

## **Work Example — Engraving (Adobe Illustrator)**

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.

# Work Example — Engraving (Adobe Illustrator)

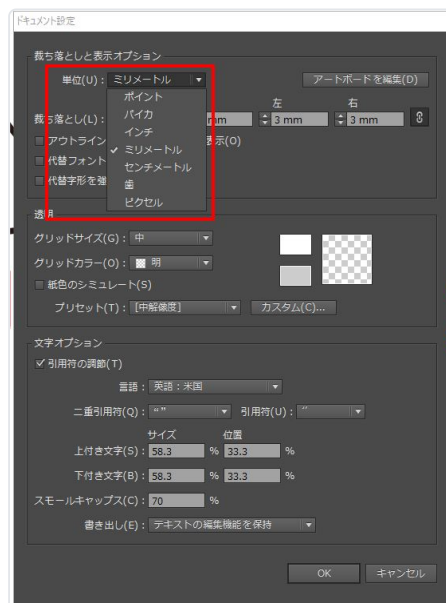
- This document assumes that the laser machine has been set up correctly.
- This document assumes that RDWorksV8, the control software for the RSD-SUNMAX series, has been installed correctly.
- This document uses Adobe Illustrator CS6.

## 1. Precautions

When creating engraving data with Adobe Illustrator, there are two methods, depending on the data format used when importing into RDWorksV8:

- a) Save as an Adobe Illustrator (\*.AI) file
- b) Export the data as a monochrome bitmap file

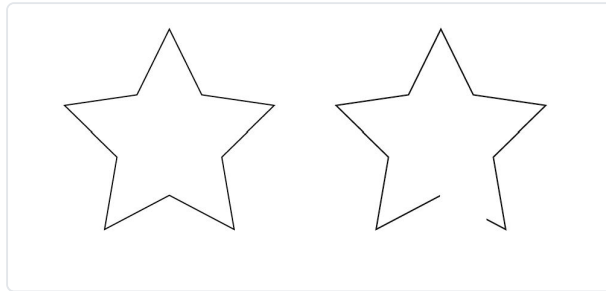
**Caution:** When creating data in Adobe Illustrator, always work in millimeters. RDWorks imports data using [mm] as its unit. Data created in units other than millimeters may not be imported at actual size. The unit in Illustrator is set under "Document Setup."



## 1.1 Points to Note When Creating Data as an Adobe Illustrator (\*.AI) File

In RDWorksV8, the data is handled as outline data, so you can perform a wide range of edits in RDWorksV8, such as editing outline nodes, smooth scaling, changing angles, and assigning different parts of the data to different layers. However, there are points to note when creating the data. As long as these points are satisfied, you can use data saved with method "a) Adobe Illustrator (\*.AI)."

**Caution:** Outline paths must always be closed.

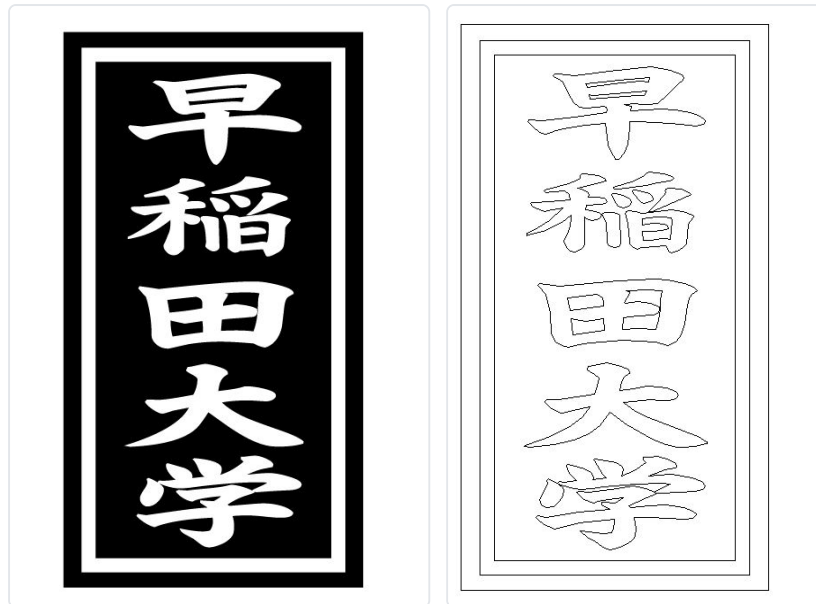


Path is closed: ○ / Path is not closed: ×

**Caution:** Do not leave path data hidden under filled areas. RDWorksV8 does not recognize fill data, so any outline path data hidden by fills will be processed as is. Paths are treated as the boundaries between raised and recessed areas, and RDWorksV8 determines black and white automatically. To hide the fill display and show only the outline path data, press "Ctrl+Y" in Illustrator.

Points to note when creating data to be saved as an Adobe Illustrator (\*.AI) file:

- Only path data can be used in RDWorksV8.
- Image data pasted into Adobe Illustrator and linked images are ignored.
- Delete clipping masks.
- Release compound paths.
- Delete guides.
- Delete trim marks.
- Ungroup all groups.
- Do not include image data.
- Convert text to outlines.
- In the "Illustrator Options" dialog displayed when saving the data in Adobe Illustrator, change the "Version" to CS6 or earlier.



When the fill is removed from engraving data by pressing Ctrl+Y, the outline paths that were hidden by the fill become visible. In RDWorksV8, the data is handled in this form.

## 1.2 Exporting Data as a Monochrome Bitmap File

If you import data exported from Illustrator as a monochrome bitmap, the result is not affected by hidden outline lines, and the workpiece is processed exactly as displayed.

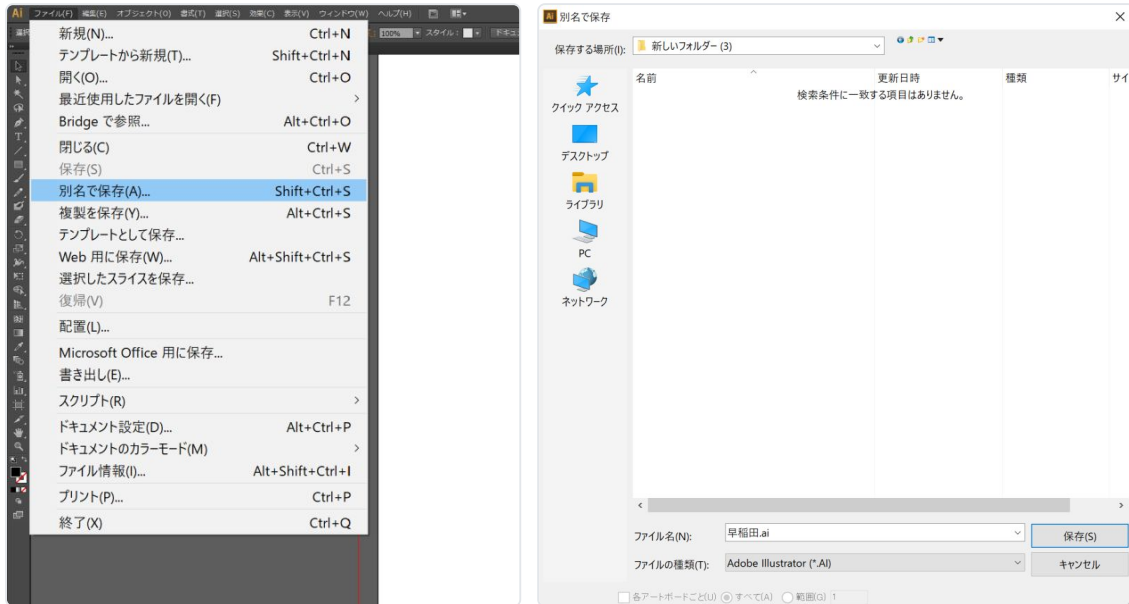
Imported monochrome bitmap data

In general, when engraving, it is easier to export the data from Illustrator as a monochrome bitmap and import it into RDWorksV8. However, if you want to create a single data file and use the layer function in RDWorksV8 to combine engraving and cutting, or to vary the engraving depth, this cannot be done with monochrome bitmap data; in such cases, import a properly prepared AI file.

## 2. How to Save Data

### 2.1 Saving as an Adobe Illustrator (\*.AI) File

Click "File > Save As" on the menu.

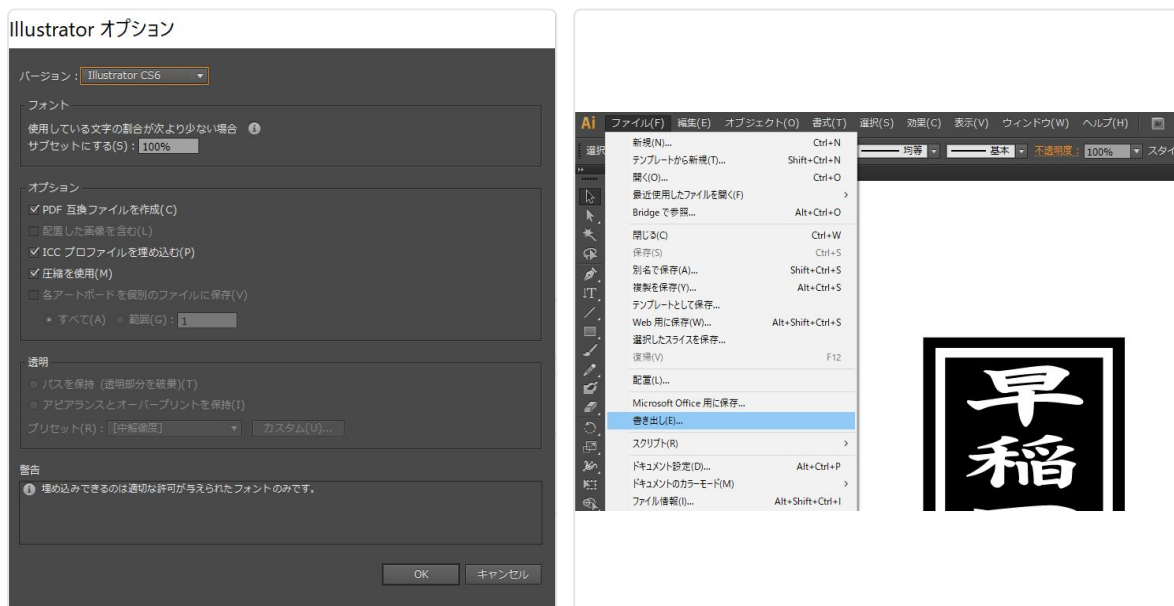


The "Export" dialog is displayed; set the file type to "Adobe Illustrator (\*.AI)."

Specify any file name and click the "Save" button.

Note: The version shown differs depending on the version of Illustrator you are using.

The options dialog is displayed.



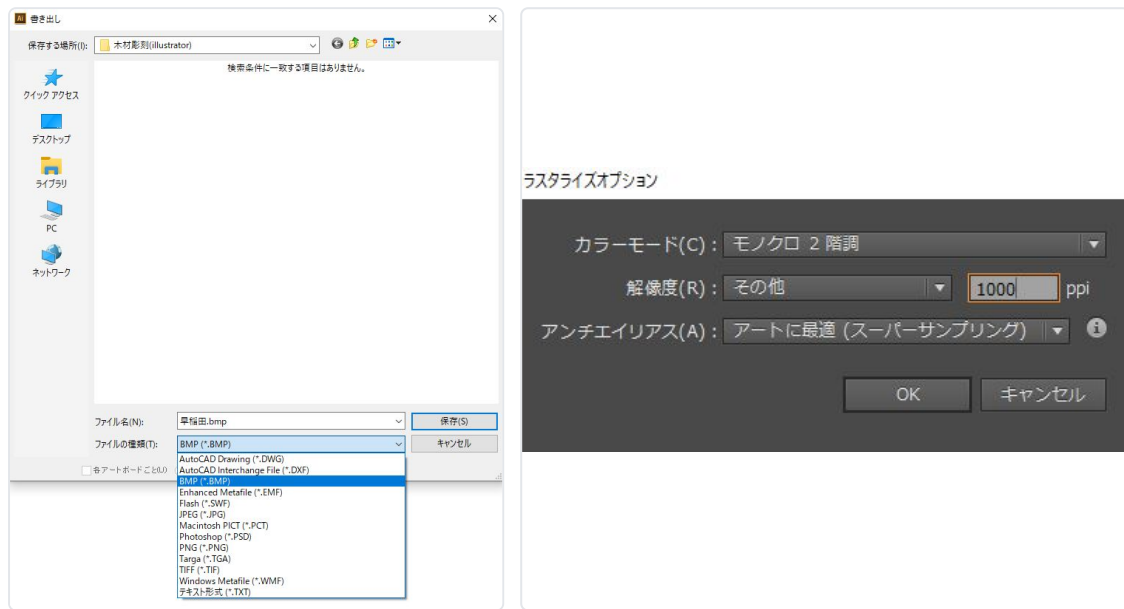
**Caution:** Use a version earlier than CS6.

## 2.2 Exporting Data as a BMP (Bitmap) File

Click "File > Export" on the menu.

**Caution:** Always save your data before exporting.

The "Export" dialog is displayed; select "BMP (\*.BMP)" as the file type. Specify any file name and click the "Save" button.



The "Rasterize Options" dialog is displayed.

1. Set the color mode to "Bitmap" (monochrome, 2-level).
2. For the resolution, select Other and set it to "1000" ppi.

**Caution:** Depending on the size of the image, a dialog may appear and the data export may fail. In that case, set the resolution to a smaller value. Also note that the image size may be larger than necessary due to clipping masks or unneeded data included in the file. The smaller the resolution value, the rougher the contours of the exported data will be. It is acceptable to lower the resolution setting to suit the workpiece material and the content of the data.

The "BMP Options" dialog is displayed; click the OK button.

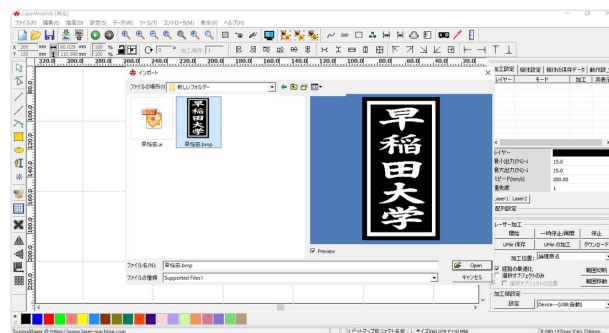


When you press the OK button, a monochrome bitmap file is generated in the specified folder.

### 3. Importing the Data File

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Click the "Import" button on the RDWorksV8 system toolbar.



The file open dialog is displayed; select the AI file created in Adobe Illustrator or the monochrome bitmap file.

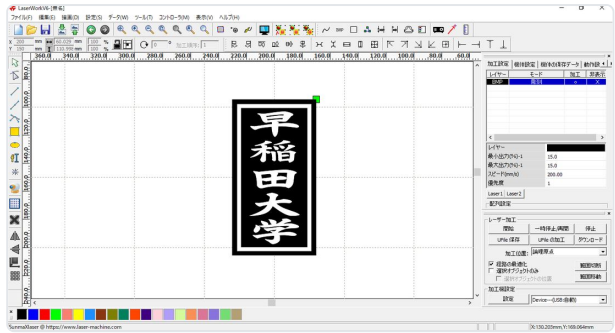
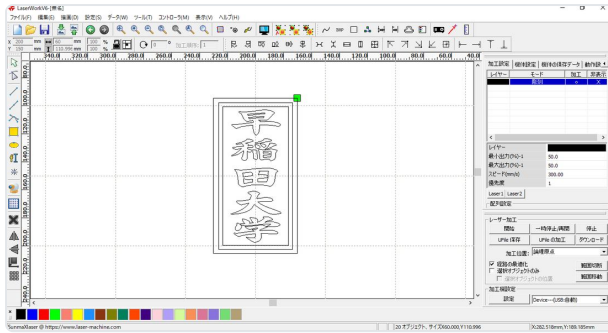
- Preview check box
- Preview pane: when you select a file, its contents are displayed.

### 4. Displaying the Data

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The data created in Illustrator is displayed.

— For an AI file —



— For a monochrome bitmap file —

## 5. Selecting and Configuring the Processing Mode

Select and configure the processing mode for engraving. The processing mode is selected and configured in the pane shown below.

Note: Depending on the state of RDWorksV8, other mode names may be displayed.

Note: The settings for each mode are remembered, so the values you set last will appear as the defaults the next time you create a job.

Note: The following illustrations show the case where a monochrome bitmap file has been imported. The settings are identical when using an AI file.

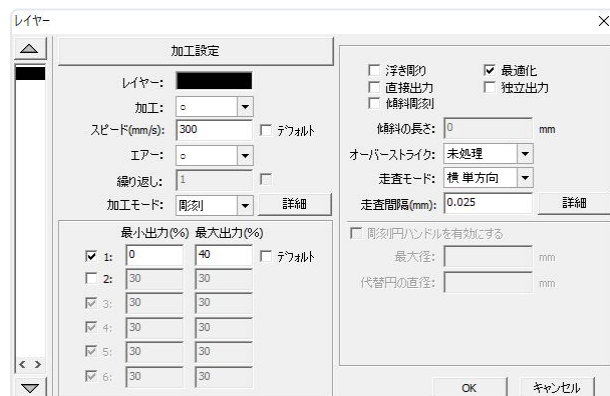


Double-click the layer entry.

Set the mode to "Scan" (engraving), or confirm that it is already set to it.

Note: For a BMP layer, the processing mode can only be set to "Scan" (engraving).

The processing details can be configured in the "Layer" dialog (the initial settings will differ from the figure below).



|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Speed</b>                    | Sets the processing speed. The unit is [mm/s]. For engraving, set the processing speed in (mm/s). The appropriate value varies with the job content, the material, and the processing mode. In general, for engraving, values up to about 600 are used. Increasing the value makes the laser head move faster and shortens the processing time, but the engraving becomes shallower.                                                                                                                                                                                                                           |
| <b>Max Power</b>                | Sets the maximum laser output. The unit is [%]. The setting range is 0 to 100, and decimal values can also be entered. Increasing the value makes the laser output stronger and the engraving deeper. To limit the load on the laser tube, the setting is generally kept to about 90 [%] at most.                                                                                                                                                                                                                                                                                                              |
| <b>Interval (scan interval)</b> | Specifies the scan interval for engraving. The unit is [mm]. The minimum value is 0.025 [mm], and settings are basically made in steps of 0.025. In general, smaller values improve the mechanical processing accuracy, but depending on the material and the data, making the interval too fine serves no purpose. Larger values shorten the processing time. If you want to increase production speed even at the cost of a coarser finish, raising this value will shorten the production time. For example, if a job engraved at 0.05 is changed to 0.1 and engraved again, the production time is halved. |
| <b>Scan Mode</b>                | Select horizontal bidirectional (X swing). The laser fires on both directions of the scan; if bidirectional is not selected, the laser fires in one direction only. Horizontal unidirectional scanning may improve the processing quality in some cases, but the processing time doubles.                                                                                                                                                                                                                                                                                                                      |
| <b>Air (Blowing)</b>            | Not supported on the RSD-SUNMAX series.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Advanced</b>                 | Not normally used. For details on this function, refer to "User Manual RDWorksV8, 5.3 Engraving Settings."                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

## 6. How to Determine the Setting Values

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The engraving settings must be changed according to the material, the desired depth, and the required quality. No single set of values applies uniformly to every material. For example, even when engraved with the same settings, cedar and ebony produce completely different engraving depths because of the difference in the hardness of the wood itself. Rubber and glass also engrave to different depths depending on their composition. In addition, for materials that melt (soften under laser irradiation and harden again as they cool), such as resin, the finish varies with the balance between the engraving speed, maximum power, and scan interval settings. Fundamentally, you need to engrave repeatedly while checking the finish, changing the conditions each time, until you find settings that meet the required quality.

An efficient way to determine the settings is as follows.

Materials that burn easily include wood, rubber, paper, leather, resin, and fabric.

Materials that resist burning include stone, glass, ceramic, and metal.

For materials that burn easily, it is efficient to start with a faster engraving speed and a lower maximum power, gradually raise the maximum power, and then lower the engraving speed while checking the finish to arrive at the final settings.

For materials that resist burning, it is efficient to start with a slower engraving speed and a higher maximum power, gradually raise the engraving speed, and then lower the maximum power while checking

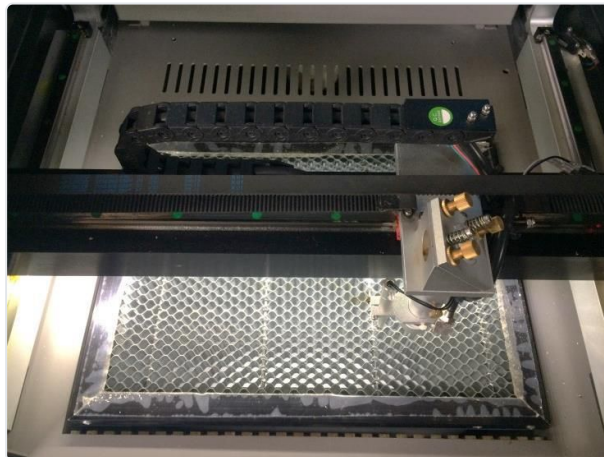
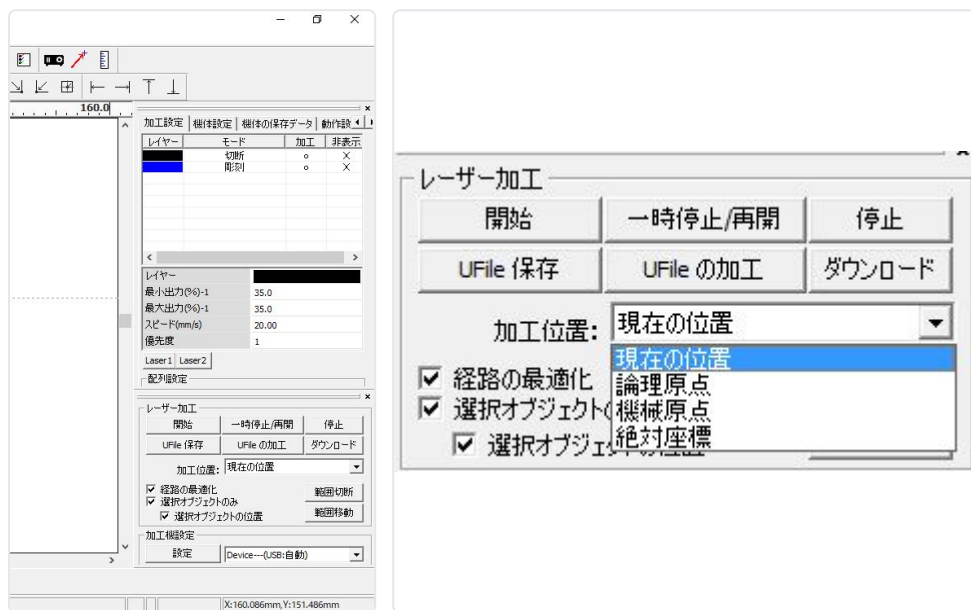
the finish to arrive at the final settings.

## 7. Setting the Origin

Before starting processing, you must check and set the processing start position.

When starting processing from the operation panel, the logical origin is always the processing start position. Refer to "Machine Operation Panel" – "About the Logical Origin" in the separate RDWorksV8 User Manual.

When starting processing from RDWorksV8, you can choose from four origin types depending on the setting.

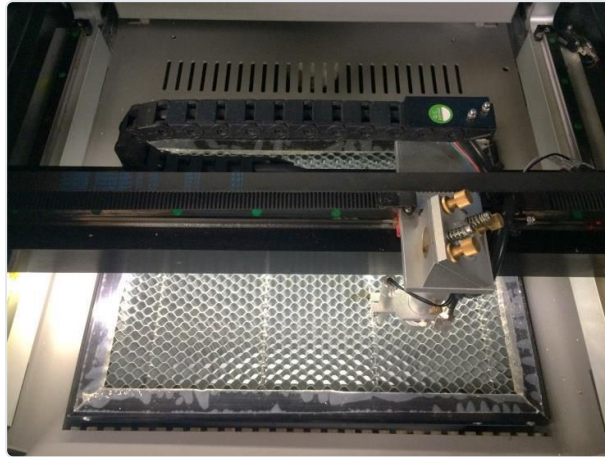


### 7.1 Current Position

When "Current position" is selected, clicking the "Start" button in RDWorksV8 begins processing with the current position of the laser head used as the data origin.

## 7.2 Logical Origin

When "Logical origin" is selected, clicking the "Start" button in RDWorksV8 begins processing with the logical origin — the position set with the "Origin" button on the laser machine — used as the data origin.

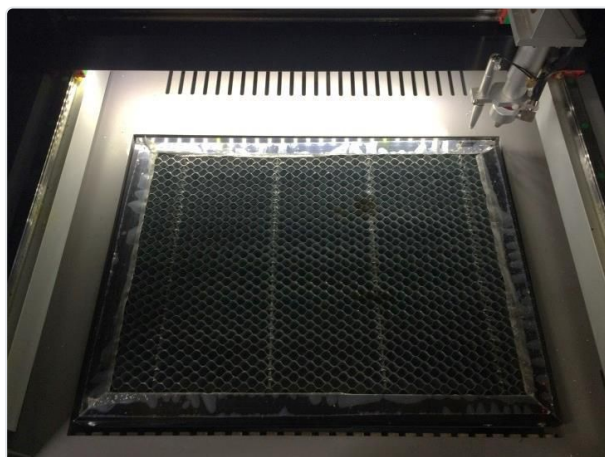


Press the "Origin" button on the machine's operation panel. Even if the laser head is then moved, when processing starts the laser head moves back to the logical origin and begins processing.

## 7.3 Machine Origin

When "Machine origin" is selected, clicking the "Start" button in RDWorksV8 begins processing with the machine origin position (rear right: the position the machine homes to when the laser machine starts up) used as the data origin.

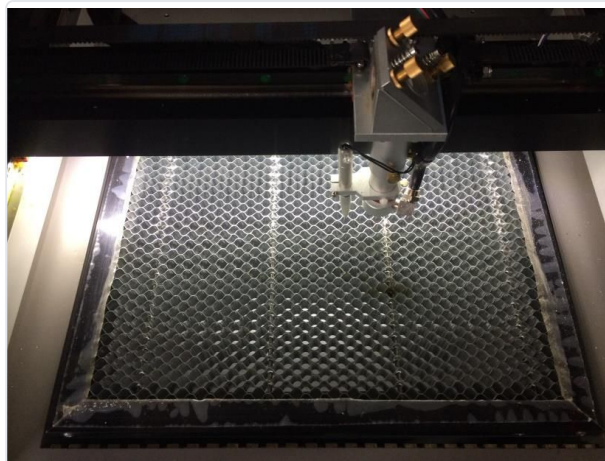
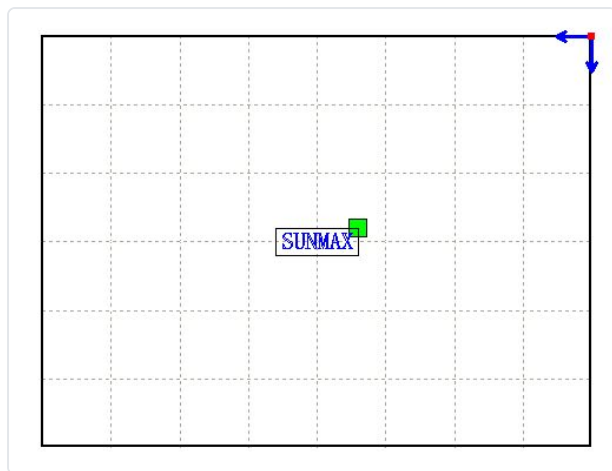
When processing from the machine origin, only cutting is possible.



When processing starts, the laser head moves to the machine origin and begins processing.

## 7.4 Absolute Origin

When "Absolute origin" is checked, the logical origin set with the "Origin" button on the operation panel and the processing-position settings used when starting from RDWorksV8 are disabled, and processing is performed at the position shown on the RDWorksV8 design screen.



Place the objects in RDWorksV8. When processing starts, the laser head moves to the same coordinates as on the RDWorksV8 design screen and begins processing.

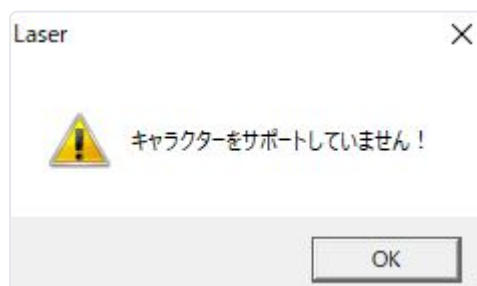
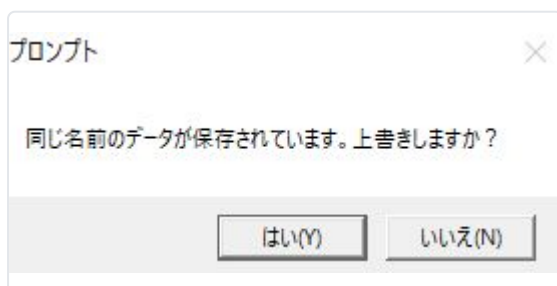
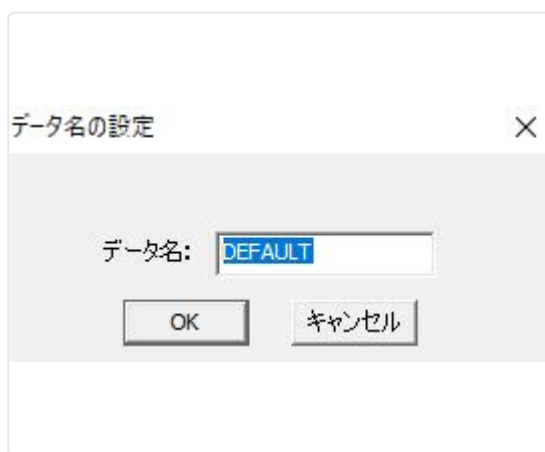
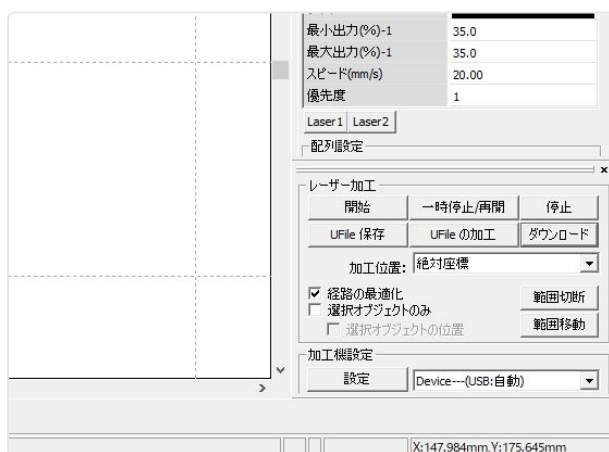
## 8. Downloading the Data

Once the processing settings and the processing position have been set, send the processing data to the laser machine.

When you download the data and then process it, processing is started from the operation panel, so the processing start position is always the logical origin.

Note: When starting processing from "Start" in the machine control pane of RDWorksV8, the data is not downloaded.

Click "Download" in the laser work area at the lower right of the screen.



Clicking the Download button displays the "Set data name" dialog. Enter any name you like.

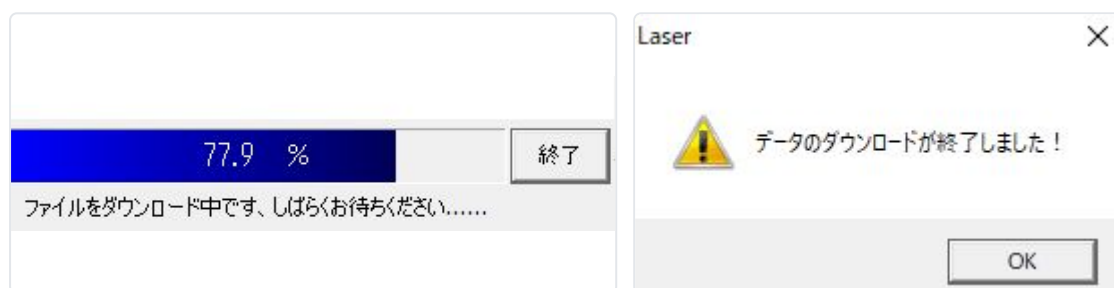
Note: If a file with the same name already exists on the laser machine, a dialog asking whether to overwrite it is displayed.

Note: Only single-byte alphanumeric characters can be used. Entering Japanese characters will cause an error.

## Starting the Download

Clicking the button starts the data download. When the download progress bar reaches 100%, the data download is finished.

Note: If the data file is large, this step may take some time.



## Download Complete

When the progress reaches 100%, the download-complete dialog is displayed.

Click the OK button.

# 9. Processing

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Now that the job data has been saved to the laser machine, it is time to run the job. Start processing by following the steps below.

## 9.1 Setting Up the Table

The RSD-SUNMAX series lets you switch between three types of work tables.

### Engraving Table

With the engraving table, no attachment is used; the material is placed directly on the laser machine's lift table for processing.

- As a rule, use it only for engraving. Do not use it for cutting. During cutting, the laser beam must pass all the way through the bottom of the material, but because the engraving table is a flat plate, the beam cannot pass through it. It is therefore used for engraving.

- Cutting on the engraving table becomes possible if you place spacers of some kind between the table and the material to create a gap. In general, a gap of about 2–5 mm is required between the table and the material.
- The engraving table is well suited to holding and processing thick materials.

### Honeycomb Table

The honeycomb table is placed on top of the lift table for use. Both engraving and cutting are possible. In addition, by connecting an exhaust blower to the honeycomb table box, the material is suctioned from underneath, so even lightweight materials such as cloth and paper can be held in place.

### Cutting Table

In addition to the honeycomb table, the RSD-SUNMAX series comes with a cutting table. By installing the supplied cutting-table parts on the table, you get a cutting table that, compared with the honeycomb table,



produces less scorching and melting on the back of the material caused by laser bounce-back. When the cutting table is installed, autofocus cannot be used. Focusing is instead adjusted with the cylinder on the laser head.

For this job, we will use the honeycomb table.

For how to install and remove each table, refer to the machine's instruction manual.

## 9.2 Focusing

The distance to the laser head differs for each workpiece.

You can either focus using autofocus, or set the height manually using the focus gauge.

**Caution:** Always perform focusing whenever the height of the workpiece changes.

**Caution:** When using the cutting table, autofocus cannot be used. Focus manually.



## Using Autofocus

With autofocus, a sensor mounted on the machine automatically adjusts the focal distance.

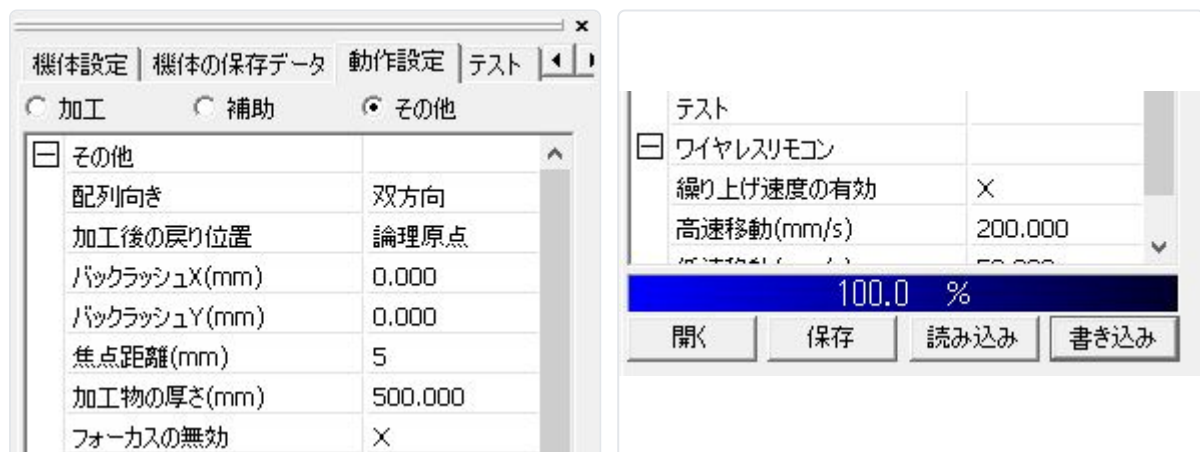
### <Adjustment procedure>

The autofocus focal distance is set by entering a value in RDWorksV8 under "Work Options" → "Other" → "Focus Distance"; this sets the autofocus return amount. Adjust the setting value, using the focus gauge, so that the head ends up at the proper position.

After entering the setting value, write (download) the data to the laser machine.

Press the "Z/U" button on the machine's operation panel to display the options screen.

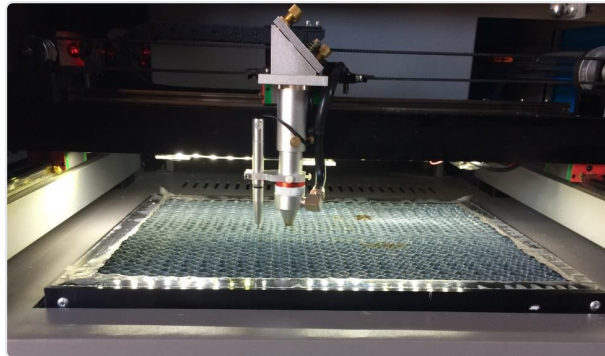
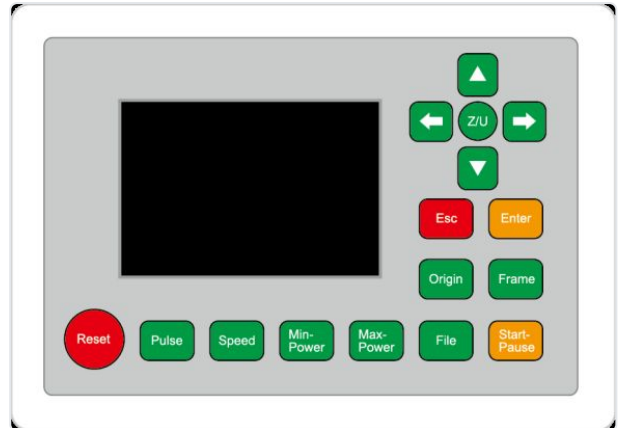
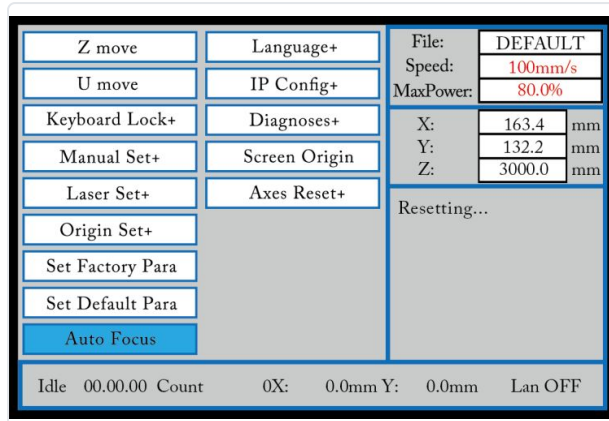
-Operation panel- (Press)



Select "Auto Focus" with the arrow keys and press "Enter".

-Operation panel screen- ((1) Select / (2) Press)

The lift table rises until it touches the autofocus switch, and the height is then automatically set to the configured focal-distance value.



### Manual Focusing (Focus Gauge)

In the manual method, you operate the lift table by hand and set the focus using the focus gauge.

This allows more accurate focusing than autofocus.

<Adjustment procedure>

-Focus gauge-

Insert the focus gauge between the laser head and the workpiece.

Press the "Z/U" button on the operation panel to display the options screen.

-Operation panel- (Insert the focus gauge / Press)

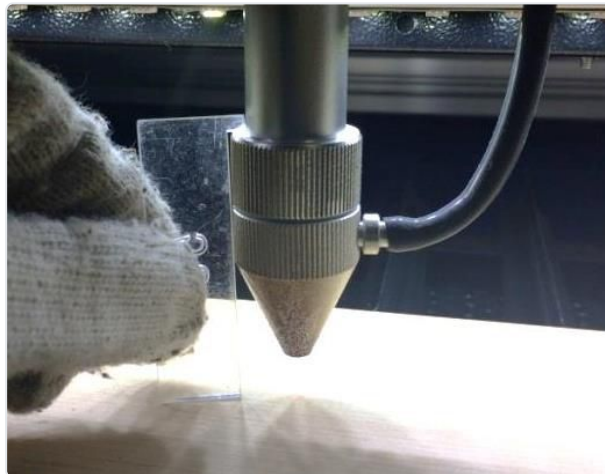
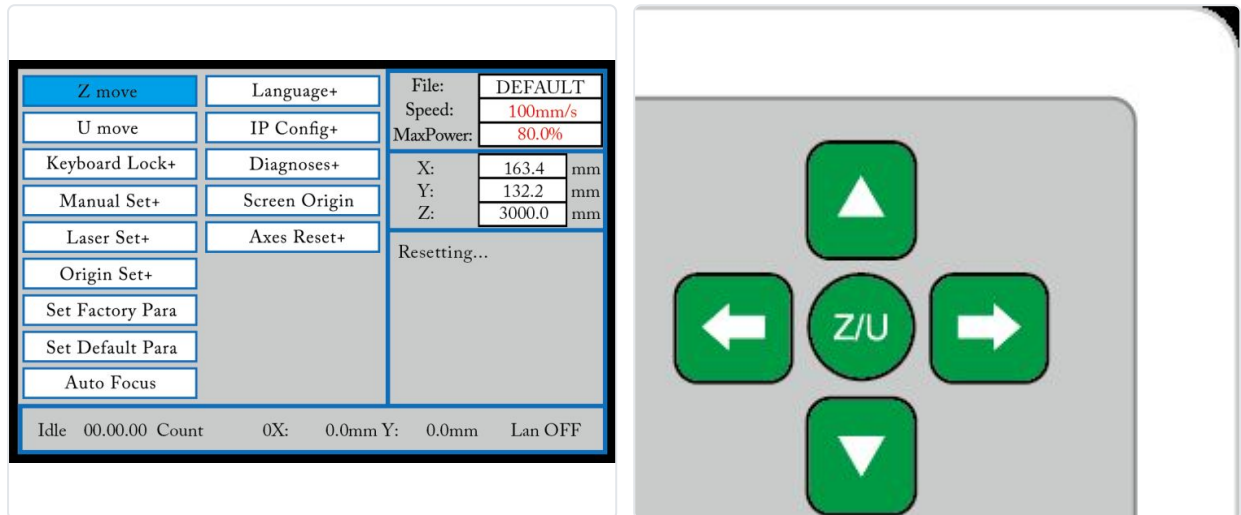


Select "Z move"; pressing the left/right arrow keys on the operation panel moves the lift table up and down.

-Operation panel screen- (Up / Down)

Adjust the height until the focus gauge just lightly grazes the workpiece.

(Until the gauge just grazes)



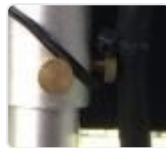
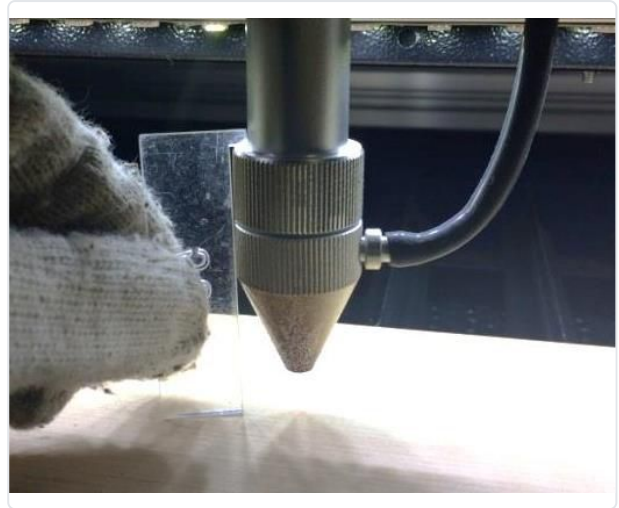
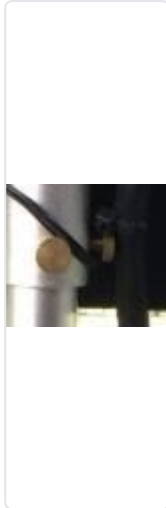
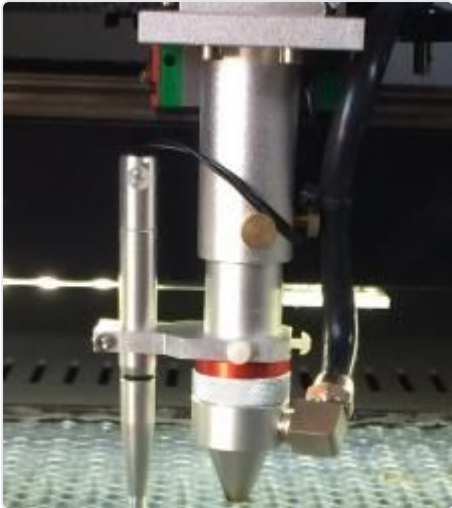
### When Using the Cutting Table

When the cutting table is in use, the lift table cannot be raised or lowered. You must focus manually (the method differs from the normal manual adjustment).

<Adjustment procedure>

Loosening the screws on the laser head allows the length of the head to be adjusted. (There are two screws.) The screws loosen counterclockwise and tighten clockwise.

After loosening the screws, insert the focus gauge between the head and the workpiece, adjust the height until the gauge just grazes, and then tighten the screws.



### 9.3 Cover

Once preparations are complete, lower the top door.

**Caution:** The laser will not fire while the top door is open.

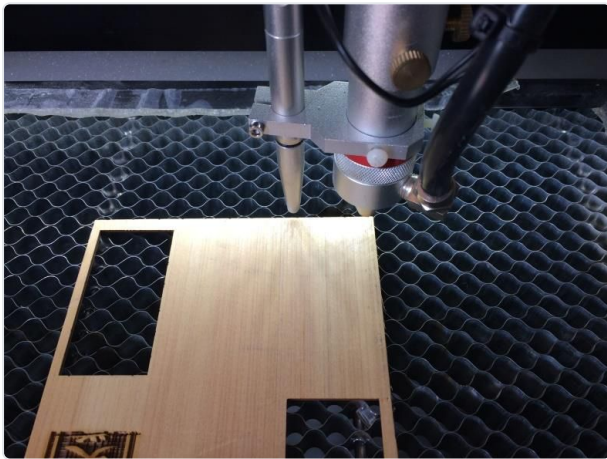
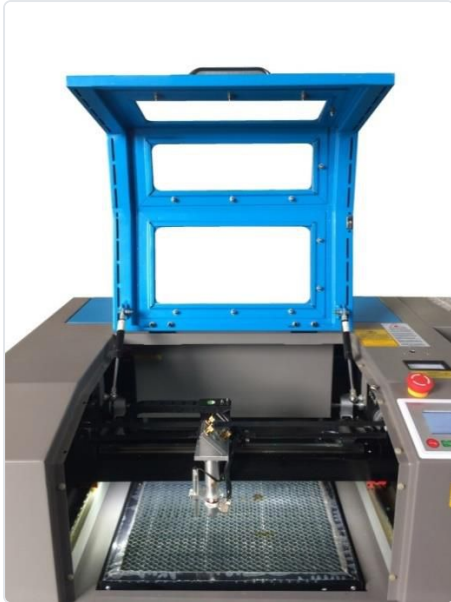
### 9.4 Power for External Equipment

Confirm that the automatic water chiller, air compressor, and exhaust blower are switched ON.

### 9.5 Starting the Job

Preparations are now complete, so we start processing. This time we will use the "logical origin" method.

Move the laser head with the arrow keys to the position where you want to process, and set the machining origin with "Origin".



Press "Start" on the operation panel to begin processing.

When processing finishes, the laser machine emits a beep. Open the protective cover and take out the processed material.



## 10. Other

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### Making multiple copies of the same engraving

Click "Array copy" on the drawing toolbar of RDWorksV8 and configure the settings there, or configure the settings under "Array output".



|    | 数 | 間隔     | ズレ    |
|----|---|--------|-------|
| X: | 3 | 20.000 | 0.000 |
| Y: | 2 | 30.000 | 0.000 |

配列 範囲指定

Array copy duplicates the selected object according to the specified row and column settings. After an array copy, therefore, you can change the position of each copied object individually or edit it as needed.

Array output outputs the selected object according to the specified row and column settings. Because the objects are not copied, you cannot change the position of each object individually or edit them after an array output. However, it allows flexible automatic arrangement, such as specifying an offset between rows and columns.

\* For details, refer to "Difference between Array copy and Array output" in the RDWorks User Manual.