

Engraving Glass Cups (UVZH)

RSD-SUNMAX Series
SUNMAX LASER

About this document: This is an English translation of the Japanese original prepared by SUNMAX LASER for reference purposes. In case of any discrepancy, the Japanese original shall prevail. Specifications are subject to change without notice.

Engraving Glass Cups

- This document assumes that the RSD-SUNMAX-UVZH laser processing machine has been set up correctly.
- This document assumes that EzCad2, the control software for the RSD-SUNMAX-UVZH, has been installed correctly.

About Engraving Glass Cups

A rotary attachment is used to engrave the side surface of a glass cup.

Glass cups vary widely, and some shapes cannot be engraved. Cups that are cylindrical and have no irregularities on the surface are best suited; other shapes will cause problems. Because the UVZH is sensitive to changes in focal distance, cups with an uneven side surface or with a diameter that varies between top and bottom are not suitable. Cups of a size (diameter) that the rotary attachment cannot grip also cannot be engraved.

Suitable shapes (cylindrical, straight type)

Unsuitable shapes

When the diameter differs between top and bottom, as in the figure at left, engraving itself is possible, but the engraved result will be distorted. Correcting the data is difficult.

Depending on the degree of taper and the design content, the distortion may not be noticeable.



Workpiece

A cylindrical item is the appropriate choice, but here we deliberately use a tumbler that is not a straight type. The engraved result will be distorted, but this workpiece requires steps that a straight type does not, which makes it well suited for explaining rotary engraving.

For a curved item such as the one in the figure at left, engraving is possible only on part of the circumference of the side surface, and only where the focal distance is within the workable range. Larger designs cannot be engraved because they go out of focus.

Depending on the nature of the surface irregularities, engraving is difficult. It is possible to engrave only on a portion where the focal distance is within the workable range.



Engraving Data

The figure below is used for the explanations in this document.

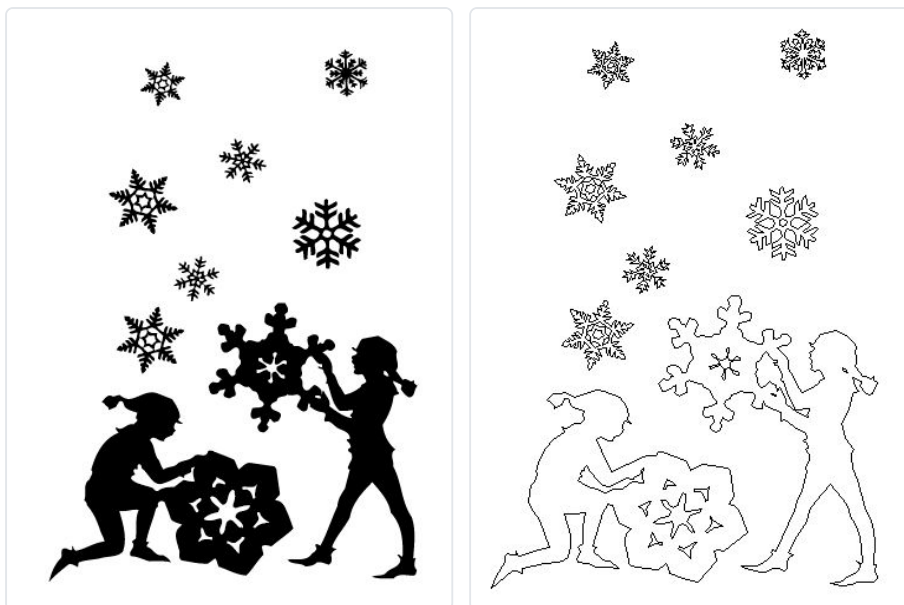
The data is an .ai file saved in "Japanese Illustrator 3" format.

Engraving is possible with any outline-data file format that EzCad2 can import (the rotary attachment cannot engrave image data).

The outline data does not have to be at actual size.

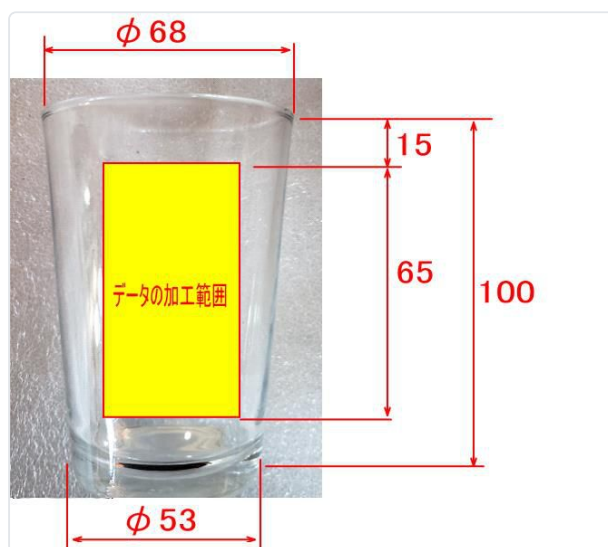
Caution: Make sure that the outlines do not overlap. If there are duplicate lines, the engraving surface will not be engraved correctly.

Caution: Make sure that all paths are closed. Paths that are not closed will not be engraved.



Engraving Dimensions

As an example, engraving is performed on a cup of the size shown in the figure below.



Preparation

Before engraving a glass cup, check the EzCad2 settings.

This does not have to be done for every job, but if the settings are not correct the engraving position will be misaligned.

(1) Laser settings

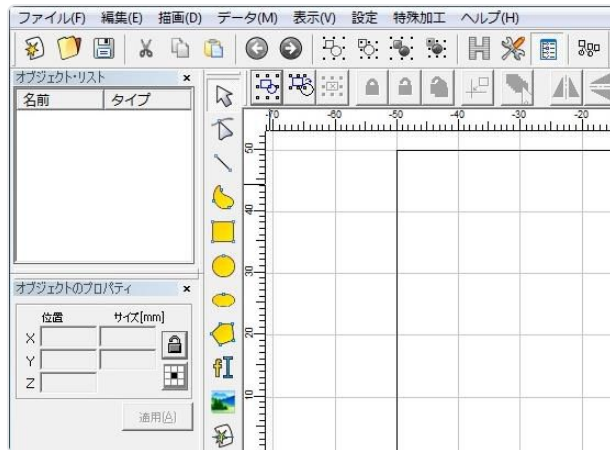
Refer to the separate document "User Manual.pdf" (6.4.1.4 Setting Method) and configure and adjust the settings so that the data content and the engraved result match.

(2) Setting the data origin

Set the data origin to the center.

If the data origin is not at the center, click the button and set it to the center.

- O Center
- X Other than center
- Click the button
- Select the center and click "OK"



(4) Checking the workpiece

If fingerprints, oil, or similar contaminants are present on the glass cup, problems may occur in the engraved result. Wipe the glass cup so that no contaminants remain on it.

Procedure

Engraving is performed using the following procedure.

(1) Installing the rotary attachment

Install the rotary attachment on the table using the following procedure.

1. Place the rotary attachment on the table

Place the rotary attachment on the table.

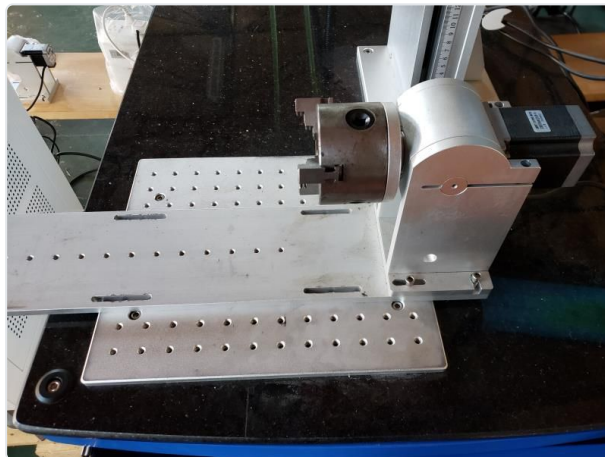
Position it so that the scroll chuck is on the right side.

2. Change the angle of the rotary attachment

Note: This step is not required if the glass cup is a straight cylindrical type; proceed to the next step. However, some cups that appear to be straight are in fact slightly tapered, so it is advisable to check when using a workpiece for the first time.

First, grip the glass cup workpiece so that the angle of the rotary attachment can be changed. Take care, because overtightening the chuck will crack the cup.

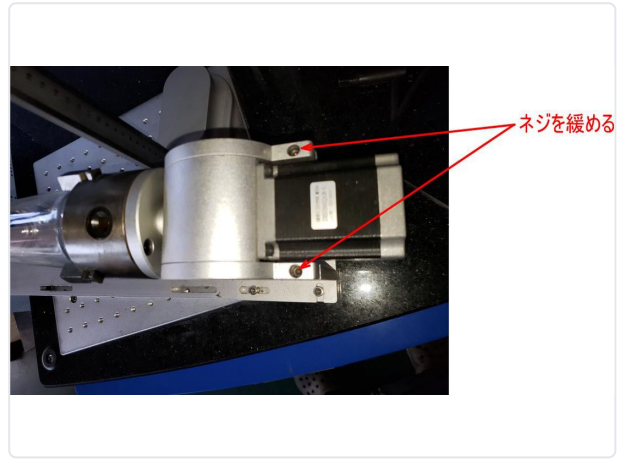
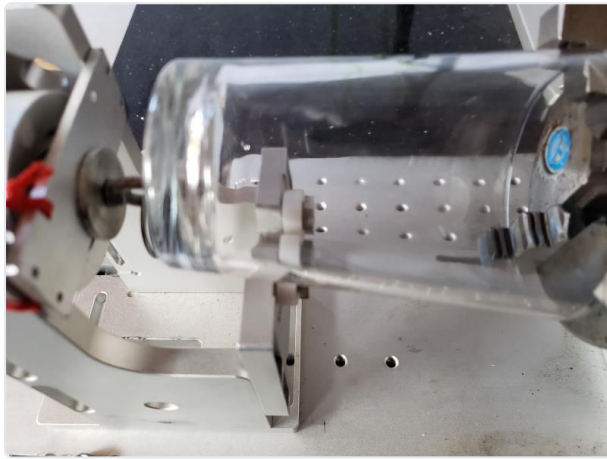
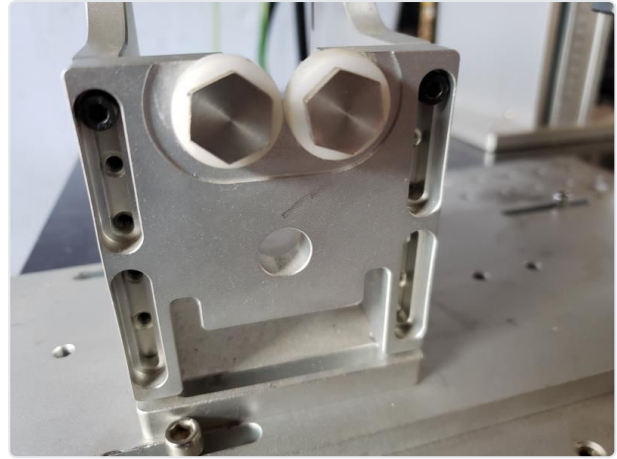
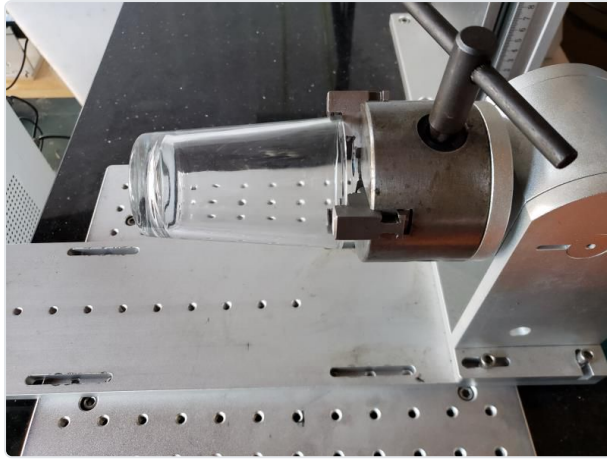
Also, to prevent the cup from being clamped in a tilted position, press the rim of the cup firmly against the scroll chuck before clamping it.



If the shape of the cup prevents it from being gripped firmly and it may fall out, use a support.

Once the cup is gripped, change the angle of the scroll chuck so that the top face of the cup is horizontal.

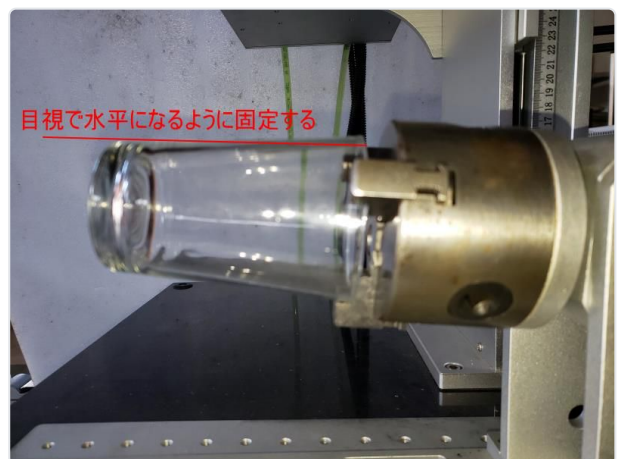
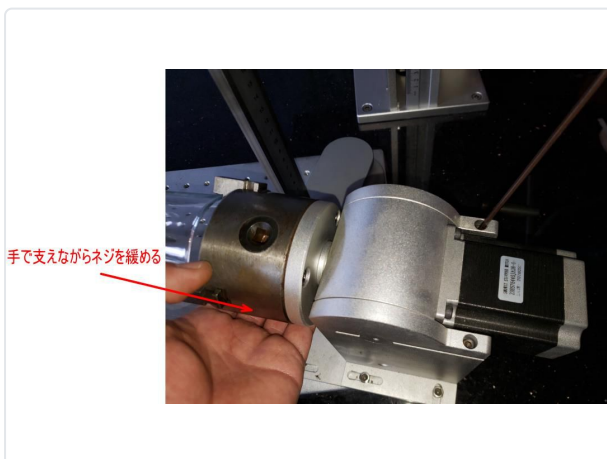
Loosen the two screws in order to change the angle of the scroll chuck. When the screws are loosened, the scroll chuck may drop under the weight of the cup and damage the cup, so support it by hand while doing this.



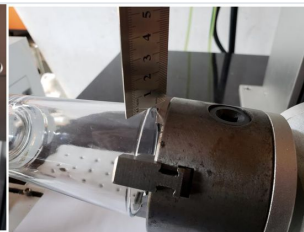
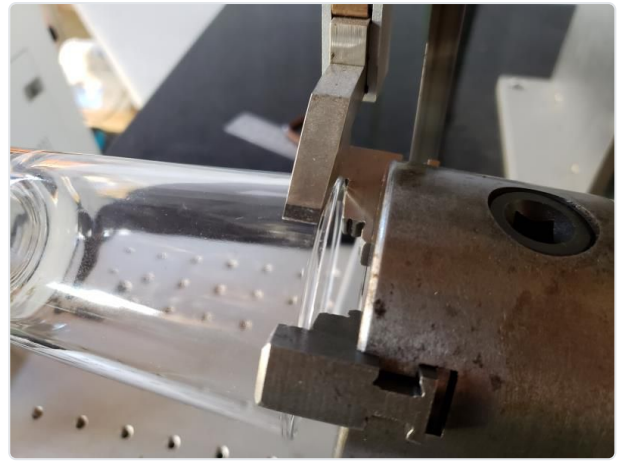
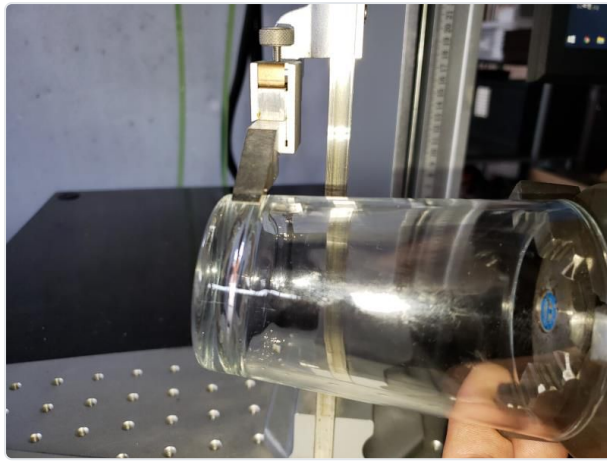
After loosening the two screws, view the cup from the side, position it so that its top edge is approximately horizontal, and tighten the screws to secure it. Tightening only one screw is enough to hold it in place.

Once it is secured by visual alignment, use a height gauge or similar instrument to adjust the cup so that its top edge is horizontal. If it is tilted, a proper engraving result cannot be obtained. Even if it takes time, make it as level as possible.

In the figure below, a height gauge is used to measure the height at both ends of the cup and adjust it until it is horizontal.



Once the top edge of the cup is level, tighten the two screws to lock the scroll chuck in place.



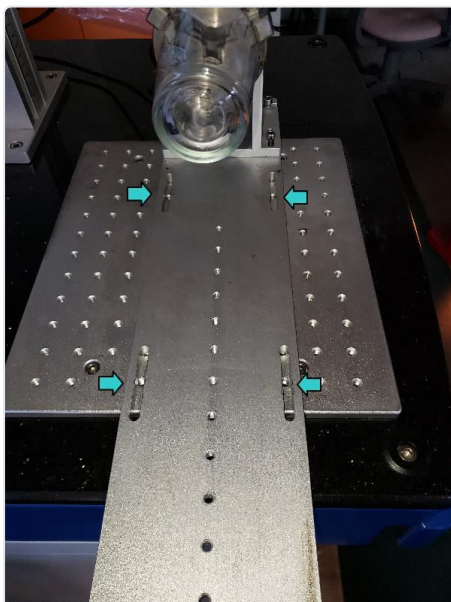
3. Set the focal distance

After the top edge of the cup has been leveled, set the focal distance.

4. Temporarily secure the rotary attachment

Once the focal distance is set, temporarily secure the rotary attachment.

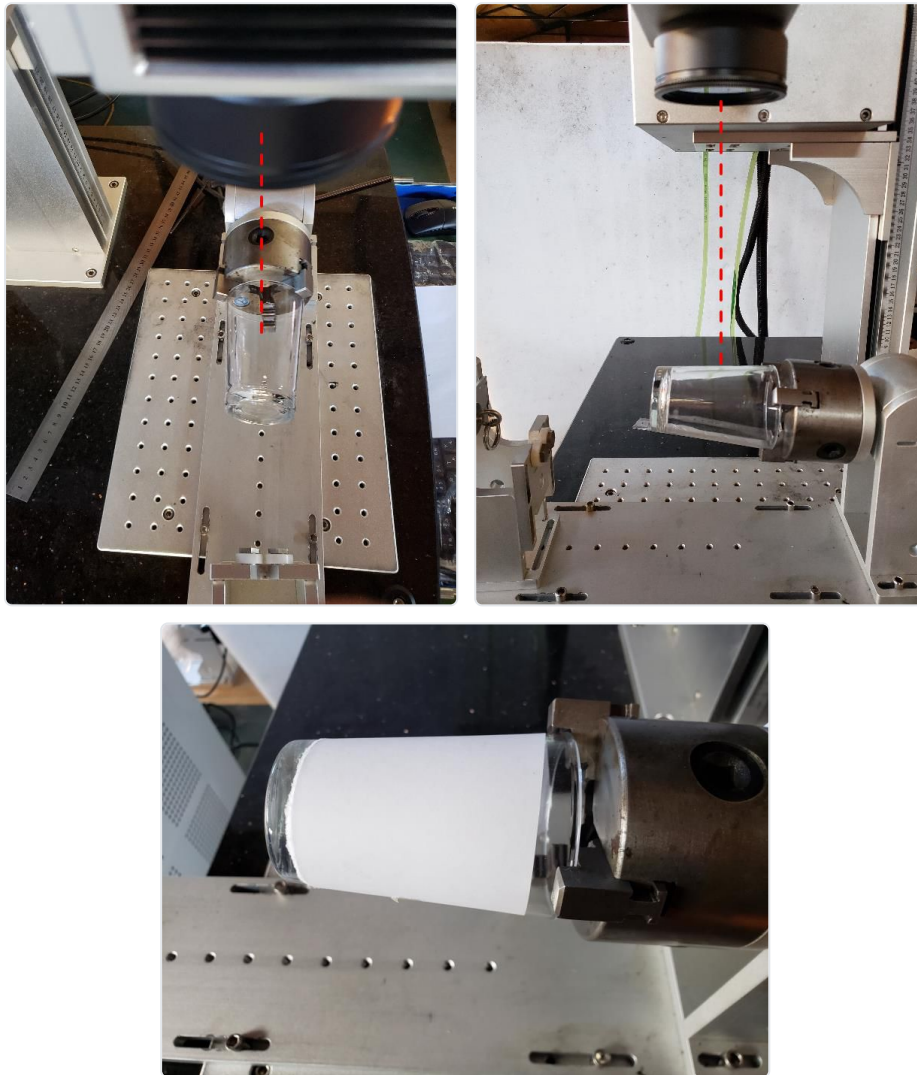
Fasten it to the table using the four screw holes in the base plate of the rotary attachment.



Position the rotary attachment by choosing table screw holes so that the engraving position comes as directly beneath the laser lens as possible, then fit the screws. At this stage, leave the screws only temporarily tightened.

5. Attach white paper to the glass cup and secure it

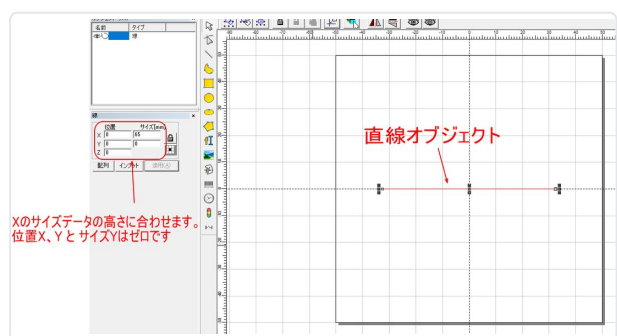
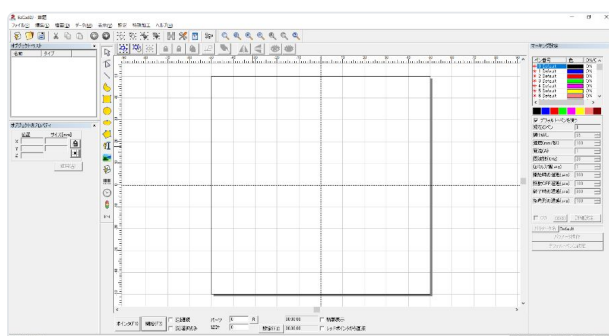
After the rotary attachment has been temporarily secured, attach a sheet of white paper such as copy paper to the glass cup so that you can check the red pointer indication. Wrap the paper around the cup and secure it with cellophane tape or similar. Since it is used only temporarily, it does not need to be attached firmly, but keep it in as close contact with the cup as possible.



Note: You may also remove the cup from the scroll chuck first and then attach the copy paper.

6. Determine and fix the position of the rotary attachment

Turn on the power to the laser unit and start EzCad.



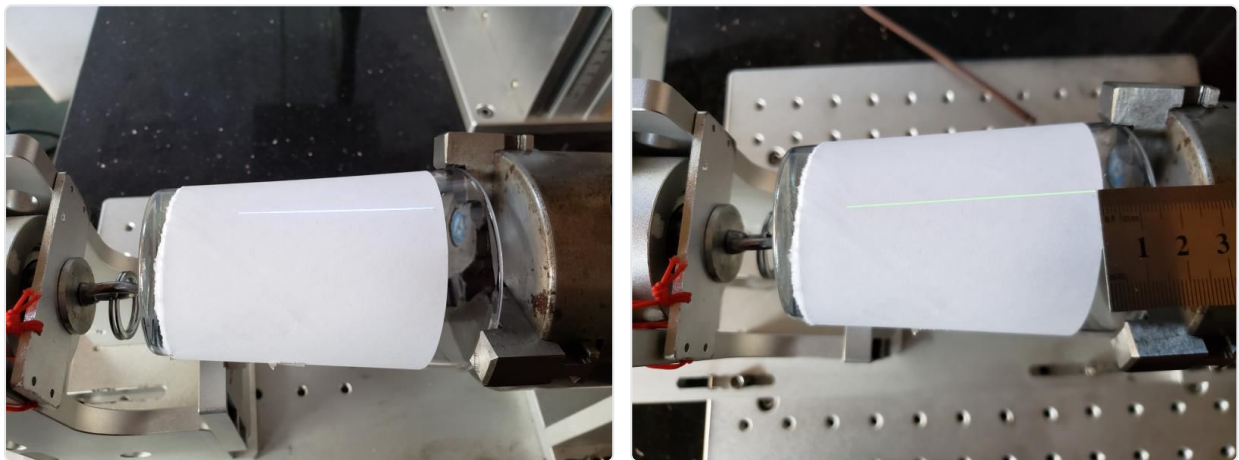
Once EzCad has started, create a single "Line" object. For the "Line" object, the X size is the size of the data to be engraved in the height direction. In this example the data size is 65 mm, so set it to 65. The Y size is zero.

When the data is ready, turn on the red pointer.

First, determine the left-right position so that it matches the engraving position of the data.

In this example, engraving is performed at a position 15 mm from the rim of the cup, so check this with a ruler.

Left-right positioning is done by moving the rotary attachment itself to the left or right. Do not change the position of the data.

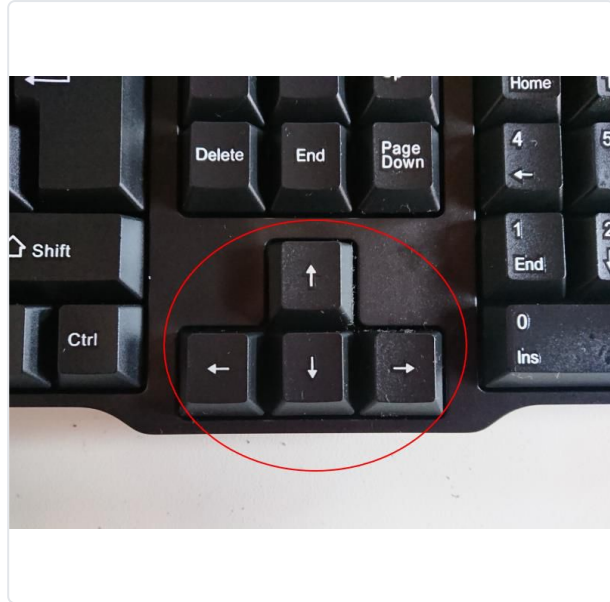
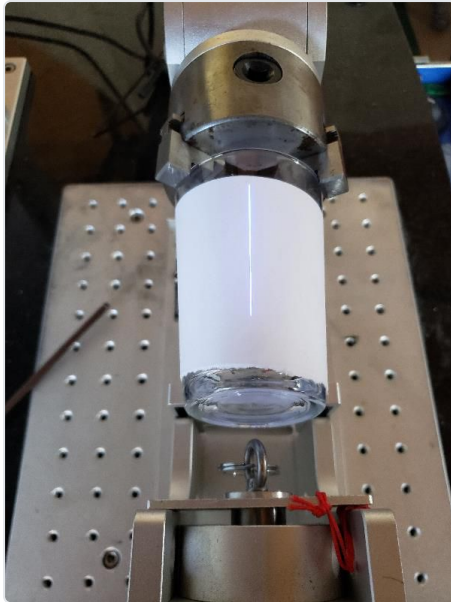


Once the left-right position has been determined, adjust the rotary attachment so that the red pointer passes through the center of the cup.

Adjust the tilt so that the red pointer runs along the center of the cup from top to bottom.

If you cannot move the rotary attachment so that the red pointer passes through the center of the cup, use the arrow keys on the keyboard to move it.

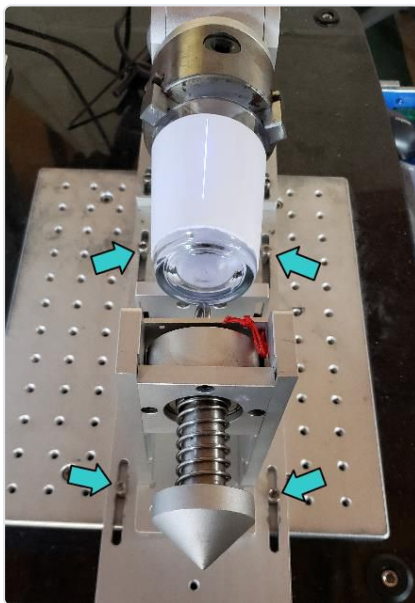
Use the arrow keys on the keyboard to move the red pointer position for fine adjustment.



(Figure note: Move the red pointer with the up and down arrow keys.)

Once the position has been determined, tighten the four screws to fix the rotary attachment in place.

If you used the keyboard to center the pointer, make a note of that position.



ゼロ以外の場合はメモしておく



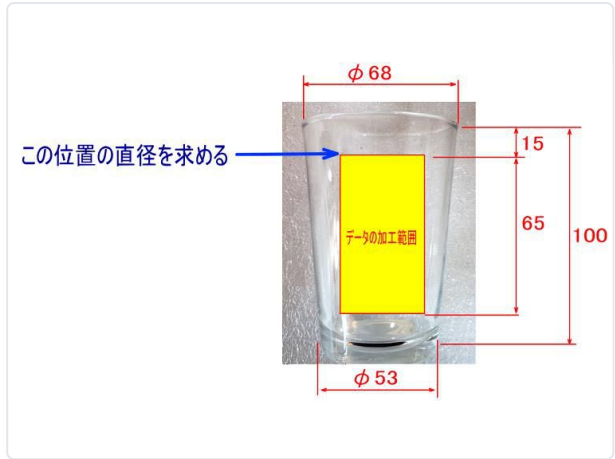
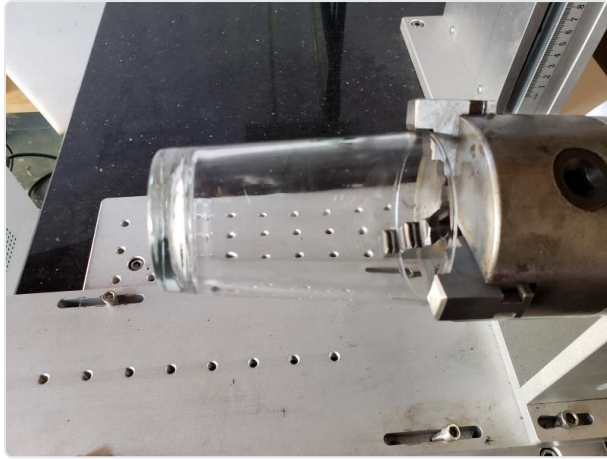
(2) Checking the cup

After the rotary attachment has been fixed in place, remove the glass cup from the rotary attachment once and peel off the white paper wrapped around it.

Then check the cup for fingerprints, oil, or other contamination.

Wipe off all contamination from the cup. Contamination may cause problems during engraving.

After wiping, mount the cup on the rotary attachment again.



(3) Calculating the diameter of the cup

The cup used here is not cylindrical, so its diameter varies with position. Because the diameter of the workpiece must be entered when configuring the rotary attachment, the diameter is obtained by calculation.

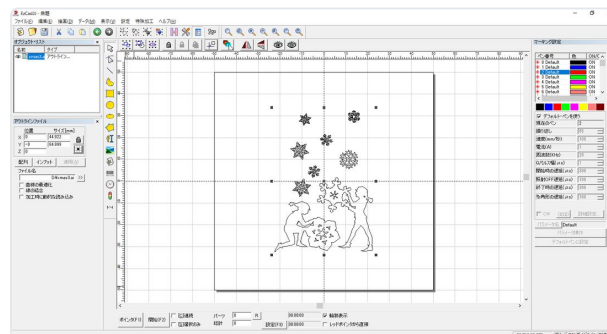
For a straight-type cup, the diameter is the same at every position, so no calculation is required. Proceed to the next step.

The diameter is calculated at the location within the engraving area where the diameter is largest. In this example, that is the diameter at the upper end of the engraving position.

In the example above, the diameter is:

$$\text{Diameter} = 68 - (68 - 53) \times 15 / 100 = 65.75$$

Caution: If the actual workpiece is smaller than the calculated diameter, a gap will occur during rotary movement. If the calculation does not divide evenly, round the value down.



(4) Engraving settings

1. Importing the data

Import the engraving data in EzCad.

2. Preparing the data

Configure the data for the rotary attachment.

First, click "Data" - "Transform" on the menu to display the "Transform" dialog.

Click the Rotate button and set the angle to 270. Set the other items as shown in the figure below, and click "Apply".

After rotating the data so that the engraving direction matches, check the size and position.

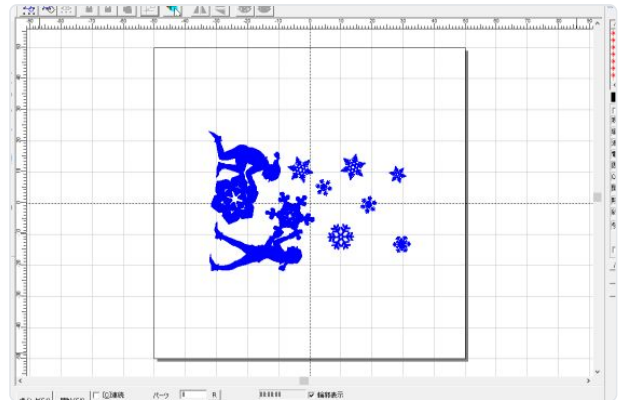
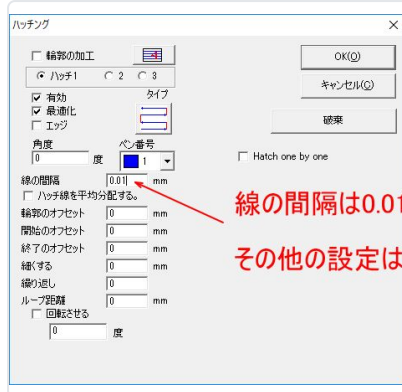


If you used the arrow keys on the keyboard to move it in the earlier section "Determine and fix the position of the rotary attachment", enter the noted value as the Y position. If you did not use the arrow keys, the Y position is zero.

Also, if the data size is not the actual size, set the size values so that they match the engraving size.

Note: When an ai file is imported, the result may not be identical even though the data itself is at actual size. In the example in the previous figure, the size is 65 x 45 in Illustrator, but a slight error occurs when it is imported. Such small errors are not a problem.

Once the size, position, and other properties of the data have been decided, configure the hatching next. Select all of the data and click the Hatch button.

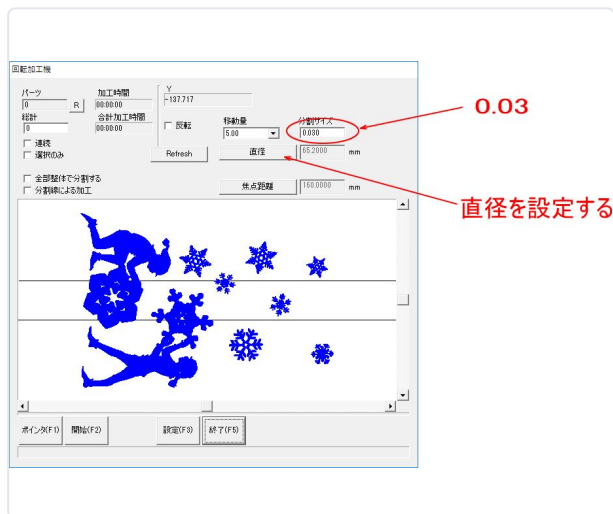


When the "Hatch" dialog appears, set the line spacing to 0.01, and change the other settings as required, using the figure below as the basis. For Hatch 2 and Hatch 3, do not check "Enable" — leave them disabled.

3. Pen settings

Configure the engraving settings of the pen used for the hatching applied in the previous step.

In this example the hatching is done with the blue pen, so the blue pen is configured. Make the settings as shown in the figure below.



4. Settings on the "Rotary Attachment" screen

After configuring the pen, click "Special Processing" - "Rotary Attachment" on the menu to display the "Rotary Attachment" dialog.

When the "Rotary Attachment" dialog appears, first set the "Split size" value to 0.03.

Note: This value varies somewhat depending on the diameter of the cup and the material, but setting it to 0.03 is appropriate in all cases.

Next, set the diameter. For the setting value, enter the value obtained in "Calculating the diameter of the cup".

Set the repeat count to "3".

Set the speed to "50".

Set the remaining items as shown in the figure at left.

(5) Engraving

Once the split size and the diameter have been set, click "Start" to begin engraving.

The engraving in this example took just under 1 hour 7 minutes.

