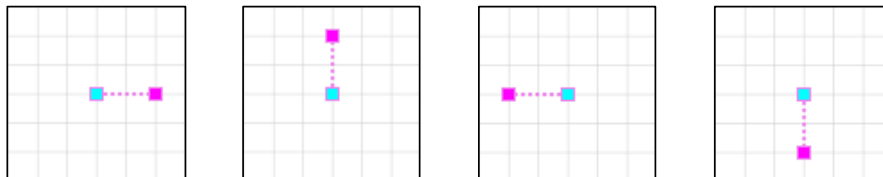
- 1) The edit mode can be changed to "Circle Drawing Mode".
- 2) Click at a position you would like to start drawing.
* Press [ESC] and drawing word finishes, and the mode changes to the created drawing select mode.



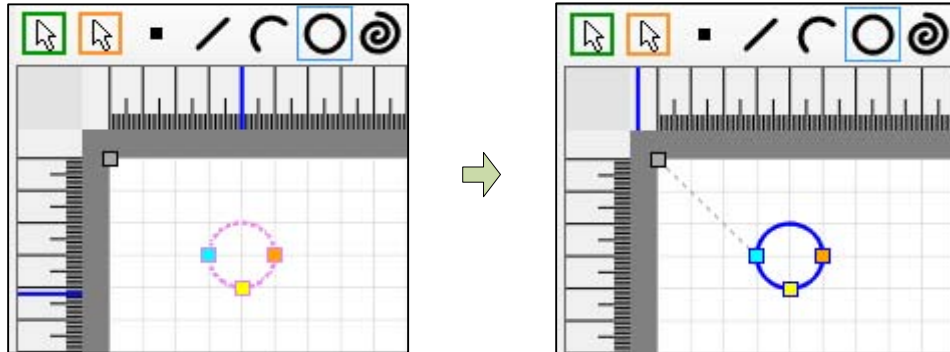
- 3) Click at a position you would like to have the 2nd pass point of drawing.
* Press [ESC] key and it goes back to 2) (Start Position Select).



Hold down [Ctrl] key when you move the mouse cursor, and the direction of the 2nd pass point can be fixed at 0deg, 90deg, 180deg and 270deg.



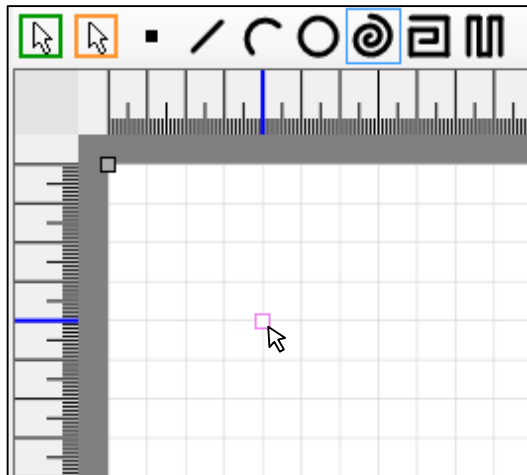
- 4) Click at a position you would like to have the 1st pass point (point to determine the rotating direction of the circle) of drawing.
 * Press [ESC] key and it goes back to 3) (2nd pass point position select).



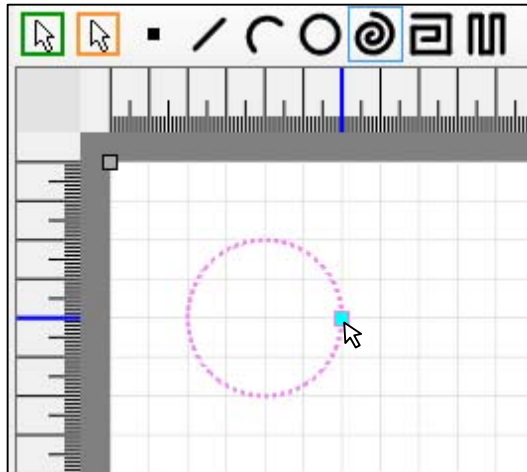
Repeat 2) to 4) when it is necessary to continue drawing a circle.

5.5.2.6 Involute (Circle) Drawing

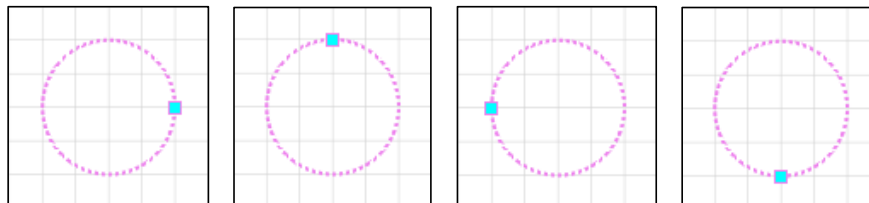
- 1) The edit mode can be changed to "Involute (Circle) Drawing Mode".
- 2) Click at a position you would like to have the center point.
* Press [ESC] and drawing word finishes, and the mode changes to the created drawing select mode.



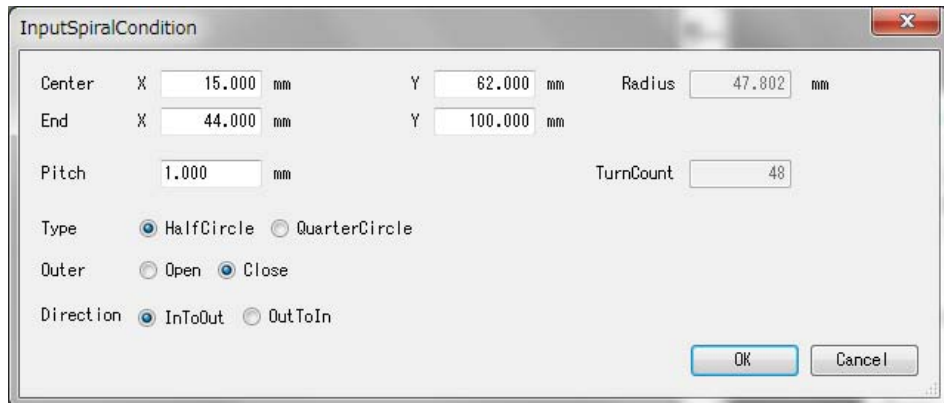
- 3) Click at a position you would like to have the outer end point.
* Press [ESC] key and it goes back to 2) (Center Point Position Select).



Hold down [Ctrl] key when you move the mouse cursor, and the direction of the outer end point can be fixed at 0deg, 90deg, 180deg and 270deg.



4) Establish the condition settings in the circular involute setting window.

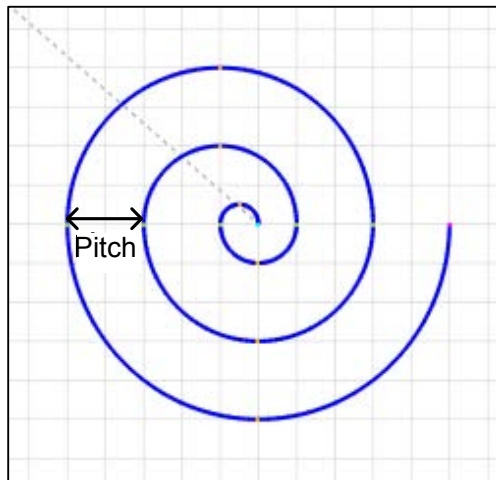


The dialog box 'InputSpiralCondition' contains the following settings:

- Center X: 15.000 mm, Y: 62.000 mm, Radius: 47.802 mm
- End X: 44.000 mm, Y: 100.000 mm
- Pitch: 1.000 mm, TurnCount: 48
- Type: ☒ HalfCircle, ☐ QuarterCircle
- Outer: ☐ Open, ☒ Close
- Direction: ☒ InToOut, ☐ OutToIn

Buttons: OK, Cancel

- Center
Change the coordinates (mm) of the center point indicated in 2) if necessary.
- End
Change the coordinates (mm) of the outer end point indicated in 3) if necessary.
- Pitch
Indicate the pitch (mm) of an involute.



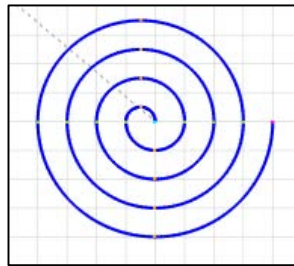
* In case the radius cannot be divided by the pitch, the most inner pitch will be smaller than the indicated pitch.

- Type

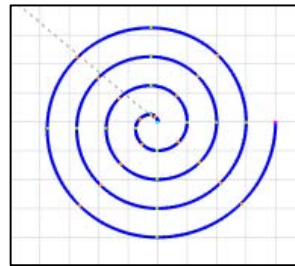
Indicate the involute type.

- [Half Circle]: An involute is created with a combination of arcs with 180deg of the central angle with different radii.
- [Quarter Circle]: An involute is created with a combination of arcs with 90deg of the central angle with different radii.

It is closer to the perfect circle than “Half Circle”.



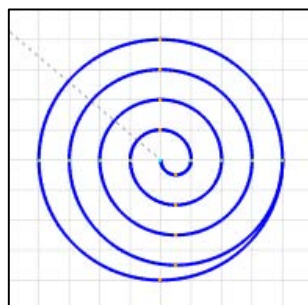
[Half Circle]



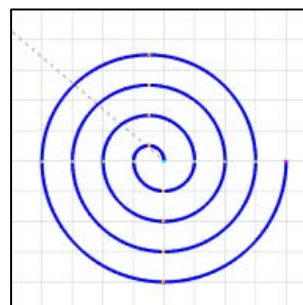
[Quarter Circle]

- Outer

Indicate whether you would like to close the outer end or not.



Close

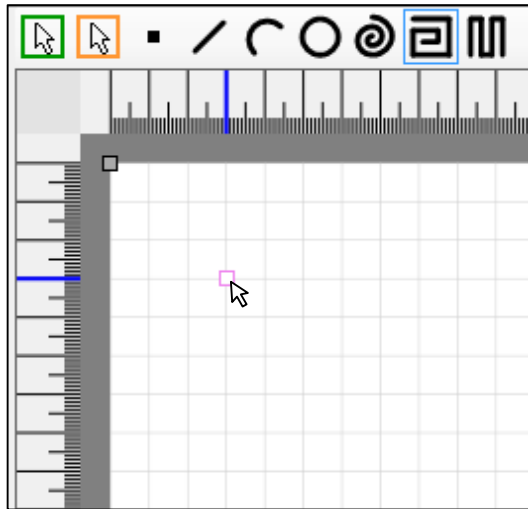


Open

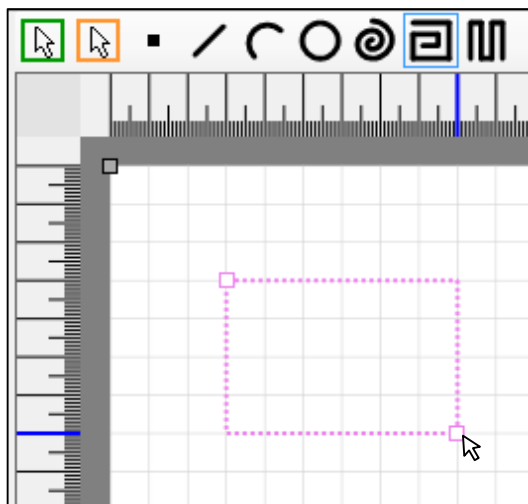
Repeat 2) to 4) when it is necessary to continue drawing a circlet involute.

5.5.2.7 Involute (Rectangle) Drawing

- 1) The edit mode can be changed to "Involute (Rectangle) Drawing Mode".
- 2) Click at a position where you would like to have the start point.
* Press [ESC] and drawing word finishes, and the mode changes to the created drawing select mode.



- 3) Click at a position where you would like to have the end point (a point on the opposite side of the start point) to determine a rectangle.
* Press [ESC] key and it goes back to 2) (Start Point Position Select).



4) Establish the condition settings in the rectangle involute setting window.

InputRectSpiralConditionForm

Start X mm Y mm Width X mm Y mm

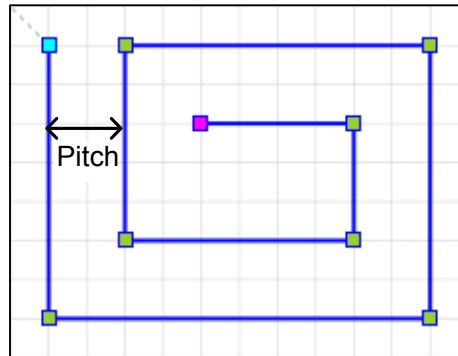
End X mm Y mm

Pitch mm TurnCount

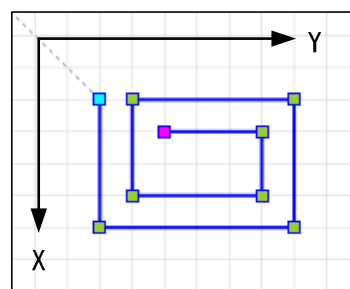
Direction ☒ X ☐ Y

OK Cancel

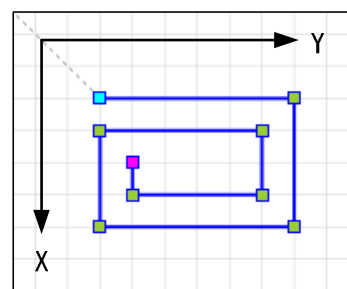
- Start
Change the coordinates (mm) of the start point indicated in 2) if necessary.
- End
Change the coordinates (mm) of the end point indicated in 3) if necessary.
- Pitch
Indicate the pitch (mm) of an involute.



- Direction
Indicate the direction (X or Y) to get moving first.



X direction

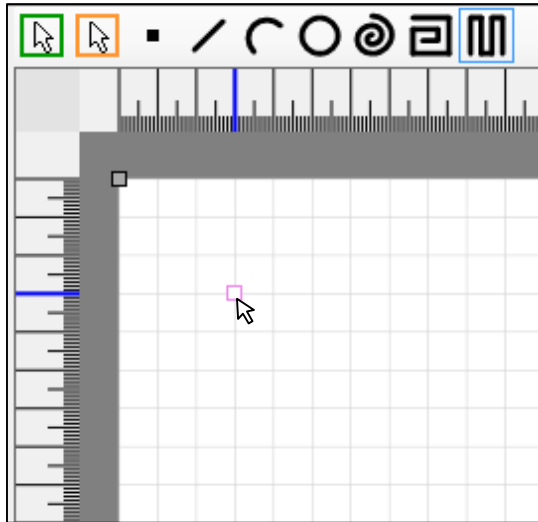


Y direction

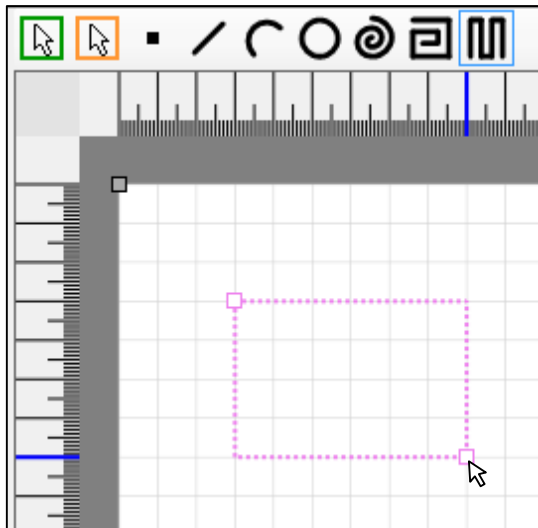
Repeat 2) to 4) when it is necessary to continue drawing a rectangle involute.

5.5.2.8 Zig-Zag Drawing

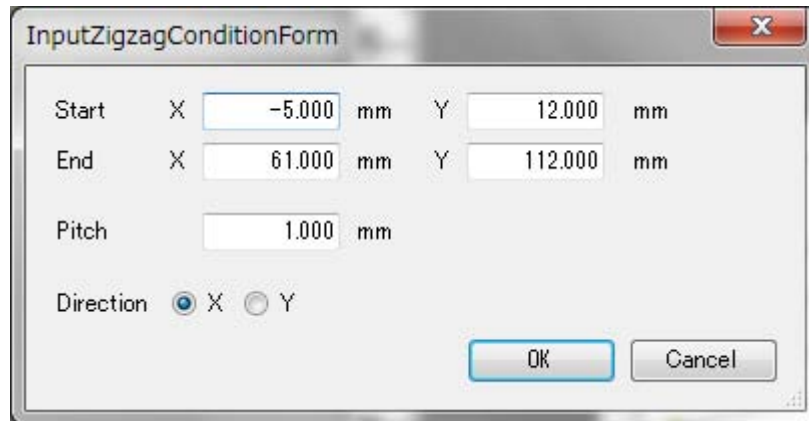
- 1) The edit mode can be changed to “Zig-Zag Drawing Mode”.
- 2) Click at a position where you would like to have the start point.
* Press [ESC] and drawing word finishes, and the mode changes to the created drawing select mode.



- 3) Click at a position where you would like to have the end point (a point on the opposite side of the start point) to determine a rectangle.
* Press [ESC] key and it goes back to 2) (Start Point Position Select).



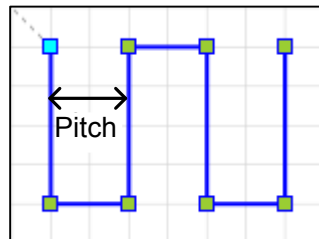
- 4) Establish the condition settings in the Input Zigzag Condition Form window.



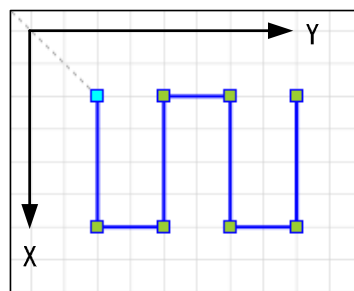
The dialog box titled "InputZigzagConditionForm" contains the following fields and controls:

- Start**: X coordinate set to -5.000 mm, Y coordinate set to 12.000 mm.
- End**: X coordinate set to 61.000 mm, Y coordinate set to 112.000 mm.
- Pitch**: Set to 1.000 mm.
- Direction**: Radio buttons for X (selected) and Y.
- Buttons**: OK and Cancel buttons at the bottom right.

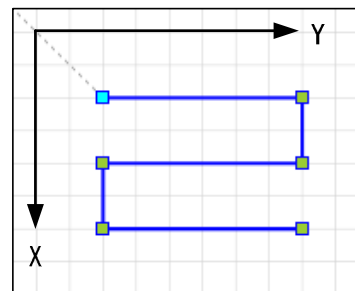
- **Start**
Change the coordinates (mm) of the start point indicated in 2) if necessary.
- **End**
Change the coordinates (mm) of the end point indicated in 3) if necessary.
- **Pitch**
Indicate the pitch (mm) of an zig-zag.



- **Direction**
Indicate the direction (X or Y) to get moving first.



X direction

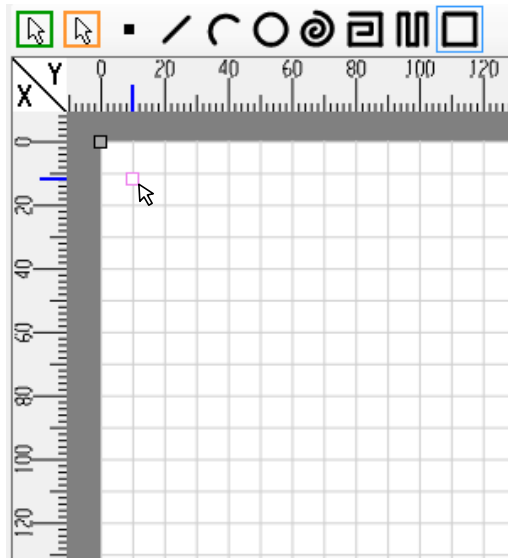


Y direction

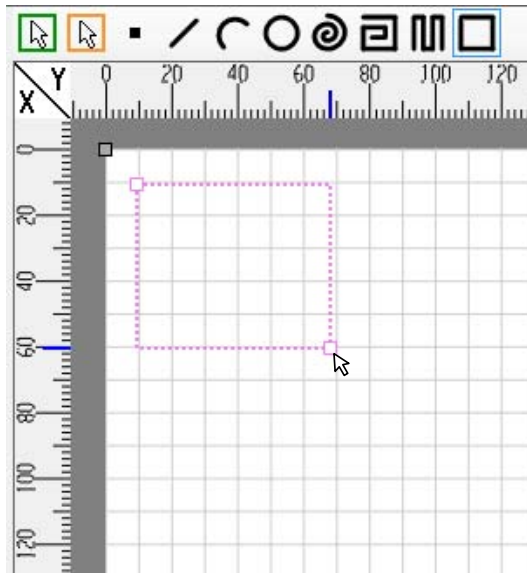
Repeat 2) to 4) when it is necessary to continue drawing a zig-zag.

5.5.2.9 Rectangle Drawing

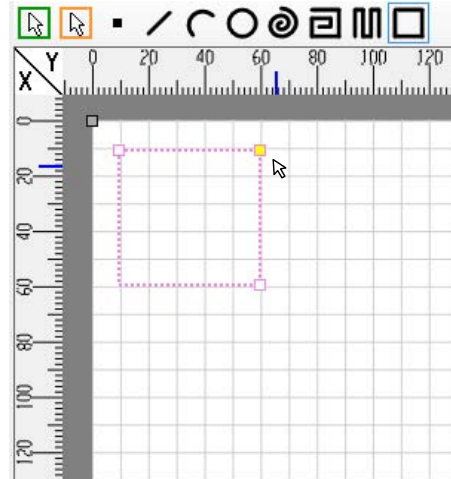
- 1) The edit mode can be changed to "Rectangle Drawing Mode".
- 2) Click at a position where you would like to have the start point.
* Press [ESC] and drawing word finishes, and the mode changes to the created drawing select mode.



- 3) Click at a position where you would like to have the end point (a point on the opposite side of the start point) to determine a rectangle.
* Press [ESC] key and it goes back to 2) (Start Point Position Select).



- 4) Click at a position you would like to have the 1st waypoint (point to determine the direction to create the rectangle) of drawing.
 * Press [ESC] key and it goes back to 3) (point to determine the direction to create the rectangle)



Repeat 2) to 4) when it is necessary to continue drawing a rectangle.

5.6 Rectifying a Figure

Select a figure and select it from the popup menu displayed by clicking the right button of the mouse.

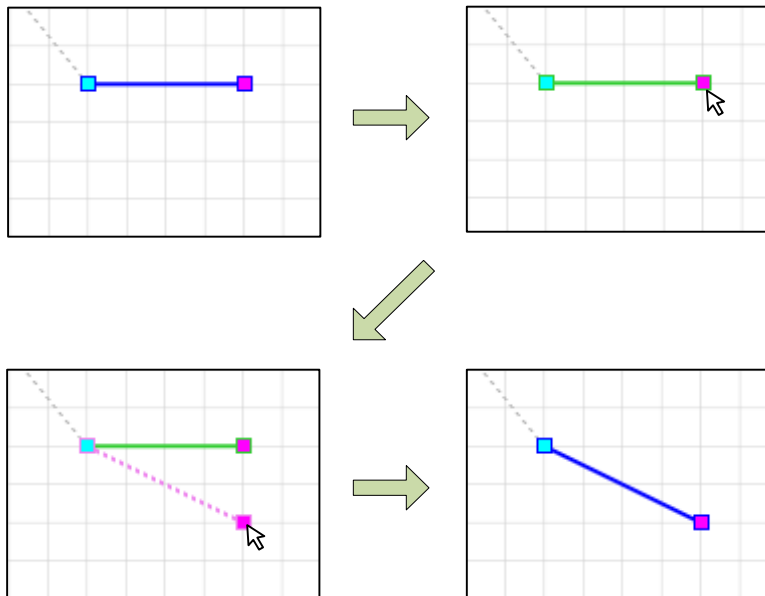
5.6.1 Move

5.6.1.1 Moving a Point

A peak point of a figure can be moved.

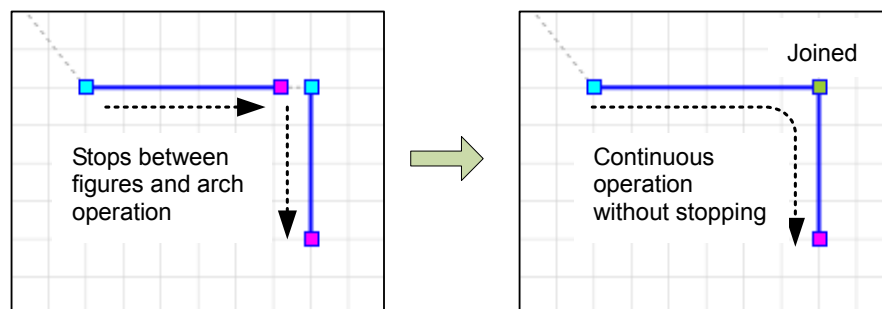
Drag a peak point you would like to move on the mouse (left button), and release the button at the position where you would like to drop the point.

* By pressing [ESC] button before releasing the mouse button, the rectification can be cancelled.



By snapping the start point of a figure (line, arc or circle) to the end point of another figure, the figures can be joined.

At the joined point of the figures, operation can be performed continuously without making a stop.



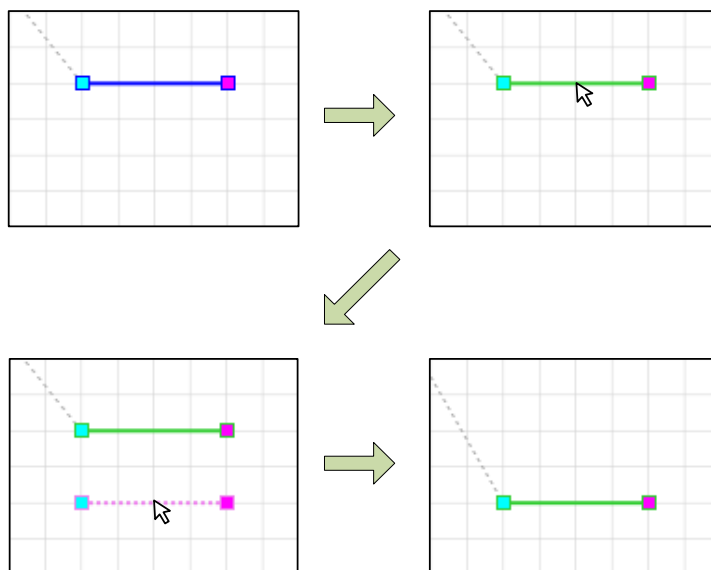
5.6.1.2 Moving a Figure

The position of a figure can be moved.

(1) Moving a Figure by Dragging

Drag a peak figure you would like to move on the mouse (left button), and release the button at the position where you would like to drop the point.

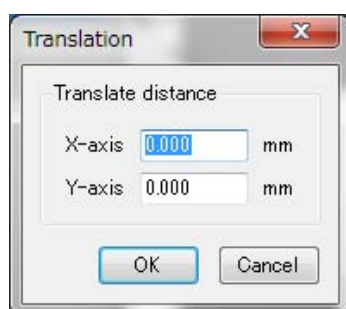
* By pressing [ECS] button before releasing the mouse button, the rectification can be cancelled.



While dragging a figure, the peak snapping feature will not work.

(2) Moving a Figure by Indicating Translation Distance

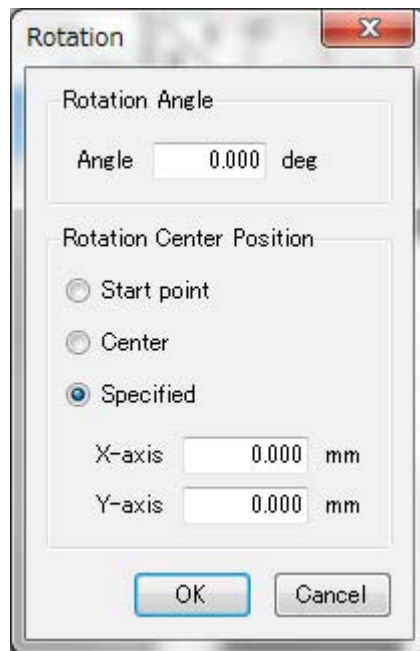
- 1) Select a figure you would like to move, and execute [Drawing (D)] – [Translation (T)] from the menu bar (or [Translation (T)] from the popup menu).
- 2) Input the translation distance for X and Y-axes in the movement setting window and click [OK] button.



5.6.2 Rotation

A figure can be rotated.

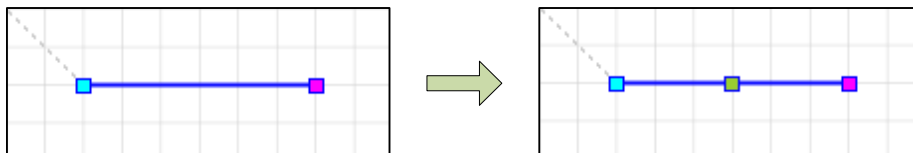
- 1) Select a figure you would like to rotate, and execute [Drawing (D)] – [Rotation (R)] from the menu bar (or [Rotation (R)] from the popup menu).
- 2) Input the rotation angle and the rotation center in the rotation setting window and click [OK] button.
Rotation center can be selected from the following;
 - Start point
Set the start point coordinates for each figure as the rotation center.
 - Center
Set the middle point for a line, the center for a circle or arc as the rotation center.
 - Specified
Set the indicated coordinates as the rotation center.



5.6.3 Divide

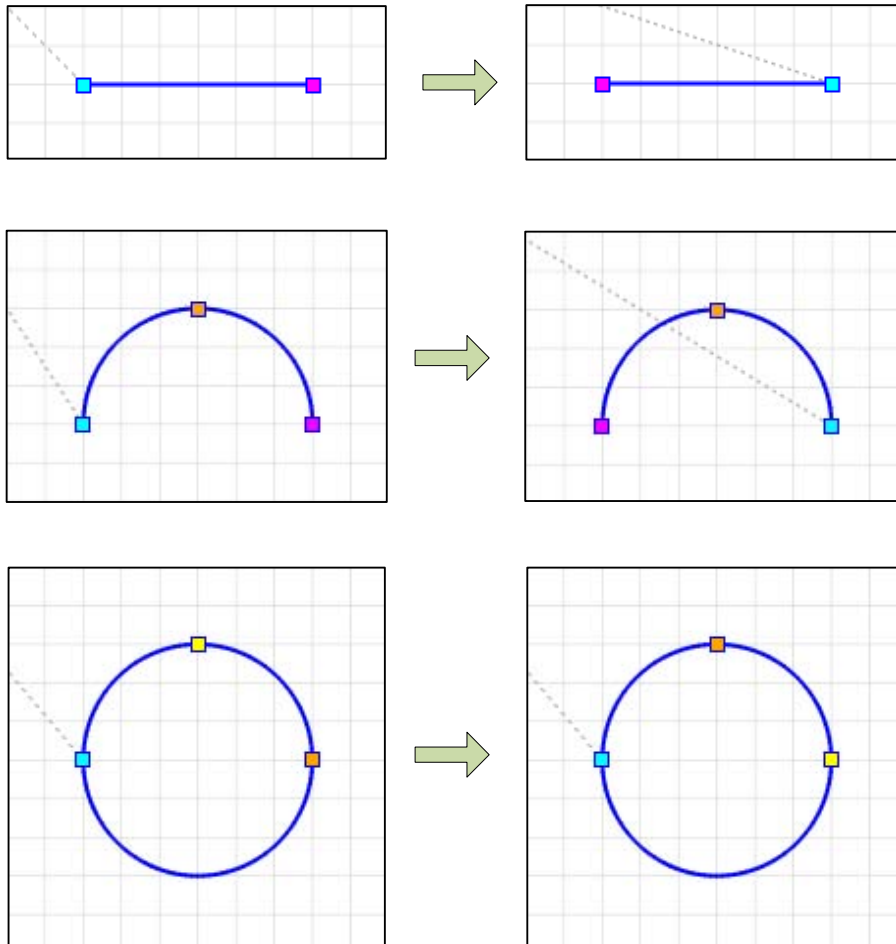
A line can be divided (in half).

Select a line you would like to divide, and execute [Divide (D)] from the popup menu.



5.6.4 Swapping Start Point and End Point

The start point and end point of a figure (1st waypoint and 2nd waypoint for a circle) can be swapped with each other. Select a figure you would like to make a swap and execute [Swap Start Point and End Point (E)] from the popup menu.



5.6.5 Delete

A figure can be rotated. Select a figure you would like to delete and either press [Del] key or execute [Remove (R)] from the popup menu.

5.6.6 Editing Information of a Figure

The information of a figure can be edited.

Select a figure and select it from the popup menu displayed by clicking the right button of the mouse.

5.6.6.1 Vertex

1) Coordinates of Vertex

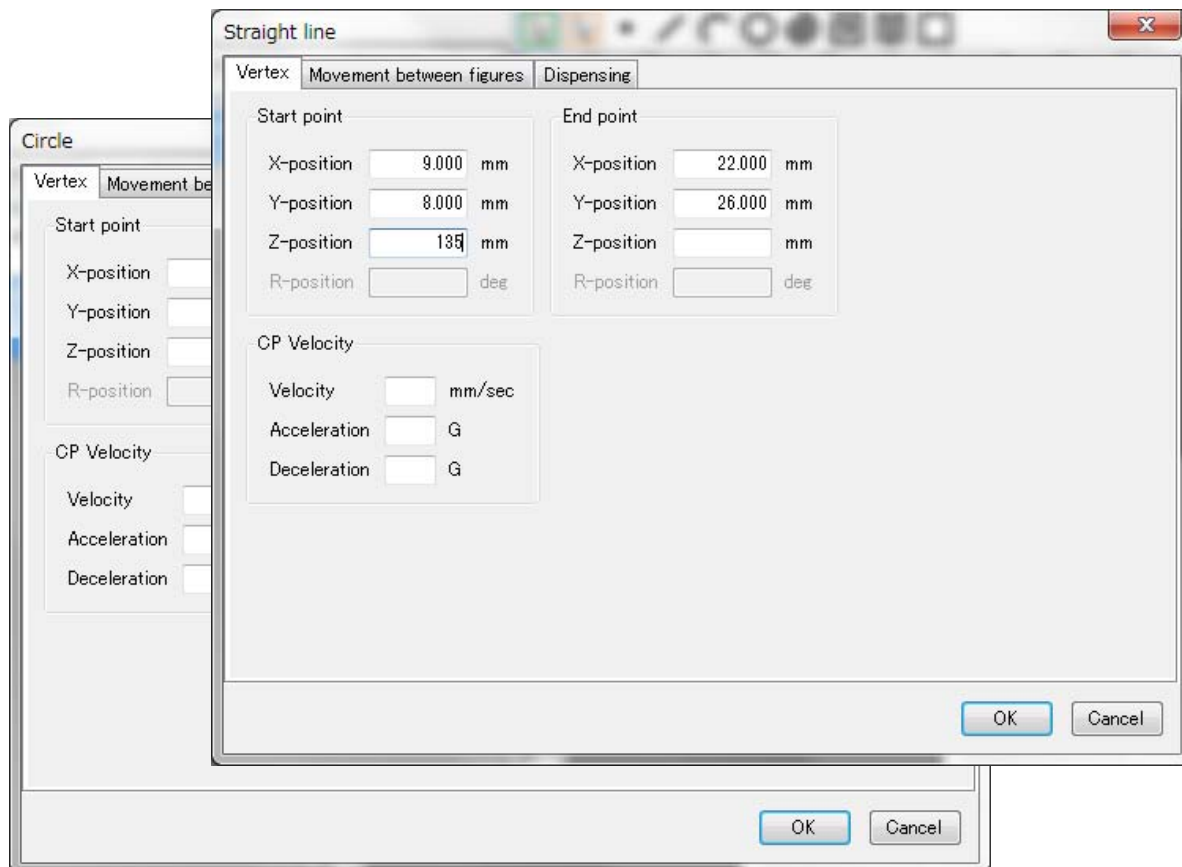
Coordinates of each point can be set.

If the Z-coordinate is left blank, the Z-coordinate from the previous figure will be taken over.

2) CP Velocity

Settings for velocity, acceleration and deceleration of linear movement, arc movement and circular movement can be established.

The values set in the project property will be applied to the items in blank.



5.6.6.2 Movement Between Figures

Set the arch motion condition for when moving to the applicable figure from the previous one.

Setting can be edited only when a check mark is put on “Set arch motion individually”.

- Interpolate Move

CP movement is performed from the end point of the previous figure to the start point of the next figure without having the arch motion.

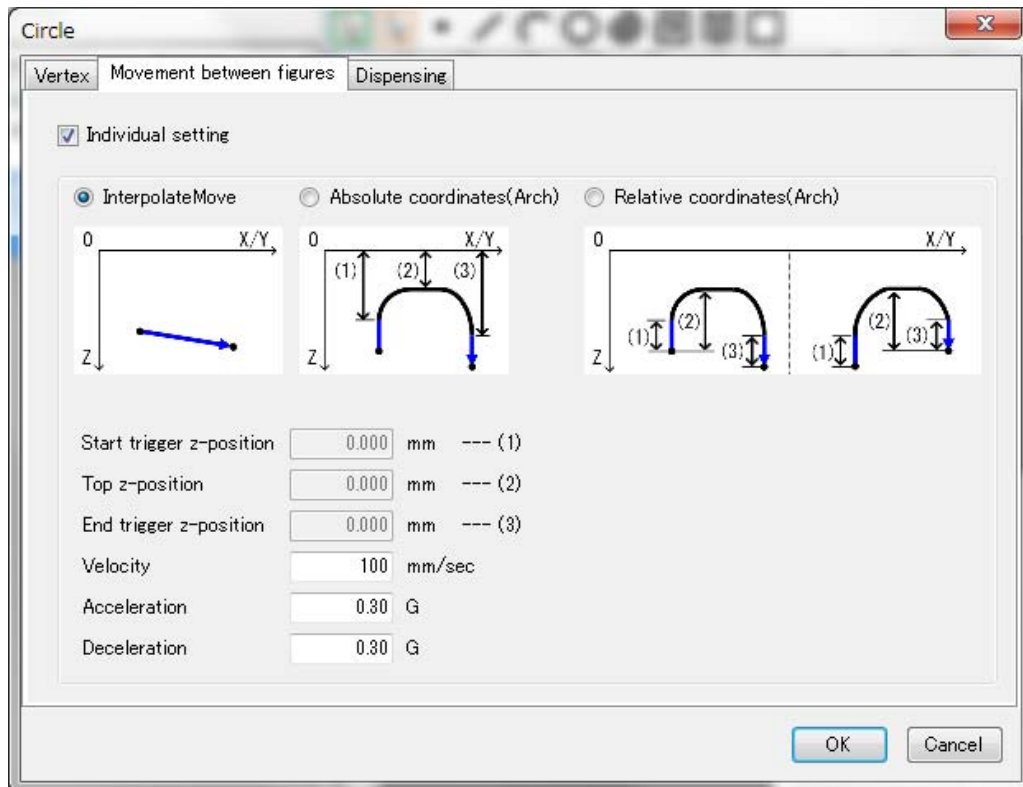
- Absolute coordinates (Arch)

Indications of the Z-axis for the start point trigger, end point trigger and the peak point are made with the absolute coordinates.

- Relative coordinates (Arch)

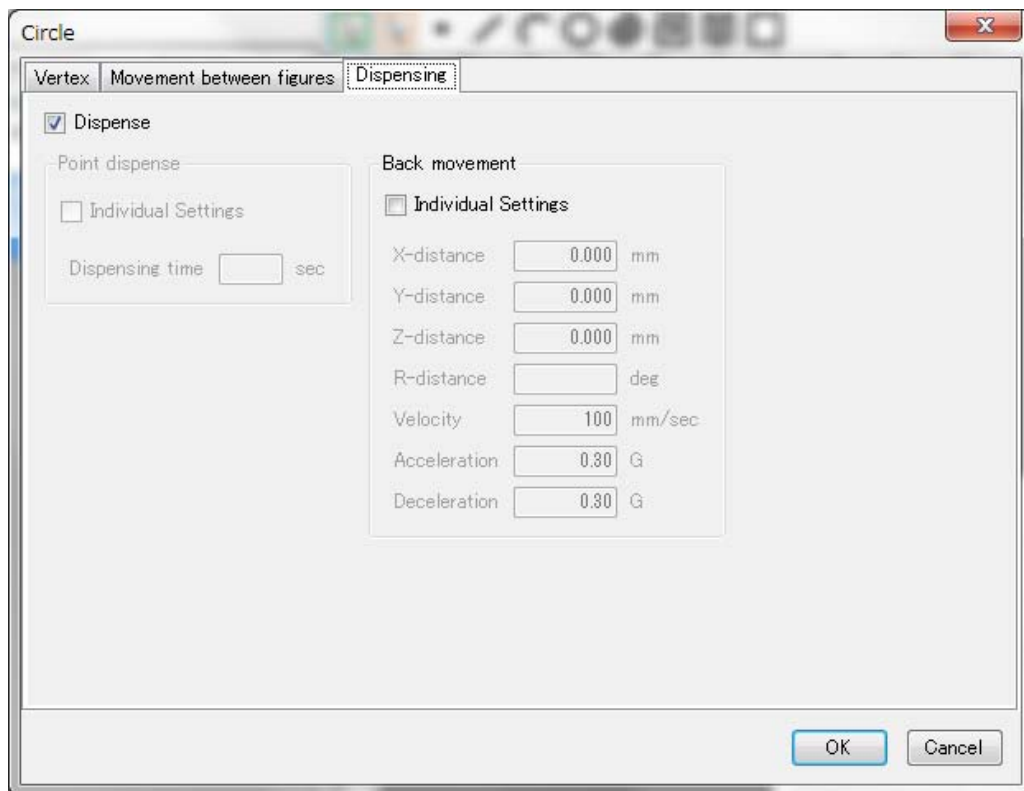
Indications of the Z-axis for the start point trigger, end point trigger and the peak point are made with the relative coordinates.

The settings in the project property will be applied when a check mark is removed from “Set arch motion individually”.



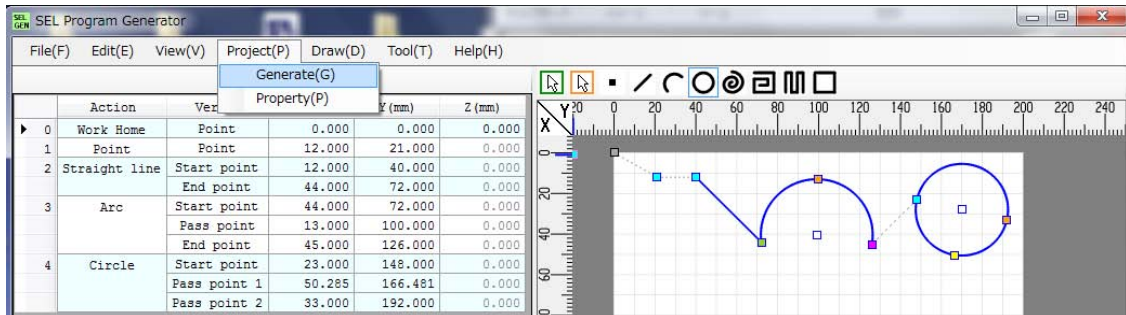
5.6.6.3 Dispensing

- (1) Dispense
Put a check mark and dispensing operation will be conducted.
- (2) Point dispense
Set the point dispensing time for when the dispensing device is in “Continuous Discharge” mode.
Put a check mark in “Individual Settings” to apply this setting, and remove the check mark to apply the settings in the project property.
- (3) Back movement
Establish the settings for return operation.
Put a check mark in “Individual Settings” to apply this setting, and remove the check mark to apply the settings in the project property.



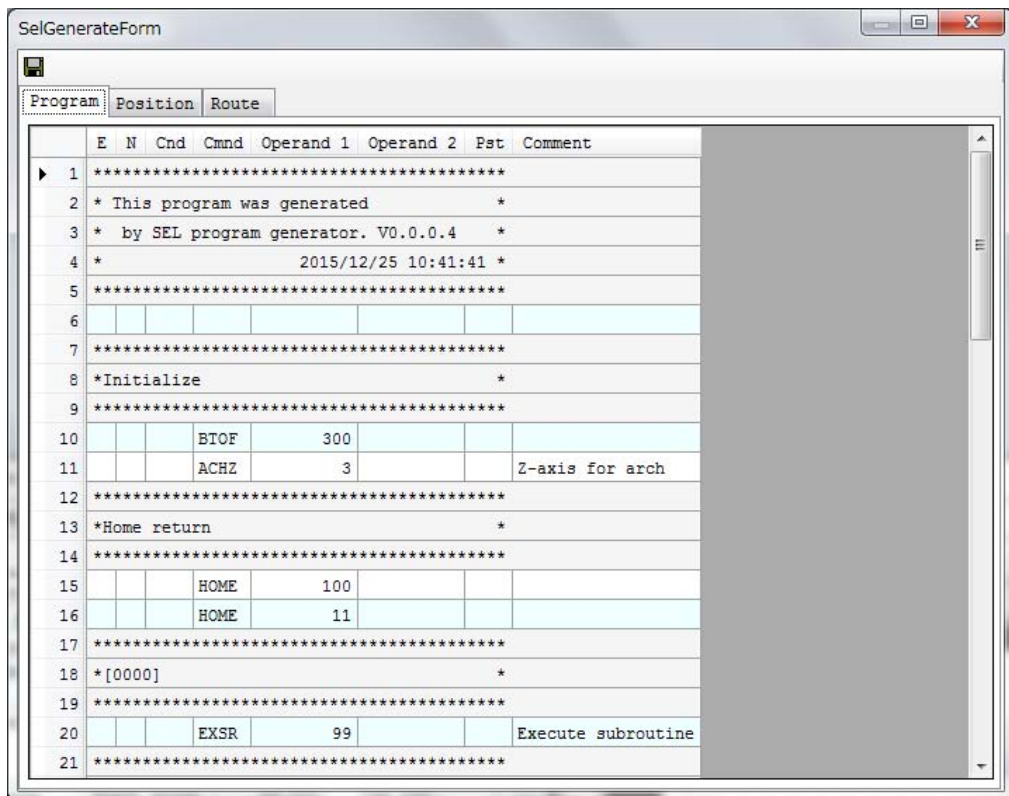
5.7 Generating SEL Program and Position Data

- 1) Execute [Project (P)] – [Generate (G)] from the menu bar.



- 2) SEL program and position data are generated and the detail of them will be displayed.

- SEL Program
The SEL program list gets displayed.



- Position Data
The position data list gets displayed.

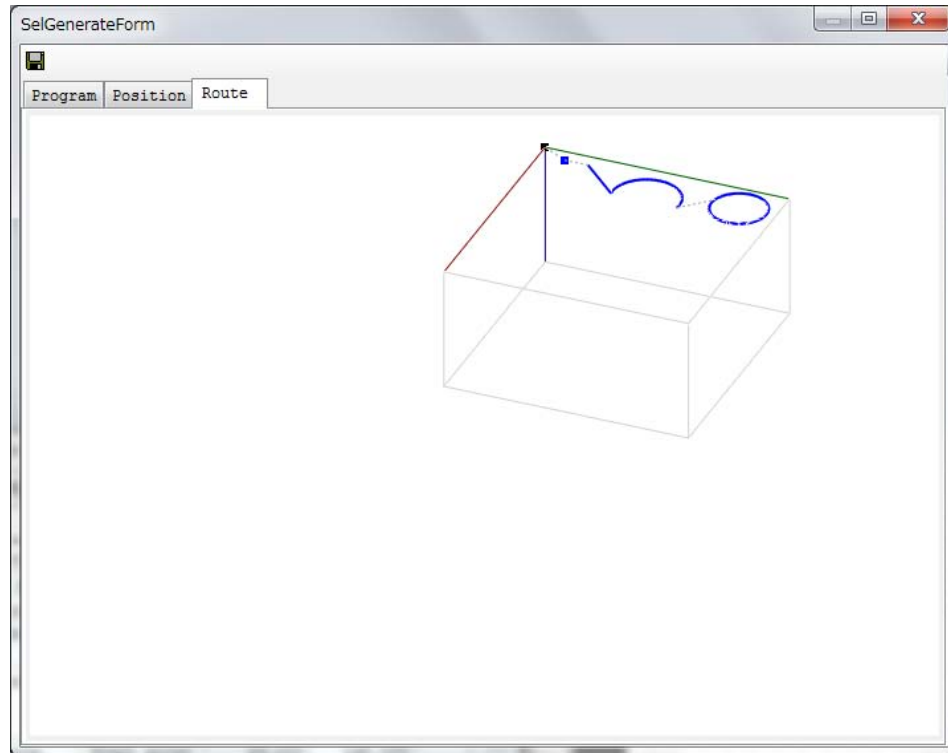
SelGenerateForm

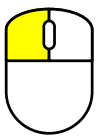
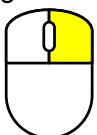
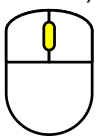
Program Position Route

	X (mm)	Y (mm)	Z (mm)	R (deg)	Vel (mm/sec)	Acc (G)	Dcl (G)
▶ 1			0.000		100	0.30	0.30
2	0.000	0.000	0.000		100	0.30	0.30
3			0.000				
4			0.000				
5			0.000				
6	12.000	21.000	0.000		100	0.30	0.30
7	12.000	40.000	0.000		100	0.30	0.30
8	44.000	72.000	0.000		100	0.30	0.30
9	13.000	100.000	0.000		100	0.30	0.30
10	45.000	126.000	0.000				
11	23.000	148.000	0.000		100	0.30	0.30
12	50.285	166.481	0.000		100	0.30	0.30
13	33.000	192.000	0.000				

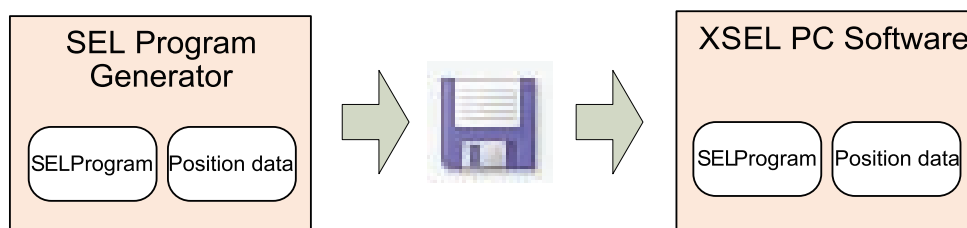
- Operation Route

Based on the created figure information, the operation route gets shown in simple 3D. (* It is not the actual operation track.)



Mouse Button	Operation	Functions
Left button 	Drag	The display rotates.
Right button 	-	It is not for use.
Wheel (Middle Button) 	Rotate	[When Ctrl key is held down] Display can be zoomed in and out.
		[When Shift key is held down] Display can be scrolled right and left.
		[In condition other than above] Display can be scrolled up and down.
	Drag	Display can be scrolled to the direction that you dragged.

- 3) The SEL program and the position data can be saved to a file if necessary.
The saved file can be read in with XSEL PC software.



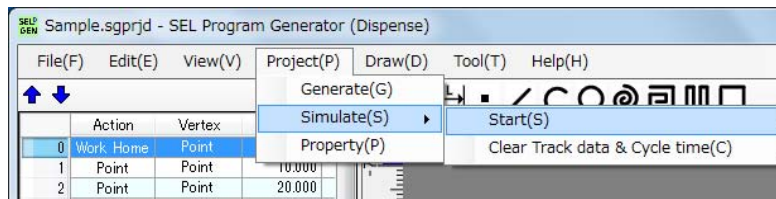
5.8 Simulation

The generated program can be simulated so you can get to know the operation track and cycle time as a reference.

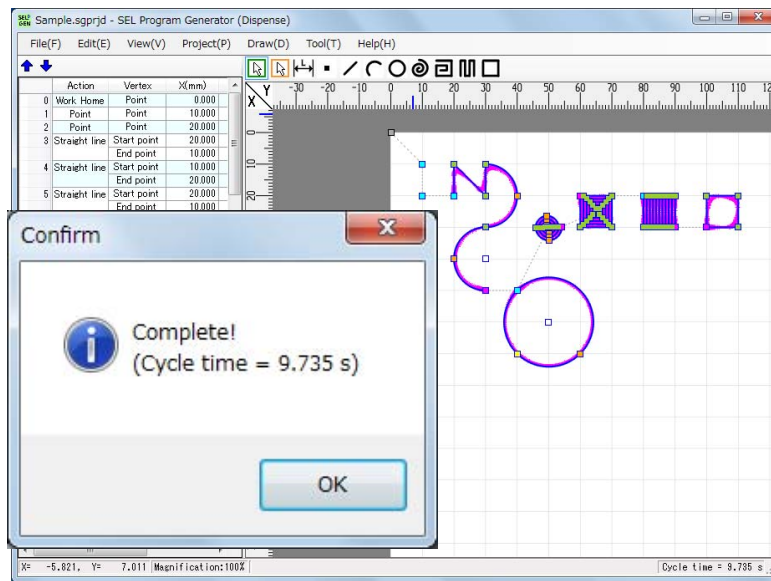


- Note that the operation track is a movement command to a controller, and it does not include the dispersion (caused by load, finishing, etc.) which can be assumed in the actual use of the device.
- The cycle time display may change depending on the performance or load of your computer, and it does not include the dispersion (caused by load, finishing, etc.) which can be assumed in the actual use of the device. Close all the softwares other than this software as much as possible when running a simulation and use it as a reference.
- The cycle time should be calculated assuming that the external input standby operation gets cancelled immediately.
- The cycle time should be calculated assuming that the home-return operation gets completed immediately.

- 1) Execute [Project (P)] - [Simulate (S)] - [Start (S)] from the menu bar.



- 2) Operation track and cycle time should be displayed after the simulation is complete.



[Cycle Time]

It is the sum total of the operation time in one cycle of “work home position → drawn figure → work home position” and time required for related processes.

It shows the process time required to perform “Cycle top (DWLT Command in figure)” → “Cycle end (EDDO Command in figure)” in the generated program.

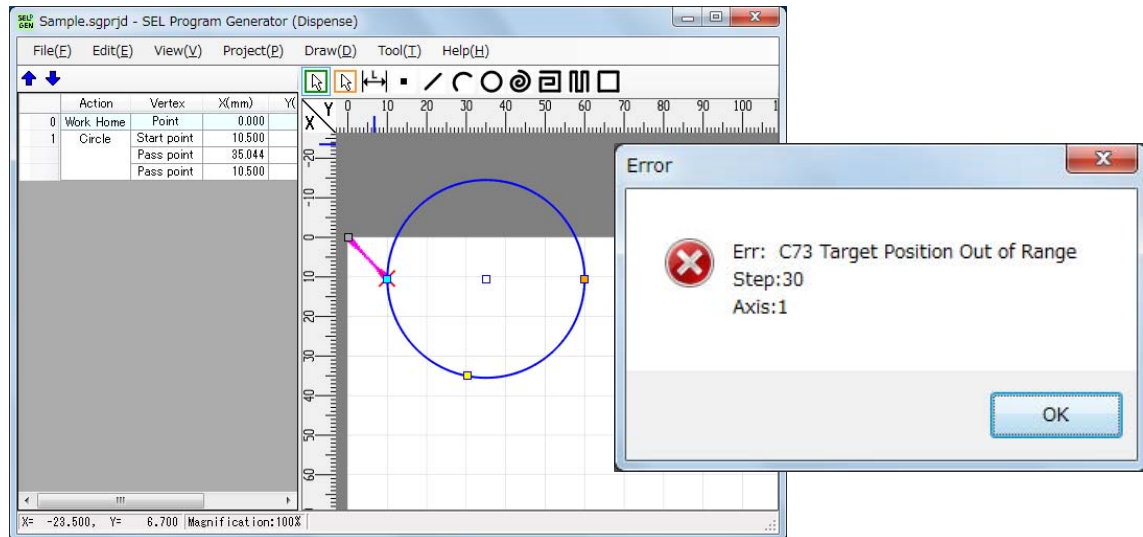
* The program shown in the figure on the right is an example.

A set of process subject to cycle time calculation

	E	N	Cnd	Cmd	Operand 1	Operand 2	Pst	Comment
1								*****
2								* This program was generated *
3								* by SEL program generator. V3.0.0.1 *
4								* 2017/05/17 20:31:55 *
5								*****
6								
7								*****
8								*Initialize *
9								*****
10				BTDF	300			
11				ACHZ	3			Z-axis for arch
12								*****
13								*Home return *
14								*****
15				HOME	100			
16				HOME	11			
17								*****
18								*[0000] *
19								*****
20				EXSR	99			Execute subroutine
21								*****
22								*Cycle top *
23								*****
24				DWLT	1099	100		
25								*****
26								*[0001]-[0003] *
27								*****
28				MOVL	6			
29				BTDF	300			
30				PATH	7	9		[0001]-[0003]
31				BTDF	300			
32								*****
33								*[0000] *
34								*****
35				EXSR	99			Execute subroutine
36								*****
37								*Cycle end *
38								*****
39				ADD	1099	1		Counter increment
40				EDDO				Jump to cycle top
41								*****
42								*Program end *
43								*****
44				EXIT				Program end
45								

[Error View]

If an error gets detected in the simulation, content as shown below should be displayed in the error window, and a cross (x) mark should be shown on the figure or track that the error was detected.



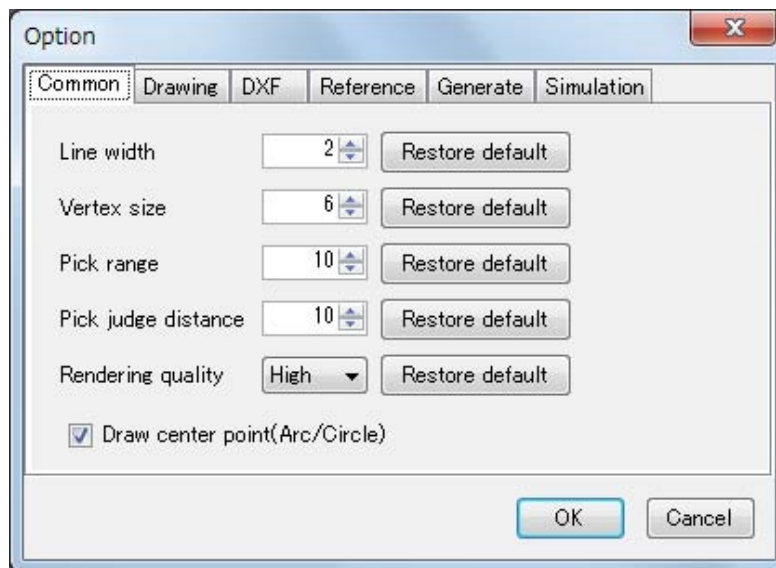
[Contents Displayed in Error Window (display to be shown only for contents with information)]

- Err : Error Number and Error Name
 - Step : Error Detection Program Step *
 - Axis : Error Detected Axis Number
 - Pos : Error Detected Position Number *
- * Applicable for SEL Program Generation Window Display displayed by selecting [Project (P)] - [SEL Program Generation (G)]

5.9 Tool Option Setting

Setting should be established for each option.

- Common Setting
- Drawing Setting
- DXF Setting
- Reference Setting
- Generate Setting
- Simulation



5.9.1 How to Display Setting Window




Execute [Tool (T)] - [Option (O)] from the menu bar.

5.9.2 Common Setting

Line width	<input type="text" value="2"/>	<input type="button" value="Restore default"/>
Vertex size	<input type="text" value="6"/>	<input type="button" value="Restore default"/>
Pick range	<input type="text" value="5"/>	<input type="button" value="Restore default"/>
Pick judge distance	<input type="text" value="3"/>	<input type="button" value="Restore default"/>
Rendering quality	<input type="button" value="High"/>	<input type="button" value="Restore default"/>
<input type="checkbox"/> Draw center point(Arc/Circle)		

Item	Contents
Line width	Set the line width of a line figure. Unit: Pixel Settable Range: 1 to 10 (Default: 2)
Vertex size	Set the size of a peak point. Unit: Pixel Settable Range: 0 to 10 (Default: 6)
Pick range	Set the picking range of the mouse cursor when clicking a figure with a mouse. Unit: Pixel Settable Range: 1 to 10 (Default: 5)
Pick judge distance	A figure starts moving after the figure gets picked (selected) and dragged for the distance set in this setting or more. Unit: Pixel Settable Range: 0 to 10 (Default: 3)
Rendering quality	Set the drawing quality of a figure. Set it to "Low" and the load of drawing process should be reduced. Settable Range: Low or High (Default: High)
Draw center point (Arc/Circle)	Set if a center of a circle / arc should be shown.

5.9.3 Drawing Setting

Normal line color		<input type="button" value="Restore default"/>
Dispensing line color		<input type="button" value="Restore default"/>
Selected line color		<input type="button" value="Restore default"/>
Decimal places	<input type="text" value="3"/>	<input type="button" value="Restore default"/>
Snap range	<input type="text" value="10"/>	<input type="button" value="Restore default"/>

Item	Contents
Normal line color	Set the color to display normal figures (figures not selected and no dispensing conducted).
Dispensing line color	Set the color to display figures with dispensing conducted.
Selected line color	Set the color to display selected figures.
Decimal places	Set the number of digits under decimal point for the coordinate values at the position where the mouse cursor points at. Unit: Digit Settable Range: 0 to 3 (Default: 3)
Snap range	Set the snap range of a peak point. Set it to "0" and the snap function will be inactivated. Unit: Pixel Settable Range: 0 to 100 (Default: 10)

5.9.4 DXF Setting

Normal line color Restore default

Selected line color Restore default

Spline 1st division distance Restore default

☐ Import Z-coordinate

☐ Remove imported figures

Item	Contents
Normal line color	Set the color to display figures not selected.
Selected line color	Set the color to display selected figures.
Spline 1st division distance	Set the distance to divide a spline figure into straight lines. Settable Range: 0.1 to 100.0 (Default: 1.0)
Import Z-coordinate	Set if the Z-axis should be read in when a dxf drawing is read in.
Remove imported figures	Set if the read dxf drawing should be deleted.

5.9.5 Reference Setting

Line color Restore default

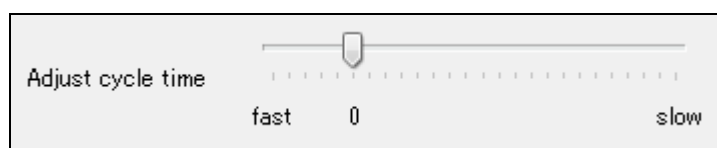
Item	Contents
Line color	Set the color to display reference figures.

5.9.6 Generate Setting

- ☐ Suppress coordinate so that it falls within software limit
- ☐ Simple arch motion conversion when arch motion is not established

Item	Contents
Suppress coordinate so that it falls within software limit	Set if adjustment should be conducted to get in the soft limit range when a figure falls out of the soft limit range. A warning message will appear if no adjustment is conducted.
Simple arch motion conversion when arch motion is not established	Set whether to switch to the simple arch motion (go up in Z-axis → move horizontally → go down in Z-axis) when "Relative Coordinate Indicated Arch Motion" should not satisfy the arch motion conditions.

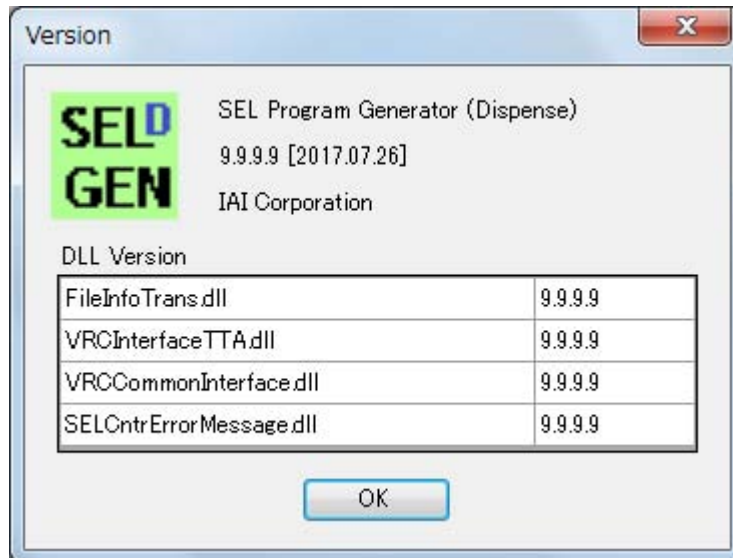
5.9.7 Simulation



Item	Contents
Adjust cycle time	It is for adjustment at the manufacturer. Keep it set at 0.

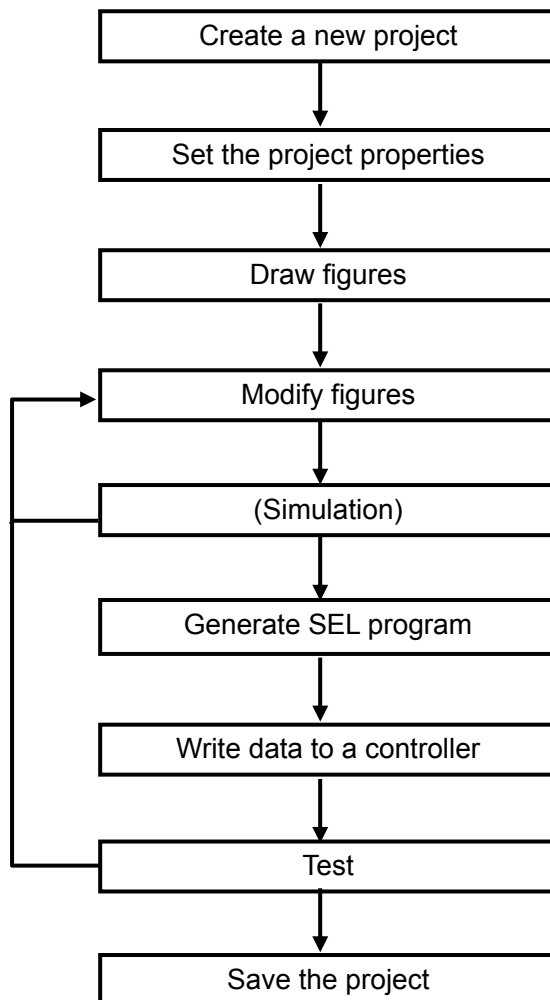
5.10 Version Information

Execute [Help (H)] - [About (A)] from the menu bar, display the “Version Information Window”



6. How to Operate

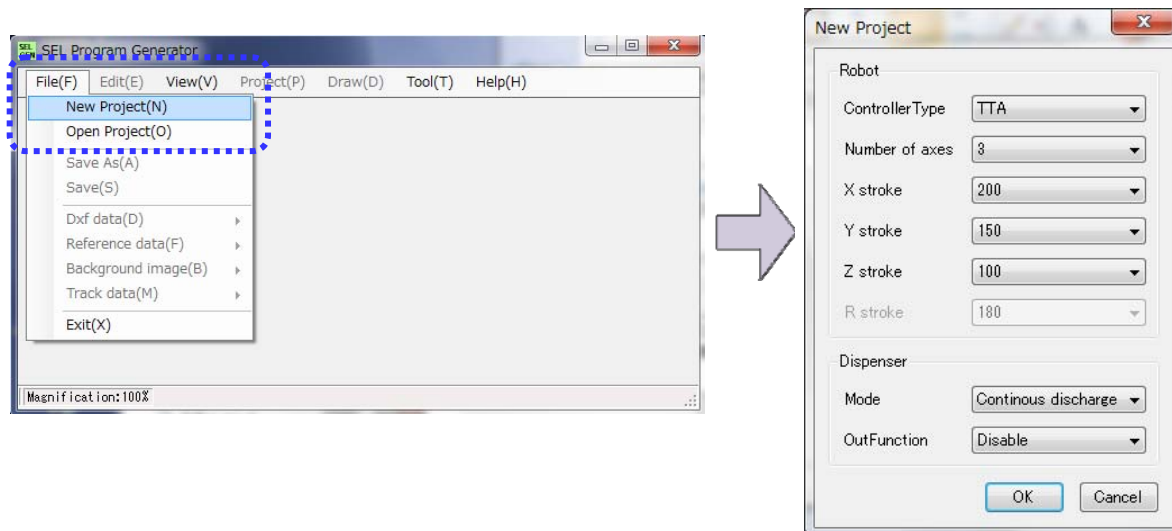
Refer to the following flow in order to generate and check the SEL program and position data.



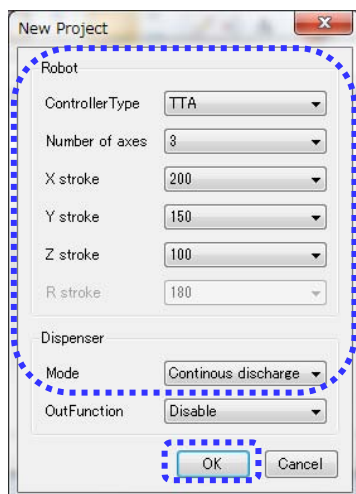
6.1 Create a New Project

The drawing data and condition settings necessary to create a program are to be managed in program units.

- 1) Execute the menu [File (F)] – [New Project (N)].



- 2) Establish the settings for the specification of the robot to use and the operation mode.



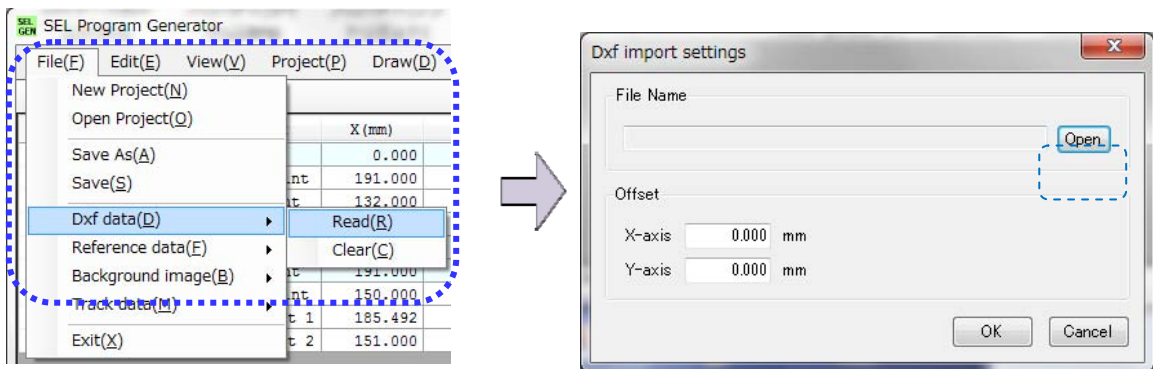
Operation mode can be selected from continuous discharge and quantitative discharge. The quantitative dispensing is a mode to perform dispensing until the response input port set on the dispensing device I/F described in Section 5.4.6 turns on.

6.2 Creating an Operation Route

6.2.1 Preparation for Reading CAD Data

Prepare CAD data (DXF) to work on in advance.

- 1) To read in a DXF file, execute "File (F)" – "Dxf Data (D)" – "Read (R)" from the menu.
- 2) Click the open button and select the CAD data file to work on.

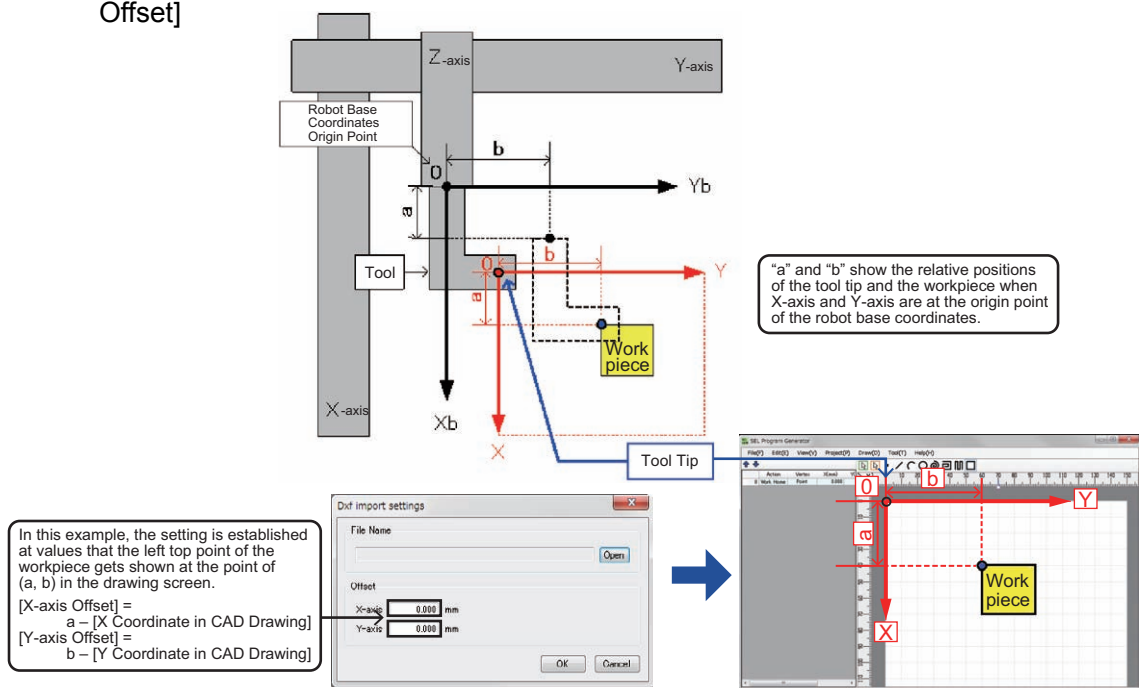


- 3) Adjust the relation of positions of the coordinates (0, 0) (= tool tip position) and the workpiece in the drawing window to the actual position relation*1 by the offset setting.

*1 When the X-axis and Y-axis are positioned to the base coordinate datum point (0, 0) of the robot, make sure to check the position relation of the tool tip and workpiece in the device drawing in advance.

The relation between the coordinates in the CAD drawing and the coordinates in the drawing window should be as shown below.

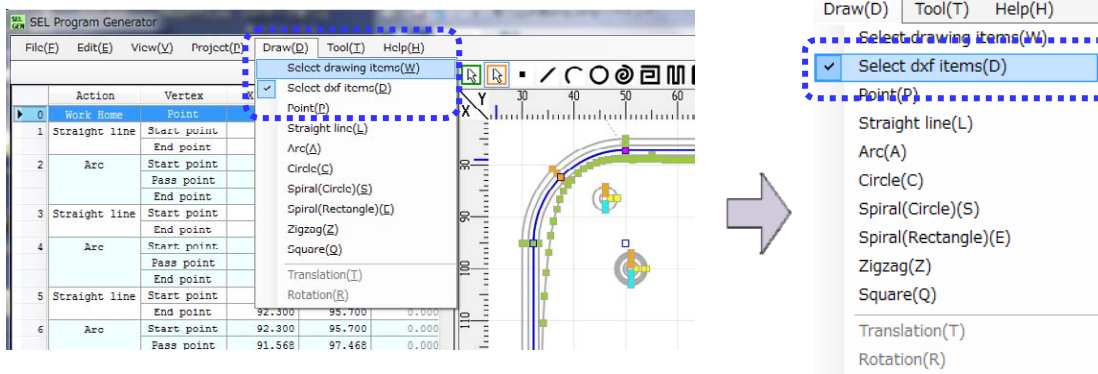
- X Coordinate in Drawing Window = [X Coordinate in CAD Drawing] + [X-axis Offset]
- Y Coordinate in Drawing Window = [Y Coordinate in CAD Drawing] + [Y-axis Offset]



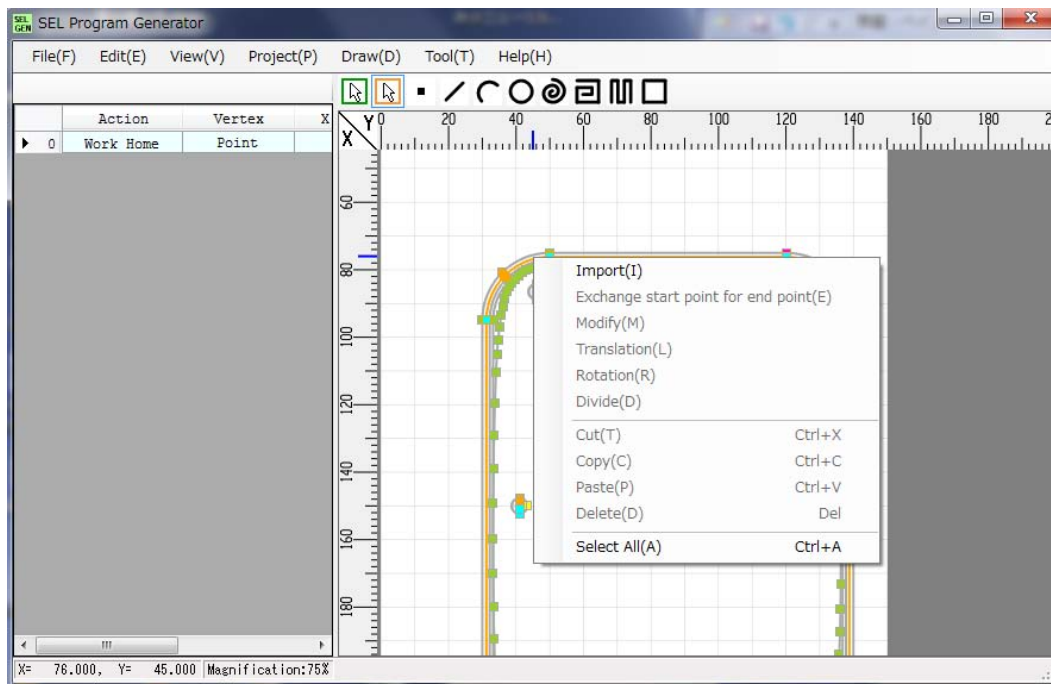
6.2.2 Picking up a Dispensing Route Figure

Select a figure to use for dispensing from the CAD data you have read in in order to load it in.

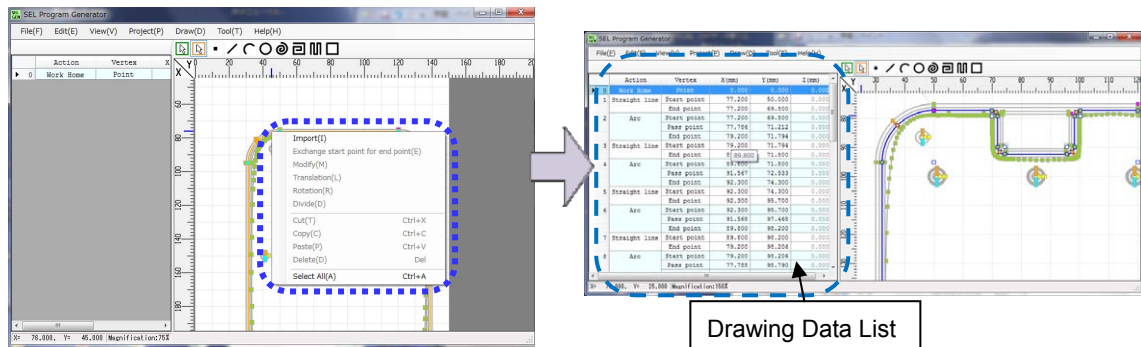
- 1) Execute “Draw (D)” – “Select dxf items (D)” from the menu.



- 2) Click the figure showing the dispensing route on the mouse to select it. The selected figure gets shown in orange and right-click to display the popup menu.



- Execute "Read in" from the popup menu. The figure that was read in (dispensing route) gets displayed in blue.



In the drawing data list on the left of the screen, the types of figures and points that were read in get displayed. The order shown in the list will be the order of operation.

Refer to 5.2 (2) and (3) for the colors and types of the lines and points.

Repeat the operation of (2) to (3) to create the dispensing route.

Be careful so the start point and the end point do not get other way around when reading in. Press [Ctrl] key while reading in and the start point and end point can be swapped.

6.2.3 Program Execution Start Position Setting

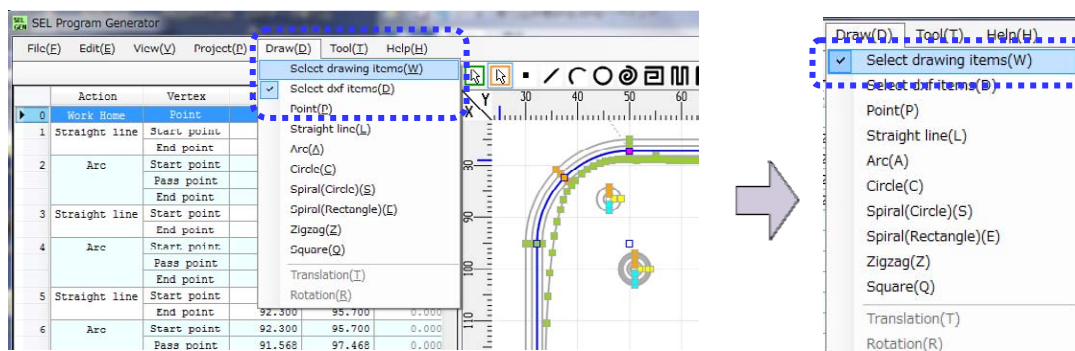
Set the coordinates for the working home point (standby position) that should be the start position for program execution.

<Reference>

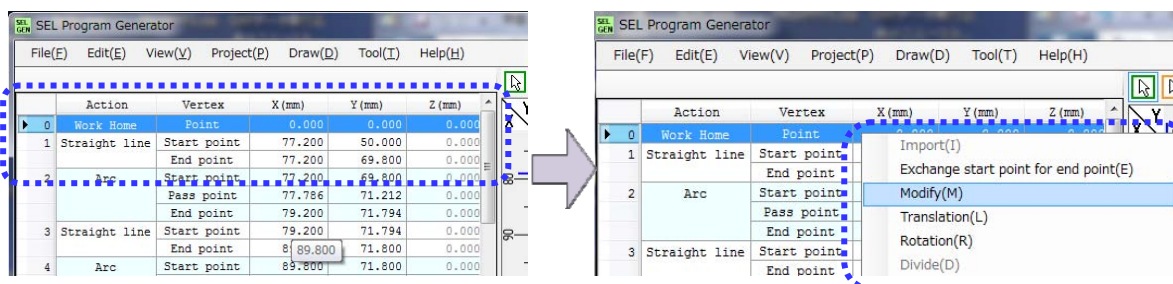
Setting can be established at any position.

Set the position considering not to have interference when a replacing workpiece.

- 1) Execute “Draw (D)” – “Select drawing items (W)” from the menu.



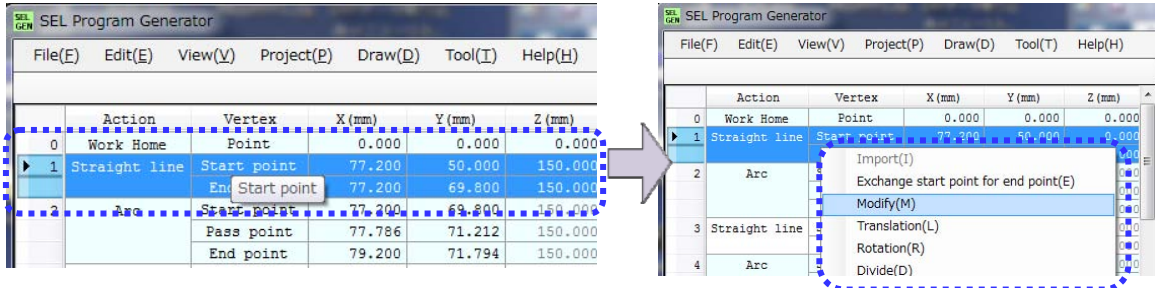
- 2) Click on “Work Home” at the top of the created data list to select it, and click on the right button and execute “Modify” from the popup menu that appears.



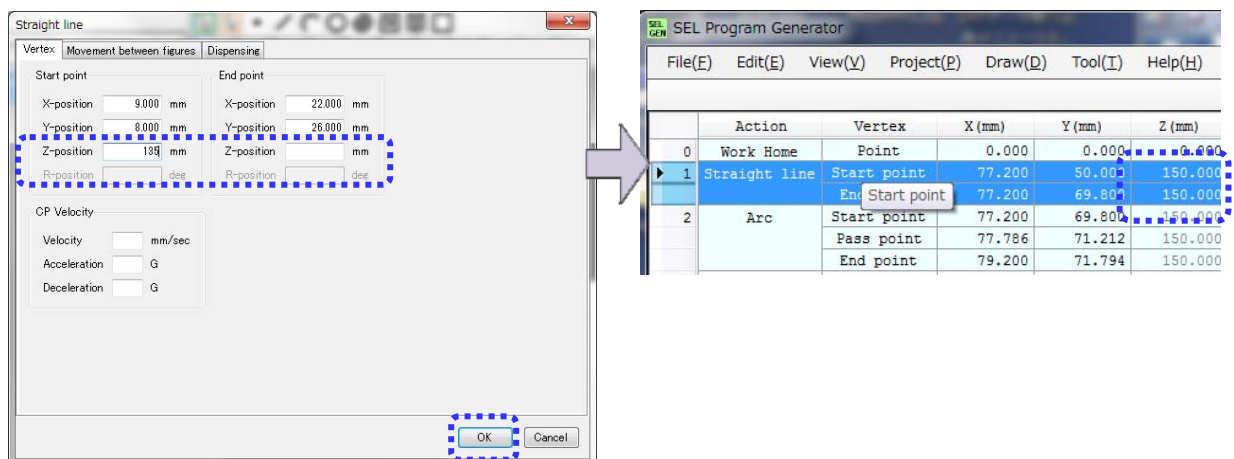
Set the working home point coordinate (X, Y and X) in the edit window.

6.2.4 Setting Height (Z-Coordinate) for Dispensing Route

- 1) Click on "Straight line" in the 2nd line in the drawing data list to select it.



- 2) As the line edit window is shown, change the Z-coordinate.
If the height (Z-coordinate) is constant, set only the coordinates of the start point.
Set the end point if the height changes.



6.3 Operational Condition Setting

Establish the setting of the operational conditions for the desired way of operation.

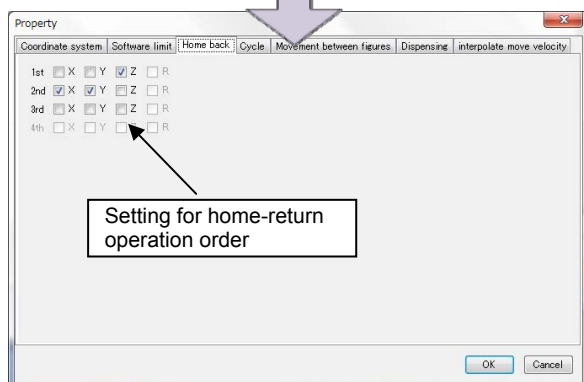
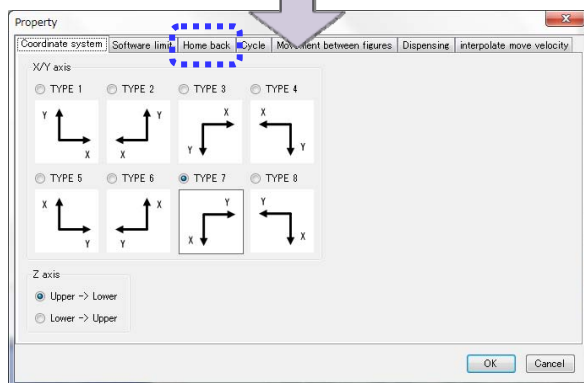
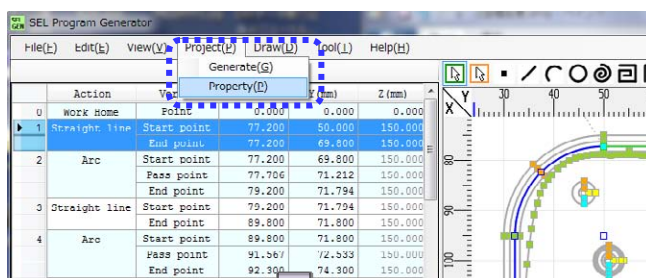
6.3.1 Home back Operation Setting

- * Unnecessary to establish setting for absolute type (including battery-less type)

Set the order to perform home back operation.

It is available to establish the setting, for example, to conduct the home back operation on the Z-axis first, and then on the X and Y-axes at the same time.

- 1) Execute [Project (P)] – [Property (P)] in the menu.
Click the home back tab in the property window.

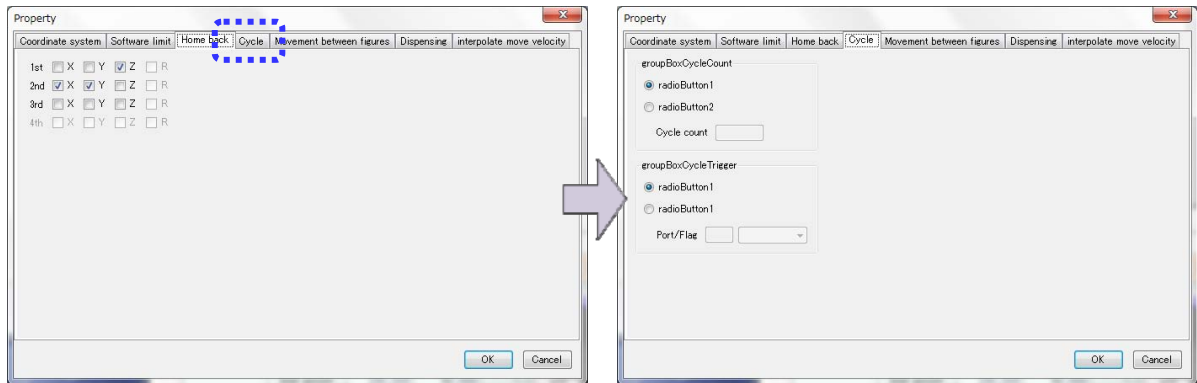


Set the order in the property window for the home back operation.

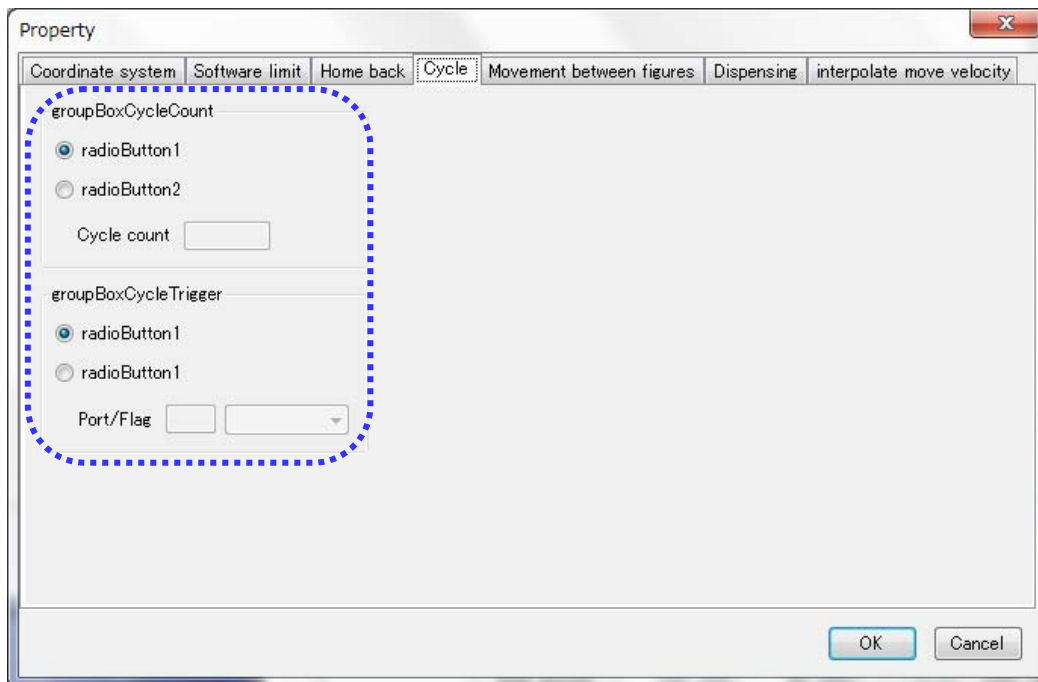
6.3.2 Setting for Times of Cycle Execution and Setting for Start Signal Condition

Set the times of execution or cycle start condition.

- 1) Click the cycle tab beside the home back operation tab.

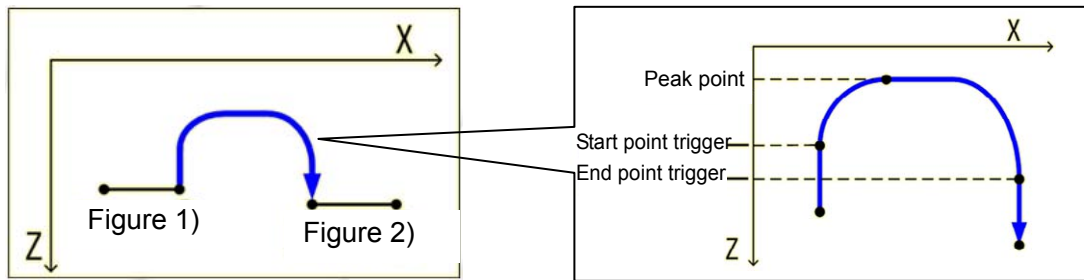


- 2) Indicate the setting for times of cycle execution and cycle start condition.
The cycle start condition can indicate such items as the port numbers or flags for SEL language.

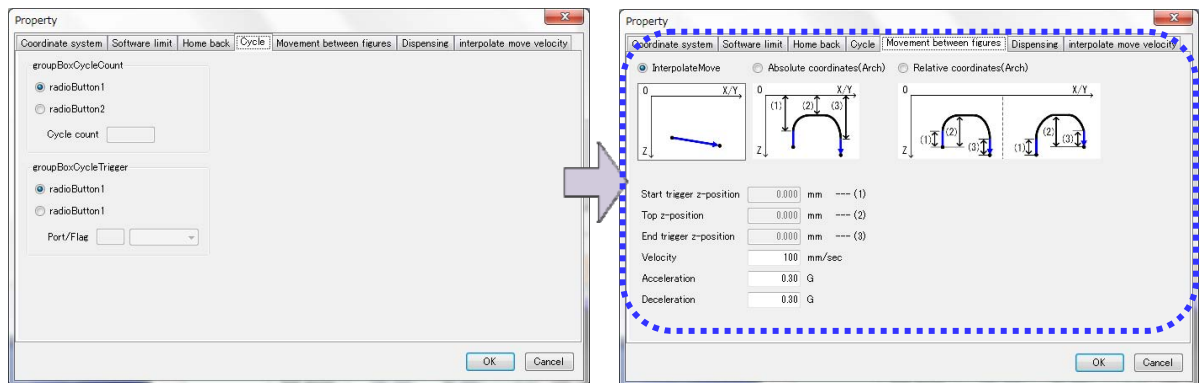


6.3.3 Setting for Movement between Figures

In case of not dispensing for a certain area, movement between two figures is to be conducted with arch motion operation.
Arch motion operation is to be set with three points of the height (Z-axis) coordinates, peak point, start point trigger and end point trigger.



1) Click the movement between figures tab beside the cycle tab.



Set the Z-axis coordinates and the velocity and acceleration / deceleration speed in arch motion in the movement between figures property window.

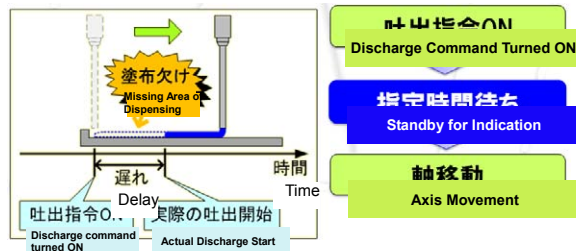
6.4 Settings Related to Dispensing Operation

Establish the setting for the following four types of dispensing operation for the desired way of operation.

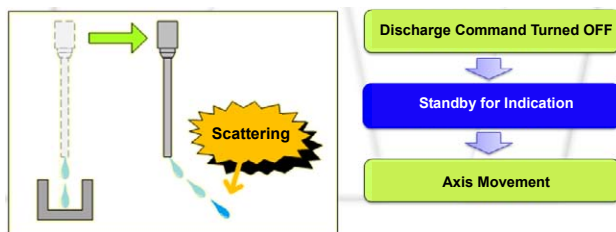
- 1) Dispensing Device and I/F Setting [Refer to Section 6.4.1]
Set the communication condition for the signals between the robot and dispensing device.



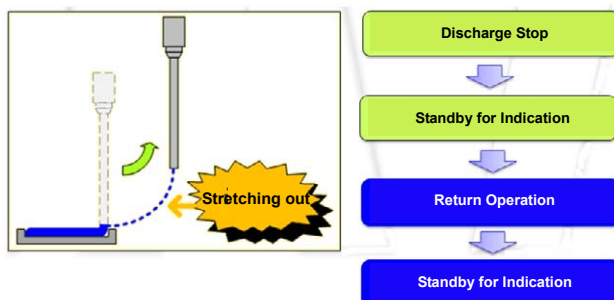
- 2) Prevention Setting for Missing Area of Dispensing [Refer to Section 6.4.2]
Prevention of missing area of dispensing due to delay of actual discharge start after discharge command turned on



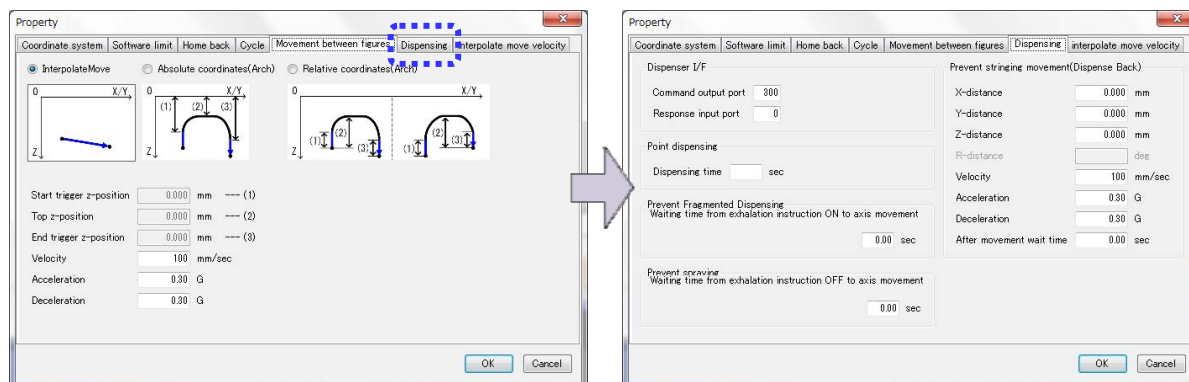
- 3) Scatter Prevention Setting [Refer to Section 6.4.3]
Prevention of scattering of dispensing agent due to delay of actual discharge stop after dispensing command turned off



- 4) Prevention Setting for Stretching out [Refer to Section 6.4.4]
Prevention for dispensing agent to be stretched out and drip around



Each setting can be established in the dispensing property.
Click the dispensing tab beside the movement between figures tab to display the property display.

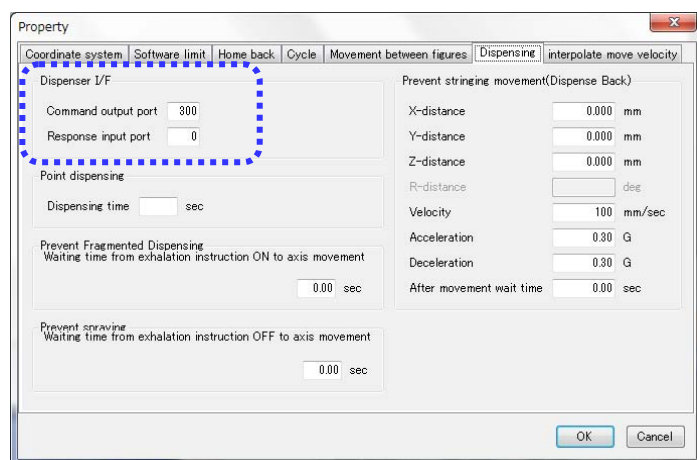


6.4.1 Setting of Dispenser I/F

Commands to the dispensing device and response are to be conducted on each port of PIO (24V input and output signals).

Set the numbers of the command output port and response input port.

* As the available ports may differ for each robot, refer to the instruction manual for each robot and select from the ports assigned for general input.



<Reference>

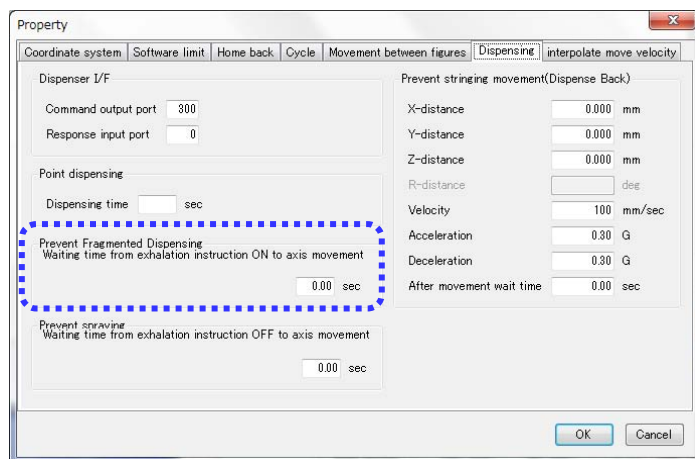
If the robot is TTA, the ports set for general output and general input at the delivery are as shown below.

Output : 321 to 331

Input : 17, 18, 20 to 22, 31

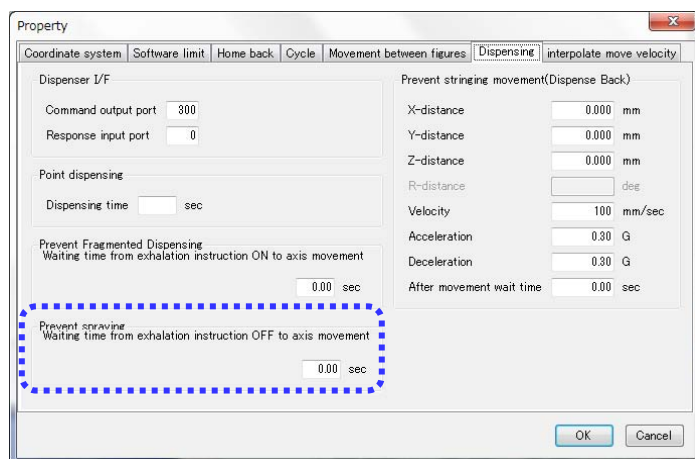
6.4.2 Setting of Prevent Fragmented Dispensing

Set the standby time before the robot starts to move after the discharge command to the dispensing device is turned on.



6.4.3 Setting of Prevent Scattering

Set the standby time before the robot starts to move after the discharge command to the dispensing device is turned off.



6.4.4 Setting of Prevent stringing movement

Setting can be established to have the robot move for the specified distance after the discharge command to the dispensing device is turned off and then stop for the specified time. Set each item.

The screenshot shows the 'Property' dialog box with the 'Dispensing' tab selected. The 'Prevent stringing movement(Dispense Back)' section is highlighted with a blue dashed border. The settings are as follows:

Parameter	Value	Unit
X-distance	0.000	mm
Y-distance	0.000	mm
Z-distance	0.000	mm
R-distance		deg
Velocity	100	mm/sec
Acceleration	0.30	G
Deceleration	0.30	G
After movement wait time	0.00	sec

Other settings visible in the dialog include:

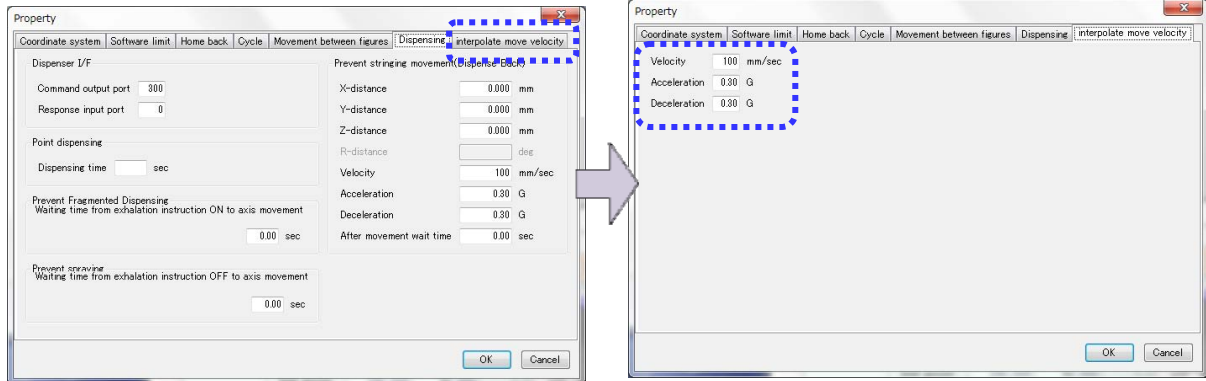
- Dispenser I/F: Command output port 300, Response input port 0
- Point dispensing: Dispensing time (empty) sec
- Prevent Fragmented Dispensing: Waiting time from exhalation instruction ON to axis movement 0.00 sec
- Prevent spraving: Waiting time from exhalation instruction OFF to axis movement 0.00 sec

Buttons: OK, Cancel

6.5 Velocity and Acceleration / Deceleration Settings for Dispensing Movement

Set the speed and acceleration / deceleration for dispensing movement to satisfy the required applied volume considering the amount of discharge of the dispensing device.

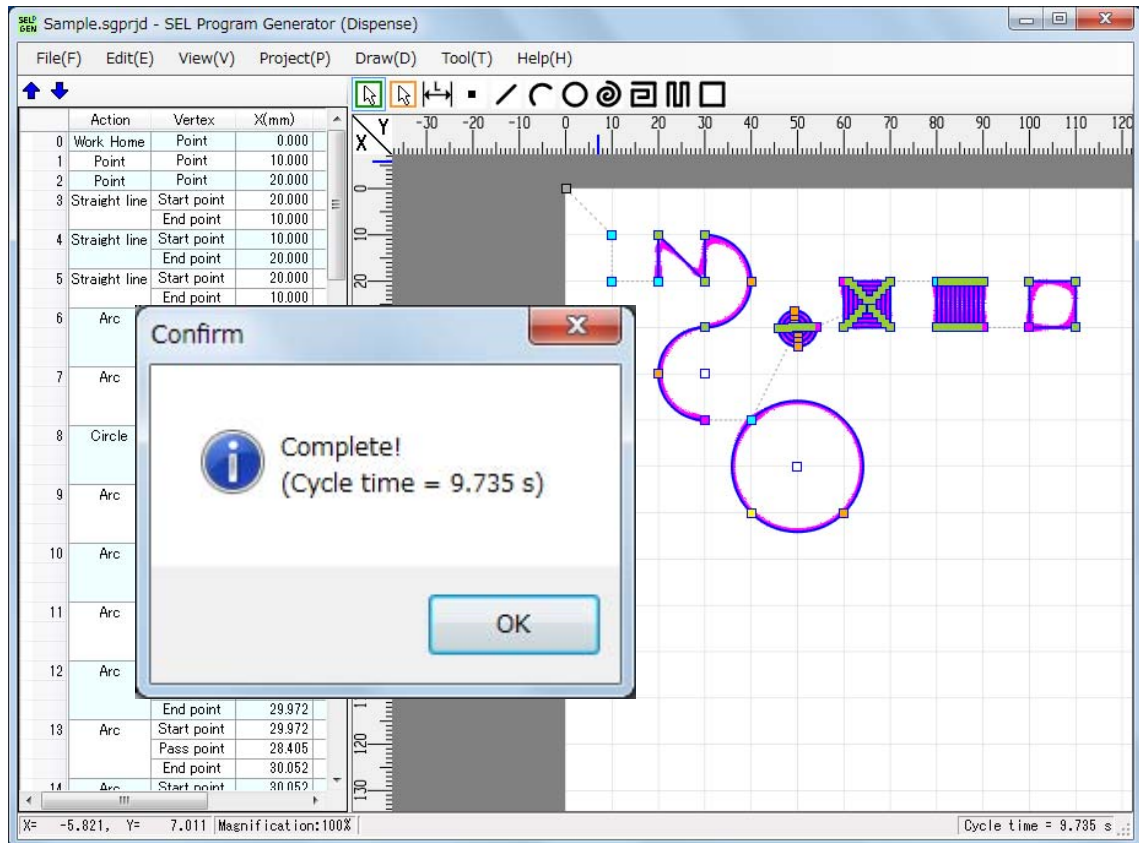
- 1) Click the interpolation movement velocity tab beside the dispensing tab.



Set the velocity and acceleration / deceleration in the interpolation movement velocity property.

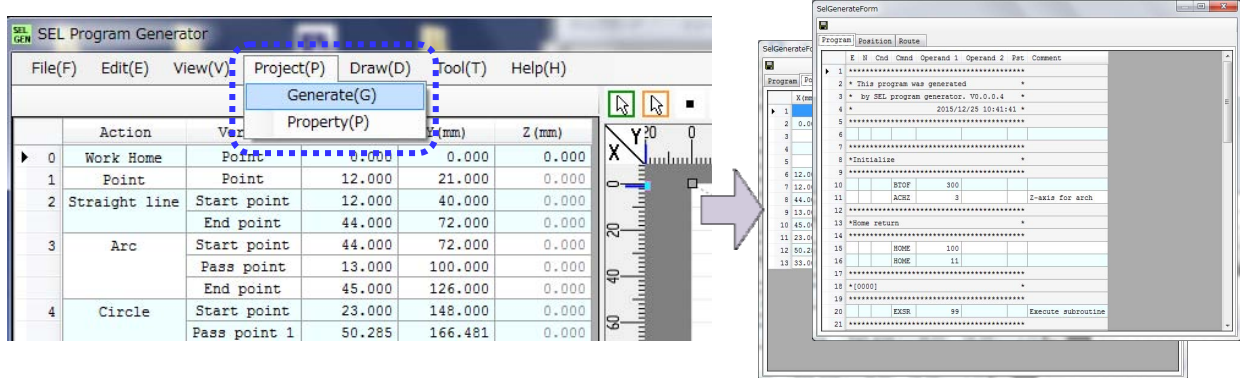
6.6 Simulation

- 1) Execute [Project (P)] - [Simulate (S)] - [Start (S)] from the menu bar.
 - 2) Operation track and cycle time should be displayed after the simulation is complete.
- * Refer to 5.4.9 Simulation in Explanation of Windows for the details of simulation.

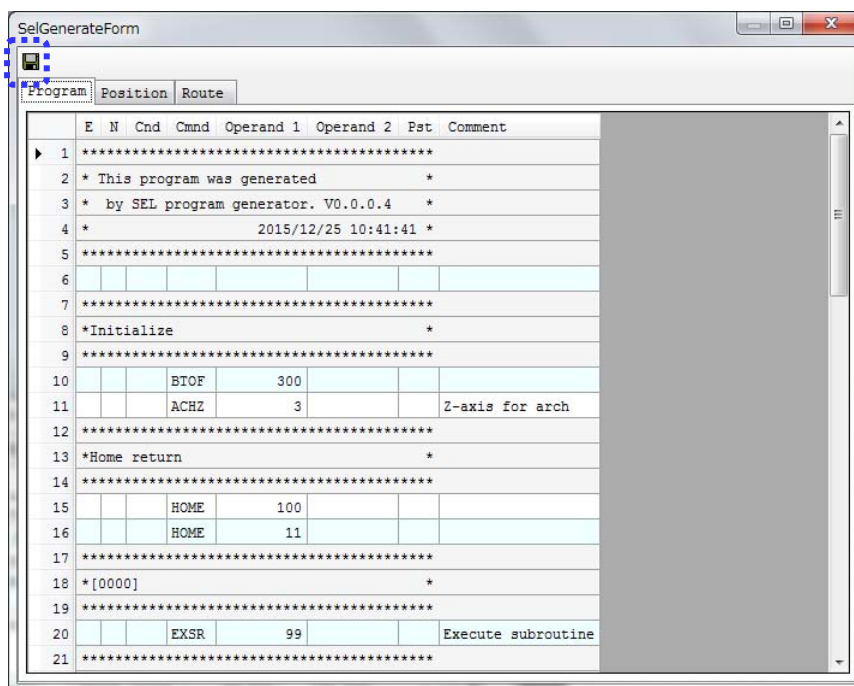


6.7 Generating and Saving SEL Program and Position Data

- 1) Execute [Project (P)] – [Generate (G)] from the menu.




- 2) Save the generated program and position data to a file.
Click the save button, and input the program name and the position data name to save.

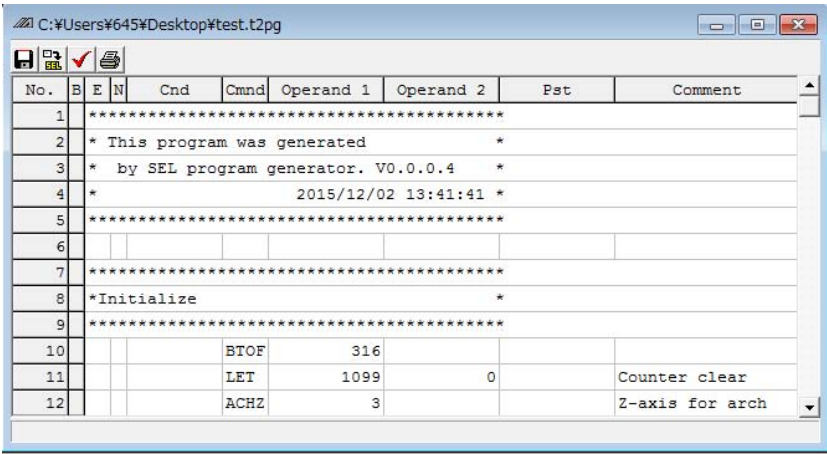


6.8 Saving a Project


Execute [File (F)] - [Save As (A)] from the menu.

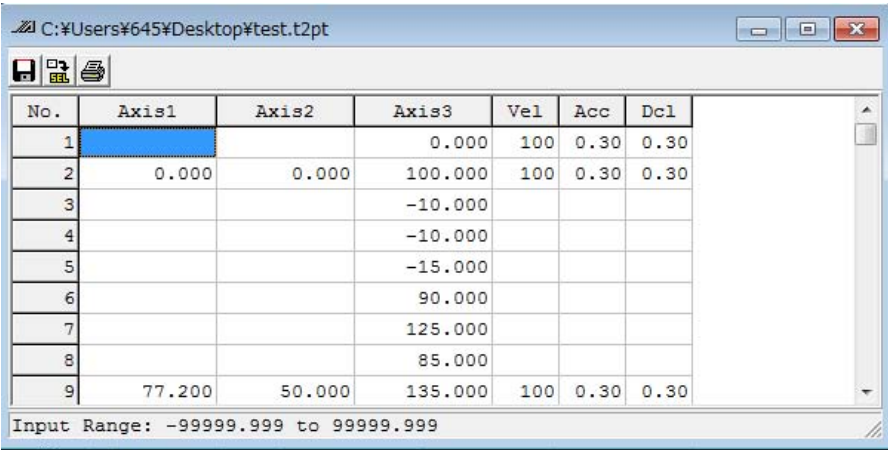
6.9 Transferring Program and Position Data to Robot

- 1) Connect the PC software to the robot.
- 2) Execute [File] - [Open] in the menu in the PC software and read in the created programs and position data after setting the file types to all the TTA files.
- 3) Transfer the read program to the robot.
Click  button, and indicate the program number to transfer it to the robot.



No.	B	E	N	Cnd	Cmnd	Operand 1	Operand 2	Pst	Comment
1									*****
2									* This program was generated *
3									* by SEL program generator. V0.0.0.4 *
4									* 2015/12/02 13:41:41 *
5									*****
6									
7									*****
8									*Initialize*
9									*****
10					BTOF	316			
11					LET	1099	0		Counter clear
12					ACHZ	3			Z-axis for arch

- 4) After transferring the program, a confirmation window for flash ROM writing will appear. Select "Yes" to write it in.
- 5) Transfer the read position data to the robot.
Click  button to transfer it to the robot.



No.	Axis1	Axis2	Axis3	Vel	Acc	Dcl
1			0.000	100	0.30	0.30
2	0.000	0.000	100.000	100	0.30	0.30
3			-10.000			
4			-10.000			
5			-15.000			
6			90.000			
7			125.000			
8			85.000			
9	77.200	50.000	135.000	100	0.30	0.30

Input Range: -99999.999 to 99999.999

- 6) At the transfer, set the top position number at the destination in "From" in the position number select window and last position number to "To" to transfer the data to the indicated position.
- 7) After transferring the position data, a confirmation window for flash ROM writing will appear. Select "Yes" to write it in.



Caution:

SEL program generator is not applicable for the work and tool coordinate system features.

When the TTA and MSEL controller to be used is applicable for the work and tool coordinate system features*1, set the of the work coordinate offset and tool coordinate offset to "0.000mm" for all the axes before executing the program.

When the work coordinate offset and tool coordinate offset are not set to "0.000mm" for all the axes, unexpected operation may occur, which could cause interference of robot, tool, workpiece, etc., and cause malfunction.

*1 Supported versions of work and tool coordinate systems

TTA : Main Application Part V2.00 and later

MSEL : Main Application Part V2.00 and later

The SEL programs, position data and simulations generated in SEL program generator should be applicable only when using the table top type robot and cartesian robot.

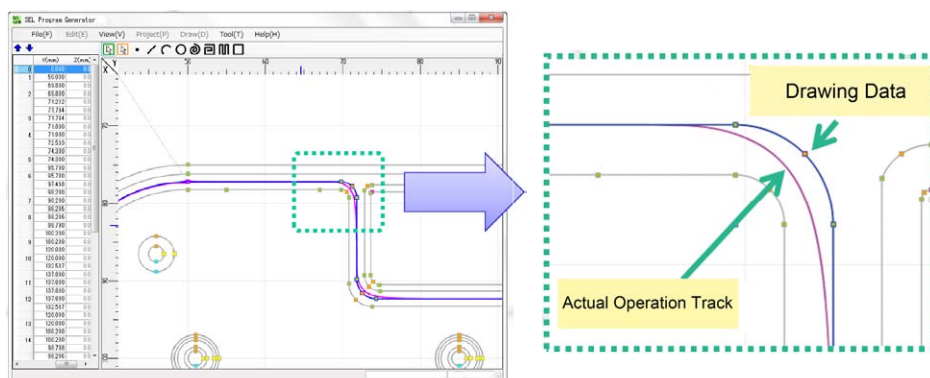
They are not applicable when using only the single axis (including gripper, rotary, etc.), wrist unit (including cartesian robot combined) or SCARA Robot (IXP).

Chapter 7 Appendix

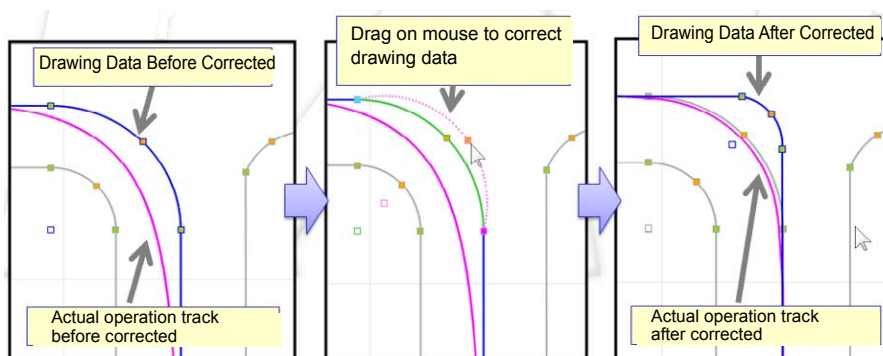
7.1 Correction of Track

The feedback pulse of X and Y-axes collected by the PC software can be displayed on the drawing window as the actual operation track.

- 1) Reading of Wave Forms
Start up the servomotor feature in the PC software.
Check on the feedback pulse of X and Y-axes and execute the SEL program generated and transferred to the controller in Chapter 6. (1 cycle)
Save the collected data to PC.
- 2) Start SEL Program Generator up and read in the servo monitor data (csv files) collected in (1). Execute "File (F)" – "Track Data" – "Read in" from the menu.
- 3) By putting the drawing data and the actual operation track together in the display, amount of misalignment can be checked on the screen.



- 4) Correct the drawing data while checking the misalignment, and generate the program again.



Change History

Revision Date	Revision Description
2016.01	First Edition
2016.07	Second Edition <ul style="list-style-type: none"> • Caution points added for when transferring program • Supplement note added for program execution start position • Explanation added for coordinates in drawing window and actual coordinates
2017.09	Third Edition <ul style="list-style-type: none"> • “MSEL” added in applicable controllers • Simulation feature added



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