MotoSim EG-VRC Ver5.20 OPTIONS INSTRUCTIONS

FOR CAM FUNCTION (FOR ARC WELDING, GENERAL PURPOSE, LASER WELDING, AND LASER CUTTING)

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

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MANDATORY

- **This manual explains teaching, playback, editing operations of jobs and files, operation management of MotoSim EG-VRC. Read this manual carefully and be sure to understand its contents before operation.**
- **General items related to safety are listed in instruction manuals supplied with the manipulator. To ensure correct and safe operation, carefully read the instructions on safety before reading this manual.**

CAUTION

- **Some drawings in this manual are shown with the protective covers or shields removed for clarity. Be sure all covers and shields are replaced before operating this product.**
- **The drawings and photos in this manual are representative examples and differences may exist between them and the delivered product.**
- **YASKAWA may modify this model without notice when necessary due to product improvements, modifications, or changes in specifications. If such modification is made, the manual number will also be revised.**
- **If your copy of the manual is damaged or lost, contact a YASKAWA representative to order a new copy. The representatives are listed on the back cover. Be sure to tell the representative the manual number listed on the front cover.**
- **YASKAWA is not responsible for incidents arising from unauthorized modification of its products. Unauthorized modification voids your product's warranty.**
- **Software described in this manual is supplied against licensee only, with permission to use or copy under the conditions stated in the license. No part of this manual may be copied or reproduced in any form without written consent of YASKAWA.**

NOTE

This instruction manual is applicable to both FS100 (a controller for small-sized manipulators) and FS100L (a controller for large and medium-sized manipulators).
The description of "FS100" refers to both "FS100" and "FS100L" in this manual unless otherwise specified.

Notes for Safe Operation

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

 WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury to personnel.
 CAUTION	Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury to personnel and damage to equipment. It may also be used to alert against unsafe practices.
 MANDATORY	Always be sure to follow explicitly the items listed under this heading.
 PROHIBITED	Must never be performed.

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

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

Notation for Menus and Buttons

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

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

Description of the Operation Procedure

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

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

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1 Introduction

Step by step instructions to generate a job by specifying the weld path from the CAD data of the work piece.This manual explains the operation method of a CAM function for Arc-welding use, General-purpose use, Laser-welding use, and Laser-cutting use. Please refer to a "OPTIONS INSTRUCTIONS FOR CAM FUNCTION (FOR PAINTING)".

NOTE

- This function is available MotoSim EG-VRC ver4.00 or later.
- To use this function (CadPack option), the MotoSim EG-VRC-CadPack is required. (The MotoSim EG-VRC-CadPack is separate product from MotoSim EG-VRC.)
- For Laser-welding use and Laser-cutting use, the additional options sold separately are needed.

1.1 CAM Function Considerations

- When using intermediate format such as IGES, STEP, etc. to import data, there may be cases where edges cannot be detected. Please use native 3D CAD format (CATIA V5, PRO / E, Inventor, SolidWorks, etc.) when possible. However, Importing 3D CAD format data (CATIA V5, PRO / E, Inventor SolidWorks, etc.) is needed extra-cost options.
- Compatible system configuration:

R1, R2, R3, R4	One robot
R1+S1, R1+S2, R1+S3 R2+S1, R2+S2, R2+S3 R3+S1, R3+S2, R3+S3 R4+S1, R4+S2, R4+S3	One robot plus one positioner
R1+B1 R2+B2 R3+B3 R4+B4	One robot plus travelling axis
R1+B1+S1, R1+B1+S2, R1+B1+S3 R2+B2+S1, R2+B2+S2, R2+B2+S3 R3+B3+S1, R3+B3+S2, R3+B3+S3 R4+B4+S1, R4+B4+S2, R4+B4+S3	One robot plus travelling axes and one positioner

NOTE

CAM function supports the travelling axes with 1, 2, or 3 axes. In the case of travelling axes with 2 axes or 3 axes, all target points of the travelling axes are created by current position.

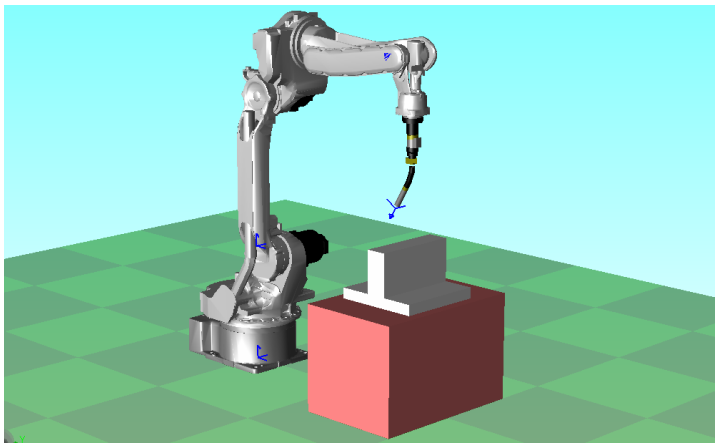
• Compatible positioner:

Supported Positioner Name	Number of axis
S250B-A00	1 (Rotation axis only)
S500B-A00	1 (Rotation axis only)
S500B-B00	1 (Rotation axis only)
D250B-A00	2 (Tilt axis + rotation axis)
D250B-B00	2 (Tilt axis + rotation axis)
D500B-A00	2 (Tilt axis + rotation axis)

2 Tutorial

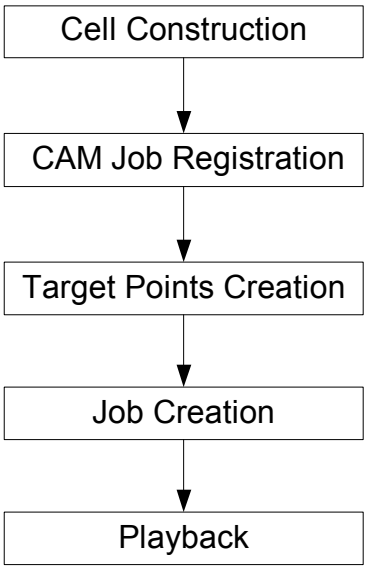
2.1 Introduction

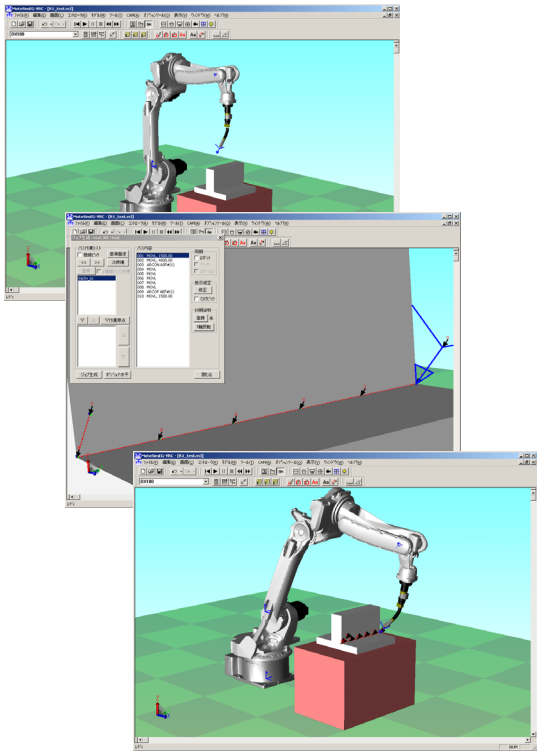
This chapter will explain the steps from the construction of the cell to the creation of a job. Here, it takes Arc-welding use as an example.
More specifically, the creation of a cell from a template, the selection of edges from the CAD data and the creation of a job. The figure below gives an overview of the cell.



In section 2.2 to 2.6,only R1 is used in the description. Please refer respectively to section 2.7 and section 2.8 for the system configuration of type R1 + B1 and R1 + S1.

Below is a flow chart of the job creation.



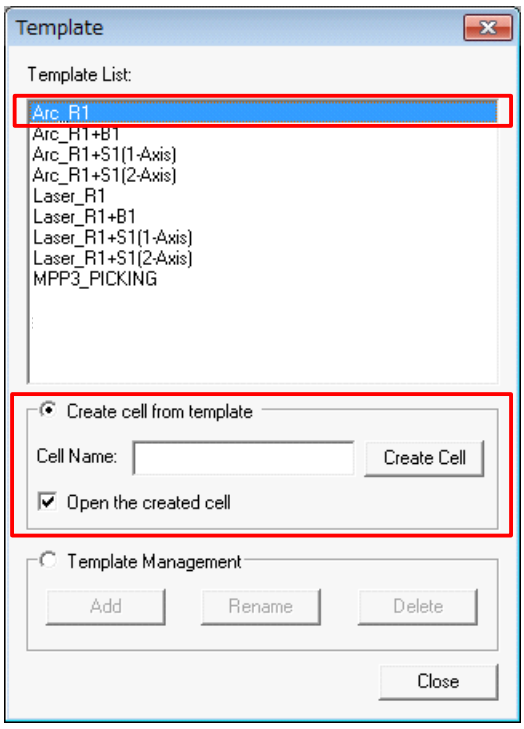


2.2 Cell Construction

Create a new cell from a template.

Procedure

1. Click the MotoSim EG-VRC button ( ), and select the [New] - [Template] menu.
2. Select "Arc_R1" from the "Template List".
3. Select the "Create cell from template" group and enter a name for the new cell.
4. Press the [Create Cell] button. The new cell will be created. If the "Open the created cell" checkbox is checked when the button is pressed, the newly created cell automatically opens.

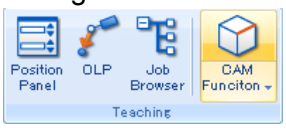


2.3 CAM Job Registration

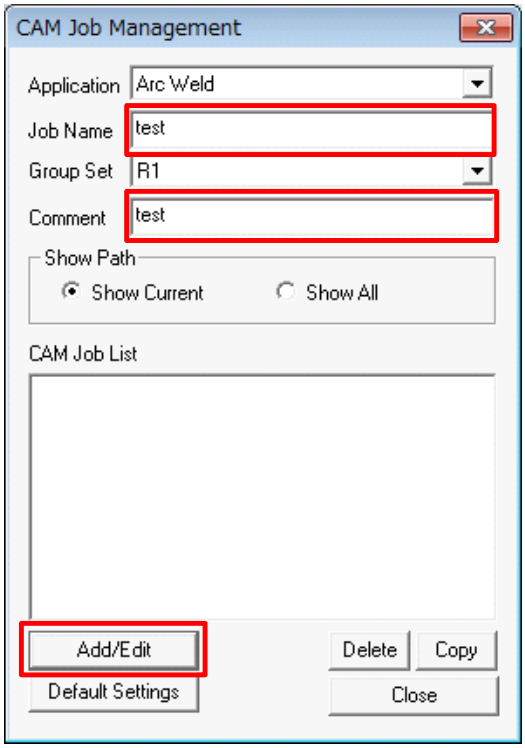
In MotoSim EG-VRC, the data (path, target points, weld settings…) registered to generate a job through the CAM function is called "CAM Job". So the registration of "CAM Job" is required to create the job that will actually run on the robot.

Procedure

1. On the [Home] tab, in the [Teaching] group, click the [CAM Function] button to display the "CAM Job Management" dialog.



2. Enter the "Job Name" and "Comment".
   The maximum number of characters for each is 32 characters. The "JobName" field is required, but the comment is an optional item. Job name must be in the proper syntax. And, please do not change the"Application".
3. Press the [Add/Edit] button to display the "Create Job" dialog.

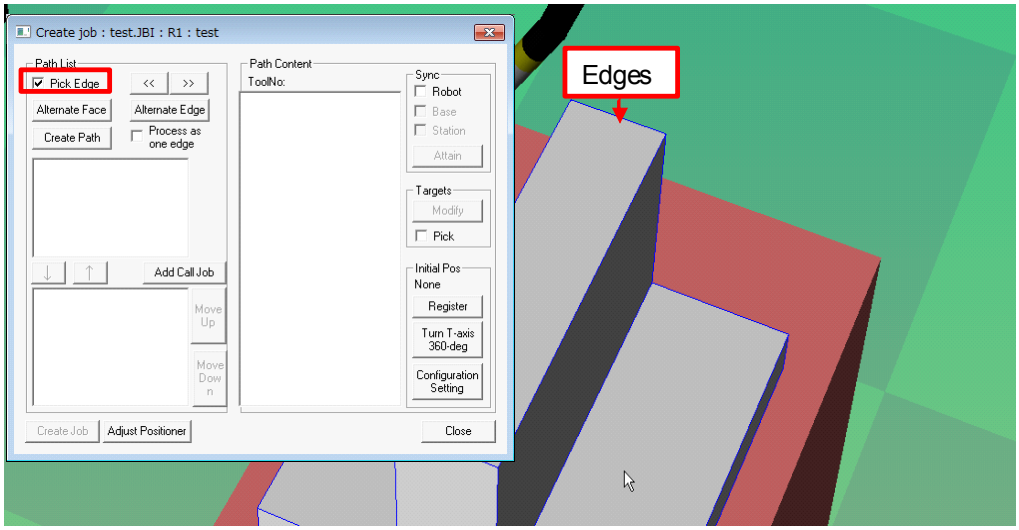


2.4 Target Points Creation

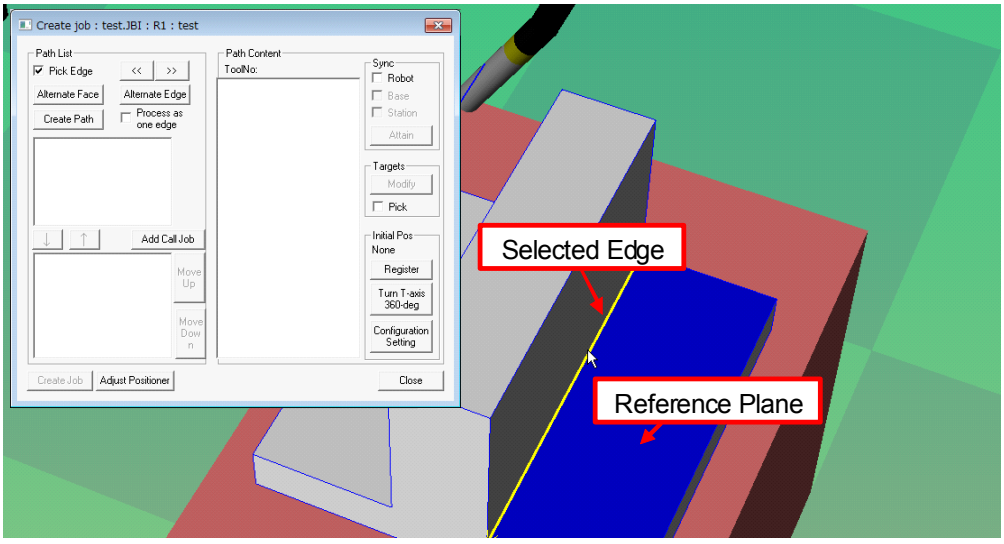
Create target points in the "Job Creation" dialog.

Procedure

1. To select the weldpath(processed line), check the "Pick Edge"box and then move the mouse cursor over the CAD model of the work piece. The selectable edges will be displayed in blue.

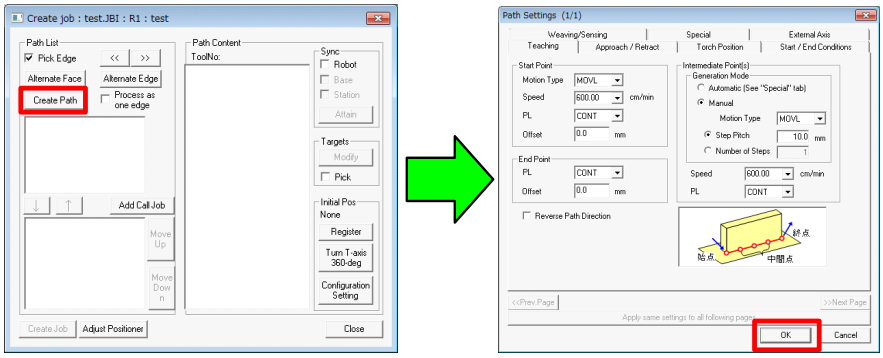


By moving the mouse on one of the blue lines, that line will become yellow. Click on the yellow line to select it. The reference plane surface displays in blueand is used as a reference to specify the angles of the torch(tool).

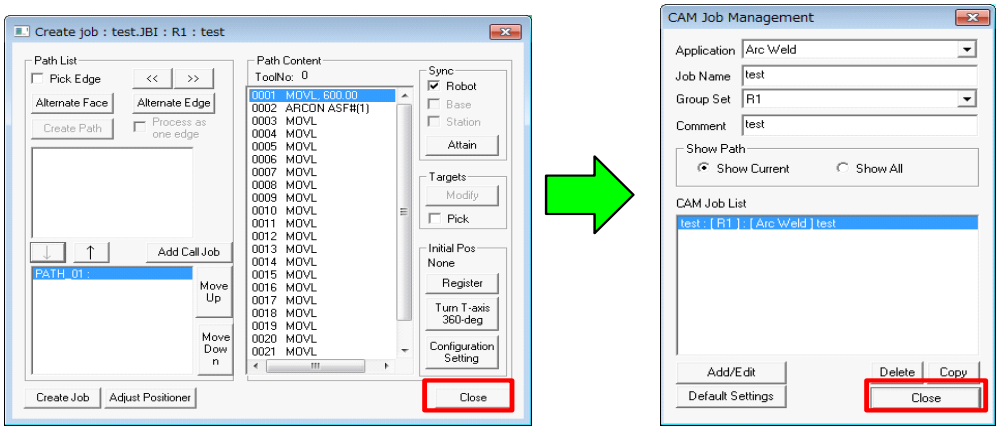


2. Once the desired edge is selected, press the [Create Path] button in the "Create Job" dialog. The "Path Settings" dialog will display. The initial values are pre-configured in the template cell; press the [OK] button to accept this configuration as it is and return to

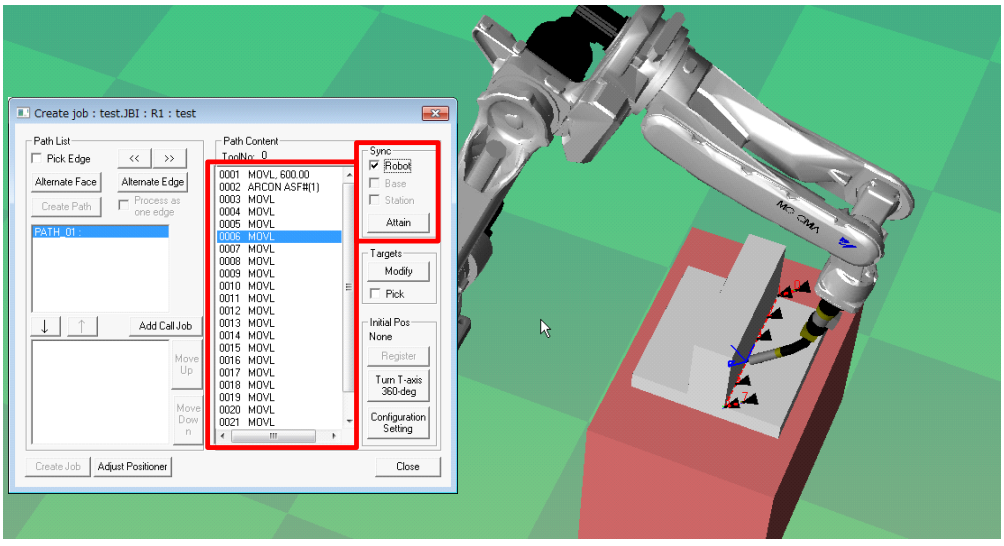
the "Create Job" dialog.



3. Select "PATH_01" from the "Path List". The content on the "PATH_01" will appear in the "Path Content" list.



4. Check the "Robot" box in the "Sync" section and then click on thelines in the "Path Content" list to move the robot in the MotoSimEG-VRC window to the corresponding position. Select the first line of the list and click the [Register] button in the "Initial Pos" section to register the robot starting position.Make sure to move the robot through all the move instructionsby clicking on them in the "Path Content" list or by using the key-board up/down arrows and verify robot position of each step.

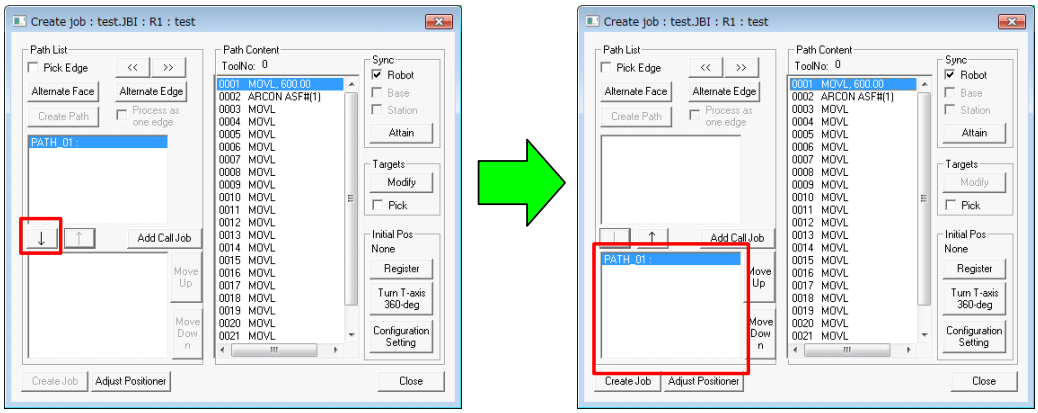


2.5 Job Creation

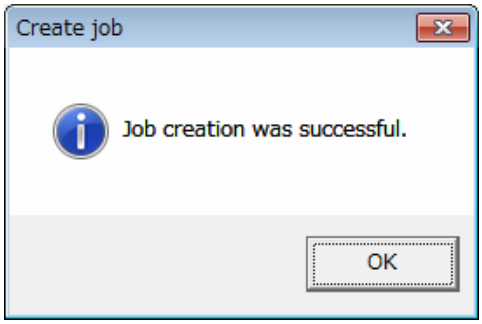
Create a job from the target points.

Procedure

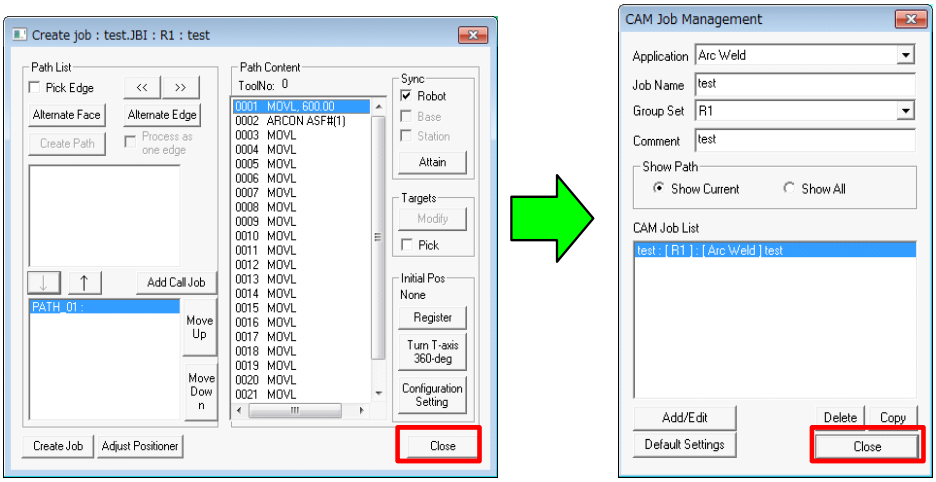
1. Select the "PATH_01" in the path list and then press the [↓] button to move the "PATH_01" to the "Job Path Sequence" list.



2. Press the [Create Job] button. The dialog below will display to indicate that the job creation was successful and the job was loaded into the virtual pendant.



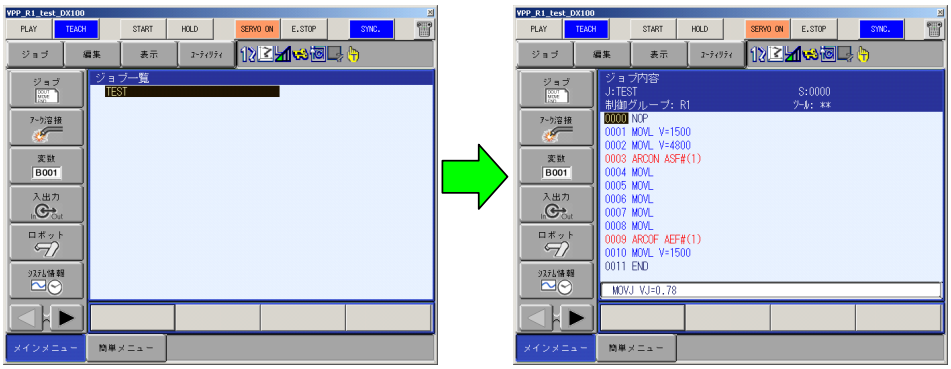
3. Press the [Close] button to close the "Create Job" dialog. The "CAM Job Management" dialog will display, press the [Close] button, to close it. The job creation is complete.



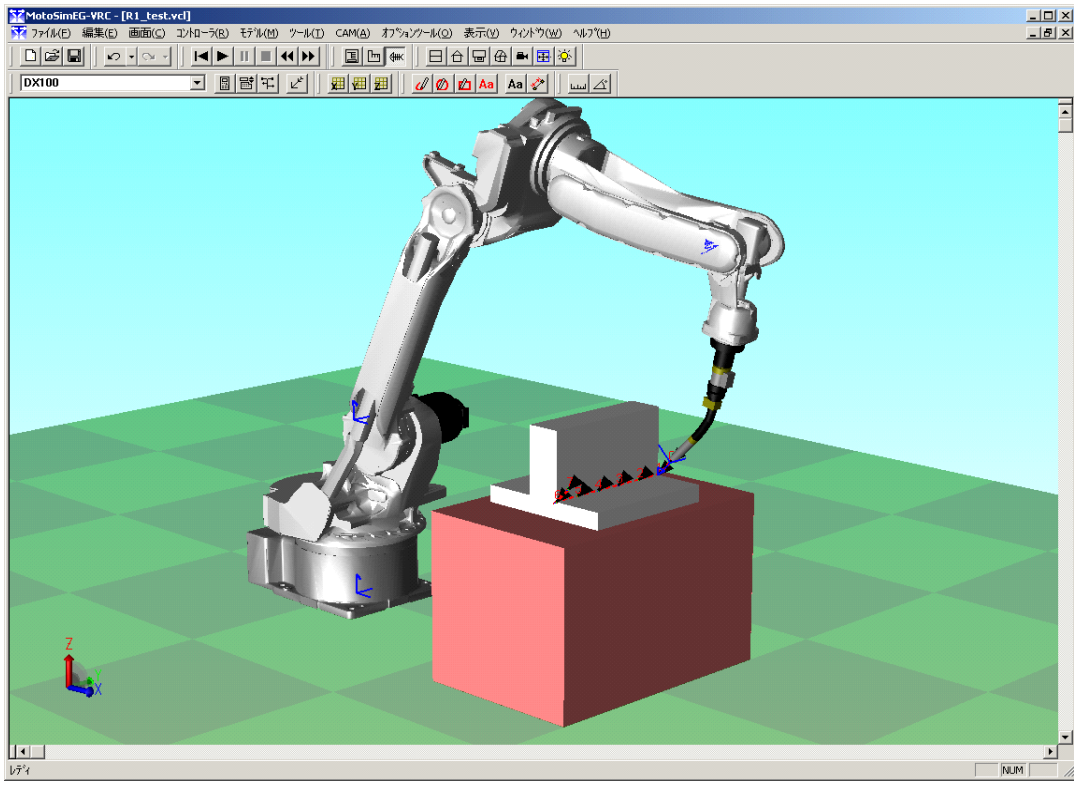
2.6 Playback

Procedure

1. Select the job in the virtual pendant. The job name is the same as the one entered in step 2 of section 2.3 "CAM Job Registration".

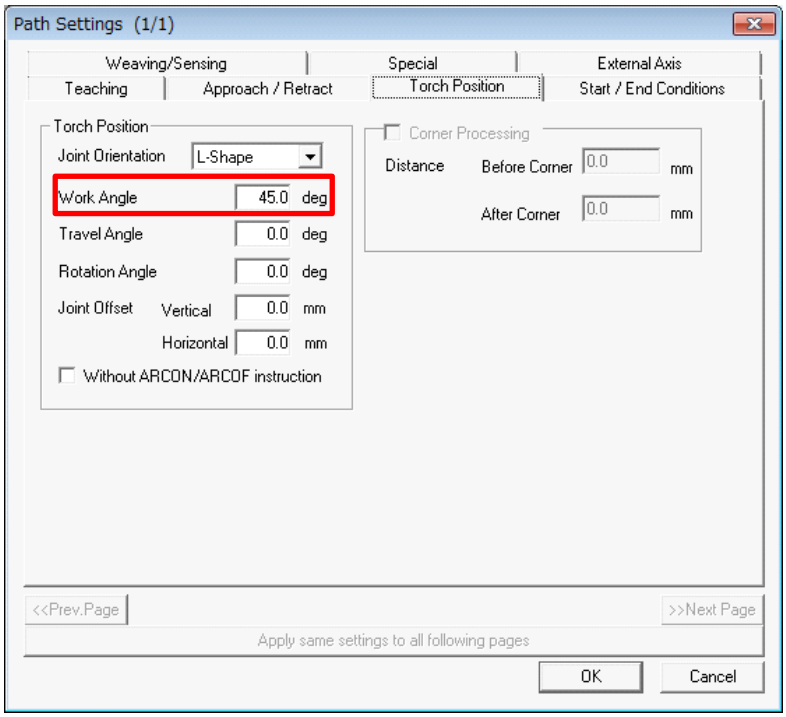


2. In MotoSimEG-VRC window, press the play button on the toolbar and the job will

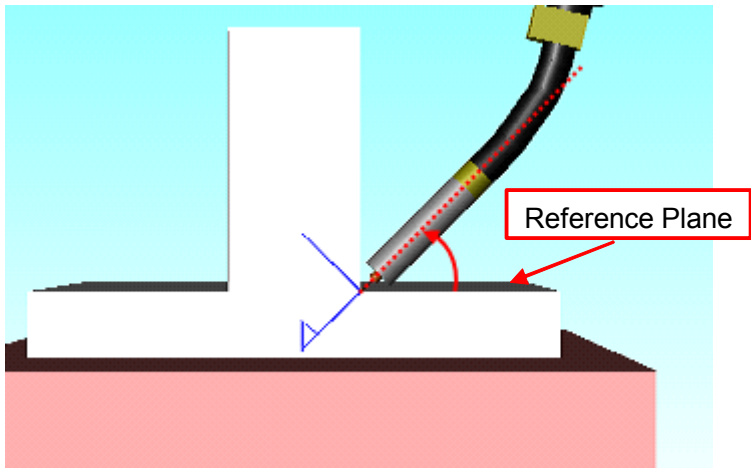


■ Torch angle settings

To change the torch angle, in step 3 of section " 2.4 Target Points Creation ", open the "Torch Position" tab, set the value enclosed with the red frame of the following figure.

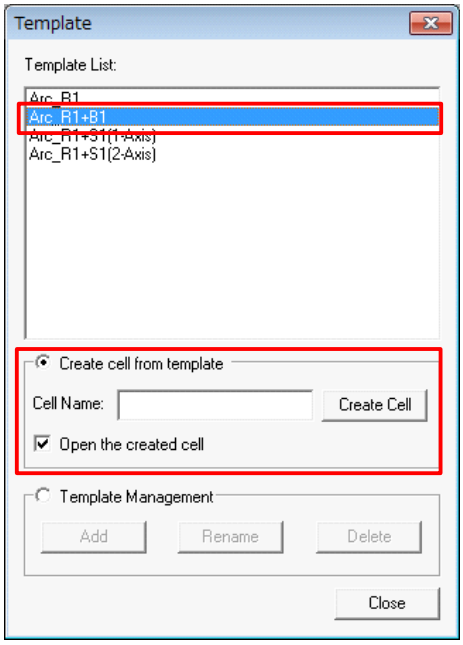


Sets the angle of the torch from the 0 deg. reference plane (as defined by the Joint Shape).

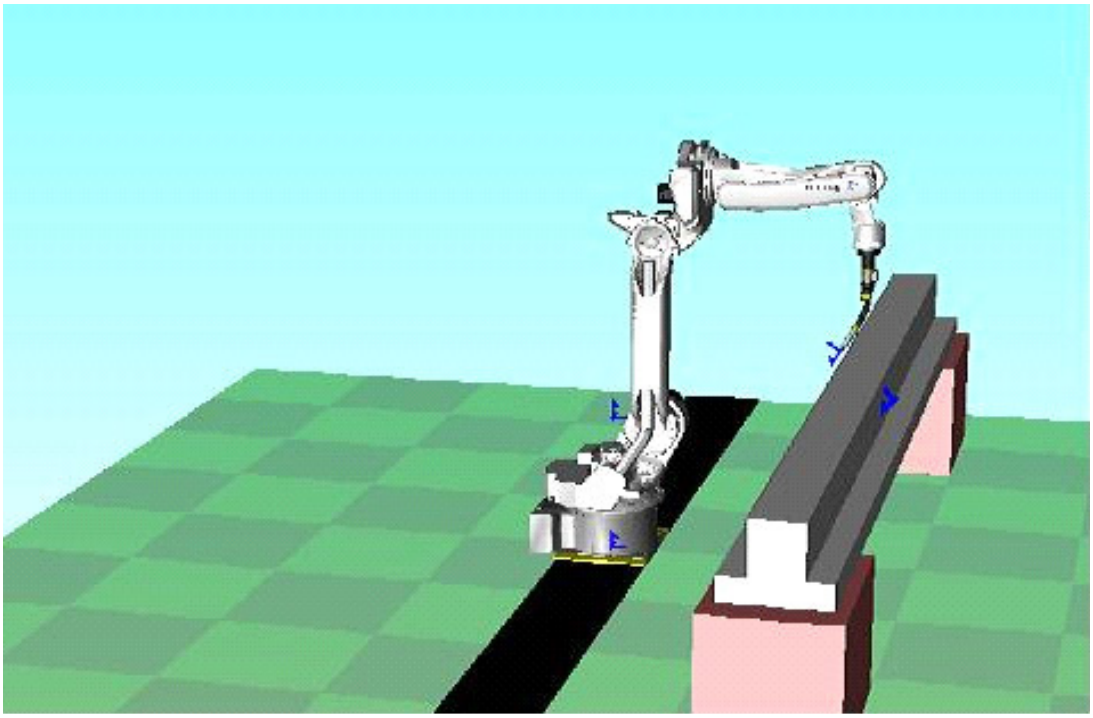


2.7 Robot with One Travelling Axis (R1 + B1)

For system with a robot and one travelling axis, the same function can be used. In step 2 of section " 2.2 Cell Construction ", select "Arc_R1 + B1" from the "Template List". For the other steps, follow the same operation as for a "R1" system.



The cell will look like the following.

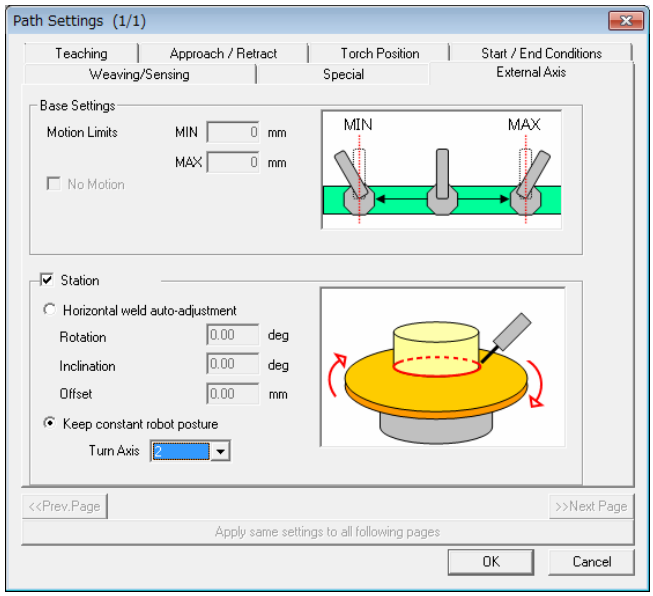


2.8 Robot with a Positioner (R1 + S1)

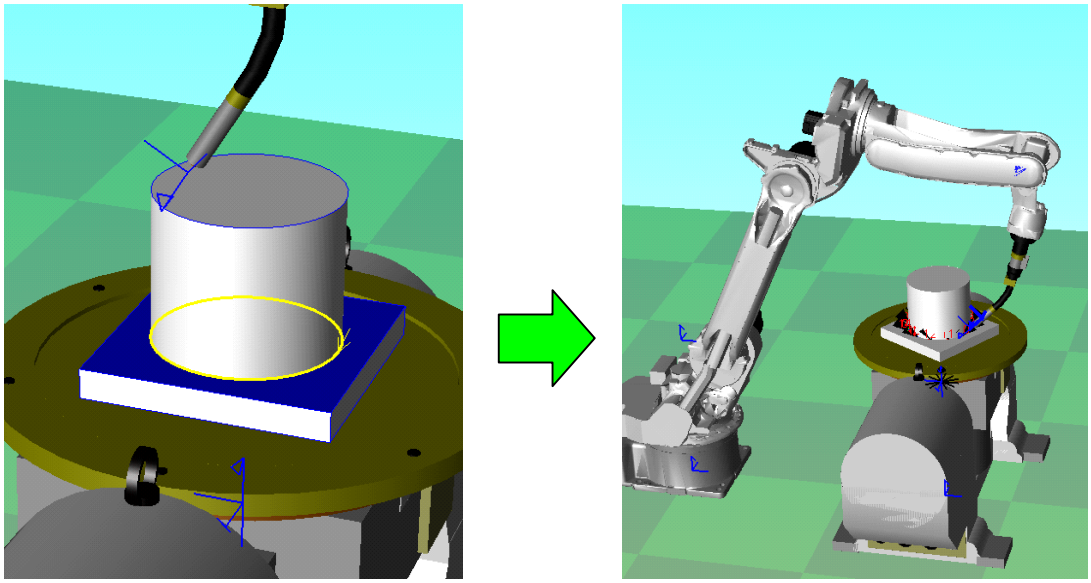
For system with a robot and positioner, the same function can be used. In step 2 of section " 2.2 Cell Construction ", select "Arc_R1+S1(2-Axis)" from the "Template List". For the other steps, follow the same operation as for a "R1" system.

■ Constant Attitude Teaching Function

This template enables the constant attitude teaching function.



In a cell created from this template, if you select an edge line as shown in the figure below, the robot will move to a fixed position and the processing is done by moving only the positioner.



For more detail about the constant attitude teaching function, please refer to section " 10 Create Job Dialog Advance Operation ".

3 Job Creation Flow

The flow outlining the job creation process is presented below. Please refer to the relevant sections for more information.

Preparation (Chapter 5)

Load robot settings

↓

CAM default settings

↓

Start point detection settings (only arc-welding use)

Preparation (Chapter 6)

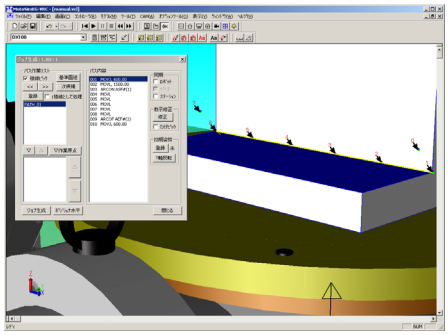
CAM job selection

↓

Edge line selection

↓

Path settings



Preparation (Chapter 7)

Initial position registration

↓

Path verification

↓

Target points adjustment

↓

Path Selection

↓

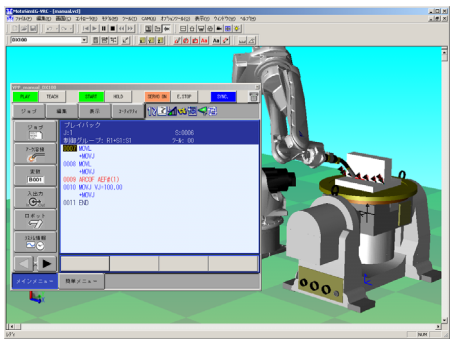
Job Creation

Preparation (Chapter 8)

Job Playback

↓

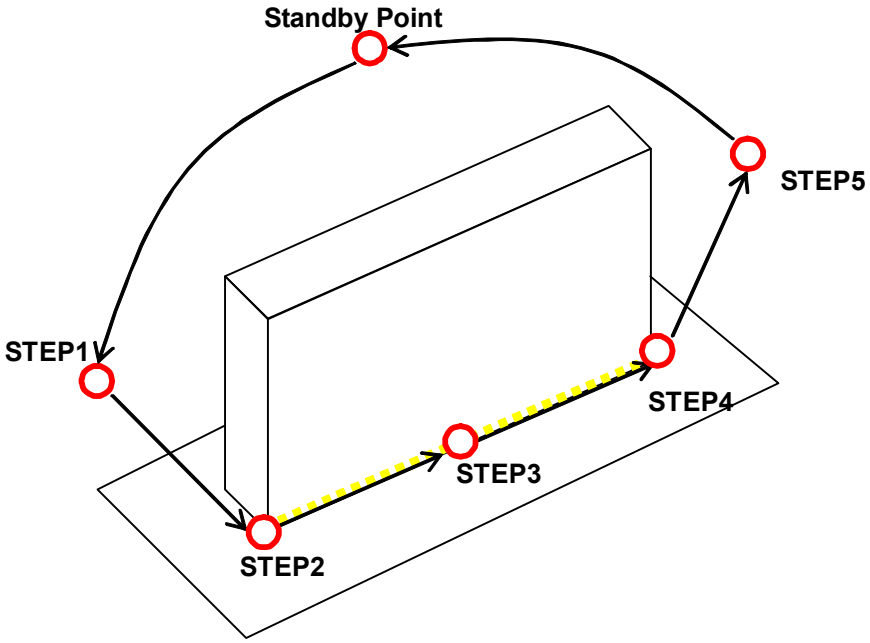
Trace function verification



4 Job Created by the CAM Function

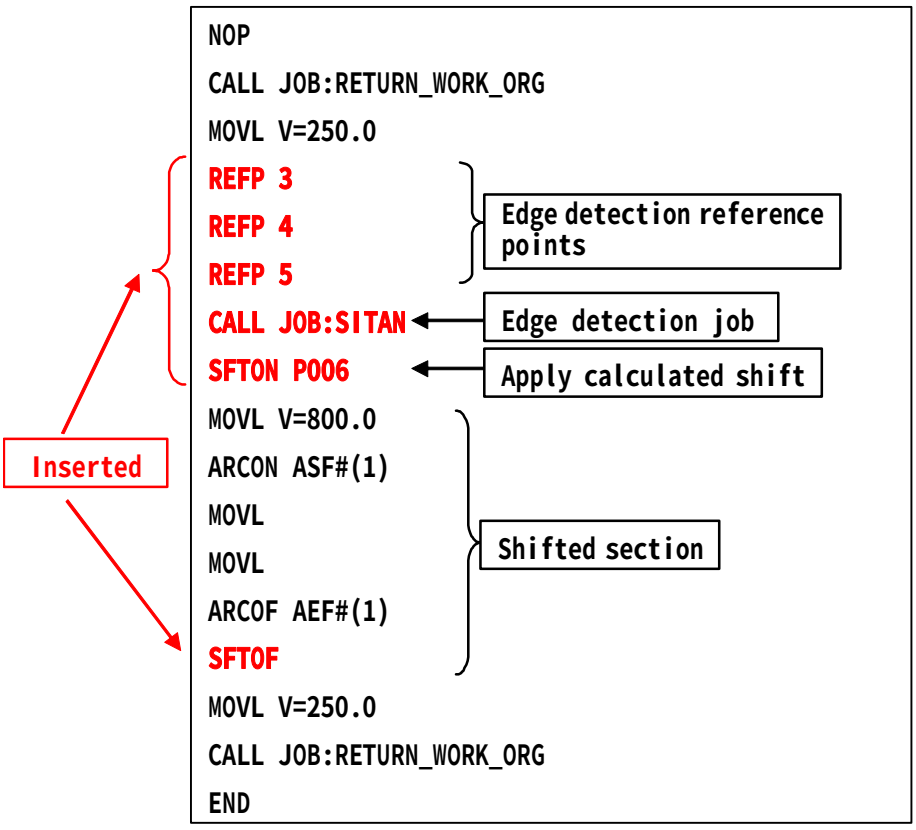
4.1 Arc Welding use

When creating the target points as shown in the figure below, the job is generated as follows. Move to a standby point by calling the work origin job (CALL JOB RETURN_WORK_ORG).

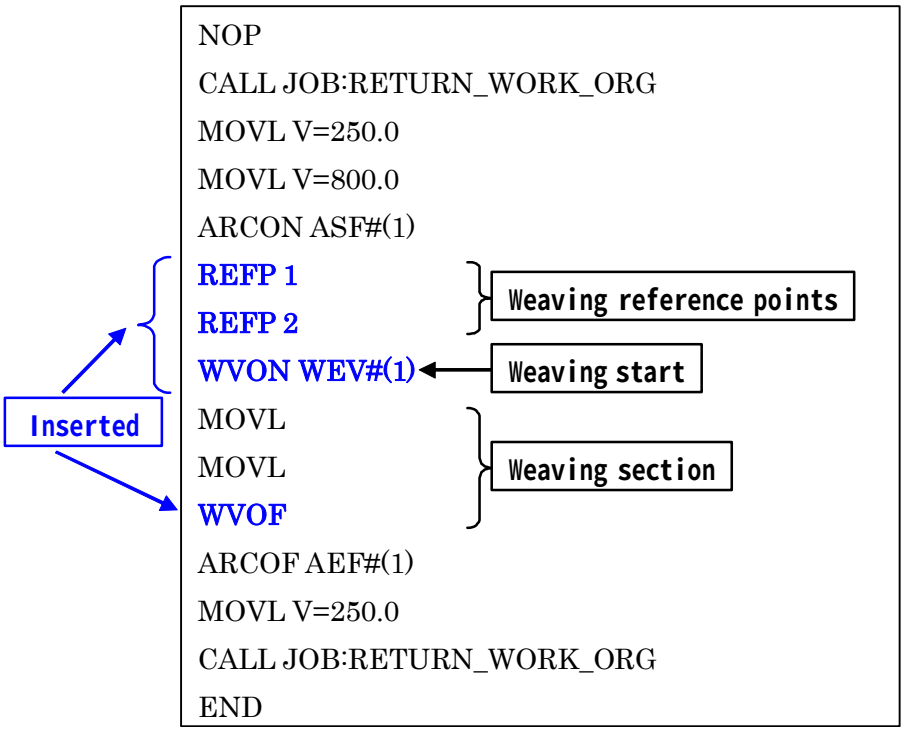



```
NOP
CALL JOB:RETURN_WORK_ORG   <- Standby Point (Call Job)
MOVL V=250.0               <- STEP1
MOVL V=800.0               <- STEP2
ARCON ASF#(1)              <- Start welding
MOVL                       <- STEP3
MOVL                       <- STEP4
ARCOF AEF#(1)              <- Stop welding
MOVL V=250.0               <- STEP5
CALL JOB:RETURN_WORK_ORG   <- Standby Point (Call Job)
END
```

If the starting edge detection function is enabled, the job will look as follows. For information on reference points setting, refer to section " 9.2 Arc Welding Use ". For starting edge detection settings, refer to section " 9.2 Arc Welding Use ".

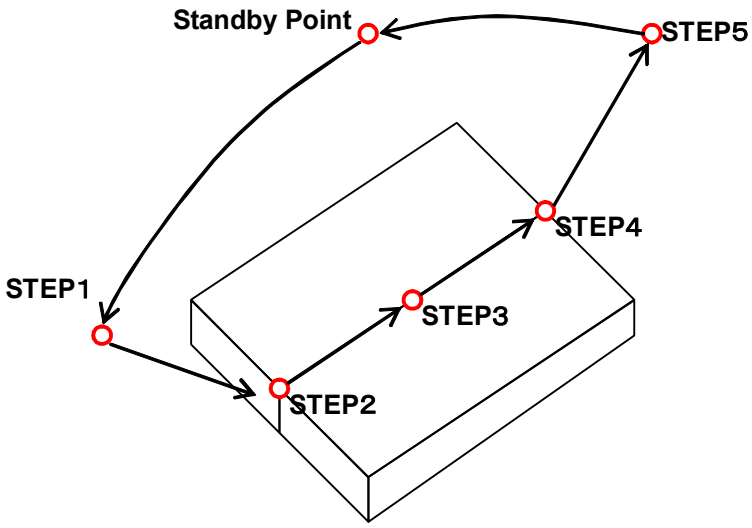


If the weaving function is enabled, the job will look as follows. For information about setting reference points for weaving, refer to the section " 9.2 Arc Welding Use ".



4.2 General purpose use

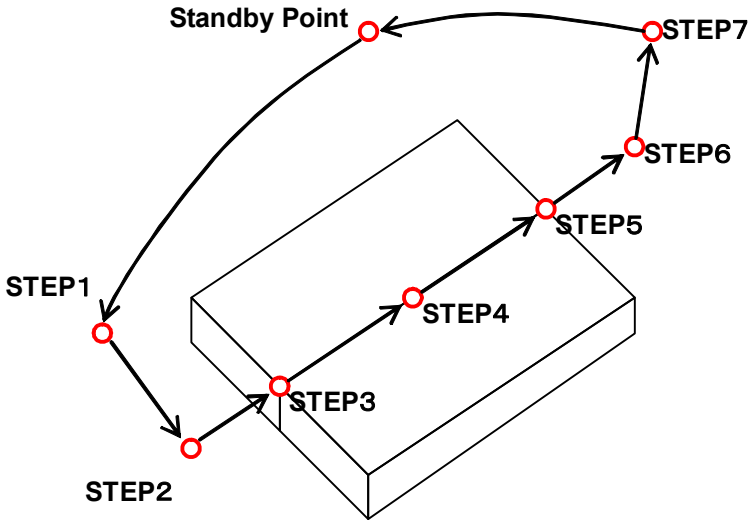
When creating the target points as shown in the figure below, the job is generated as follows. Move to a standby point by calling the work origin job (CALL JOB RETURN_WORK_ORG).




```
NOP
CALL JOB:RETURN_WORK_ORG   <- Standby Point (Call Job)
MOVJ VJ=25.00              <- STEP1
MOVL V=800.0               <- STEP2
MOVL V=250.0               <- STEP3
MOVL V=250.0               <- STEP4
MOVL V=800.0               <- STEP5
CALL JOB:RETURN_WORK_ORG   <- Standby Point (Call Job)
END
```

4.3 Laser welding use

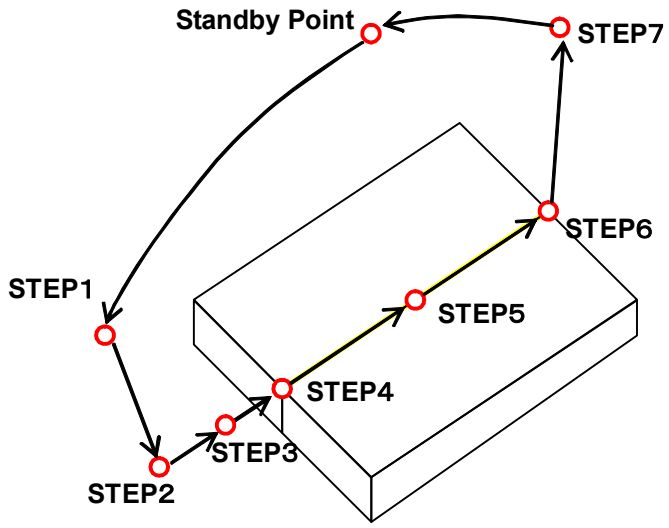
When creating the target points as shown in the figure below, the job is generated as follows.
Move to a standby point by calling the work origin job (CALL JOB RETURN_WORK_ORG).




```
NOP
CALL JOB:RETURN_WORK_ORG      <- Standby Point (Call Job)
MOVJ VJ=25.00                 <- STEP1
MOVL V=800.0                  <- STEP2 (Accelerating point)
MOVL V=400.0                  <- STEP3
MOVL V=400.0                  <- STEP4
MOVL V=400.0                  <- STEP5
MOVL V=400.0                  <- STEP6
MOVL V=800.0                  <- STEP7
CALL JOB:RETURN_WORK_ORG      <- Standby Point (Call Job)
END
```

4.4 Laser cutting use

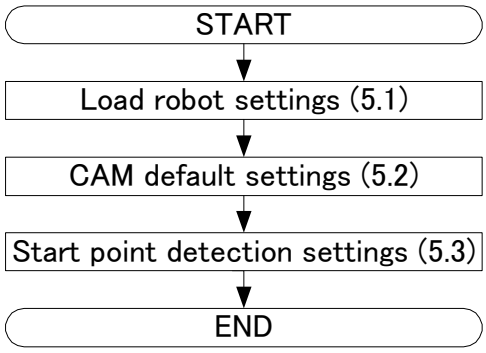
When creating the target points as shown in the figure below, the job is generated as follows.
Move to a standby point by calling the work origin job (CALL JOB RETURN_WORK_ORG).




```
NOP
CALL JOB:RETURN_WORK_ORG   <-- Standby Point (Call Job)
MOVJ VJ=25.00              <-- STEP1
MOVL V=800.0 PL=0          <-- STEP2  (Accelerating point)
DOUT OT#(1) ON             <-- Gas ON
TIMER T=0.50               <-- Timer to stabilize the gas
MOVL V=400.0               <-- STEP3 (Start shift point)
DOUT OT#(2) ON             <-- Laser ON
MOVL V=400.0               <-- STEP4
MOVL V=400.0               <-- STEP5
MOVL V=400.0               <-- STEP6
DOUT OT#(3) ON             <-- Laser OFF
DOUT OT#(4) ON             <-- Gas OFF
MOVL V=800.0               <-- STEP6
CALL JOB:RETURN_WORK_ORG   <-- Standby Point (Call Job)
END
```

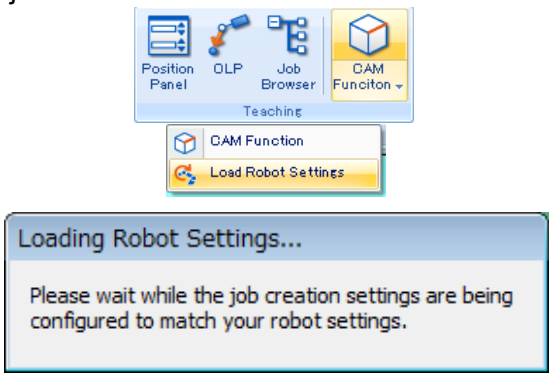
5 Preparation

The preparation steps are outlined below. Please refer to each corresponding section for details.



5.1 Load Robot Settings

Before using the CAM function for the first time, always on the [Home] tab, in the [Teaching] group, click the [CAM Function]-[Load Robot Settings] button.
When you select the [Load Robot Settings], the following message displays while the necessary information to create jobs is loaded.



The message will close once the process is completed.

NOTE

Please perform the [Load Robot Settings] whenever one of the following modifications is done.

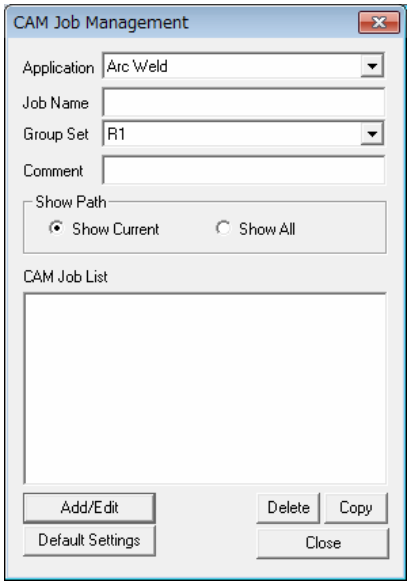
- Controller parameter modification
- Tool data modification

5.2 CAM Default Settings

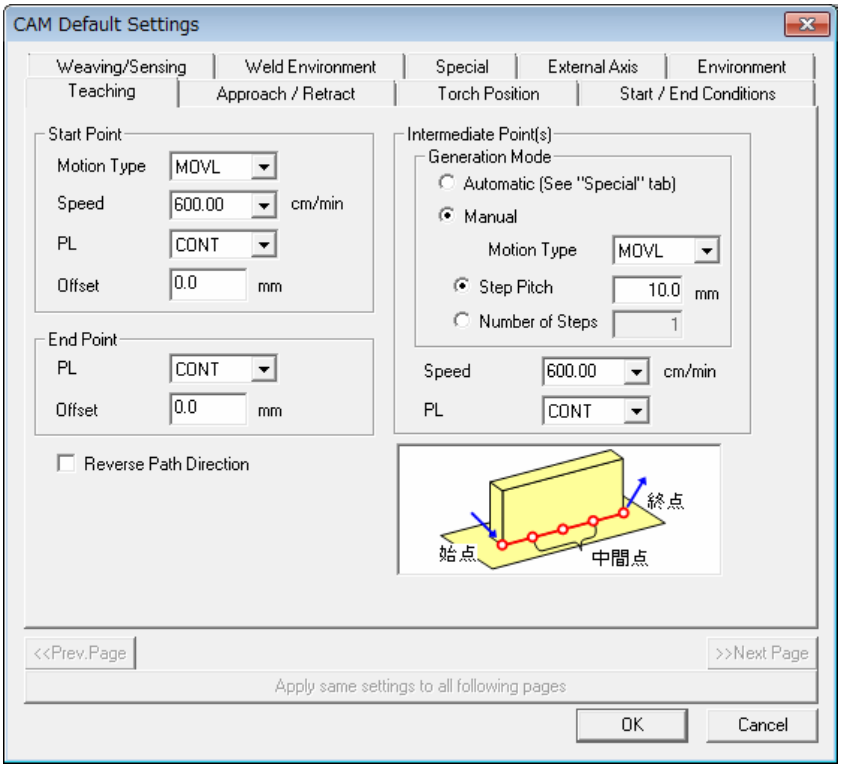
Setup the default settingsfor path generation of CAM Jobs. These settings will be used to set the initial values in section " 6.3 Path Settings ".Set the path default settings for the current cell when you start using the CAM function. This will prevent having to always modify the same values to your preference every time a new path is created.

Procedure

1. On the [Home] tab, in the [Teaching] group, click the [CAM Function] button to display the "CAM Job Management" dialog.



2. Press the [Default Settings] button to display the "CAMDefault Settings" dialog.



3. Set the preferred values for the path settings. These values will be used as the initial values when a new path is created. Existing path(s) will not be affected by these changes. For details about the various settings please refer to section " 9 CAM Default and Path Settings ".
4. Once the preferred settings have been set, press the [OK] button to return to the "CAM Job Management" dialog.

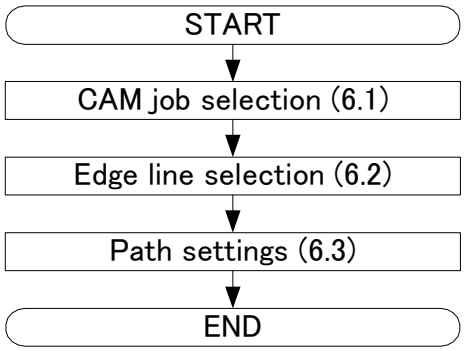
5.3 StartingPoint Detection Setting (only arc-welding use)

The starting point detection function is optional. To use this function, please refer to section 8.9 "Sensing Option Settings" of the MotoSim EG-VRC operation manual. For more information on the starting detection function, please refer to the "Instructions for basic operation of starting point detection function" manual for the appropriate controller.

This function is not available for the FS100 controller.

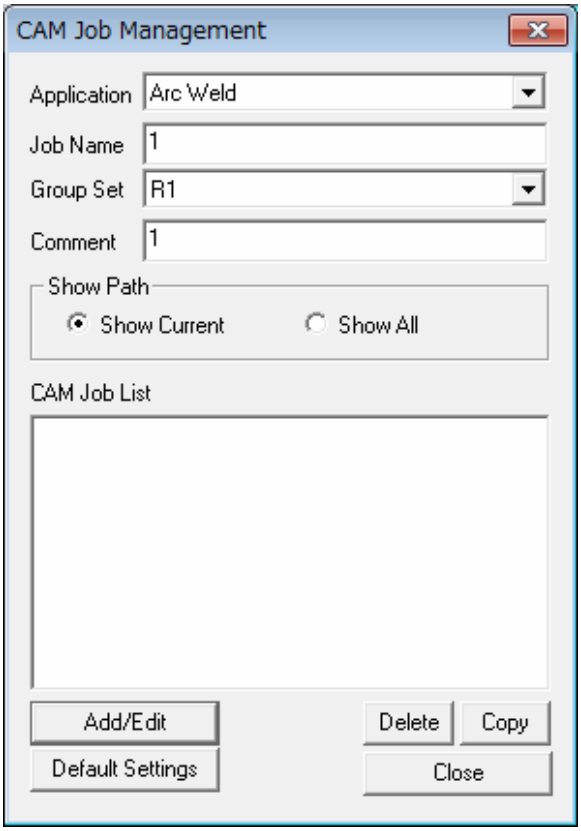
6 Path Creation

The path (target points) creation flow is outlined below. Please refer to each corresponding section for details.



6.1 CAM Job Management

Use the "CAM Job Management" dialog to create, edit, copy or delete CAM jobs.
Select [CAM] - [Create Job from CAM] to display the "CAM Job Management" dialog.



■ Add a new CAM job

1. In the "CAM Job Management" dialog, select the "Application" type from the drop down list and enter a "Job Name" and "Comment". Application is selected to suit the robot application.

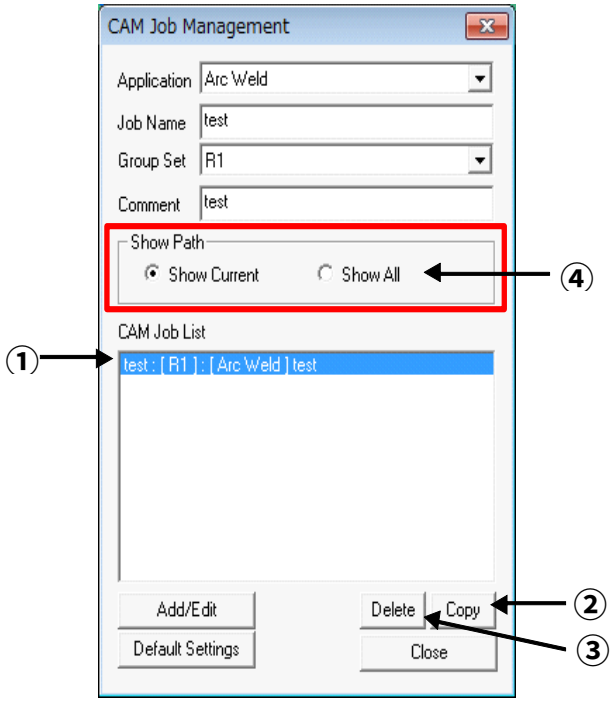
Application	Note
Arc Weld	
General Purpose	
Laser Welding	needed extra-cost options
Laser Cutting	needed extra-cost options

Job name field is required and must be in the proper syntax (alphanumeric characters and a limited set of symbols only, no space allowed). The comment is optional item and can include spaces. The allowable number of characters depends on the controller and is defined in the following table.

Controller	Job Name	Comment
DX200	32 characters	32 characters
DX100	32 characters	32 characters
FS100	32 characters	32 characters
NX100	8 characters	32 characters

2. Press the [Add/Edit] button to add the new CAM job to the list and display the "Create Job" dialog (refer to section 6.2 and following sections for details).

■ Edit an existing CAM job



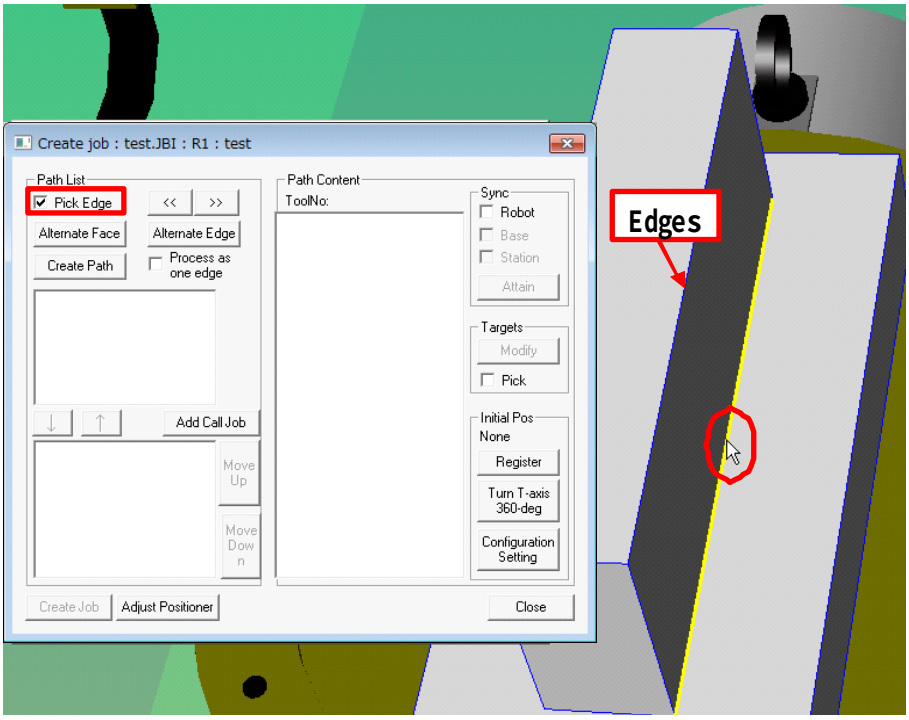
1. Double click anexisting CAM job from the list or select itand press the [Add/Edit] button to display the "Create Job" dialogfor that item (refer to section 6.2 and following sections for details).
2. Select an existing CAM job from the list and press the [Copy] button to copy it.
3. Select an existing CAM job from the list and press the [Delete] button to delete it.
4. Select "Show Current" button, the path of current CAM job is displayed only. Select "Show All" button, the paths of all CAM job are displayed.

6.2 Edge Line Selection

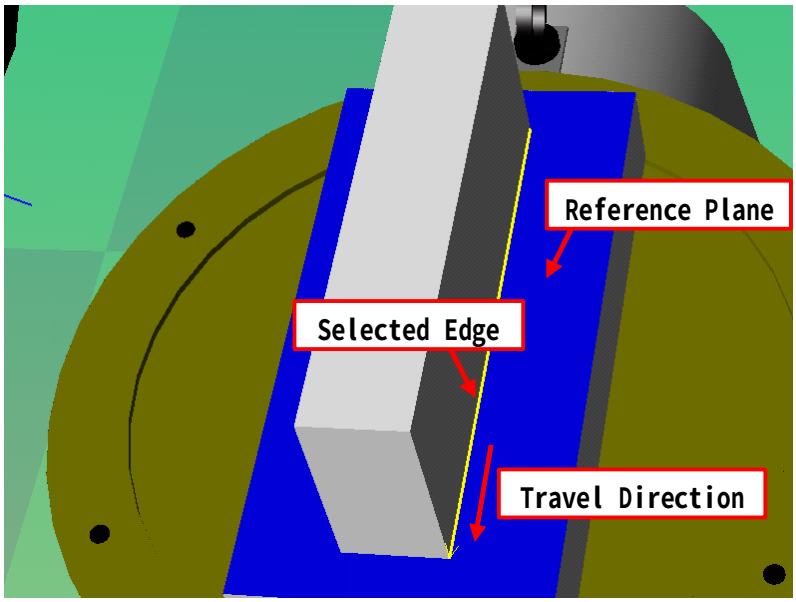
In the "Job Create" dialog select the "Pick Edge" tool and then choose the edges of a model to be processed.

Procedure

1. Check the "Pick Edge" box and then move the mouse cursor over the CAD model of the work piece. The selectable edges will be displayed in blue. By moving the mouse on one of the blue lines, that line will become yellow. Click on the yellow line to select it.



2. The selected edge becomes a yellow arrow. The processing will follow the same direction as the arrow from the start to the end of the arrow. Furthermore, one of the surfaces in contact with the edge that will be used as the reference plane is displayed in blue. This reference surface can be changed by pressing the [Alternate Face] button.Note that in some cases, the blue reference plane may be hidden from sight by other surfaces.By using the [<<] and [>>] buttons, the selected edge can be extended to adjacent edges. If multiple edges are possible, the [Alternate Edge] button can be used to iterate through the possible options.



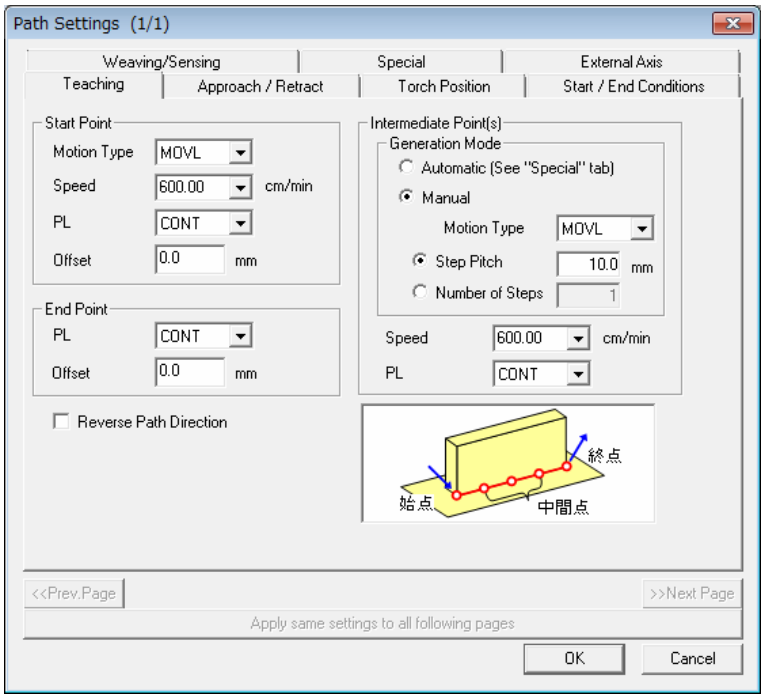
3. For systems with a robot and a positioner, the positioner's posture at the time the [Create Path] button is pressed will be used in the job. The positioner horizontal function can be enabled to automatically move the positioner to maintain the weld line horizontal to the ground. For details about the positioner horizontal function, please refer to section " 10.4 Positioner Adjustment ".
4. When the [<<] and [>>] buttonsare used to extend the path to adjacent edges, if the "Process as One Edge" box is checked, only one page will be created for the Path Settings (only arc-welding use and general purpose use). If left unchecked, a page will be created for each edge selected.
5. Press the [Create Path] button.

6.3 Path Settings

The path settings define how the weld path will be generated in relation with the selected edge. The "Path Setting" dialog is displayed automatically after clicking [Create Path] in the "Create Job" dialog or by double clicking an existing path in the path list.

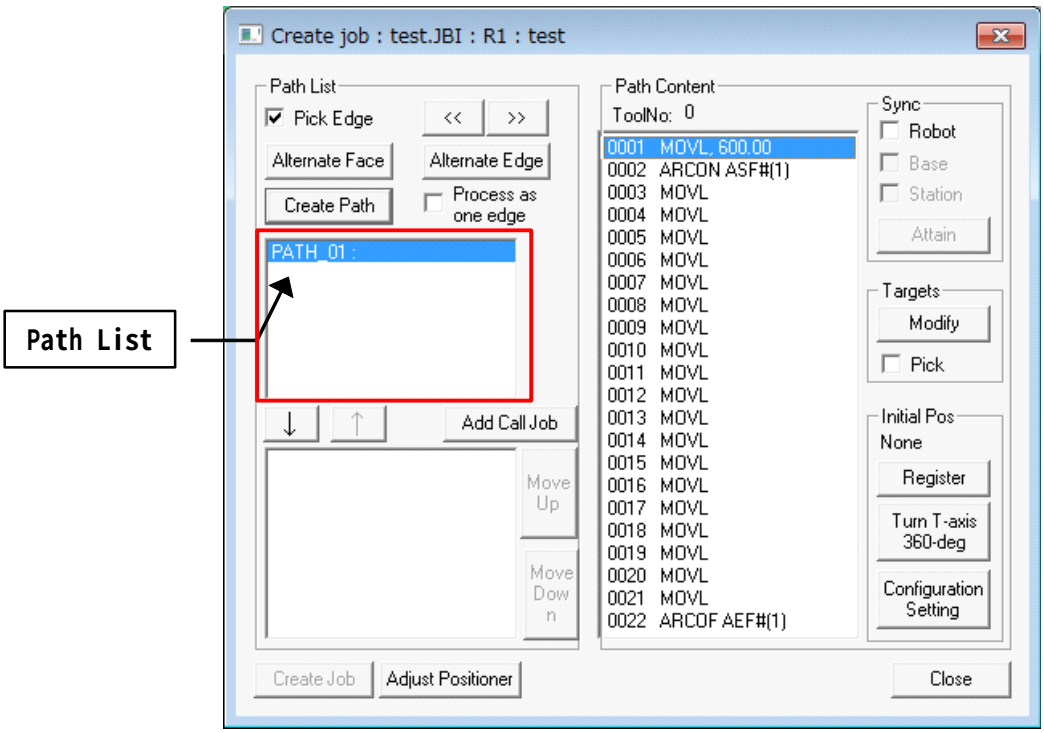
Procedure

1. When the "Path Settings" dialog is displayed for a new path, its values will be set to the CAM default settings previously defined in section 5.2 "CAM Default Settings". For the detail of each setting, please refer to section " 9 CAM Default and Path Settings ".



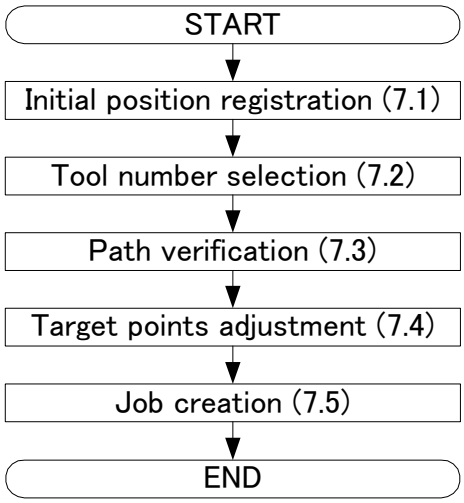
2. If more than one edge is selected and the "Process as One Edge" checkbox was not checked on the "Path Settings" dialog, the settings can be defined for each edge by using the [<<Prev.Page] and [Next Page >>] buttons to navigate through the pages corresponding to each edge. Setting modifications made for one edge can be copied to all the other pages by clicking the [Apply same settings to all pages] button.

3. After completing the settings, press the [OK] button to apply the settings and return to the "Path Settings" dialog. The path will be created in the path list. For example in the following figure "PATH_01" was created.



7 Job Creation

The job creation flow is outlined below. Please refer to each corresponding section for details.



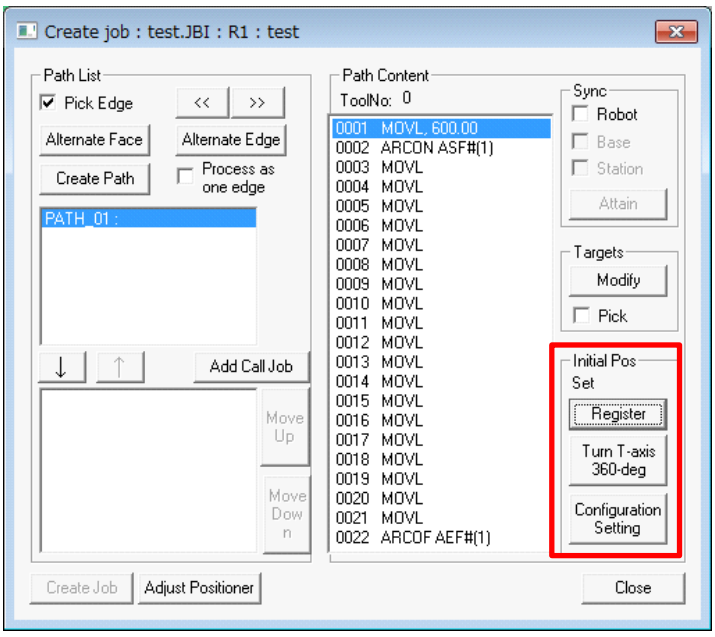
7.1 Initial Position Registration

The initial position registration is required as a reference to select the posture of the first step of the job. The solution with the posture closest to the initial position will be used for the first step. For the following steps, the solution closest to the previous step is used. For the initial position select a suitable posture that takes into consideration each robot axis pulse limits, the cables not getting caught up, etc.

Procedure

1. In MotoSimEG-VRC, move the robot to a position with the desired posture.

2. In the "Create Job" dialog, in the "Initial Pos" section, click the [Register] button. The display will be changed from "None" to "Set".



By pressing the [Turn T-axis 360-deg] button, the T-axis position of the currently recorded initial position can be turned by 360-deg. This is useful in the procedure from section " 7.3 Path Verification " to fix cases where the T-axis reaches its motion limit and the motion cannot be completed properly.
By pressing the [Configuration Setting] button, the configuration list is displayed. To change the robot configuration, select the configuration of the list.

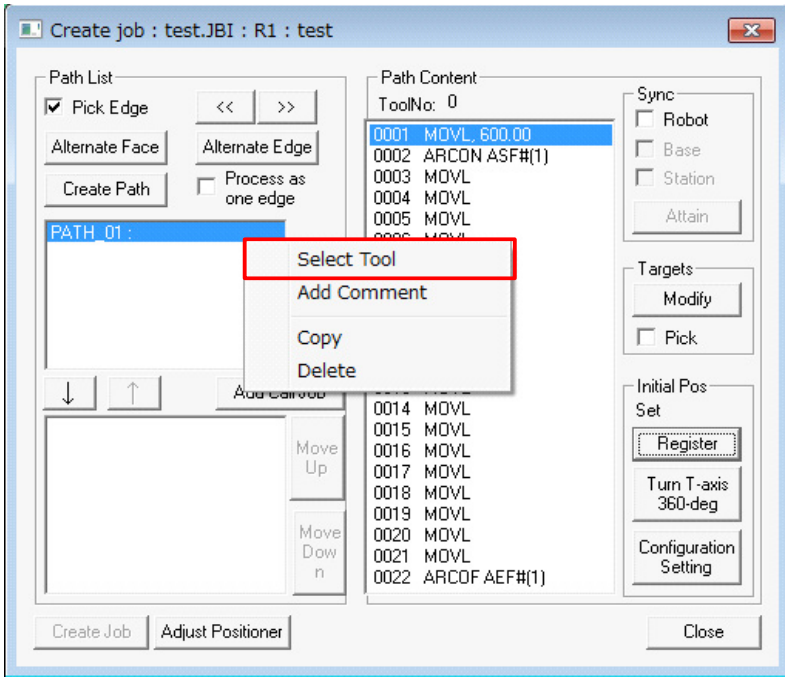
7.2 Tool Number Selection

The default tool number is tool 0. If another tool number is used, use the following procedure to set the desired tool number.

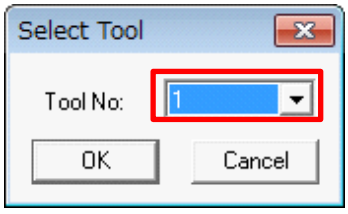
NOTE Multiple Tools parameter must be set to be able to use this function

Procedure

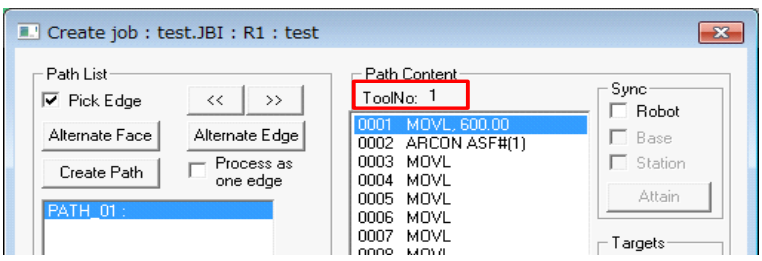
1. Select a path from the Path List and right click on it to display the pop-up menu for that path. From the menu select [Select Tool].



2. In the "Select Tool" dialog, select the desired tool number from the list and press the [OK] button.



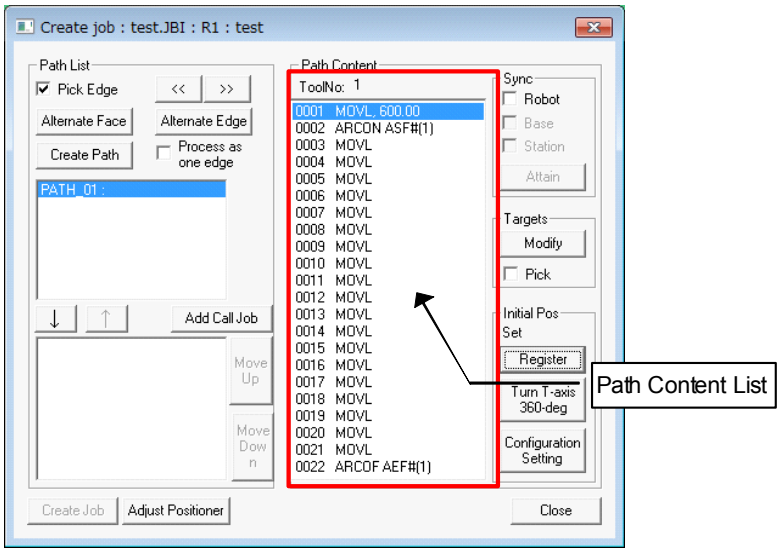
3. Verify that the selected tool number was changed.



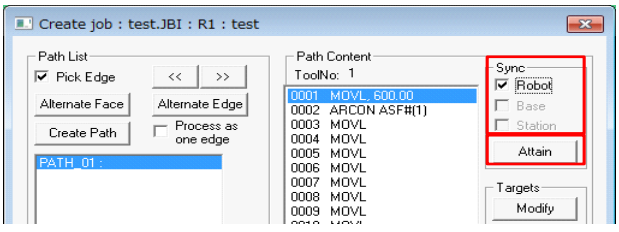
7.3 Path Verification

Procedure

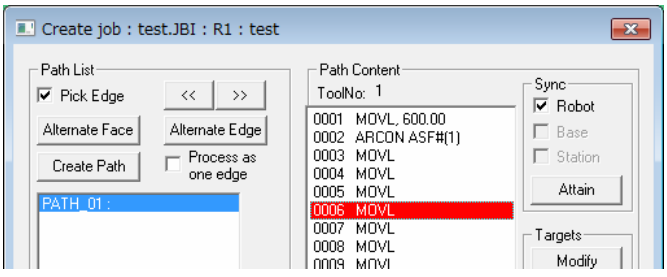
1. Select a path from the "Path List"to display its contents in the "Path Content" box to the right.



2. In the "Sync" section, put a check next to each device (robot, base, station) that is to be synchronized with the path content.If the system consists of a Robot and Station or Robot and Base, the checkbox for the Station or Base will automatically be checked when the Robot box is checked.Put a check next to each device and click the "Attain" button, all steps in the "Path Content" list are checked if the target point can reached or not. (Progress bar is displayed between checking.)



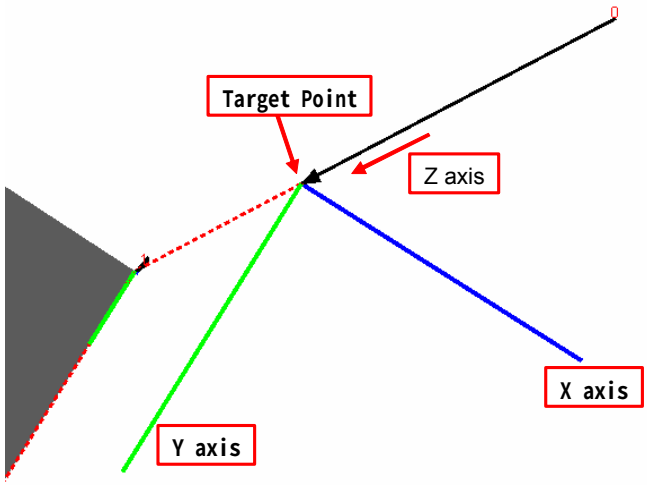
3. When all steps can be reached, the cursor reaches at the final step in the "Path Content" list. If the step cannot be reached, that step in the "Path Content" list is displayed red. (when the Robot box in the "Sync" section is checked.)
Click the steps in the "Path Content" list to move the device to that step's corresponding target point.



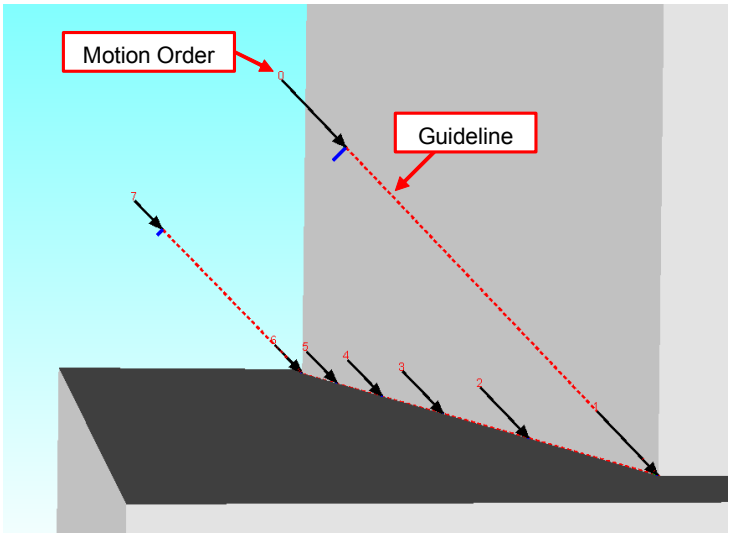
4. If the device doesn't move to the selected target point, this means that the target point cannot be reached. Adjust the position of the work piece, the positioner, robot posture, target point, etc. Selection of different surface for the edgemay be required see selecting an "Alternate Face" in Section 6.2.

■ Display in MotoSimEG-VRC

In MotoSimEG-VRC, the tool orientation (Z-axis) for each target points is displayed by a black arrow. The tip of the arrow corresponds to the target point position. The TCP (Tool Control Point) X and Y axes are displayed in blue and green respectively.



The small number next to the black arrows indicates the target point order in the motion sequence. The red dotted line (guideline) passes through the target points to give an indication of the trajectory of the TCP. However, the robot true trajectory may not follow this line exactly due to rounding and path smoothing. For the actual robot path verification, please refer to section 8 "Motion Verification".
The numbers and guideline can be made visible by changing the settings on the "Show Teach Point" tab in "Option Settings" dialog that can be displayed by selecting [Tool] - [Options] from the MotoSimEG-VRC menu. The number, if displayed do not directly relate to the line number displayed in the Path Content list.

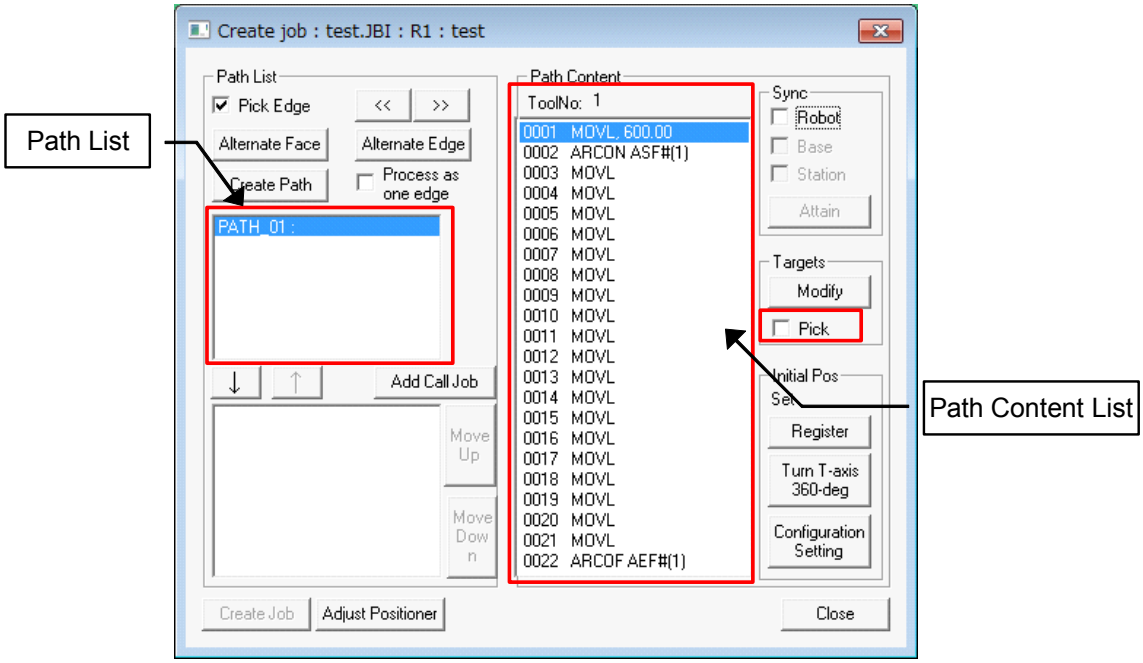


7.4 Target Points Adjustment

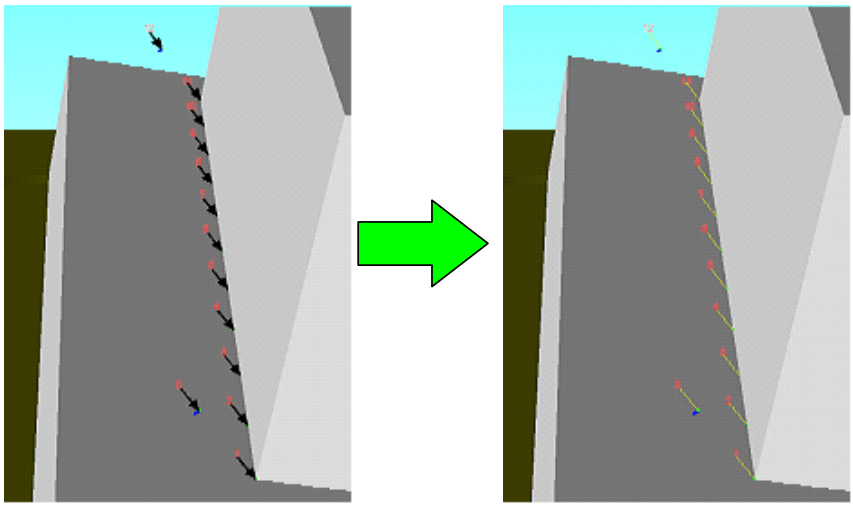
In the case where some target points need adjustment, the following procedure can be used.

Procedure

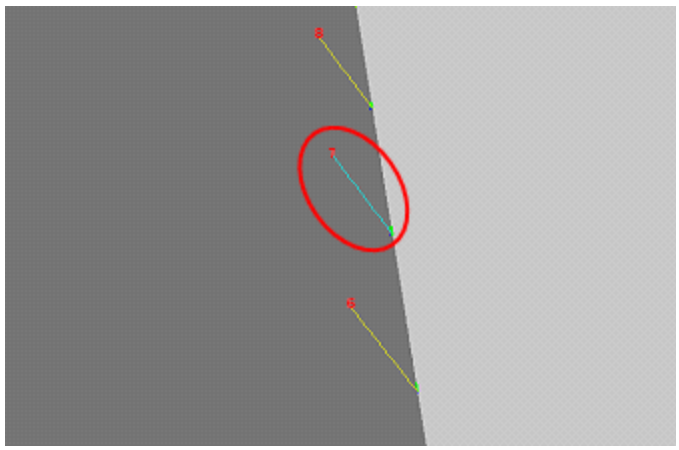
1. In the "Create Job" dialog, select from the "Path List" the path that needs adjustment. The selected path detailsare displayed in the "Path Content"list.



2. In the "Targets" section, put a check in the "Pick" box. The target point's display will change from black arrow to yellow line as in the following pictures.

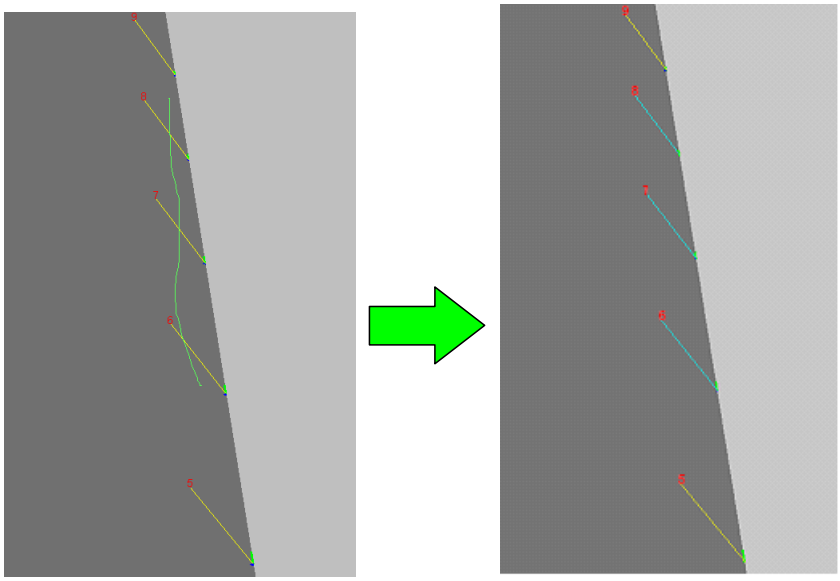


3. While holding the [Ctrl] key, click on a yellow line target to select the target for modification. The selected target changes to a light blue line target.

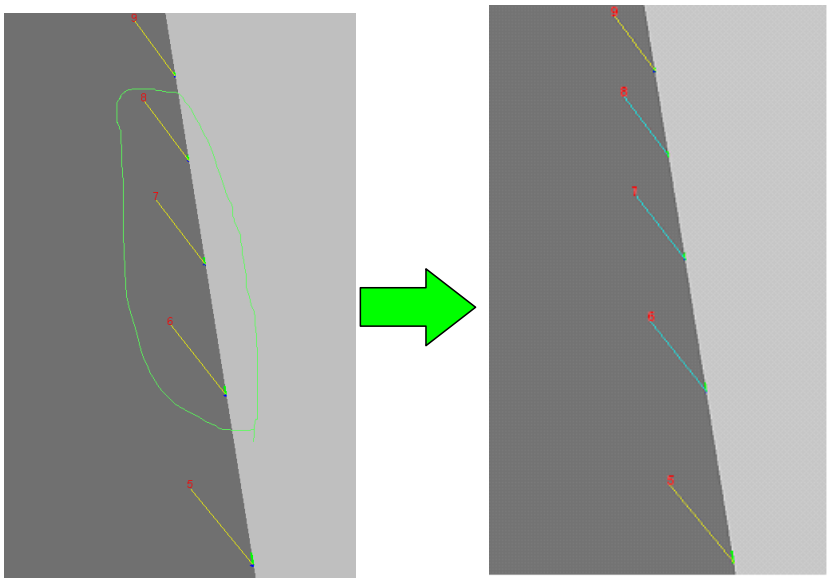


Multiple targets can be selected by holding down the [Ctrl] button and clicking the desired additional targets.Target selection can be cleared by unchecking the "Pick" box or by [Ctrl] clicking on the target

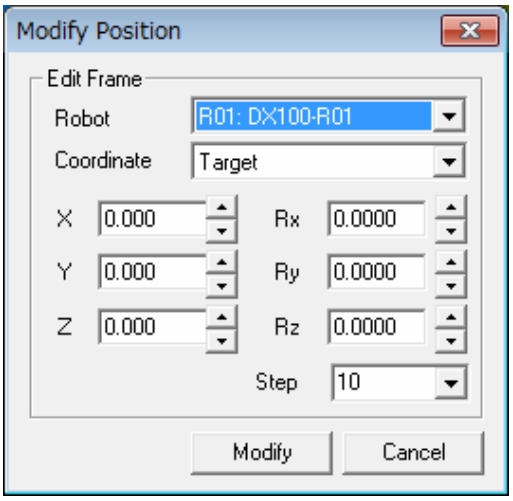
4. To select multiple targets, hold the [Ctrl] key then click and hold the left mouse button and drag the mouse cursor over the targets to be selected. A green line is drawn to indicate the mouse selection path. Release the mouse button and all the targets touching the green line will be selected.



In the same manner, a closed shape can be drawn with the green line and when the mouse button is released all the targets inside the closed shape are selected.

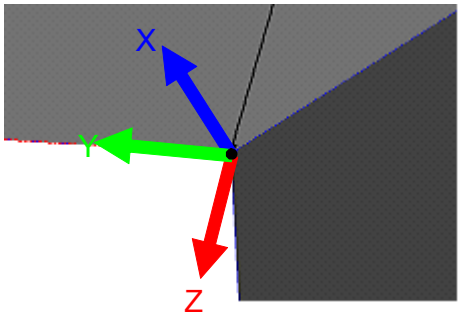


5. Once the target selection is completed, press the [Modify] button in the [Create Job] dialog to display the "Modify Position" dialog.

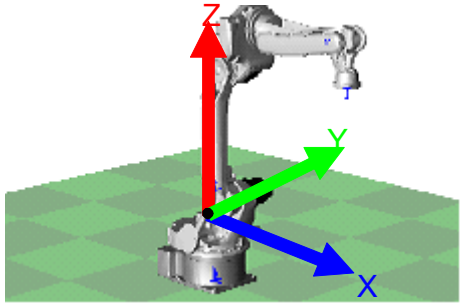


Select the between the targetor robot coordinate system. For the arc-welding use,

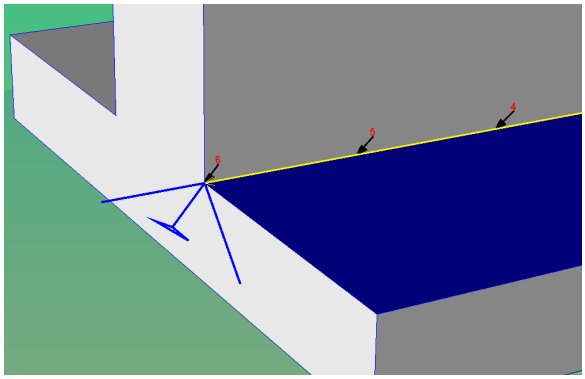
welding coordinate system can be selected.



Target Coordinates



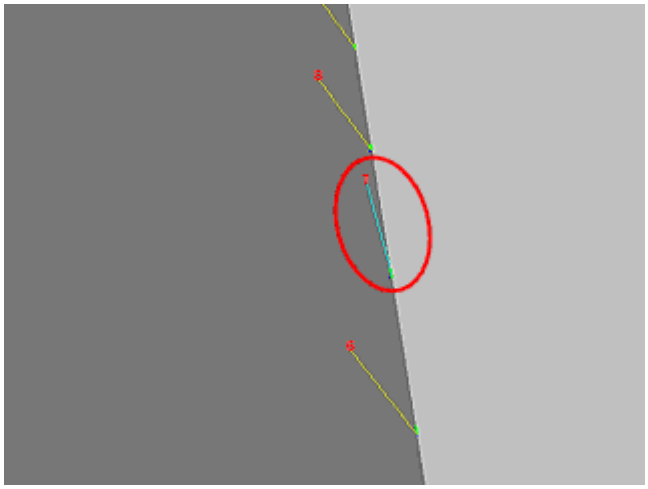
Robot Coordinates



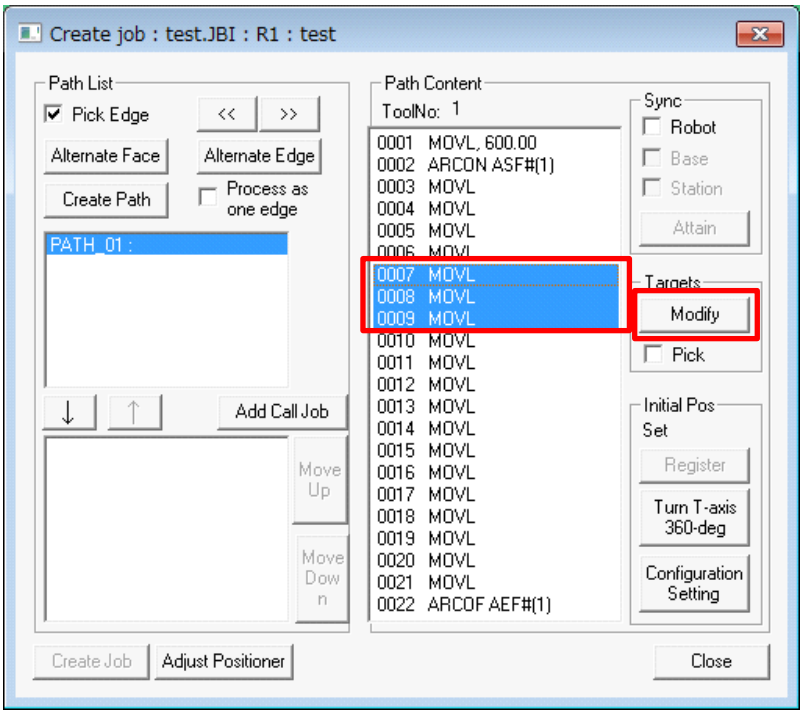
Welding Coordinates (only arc-welding use)

Enter the desired shift amount in that coordinate system. The target point position will dynamically update.

6. Press the [Modify] button to accept the targets points modified position. Press the [Cancel] button to discard any modifications made.



7. The selection of target points to be modified can also be done from the "Create Job" dialog by click on lines in the "Path Content" list. To select multiple lines/target points, hold the [Ctrl] while clicking on the desired lines. For range selection, click the first desired line, then while holding the [Shift] key clickon the last line of the desired range. Once the selection is complete, press the [Modify] button of the "Target" section of the dialog and proceed as per step 5 and 6 above to modify the target position.

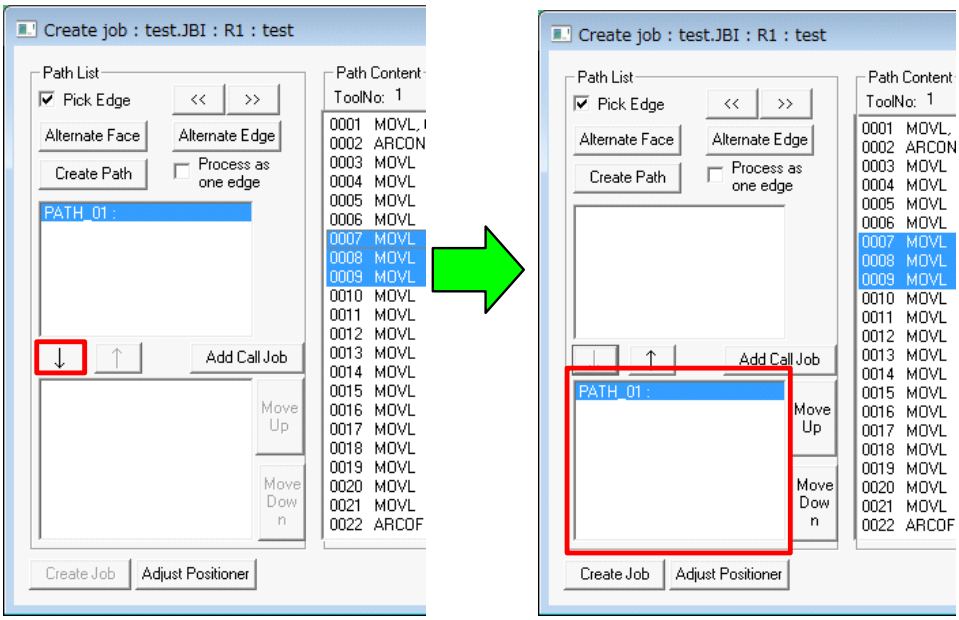


7.5 Job Creation

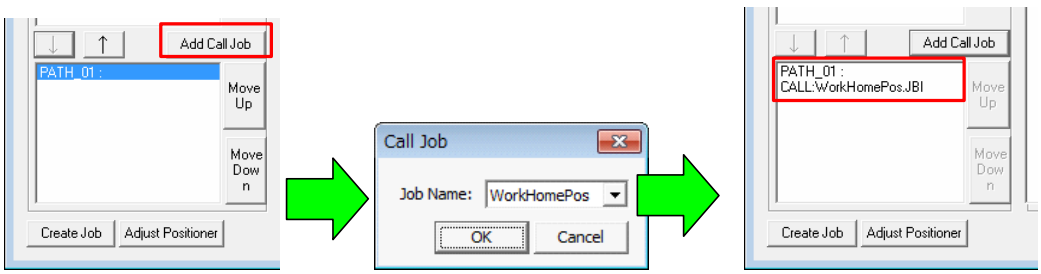
Create a job from selected path.

Procedure

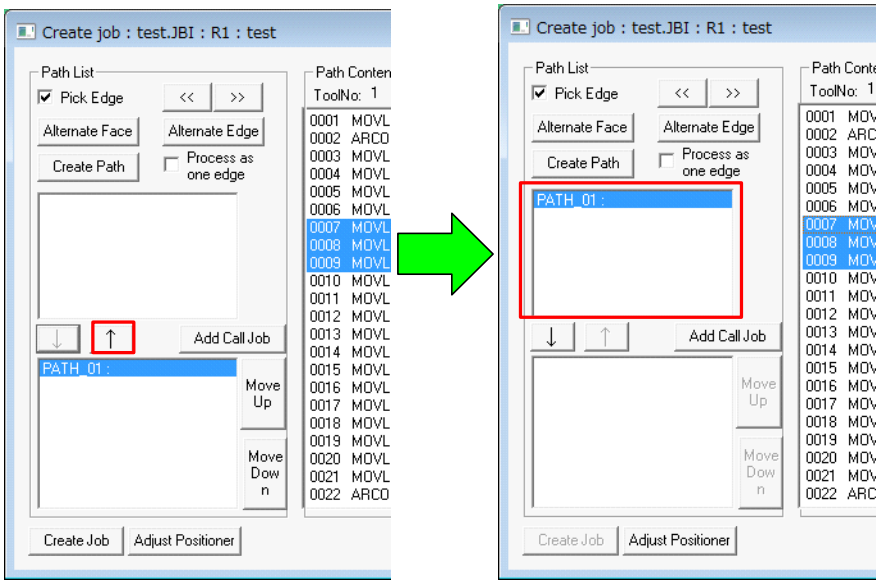
1. In the "Create Job" dialog, select paths from the "Path List" and press the [↓] button to move the paths to the "Job Path Sequence" list. Only the paths in the "Job Path Sequence" will be included in the created job. If there are multiple paths, they will be combined into a single job. The order of the paths can be reorganized by selecting a path in the list and moving it up or down in the sequence using the [↑] and [↓] buttons on the right side of the "Job Path Sequence" list.



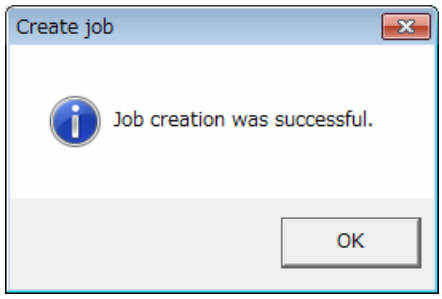
2. In the "Default Settings" dialog, if jobs have been registered under the "Environment" tab, calls to those jobs can be added to the job path sequence by pressing the [Add Call Job]. The "Call Job" dialog displays. Select from the drop down list the desired job name and then press the [OK] button to add an instruction line in the sequence to this sub-job.



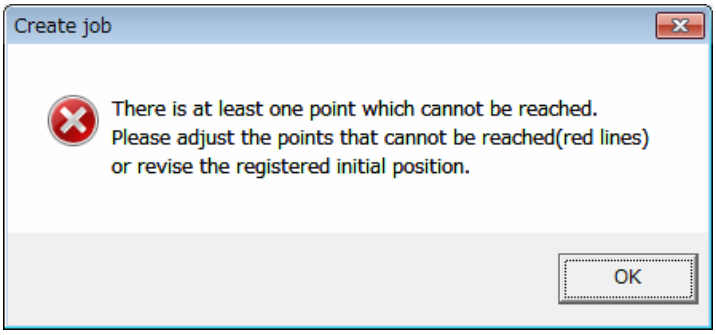
3. Paths in the "Job Path Sequence" can be removed by selecting a path in that list and pressing the [↑] button to move the path back to the "Path List".



4. Once the desired paths have been selected and ordered in the "Job Path Sequence", press the [Create Job] button. The dialog below will display to indicate that the job creation was successful and the job was loaded into the virtual pendant.



If instead the following dialog displays then the job creation failed.

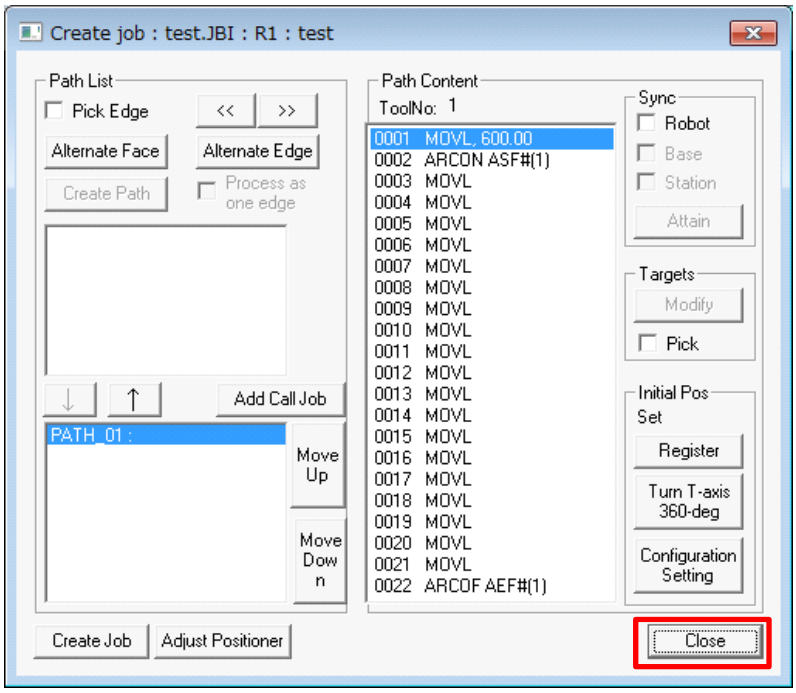


In such case, using the robot synchronizing function check that all steps can be reached. If some point cannot be reached, consider the following solutions:

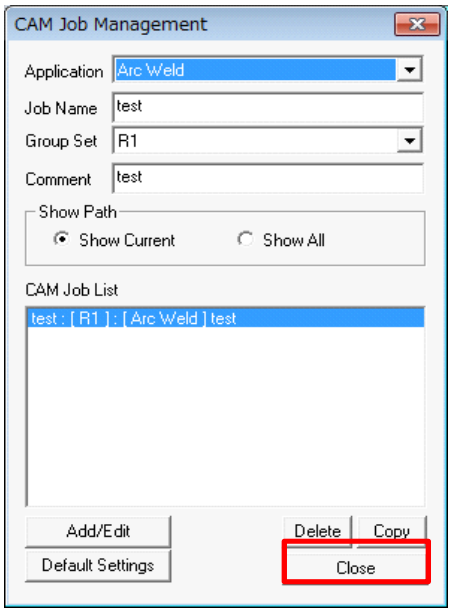
- Adjust the path content (work and travel angles, approach and retract points, etc.) (Refer to section " 6.3 Path Settings ")
- Adjust the initial position posture reference (Refer to section " 7.1 Initial Position Registration ")
- Adjust position and orientation of modified target point.
- Adjust the robot and work piece layout.
- Adjust the tool definition. (Make sure to reload the robot settings after making

modification as per section " 5.1 Load Robot Settings ")

5. Once the job creation is done, press the [Close] button to close the "Create Job" dialog. The "CAM Job Management" dialog will display.



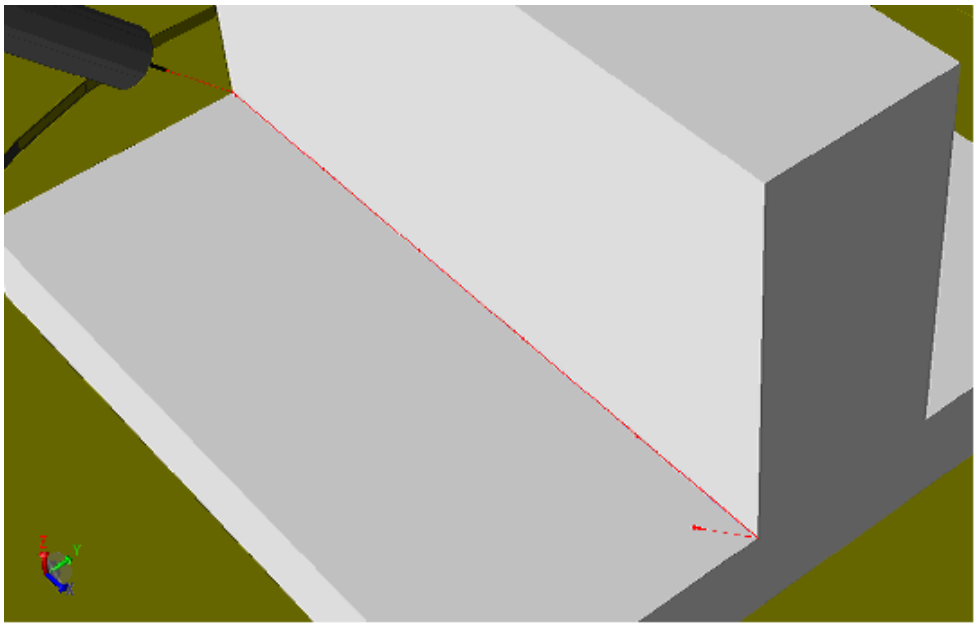
6. If the no other job need to be created at this time, close the "CAM Job Management" dialog by clicking the [Close] button.



8 Motion Verification

Procedure

1. From the virtual pendant main menu, select [JOB] - [SELECT JOB]. From the job list, select the created job.
2. Playback the job to verify the motion.
3. If the trace function is used, the tool trace is displayed. The relation between the trace, speed and I/O signal can be viewed by using the speed graph function. For details about the speed graph, please refer to section 8.13 "Speed Graph Function" of the MotoSim EG-VRC operation manual.



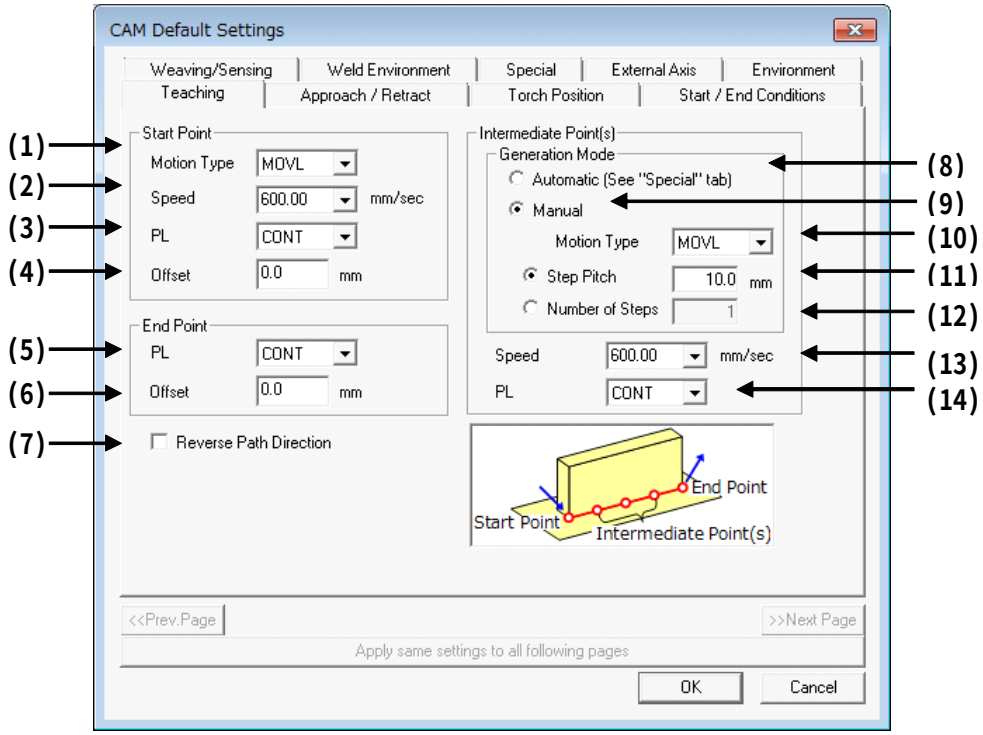
9 CAM Default and Path Settings

For the CAM Default Settings, in the "CAM Job Management" dialog press the "Default Settings" button to display the "CAM Default Settings" dialog and adjust the various default values. These settings are used as the initial values for settings of a new path. The "Path Settings" dialog is displayed when a new path is created or by double-clicking on an existing path in the "Path List" of the "Create Job" dialog. This chapter will explain the settings on each tab of those dialogs.

The modification of settings in the "CAM Default Settings" only affects paths created after the modifications. Existing paths will not be affected. To reflect the change on an existing path, the path would need to be deleted and recreated.

9.1 COMMON TO ALL APPLICATIONS

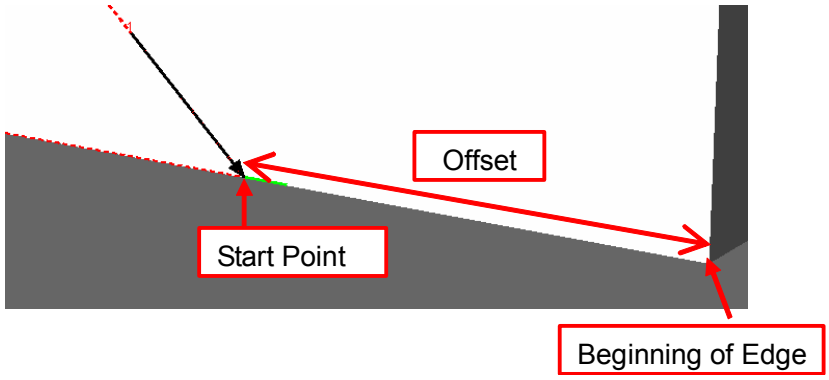
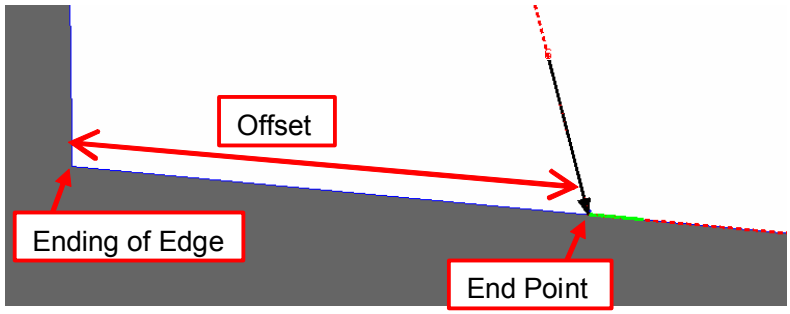
9.1.1 Teaching



Teaching

Start Point	
(1)Motion Type	Sets the interpolation method of the motion instruction. Can not be set for laser cutting use.
(2)Speed	Sets the speed for motion to the Start Point. The speed units can be set under the "Environment" tab. Can not be set for laser cutting use.
(3)PL	Sets the position accuracy level. The "CONT" tag means continuous motion through the point which is the default behavior when no PL tag is defined. Can not be set for laser cutting use.

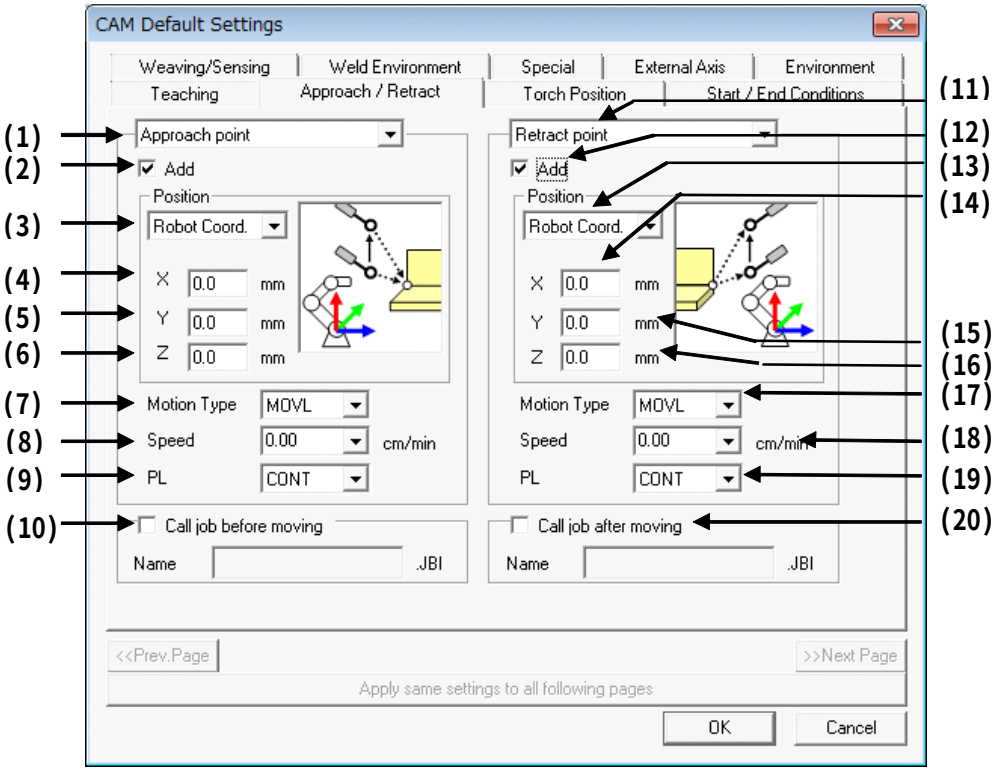
Teaching

(4)Offset	Sets the offset of the start point from the beginning of the edge. (Units: mm) Can be set for arc-welding use only. 
End Point	
(5)PL	Sets the position accuracy level. The "CONT" tag means continuous motion through the point which is the default behavior when no PL tag is defined.
(6)Offset	Sets the offset of the end point from the ending of the edge. Enter a negative value to stop before the end of the edge. (Units: mm) Can be set for arc-welding use only. 
(7)Reverse Path	When this box is checked the direction of the generated path is reversed.
Intermediate Point(s)	
Generation Mode	
(8)Automatic	Sets the automatic generation of intermediate points based on the criteria defined on the "Special" tab. When using the Automatic mode, the offsets for the start and end points cannot be set.
(9)Manual	Sets the generation of intermediate points based on the values entered by the user in the fields below.
(10)Motion Type	Sets the interpolation method of the motion instruction.
(11)Step Pitch	Specifies the interval between the intermediate points.(Units: mm)

Teaching

(12)Number of Steps	Set the number of segment in the path.
(13)Speed	Sets the speed to be used for the weld path. The speed units can be set under the "Environment" tab. The speed can be overridden by the selection on the Start/End Conditions tab.
(14)PL	Sets the position accuracy level. The "CONT" tag means continuous motion through the point which is the default behavior when no PL tag is defined.

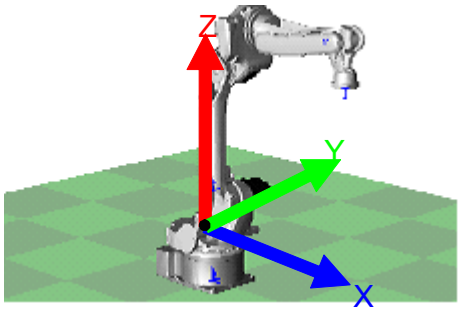
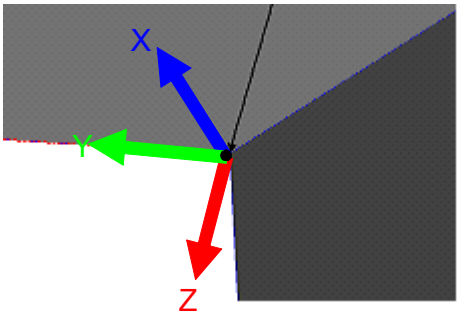
9.1.2 Approach/Retract



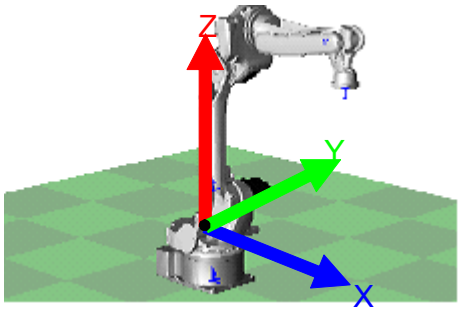
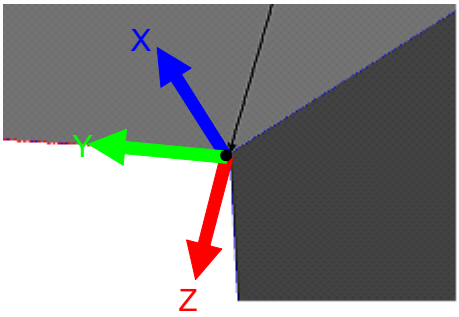
Approach/Retract

(1)Approach	When the [Add] check box below is checked, this box becomes effective. If the escape point is needed, Selects Escape point (Approach side) and Sets the parameter.
(2)Add	When this box is checked, an approach point is added to the path.

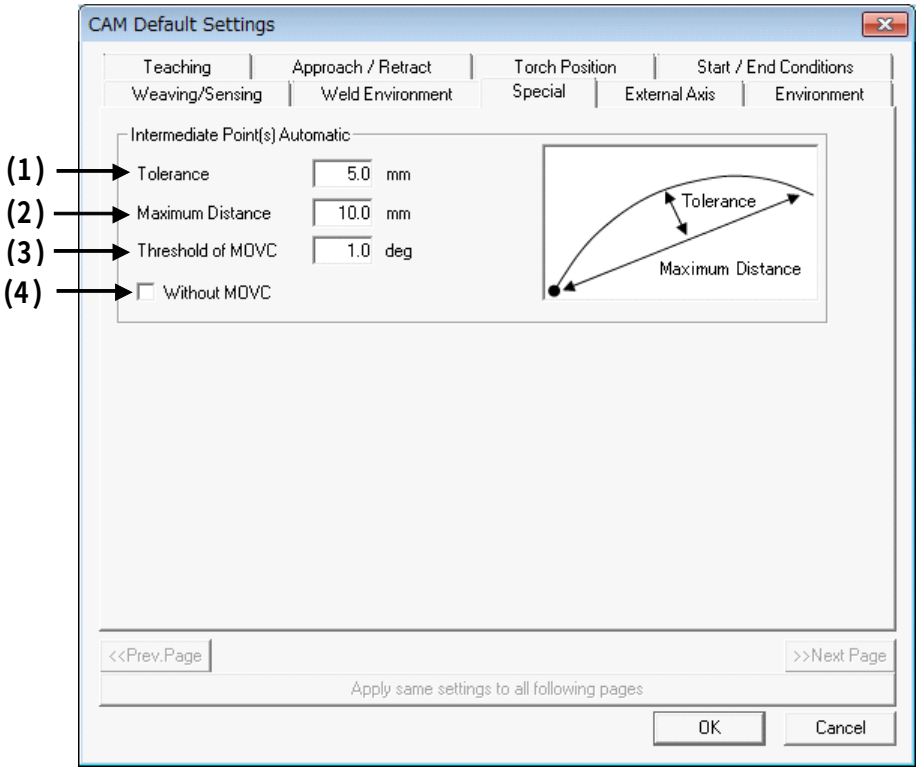
Approach/Retract

(3)Position	Sets the relative position of the approach point from the beginning of the weld in the selected coordinated system. The following figure shows the directions of the X-Y-Z axes when the "Robot" coordinate system is selected.  The following figure shows the directions of the X-Y-Z axes when the "Target" (Tool) coordinate system is selected. 
(4)X	The relative distance along the X-axis of the approach point from the beginning of the weld.
(5)Y	The relative distance along the Y-axis of the approach point from the beginning of the weld.
(6)Z	The relative distance along the Z-axis of the approach point from the beginning of the weld.
(7)Motion Type	Sets the interpolation method of the motion instruction.
(8)Speed	Sets the speed. The speed units can be set under the "Environment" tab.
(9)PL	Sets the position accuracy level. The "CONT" tag means continuous motion through the point which is the default behavior when no PL tag is defined.
(10)Call job before moving	When this box is checked, a call instruction for the specified job name is added before the path motion instructions.
(11)Retract point	When the [Add] check box below is checked, this box becomes effective. If the escape point is needed, Selects Escape point (Release side) and Sets the parameter.
(12)Add	When this box is checked, a retract point is added to the path.

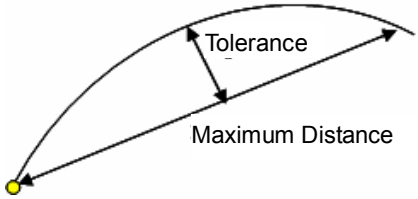
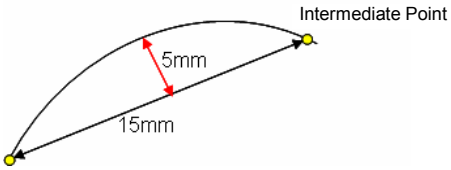
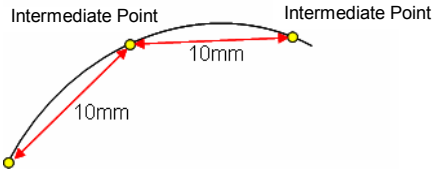
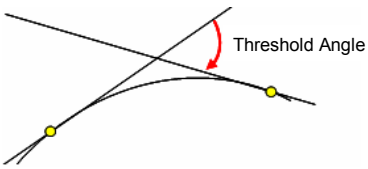
Approach/Retract

(13)Position	Sets the relative position of the Retract point from the ending of the weld in the selected coordinated system. The following figure shows the directions of the X-Y-Z axes when the "Robot" coordinate system is selected.  The following figure shows the directions of the X-Y-Z axes when the "Target" (Tool) coordinate system is selected. 
(14)X	The relative distance along the X-axis of the retract point from the ending of the weld.
(15)Y	The relative distance along the Y-axis of the retract point from the ending of the weld.
(16)Z	The relative distance along the Z-axis of the retract point from the ending of the weld.
(17)Motion Type	Sets the interpolation method of the motion instruction.
(18)Speed	Sets the speed. The speed units can be set under the "Environment" tab.
(19)PL	Sets the position accuracy level. The "CONT" tag means continuous motion through the point which is the default behavior when no PL tag is defined.
(20)Call job after moving	When this box is checked, a call instruction for the specified job name is added after the path motion instructions.

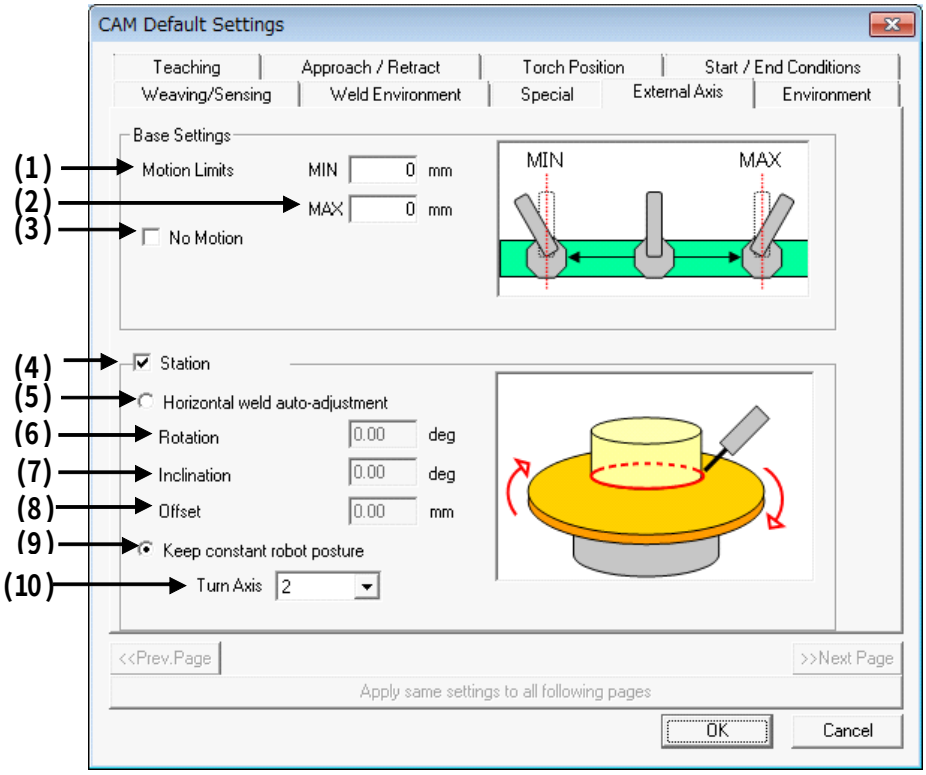
9.1.3 Special


CAM Default Settings
Teaching
Approach / Retract
Torch Position
Start / End Conditions
Weaving/Sensing
Weld Environment
Special
External Axis
Environment
Intermediate Point(s) Automatic
(1)
Tolerance
5.0
mm
(2)
Maximum Distance
10.0
mm
(3)
Threshold of MOVC
1.0
deg
(4)
Without MOVC
Tolerance
Maximum Distance
<<Prev.Page
>>Next Page
Apply same settings to all following pages
OK
Cancel

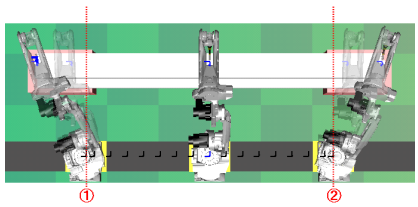
Special

Intermediate Points(s) Automatic Division		
(1) Tolerance	Sets the path deviation tolerance from the edge. Sufficient intermediate points are generated to keep the distance between the each path segment and the edge below the tolerance. (Units: mm)	
(2) Maximum Distance	Sets the maximum distance between two intermediate points. Sufficient intermediate points are generated to keep the maximum distance between points below the maximum distance. (Units: mm)	For example, if the Tolerance = 5mm and the Maximum Distance = 20mm, the intermediate point in the figure below is generated by following the most restrictive condition, the Tolerance.  If the condition are changed to Tolerance = 5mm and Maximum Distance = 10 mm. The Maximum distance becomes more restrictive and the following intermediate points are generated instead. 
(3) Threshold of MOVC	Sets the threshold angle to decide when MOVC instructions are used. (Units: deg.)	When the angle between tangents of two points is larger than the threshold angle, MOVC (circular move) instructions are used instead of MOVL (linear move) instructions. 
(4) Without MOVC	When checked, MOVC instructions are not used. The path is generated using only linear segments (MOVL).	

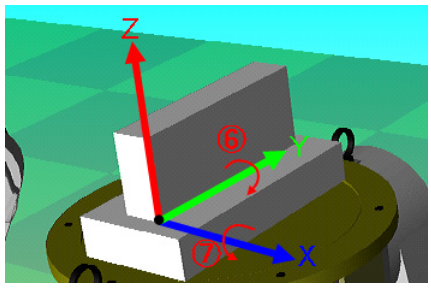
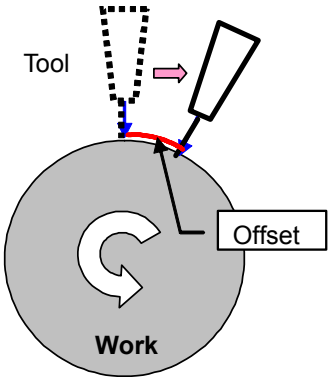
9.1.4 External Axis



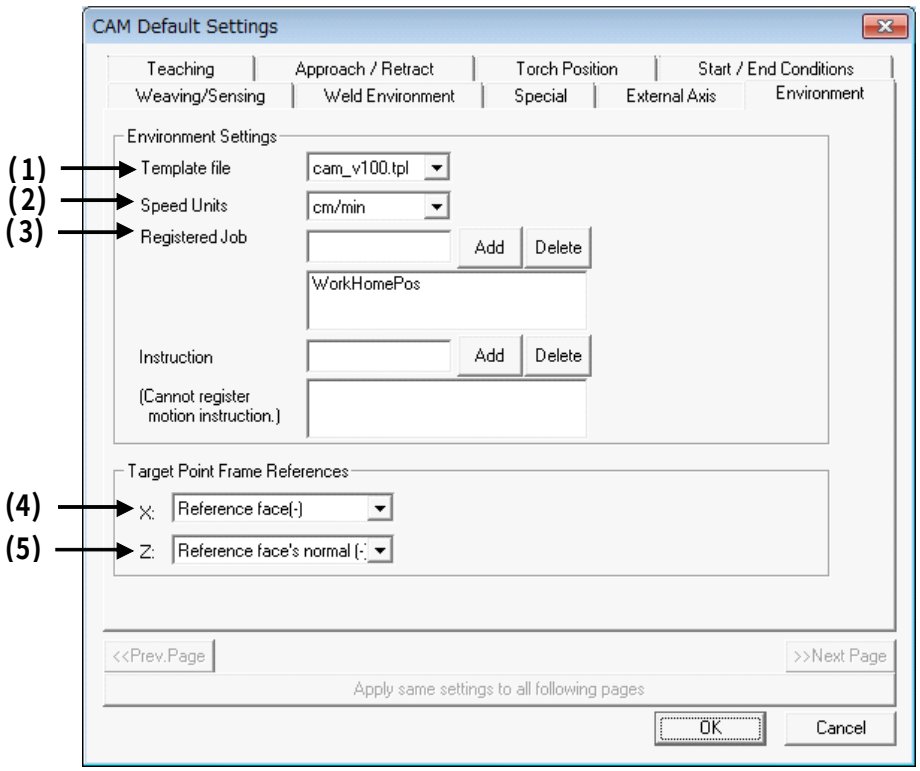
External Axis

Base Settings		
(1) MIN (2) MAX	Sets the minimum and maximum values of the base axis. Please set the same or more restrictive valuesthan the ones set in the virtual pendant.	 The position of the base axis is created in front of the target point as long as the target point is within the range of base motion limits. If the target point is outside the base limits, the base is moved to its limit and robot s-axis turns to reach the target.
(3) No Motion	When checked the base axis does not moved automatically. The position of the base at the time that the path is created will be used.	
(4) Station Coordination	When checked the station motion is coordinated with the robot motion.	

External Axis

(5) Horizontal weld auto-adjustment	Select this option to automatically adjust the positioner to maintain the weld edge in the horizontal plane.	
(6) Rotation	Sets the rotation angle around the processed edge (Y-axis)to adjust the position walls forming the edge. (Units: deg.)	
(7) Inclination	Sets the inclination angle of the edge (rotation around the X-axis) to change the slope of the processing.(Units: deg.)	
(8) Offset	Sets a distance to offset the processing position in proportion to the inclination (7). When a value is set, the inclination angle is automatically adjusted. Note: The calculation is an approximation based on the radius between the position of the torch and the center of rotation of the station.	
(9) Keep constant robot posture	Select this option to maintain the robot in a constant posture by using the positioner to move the work.	
(10) Turn Axis	Identifies which axis of a multiple axes station will turn when using the "Keep constant robot posture" option.	

9.1.5 Environment (Default Settings Only)



Environment (Default Settings Only)

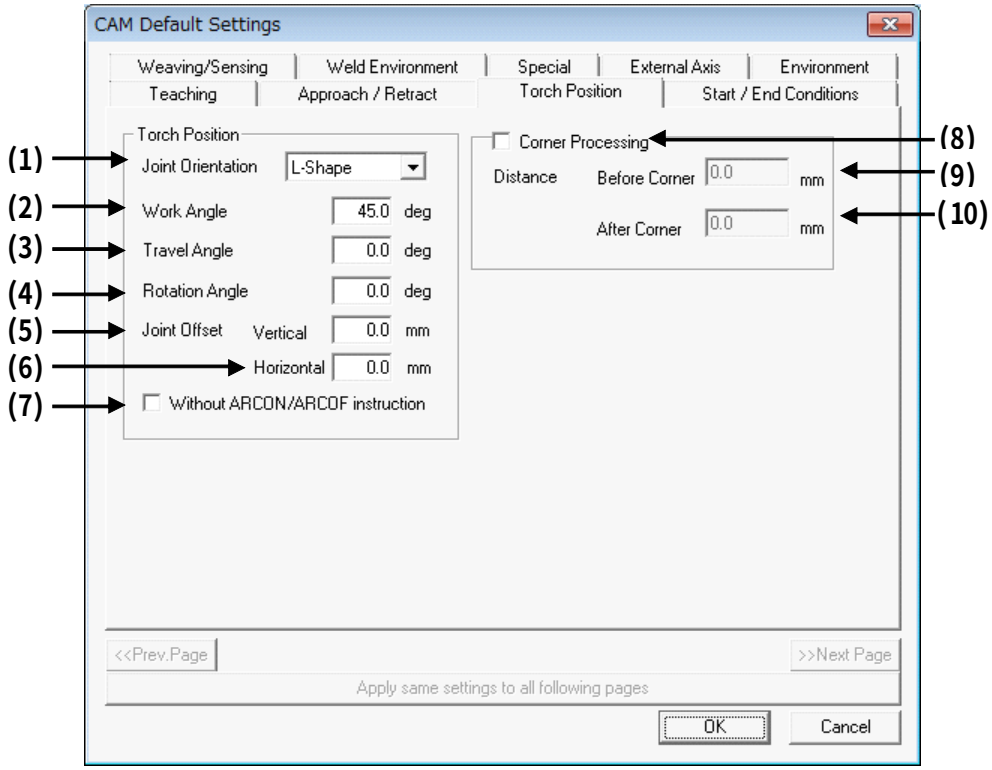
Environment Settings	
(1)Template file	Selects the template file to be used when creating jobs. cam_v***.tpl is selected automatically. (*** is the version number of template file. When the version number is 1.00, the file name is cam_v100.tpl.) NOTE When the cell is created before MotoSim EG-VRC ver 5.00, the template file may be set the following files. • cam.tpl • cam_bs.tpl • cam_station.tpl When the these file is selected, select the cam_v***.tpl manually.
(2)Speed Units	Selects the type of units used to define motion speed in various dialogs.
(3)Registered Job	Registers jobs that can then be inserted in path sequence when using the [Add Call Job] button of the "Create Job" dialog. To add jobs to the list, type the name of the job (without the .jbi extension) in the textbox and press the [Add] button. The name will be transferred to the list below. To remove a registered job from the list, select the job name in the list and click the [Delete] button.
Target Point Frame References	

Environment (Default Settings Only)

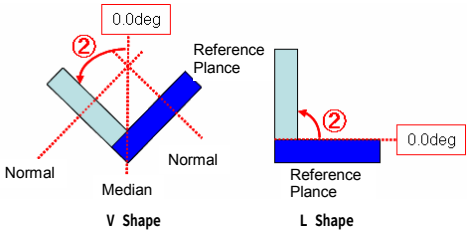
(4)X	Sets the reference used to determine the direction of the X-axis of the target point frame. (Default: Reference face (+))
(5)Z	Sets the reference used to determine the direction of the Z-axis of the target point frame. (Default: Reference face's normal (-))

9.2 Arc Welding Use

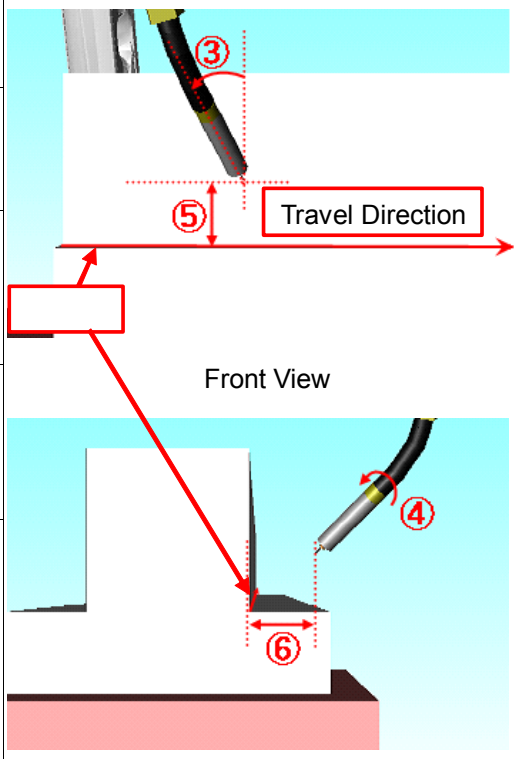
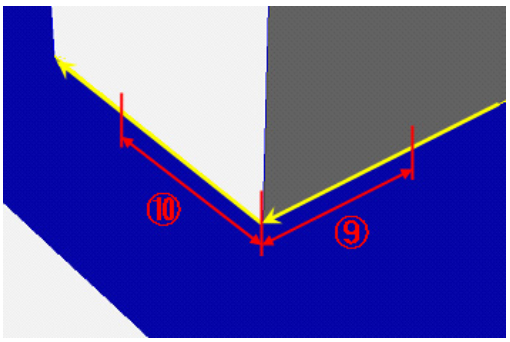
9.2.1 Torch Position



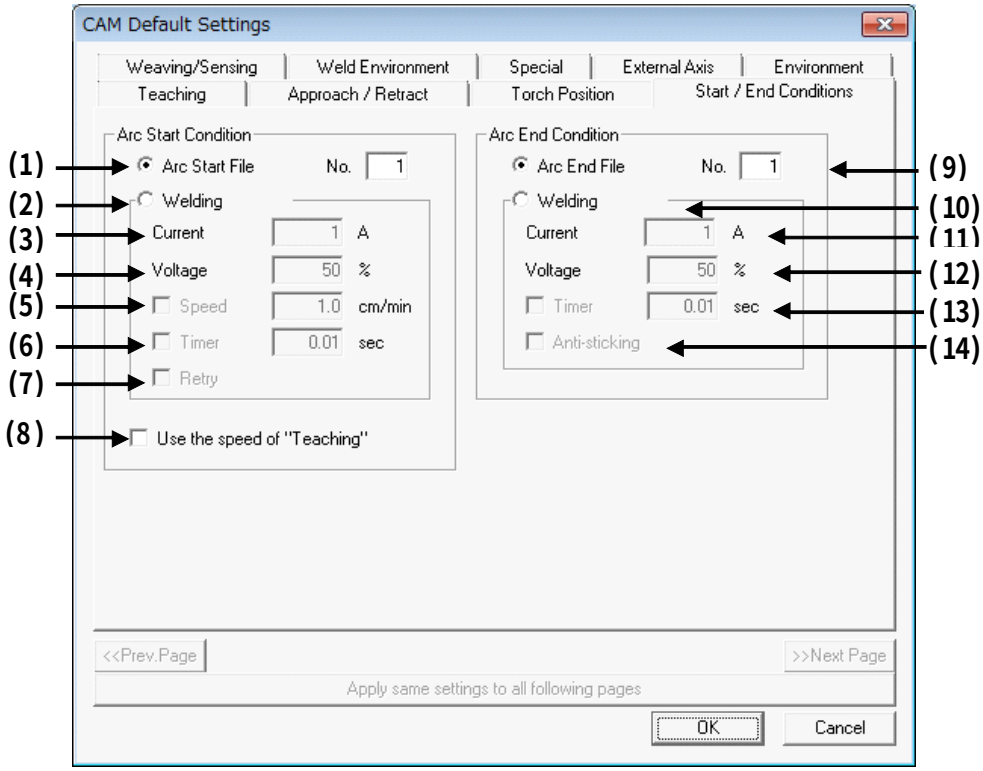
Torch Position

Torch Position		
(1)JointOrientation	Specifies the shape of the joint to be welded. Depending on the selection between the V-Shape or L-Shape, the 0 deg. reference changes.	
(2)Work Angle	Sets the angle of the torch from the 0 deg. reference plane (as defined by the Joint Shape). (Units: deg.)	

Torch Position

(3)Travel Angle	Sets the angle of the torch from the plane perpendicular to the travel direction. (Units: deg.)	 Front View Side View
(4)Rotation Angle	Sets the angle of the torch rotation. (Units: deg.)	
(5)Vertical	Sets the vertical shift amount of the target points. (Units: mm)	
(6)Horizontal	Sets the horizontal shift amount of the target points. (Units: mm)	
(7)Without ARCON/ARCOFF instruction	When this box is checked, the ARCON/ARCOFF instructions will not be included in the path.	
(8)Corner Processing	When this box is checked, the corner processing is enabled. When welding multiple edges continuously around a corner, the posture of the robot has to change drastically to move from one side of a corner to the other side. In order to smooth the transition, the corner processing function allows changing the torch angles gradually when within a defined distance of the corner.	 Corner Processing
(9)Before Corner	Sets the distance before a corner where the torch is allowed to transition from one orientation to another.	
(10)After Corner	Sets the distance after a corner where the torch is allowed to transition from one orientation to another.	

9.2.2 Start/End Conditions



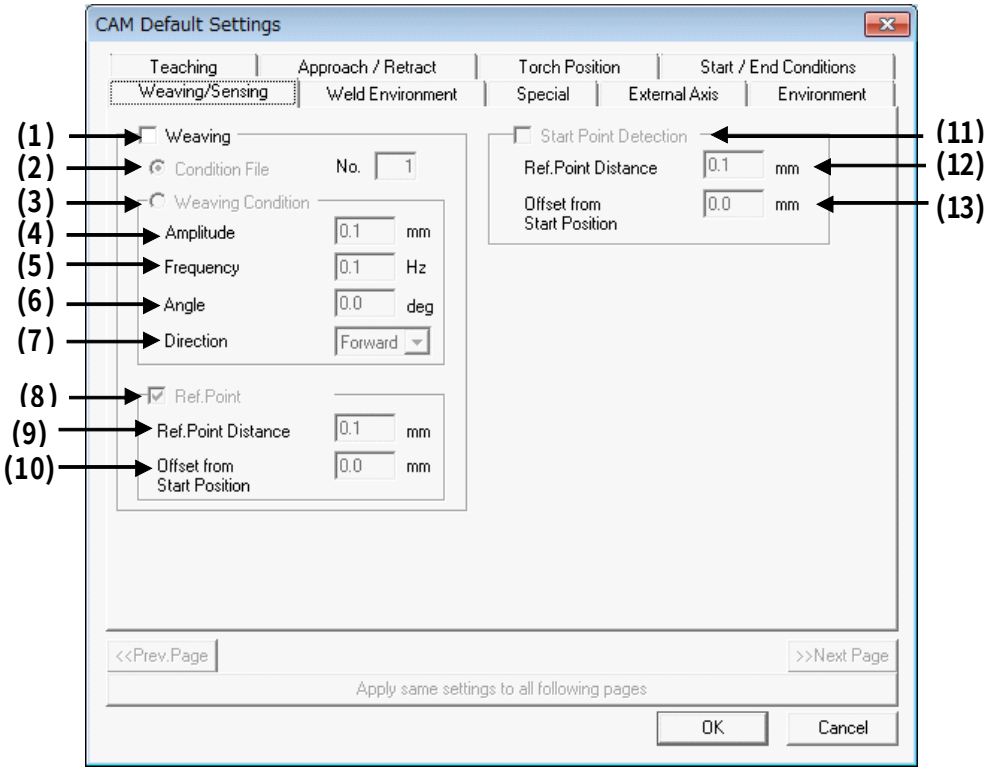
Start/End Conditions

Arc Start Condition		
(1) Arc Start File	Select to specify the use of the conditions defined in an Arc Start File. Enter the number of the file to be used.	For example, if you select the condition file 1, the following instruction will be added to the path: ARCON ASF#(1)
(2) Welding Conditions	Select to specify the arc start welding conditions.	
(3) Current	Sets the welding current. (Units: A)	For example, is you enter the following values: 3) 1 4) 50.0 5) 100.0 6) 0.50 7) ON The following instruction will be added to the path: ARCON AC=1 AVP=50 T=0.50 V=100.0 RETRY
(4) Voltage	Sets the welding voltage. (Units: %) (Units: % or V) The Voltage units can be set under the "Weld Environment" tab.	
(5) Speed	When checked, the travel speed while welding is specified. Speed units can be set in the "Environment" tab.	
(6) Timer	When checked, the timer value to delay beginning of the motion is specified. (Units: sec.)	
(7) Retry	When checked, the function to retry establishing an arc after a failure is enabled.	

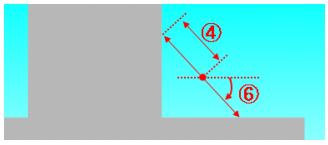
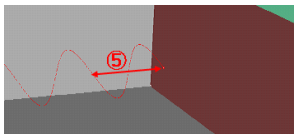
Start/End Conditions

(8) Use the speed of the "Teaching" tab	When checked, the speed value specified on the "Teaching" tab under the "Intermediate Points" sections will be used. This speed will be specified on the appropriate move instructions and supersedes the speed specified in the "Arc Start Condition".	
Arc End Condition		
(9) Arc End File	Select to specify the use of the conditions defined in an Arc End File. Enter the number of the file to be used.	For example, if you select the condition file 1, the following instruction will be added to the path: ARCOF AEF#(1)
(10) Welding Conditions	Select to specify the arc end welding conditions.	For example, is you enter the following values: 11) 1 12) 50.0 13) 100.0 14) ON The following instruction will be added to the path: ARCOF AC=1 AVP=50 T=0.50 ANTSTK
(11) Current	Sets the welding current. (Units: A)	
(12) Voltage	Sets the welding voltage. (Units: % or V) The Voltage units can be set under the "Weld Environment" tab.	
(13) Timer	When checked, the timer value to maintain the arc after the end point is reached is specified. (Units: sec.)	
(14) Anti-sticking	When checked, the function to prevent the wire from sticking to the weld is enabled.	

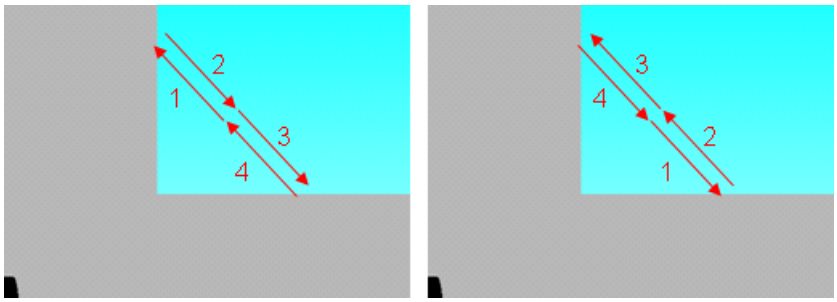
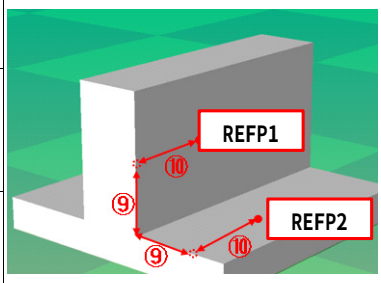
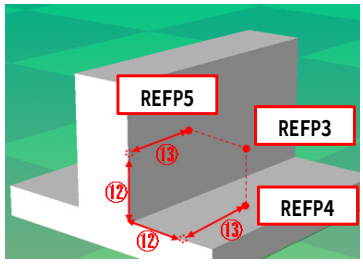
9.2.3 Weaving/Sensing



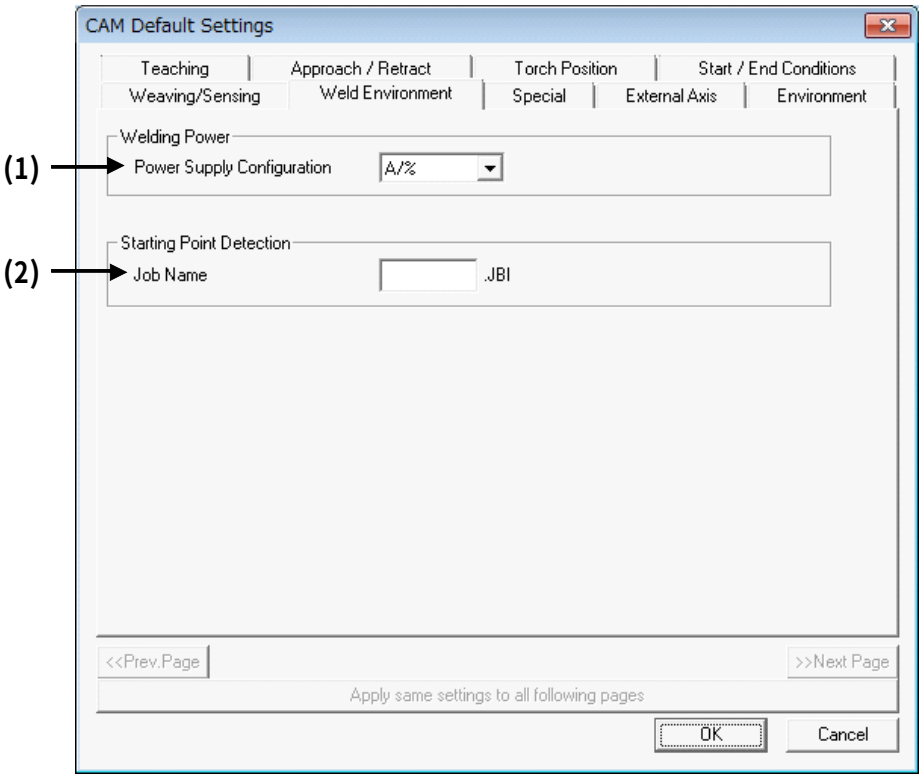
Weaving/Sensing

(1) Weaving		
(2) Condition File	Select to specify the use of the conditions defined in aWeaving Condition File. Enter the number of the file to be used.	For example, if you select the condition file 1, the following instruction will be added to the path: WVONWEV#(1)
(3) Weaving Conditions	Select to specify the weaving conditions for single amplitude weave. For triangle or L-shaped weave, use condition file (2).	
(4) Amplitude	Sets the amplitude of the weave. (Units: mm)	 Side view
(5) Frequency	Sets the frequency of the weave. (Units: Hz)	
(6) Angle	Sets the angle of the weaving plane. (Units: deg.)	 Main View

Weaving/Sensing

(7) Direction	Sets the direction of the weave.  Forward Reverse	
(8) Ref.Point Registration	When checked, weaving reference points (REFP1, REFP2) are registered with the weave.	 Weaving Reference Points
(9) Ref.Point Distance	Sets the distance of the reference points from the weld. (Units: mm)	
(10) Offset from Start Position	Sets the distance of the reference points from the beginning of the weld in the travel direction. (Units: mm)	
(11) Start Point Detection	When checked, detection reference points (REFP3, REFP4, REFP5) are registered and search instructions are added to the path.	 Search Reference Points
(12) Ref.Point Distance	Sets the distance of the reference points from the weld. (Units: mm)	
(13) Offset from Start Position	Sets the distance of the reference points from the beginning of the weld in the travel direction. (Units: mm)	

9.2.4 Weld Environment (Default Settings Only)



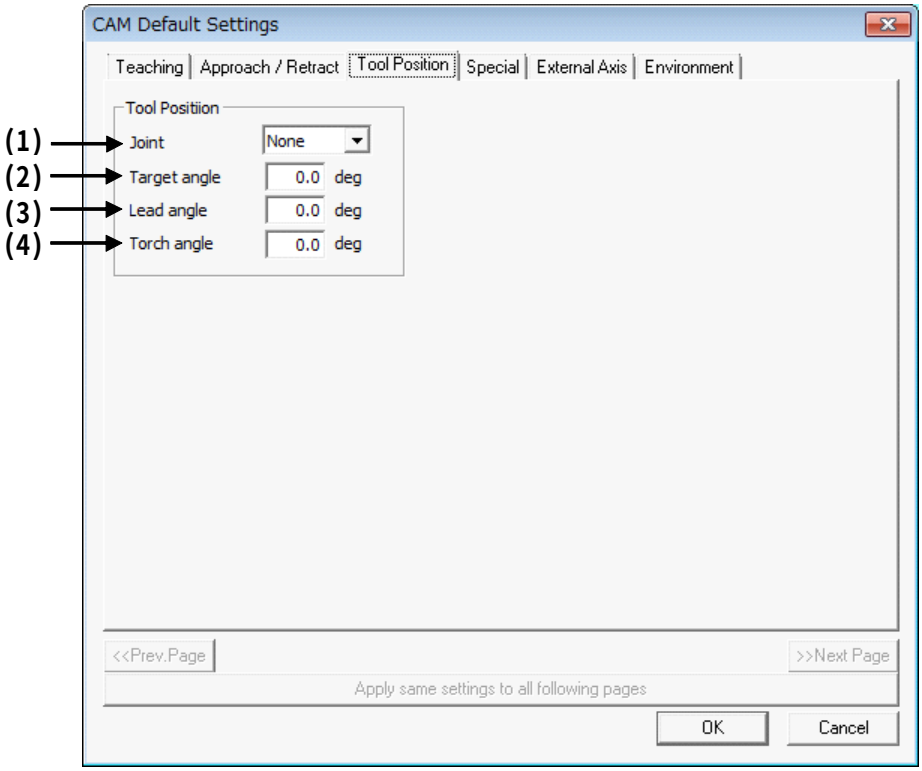
Weld Environment

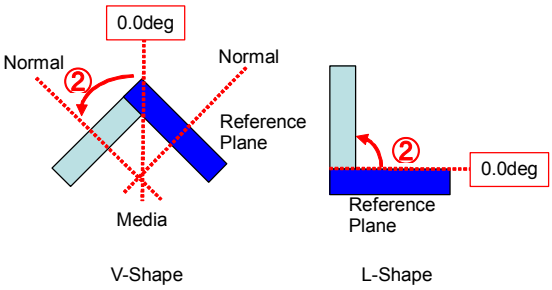
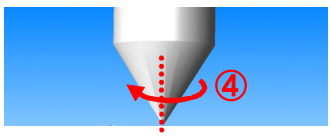
Welding Power Source	
(1) Power Supply Configuration	Sets the power supply condition of welding power source. Make this setting match the setting of the power supply on the virtual pendant.
Starting Point Detection	
(2) Job Name	Sets the starting point detection job name that is used when this function is used. Please set this job to match the system configuration.

R1	HR1T1.JBI
R1 + B1	HR1B1T1.JBI
R1 + S1	HR1S1T1.JBI

9.3 General Purpose Use

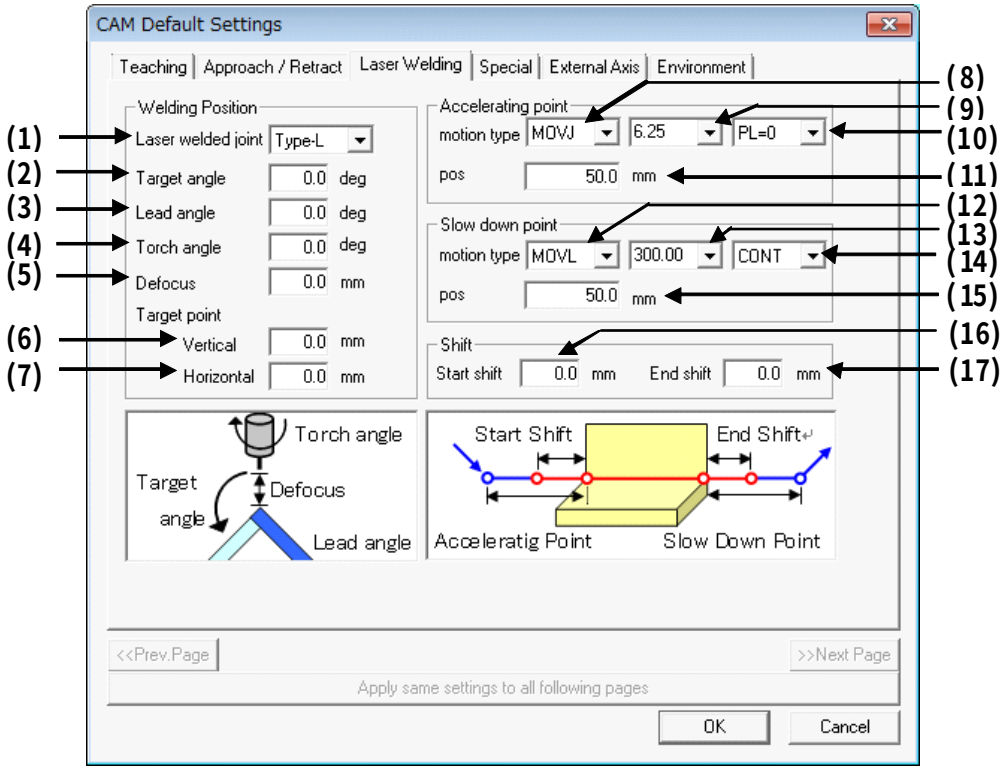
9.3.1 Tool Position

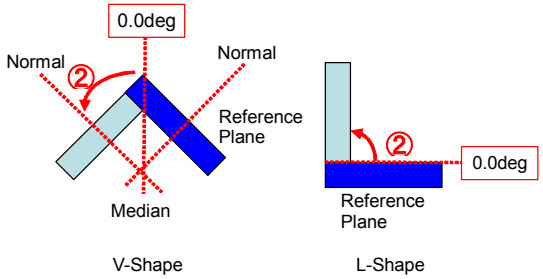


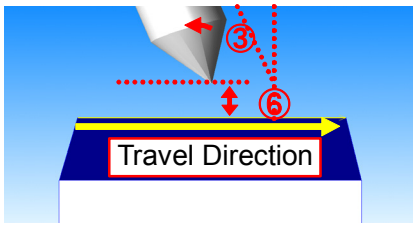
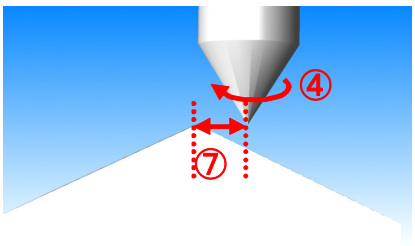
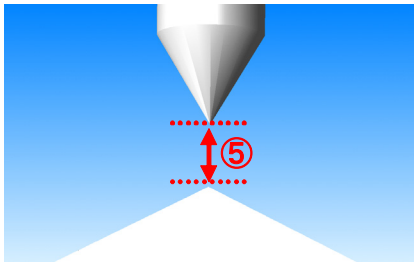
Toool Position		
(1) Joint	Specifies the shape of the joint to be welded. Depending on the selection between the V-Shape or L-Shape, the 0 deg. reference changes.	
(2) Target Angle	Sets the angle of the torch from the 0 deg. reference plane (as defined by the Joint Shape). (Units: deg.)	
(3) Lead Angle	Sets the angle of the torch from the plane perpendicular to the travel direction. (Units: deg.)	
(4) Torch Angle	Sets the angle of the torch rotation. (Units: deg.)	

9.4 Laser Welding Use

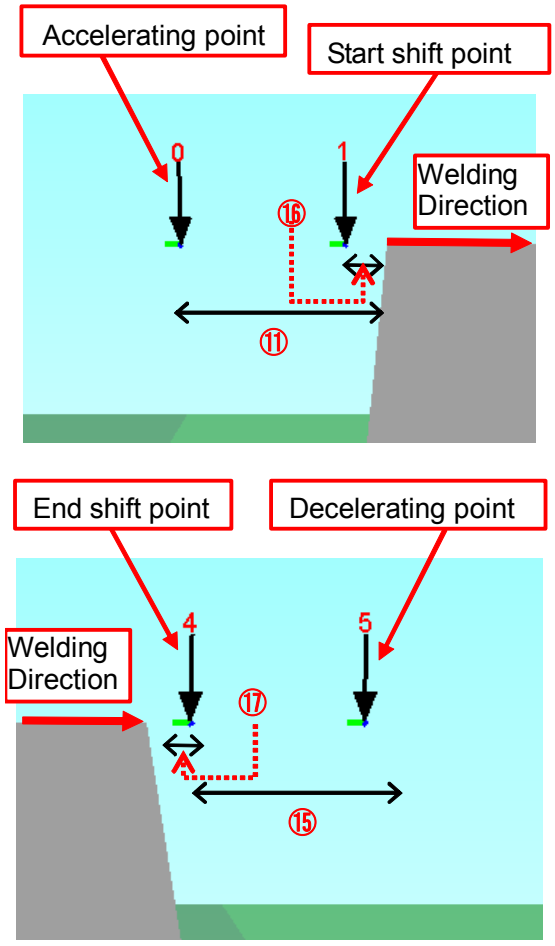
9.4.1 Laser Welding



Welding Position		
(1) Laser welded joint	Specifies the method to appoint the target angle. Depending on the selection between the L-Shape or L-Shape, the 0 deg. reference changes.	
(2) Target angle	Sets the angle of the torch from the 0 deg. reference plane (as defined by the Joint Shape). (Units: deg.)	

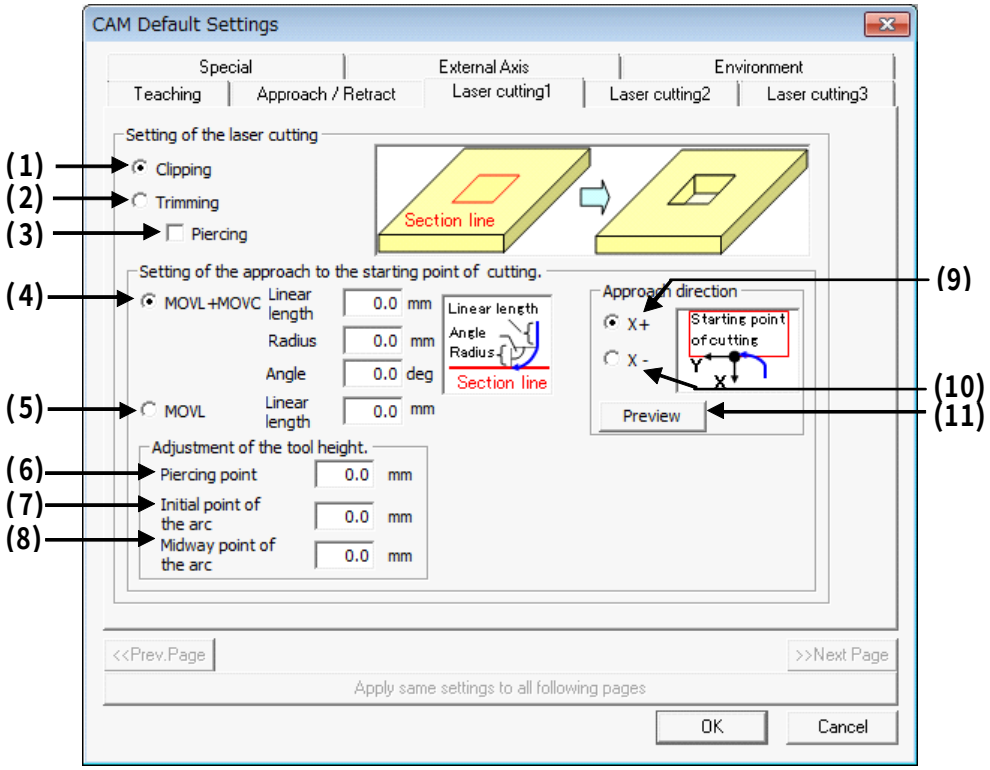
(3) Lead angle	Sets the angle of the torch from the plane perpendicular to the travel direction. (Units: deg.)	 Front View
(4) Torch angle	Sets the angle of the torch rotation. (Units: deg.)	 Side View
(5) Defocus	Specifies the tip height from the work at the welding points. (Units: mm)	
Target point		
(6) Vertical	Sets the vertical shift amount of the target points. (Units: mm)	
(7) Horizontal	Sets the horizontal shift amount of the target points. (Units: mm)	

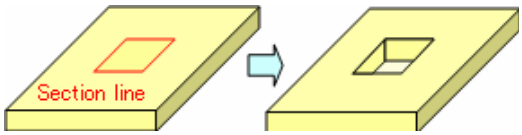
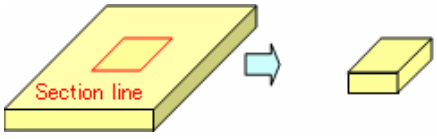
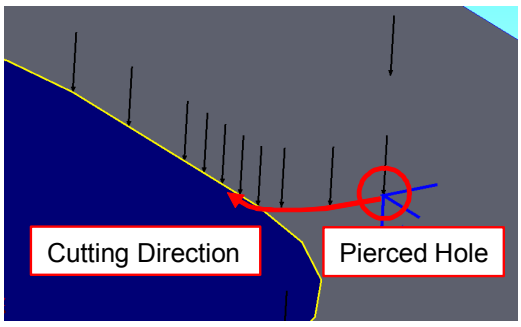
Accelerating point	
(8) motion type	Sets the interpolation method of the motion instruction of accelerating point.
(9)	
(10)	
(11) pos	Sets the offset of the accelerating point. (Units: mm)
Slow down point	
(12) motion type	Sets the interpolation method of the motion instruction of decelerat-ing point.
(13)	
(14)	
(15) pos	Sets the offset of the decelerating point. (Units: mm)
Shift	
(16)Start shift	Sets the offset of the start shift point. (Units: mm)
(17)End shift	Sets the offset of the end shift point. (Units: mm)

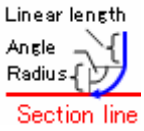
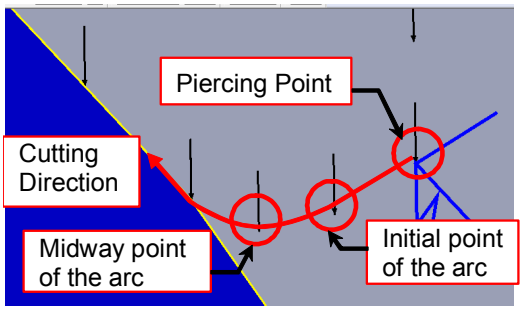
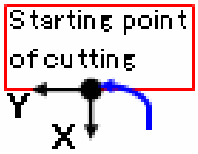
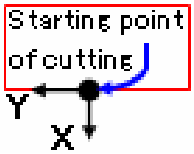


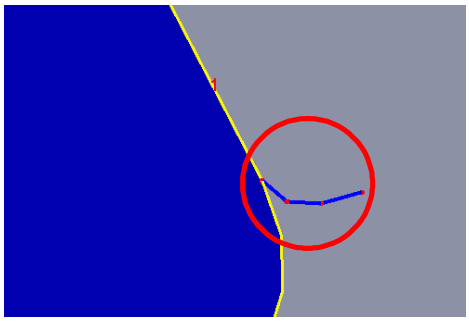
9.5 Laser Cutting Use

9.5.1 Laser Cutting 1

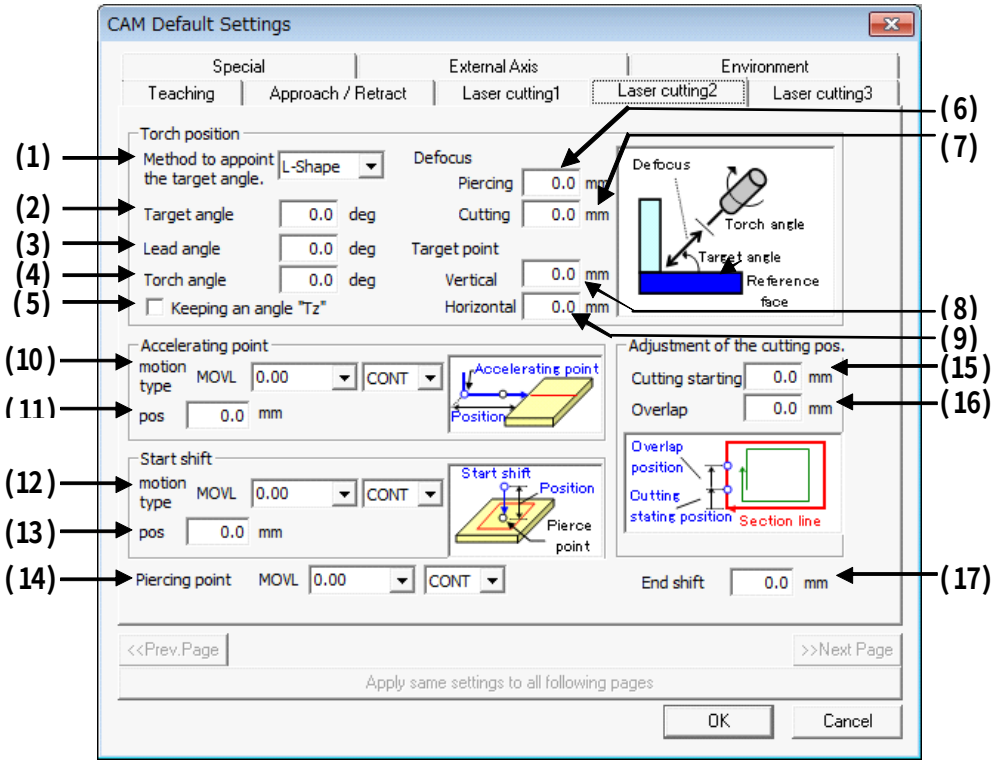


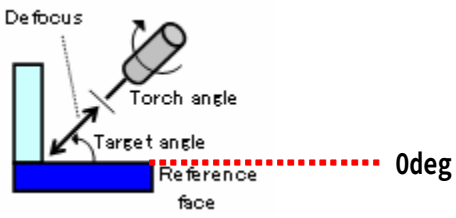
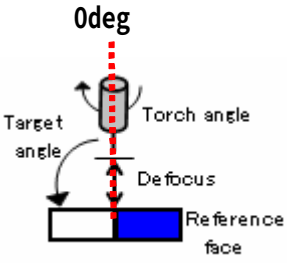
Setting of the laser cutting		
(1) Clipping	When this button is checked, the processed path is created to clip the work.	
(2) Trimming	When this button is checked, the processed path is created to trim the work.	
(3) Piercing	When this box is checked, the pierced hole is made first, and trimming is started from the inner side of the work.	

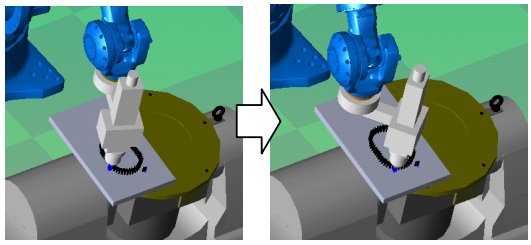
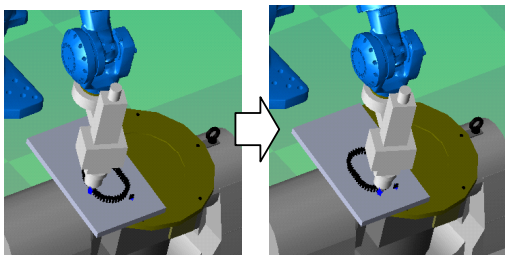
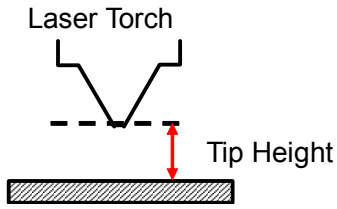
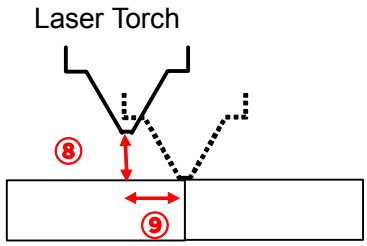
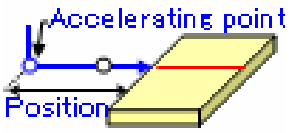
Setting of the approach to the starting point of cutting.		
(4) MOVL+MOVC	When this button is selected, the robot approaches the cutting start point by MOVL and MOVC. Specifies the linear length, the radius, and angle.	
(5) MOVL	When this button is selected, the robot approaches the cutting start point by MOVL only. Specifies the linear length.	
Adjustment of the tool height.		
(6) Piercing point	Specifies the height direction offset of the tool at the piercing point.(Units: mm)	
(7) Initial point of the arc	Specifies the height direction offset of the tool at the initial point of the arc. (Units: mm)	
(8) Midway point of the arc	Specifies the height direction offset of the tool at the midway point of the arc. (Units: mm)	
Approach direction		
(9) X+	When the approach is "MOVL+MOVC", and this button is selected, the robot approaches from X+ direction of the cutting start point frame. When the approach is "MOVL", this is not available.	
(10) X-	When the approach is "MOVL+MOVC", and this button is selected, the robot approaches from X- direction of the cutting start point frame. When the approach is "MOVL", this is not available.	

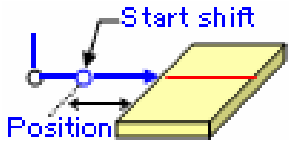
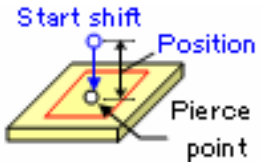
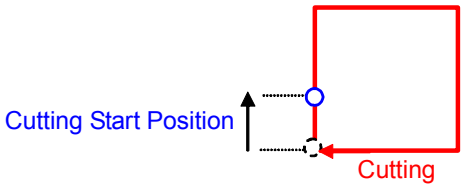
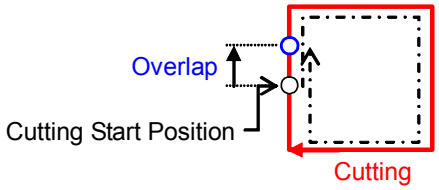
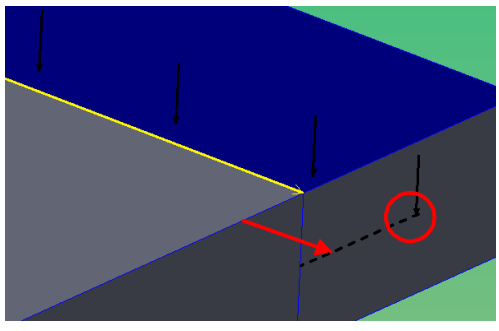
(11) Preview	When the approach is "MOVL+MOVC", the approach is displayed according to the setup of the "Approach direction", the "Linear length", the "Radius", and the "Angle." When the approach is "MOVL", this is not available.	

9.5.2 Laser Cutting 2

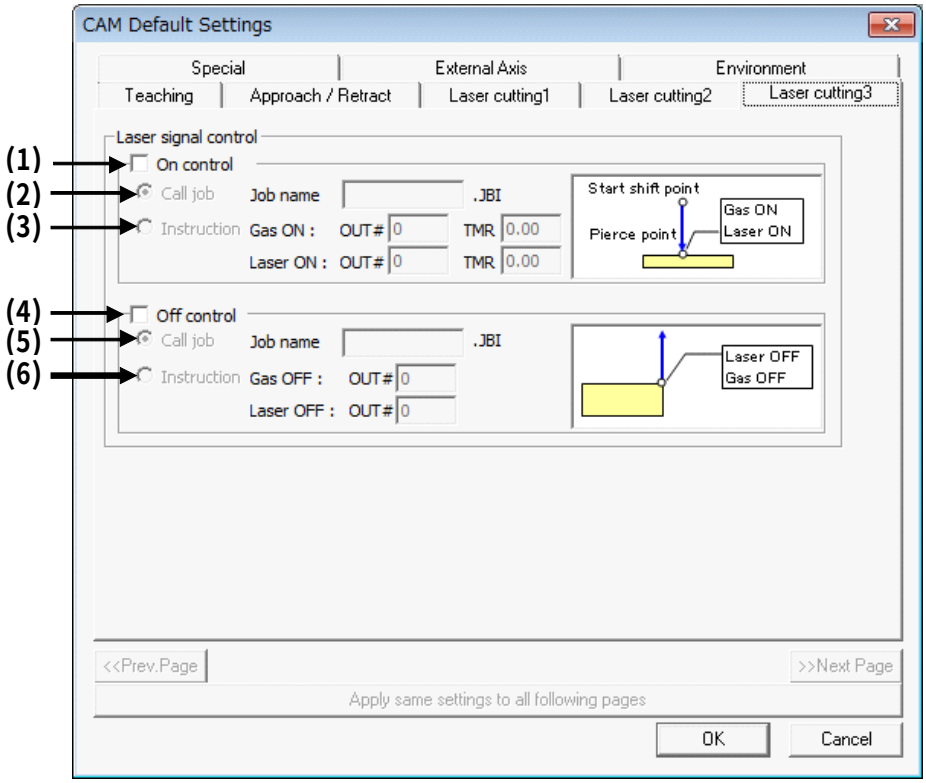


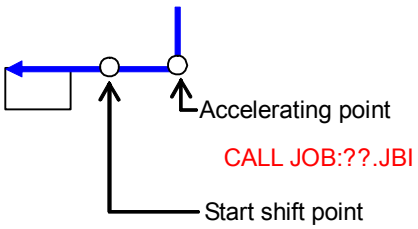
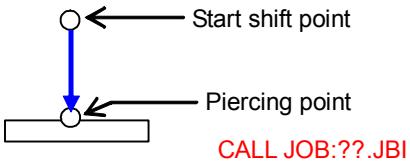
Torch position		
(1) Method to appoint the target angle.	Specifies the method to appoint the target angle. Depending on the selection between the L-Shape or I-Shape, the 0 deg. reference changes.	L-Shape  I-Shape 
(2) Target angle	Sets the angle of the torch from the 0 deg. reference plane (as defined by the Joint Shape). (Units: deg.)	
(3) Lead angle	Sets the angle of the torch from the plane perpendicular to the travel direction. (Units: deg.)	
(4) Torch angle	Sets the angle of the torch rotation. (Units: deg.)	

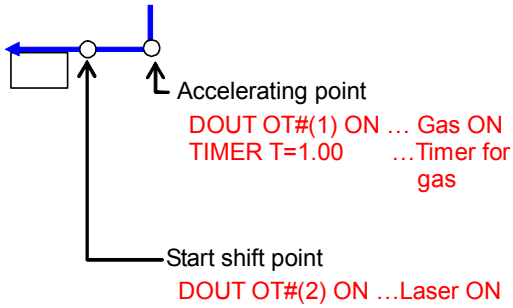
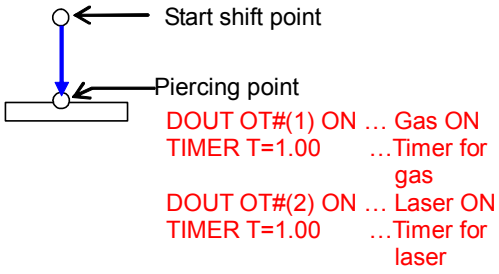
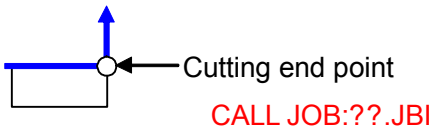
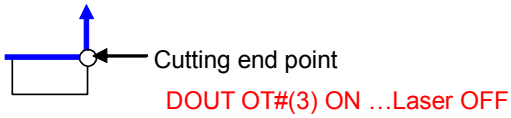
(5) Keeping an angle "Tz"	When this is checked, the target points are created so that they may not rotate about the tool Z.	When this is not checked:  When this is checked: 
(6) Piercing	Specifies the tip height from the work at the piercing point. (Units: mm)	
(7) Cutting	Specifies the tip height from the work at the cutting points. (Units: mm)	
(8) Vertical	Sets the vertical shift amount of the target points. (Units: mm)	
(9) Horizontal	Sets the horizontal shift amount of the target points. (Units: mm)	
Accelerating point		
(10) motion type	Sets the interpolation method of the motion instruction of accelerating point.	
(11) pos	Sets the offset of the accelerating point from the beginning of the edge. (Units: mm)	
Start Shift		

(12) motion type	Sets the interpolation method of the motion instruction of start shift point.	When piercing is not executed: 
(13) pos	Sets the offset of the start shift point. (Units: mm)	When piercing is executed: 
(14) Piercing point	Sets the interpolation method of the motion instruction of piercing points.	
Adjustment of cutting pos.		
(15) Cutting Starting	Sets the offset of the cutting start position. (Units: mm) When this is set 0mm, the starting point of the first selected edges is the cutting start position.	
(16) Overlap	Sets the overlapped amount. (Units: mm) When this is set, even after going around to the cutting start position, robot continues moving a specified amount.	
(17) End shift	Sets the offset of the start shift point. (Units: mm) Add the end shift point at the specified position.	

9.5.3 Laser Cutting 3



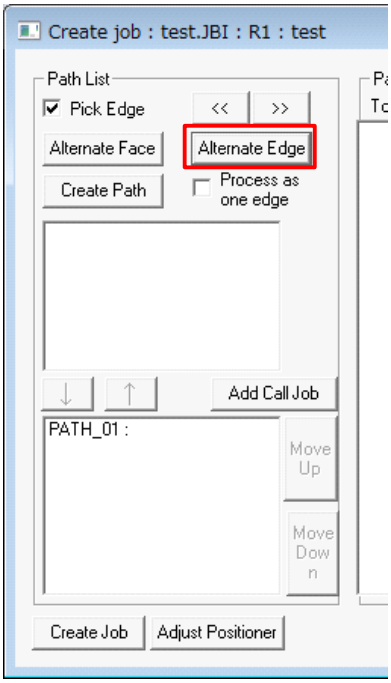
Laser signal control		
(1) On control		
(2) Call job	When this box is checked, a call instruction for the specified job name is added to turn Laser signal "ON".	When piercing is not executed:  When piercing is executed: 

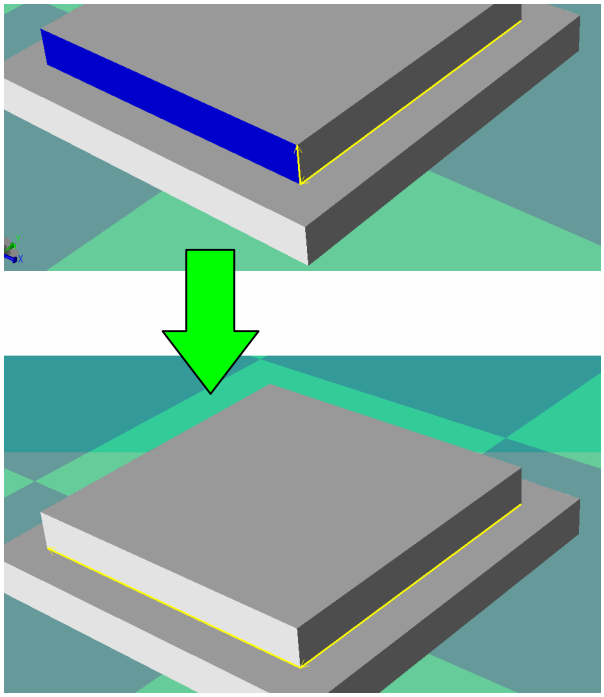
(3) Instruction	Selects to specify the Laser signal settings. Sets the Out signal to turn gas ON and the timer value for gas. And, set the Out signal to turn laser ON. When the piercing is executed, set the timer value for laser.	When piercing is not executed:  When piercing is executed: 
(4) Off control		
(5) Call job	When this box is checked, a call instruction for the specified job name is added to turn Laser signal "OFF".	
(6) Instruction	Selects to specify the Laser signal settings. Sets the Out signal to turn gas OFF and laser OFF.	

10 Create Job Dialog Advance Operation

10.1 Alternative Edge Button

When selecting consecutive edges, depending on the CAD model, there may be multiple edges continuing from the end of the currently selected edge. In such case, when pressing the continuation buttons [<<] or [>>], one of the possible edges will be arbitrarily selected. If the selected continuing edge is not the desired one, repeatedly press the [Alternative Edge] button to iterate through all the possible edges until the desired edge become the selected one.

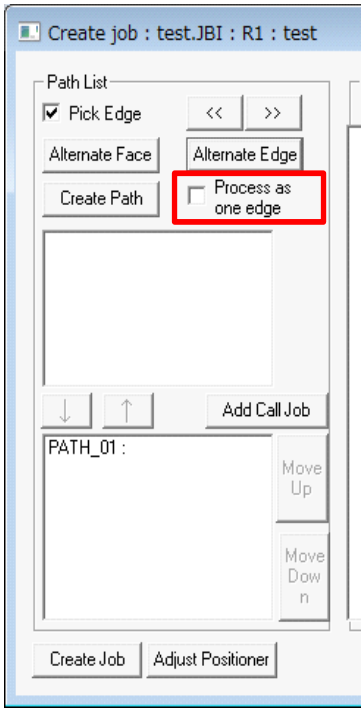


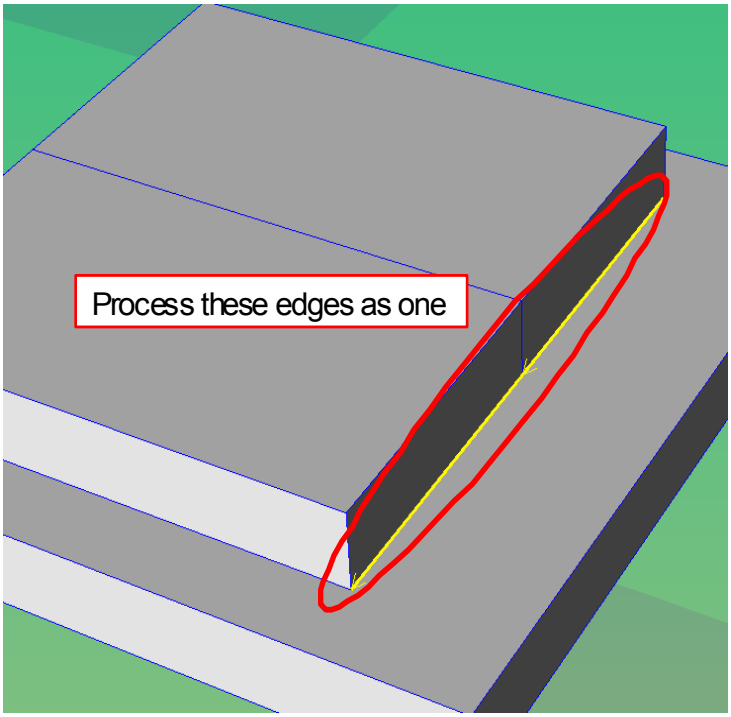


10.2 Process as One Edge Option

There may be cases where the edge on the CAD model looks like a straight line but it is not actually composed of a single edge. In such case, if desired, the multiple edges can be processed as a single edge by checking the "Process as one edge" box. However, when processing multiple edges as one line, offset values for the start and end point cannot be set.

NOTE This function is enable for "arc-welding use" and "general purpose use" only.

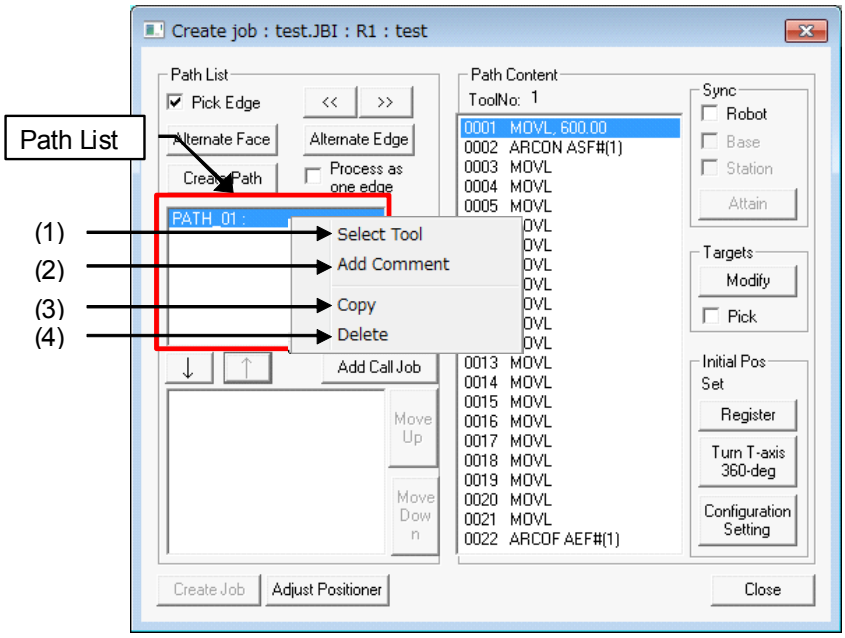


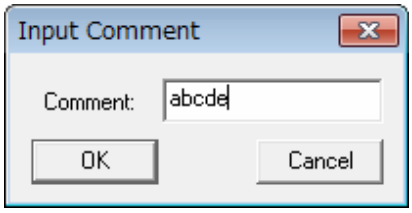
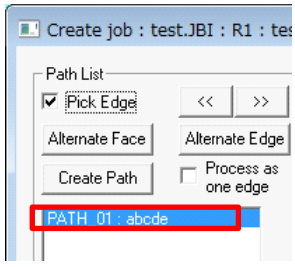


10.3 Right Click Menu

10.3.1 Path List

When an item from the "Path List" is selected and the right mouse button is clicked, the associated pop-up menu displays with the following items.

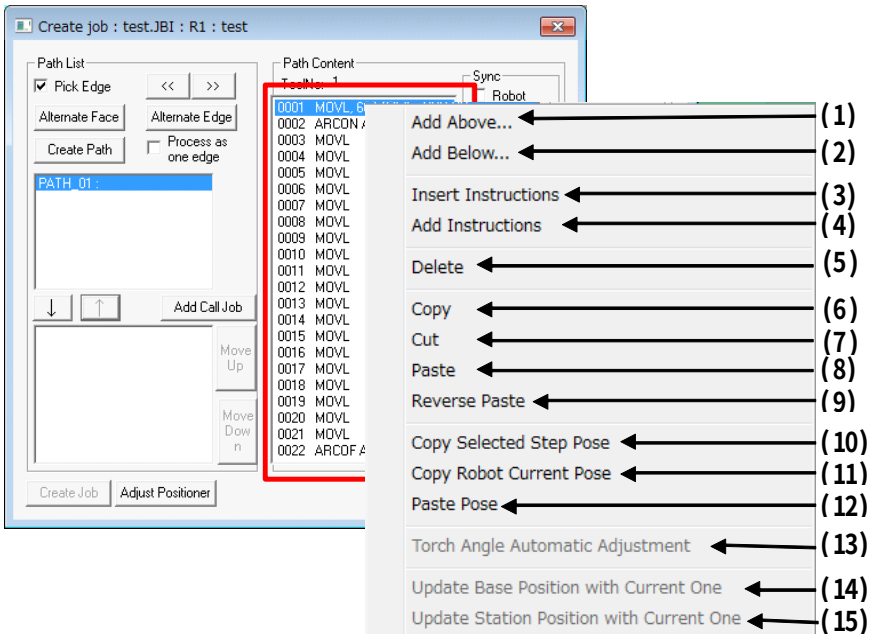


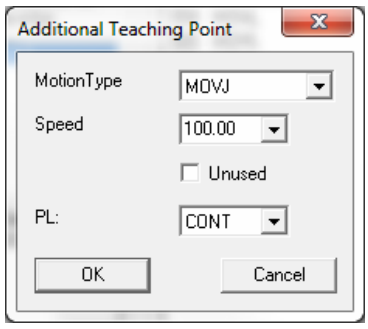
Select Tool	Displays the "Select Tool" dialog to select the tool to be used with this path. For details, refer to section " 7.2 Tool Number Selection "
Add Comment	Sets a comment to help identify the path. Select this item to display the following dialog.  Enter a comment and then press the [OK] button. The comment displays next to the path in the "Path List".  The comment is limited to 10 characters.
Copy	The path chosen by the path list is copied.

Delete	Deletes the selected path from the list

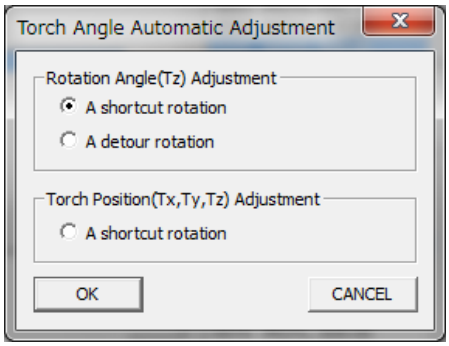
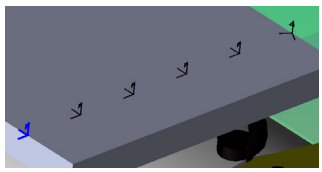
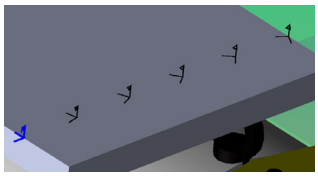
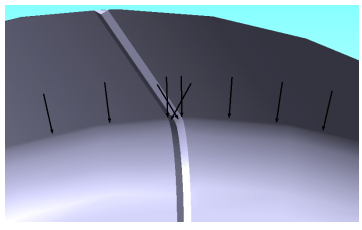
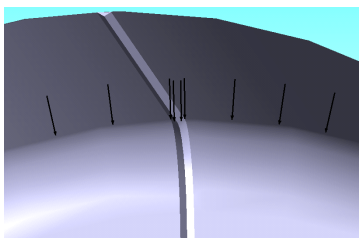
10.3.2 Path Content List

When an item from the "Path Content" list is selected and the right mouse button is clicked, the associated pop-up menu displays with the following items.



(1)Add Above...	Adds instructions for moving to the position of the robot (base/station) displayed in MotoSim EG-VRC. Instructions are added above the item selected in the Path Work List.	Clicking (1) or (2) will display the following dialog box.  If there is a station, the Motion Type item will display SMOV*. The speed unit is the same as that set in the Environment tab. For example, with Motion Type: MOVJ and a speed of 100.0 set, if Unused is not selected, MOVJ VJ=100.0. If Unused is selected, MOVJ is set. PL determines the positioning accuracy.
(2)Add Below...	Adds instructions for moving to the position of the robot (base/station) displayed in MotoSim EG-VRC. Instructions are added below the item selected in the Path Work List.	
(3) Insert Instructions	Inserts instructions registered by instruction registration in the {Default Setting} - {Environment} tab above the item selected in the Path Work List	

(4) Add Instructions	Adds instructions registered by instruction registration in the {Default Setting} - {Environment} tab below the item selected in the Path Work List.
(5) Delete	Deletes the selected items from the Path Work list.
(6) Copy	Copies the posture of the robot axis of the item selected in the Path Work List. When multiple items are selected, copying cannot be performed.
(7) Cut	Copies the posture at the current value of the robot axis.
(8) Paste	Replaces the posture of the robot axis of the item currently selected in the Path Work List with the copied posture.
(9) Reverse Paste	Inserts the reverse of the row copied in the operation of (7) or (8).
(10) Copy selected step pose	Copies the posture of the current robot.
(11) Copy robot current pose	Copies the posture of the robot of the row currently selected in the Path Work List.
(12) Paste Pose	Replaces the currently selected row with the posture copied using (10) or (11). Replaces everything of the row selected in the Path Work List.

(13) Torch Angle Automatic Adjustment	Torch angle automatic adjustment function is used. When two arbitrary lines are selected, the torch angle is gradually adjusted from the position of the minimum line of a selection line to the position of the maximum line.	When this is selected, the below dialog is displayed.  Rotation Angle (Tz) Adjustment Adjusts rotation about the tool Z. The rotation about the tool Z can be set in a shortcut rotation or a detour rotation. **Before**  **Shortcut rotation** **After**  Torch Position (Tx,Ty,Tz) Adjustment Adjusts rotation about the tool X, Y and Z. If this function is used, it becomes impossible to maintain the perpendicular to the work surface of target points. But, the robot can move smoothly between targets. **Before**  **After** 

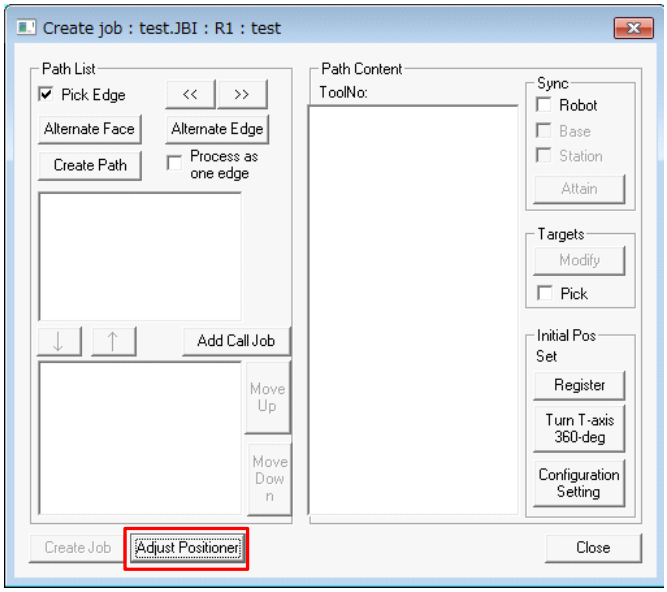
(14) Update Base Position with Current One	Overwrites the travel axis position of the item selected in the Path Work List with the travel axis position displayed in MotoSim EG-VRC.
(15) Update Station Position with Current One	Overwrites the station axis position of the item selected in the Path Work List with the station axis position displayed in MotoSim EG-VRC.

10.4 Positioner Adjustment

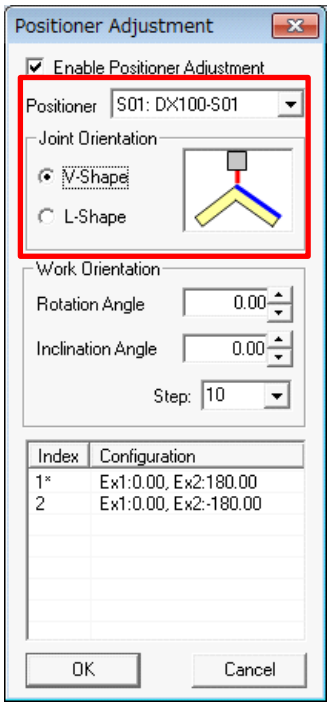
For a system with a robot and a positioner, the position of the positioner must be determined so a path can be generated from the detected edges. Using the positioner adjustment function, the positioner can be set to automatically adjust its position to maintain certain criteria such as keeping orientation of the selected edges in a plane horizontal with the ground. When selecting multiple edges together, the positioner adjustment is based on the first selected edge. In the case of a curved edge, the tangent of the starting point is positioned to be horizontal with the ground.

Procedure

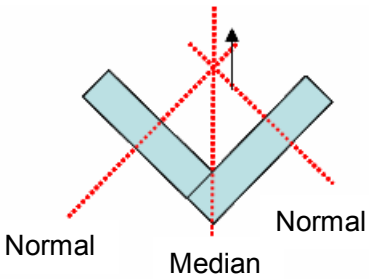
1. Select an edge on the work piece.
2. Click the [Adjust Positioner] button on the "Create Job" dialog to display the "Positioner Adjustment" dialog.



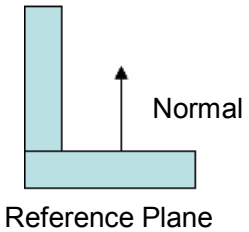
3. Select the "Joint Orientation" mode between a "V" and an "L" shape.



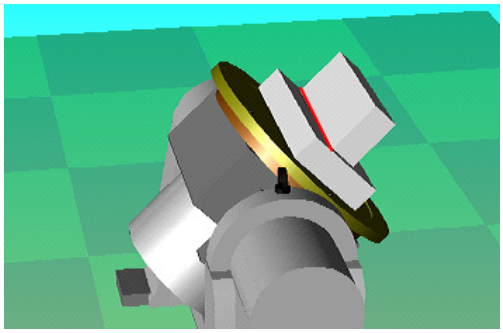
V-Shape: Adjustment to keep the median between the normals of the two planes forming the edge straight up.
L-Shape: Adjustment to keep the normal of the reference surface of an edge straight up.



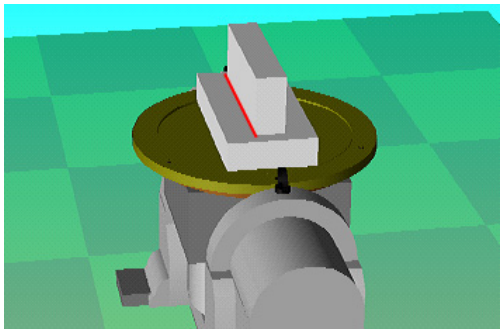
V-Shape



L-Shape

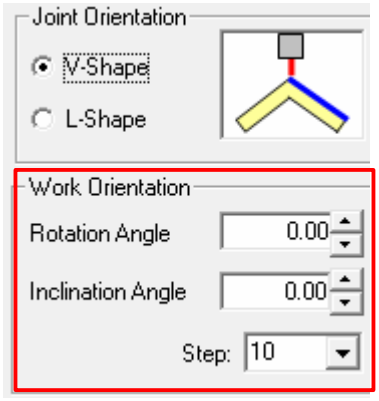


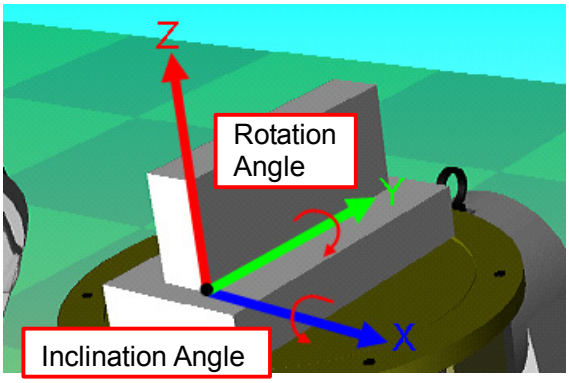
V-Shape



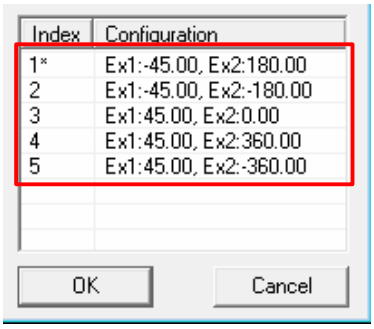
L-Shape

4. In the case where more specific angles are required, the rotation and inclination angles can be set. For the work orientation, the direction of the Y-axis is along the edge, the Z-axis in the upward direction and the X-axis is perpendicular to the both the Y and Z axes. The "Rotation Angle" turns about the Y-axis to change the position walls forming the edge and the "Inclination Angle" turns about the X-axis to change the slope of the weld.





5. When multiple configurations are available, select the desired configuration from the list.



6. Changing the selected edge on the work will cause adjustments to be madeto maintain the selected edge horizontal to ground. To prevent the positioner from changing position when selecting an edge, uncheck the "Enable Positioner Adjustment" box.

MotoSim EG-VRC OPTIONS INSTRUCTIONS

FOR CAM FUNCTION (FOR ARC WELDING, GENERAL PURPOSE, LASER WELDING, AND LASER CUTTING))

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