

# 3D Engrave

## USER'S MANUAL

This document is the operation manual for 3D Engrave for Windows, a program for making relief.

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# Part 1

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**What's 3D Engrave?**

## 1-1 System Requirements

### Computer

Personal computer running Windows 95, Windows 98, Windows Me, Windows NT 4.0, or Windows 2000

### CPU

- If you're using Windows 95 : i486SX or better (Pentium 100 MHz recommended)
- If you're using Windows 98 : i486DX or better (Pentium 100 MHz recommended)
- If you're using Windows Me : Pentium 150 MHz or better
- If you're using Windows NT 4.0 : i486DX or better (Pentium 100 MHz recommended)
- If you're using Windows 2000 : Pentium 133 MHz or better

### System Memory

- If you're using Windows 95 : 8 Mbyte or more (16 Mbyte or more recommended)
- If you're using Windows 98 : 16 Mbyte or more (32 Mbyte or more recommended)
- If you're using Windows Me : 32 Mbyte or more
- If you're using Windows NT 4.0 : 16 Mbyte or more (32 Mbyte or more recommended)
- If you're using Windows 2000 : 32 Mbyte or more

### Hard Disk

A hard disk with at least 10 MBytes of free space is required.

## 1-2 Overview of 3D Engrave

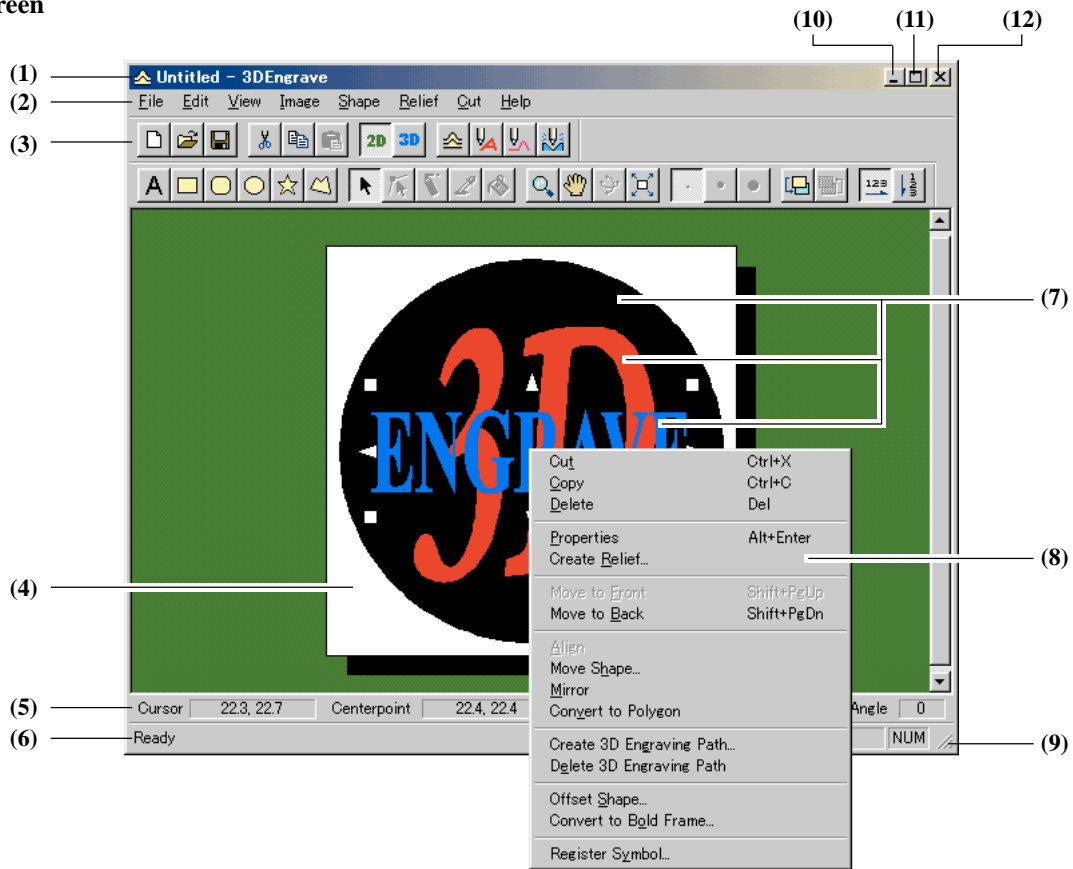
3D Engrave is a program for creating reliefs (raised engravings) and engravings on curved surfaces.

### Main Features of 3D Engrave

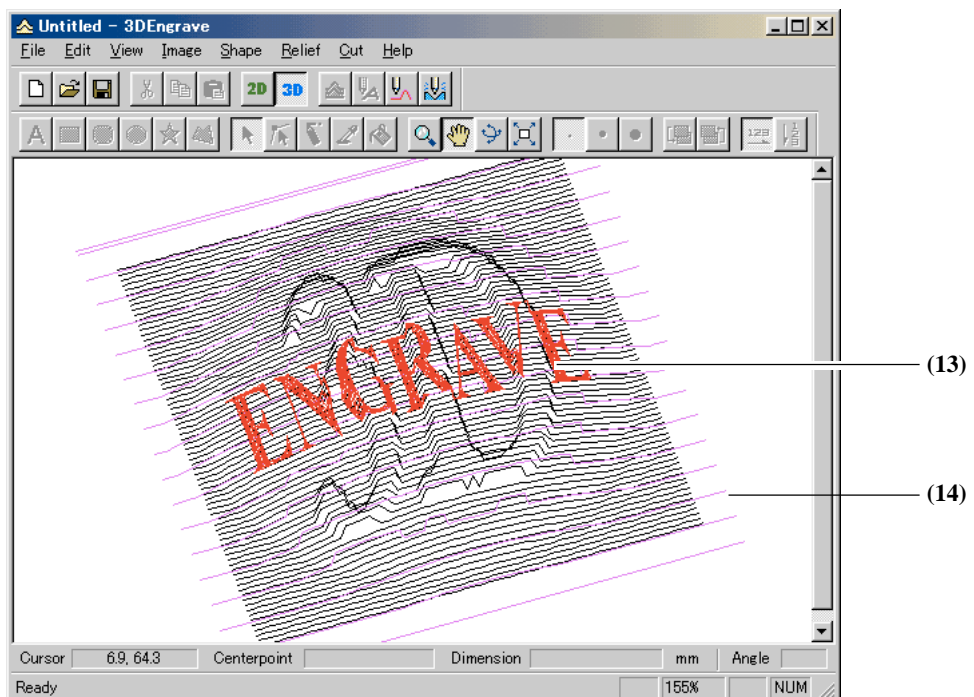
- Make flat shapes three-dimensional.  
You can apply thickness to shapes, text, and images that have no thickness, and create reliefs (raised engravings). You can press shapes and text outward in the height direction to make them three dimensional.
- Engrave the surfaces of solid objects.  
When used together with a 3D scanner and modeling machine from Roland DG Corp., you can engrave shapes and text by tracing the surface shape of a solid object. You can also scan a solid object with a 3D scanner and create the tool path for engraving on the surface of three-dimensional data. 3D Engrave can import Dr. PICZA files.
- Make figures and other images three-dimensional.  
You can import image files for figures and the like, and make them three dimensional.  
Note that photographs and other images with continuous gradations are not suitable for being made three-dimensional. It's best to use images with clearly defined borders between colors. Using binary (black and white) images when possible is recommended.  
Images can be entered by [importing them from a TWAIN-compliant image scanner](#) connected to the host computer, or by [importing an image file saved in bitmap \(BMP\) format](#). You can also register a converted graphic as a symbol.
- Create tool paths.  
You can create the path that the tip of the tool follows (the tool path).  
The cutting parameters required for creating the tool path (such as the cutting-in amount and the path interval) are set automatically simply by choosing the composition of the material and the specifications of the tool. Optimal cutting parameters for the material and tool combination are selected.  
Supported tool-tip configuration are the square end mill, ball end mill, and engraving tool.
- You can save solid shapes created with 3D Engrave as files in DXF, STL, or VRML format.
- You can perform surfacing for cut materials.

# 1-3 Names and Functions of Screen Items

## ■ 2D Screen



## ■ 3D Screen



**(1) Title bar**

The file name and program name are displayed here. The window can be moved by dragging the title bar.

**(2) Menu Bar**

Runs the various commands for 3D Engrave.

 Related Topics     [\[File\] menu](#)  
[\[Edit\] menu](#)  
[\[View\] menu](#)  
[\[Image\] menu](#)  
[\[Shape\] menu](#)  
[\[Relief\] menu](#)  
[\[Cut\] menu](#)  
[\[Help\] menu](#)

**(3) Toolbar**

The toolbar is provided with buttons for running 3D Engrave commands such as [Open...] and [Save]. Moving the mouse pointer over a button displays a brief description of the button's function.

 Related Topics     [Toolbar buttons](#)

**(4) Relief area**

This white rectangle shows the cutting area set with [Relief] - [Relief Size].

An object that protrudes beyond this area is not output.

**(5) Object Information Bar**

This shows the location of the mouse pointer, as well as the centerpoint, size, angle, and slant of the object.

**(6) Status Bar**

This shows 3D Engrave's state of operation and provides brief descriptions of commands.

This also shows object color and amount of zoom in or zoom out for the image.

**(7) Object**

This is a collective term for shapes, text strings, and images.

**(8) Popup menu**

Clicking the right mouse button within an editing area makes a menu appear.

The commands you can use differ according to the type of object that is chosen.

**(9)**

When the mouse pointer is moved close to here, the pointer changes to a diagonal arrow. You can then change the window size by dragging.

**(10) Minimize button**

This shrinks the window to a button on the taskbar.

**(11) Maximize button**

This expands the window to fill the screen.

**(12) Close button**

This ends the program.

If changes made to the file being edited have not been saved, a dialog box asking if you wish to save the changes is displayed.

**(13)**

The red line is the tool path for engraving.

This is the tool path for engraving on the surface of the relief. Choose an object on the 2D screen, then click [Cut] - [Create 3D Engraving Path].

**(14)**

The pink line is the tool path for cutting.

The tool path for cutting is the tool path that is used for cutting the entire relief. Clicking [Cut] - [Create Tool Path] calculates and displays the tool path that satisfies the present cutting parameters. The cutting parameters are set with [Cut] - [Cutting Parameters].



# Part 2

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**If You're Making a  
Relief for the First  
Time**

This chapter highlights the general basic knowledge needed to perform cutting.

If this is your first experience with cutting, be sure to read this chapter. After you have read it, go to "Trying it Out" and take a look at "Creating a Relief" and "Engraving on a Curved Surface," and try out cutting yourself. There you'll find explanations of actual cutting examples that use 3D Engrave. The following chapter has a section called "Break down the item into smaller parts," but you cannot break down items into smaller parts using this program. To break down an item into smaller parts, you need to use Export to save 3D data to a file, then open it with a commercially available program to accomplish the task.

## Before Starting to Cut

When creating a shape by cutting, the most important matters the material and the shape being cut. These determine the method and procedure for cutting.

After you've performed cutting a few of times and familiarized yourself with the process, you'll find yourself planning the steps for a new cutting project in your head. Until then, you should plan out the steps for cutting first, before you start work.

This is the best method for not wasting time and materials. The secret to good planning is to consider the operation in reverse, starting from the finished item.

- 1 Decide on the size of the finished item.
- 2 Decide on the composition of the workpiece.
- 3 Break down the item into smaller parts.
- 4 Choose the tool.

### 1 Decide on the size of the finished item.

Decide on the size when finished.

If it is larger than the modeling machine's cutting area, you must divide it into portions of cuttable size.

### 2 Decide on the composition of the workpiece.

After making it, how will it be used? The composition to use differs according to the purpose of the item.

Because there are restrictions to the compositions that can be cut according to the modeling machine, choose the a composition from among those available that is suited to the item's purpose.

When deciding on the target purpose, give consideration to matters such as these:

- How much strength is required?
- How much durability is required?
- How much precision is required?
- After cutting, will further processing (such as coloring) be performed?

You may also wish to give thought to design factors such as whether you want to use wood grain. If there are no particular requirements, it's a good idea to choose a composition that is easy to cut.

### 3 Break down the item into smaller parts.

After deciding on the size and composition, divide the item into sizes and shapes that can be cut. Cut each of the component parts, then put them together.

Depending on the item's size and shape, it may not be necessary to divide it into smaller parts.

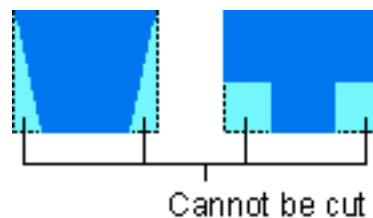
Dividing an item into smaller parts is done to break it down into units that the modeling machine can cut.

When dividing an item into parts, follow the basic rules shown below.

- After dividing, the size must be smaller than the cutting area.

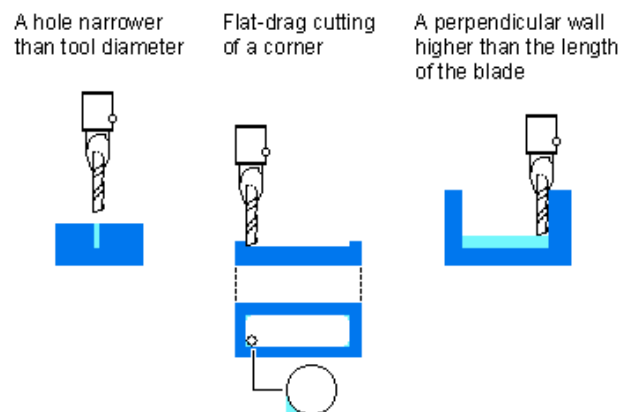
- There must be no overhang.

Because modeling machines from Roland DG Corp. employ an XYZ-axis rectangular coordinate system, you cannot cut underneath an overhanging shape.



Attempting cutting with only a modeling machine may actually take more time and trouble. In some cases, however, you may wish to deliberately leave an overhang, then after cutting, work the portion underneath by hand.

Because the tool is brought against the workpiece to perform cutting, cutting such as the following is physically impossible.



### 4 Choose the tool.

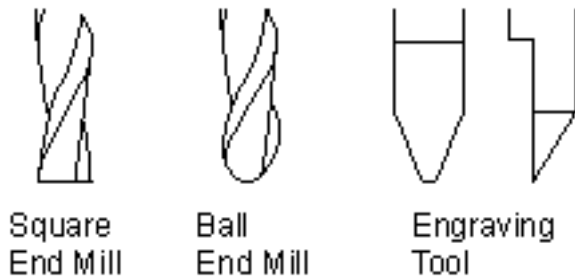
Choose a tool suited to the composition of the workpiece, the shape to cut, and the cutting method.

The main specifications that are the decisive factors when choosing a tool are the shape of the tool tip and the composition (hardness) of the tool.

The tools you can use vary according to the modeling machine. Check the operator's manual for the modeling machine you're using, or a catalog from Roland DG Corp.

**Shape of the Tool Tip**

- [Square end mill] This is a tool for cutting with a flat tip. It is suitable for cutting flat and stepped items.
- [Ball end mill] This is a tool for cutting with a rounded tip. It is suitable for cutting curved surfaces and wavy shapes.
- [Engraving tool] This is a tool for engraving with a pointed tip. It is suitable for engraving text and the like on nameplates and rating plates.

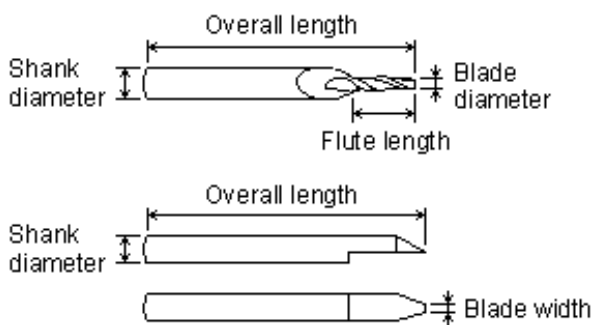


**Tool Composition (Hardness)**

Choose a tool suited to the hardness of the workpiece to cut. The following two types are optionally available from Roland DG Corp.

- [High-speed steel] This is the standard tool when performing cutting. It is suitable for cutting resin, foamed material, balsa, and the like.
- [Cemented carbide] This features a long life compared with high-speed steel. Besides resin, it is suitable for cutting aluminum, brass, and hard wood (such as magnolia).

**Other Specifications**



- [Shank diameter] Choose a diameter that can be mounted on the modeling machine.
- [Mill diameter] Choose an item that can cut detailed portions of objects.
- [Blade width] Make your choice according to the size of the text to engrave.

# Part 3

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Trying It Out

## 3-1 Creating a Relief

### What's a Relief?

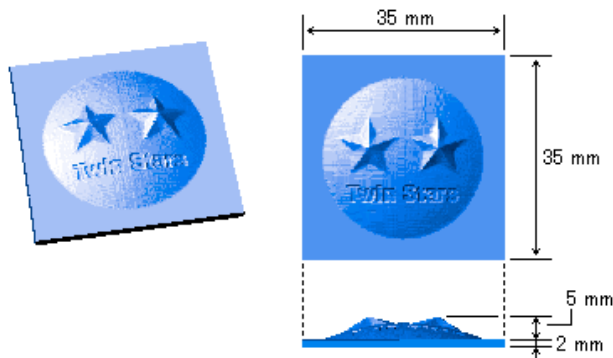
Relief, or raised engraving, is an engraving method for cutting a three-dimensional shape into a flat surface so that it is raised above the surface.

It could be called a form of artistic expression intermediate between painting and sculpture.

### What You're Going to Make

This describes the steps for making the relief shown in the figures.

You create all of the relief except for the text, then engrave the text on the relief.



Modeling wax, which is comparatively easy to cut, is used as the material.

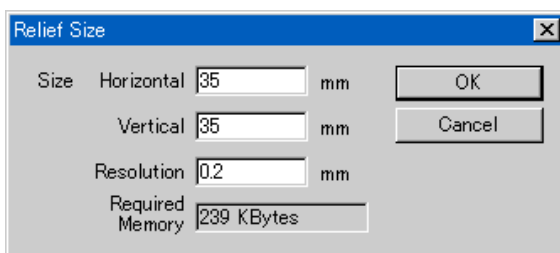
A square end mill is used for the relief (except for text) and for surfacing, and an engraving tool is used to cut the text portion. The tools have the following specifications.

Square End Mill	Engraving Tool
Blade diameter: 3 mm	Tool diameter: 3 mm
	Blade width: 0.32 mm
	Blade angle: 24.2 degrees

### Step 1: Decide on the size.

When you create a new file, first enter the size of the relief. If you want to change the dimensions later, click [Relief] - [Relief Size].

1. Click [File] - [New...].  
The [Relief Size] dialog box appears.
2. Enter the size of the relief.  
In this example, enter 35 for [Vertical] and 35 for [Horizontal].



3. Type in the degree of detail for the relief at [Resolution]. Smaller values make for a relief with correspondingly smoother curves, but require more memory. When performing actual cutting, making this value smaller than the modeling machine's cutting precision has no significance.  
In this example, enter 0.2.


4. Click [OK].

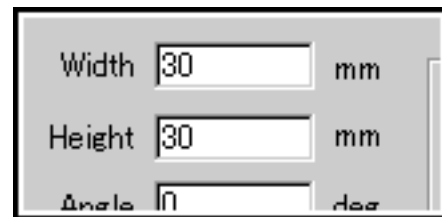
Related Topics [\[Relief\] menu](#)

### Step 2: Create the shapes.

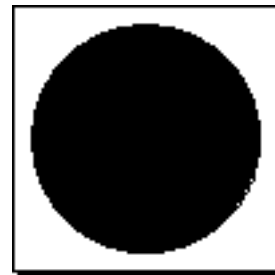
Create the shapes and lay them out in the cutting area you set. In this example, you'll make a circle and a star.

#### Make the circle.


1. Click .  
The mouse pointer changes to the shape-drawing tool (+).
2. Hold down the [Shift] key and drag to make a circle.
3. Click [Shape] - [Properties...].  
The [Shape Properties] dialog box appears.
4. For [Width] and [Height], enter 30 mm, then click [OK].



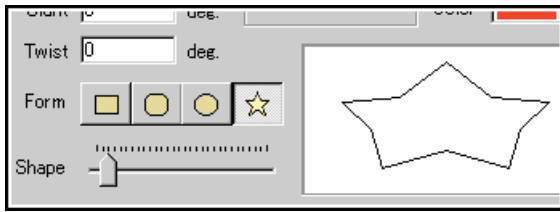
5. Click [Shape] - [Move Shape...].  
The [Move Shape] dialog box appears.
6. Click the center of the shape.  
For [X] and [Y], enter 17.5, then click [OK].  
The circle is laid out at the center of the cutting area.




#### Make the star.

7. Click .
8. Drag to make a star.
9. Click [Shape] - [Properties...].  
The [Shape Properties] dialog box appears.
10. When the star overlaps the circle, change the color so that the star remains visible.  
Click the [Color] arrow, then click red.

- Reduce the number of vertices on the star to change it to five vertices.  
Drag the [Shape] slider to set the number of vertices to 5.



- Click [OK].
- Click , then drag the star to lay it out at the location shown in the figure.






- Click [Edit] - [Copy], then click [Edit] - [Paste].  
The star is copied, and a star of the same shape is placed over the original star.
- Hold down the [Shift] key and drag to the right-hand side to lay it out at the location shown in the figure.



### Step 3: Enter text.

Enter the text, then set the size and font.

- Click .  
The mouse pointer changes to the text-editing tool (  ).
- Click at the start point for entering text.
- Type "Twin Stars" from the keyboard.
- Click .
- Click [Shape] - [Properties...].  
The [Text String Properties] dialog box appears.
- Click the [Font] arrow, then click Arial.




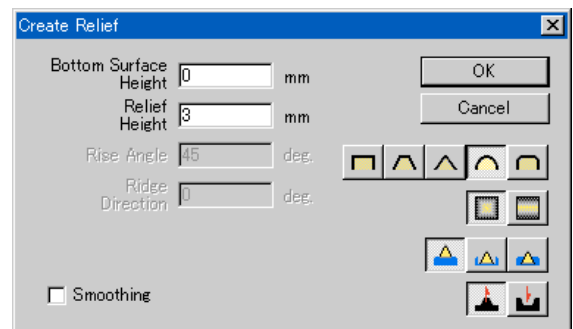
- For [Width], enter 20 mm.
- When the text overlaps the circle, change the color so that the text remains visible.  
Click the [Color] arrow, then click green.
- Click [OK].
- Drag the text to lay it out at the location shown in the figure.



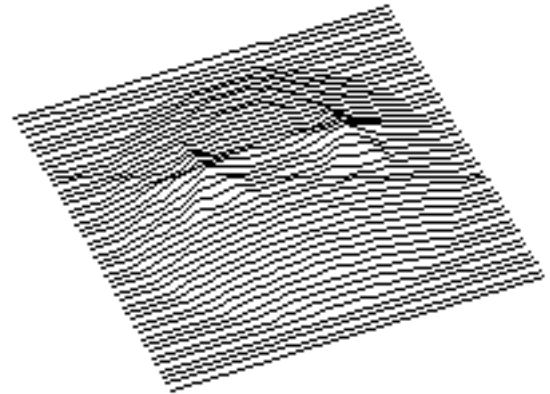
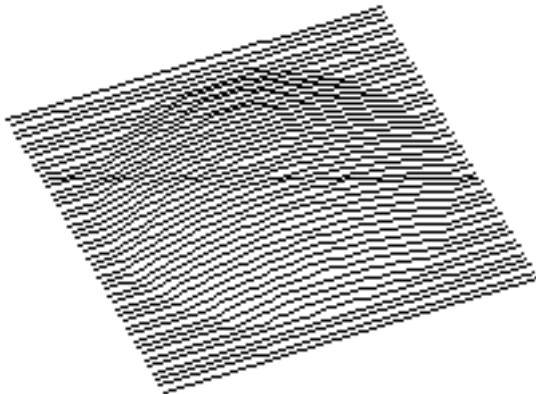
### Step 4: Create the relief.

Add thickness to the shapes to make the relief.  
Work in sequence from the bottom up to create the relief in successive layers. The relief you're making in this example has the form of two stars added on a curved surface like a portion cut from a sphere, so make the relief by working first with the curved surface like a portion of a sphere, and then the stars.

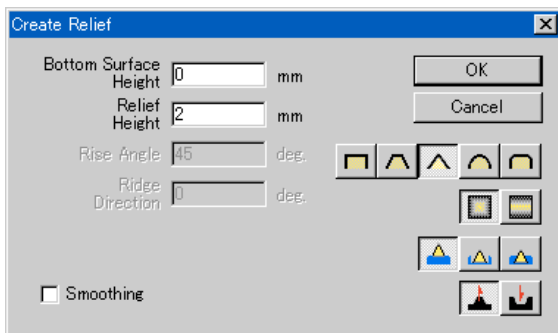
- Click .
- Click the circle to choose it.
- Click [Relief] - [Create Relief].  
The [Create Relief] dialog box appears.
- Make the settings as shown below.



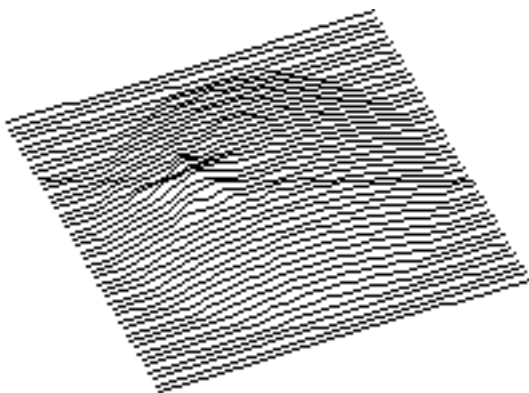
- Click [OK].  
The view switches to the 3D screen and shows the shape of the relief.



- Click **2D** to return to the 2D screen.
- Click anywhere outside the circle to cancel the selection for the circle.
- Click one of the stars to choose it.
- Make the settings as shown below.



- Click [OK].  
The view switches to the 3D screen and shows the shape of the relief.



- Click **2D** to return to the 2D screen.
- Carry out the same steps (steps 8 through 10) for the other star as well.

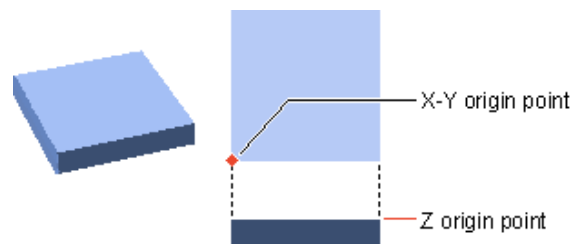
### Step 5: Get the machine ready.

Install a tool and load a workpiece on the modeling machine, then set the origin point for the X and Y axes and the origin point for the Z axis.

If necessary, after loading the workpiece, perform surfacing. Surfacing is the process of cutting the surfacing of a load workpiece to make it level. Usually it is performed in the preparation stage, before you carry out cutting.

After surfacing, a new Z-axis origin is set at the height of the surface. Use surfacing at times such as when making a leveled surface the reference surface in the depth direction (the Z-axis origin) or when eliminating unevenness on the surface of a workpiece.

- Load a workpiece and install a tool on the modeling machine.  
In this example, load a workpiece larger than 35 mm (vertical) by 35 mm (horizontal) by 7 mm (thickness). A workpiece that is too large takes a long time to cut, so a workpiece having a margin of just a few millimeters is best.  
For information on how to mount it, see the operator's manual for the modeling machine.
- Operate the modeling machine to set the Z-axis origin at the surface of the workpiece.  
Also, set the X- and Y-axis origin at the lower-left point of the workpiece.  
For information on how to make the settings, see the operator's manual for the modeling machine.



- When you're done loading the workpiece, installing the tool, and setting the origin points, perform surfacing. Before you actually perform surfacing, enter the cutting parameters for the surfacing task.
- Click [Cut] - [Cutting Parameters].  
The [Cutting Parameters] dialog box appears.

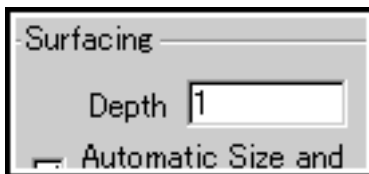
- Click the [Material] arrow and choose the composition of the loaded workpiece.  
In this example, click Modeling Wax.



- Click [Tool] type, and enter the specifications for the tool.  
In this example, click Square End Mill. For the blade diameter, enter 3 mm.



- Click [OK].
- Click [Cut] - [Layout...].  
The [Layout - Surfacing Setup] dialog box appears.
- For [Depth], enter the cutting-in amount from the Z-axis origin.  
In this example, enter 1.0 mm.



- Click [Start Surfacing].
- A prompt to confirm the start of surfacing appears. Click [OK].

When surfacing is finished, then without removing the workpiece or the tool, carry out Step 6 and after.

## Step 6: Create the tool path for draft cutting.

Create the path that the tip of the blade traces (the tool path). A tool path that satisfies the present cutting parameters is created, so before creating the tool path, make the settings for the cutting parameters. You can make the settings for the cutting parameters by choosing the tool and the workpiece. When you choose the composition and the tool, the settings for suitable cutting parameters (cutting-in amount, feed speed, and so on) are made.

You can also enter your own original cutting parameters when using a new tool or a workpiece with a new composition. However, an error in the settings may not only result in incorrect cutting, but may even cause the tool to break during cutting, so the cutting parameters must be set with great care. Cutting has two processes: draft cutting and finishing. You make the tool path for draft cutting and perform cutting, then output the tool path for finishing to complete the item. In this example, you also create a tool path for engraving, and after performing finishing, engrave the text.

### Create the tool path for draft cutting.

Cut the general shape of the relief, leaving a margin to be cut away during finishing.

In this process, you do not create the tool path for engraving the text. This is because the tool path for engraving does not

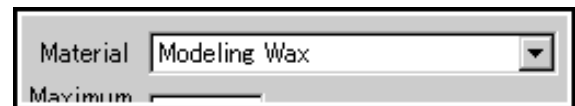
take into account stepwise cutting-in until the desired depth is reached, and so including the path for engraving in draft cutting may cause the cutting-in amount for one pass to exceed the limit.

- Click [Cut] - [Create Tool Path].  
The [Cutting Parameters] dialog box appears.

- For [Process], click [Draft Cutting] to select it.



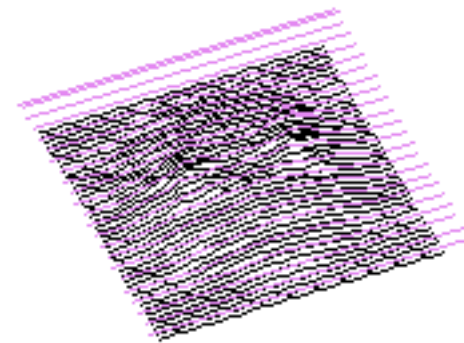
- Click the [Material] arrow and choose the composition of the loaded workpiece.  
In this example, click Modeling Wax.



- Click [Tool] type, and enter the specifications for the tool.  
In this example, click Square End Mill. For the blade diameter, enter 3 mm.



- Enter the cutting depth in [Maximum Depth].  
When the dialog box appears, the thickness of the relief is already entered. In this example, you are cutting the entire relief, so click [OK] without changing the value.
- Click [Cut] - [Create Tool Path].  
A dialog box appears while processing is in progress. When the processing finishes, the display switches to the 3D screen and the tool path appears as a pink line.



## Step 7: Before cutting, check the shape.

If Virtual MODELA is installed and set up, then before you perform cutting you can check the shape that will be produced after cutting.

Send the tool path you created to Virtual MODELA and simulate the movement of the tool. To view the completed shape on-screen after finishing ends, send both the draft-cutting tool path and the finishing tool path, in that order.

- Click [File] - [Output Preview].  
Virtual MODELA starts and imports the tool path.



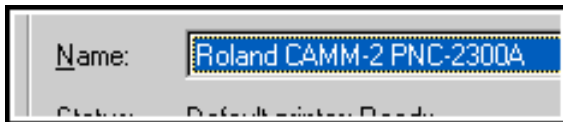
- When the tool paths are imported, simulation of cutting starts.  
An animated display of tool movement appears, and the shape after cutting is gradually produced.  
You can also view only the cutting results, without showing the animation.
- To display a three-dimensional view of the shape after cutting, click [View] - [Screen] - [3D View].  
To display the three-dimensional view in greater detail, click [View] - [Confirmation Drawing] - [Precise Rendering].
- To get a rough estimate of cutting time, click [Simulation] - [Estimate Cutting Time].

For detailed information on using Virtual MODELA, take a look at the help for Virtual MODELA.

## Step 8: Send the data and perform cutting.

Once you've made sure the shape is what you expected, output the data to the modeling machine and perform actual cutting.

- Click the 3D Engrave window to make it active.
- Click [File] - [Output Device Setup].  
The [Print Setup] dialog box appears.
- Click the [Name] arrow and choose the driver for the output device.  
The driver you chose is saved in memory. The setting is retained even after you quit 3D Engrave.



- Make sure [Where] shows the port where the modeling machine is connected, then click [OK].  
If the port is different, make the setting for the correct port.  
You cannot make the setting at [Properties...] in the [Print Setup] dialog box. Go into the [Printers] folder and open the properties for the driver.



- Click [File] - [Output].  
The tool path is sent to the modeling machine and cutting starts.

When draft cutting ends, continue with finishing.

## Step 9: Create the tool path for finishing.

After draft cutting ends, perform finishing to complete the relief (except for text engraving).

In finishing, the thickness remaining after draft cutting is cut away in a single cutting pass. This means that if the sequence for draft cutting and finishing is reversed, the cutting-in

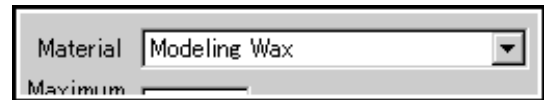
amount for one pass may exceed the limit of the tool. Be sure never to perform finishing on material that has not undergone draft cutting.

- Click [Cut] - [Cutting Parameters].  
The [Cutting Parameters] dialog box appears.

- For [Process], click [Finishing] to select it.



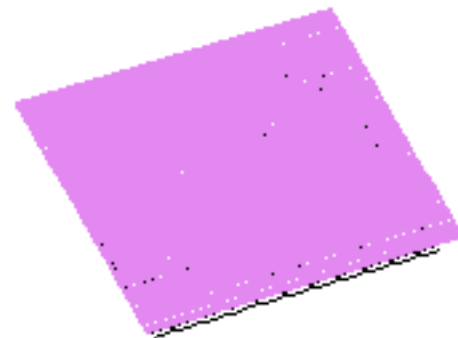
- Click the [Material] arrow and choose the composition of the loaded workpiece.  
In this example, click Modeling Wax.



- Click [Tool] type, and enter the specifications for the tool.  
In this example, click Square End Mill. For the blade diameter, enter 3 mm.



- Enter the cutting depth in [Maximum Depth].  
When the dialog box appears, the thickness of the relief is already entered. In this example, you are cutting the entire relief, so click [OK] without changing the value.
- Click [Cut] - [Create Tool Path].  
A dialog box appears while processing is in progress. When the processing finishes, the display switches to the 3D screen and the tool path appears as a pink line.



- Before performing finishing, to check the shape after cutting, click [File] - [Output Preview].  
Virtual MODELA starts and imports the tool path. If Virtual MODELA is already running, click the window to make it active.  
For more information, refer to Step 7 Before cutting, check the shape.
- To perform finishing with the modeling machine, click [File] - [Output].  
For more information, refer to Step 8 Send the data and perform cutting.



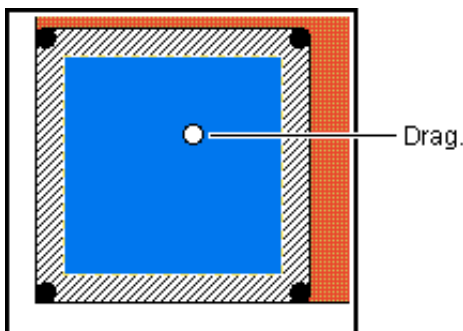
### Step 10: Engrave the text.

Now you engrave the text on the workpiece after finishing has ended.

Change the tool to the engraving tool and set a new origin point for the Z axis.

#### Change the tool and set the Z-axis origin.

1. Replace the square end mill with the engraving tool.  
For information on how to mount it, see the operator's manual for the modeling machine.
2. Use the modeling machine to move the tool to its highest position, then set the Z-axis origin.  
To avoid danger, be sure to perform this task.
3. Use the modeling machine to move the tool, then set the Z-axis origin at the highest position on the target object.  
Be careful not to damage the engraving surface.  
For information on how to make the settings, refer to the operator's manual for the modeling machine.
4. For models on which the tool cannot be moved, click [Cut] - [Layout...].  
The [Layout - Surfacing Setup] dialog box appears.
5. Drag the white circle (○) to the location of the target object.  
You can specify the tool-movement location as coordinates by entering values at [Cursor] for [X] and [Y].

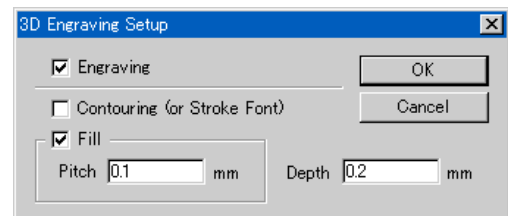


6. Double-click the white circle (○).  
The tool moves to the location you specified and descends to the Z-axis origin.
7. Press the Tool Down key on the modeling machine to align the tip of the tool with the highest position of the target object.  
Be careful not to damage the engraving surface.

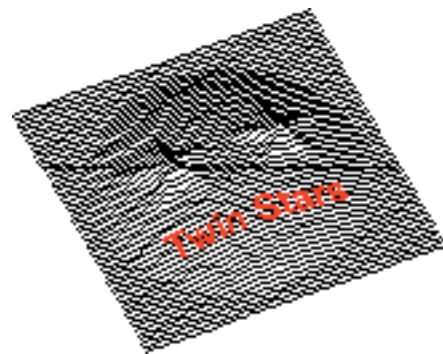


#### Create and output the tool path for engraving.

1. In 3D Engrave, click [Cut] - [Delete Tool Path].  
Because the tool path for finishing should still be remaining, it must be deleted.
2. Click **2D**.
3. Choose the text by clicking it.
4. Click [Cut] - [Create 3D Engraving Path].  
The [3D Engraving Setup] dialog box appears.
5. Make the settings as shown below.



6. Click [OK].  
The view changes to the 3D screen and shows the tool path for engraving in red.



7. Click [File] - [Output].  
The tool path for engraving is sent to the modeling machine and engraving starts.



## 3-2 Engraving on a Curved Surface

### What Is Engraving on a Curved Surface?

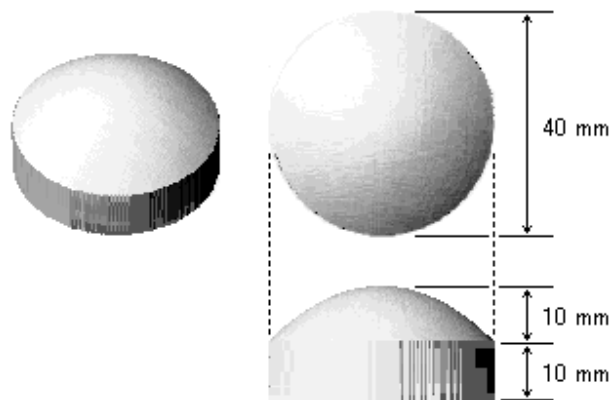
This engraves shapes and text on the curved surface of an existing object.

You use a 3D scanner and Dr. PICZA from Roland DG Corp. to scan a curved surface, then create a tool path for engraving on the three-dimensional object. 3D Engrave can import PICZA data.

There are some secrets to the method for aligning the loaded position of the target object and the output position. For more information, take a look at the procedures.

### What You're Going to Make

This describes the steps for engraving the surface of the three-dimensional object shown in the figures.



Scan the engraving surface of the three-dimensional object with a 3D scanner.

Use this 3D data to create a path for engraving the surface and engrave the company logo.



Make sure the item to be engraved is made of a material that your modeling machine can cut. This example uses chemical wood.

Because the task is for engraving shapes, use the engraving tool. The engraving tool has the following specifications.

Tool diameter: 3 mm  
Blade width: 0.32 mm  
Blade angle: 24.2 degrees

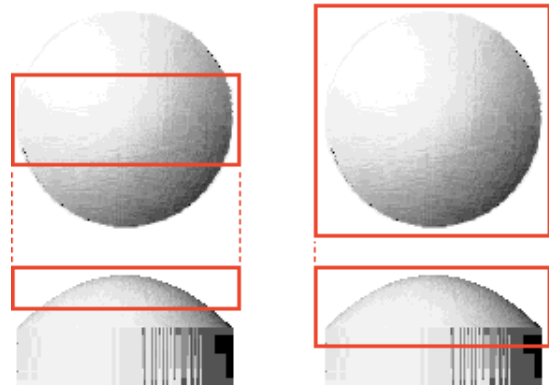
### Step 1: Scan the curved surface.

Use a 3D scanner and Dr. PICZA from Roland DG Corp. to scan the three-dimensional object for engraving. Scan the surface to engrave and save it as a PICZA format (.pix) file.

#### Note

Scan the entire outer shape of the object, and not just the area to engrave.

Set the height direction of the scanning area at a height that includes all of the curved surface to engrave.



Only the engraving area is scanned. This does not contain the curved surface.

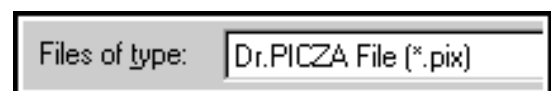
The entire area is scanned. A height that includes the curved surface is specified.

For information on how to use the 3D scanner and Dr. PICZA, refer to the operator's manual for the 3D scanner. For more information about Dr. PICZA, take a look at the help for the program.

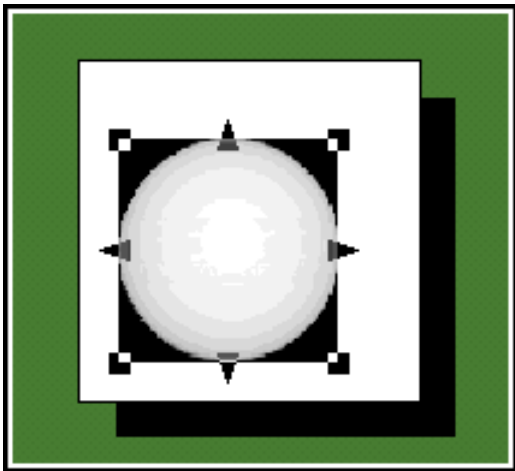
### Step 2: Import the scanning data.

Import the scanning data into 3D Engrave.

1. Start 3D Engrave and click [File] - [Import...]. The [Open] dialog box appears.
2. Click the [Look in] arrow and select the folder where the scanning data is saved.
3. Click the [File of type] arrow and choose [Dr. PICZA File (\*.pix)].




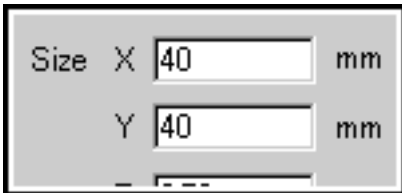
4. From the displayed list of files, click the scanning-data file to choose it.
5. Click [Open].  
The scanning data is imported and displayed in grayscale.



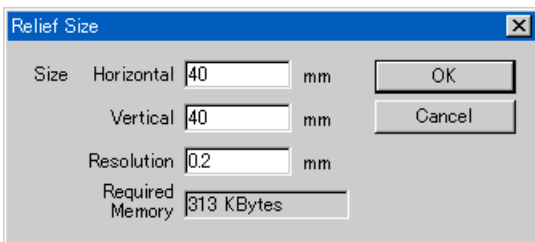
### Step 3: Decide on the size.

Make the dimensions of the relief the same size as the scanning data. Then move the scanning data to the lower left of the relief.

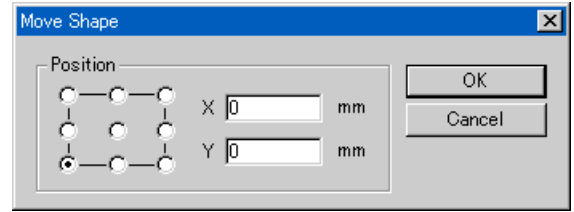
1. Click .
2. Click the imported scanning data to select it.
3. Click [Shape] - [Properties...]. The [\[PICZA Data Properties\] dialog box](#) appears.
4. Make a note of the X and Y values in [Size]. In this example, assume that these are the following values.



5. Click [Relief] - [Relief Size]. The [\[Relief Size\] dialog box](#) appears.
6. For [Size] enter the value of X you noted in step 4 in [Horizontal], and enter the value of Y you noted in [Vertical]. In this example, enter 40 mm for each.



7. Click [OK].
8. Click [Shape] - [Move Shape...]. The [\[Move Shape\] dialog box](#) appears.
9. For [X] and [Y], enter 0 mm, then click [OK].

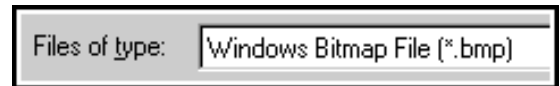




The scanning data is laid out at the lower left of the relief.

### Step 4: Import the image and convert it to polygons.

Import the image, then convert it to polygons. Conversion to polygons is performed because an engraving path cannot be created if the image remains an image. This section explains the steps for converting an image file you've already acquired with the scanner (in [Windows bitmap](#) format) to polygons.

1. [Click [File] - [Import...]. The [Open] dialog box appears.
2. Click the [Look in] arrow and select the folder where the image file is saved.
3. Click the [File Type] arrow and choose [Windows Bitmap File (\*.bmp)].



4. From the displayed list of files, click the image file to choose it.
5. Click [Open]. The image is imported.
6. Click .
7. Click the image to select it.
8. Hold down the [Shift] key and drag the  that surround the image. Drag to change the same size as in the figure. Dragging while holding down the [Shift] key changes the size without changing the vertical/horizontal aspect.



9. Click anywhere outside the image to cancel the selection.
10. While holding down the [Shift] key, click first the image, then the PICZA data.
11. Click [Shape] - [Align].  
The image is laid out at the center of the PICZA data.



12. Click anywhere outside the image and the PICZA data to cancel the selection.
13. Click the image to select it.
14. Click [Shape] - [Convert to Polygon].  
The [Contouring] dialog box appears.
15. Click [Create binary bitmap and convert contour to polygons], then click [OK].  
The [Bitmap Preview] dialog box appears.
16. The preview screen shows the image. Check what is shown, then click [OK].  
The image changes to polygons.

### Step 5: Make a base.

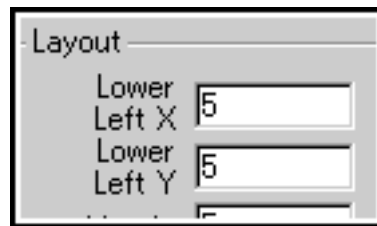
Make a base for securing in place the object to engrave. Create a mounting location for the object to enable engraving where you intend.

1. Load the workpiece on the modeling machine.  
Take care not to allow the thickness to exceed the modeling machine's height limit when the target object is loaded. In this example, the material is modeling wax with a thickness of about 15 mm.  
For information on how to mount it, refer to the operator's manual for the modeling machine.
2. Install a tool on the modeling machine.  
For information on how to mount it, refer to the operator's manual for the modeling machine.  
In this example, attach a square end mill (blade diameter 3 mm).
3. Set the X- and Y-axis origin near the lower-left point of the workpiece and the Z-axis origin on the surface of the workpiece.  
For information on how to make the settings, refer to the operator's manual for the modeling machine.

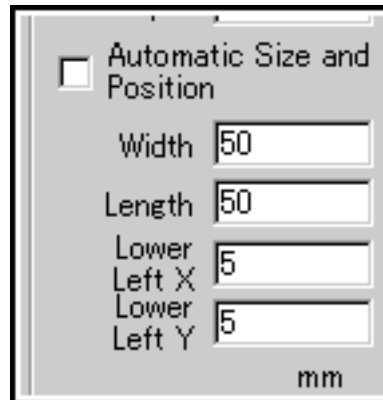
**Use the surfacing function to cut the base and create a place for mounting the target object.**

**Make the settings for the cutting parameters, the surfacing dimensions, and the location in that order, then perform surfacing.**

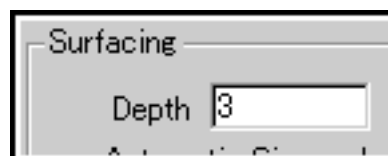
4. Click [Cut] - [Cutting Parameters].  
The [Cutting Parameters] dialog box appears.
5. Click the [Material] arrow, then click [Modeling wax].
6. For the tool-tip configuration choose [Square end mill], for [Blade Dia.] enter 3 mm, then click [OK].
7. Click [Cut] - [Layout...].  
The [Layout - Surfacing Setup] dialog box appears.
8. For [Layout], enter the values for [Lower Left X] and [Lower Left Y].  
These determine the output location for the relief. In this example, enter 5 mm for each.



9. Click [Automatic Size and Position] to cancel the selection.

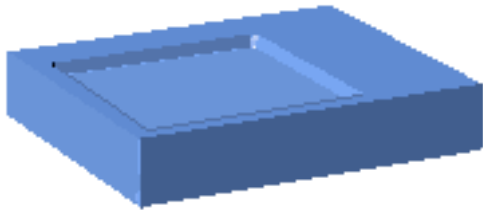


10. Enter 50 mm for [Width] and 50 mm for [Height].
11. Enter values for [Lower Left X] and [Lower Left Y] so that the origin points for the relief area and the surfacing area are the same.  
In this example, enter 5 mm for each.
12. Enter the depth for surfacing.  
In this example, for [Surfacing], enter 3 mm for [Depth].



13. Click [Start].

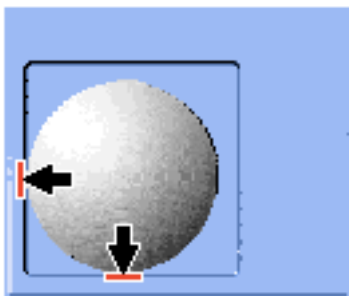
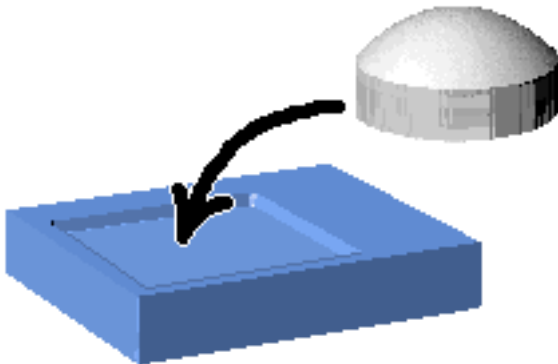
When surfacing finishes, do not remove the workpiece or the tool.



### Step 6: Secure the object in place and set the Z origin.

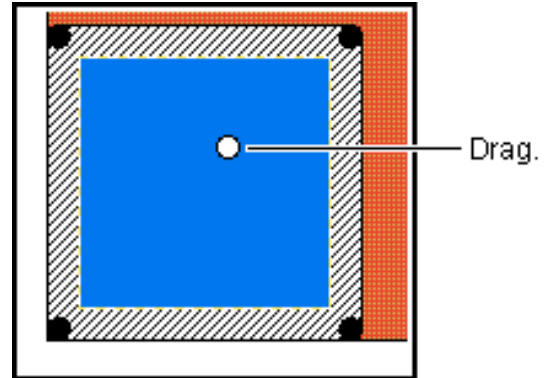
Mount the object for engraving on the base. Change the tool to one for engraving and set the Z-axis origin again.

1. Mount the object for engraving on the base.  
In this example, mount the object at the lower left of the groove in the base as shown in the figure.  
For information on how to secure the object in place, refer to the operator's manual for the modeling machine.

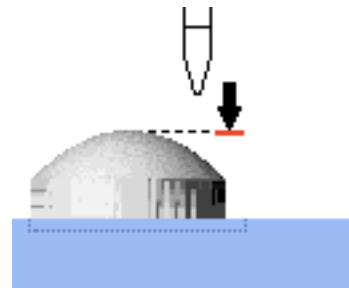


2. Replace the square end mill with the engraving tool.  
For information on how to mount it, refer to the operator's manual for the modeling machine.
3. Use the modeling machine to move the tool to its highest position, then set the Z-axis origin.  
To avoid danger, be sure to perform this task.
4. Use the modeling machine to move the tool, then set the Z-axis origin at the highest position on the target object.  
Be careful not to damage the engraving surface.  
For information on how to make the settings, refer to the operator's manual for the modeling machine.

5. For models on which the tool cannot be moved, click [Cut] - [Layout...].  
The [Layout - Surfacing Setup] dialog box appears.
6. Drag the white circle (⊙) to the location of the target object.  
You can specify the tool-movement location as coordinates by entering values at [Cursor] for [X] and [Y].





7. Double-click the white circle (⊙).  
The tool moves to the location you specified and descends to the Z-axis origin.
8. Press the Tool Down key on the modeling machine to align the tip of the tool with the highest position of the target object.  
Be careful not to damage the engraving surface.



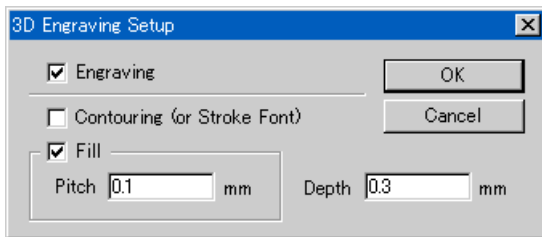
### Step 7: Create the tool path.

Add thickness to the PICZA data, then create a tool path for engraving on the top of the shape. In this example, only the tool path for engraving is created, so no settings are made for the cutting parameters.

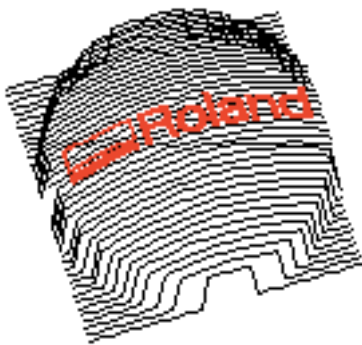
1. Click .
2. Click the PICZA data to select it.
3. Click [Relief] - [Create Relief].  
The [Create Relief] dialog box appears.
4. Click [OK] without changing any values.  
The view switches to the 3D screen and shows the shape of the relief.
5. Click  to return to the 2D screen.
6. Click the polygon in the figure to select it.



- Click [Cut] - [Create 3D Engraving Path].  
The [3D Engraving Setup] dialog box appears.
- Make the settings as shown below.



- Click [OK].  
The view changes to the 3D screen and shows the tool path for engraving in red.



### Step 8: Send the data and perform cutting.

- Click [File] - [Output Device Setup].  
The [Print Setup] dialog box appears.
- Click the [Name] arrow and choose the driver for the output device.  
The driver you chose is saved in memory. The setting is retained even after you quit 3D Engrave.



- Make sure [Location] shows the port where the modeling machine is connected, then click [OK].  
If the port is incorrect, make the setting for the correct port.  
You cannot make the setting at [Properties...] in the [Print Setup] dialog box. Go into the [Printers] folder and open the properties for the driver.



- Click [File] - [Output].  
The tool path for engraving is sent to the modeling machine and engraving starts.



# Part 4





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**Editing Shapes and Text**



# 4-1 Basic Operations

## Selecting shapes and text

1. If the 3D screen is displayed, click .
2. Click the  button.
3. Move the mouse cursor to the object to be selected, and click the mouse.
4. The symbols  and  appear around the selected object.




When an object is chosen, pressing the [Tab] key selects a different object. To invert the object selection order, hold down the [Shift] key and press [Tab].



### Selecting more than object

- While holding down the [Shift] key, click on each of the objects you wish to select.
- Drag the mouse to enclose entirely the object you wish to select.





### Canceling the selection of an object


1. Click the  button.
2. Click on an area other than the selected object.

## Moving to a different location

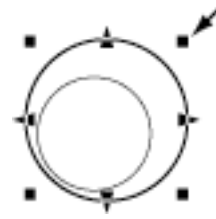
1. If the 3D screen is displayed, click .
2. Click the  button.
3. Click on the object to select it.
4. Drag the object.  
To restrict the direction of movement to either up and down or to the left and right, hold down the [Shift] key while dragging the object.


## Changing the size

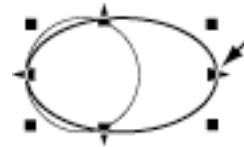
1. If the 3D screen is displayed, click .
2. Click the  button.
3. Click on the object to select it.
4. Change the size of the object by dragging the points ( and ) that appear around the object.


The size can be freely changed by dragging a square point ()  
The size can be changed while maintaining the shape's

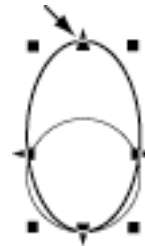
vertical and horizontal aspect by holding down the [Shift] key while dragging.




The triangular points () on the left and right can be dragged to change the horizontal size.







The triangular points () above and below can be dragged to change the vertical size.

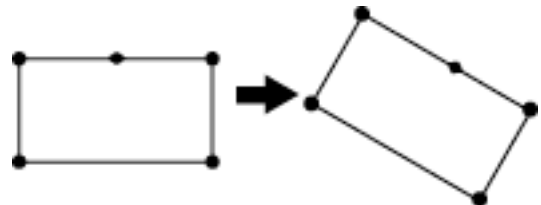


 Related Topics



[Changing the size without altering the centerpoint](#)

## Rotating

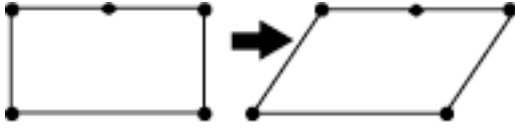
1. If the 3D screen is displayed, click .
2. Click the  button.
3. Click on the object to select it.
4. Click on the object again.  
The circular points () appear around the object.
5. Drag a circular point () to rotate the object.



## Slanting

1. If the 3D screen is displayed, click .
2. Click the  button.





- Click on the object to select it.
- Click on the object again.  
The diamond point (■) appears.  
In the case of a text string, a slant bar appears.
- Drag a diamond point (■) to slant the object.





For a text string, drag one of the points (■) for the slant bar.






### Making a copy of the same shape

- If the 3D screen is displayed, click .
- Click the  button.
- Select the object to be copied by clicking on it.
- Click the  button.
- Click the  button.  
The new object is copied overlapping the source object.
- Select the copied object and drag it to the desired location.




### Deleting

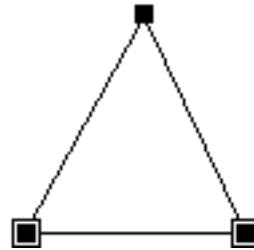
- If the 3D screen is displayed, click .
- Click the  button.
- Select the object to be deleted by clicking on it.
- From the [Edit] menu, click [Delete].  
Alternatively, press the [Delete] key.

### Selecting a vertex on a polygon




- If the 3D screen is displayed, click .
- Click , then click the polygon.
- Click the  button.
- Click on the point.  
The selected point changes to a square with a border (■).  
When a vertex is chosen, pressing the [Tab] key selects a different vertex. To invert the vertex selection order, hold down the [Shift] key and press [Tab].

### Selecting multiple vertices of a polygon

- If the 3D screen is displayed, click .
- Click , then click the polygon.
- Click the  button.
- Hold down the [Shift] key and click on each point (■).  
Alternatively, drag the mouse over the points to be selected.  
Each selected point changes to a square with a border (■).






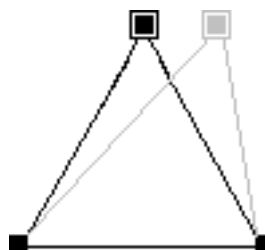
### Selecting all vertices of a polygon

- If the 3D screen is displayed, click .
- Click , then click the polygon.
- Click the  button.
- While holding down the [Ctrl] key, click on one point (■).  
All vertices contained in the polygon change to squares with borders (■).



### Changing the shape of a polygon

- If the 3D screen is displayed, click .
- Click , then click the polygon.
- Click the  button.
- Drag the vertex (■).







To restrict the direction of movement to either up and down or to the left and right, hold down the [Shift] key

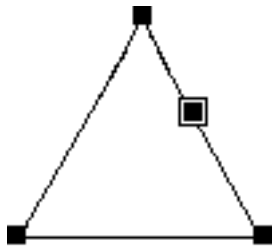
while dragging the vertex.

You can also move a vertex with the keyboard arrow keys.

To increase the amount of movement, hold down the [Shift] key while using the arrow keys.






## Increasing the vertices of a polygon

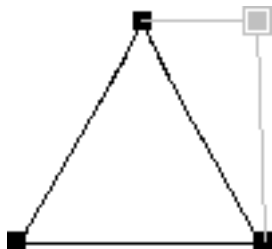
1. If the 3D screen is displayed, click .
2. Click , then click the polygon.
3. Click the  button.
4. Move the mouse pointer over a line of the polygon, then click.  
A  appears where the point will be added.
5. From the [Shape] menu, click [Insert Vertex].



You can also double-click on a line in a graphic and add a vertex.




## Reducing the vertices of a polygon

1. If the 3D screen is displayed, click .
2. Click , then click the polygon.
3. Click the  button.
4. Click on the point.  
The selected point changes to a square with a border (  ).  
To delete two or more points at the same time, hold down the [Shift] key as you click on each point (  ). Alternatively, drag the mouse over the points to be deleted.
5. From the [Shape] menu, click [Delete Vertex].





You can also delete a vertex by pressing the [Delete] key.

## Entering text

1. If the 3D screen is displayed, click .
2. Click the  button.  
The mouse pointer changes to the cursor for the text-editing tool (  ).
3. Click at the start point for entering the text.
4. Type in the text from the keyboard.

## Changing the text font

1. If the 3D screen is displayed, click .
2. Click the  button.
3. Click the text.
4. On the [Shape] menu, click [Properties...].  
The [\[Text String Properties\] dialog box](#) appears.
5. Click the [Font] arrow, then click a font name.

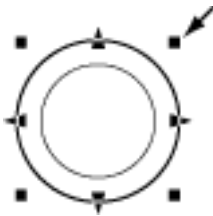
## 4-2 Application

### Changing the size without altering the centerpoint

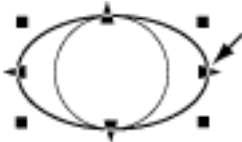
To change the size without altering the position of its centerpoint, hold down the [Ctrl] key and drag an editing point (■ or ▲).

1. Select the object.
2. While holding down the [Ctrl] key, drag a point (■ or ▲).  
The size can be freely changed by dragging a square point (■).

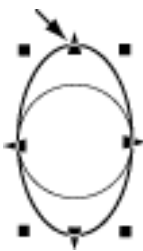
The size can be changed while maintaining the shape's vertical and horizontal aspect by holding down the [Shift] key while dragging.



The triangular points (▲) on the left and right can be dragged to change the horizontal size.



The triangular points (▲) above and below can be dragged to change the vertical size.

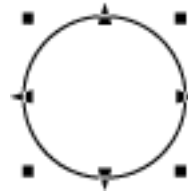



 Related Topics [Changing the size](#)

### Creating circles and squares

To create a shape with a vertical/horizontal aspect of 1:1, such as a circle or square, drag while holding down the [Shift] key. This function is not supported when creating text or a polygon.

1. Click the button for creating a rectangle, round rectangle, circle or ellipse, or star.
2. While holding down the [Shift] key, drag the object.



 Related Topics [Changing the size](#)  
[Text String Properties](#) [Keep Aspect for input]  
[Polygon Properties](#) [Keep Aspect for input]

### Drawing a shape from a centerpoint

To create a shape with a shape's start point the centerpoint, drag while holding down the [Ctrl] key.

This function is not supported when creating text or a polygon.

1. Click the button for creating a square, rounded-corner square, circle or ellipse, or star.
2. While holding down the [Ctrl] key, drag the object.

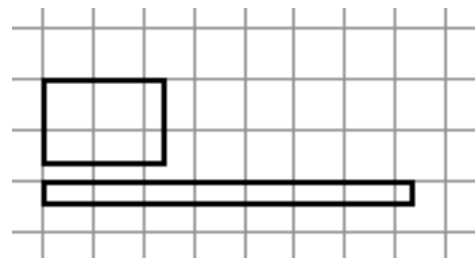
 Related Topics [Creating circles and squares](#)

### Using a grid to align objects

It's possible to use a grid as a guide for placing and sizing objects. The grid is shown on screen with equal vertical and horizontal spacing. When 3D Engrave has just been installed, the grid is not shown.

To align an object with the grid, from the [View] menu, activate [Snap To Grid].

1. Create the object at any location.
2. At the [View] menu, click [Show Grid] to activate it.
3. At the [View] menu, click [Snap To Grid] to activate it.
4. Select the objects one at a time, and move each object toward the grid at the desired location. The object is automatically pulled to the grid and aligned.

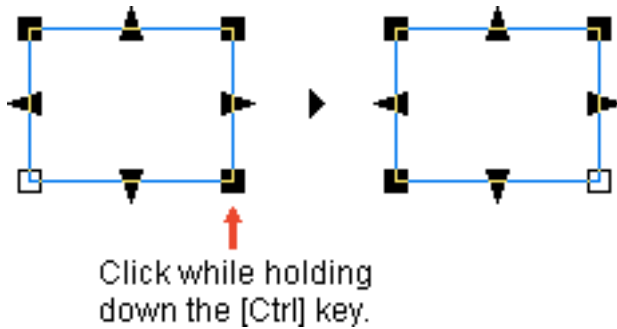


When the rectangles are aligned with the left-hand edge

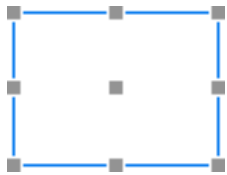
### Changing the point where an object snaps to the grid

The snap point is initially at an object's lower left.

To change the snap point, hold down the [Ctrl] key and click on the desired point.



The snap point can be a point around the perimeter of the object (any of eight points) or a point at the center of the object.



You can use this feature to align a number of objects at their centers or their upper-right points, for example.

 Related Topics [\[Grid Setup...\] command](#)  
[Aligning centerpoints](#)

## Aligning centerpoints

When arranging a text string at the center of a rectangle, or when aligning many shapes at their centers, use the [Shape] menu's [Align] command.

1. Create the objects at any location.




2. Select all of the objects whose centers you wish to align.
3. From the [Shape] menu, click [Align].  
The centers of the selected objects are aligned.  
If you have selected a number of objects while holding down the [Shift] key, the objects are overlaid atop the last object you chose. If you've selected a number of objects by dragging an area, the objects are overlaid atop the object in the foreground.

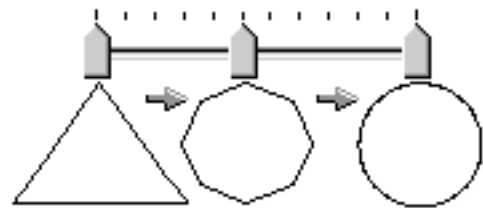


 Related Topics [Moving to a different location](#)  
[Using a grid to align objects](#)

## Creating regular polygons

A regular polygon can be created by first making a circle, then modifying it.

1. Click the  button.
2. While holding down the [Shift] key, drag the mouse to create a circle.
3. Select the circle, then from the [Shape] menu, click [Properties].  
The [Shape Properties] dialog box appears.
4. Drag the [Shape] slider.  
You can make any regular polygon having from three sides (an equilateral triangle) to thirteen. Dragging the slider to the right-hand edge creates a circle instead of a polygon.



## Registering frequently used objects

You can register often-used objects, such as company or organization logos, as symbols.

You can register flat shapes, text, and images. Three-dimensional shapes cannot be registered, but the various relief-creation settings specified for the object are saved.

1. Select the object to be registered a symbol.
2. From the [Shape] menu, click [Register Symbol].  
The [Add Symbol] dialog box appears.
3. Register the symbol with an appropriate group according to use or shape.  
To create a new group, click [New Group] and enter a name for the group. When adding the symbol to an existing group, select the group name with [Group Name].
4. At [Symbol Name], enter a name for the symbol. Then click [Add].

# Part 5

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**Hints and Tips**

## 5-1 Engraving on a cut surface

You can create a relief by cutting, then perform engraving on the relief.

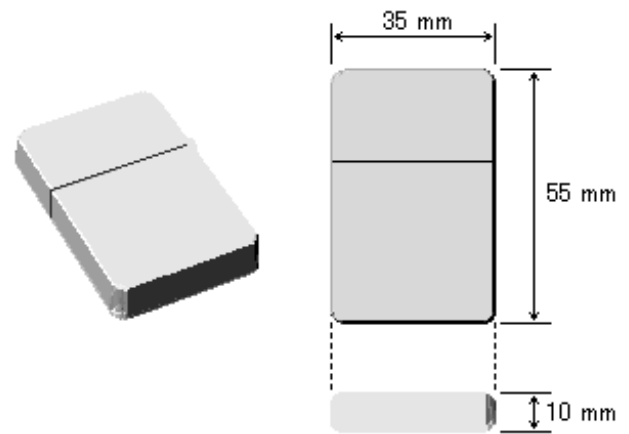
Take a look at Trying It Out - [Creating a Relief](#), which explains the method in detail.

## 5-2 Engraving an existing object

### Engraving a flat surface [Getting started]

This explains how to engrave text and shapes on an existing object. However, this method is limited to cases where the engraving surface is flat.

This section describes an example of engraving a name on the three-dimensional object shown in the figure.



It is assumed that material of the engraving surface can be cut by your modeling machine. In this example, the material is aluminum.

For the tool, use the engraving tool, which is suited to engraving text. The tool specifications are as follows.

Tool diameter:	3 mm
Blade width:	0.32 mm
Blade angle:	24.2 degrees

The procedure for engraving a flat surface on a three-dimensional object can be broadly divided into three steps.

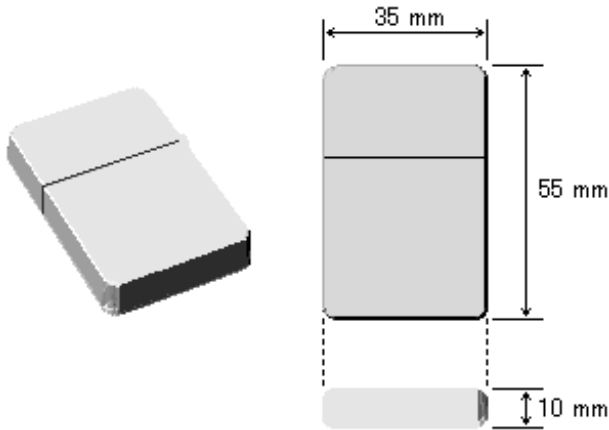
- 1 Measure the dimensions.
- 2 Make a base for mounting the object.
- 3 Mount the object on the base and perform engraving.

### Engraving a flat surface [Step 1: Measuring the dimensions]

Measure the dimensions of the object for engraving.

The measured dimensions are used to determine the engraving position for the text and in cutting the base to secure the object in place.

As explained in “Engraving a flat surface [Getting started],” this example uses the following dimensions.



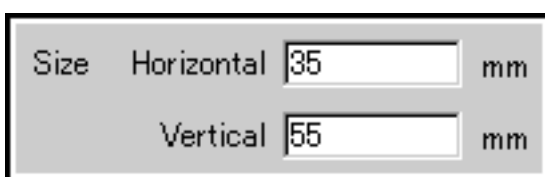
### Engraving a flat surface [Step 2: Make a base.]

Make a base for securing in place the object to engrave. Create a mounting location for the object to enable engraving where you intend.

1. Load the workpiece on the modeling machine. Take care not to allow the thickness to exceed the modeling machine's height limit when the target object is loaded. In this example, the material is modeling wax with a thickness of about 15 mm. For information on how to mount it, refer to the operator's manual for the modeling machine.
2. Install a tool on the modeling machine. For information on how to mount it, refer to the operator's manual for the modeling machine. In this example, attach a square end mill (blade diameter 3 mm).
3. Set the X- and Y-axis origin near the lower-left point of the workpiece and the Z-axis origin on the surface of the workpiece. For information on how to make the settings, refer to the operator's manual for the modeling machine.

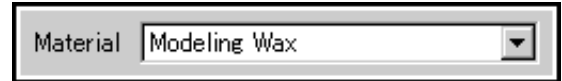
**Use the surfacing function to cut the base and create a place for mounting the target object. Make the settings for the size of the relief, the cutting parameters, and the size and location of surfacing, in that order, then perform surfacing.**

4. Start 3D Engrave, then click [Relief] - [Relief Size]. The [Relief Size] dialog box appears.
5. For [Horizontal], enter 35 mm, and for [Vertical], enter 55 mm, then click [OK].



6. Click [Cut] - [Cutting Parameters]. The [Cutting Parameters] dialog box appears.

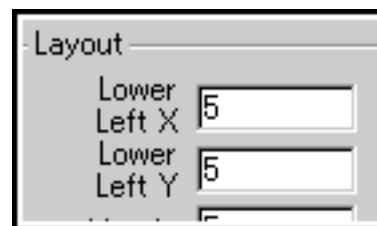
7. Click the [Material] arrow, then click [Modeling wax].



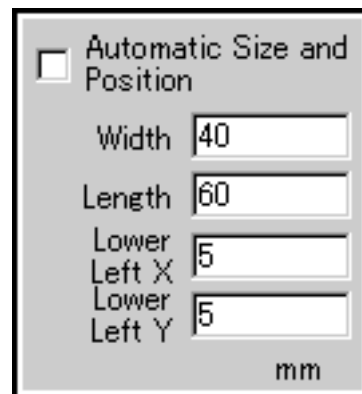
8. For the tool-tip configuration choose [Square end mill], for [Blade Diameter] enter 3 mm, then click [OK].



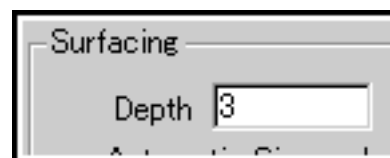
9. Click [Cut] - [Layout...]. The [Layout - Surfacing Setup] dialog box appears.
10. For [Layout], enter the values for [Lower Left X] and [Lower Left Y]. These determine the output location for the relief. In this example, enter 5 mm for each.



11. Click [Automatic Size and Position] to cancel the selection.

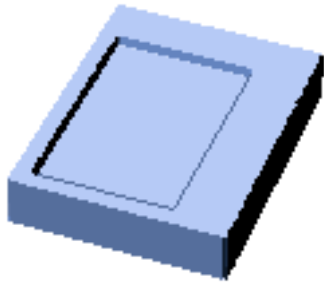


12. Enter 40 mm for [Width] and 60 mm for [Height].
13. Enter values for [Lower Left X] and [Lower Left Y] so that the origin points for the relief area and the surfacing area are the same. In this example, enter 5 mm for each.
14. Enter the depth for surfacing. In this example, for [Surfacing], enter 3 mm for [Depth].



15. Click [Start]. When surfacing finishes, do not remove the workpiece or the tool.



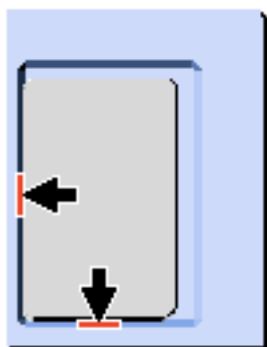
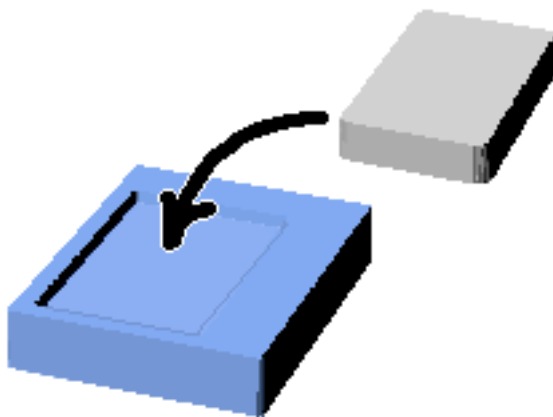


### Engraving a flat surface [Step 3: Perform engraving.]

Mount the object to engrave on the base and engrave the text. For information about the specifications of the tool used for engraving the text and the material of the engraving surface on the object, see “Engraving a flat surface [Getting started].”

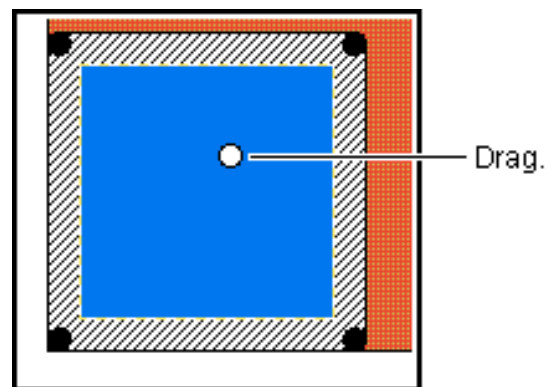
#### Mount the object on the base and set the Z-axis origin on the engraving surface.

1. Mount the object for engraving on the base.  
In this example, mount the object at the lower left of the groove in the base as shown in the figure.  
For information on how to secure the object in place, refer to the operator’s manual for the modeling machine.

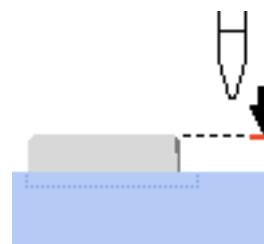


2. Replace the square end mill with the engraving tool.  
For information on how to mount it, refer to the operator’s manual for the modeling machine.





3. Use the modeling machine to move the tool to its highest position, then set the Z-axis origin.  
To avoid danger, be sure to perform this task.
4. Use the modeling machine to move the tool, then set the Z-axis origin at the highest position on the target object.  
Be careful not to damage the engraving surface.  
For information on how to make the settings, refer to the operator’s manual for the modeling machine.
5. For models on which the tool cannot be moved, click [Cut] - [Layout...].  
The [Layout - Surfacing Setup] dialog box appears.
6. Drag the white circle (○) to the location of the target object.  
You can specify the tool-movement location as coordinates by entering values at [Cursor] for [X] and [Y].



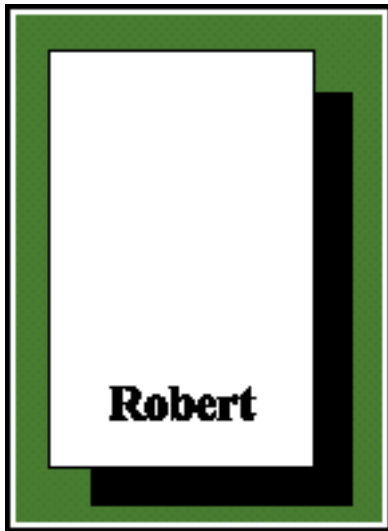
7. Double-click the white circle (○).  
The tool moves to the location you specified and descends to the Z-axis origin.
8. Press the Tool Down key on the modeling machine to align the tip of the tool with the highest position of the target object.  
Be careful not to damage the engraving surface.



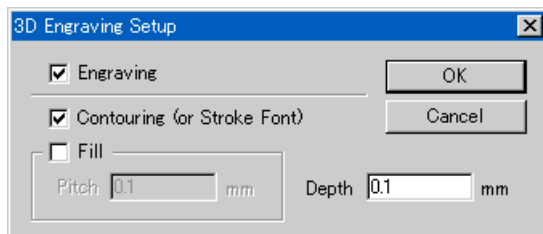
**Only the engraving path is output, so the settings for the cutting parameters are not made again. Enter and lay out the text, then perform engraving.**

9. Click .
10. Click at the start point for entering text.
11. Type in the text from the keyboard.  
In this example, enter Robert.
12. Click .
13. Click the text to select it, then change the size and location.  
To change the size, drag the  and  surrounding the text.

To change the location, drag the text.  
 To change the font, click [Shape] - [Properties...].



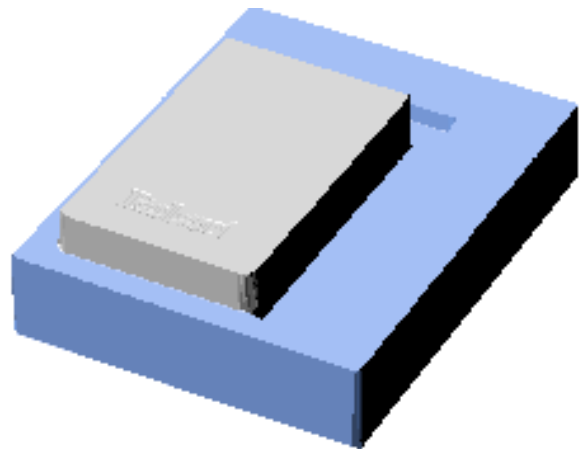
14. Click [Cut] - [Create 3D Engraving Path].  
 The [\[3D Engraving Setup\]](#) dialog box appears.
15. Click [Engraving] to select it.
16. To engrave the contour, click [Contouring (or Stroke Font)] to select it.  
 To flat-drag the interiors of the characters, click [Fill] to select it.  
 In this example, only the contours of the text are to be engraved, so click [Contouring (or Stroke Font)] to select it.



17. For [Depth], enter the engraving depth.  
 In this example, enter 0.1 mm.
18. Click [OK] to switch to the 3D screen.  
 Make sure the contours of the text are shown by red lines.



19. Click [File] - [Output].  
 When the prompt appears, click [OK].
20. Engraving starts.



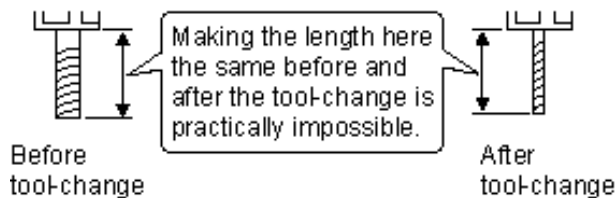
### Engraving on a curved surface

You can engrave text and shapes on the curved surface of an existing object.  
 Take a look at Trying It Out - [Engraving on a Curved Surface](#), which explains the method in detail.

## 5-3 Changing the tool while cutting is in progress

When changing cutting processes, at times you may want to change the tool. For instance, you may want to perform draft cutting quickly with a square end mill having a comparatively large diameter, then produce an attractive finish with a ball end mill, or you may want to use an engraving tool just when engraving text.

When you change the tool while cutting is in progress, the height of the tool tip (the Z-axis coordinate) also changes. Continuing cutting without taking this into account may not only fail to produce the shape you intended, but can also lead to danger of tool breakage.



It is impossible to install the tools so that they have the same height before and after the tool-change. For this reason, the Z-axis coordinate is corrected so that the tool tip has the same height before and after the tool-change.

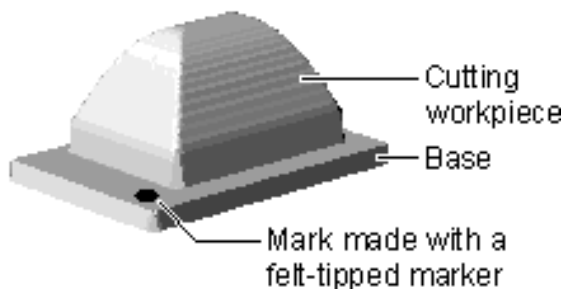
This creates horizontal surfaces whose height is unchanged throughout all cutting processes, and after a tool-change sets the Z-axis origin at the height of the surface. This section highlights two methods of correction.

### Method using the surface of the base

This method involves placing a base under the cutting workpiece and setting the Z-axis origin after tool-change to its surface. This is available only on modeling machines that can display the Z-axis coordinate.

Be sure to perform surfacing on the base before mounting the workpiece.

1. Make a mark on the surface of the base with a felt-tipped marker.



2. Operate the modeling machine to lower the tool to above the mark made with the felt-tipped marker. Lower the tool until the mark is cut.

3. Make a note of the Z-axis coordinate when the mark was cut.
4. Raise the tool, then replace the tool.
5. Lower the tool to above the mark made with the felt-tipped marker. Lower the tool until the mark is cut.
6. Set the Z-axis origin at the location where you lowered the tool in step 5.
7. Raise the tool by the whole-number portion of the Z-axis coordinate value you noted down in step 3, and set the Z-axis origin again.

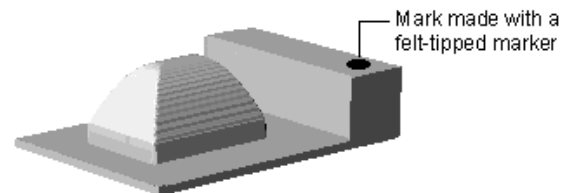
### Method using a workpiece surface that is not cut

This method involves loading a block that is larger than necessary, and setting the Z-axis origin after tool-change at the surface of the material that remained uncut.

Before carrying out cutting, be sure to perform surfacing of the cutting workpiece.

The explanation starts with the tasks after changing the tool.

1. Make a mark with a felt-tipped marker on the surface of the workpiece that remains uncut.



2. Operate the modeling machine to lower the tool to above the mark made with the felt-tipped marker. Lower the tool until the mark is cut.
3. Set the Z-axis origin at this height.

## 5-4 Making a image three dimensional

### Using a scanner to import an object

You can import an image acquired with a scanner into 3D Engrave and make it into a relief.

3D Engrave supports scanners that comply with TWAIN\_32. For information on connecting the scanner and installing the scanner driver, please refer to the scanner's documentation.

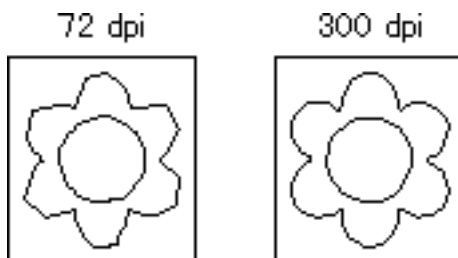
When an image is converted to polygons, depending on the image it may not be possible to extract the outlines smoothly. When converting an image to polygons, keep the following conditions in mind as you prepare the data.

#### Conditions for data allowing extraction of clear outlines

- Boundaries between two colors should be sharp and well defined, with no continuous **gradations**. Using only the two values of white and black is recommended. Scanned data for photographs generally contains continuous gradations, making it unsuitable for outlining.



- The scan **resolution** should be high. In general, a higher resolution yields outlining of greater accuracy. The optimal resolution varies according to a shape's complexity and size when cut. However, it takes longer to import high-resolution data into 3D Engrave than low-resolution data.




- The size of the original art being scanned should be the same as the size when engraving. Results of engraving that are more attractive than the original art are not obtained when an image smaller than the engraved image is imported and then enlarged with 3D Engrave. To help ensure attractive results of engraving, start with a larger object and reduce it to the desired size.

1. From the [File] menu, click [Select Scanner...].
2. Select the driver for the scanner.  
If a TWAIN driver and a TWAIN\_32 driver are both installed, select the TWAIN\_32 driver.
3. Load the original document on the scanner.
4. From the [File] menu, click [Acquire Image...].  
Launch the scanning software. For information on how to do this, please refer to the documentation for the scanner.
5. When the scanning is finished, the scanned image is imported into 3D Engrave.

To make a relief of the imported image as it is without editing it, select the image, then click [Relief] - [Create Relief].

To menu the image, use the commands on the [Image] menu.

To retouch the image, click .

To convert the image to polygons, click [Shape] - [Convert to Polygon].

Images having more than 16 colors cannot be converted to polygons. To reduce the number of colors, click [Image] - [Reduce Colors].

### Importing bitmap data

3D Engrave can import and make reliefs of image files in Windows bitmap format (which have the file extension \*.bmp). For information on how to save a file in Windows bitmap format, please refer to the documentation for the software application.

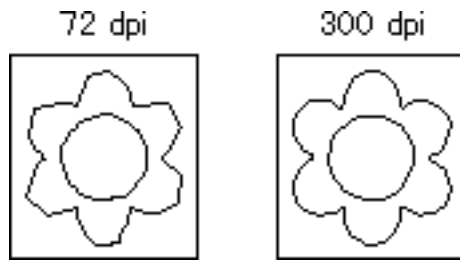
When an image is converted to polygons, depending on the image it may not be possible to extract the outlines smoothly. When converting an image to polygons, keep the following conditions in mind as you prepare the data.

Conditions for data allowing extraction of clear outlines

- Boundaries between two colors should be sharp and well defined, with no continuous **gradations**. Using only the two values of white and black is recommended. Scanned data for photographs generally contains continuous gradations, making it unsuitable for outlining.




- The scan **resolution** should be high. In general, a higher resolution yields outlining of greater accuracy. The optimal resolution varies according to a shape's complexity and size when cut. However, it takes longer to import high-resolution data into 3D Engrave than low-resolution data.



- The size of the original art being scanned should be the same as the size when engraving.  
Results of engraving that are more attractive than the original art are not obtained when an image smaller than the engraved image is imported and then enlarged with 3D Engrave. To help ensure attractive results of engraving, start with a larger object and reduce it to the desired size.

1. From the [File] menu, click [Import...].  
The [Open] dialog box appears.
2. Click [Files of type] and select [Windows Bitmap File (\*.bmp)].  
A list of files that can be imported is shown.
3. Select the desired file and click [Open...].
4. The imported image is laid out on screen.

To make a relief of the imported image as it is without editing it, select the image, then click [Relief] - [Create Relief].  
To menu the image, use the commands on the [Image] menu.

To retouch the image, click .

To convert the image to polygons, click [Shape] - [Convert to Polygon].

Images having more than 16 colors cannot be converted to polygons. To reduce the number of colors, click [Image] - [Reduce Colors].

 Related Topics      [\[Import...\] command](#)

## 5-5 Importing a shape

### Pasting a graphic created with commercial software

You can copy data created with software such as CorelDRAW! that uses vector data, and paste the data into 3D Engrave using the clipboard. The data pasted in can then be edited just like any ordinary object.

#### Conditions for data that can be pasted

- Don't include bitmap data
  - Don't fill or apply shading inside shapes
  - Set line width to the finest (narrowest) available setting
1. After using a commercial software application to create data, select the data and copy it.  
For information on how to create data with the commercial software application, refer to the documentation for the software you are using.
  2. If the 3D Engrave view is the 3D screen, change it to the 2D screen.
  3. From the [Edit] menu, click [Paste].  
The copied data appears in 3D Engrave.

### Using symbols

3D Engrave is provided with a set of symbols. Symbols can be added to a file being edited, or registered with 3D Engrave objects.

#### Importing a symbol

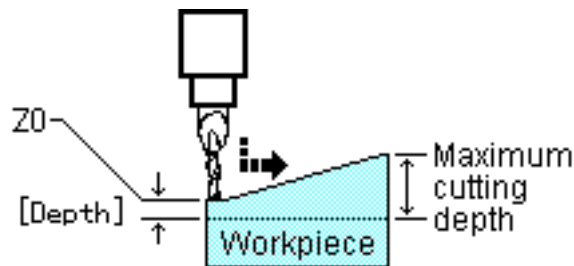
1. From the [Shape] menu, click [Symbol].  
The [Symbol] dialog box appears.
2. Select the group, then click on the symbol to be added.
3. Click [Insert].  
The chosen symbol (object) is laid out on screen.
4. Adjust the size and position of the symbol to be placed.

#### Registering a symbol

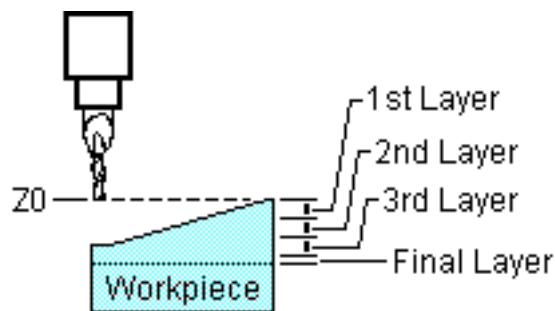
1. Select the object to be registered a symbol.
2. From the [Shape] menu, click [Register Symbol].  
The [Add Symbol] dialog box appears.
3. Register the symbol with an appropriate group according to use or shape.  
To create a new group, click [New Group] and enter a name for the group. When adding the symbol to an existing group, select the group name with [Group Name].
4. At [Symbol Name], enter a name for the symbol. Then click [Add].

## 5-6 Tips on Surface Leveling

If you place the origin for Z-axis at the lower part of the target work piece, cutting amount per stroke gets increased and machine may fail to cut somewhere. This problem tends to happen when the surface of the work piece is slanting as per a figure below :



Place the origin for Z-axis at the highest part of the target work piece by operating modeling machine. It should be OK to find the highest part just approximately.



## 5-7 Changing the Measurement System for Numerical Values

The measurement system used for numerical values depends on the unit setting for Windows in effect when 3D Engrave starts up. The settings for Windows can be changed with [Measurement System] on the [Number] tab under [Control Panel] - [Regional Setting].

If the measurement system has been changed, 3D Engrave must be stopped and restarted for the new setting to take effect.

# Part 6

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## Commands

## 6-1 Toolbar buttons

The toolbar is provided with buttons for running 3D Engrave commands such as [Open...] and [Save]. Moving the mouse pointer over a button displays a brief description of the button's function.

The buttons provided on the toolbar are as shown below. Click on a button's icon to display an explanation of the command.



This creates a new file.



This opens a 3D Engrave file.



This saves the file, overwriting the previous version of the file.



This deletes the selected object, and copies it to the **clipboard**.



This copies the selected object to the **clipboard**.



This copies the contents of the **clipboard**, pasting them at the selected on-screen location.



This switches to a flat (two-dimensional) shape-editing screen.  
Display this screen when you want to add shapes or text, modify shapes, or change the thickness. You cannot edit shapes or text at the 3D screen.



This switches to a solid (three-dimensional) display screen.  
Display this screen when you want to check a tool path or the shape of a relief.



This adds thickness to shapes, text, images or other flat objects to create a relief (raised engraving).



This creates a tool path for engraving for the selected shapes and text.



This creates the path that the tip of the blade traces (the tool path).



This outputs the tool path to the modeling machine and starts cutting.



This is used to enter a block of text to be engrave. Clicking this button changes the mouse pointer to the text-editing tool (I). Click at the point where text is to be inserted, and use the keyboard to enter the block of text.

3D Engrave can use **TrueType fonts** registered with Windows as well as stroke fonts.

You can use stroke fonts only with 3D Engrave. These cannot be used from other Windows-based programs. When you are choosing a font, fonts shown with **P** to the left of the font name are stroke fonts. TrueType fonts are shown with **T** to the left of the font name.

It's also possible to add or delete text to or from a block of text that has been entered.

Related Topics

[Text String Properties](#)



This is for drawing a rectangle or square by dragging at the desired location.

Clicking this button changes the mouse pointer to the shape-drawing tool (+).

Related Topics

[Shape Properties](#)  
[Creating circles and squares](#)  
[Drawing a shape from a centerpoint](#)



This is for drawing a rounded-corner rectangle by dragging at the desired location.

Clicking this button changes the mouse pointer to the shape-drawing tool (+).

Related Topics

[Shape Properties](#)  
[Creating circles and squares](#)  
[Drawing a shape from a centerpoint](#)



This is for drawing an ellipse or circle by dragging at the desired location.

Clicking this button changes the mouse pointer to the shape-drawing tool (+).

Related Topics

[Shape Properties](#)  
[Creating circles and squares](#)  
[Drawing a shape from a centerpoint](#)



This is for drawing a star shape by dragging at the desired location.

Clicking this button changes the mouse pointer to the shape-drawing tool (+).

Related Topics

[Shape Properties](#)  
[Creating circles and squares](#)  
[Drawing a shape from a centerpoint](#)





This creates a polygon by clicking on vertices. To end creation, double-click on the end point. Clicking this button changes the mouse pointer to the shape-drawing tool (+).

Related Topics [Polygon Properties](#)



This chooses an object (shape or text). To select an object, move the mouse pointer over the object and click. When an object is chosen, pressing the [Tab] key selects a different object. To invert the object selection order, hold down the [Shift] key and press [Tab].

Related Topics [Selecting shapes and text](#)



This is used to reposition the vertices of a polygon, changing its shape. Clicking this button then clicking overtop the polygon display's the vertices (■). Double-click on a line to add a vertex. Drag one of the square pointers (■) to change the position of the corresponding vertex. When a vertex is chosen, pressing the [Tab] key selects a different vertex. To invert the vertex selection order, hold down the [Shift] key and press [Tab].

If you've already selected a polygon


- Double-clicking where there is no object deselects the polygon.
- Double-clicking on a new polygon selects it.
- Double-clicking on an object other than a polygon cancels the Vertex Edit mode and enables the Object Edit mode.

Related Topics [Selecting a vertex on a polygon](#)



This retouches lines and points on an imported image.

Choose the pen width with the  ,  , and  buttons.


To pick up the pen color from the image, click the  button. The status bar lets you check the presently selected color.



The color when retouching or filling an image is picked up from the imported image. Click this button, then click the desired color. The status bar lets you check the presently selected color.



This fills the clicked pixel and adjacent pixels of the same color.

Choose the fill color with . The status bar lets you check the presently selected color.



This enlarges or reduces the view of the object.

- 2D View

Clicking the left mouse button show an enlarged view with the point where clicked at the center. The area to be enlarged can also be specified by dragging with the mouse.

Clicking the right mouse button shows a reduced-size view.

- 3D View

Clicking the left mouse button show an enlarged view with the point where clicked at the center. You can display at the desired size by dragging up or down.

Clicking the right mouse button shows a reduced-size view. You can select the area to zoom by holding down the right mouse button while dragging.

 Keyboard shortcut:

Zoom in : [Ctrl]+[Page Down]

Zoom out : [Ctrl]+[Page Up]



This moves the screen display to show areas outside the window which are not visible. Click this button, then drag the screen.



This lets you rotate a three-dimensional object to view it from a different perspective. This is available only when at the 3D screen.



This command expands or reduces the size of the object shown to fill the screen.



These select the pen width for retouching an image.



This changes the front-back relationship of the objects.  
The selected object is moved to the back.



This changes the front-back relationship of the objects.  
The selected object is moved to the front.



The selected block text of text changes to a horizontal layout.



The selected block text of text changes to a vertical layout.

## 6-2 [File] menu



### [File] - [New...] command

This creates a new file.

Running this command opens the [Relief Size] dialog box. If changes made to a file being edited have not been saved, a dialog box asking if you wish to save the changes is displayed.

▶ Keyboard shortcut: [Ctrl]+[N]

### [Relief Size] dialog box

#### Size (Horizontal / Vertical)

Enter the size of the relief.

Changing the size also changes the size of the shaded white rectangle (the relief area).

#### Resolution

Type in the degree of detail for the relief.

Smaller values produce three-dimensional objects with smoother curves, but require larger amounts of memory. Because this does not necessarily correlate with the fineness of the mesh with which the 3D screen is displayed, you cannot check the resolution at the 3D screen.

#### Required Memory

This displays an estimate of the memory required to create a relief of the specified size and resolution.

This is the memory used only by 3D Engrave, and does not include the amount used by the operating system. If the amount of memory actually installed in the computer is much less than this amount, the amount of disk space used by virtual memory increases, and operating speed may become slower as a result.



### [File] - [Open...] command

This opens a 3D Engrave file.

Running this command opens the [Open] dialog box.


If changes made to a file being edited have not been saved, a dialog box asking if you wish to save the changes is displayed.

▶ Keyboard shortcut: [Ctrl]+[O]



## [File] - [Save] command

This saves the file, overwriting the previous version of the file. To save the file with a different name or in a different area, use the [Save As...] command.

 Keyboard shortcut: [Ctrl]+[S]

## [File] - [Save As...] command

This saves the file with a different name. Running this command opens the [Save As] dialog box.

## [File] - [Import...] command

This imports a file created using another software application. Running this command makes the [Open] dialog box appear.

 Related Topics [Importing bitmap data](#)

## [File] - [Export] - [DXF...] command

This saves the three-dimensional data for a relief as file in DXF format. The output file can be read by applications that support the DXF file format.

## [File] - [Export] - [STL...] command

This saves the three-dimensional data for a relief as file in STL format. The output file can be read by applications that support the STL file format.

## [File] - [Export] - [VRML...] command

This saves the three-dimensional data for a relief as file in VRML 1.0 format. The output file can be read by web browsers that support the VRML file format.


## [File] - [Select Scanner...] command

This selects the scanner connected to the computer. 3D Engrave supports scanners that comply with TWAIN\_32. For information on connecting the scanner and installing the scanner driver, please refer to the scanner's documentation. If a TWAIN driver and a TWAIN\_32 driver are both installed, choose the TWAIN\_32 driver.

 Related Topics [Using a scanner to import an object](#)

## [File] - [Acquire Image...] command

This takes in the image from the scanner. You can also use [Shape] - [Convert to Polygons] to convert the acquired image to shapes. Running this command launches the software for performing scanning. For more information on operation, please refer to the scanner's documentation.


 Related Topics [Using a scanner to import an object](#)



## [File] - [Output] command

This outputs the tool path to the modeling machine and starts cutting.

The tool path is output to the port for the presently selected driver. To choose the output device (driver), click [File] - [Output Device Setup].

 Related Topics [Create the tool path for draft cutting](#)  
[Create the tool path for finishing](#)  
[Engrave the text](#)

## [File] - [Output Preview] command

This lets you check the shape after cutting on screen before you actually perform cutting on the modeling machine. Running this command starts Virtual MODELA. If Virtual MODELA is not installed and set up on the computer, an error message appears.

In addition to the tool path, the following information is sent to Virtual MODELA.

Program name (3D Engrave), file name, tool type, blade diameter (or, for the engraving tool, tool diameter), blade width (engraving tool only), material, workpiece size (relief area), location of the X-Y origin point, model name, and machine resolution

For information on how to use Virtual MODELA, take a look at the help for Virtual MODELA.

## [File] - [Output Device Setup...] command

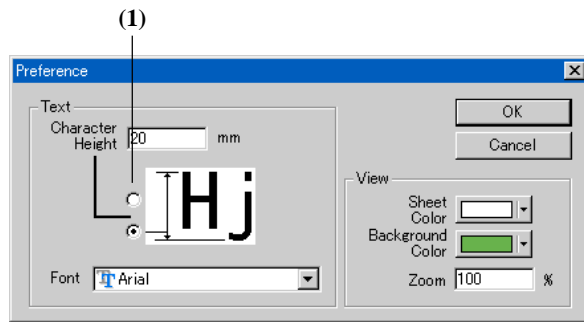
This chooses the output-destination device for the tool path. The [Print Setup] dialog box appears. To choose the output device, click the [Name] arrow, then click the driver. Any setting for the cutting area (workpiece size) or cutting parameters (tool speed, depth, and so on) made with the driver have no relationship to the data that is output. Such settings are ignored.

The driver selected here is saved in memory.

## [File] - [Preferences...] command

This sets the default font and text height when entering text, the screen color scheme, and the zoom ratio. Running this command displays the [Preferences] dialog box.

[Preferences] dialog box



### Character Height

This is for entering the default value for text height.

(1)

Choose the portion of the text for which you want to enter the height.

### Font

This sets the default font used when entering text.

### Sheet color

This determines the color of the relief area.

To specify a color other than one of the selections shown, click [Other]. This displays the [Color] dialog box.

### Background color

This determines the background color of the relief area.

To specify a color other than one of the selections shown, click [Other]. This displays the [Color] dialog box.

### Zoom

This determines the zoom ratio used when 3D Engrave starts.

## [File] - [Exit] command

This ends the program.

If changes made to the file being edited have not been saved, a dialog box asking if you wish to save the changes is displayed.

▶ Shortcut:



Click the button for closing the application window.

## 6-3 [Edit] menu

### [Edit] - [Undo] command

This erases the change just made and returns to the previous form.

▶ Keyboard shortcut: [Ctrl]+[Z]

### [Edit] - [Redo] command

This cancels an [Undo] command that has just been run.

▶ Keyboard shortcut: [Ctrl]+[Y]



### [Edit] - [Cut] command

This deletes the selected object, and copies it to the **clipboard**. The contents of the clipboard are maintained until another object is copied to the clipboard. To paste the clipboard contents, run the [Edit] - [Paste] command.

▶ Keyboard shortcut: [Ctrl]+[X]



### [Edit] - [Copy] command

This copies the selected object to the **clipboard**. The contents of the clipboard are maintained until another object is copied to the clipboard. To paste the clipboard contents, run the [Edit] - [Paste] command.

▶ Keyboard shortcut: [Ctrl]+[C]

☐ Related Topics [Making a copy of the same shape](#)



### [Edit] - [Paste] command

This copies the contents of the **clipboard**, pasting them at the selected on-screen location.

▶ Keyboard shortcut: [Ctrl]+[V]

☐ Related Topics [Making a copy of the same shape](#)

### [Edit] - [Delete] command

This deletes the selected object. The deleted object is not copied to the **clipboard**.

▶ Keyboard shortcut: [Delete]

**[Edit] - [Select All] command**

This selects all objects displayed on screen.

▶ Keyboard shortcut: [Ctrl]+[A]

**6-4 [View] menu****[View] - [Zoom] - [Zoom In] command**

This displays an enlarged view of the object.

▶ Keyboard shortcut: [Ctrl]+[Page Down]

**[View] - [Zoom] - [Zoom Out] command**

This displays an reduced view of the object.

▶ Keyboard shortcut: [Ctrl]+[Page Up]

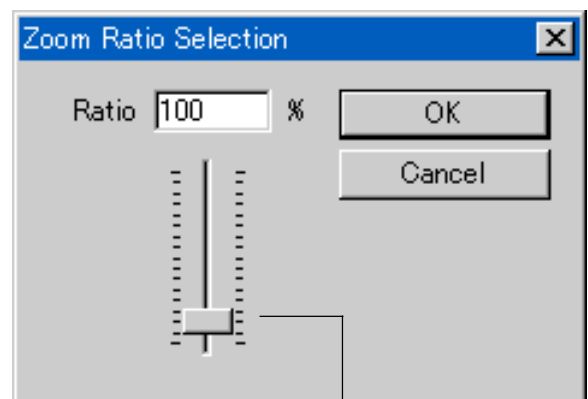
**[View] - [Zoom] - [Specify Zoom Ratio...] command**

This specifies the ratio for enlarging or reduced the view of the object.

Running this command opens the [Zoom Ratio Selection] dialog box.

To set the zoom ratio used when 3D Engrave starts, from the [File] menu, click [\[Preferences\]](#).

[Zoom Ratio Selection] dialog box



(1)

**Ratio**

Enter the view ratio as a percentage.  
Any integer from 1 to 800 can be entered.

(1)

Dragging this slider up or down changes the view ratio.  
Any integer from 1 to 800 can be entered.



## [View] - [Fit to Screen] command

This command expands or reduces the size of the object shown to fill the screen.

## [View] - [Screen] command

This switches between a flat view (2D screen) and a three-dimensional view (3D screen) of the object.

To add or modify shapes, switch to the 2D screen. To check the shape of a relief, switch to the 3D screen.

## [View] - [Tool Path] command

This displays or hides the tool path.

The tool path is displayed only when at the 3D screen.

## [View] - [Shape Information] command

This toggles the display of the object information bar on or off.

The object information bar shows the position of the mouse pointer, as well as the object's centerpoint, dimensions, angle, and slant.

Toggling off the display of the object information bar enlarges the area of the edit screen.

## [View] - [Toolbar] command

This toggles the display of the toolbar on or off.

The toolbar is provided with buttons for running 3D Engrave commands such as [Open...] and [Save]. Moving the mouse pointer over a button displays the button's name.

Toggling off the display of the toolbar enlarges the area of the edit screen.

 [Related Topics](#)     [Toolbar buttons](#)

## [View] - [Status Bar] command

This command toggles display of the status bar window on or off.

The status bar shows helpful comments amount commands. We recommend leaving the status bar on until you're familiar with how 3D Engrave works.

Turning off the status bar enlarges the object's display area.

## [View] - [Show Grid] command

This toggles the display of the grid on or off.

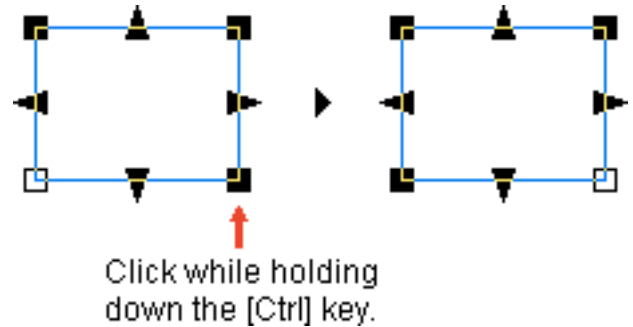
## [View] - [Snap To Grid] command

When this is on, objects are automatically aligned with the grid lines.

Alignment with the grid lines can make it easier to arrange two or more objects or make settings for object size.

When 3D Engrave has just been installed, this function is off. The snap point is initially at an object's lower left.

To change the snap point, hold down the [Ctrl] key and click on the desired point.



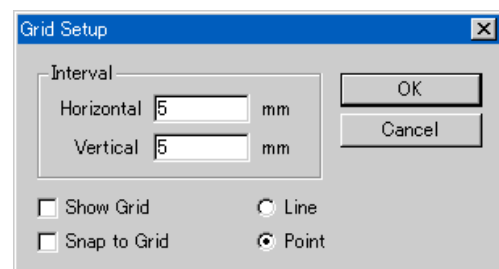
The snap point can be a point around the perimeter of the object (any of eight points) or a point at the center of the object.



## [View] - [Grid Setup...] command

This makes the settings for grid interval, whether the grid is displayed, and whether the snap to grid function is on or off. Running this command displays the [Grid Setup] dialog box.

[Grid Setup] dialog box




### Interval - Horizontal

Enter the interval for horizontally adjacent grid lines.

When 3D Engrave has just been installed, this is set at 2.0 mm (0.079 inch).

Setting range: 0.01 to 50.00 mm (0.001 to 2.000 inch)

 [Related Topics](#)     [Changing the Measurement System for Numerical Values](#)

**Interval - Vertical**

Enter the interval for vertically adjacent grid lines.  
When 3D Engrave has just been installed, this is set at 2.0 mm (0.079 inch).

Setting range: 0.01 to 50.00 mm (0.001 to 2.000 inch)

Related Topics [Changing the Measurement System for Numerical Values](#)

**Show Grid**

This toggles the display of the grid on or off.

**Snap to Grid**

This toggles the function for snapping objects to the grid on or off.

**Line**

The grid is shown with lines.

**Point**

The grid appears as points.

**[View] - [Coarse Mesh] command**

This widens the interval between adjacent wire-frame lines when displaying a relief three-dimensionally on the 3D screen. Use this when the interval is too narrow and the shape is difficult to make out.

**[View] - [Fine Mesh] command**

This narrows the interval between adjacent wire-frame lines when displaying a relief three-dimensionally on the 3D screen. Use this when the interval is too wide and the shape is difficult to make out.

**6-5 [Image] menu****[Image] - [Remove Noise] command**

This makes image noise less conspicuous.  
When you scan an image with a scanner, grime on the scanning surface can cause noise. If noise is large enough to be visible, we recommend correcting the image with Image Retouch or scanning the image again.

**[Image] - [Reduce Colors...] command**

This reduces the number of colors used in an image. The color of each pixel changes to the closest color from the palette having the specified number of colors. Converting a photograph or the like using many colors to polygons may produce shapes that are too small for practical use. Use this to perform preprocessing before converting an image to polygons.  
Running this command displays the [Reduce Image Colors] dialog box.

[Reduce Image Colors] dialog box

**Number of colors**

This selects the number of colors to be used after image conversion.

**[Image] - [Grayscale] command**

This discards the colors of an image, representing them as gradations of black.  
The number of gradations is 256.

**[Image] - [Invert Negative/Positive] command**

This inverts the colors.  
When a relief has been created from an image, this inverts the rises and depressions of the original image before inversion.

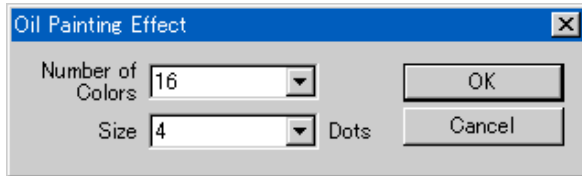
**[Image] - [Emboss] command**

This changes the image so that only its contours stand out. Color information is lost, and the image changes to grayscale.

## [Image] - [Oil Painting...] command

This change the image to a group of coarse points.  
Running this command displays the [Oil Painting Effect] dialog box.

[Oil Painting Effect] dialog box



### Number of colors

This selects the number of colors to be used after image conversion.

### Size

This selects the number of dots to make the same color. Larger numbers produce coarse images. If you want to retain most of the sharpness of the original image, choose a small number.


## 6-6 [Shape] menu

### [Shape]- [Properties...] command

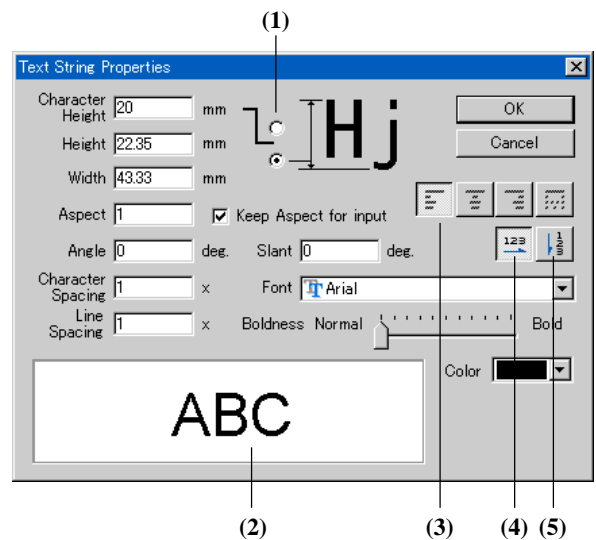
This is used to change the form of an object by modifying its numerical values.

A dialog box for changing the shape appears. The items displayed vary according to the type of object selected.

- [Text String Properties](#)
- [Shape Properties](#)
- [Polygon Properties](#)
- [Image Properties](#)
- [PICZA Data Properties](#)

 Keyboard shortcut: [Alt] + [Enter]


[Text String Properties] dialog box



### Character Height

Enter the height of the text.

The setting immediately affects all characters in the text string. Changing this value also makes the [Height] value change accordingly.

 Related Topics [Changing the Measurement System for Numerical Values](#)


### (1)

Choose the portion of the text for which you want to enter the height.

### Height

Enter the overall height for the text string.

Changing this value also makes the [Text Height] value change accordingly.

 Related Topics [Changing the Measurement System for Numerical Values](#)



**Width**

Enter the overall width for the text string.

Related Topics [Changing the Measurement System for Numerical Values](#)

**Aspect**

Enter the size as a ratio, with the vertical/horizontal aspect (vertical/horizontal ratio) when the text or shape was created as 1.

Entering a number changes the width without varying the height. Enter 2 to double the width. Enter 0.5 to halve it.

**Keep Aspect for input**

This causes an object's aspect to be maintained at a fixed value when a numerical value is entered for Height or Width.

When a value is entered for Height (or Width), the value of Width (or Height) changes automatically.

**(3)**

You can center a text string or align it with the left margin, the right margin, or both (justified).

**Angle**

Enter the angle of rotation for the object.

The unit is in degrees.

A negative angle may also be entered. Entering a negative angle rotates the object clockwise.

**Slant**

Enter the degree of slant of the object.

The unit is in degrees.

Entering a positive angle makes the object slant to the right. Entering a negative angle makes the object slant to the left.

**Line Alignment**

You can center a text string or align it with the left margin, the right margin, or both (justified).

**Character Spacing**

Enter the pitch (interval) for adjacent characters. Character size does not change.

Changing this value also makes the [Width] value change accordingly.

**Font**

This displays the name of the selected font.

To change the font for the text, click on the down-pointing triangle.

**Line Spacing**

This specifies the spacing between adjacent lines.

**Color**

This chooses the colors of surfaces and lines in text or shapes.

When overlapping shapes are difficult to make out, you can color them differently to distinguish them.

**Boldness**

Dragging the slider changes the thickness (weight) of text. A font cannot be made narrower than its standard weight.

The left-hand end of the slider is standard weight, and the right-hand end is maximum weight.

**(2)**

This shows the shape of the text.

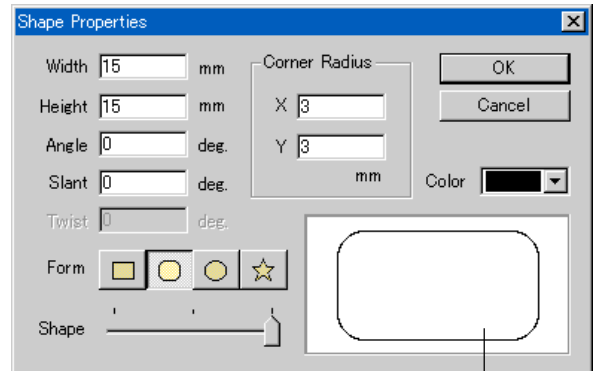
**(4)**

This selected text changes to a horizontal layout.

**(5)**

This selected text changes to a vertical layout.

[Shape Properties] dialog box



(1)

**Height**

Enter the object's height.

Related Topics [Changing the Measurement System for Numerical Values](#)

**Width**

Enter the object's width.

Related Topics [Changing the Measurement System for Numerical Values](#)

**Angle**

Enter the angle of rotation for the object.

The unit is in degrees.

A negative angle may also be entered. Entering a negative angle rotates the object clockwise.

**Slant**

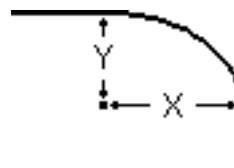
Enter the degree of slant of the object.

The unit is in degrees.

Entering a positive angle makes the object slant to the right. Entering a negative angle makes the object slant to the left.

**Corner Radius - X, Y**

Enter the corner roundness for a rounded-corner rectangle.



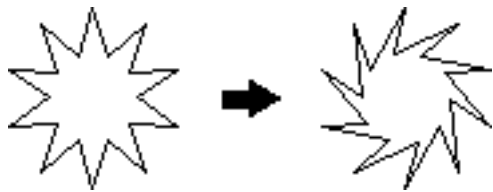
Related Topics [Changing the Measurement System for Numerical Values](#)

**Color**

This chooses the colors of surfaces and lines in text or shapes.  
When overlapping shapes are difficult to make out, you can color them differently to distinguish them.

**Twist**

This rotates the center of the star without change the positions of the vertices.  
Enter the angle of rotation. The units of measurement are degrees.  
Entering a positive value rotates the star counterclockwise.  
Entering a negative value rotates it clockwise.  
This can be used only with stars.



**Form**

Choose the type of shape.

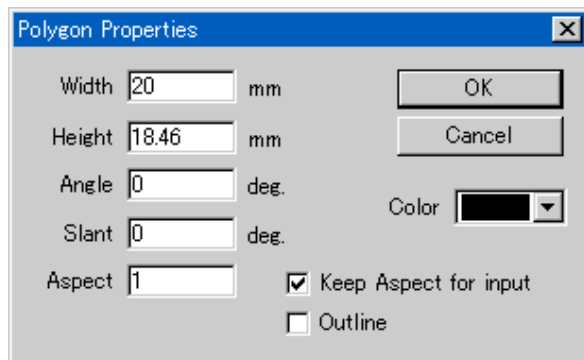
**(1)**

This shows the shape of the graphic.

**Shape**

Drag the slider to change the shape of the object.  
Depending on the type of shape you chose, the way the shape changes may vary.

[Polygon Properties] dialog box



**Height**

Enter the object's height.

Related Topics [Changing the Measurement System for Numerical Values](#)

**Width**

Enter the object's width.

Related Topics [Changing the Measurement System for Numerical Values](#)

**Angle**

Enter the angle of rotation for the object.  
The unit is in degrees.  
A negative angle may also be entered. Entering a negative angle rotates the object clockwise.

**Slant**

Enter the degree of slant of the object.  
The unit is in degrees.  
Entering a positive angle makes the object slant to the right.  
Entering a negative angle makes the object slant to the left.

**Aspect**

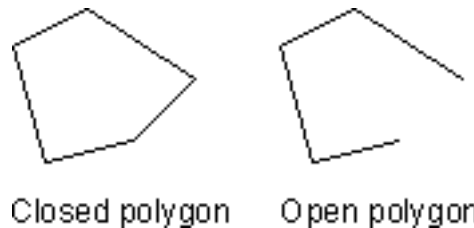
Enter the size as a ratio, with the vertical/horizontal aspect (vertical/horizontal ratio) when the text or shape was created as 1.  
Entering a number changes the width without varying the height. Enter 2 to double the width. Enter 0.5 to halve it.

**Keep Aspect for input**

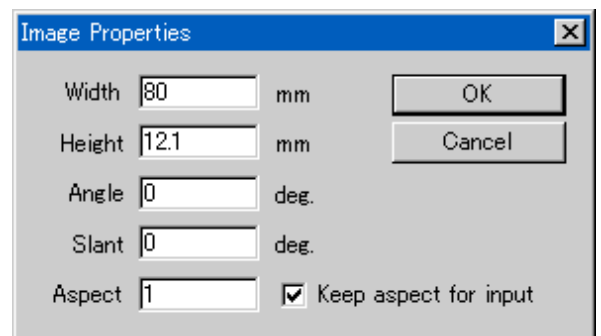
This causes an object's aspect to be maintained at a fixed value when a numerical value is entered for Height or Width.  
When a value is entered for Height (or Width), the value of Width (or Height) changes automatically.

**Outline**

This eliminates the surfaces of polygons, leaving only their contours, or outlines.  
You cannot add thickness to polygons that are only outlines. These lines are used to create the engraving path.  
When this is selected, you can create open polygons (continuous lines). To create an open polygon, click the severance point, then click [Cut] - [Sever Vertex].  
You can create a line segment by reducing the number of vertices of an open polygon to two.



[Image Properties] dialog box



**Height**

Enter the object's height.

Related Topics [Changing the Measurement System for Numerical Values](#)

**Width**

Enter the object's width.

Related Topics [Changing the Measurement System for Numerical Values](#)

**Angle**

Enter the angle of rotation for the object.  
The unit is in degrees.  
A negative angle may also be entered. Entering a negative angle rotates the object clockwise.

**Slant**

Enter the degree of slant of the object.  
The unit is in degrees.  
Entering a positive angle makes the object slant to the right.  
Entering a negative angle makes the object slant to the left.

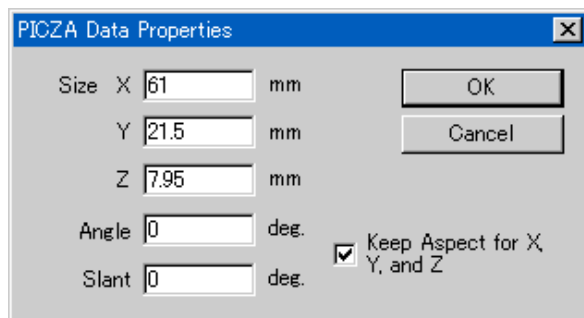
**Aspect**

Enter the size as a ratio, with the vertical/horizontal aspect (vertical/horizontal ratio) when the text or shape was created as 1.  
Entering a number changes the width without varying the height. Enter 2 to double the width. Enter 0.5 to halve it.

**Keep Aspect for input**

This causes an object's aspect to be maintained at a fixed value when a numerical value is entered for Height or Width.  
When a value is entered for Height (or Width), the value of Width (or Height) changes automatically.

**[PICZA Data Properties] dialog box**



**Size - X, Y, Z**

This changes the size of the PICZA data.  
To change the size without modifying the vertical, horizontal, and height aspect, click [Keep Aspect for X, Y, and Z] to select it.

**Angle**

Enter the angle of rotation for the object.  
The unit is in degrees.  
A negative angle may also be entered. Entering a negative angle rotates the object clockwise.

**Slant**

Enter the degree of slant of the object.  
The unit is in degrees.  
Entering a positive angle makes the object slant to the right.  
Entering a negative angle makes the object slant to the left.

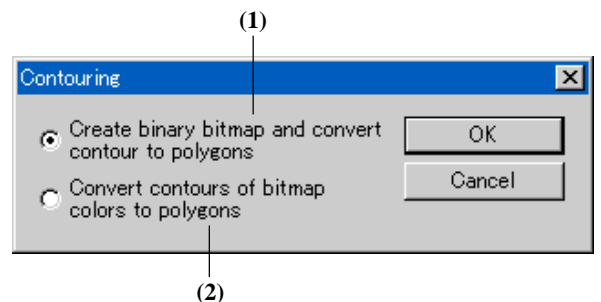
**Keep Aspect for X, Y, and Z**

This changes the size of the PICZA data without altering the vertical, horizontal, and height size aspect.  
This does not mean that the original PICZA data aspect is retained. The size aspect in effect when this is selected is retained.

**[Shape] - [Convert to Polygon] command**

This changes the attribute for an object other than a polygon to the attribute for a polygon. The original attribute (text, quadrilateral, rounded-corner quadrilateral, circle or ellipse, or star) is lost.  
Converting an object to a polygon with this command makes it possible for you to edit its points (vertices).  
When you are converting an image to polygons, the [Contouring] dialog box appears.  
Images having more than 16 colors cannot be converted. In such cases, use [Image] - [Reduce Colors] to reduce the number of colors to 16 or fewer.

**[Contouring] dialog box**



**(1)**

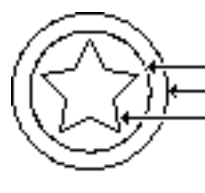
This reduces an image to two colors (black and white) and converts it to polygons.  
Clicking [OK] displays the color-reduced image on the preview screen. At the preview screen, you can adjust the density of the image.

**(2)**

This converts an image to polygons without changing the number of colors.  
Because the contours of each color are extracted, greater numbers of colors result in longer processing times.

**[Shape] - [Unite Polygons] command**

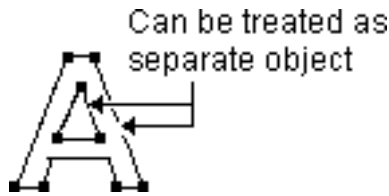
A number of objects can be grouped together and united into a single polygon.  
They can then be moved or resized while maintaining the layout the objects had before they were joined together. The points of an object polygon that has been joined together in this fashion can be edited in the same way as an ordinary polygon.



Can be treated as a single object

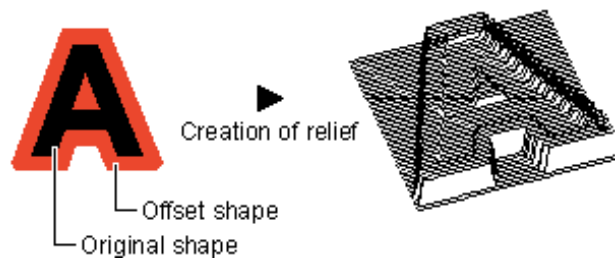
### [Shape] - [Divide Polygon] command

A polygon can be split into individual parts.



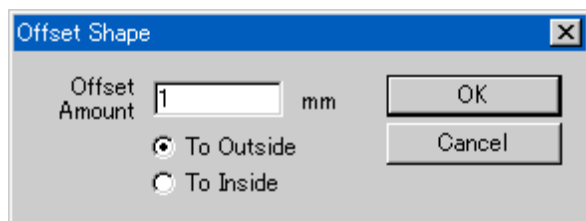
### [Shape] - [Offset Shape] command

This creates a shape that is offset shape to the inside or outside of the selected shape, overlapping the original shape. The shape that is offset changes color from the original shape. Using this function, you can make such things as three-dimensional enclosed characters like the one shown in the figure.



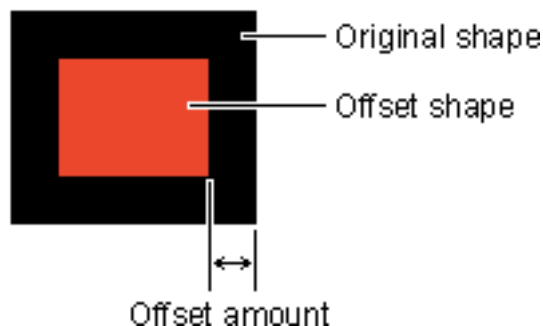
Running this command displays the [Offset Shape] dialog box.

[Offset Shape] dialog box



#### Offset Amount

Enter the amount of offset for the shape.



[Changing the Measurement System for Numerical Values](#)

#### To Outside

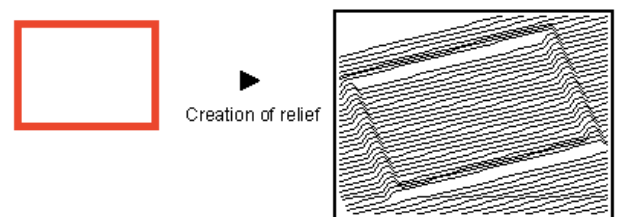
This creates a shape that is offset to the outside of the original shape.

#### To Inside

This creates a shape that is offset to the inside of the original shape.

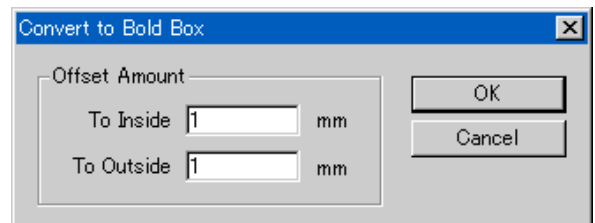
### [Shape] - [Convert to Bold Frame...] command

This thickens the contour line of the shape. It creates two offset shapes, then converts them to polygons and combines them. The original shape is deleted. You can use this function to create a frame around a relief.



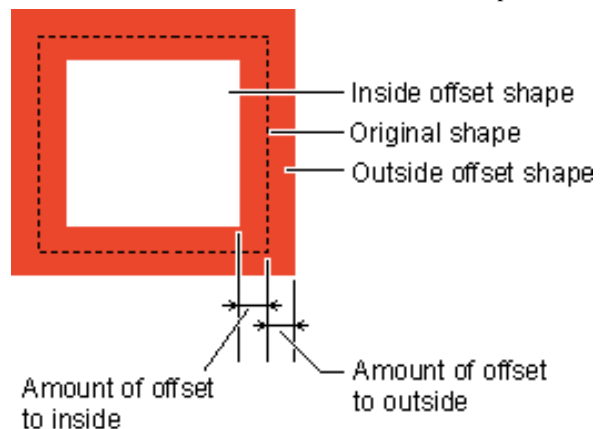
Running this command displays the [Convert to Bold Box] dialog box.

[Convert to Bold Box] dialog box



#### Offset Amount - To Outside

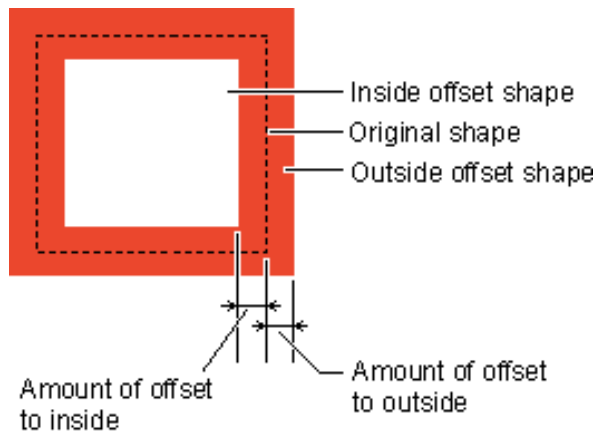
Enter the amount of offset to the outside of the shape.



[Changing the Measurement System for Numerical Values](#)

#### Offset Amount - To Inside

Enter the amount of offset to the inside of the shape.



Related Topics [Changing the Measurement System for Numerical Values](#)

### [Shape] - [Insert Vertex] command

This adds a vertex at the specified location.

Keyboard shortcut: [Insert]

Related Topics [Increasing the vertices of a polygon](#)

### [Shape] - [Delete Vertex] command

This deletes the selected vertex.

Keyboard shortcut: [Delete]

Related Topics [Reducing the vertices of a polygon](#)

### [Shape] - [Connect Vertex] command

This connects the endpoints of an open polygon with a line. To connect vertices, choose two open endpoints of a polygon, then run this command.

Connecting to the endpoint of a different polygon

1. Select the target polygon.
2. At the [Shape] menu, click [Unite Polygons].
3. Select the two endpoints.
4. At the [Shape] menu, click [Connect Vertex].

Keyboard shortcut: [Alt]+[Insert]

### [Shape] - [Sever Vertex] command

This severs a polygon at a specified location. To specify the severance point, click on one of the polygon's line segments or vertices.

Keyboard shortcut: [Alt]+[Delete]

### [Shape] - [Snap to Vertex] command

This overlays the selected vertex on the closest vertex.

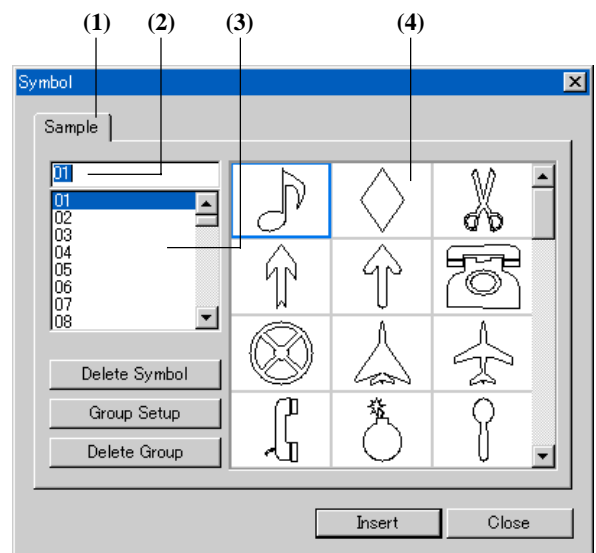
Snapping to the vertex of a different polygon

1. Select the target polygon.
2. At the [Shape] menu, click [Unite Polygons].
3. Select the vertex to snap to.
4. At the [Shape] menu, click [Snap to Vertex].

### [Shape] - [Symbol...] command

This adds a symbol to the file being edited. Running this command opens the [Symbol] dialog box.

[Symbol] dialog box



- (1) The symbol and group names appear. Click the tab and select the group.
- (2) The name of the selected symbol is displayed. Entering a symbol name selects the specified symbol.
- (3) A list of symbol names is displayed. Click on the name of a symbol to select it.
- (4) A list of symbol shapes is displayed. Click on a symbol to select it.

#### Delete Symbol

This deletes the selected symbol.

#### Group Setup

This changes the name of the currently selected group. The [Change Group Name] dialog box appears. Enter the name of the group in the dialog box.

**Delete Group**

This deletes the currently selected group. Any symbols registered in the group are all deleted as well.

**Insert**

This adds the selected symbol to the file being edited.

**[Shape] - [Register Symbol...] command**

It is used to register a symbol with a 3D Engrave object. You can register flat shapes, text, and images. Three-dimensional shapes cannot be registered, but the various relief-creation settings specified for the object are saved. Running this command opens the [Add Symbol] dialog box.

[Add Symbol] dialog box



**Group Name**

Select the group where the symbol is to be registered. Click to display a list of existing group names. To add a new group, click [New Group].

**Symbol Name**

Enter the symbol name for the selected object.

**New Group**

This adds a new group for the symbol. The [New Group] dialog box appears. Enter the name of the group in the dialog box.

**Add**

The selected object is registered as a symbol.



**[Shape] - [Move To Front]**

**command**

This changes the front-back relationship of the objects. The selected object is moved to the front.

▶ Keyboard shortcut: [Shift]+[Page Up]



**[Shape] - [Move To Back]**

**command**

This changes the front-back relationship of the objects. The selected object is moved to the back.

▶ Keyboard shortcut: [Shift]+[Page Down]

**[Shape] - [Align] command**

All selected objects are aligned at their centers.

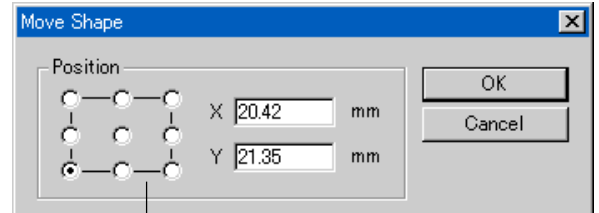
If you have selected a number of objects while holding down the [Shift] key, the objects are overlaid atop the last object you chose. If you've selected a number of objects by dragging an area, the objects are overlaid atop the object in the foreground.

▣ Related Topics [Aligning centerpoints](#)

**[Shape] - [Move Shape...] command**

This specifies an object's location as the distance from the lower-left point of the relief area. Running this command displays the [Move Shape] dialog box.

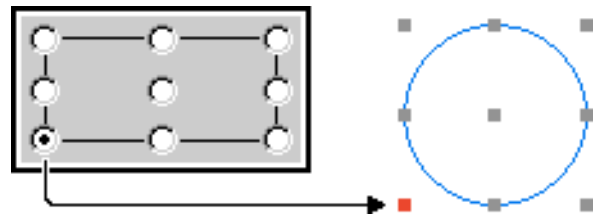
[Move Shape] dialog box



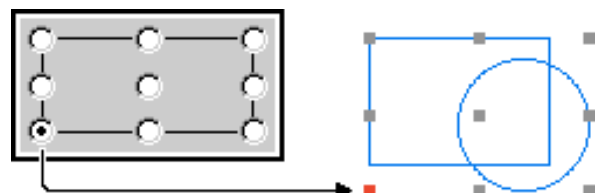
(1)

(1)

Choose which portion of the object is to be used for specifying the position.

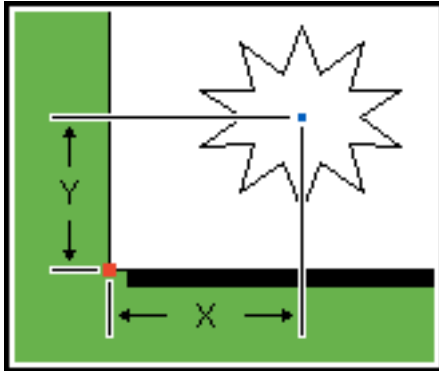


When more than one object is chosen, a rectangle enclosing all the objects is displayed.



**Position - X, Y**

This specifies an object's position as a certain distance from the origin point.



\* When the object's center is taken to be the reference point

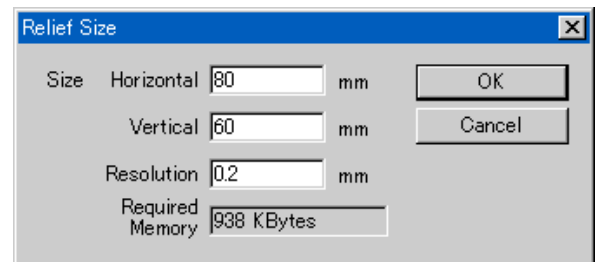
Related Topics [Changing the Measurement System for Numerical Values](#)

**[Shape] - [Mirror] command**

This flips an object from left to right, creating a mirror image.

**6-7 [Relief] menu****[Relief] - [Relief Size...] command**

This sets the cutting area (the size of the entire relief). Changing the size also changes the size of the white rectangle on the 2D screen. Because the size of the relief determines the amount of memory used, we recommend setting this to the minimum necessary size. Running this command displays the [Relief Size] dialog box.

**[Relief Size] dialog box****Size (Horizontal / Vertical)**

Enter the size of the relief.

Changing the size also changes the size of the shaded white rectangle (the relief area).

**Resolution**

Type in the degree of detail for the relief.

Smaller values produce three-dimensional objects with smoother curves, but require larger amounts of memory. Because this does not necessarily correlate with the fineness of the mesh with which the 3D screen is displayed, you cannot check the resolution at the 3D screen.

**Required Memory**

This displays an estimate of the memory required to create a relief of the specified size and resolution.

This is the memory used only by 3D Engrave, and does not include the amount used by the operating system. If the amount of memory actually installed in the computer is much less than this amount, the amount of disk space used by virtual memory increases, and operating speed may become slower as a result.

**[Relief] - [Create Relief...]****command**

This adds thickness to shapes, text, images or other flat objects to create a relief (raised engraving). The 3D screen appears automatically to let you check the relief.

The relief on the 3D screen is an aggregate of the reliefs of the respective shapes. The relief is created by stacking shapes on and digging down into the present configuration.

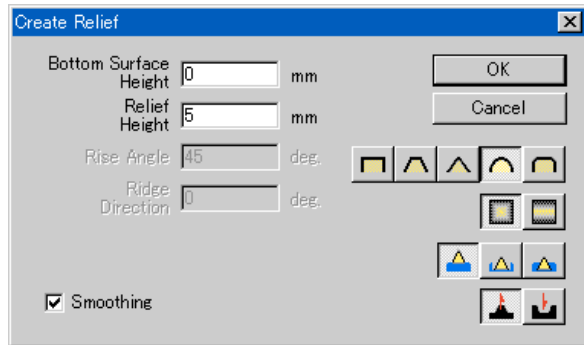
Changing the shape or location of the flat objects does not affect the relief. To change the shape of the relief, use [Relief] - [Delete Relief] to erase the relief, then create it again.

Running this command displays the [Create Relief] dialog box.

[Create Relief] dialog box


There are three types of Create Relief dialog boxes. The dialog box that appears differs according to the type of object. Display the dialog box you want to see explanations for, then click the place you want to learn more about.



■ When creating a relief of a shape or text



**Bottom Surface Height**

Enter the height of the bottom of the relief. You can enter a value when the cross-section of the relief is something other than a rectangle.


When  has been selected, this is the relative height from the present shape.

When  or  has been selected, this is the height from zero height.

Related Topics [Changing the Measurement System for Numerical Values](#)

**Relief Height/Round-corner Radius**

Enter the thickness of the relief.

When  has been selected, enter the radius of the circle.

Related Topics [Changing the Measurement System for Numerical Values](#)

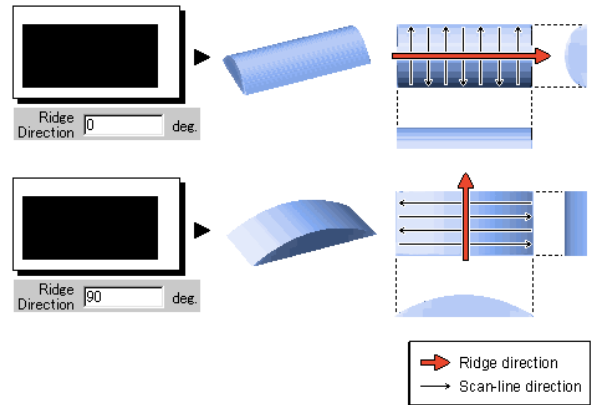
**Rise Angle**

Enter the angle of the trapezoid shown in the figure. You can enter a value when creating a relief whose cross-section is a trapezoid.









**Ridge Direction**

Enter the direction of the ridge of the three-dimensional shape. This determines the direction of the scan lines. The scan lines are made so as to intersect the ridge direction at a right angle.



Enter the positive direction of the X axis as 0 degrees. Counterclockwise is the positive direction. Normally, enter the object's angle of rotation.

You can enter a value only when  has been selected.

Use , , , , and  to choose the shape of the scan lines.

The interval between adjacent scan lines is set in the [Relief Size] dialog box, with [Resolution].

**Smoothing**

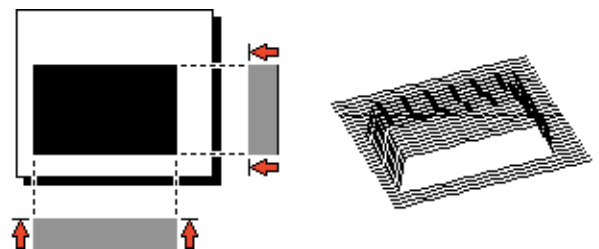
This smooths the relief for the object. Conversely, sharpness is lost.

Height is corrected so as to reduce differences in height (along the Z axis) between adjacent points.

To smooth the entire relief, Click [Relief] - [Smoothing].

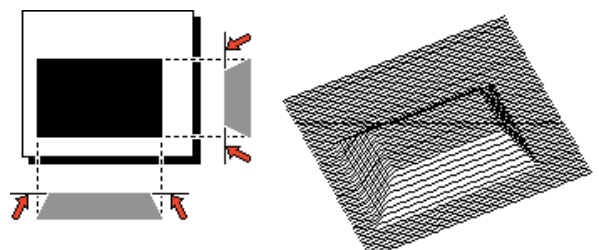


This pushes the object up (or down) perpendicularly along the Z axes.



This pushes the object up (or down) at an angle along the Z axes.

Enter the angle at [Rise Angle].

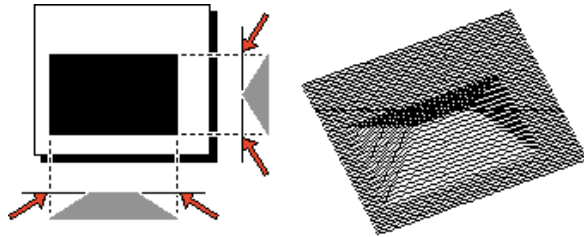




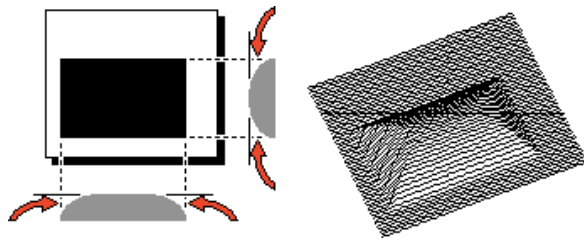
When pushed up at an angle from two opposite sides, intersection occurs at a certain height. You cannot create a three-dimensional shape at higher than the intersection height.



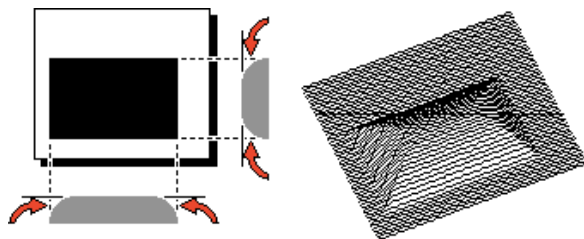
This pushes the object up (or down) at an angle along the Z axes. The angle is calculated to intersect at the relief height.



This pushes the object up (or down) in the shape of a parabola along the Z axes. The shape of the parabola is calculated to intersect at the relief height.



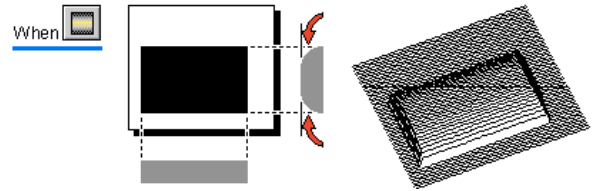
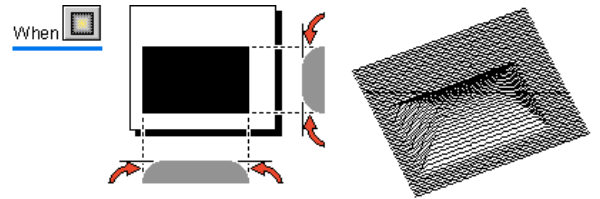
This pushes the object up (or down) in the shape of a circle along the Z axes. Enter the radius of the circle at [Round-corner Radius].



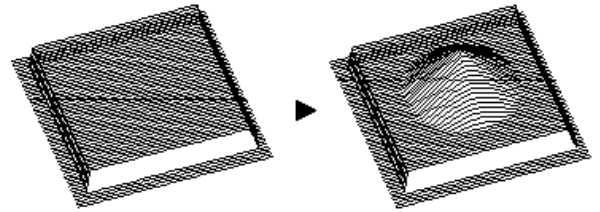
This pushes the selected shape up (or down) from four sides.



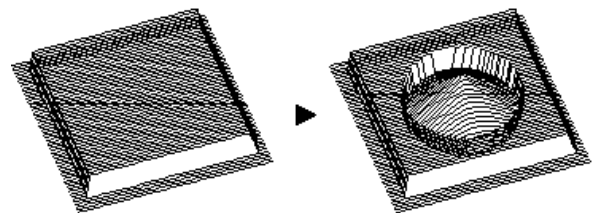
This pushes the selected shape up (or down) from two opposite sides.



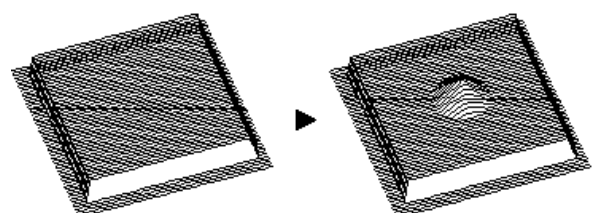
This stacks the three-dimensional shape on top of the shape already created.



This creates a three-dimensional shape referenced from the X-Y plane at zero height. This sets the height at the place of overlap with the shape created earlier to zero, and thereafter creates the three-dimensional shape.

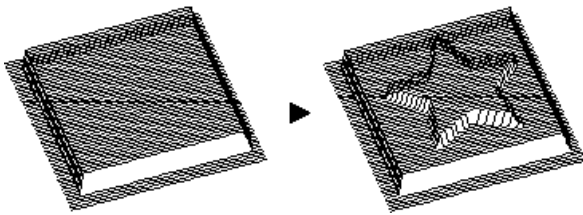


This creates a three-dimensional shape referenced from the X-Y plane at zero height. This leaves the shape created earlier unchanged, and stacks the new three-dimensional shape on it.

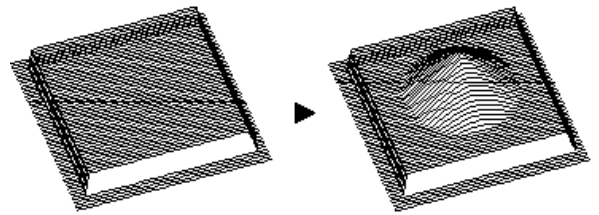




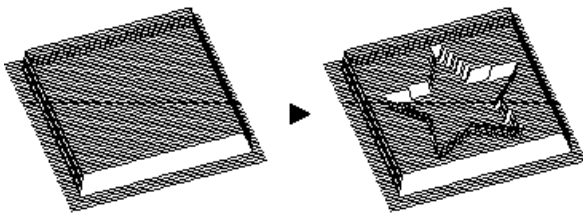
This stacks the thicknesses of the three-dimensional shapes one above another.



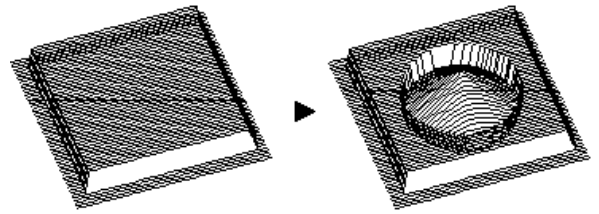
This stacks the three-dimensional shape on top of the shape already created.



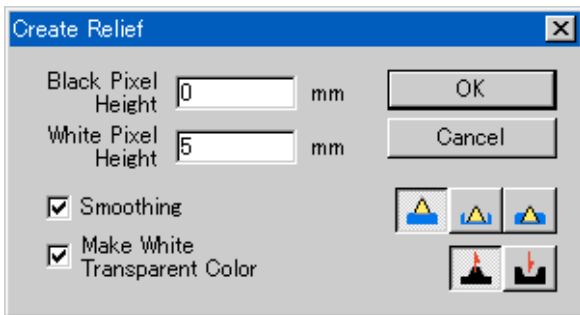
This pushes the thickness of the three-dimensional shape downward.



This creates a three-dimensional shape referenced from the X-Y plane at zero height. This sets the height at the place of overlap with the shape created earlier to zero, and thereafter creates the three-dimensional shape.



■ When creating a relief of an image



**Black Pixel Height, White Pixel Height**

Enter the maximum and minimum values for thickness when creating a relief from an image. The nearer a color is to white, the closer it approaches the white-pixel height, and the nearer a color is to black, the closer it approaches the black-pixel height.

☐ Related Topics [Changing the Measurement System for Numerical Values](#)

**Smoothing**

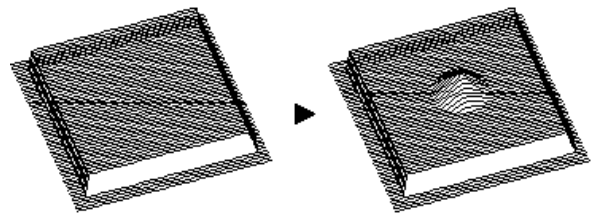
This smooths the relief for the object. Conversely, sharpness is lost. Height is corrected so as to reduce differences in height (along the Z axis) between adjacent points. To smooth the entire relief, Click [Relief] - [Smoothing].

**Make White Transparent**

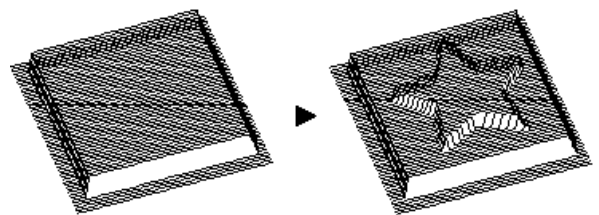
This makes white pixels (R=255, G=255, B=255) transparent. Select this to set the thickness of the white areas of the image to zero.



This creates a three-dimensional shape referenced from the X-Y plane at zero height. This leaves the shape created earlier unchanged, and stacks the new three-dimensional shape on it.

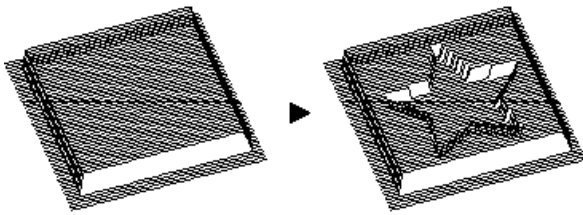


This stacks the thicknesses of the three-dimensional shapes one above another.

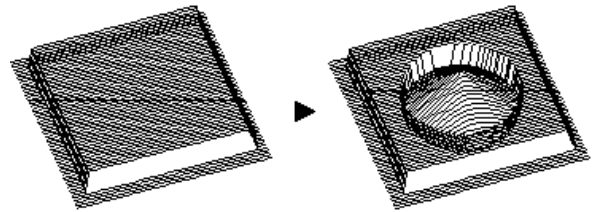




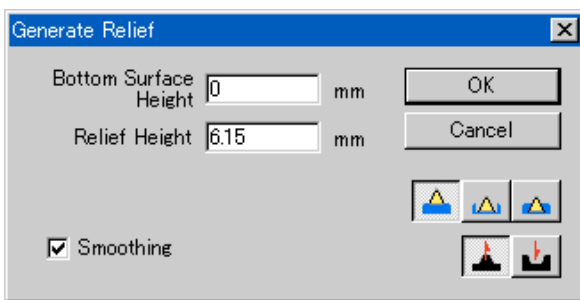
This pushes the thickness of the three-dimensional shape downward.



This creates a three-dimensional shape referenced from the X-Y plane at zero height. This sets the height at the place of overlap with the shape created earlier to zero, and thereafter creates the three-dimensional shape.






■ When creating a relief of PICZA data



**Bottom Surface Height**

Enter the height of the bottom of the relief.

When  has been selected, this is the relative height from the present shape.

When  or  has been selected, this is the height from zero height.

Related Topics [Changing the Measurement System for Numerical Values](#)

**Relief Height**

Enter the thickness of the relief.

Related Topics [Changing the Measurement System for Numerical Values](#)

**Smoothing**

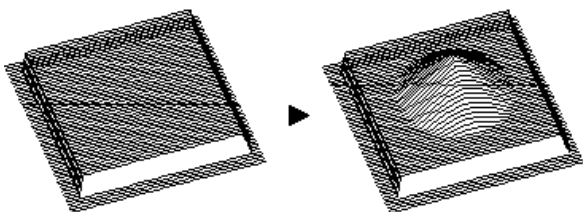
This smooths the relief for the object. Conversely, sharpness is lost.

Height is corrected so as to reduce differences in height (along the Z axis) between adjacent points.

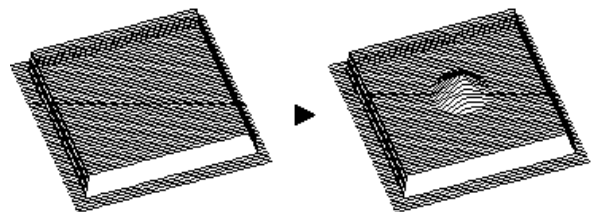
To smooth the entire relief, Click [Relief] - [Smoothing].



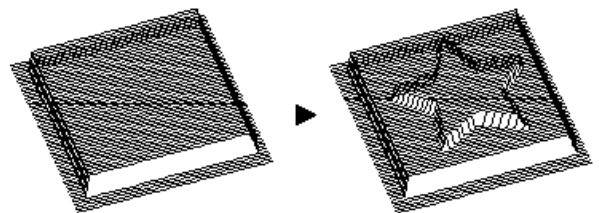
This stacks the three-dimensional shape on top of the shape already created.



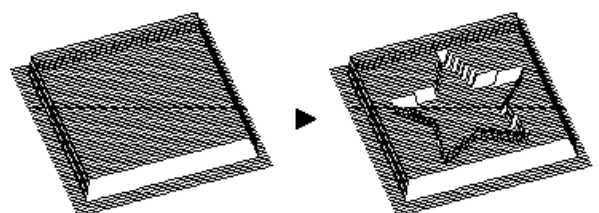
This creates a three-dimensional shape referenced from the X-Y plane at zero height. This leaves the shape created earlier unchanged, and stacks the new three-dimensional shape on it.



This stacks the thicknesses of the three-dimensional shapes one above another.



This pushes the thickness of the three-dimensional shape downward.



### **[Relief] - [Delete Relief] command**

This deletes the relief that has been created.

The three-dimensional object shown on the 3D screen is deleted, and the screen returns to an X-Y plane with no height.

Use this to do over the creation of a relief from the beginning.

### **[Relief] - [Smoothing] command**

This smooths an entire relief. Conversely, sharpness is lost.

Height is corrected so as to reduce differences in height (along the Z axis) between adjacent points.

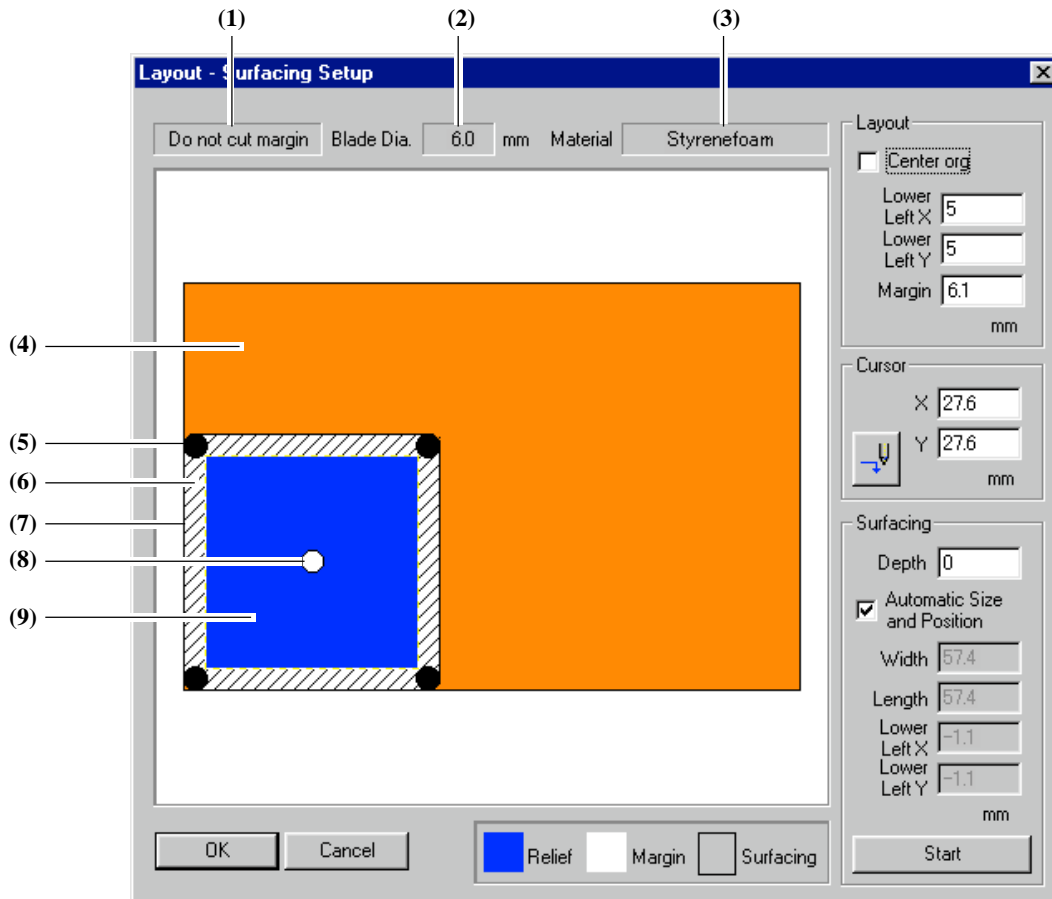
## 6-8 [Cut] menu

### [Cut] - [Layout...] command

This is used to make the settings for the loaded location of the cutting material, for the margin settings, and for surfacing.

Running this command opens the [Layout - Surfacing Setup] dialog box.

[Layout - Surfacing Setup] dialog box



- (1) This shows whether abstraction is on or off, letting you verify the current setting.
- (2) This displays the blade diameter (or, for the engraving tool, the tool diameter). This lets you check the present setting.
- (3) This shows the cutting material, letting you verify the current setting.

#### Layout - Center org

This sets the X-Y origin point at the center of the object. This is valid only on modeling machines that can set the origin point at the center of the cutting range. When this is selected, then on the modeling machine, set the origin point at the center. This is convenient when used to perform cutting using a center vise.

#### Layout - Lower Left X, Lower Left Y

This sets the lower-left position for the relief area (the rectangular area in blue).

Enter the distance from the X-Y origin point that has been set on the modeling machine. (For more information on the position of the X-Y origin point and how to set it, please refer to the user's manual for your modeling machine.) This setting cannot be made when [Center org] has been selected.

Related Topics [Changing the Measurement System for Numerical Values](#)

#### Layout - Margin

This provides for a margin of material around the relief area (the rectangular area in blue). Changing this setting changes the range of the white rectangle. The margin is provided on both the X axis in the Y axis. No setting is made along the Z axis.

Setting range: Total of blade diameter plus fine margin to 50 mm  
(Total of blade diameter plus fine margin to 2 inch)

The fine margin can be verified at the [\[Customize Parameters\] dialog box](#).

Related Topics [Changing the Measurement System for Numerical Values](#)

**Cursor - X, Y**

This specifies the destination for movement of the tool on the modeling machine.

Enter the distance from the X-Y origin point that has been set on the modeling machine. (For more information on the position of the X-Y origin point and how to set it, please refer to the user's manual for your modeling machine.)

Related Topics [Changing the Measurement System for Numerical Values](#)



Clicking this lowers the tool at the position entered for [Cursor] X and Y.

The height to which the tip of the tool is lowered is the Z-axis origin point (Z0) set on the modeling machine. Take care not to damage or cut the surface of the material.

Clicking this button performs the following operations on the modeling machine.

- 1 The tool rotates and rises to the highest point.
- 2 The tool moves to the corresponding position.
- 3 The tool descends to the Z origin and stops turning.

**Surfacing**

Cut the back of the loaded material, creating a level surface. This is also called "surface leveling." Surfacing is normally performed as one of the preparatory steps for cutting an object. Surfacing is used to make a leveled surface a reference surface in the depth direction (Z origin), or to eliminate unevenness in the surface of the material.

The cutting parameters for surfacing use the draft-cutting parameters for the presently selected material, blade diameter, and tool-tip configuration. Before performing surfacing, use [Cut] - [Cutting Parameters] to set the cutting parameters.

When you make surface leveling, you should [place the origin for Z-axis at the highest part of the target work piece](#).

**Surfacing - Depth**

Enter the depth, in millimeters (or inches), to cut from the Z-axis origin set on the modeling machine. After surfacing, a new Z-axis origin is set for the leveled surface.

The setting range varies according to the machine type set with the [Cut] - [Machines] command.

Related Topics [Changing the Measurement System for Numerical Values](#)

**Surfacing - Automatic Size and Position**

When this is on, the width and position of the surfacing range are set automatically.

The width of the surfacing range is set to the actual cutting area. The cutting area is the area that includes the size of the object, the margin, and abstraction.

The position of the surfacing is always maintains the same relationship with respect to the object, so changing the object's position moves the surfacing range by the same amount.

When off, the width and position of the surfacing range can be freely changed.

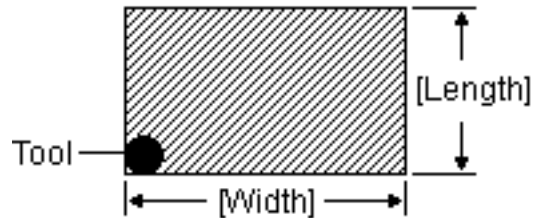
Around the range shown by shaded lines are symbols. The size can be changed by dragging these. Dragging the shaded area moves the location of the surfacing range. The size and position can also be changed by typing in values in

the text entry fields.

**Surfacing - Width, Length**

This is used to enter the width and length of the surfacing range.

[Width] is the dimension along the X axis, and [Length] is the dimension along the Y axis.



Related Topics [Changing the Measurement System for Numerical Values](#)

**Surfacing - Lower Left X, Lower Left Y**

This is used to enter the position of the lower-left point of the surfacing range.

Enter the distance from the X-Y origin point that has been set on the modeling machine. (For more information on the position of the X-Y origin point and how to set it, please refer to the user's manual for your modeling machine.)

Related Topics [Changing the Measurement System for Numerical Values](#)

**Surfacing - Start**

This starts rotation of the tool (blade) and begins surfacing. Before clicking this button, check to make sure all the settings for surfacing are correct.

**(4)**

The orange rectangle shows the maximum operating range for passage of the center of the tool (blade).

The size of the operating range varies according to the machine type set with the [Cut] - [Machines] command. The lower-left point of this rectangle (or when [Center org] is selected, the centerpoint of the rectangle) indicates the X-Y origin point on the modeling machine. To align the on-screen image with the modeling machine's operating range, set the X-Y origin on the modeling machine at the lower-left point of the maximum operating range. (For more information on the position of the X-Y origin point and how to set it, please refer to the user's manual for your modeling machine. Please note that the X-Y origin on the MODEL A is set to a fixed point and cannot be changed.)

Related Topics [Changing the Measurement System for Numerical Values](#)

**(5)**

Double-clicking on a black circle lowers the tool (blade) at the circle's position. The height to which the tip of the tool is lowered is the Z-axis origin point (Z0) set on the modeling machine. Take care not to damage or cut the surface of the material.

This makes it possible to actually see the tool's lowered location and verify that the cutting position that has been set is correct.

Double-clicking on a black circle performs the following operations on the modeling machine.

- 1 The tool rotates and rises to the highest point.
- 2 The tool moves to the corresponding position.
- 3 The tool descends to the Z origin and stops turning.

(6)

The white rectangle shows the margin provided around the relief area.

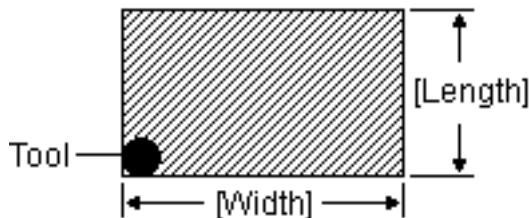
To change the margin, under [Layout] type in the value for [Margin].

(7)

The shaded rectangle shows the surfacing range.

To change the extent of the surfacing range, turn off [Automatic].

Around the range shown by shaded lines are ■ symbols. The size can be changed by dragging these. The size and position can also be changed by typing in values in the [Width] and [Length] text entry fields.



Dragging the shaded area moves the location of the surfacing range. The location can also be changed by entering values in the [Lower Left X] and [Lower Left Y] text entry fields.

(8)

Double-clicking on a white circle (○) lowers the tool (blade) at the circle's position.

You can move the tool's lowering point by dragging this. To specify the point as coordinates, at [Cursor] enter the values for X and Y. Use this as a software cursor for modeling machines which do not have tool-movement keys.

The height to which the tip of the tool is lowered is the Z-axis origin point (Z0) set on the modeling machine. Take care not to damage or cut the surface of the material.

Double-clicking on a white circle performs the following operations on the modeling machine.

- 1 The tool rotates and rises to the highest point.
- 2 The tool moves to the corresponding position.
- 3 The tool descends to the Z origin and stops turning.

Right-clicking a white circle (○) displays a shortcut menu. With this shortcut menu, you can move the tool to the center or four corners of the blue rectangle.

(9)

The blue rectangle shows the relief area (cutting area).

Dragging the blue rectangle changes the cutting location. To enter the object's cutting location with numerical values, under [Layout], type in values for [Lower Left X] and [Lower Left Y].



## [Cut] - [Create Tool Path] command

This creates the path that the tip of the blade traces (the tool path).

This creates a tool path that satisfies the cutting parameters set with [Cut] - [Cutting Parameters].

The tool path for cutting appears on the 3D screen as a pink line.

Related Topics

[Create the tool path for draft cutting](#)  
[Create the tool path for finishing](#)

## [Cut] - [Delete Tool Path] command

This deletes the tool path created with [Cut] - [Create Tool Path].

The tool path for engraving is not deleted.



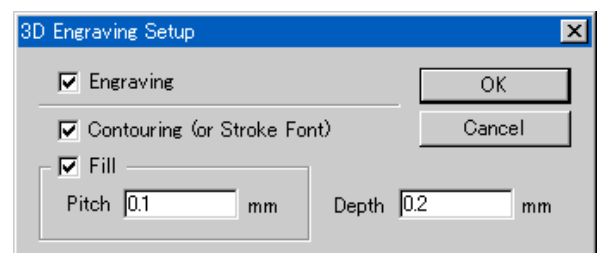
## [Cut] - [Create 3D Engraving Path...] command

This creates a tool path for engraving for the selected shapes and text.

The tool path for engraving appears on the 3D screen as a red line.

Running this command displays the [\[3D Engraving Setup\] dialog box](#).

### [3D Engraving Setup] dialog box



#### Engraving

When engraving an object, select this.

When this is selected, you can choose the parameters for engraving.

#### Contouring (or Stroke Font)

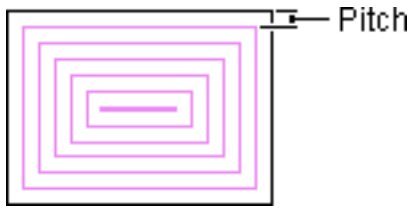
This engraves the contour lines of the object.

#### Fill

When on, the interior of the object (text or shape) is engraved by flat-drag cutting.

The route along which the tool moves (the tool path) is created along the contours of the object. Set the tool-path pitch with [Pitch].

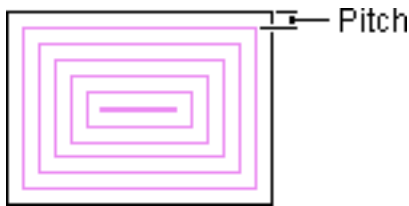
The tool path is created on the inner side of the object. To engrave an object's contour lines, select [Contour].



**Pitch**

This sets the fill pitch (the spacing between adjacent tool paths).

Normally you should enter the diameter of the blade installed on the output device. To ensure an attractive finish for flat-drag engraving, the pitch is generally set at a value smaller than the blade diameter.



Related Topics [Changing the Measurement System for Numerical Values](#)

**Depth**

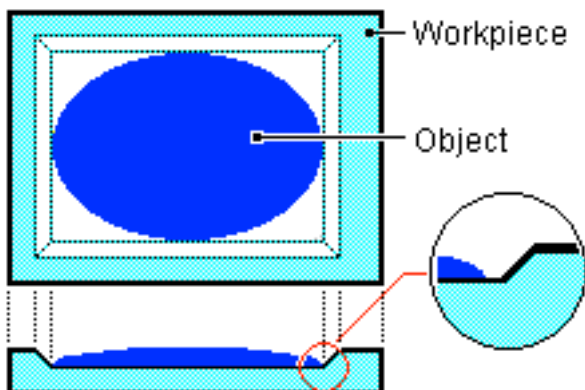
Enter the cutting-in depth for engraving.

**[Cut] - [Delete 3D Engraving Path] command**

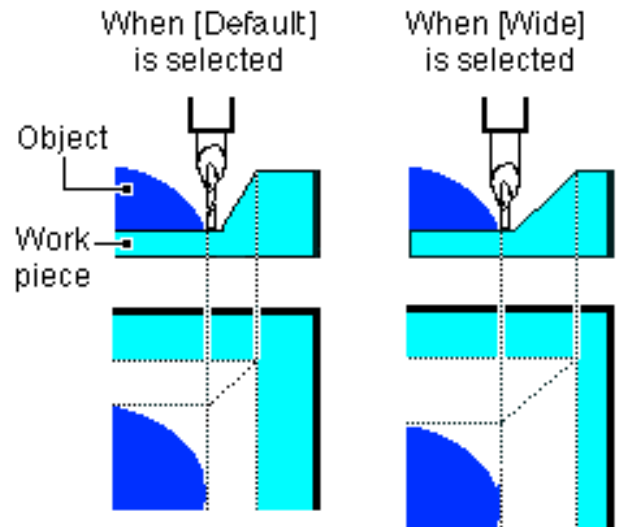
This deletes the tool path for engraving created with [Cut] - [Create 3D Engraving Path]. The red line shown on the 3D screen disappears.

**[Cut] - [Cut Margin] command**

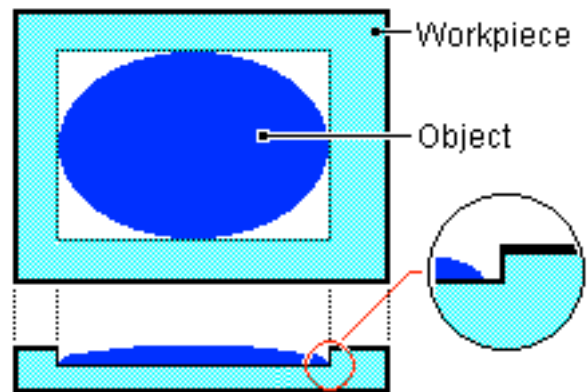
This cuts a beveled perimeter around the object. When an object is cut, the margin surrounding the object becomes a wall. This wall may become an obstruction that impedes cutting of the object. This function is on by default.



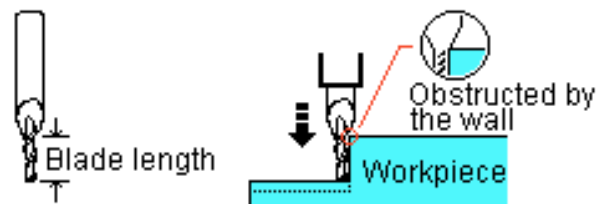
The default is [Default]. If the blade strikes the walls when set at [Default], set it to [Wide]. [Wide] produces a gentler angle than [Default] for the margin portion, as the figure shows. This means it can perform cutting without striking the walls, even when using a tool with a short blade length.



When this function is off, cutting results are as shown below:



In this case, care must be taken to ensure that the depth of the object does not exceed blade length.

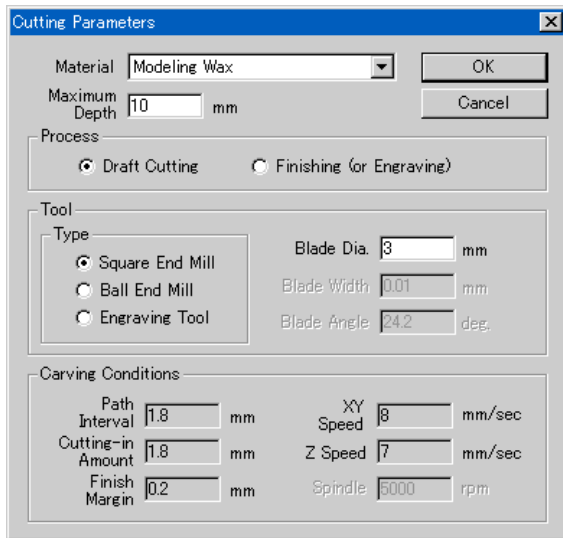




## [Cut] - [Cutting Parameters...] command

This sets the parameters for creating a tool path. The tool path created with [Cut] - [Create Tool Path] is made so as to satisfy the parameters you set here. Make the settings for cutting process, tool specifications, composition of the cutting material, and cutting depth. Running this command displays the [Cutting Parameters] dialog box.

### [Cutting Parameters] dialog box



#### Material

This chooses the composition of the cutting material. Choosing the composition selects the optimal cutting parameters for the material. If the composition of the loaded material is not listed, you can set the cutting parameters manually. To set the cutting parameters manually, use [Cut] - [Customize Parameters].

#### Maximum Depth

This sets the depth for cutting. The setting range is from 0 to the height of the relief.

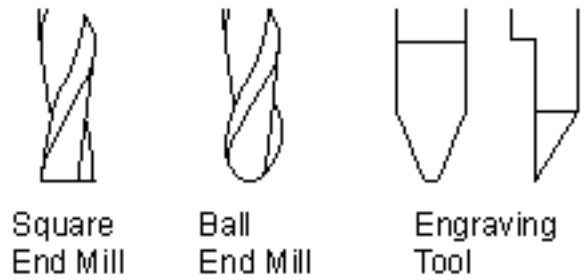
#### Process

This chooses the cutting process. Cutting is performed in two sequential processes: draft cutting and finishing. Doing this lets you achieve an attractive finish quickly and efficiently. Set the first process to "Draft cutting." Draft cutting: This performs high-speed cutting, leaving a margin for finishing (finish margin). Finishing: This performs high-precision cutting of the margin on the workpiece surface left by draft cutting.



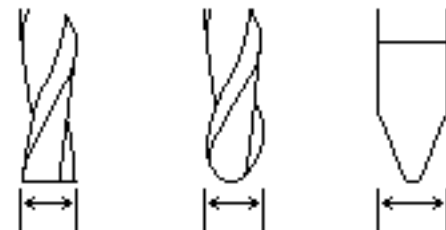
#### Type

This chooses the tip configuration of the tool installed on the modeling machine.



#### Blade Dia. (Tool Dia.)

Enter the diameter of the blade for the tool installed on the modeling machine. For an engraving tool, enter the diameter of the tool.



#### Blade Width

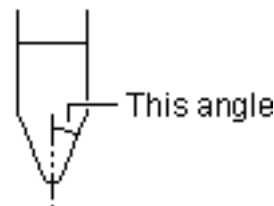
Enter the width of the blade for the engraving tool.



Setting range: 0.01 to tool diameter (mm)  
(0.001 to tool diameter [inch])

#### Blade Angle

Enter the angle of the blade for the engraving tool.



Setting range: 1 to 60 degrees

If you're using an engraving tool from Roland DG Corp., enter 24.2.

#### Carving Conditions

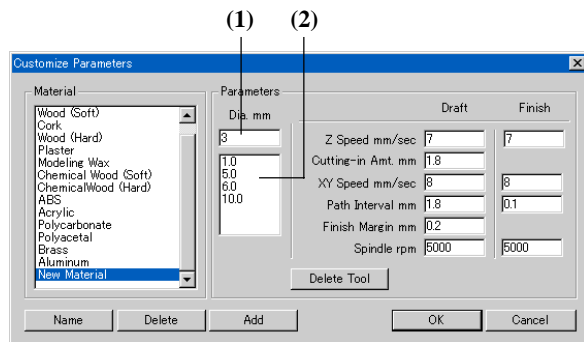
This displays the cutting parameters that have been set. The cutting parameters are determined by the material and the tool. The cutting parameters that are set are optimal for cutting the selected material with the selected tool. For detailed descriptions of each parameter, take a look at the [Customize Parameters] dialog box.

## [Cut] - [Customize Parameter...] command

This is used to add or delete a desired cutting material, and to enter cutting conditions for such materials. Adding a cutting material displays the material-selection list.

Running this command opens the [Customize Parameters] dialog box.

### [Customize Parameters] dialog box



#### Material

This displays the list of cutting materials established for 3D Engrave.

Clicking on the name of a material displays the material's cutting conditions.

#### Name

This changes the name of a cutting material.

Only the names of materials which have been added using the [Add] button can be changed. Select the desired material name by clicking on the name, then click this button.

#### Delete

This deletes a cutting material from 3D Engrave.

Only the names of materials which have been added using the [Add] button can be deleted.

#### Add

This adds a new cutting material to 3D Engrave.

This is used to add a material not registered with 3D Engrave, or to customize the cutting conditions for a material when the existing cutting conditions do not yield favorable results.

#### Add cutting conditions

- From the list of material names, select the desired material by clicking on its name.  
The cutting conditions for the material selected here are copied to the cutting conditions for the new material.
- Click [Add].
- Enter the material name and click [OK].
- Enter the cutting conditions for the new material.

#### (1)

This adds the blade diameter and its cutting conditions to the material added using the [Add] button.

Only the blade diameter of a material which has been added using the [Add] button can be edited.

The setting range varies according to the machine type set

with the [Cut] - [Machines] command.

#### Add the blade diameter

- From the list, select the blade diameter by clicking on it.  
The cutting conditions for the blade diameter selected here are copied to the cutting conditions for the new blade diameter.
- Type in the blade diameter in the text entry field.
- Move the cursor to another text entry field, or click [OK].
- Enter the cutting conditions for the new diameter.

Related Topics [Changing the Measurement System for Numerical Values](#)

#### (2)

This displays the blade diameter for a registered material. Clicking to select it displays the cutting conditions for the blade diameter.

#### Delete Tool

This deletes the blade diameter stored for the material. Only materials which have been added using the [Add] button can be deleted.

#### Z Speed

This sets the descending speed of the tool.

The setting range varies according to the machine type set with the [Cut] - [Machines] command.

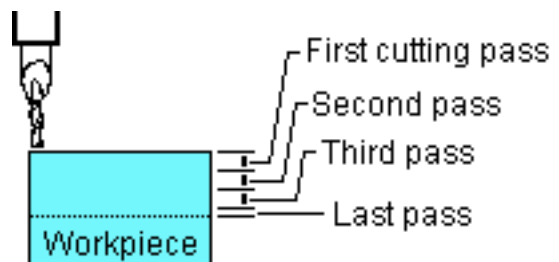
The unit of measurement is in mm/sec, and cannot be changed.

#### Cutting-in Amt.

This sets the cutting-in depth per cutting pass.

Cutting to the target depth is achieved by performed cutting at this cutting-in depth for the necessary number of times. Hard materials and narrow-diameter tools generally require a smaller cutting-in amount.

Setting range: 0.03 to 25 mm  
(0.001 to 1 inch)



Related Topics [Changing the Measurement System for Numerical Values](#)

#### XY Speed

This sets the tool's speed of movement in the along the X and Y axes.


The setting range varies according to the machine type set with the [Cut] - [Machines] command.

The unit of measurement is in mm/sec, and cannot be changed.

**Path Interval**

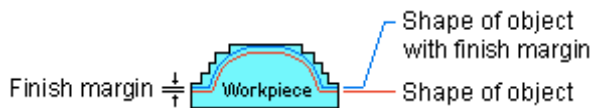
This sets the interval between adjacent path lines.

Setting range: 0.03 mm to blade diameter (in mm)  
(0.001 inch to blade diameter [in inches])

 [Related Topics](#) [Changing the Measurement System for Numerical Values](#)


**Finish Margin**

During rough cutting, material of the thickness of the fine margin is allowed to remain around the object as it is cut. The results of rough cutting are as shown below.



Because the depth of the fine margin is cut at one time in finish (fine) cutting, the fine margin is made smaller than the Z-axis cutting-in amount.

Setting range: 0.01 mm to Z-axis cutting-in amount (in mm)  
(0.001 inch to Z-axis cutting-in amount [in inches])

 [Related Topics](#) [Changing the Measurement System for Numerical Values](#)

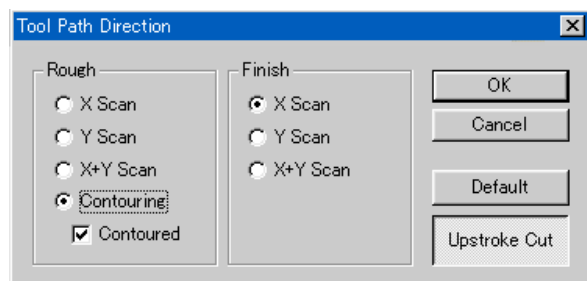
**Spindle**

This sets the speed of the spindle motor. The unit is in revolutions per minute (rpm). The setting range varies according to the machine type set with the [Cut] - [Machines] command. For some models, spindle speed cannot be set.

**[Cut] - [Path Direction...] command**

This sets the direction of tool movement during cutting. Running this command opens the [Tool Path Direction] dialog box.

[Tool Path Direction] dialog box



**Rough**

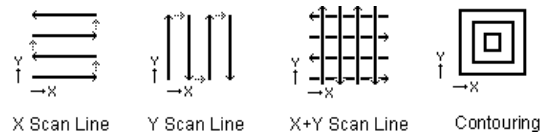
This chooses the direction of cutting for rough (draft) cutting.

X Scan Line This performs tool movement and cutting along the X axis. Tool paths are created only along the X axis.

Y Scan Line This performs tool movement and cutting along the Y axis. Tool paths are created only along the Y axis.

X+Y Scan Line This performs tool movement and cutting along the X and Y axes. Tool paths are created along both the X and Y axes.

Contouring This performs cutting at different stages of depth. Contoured After cutting contour lines, the object's profile is cut.



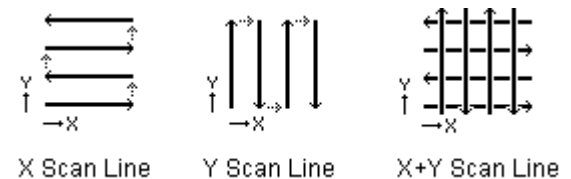
**Finish**

This chooses the direction of cutting for finish (fine) cutting.

X Scan Line This performs tool movement and cutting along the X axis. Tool paths are created only along the X axis.

Y Scan Line This performs tool movement and cutting along the Y axis. Tool paths are created only along the Y axis.

X+Y Scan Line This performs tool movement and cutting along the X and Y axes. Tool paths are created along both the X and Y axes.



**Default**

This returns values to their factory defaults.

Factory-default settings

Draft... [Contouring] and [Contoured] is on  
[High Precision] is off

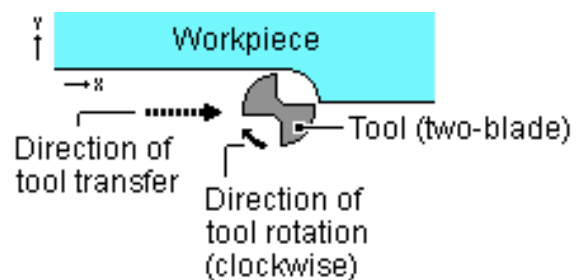
Fine... [X Scan Line] is on and [High Precision] is off

Upstroke Cut

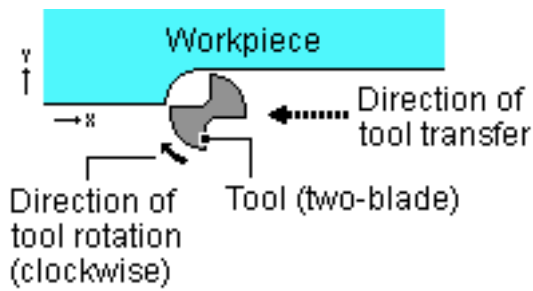
**[Upstroke Cut] and [Downstroke Cut] switches**

These choose whether cutting is performed in the same direction as tool rotation, or in the opposite direction.

[Upstroke Cut]



[Downstroke Cut]

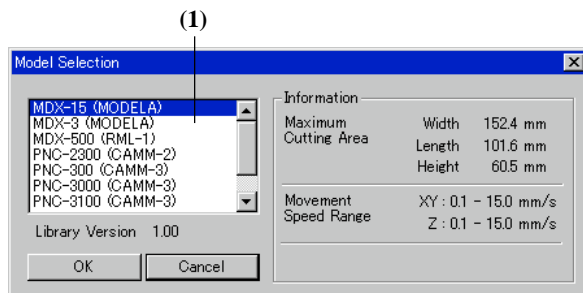


[Upstroke Cut] generally places less of a load on the material and tool (blade) than [Downstroke Cut], making it suitable for hard materials. [Downstroke Cut] places a fairly large load on the material and tool, making it better suited to soft materials.

### [Cut] - [Machines...] command

This selects the type of modeling machine used for cutting. Running this command opens the [Machines] dialog box.

[Machines] dialog box



(1)  
This is used to choose the type of modeling machine connected to the computer.

#### Information

The specifications of the selected machine type are displayed.

## 6-9 [Help] menu

### [Help] - [Contents] command

This displays the contents page for online help.

### [Help] - [About 3D Engrave...] command

This displays the version number and copyright information for 3D Engrave.

# Part 7

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**If You Think There's a  
Problem...**

## 7-1 3D Engrave doesn't function.

### **Does the computer you're using provide the correct operating environment for 3D Engrave?**

Check the conditions for the 3D Engrave operating environment and make sure that the computer offers a suitable environment.

### **Was the software installed using the setup program?**

The setup program puts the files for 3D Engrave in the necessary locations to enable the software to be used under Windows.

## 7-2 Output device doesn't function.

### **Was the correct port selected for the printer driver?**

The data-output port is set with the printer driver. Open the driver's properties, and on the [Details] tab, check the setting for [Print to the following port:].

### **Is the cable connected?**

Switch off the power to the computer and the output device, and use an interface cable to connect the two devices.

### **Is the correct type of cable used?**

The type of interface cable may vary according to the computer model. Make the connection with the correct type of cable for the computer.

Be sure the computer and the output device are both switched off before attempting to attach or disconnect the interface cable.

## 7-3 Error Messages

### “XXXXX, illegal font selected.”

The 3D Engrave file you tried to open contains fonts that are not registered in Windows. When this happens, a list of substitute fonts is displayed.

The file may have been made on a machine with a different font environment, or some fonts may have been deleted from Windows. To reproduce the original image, make sure the necessary fonts are installed.

### “A file with the same name already exists.”

The specified group or symbol name already exists. Change it to a different name.

### “Could not generate outline”

#### Displayed when converting to polygons

An outline could not be extracted because of the faint color of data imported using a scanner or Windows bitmap data imported with the [Import] command. Adjust the data to a darkness that allows an outline to be extracted and import the data again.

#### Displayed when creating an engraving path

Processing for filling the engraving path in the combined polygons could not be performed.  
Changing the fill pitch may make it possible to perform filling. If filling cannot be performed even after you change the pitch, cancel the combination of polygons.

### “Unexpected file format”

The shape imported from the clipboard with the [Paste] command is in a file format that 3D Engrave does not recognize.

### “Failed to create folder.”

A folder that 3D Engrave require in order to run could not be created.

The drive where installed may be write-protected, or there may not be enough disk space. Make the write-protected disk writable, or delete unneeded files to create more free space.

### “XXXXX folder not found. Starting with referenced folder changed to default folder. Save the change ?”

A folder that 3D Engrave require in order to run could not be found.

A program file for 3D Engrave may have been moved, or a folder may have been deleted. Follow the messages to specify the location of the folder, or reinstall 3D Engrave.

### “Failed to import file.”

The file you attempted to read with the [Open...] or [Import...] command is in a format that 3D Engrave does not recognize. Prepare a file in a format that 3D Engrave can recognize.

Readable file formats

Windows bitmap format: File extension \*.bmp

Dr. PICZA format: File extension \*.pix

Vector Art files: File extension \*.dxf

### “Failed to write file.”

The file could not be saved.

The disk where you attempted to save the file may be write-protected or full. Make the write-protected disk writable, or delete unneeded files to create more free space.

### “A required file was not found. Please reinstall.”

One or more files needed to run 3D Engrave cannot be found. Some files used by 3D Engrave may have been moved or erased. Reinstall 3D Engrave.

### “The specified machine type XXXXX has not been selected. Please select the machine type.”

3D Engrave's machine-type library file (\*.lib) cannot be found. The library file may have been moved or erased. Make the settings for the selected machine type for 3D Engrave again. If the corresponding machine type is not listed, reinstall 3D Engrave.

### “This material name is already registered. Enter another material name.”

A material of the same name has already been registered. Enter a different name for the material.

### “The specified material name XXXXX is not registered. Specify XXXXX.”

#### Displayed when opening a file

The material name saved in a file is not registered with 3D Engrave. The specified material has been deleted from 3D Engrave.

#### When the machine type has been changed with the [Machines] command

The material in question has not been registered for the selected machine type.

### “Output failed.”

Cutting data could not be output.

Make sure the setting for the driver output port is correct, and make sure the cable is connected.

### **“Too many colors. Reduce to 16 colors or less.”**

Because the image has more than 16 colors, it cannot be converted to polygons. Attempting to continue without correcting this may produce shapes after conversion that are too complex and not suitable for practical use. Use [Image] - [Reduce Colors] to reduce the number of colors.

### **“Preview failed. Install Virtual MODELA.”**

Virtual MODELA could not be started, and the shape after cutting could not be previewed. If Virtual MODELA is not installed and set up, then install Virtual MODELA. If this message appears even though it is already installed and set up, then reinstall it.

## **7-4 Warning Messages**

### **“Perform engraving after draft cutting. OK?”**

The draft-cutting tool path and the engraving tool path are intermixed. Performing output without correcting this may not only fail to produce the shape you intended, but may also lead to danger of tool breakage. Click No to stop output of the tool path. To delete the engraving tool path, select all shapes and click [Cut] - [Delete 3D Engraving Path]. If you want to output the tool path anyway, click Yes. When you do this, then after draft cutting finishes, the engraving tool path is output.

### **“There are XXXXX polygons and a file size of approx. XXXXX MB. OK?”**

This appears when there is a chance that the size of the file to export will exceed 1 MB. To continue with exporting, click Yes. If you want to cancel the operation and reduce the size, click No. To reduce the size, click [Relief] - [Relief Size], then reduce the value for [Size] or increase the value for [Resolution].



# Appendix

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# Glossary

## Object

This is the collective name for shapes, blocks of text and images.

## 3D Engrave file

This is a file saved in 3D Engrave format.

## Windows bitmap

BMP (Windows bitmap) is a standard graphical file format for Windows. It can be used to store bitmap data.

All graphics are represented as a collection of dots.

## TrueType font

This is one type of outline font system that represents text as an outline and a filled portion. It is provided as standard on Windows.

## Vector data

Vector data is a data format that represents images (text and shapes) as a set of reference points and the lines that connect them. Most draw-type software applications can be used to create vector-data images.

## Bitmap data

Bitmap data is a data format that represents images (text and shapes) as a collection of dots. Most paint-type software applications show images as bitmaps.

## Resolution

This is a scale that indicates the precision of images displayed on screen, printed on the printer, or acquired with the scanner. The larger the number, the more detailed and attractive is the image it represents.

## Gradation

This indicates the smoothness of changes in color when colors are used.

## Clipboard

The clipboard is used to hold data temporarily when it is being copied or cut. The clipboard is a standard feature of Windows.

