

First Machining with LaserWork V6 — LT Series Work Example

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 Examples — First Machining (LaserWork V6)

- This document assumes that the laser machine has been set up correctly.
- This document assumes that the honeycomb table is installed.
- This document assumes that LaserWork V6 (hereafter "LaserWork"), the control software for the RSD-SUNMAX-LT6040-ST908, has been installed correctly.

This work example collection walks you through the entire process — from creating the design to machining it — using a design that combines engraving (blue) and cutting (black), as shown below.



— *Actual machined result* — (Engraving / Cutting)

1. About "First Machining"

- "First Machining" is a set of work examples for machining for the first time with the RSD-SUNMAX-LT6040-ST908.
- It is intended for users who did not receive the initial training at machine delivery. It assumes that, following the Setup Guide, the laser machine has been installed correctly, the LaserWork V6 control software has been installed correctly, and the machine is ready to operate.
- In this document, a wooden board is machined. Depending on the type and thickness of the wood you prepare, the settings given in this document may not produce good results. In that case, you will need to adjust the settings.

2. Preparation

Make sure the laser machine and the control PC are connected correctly. (Connect them using the dedicated cable — the USB cable supplied with the machine.)

2.1 Starting the Laser Machine

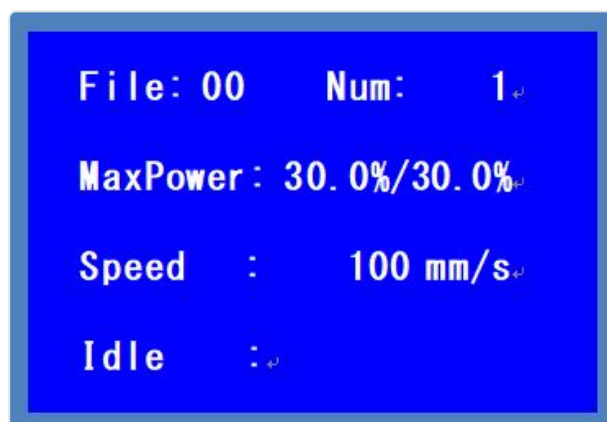
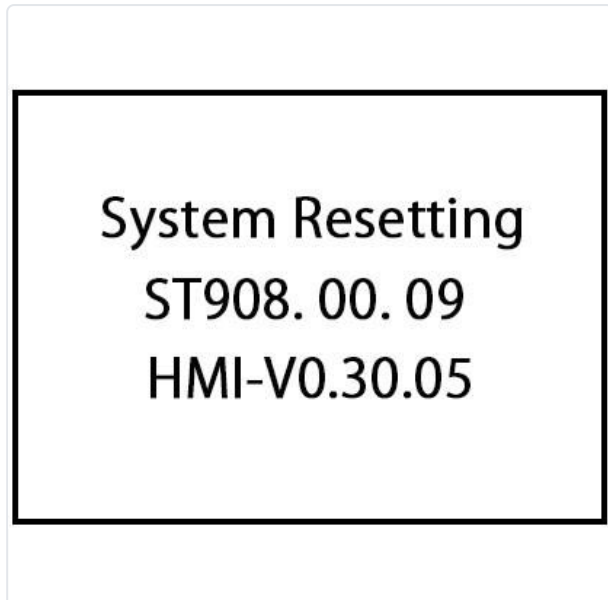
Turn on the laser machine.

1. Turn the main switch clockwise. When the power is ON, the switch pops outward.



When you turn on the laser machine, the startup screen appears on the machine's operation panel as shown below; confirm that it changes to the normal screen after a short while. The area outlined by the red dashed line is the monitor screen, where information is displayed.

Also, at startup the laser head performs a homing operation (moves to the right rear of the work area) and then moves to the logical origin position.

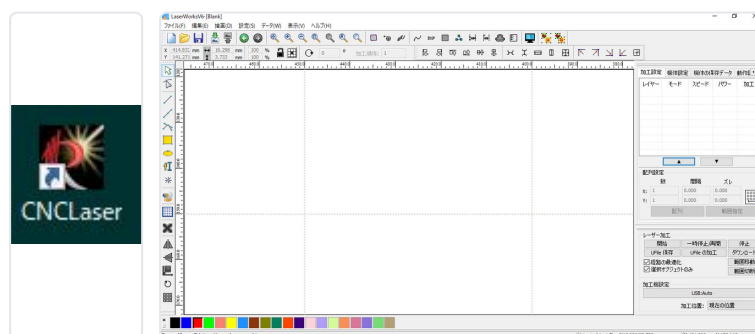


— Operation panel — / — Startup screen — / — Normal screen —

Note: The screens shown above include version information. Depending on the production lot of the machine, the actual display may differ from the figures above.

2.2 Starting the LaserWork Control Software

Launch the control software on the PC. Place the cursor on the CNCLaser icon and double-click it.



— Startup screen —

2.3 Checking That the Machine Operates Correctly

Note: This check is not necessary if the laser head moved to the right rear of the machine after the laser machine was powered on.

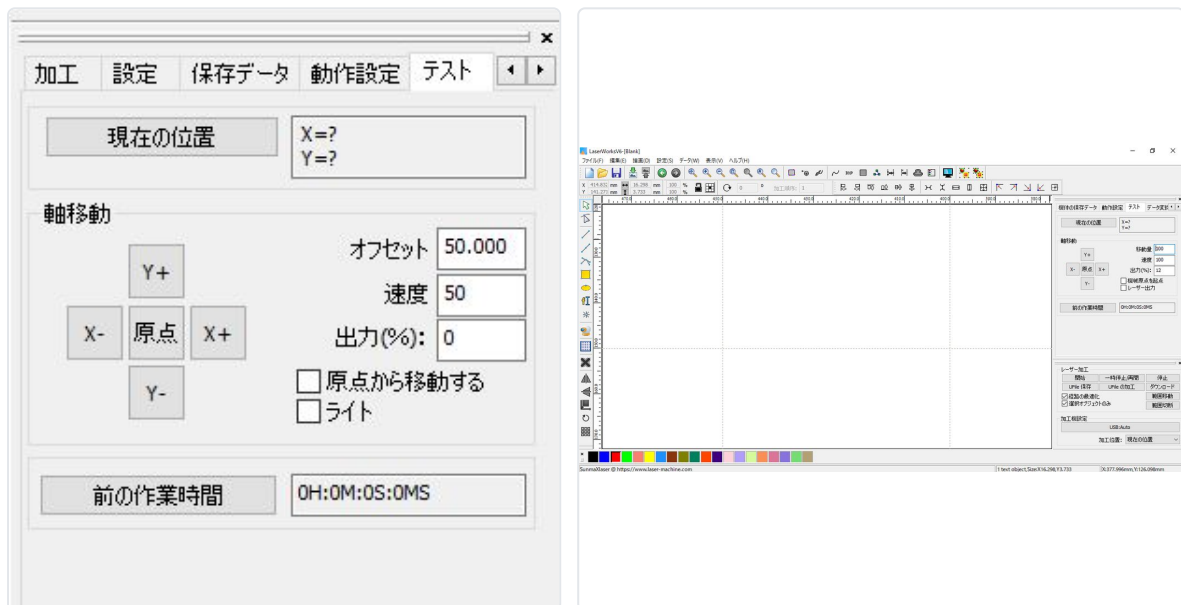
Click the "Test" tab in the machining settings pane at the top right of the screen to display it, then use "Axis move" to check that the laser head operates correctly (this is a check for first-time machining only; it is not normally performed).

Click the four buttons below with the mouse. If the laser head moves correctly, the connection between the laser machine and the control PC is working properly.

Note: With one click, the laser head moves by the offset amount.

Note: The travel distance and speed can be changed with Offset (distance) and Speed.

Note: If the "Test" tab is not visible on the screen, click the arrow buttons to display it.



Clicking "Y+" with the mouse moves the laser head toward the rear.

Clicking "Y-" with the mouse moves the laser head toward the front.

Clicking "X+" with the mouse moves the laser head to the right.

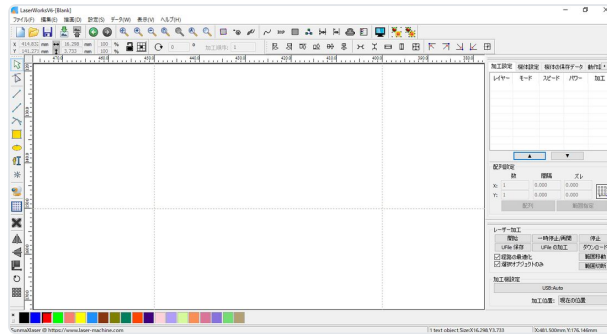
Clicking "X-" with the mouse moves the laser head to the left.

3. Creating the Cutting Design Data

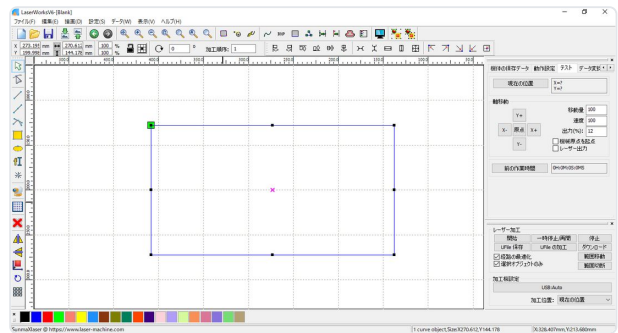
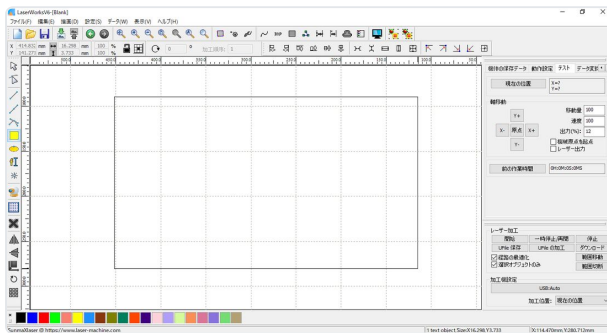
Create the cutting design in LaserWork. The data to be created is a design that combines engraving (blue) and cutting (black), as shown below. Here we create the rectangular frame needed for cutting.

3.1 Creating a Rectangle

1. Create a rectangle for the cutting design. Click "Rectangle" in the drawing toolbox.



2. Drag within the work area to place the rectangle at a suitable position.



3.3 Positioning the Rectangle

Decide where to place the rectangle. To move or position an object, either click "Select", or enter values in the X and Y fields of the properties toolbar to move the object.

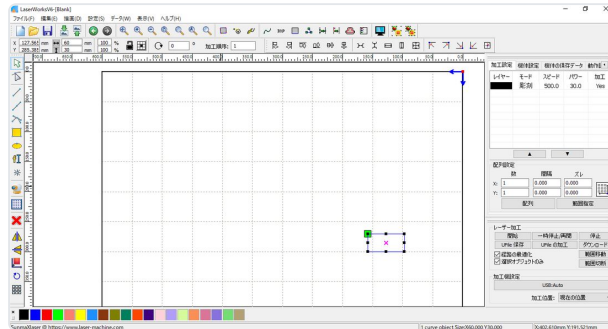
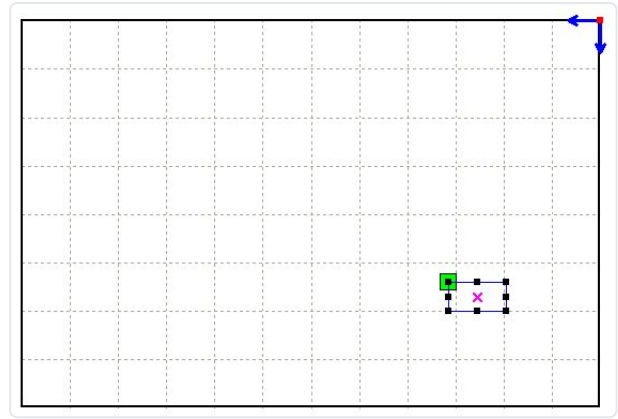
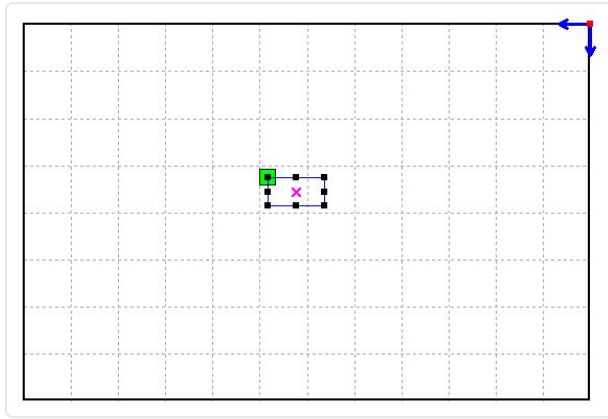
Using the Select tool

Click "Select" in the drawing toolbox, then click the object to put it in the selected state.

Drag it to a suitable position, then click. (Click the outline.)

Place the mouse cursor on the "x" mark at the center and drag with the mouse to change the position of the rectangle.

Also, when you place the mouse cursor on any of the black dots (■) at the eight points around the rectangle, the cursor changes to an arrow shape. Dragging the mouse in that state stretches or shrinks the rectangle in the direction of the drag.

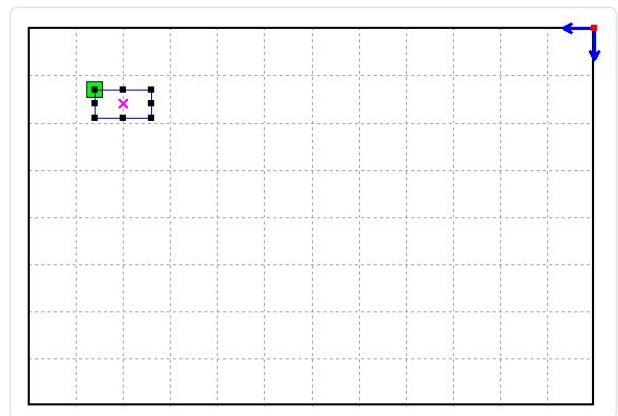
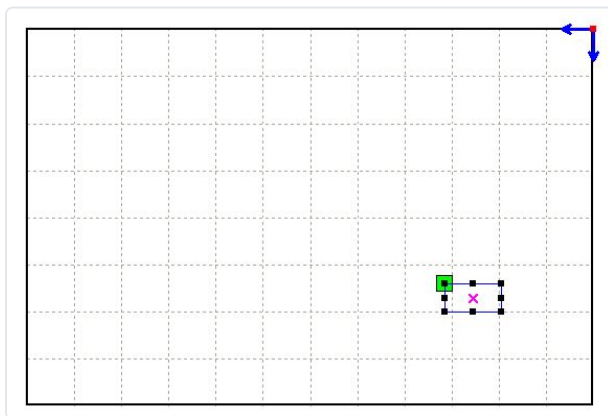


— Before moving — / — After moving —

Entering X and Y values

By entering values in the X and Y fields of the properties toolbar, you can place the object at a specific position within the work area.

When you enter values in X and Y, the object moves to the entered coordinates.



— Before entering values — / — After entering values —

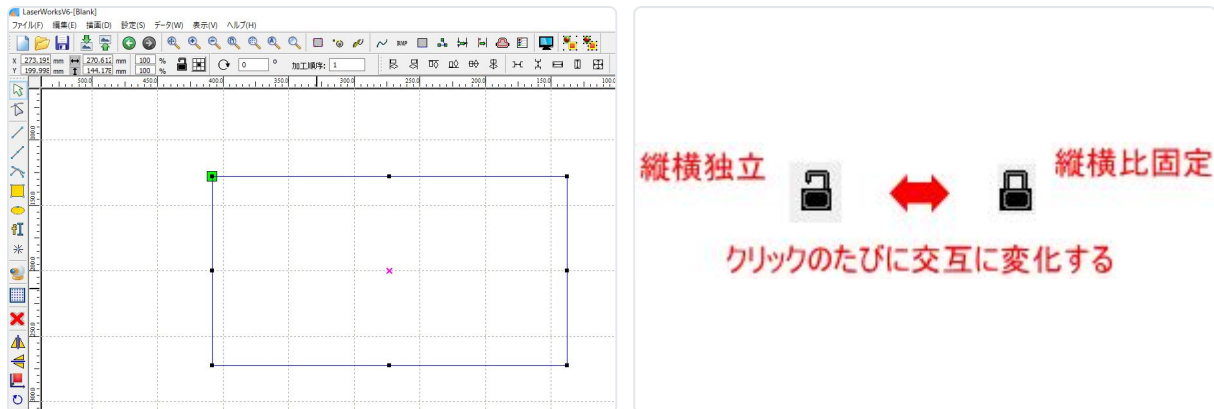
3.4 Changing the Size

Change the size of the rectangle.

Use "Length in X direction" and "Length in Y direction" on the property toolbar to change the size.

- Property toolbar -

Enter the desired value.



[To lock or unlock the aspect ratio, click the lock icon]

When the aspect ratio is locked, change the width or height value and press the Tab key on the keyboard; the selected object is then scaled up or down while keeping its proportions.

When the aspect ratio is not locked, change the width or height value and press the Tab key; only the width or height of the selected object is changed to the value you set.

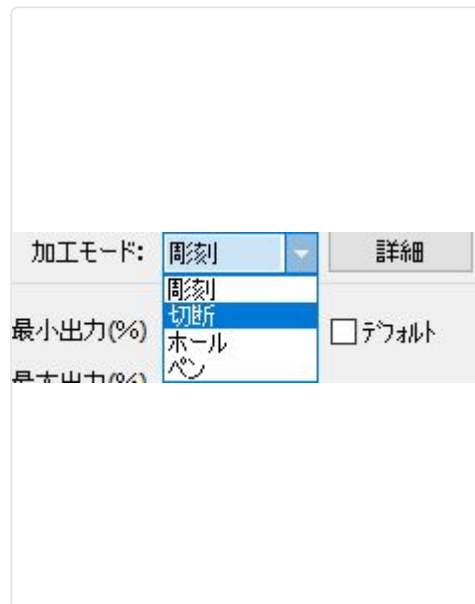
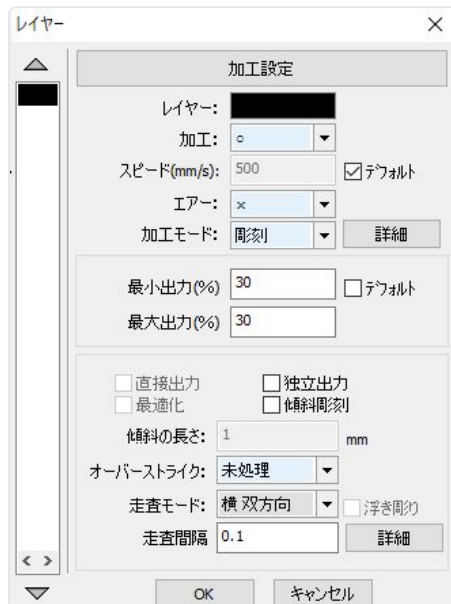
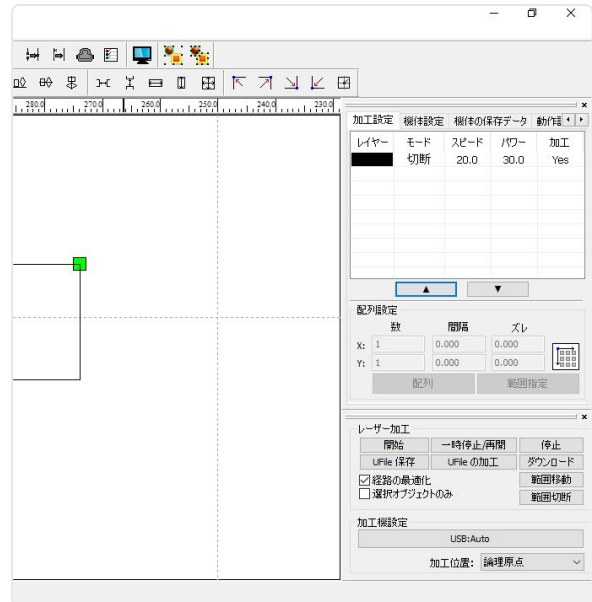
4. Configuring the Cutting Settings

Once the cutting design is complete, configure the cutting settings.

4.1 Displaying the Processing Pane

From the tabs at the top right of the screen, display "Processing Settings", place the cursor on the layer you want to configure, and double-click it.

Note: If the processing settings pane is not shown on the screen, click the arrow button on the tab bar to display it.

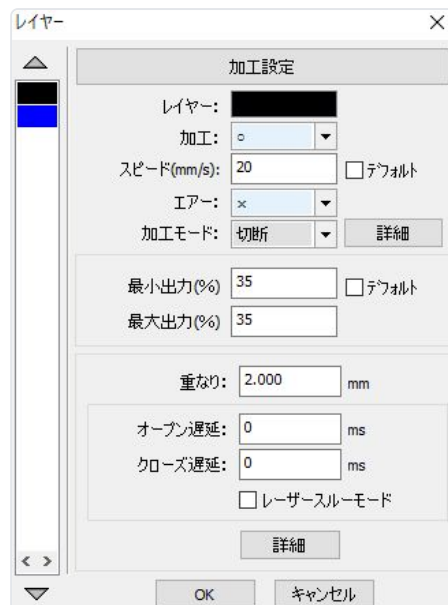


4.2 Changing the Processing Mode

When the Layer dialog appears, set the processing mode to Cut.

Double-click the layer. A list of modes appears; click "Cut".

4.3 Processing Settings



Item	Description
Speed	Sets the cutting speed. The unit is [mm/s]. In general, a value up to about 20 is used for cutting. A larger value makes the laser head move faster and shortens the processing time, but reduces the thickness of material that can be cut.
Air	Not set.
Min Power	Sets the low laser output. Set it to a value no higher than the Max Power setting. Normally, the same value as Max Power is fine. The unit is %, and values from 0 to 100 can be set.
Max Power	Sets the laser output used during normal operation. The unit is %, and values from 0 to 100 can be set.
Overlap	If a closed design cannot be cut properly (the cut-out piece does not come free) due to the properties of the material or mechanical error, enter a correction value here. Normally, a value of about 0.1 [mm] is set.
Open Delay	Sets the delay time before the laser output turns ON when laser firing starts (at the start of processing, or when firing resumes after moving between objects). Normally set to zero.
Close Delay	Sets the delay time before the laser output turns OFF when laser firing ends (at the end of processing, or before moving between objects). Normally set to zero.
Laser Through Mode	When Laser Through Mode is checked, the laser head stops while the laser output ON/OFF is in the delay state defined by the Open Delay and Close Delay settings.

If "Default" is checked, the Speed and Min/Max Power settings are disabled. When it is checked, processing uses the Speed set / Min Power / Max Power settings on the operation panel. This applies both when starting processing from LaserWork with "Start" and when processing data saved to the machine via "Download" from the operation panel — in both cases, the machine runs at the Speed set / Min Power / Max Power settings.

Advanced: Clicking "Advanced" opens the "Cut — Advanced Settings" dialog, where seam compensation can be configured.

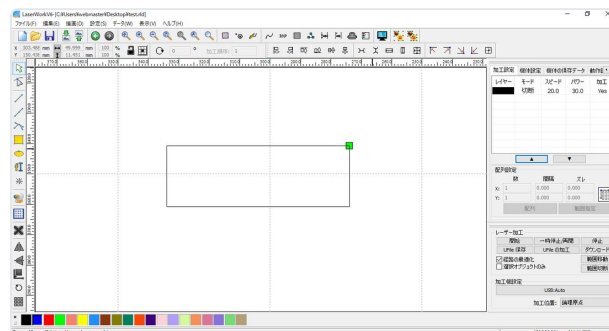
For details, refer to "Cutting Settings" in the separate LaserWork V6 User Manual.

5. Creating the Engraving Design

Create the design for engraving in LaserWork V6. The blue text (SUNMAX) is a "Text" object.

5.1 Text

1. Click "Text" in the drawing tools and enter the characters.

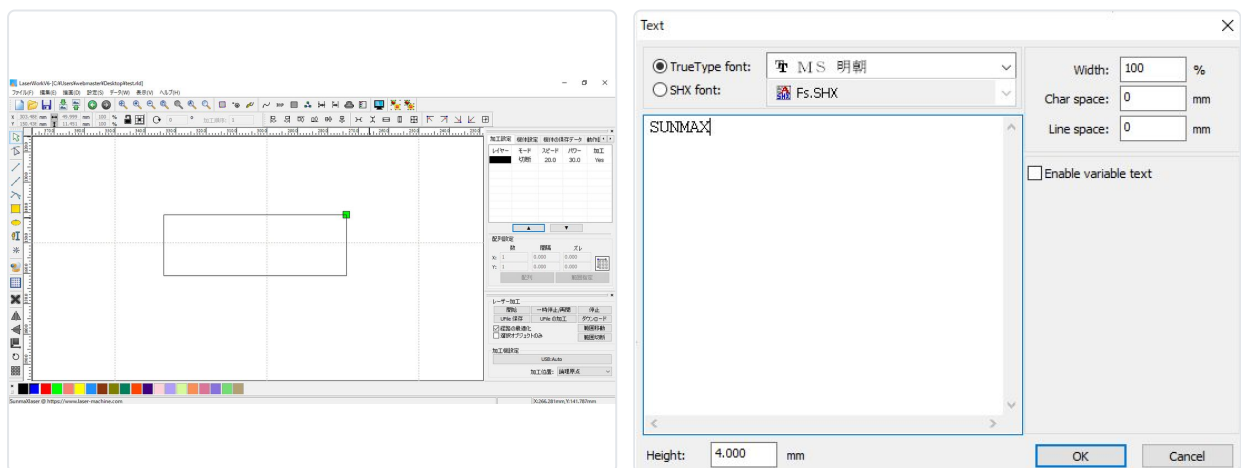


2. Click at a suitable position on the design screen.

5.2 Text Dialog

The "Text" dialog appears.

Enter the characters to be engraved in the text editing area. (In this example, enter SUNMAX.)



Height: Sets the initial height of the text string. The value can be changed freely later, so any value is fine. When making rubber stamps, setting it to about 4 improves workability.

Width: Sets the initial width of the characters. It is always 100% and does not need to be changed.

Char Space: Sets the spacing between characters. Character spacing is difficult to adjust later. For rubber stamps, if the height is set to 4, set this to 0.1.

Line Space: Sets the length of the line spacing.

TrueType / SHX (CAD): By selecting TrueType or SHX, you can choose between the PC's fonts and CAD line fonts. SHX fonts are formed only of lines with no thickness, so they cannot be engraved. Here, select TrueType.

Note: For details, refer to "Text" in the separate LaserWork V6 User Manual.

Clicking the "OK" button generates the text string data on the screen.



5.3 Editing the Text

Positioning / Moving

To position or move the object, use "Select", or enter values for the X and Y axes in the property toolbar.

Refer to 3.3 "Positioning the Rectangle" in this work example.

Changing the Size

You can change the size of the object by entering the desired values in "Length in X direction" and "Length in Y direction" on the property toolbar.

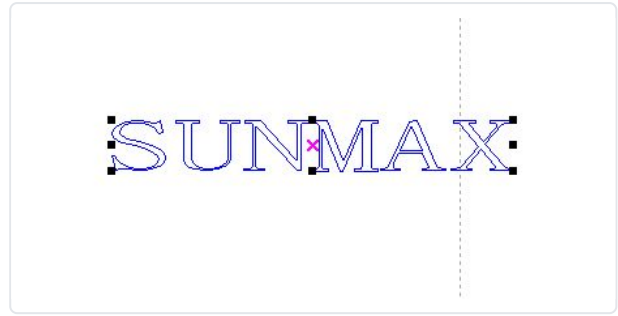
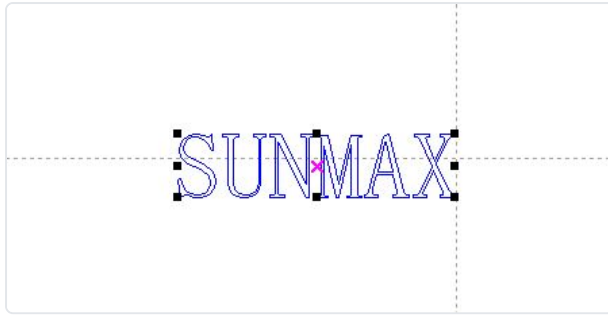
Refer to 3.3 "Positioning the Rectangle" in this work example.

[Locking the aspect ratio is recommended]

With text strings, scaling the width and height separately upsets the balance of the characters. To prevent this, check the lock icon in the property toolbar before changing the size.

When the aspect ratio is locked, change the width or height value and press the Tab key on the keyboard; the selected object is then scaled up or down while keeping its proportions.

When the aspect ratio is not locked, change the width or height value and press the Tab key; only the width or height of the selected object is changed to the value you set.



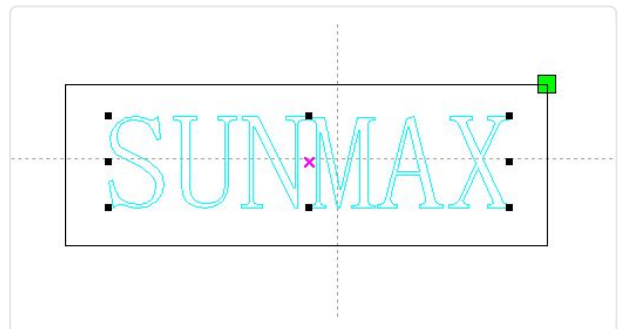
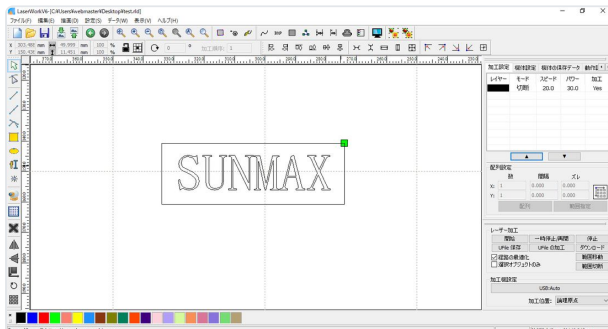
- With aspect ratio locked (X axis enlarged by 30 mm) -
- Without aspect ratio locked (X axis enlarged by 30 mm) -

6. Configuring the Engraving Settings

Now that the engraving data has been created, configure the processing settings for the engraving data.

6.1 Creating an Engraving Layer

At this stage, the text string is on the same layer as the rectangle, so the engraving object (the text) must be placed on a separate layer. To do this, change the layer color using the layer toolbar.

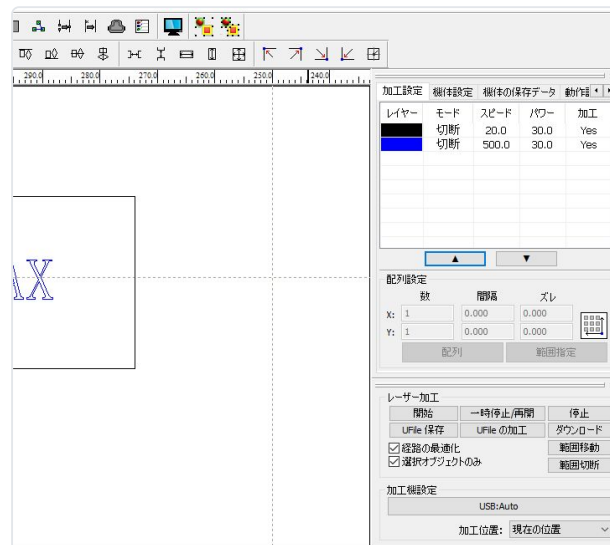
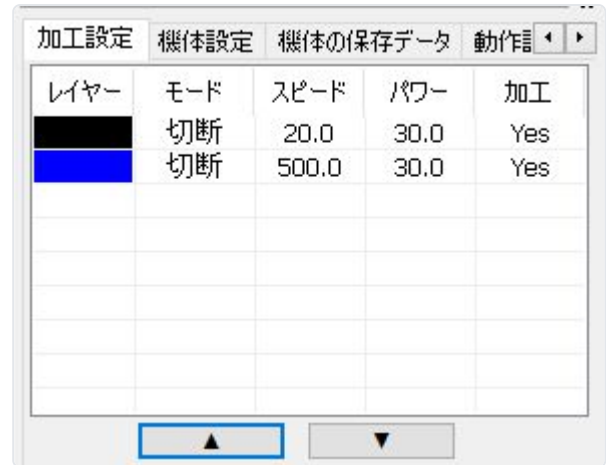
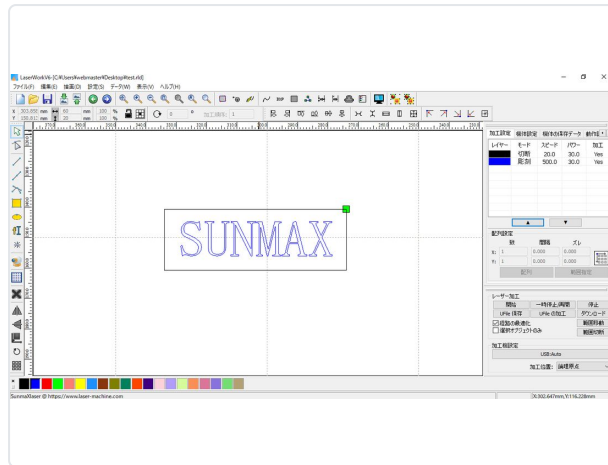


1. First, click the text (SUNMAX) with "Select" to put it in the selected state.
2. On the layer toolbar at the bottom right of the screen, click any color other than black (the cutting layer).

Select blue as the engraving layer. (Any color is fine.)

An engraving layer is required. — Layer toolbar

3. Confirm that a new layer has been added to the layer list in the processing settings. (The objects in the work area are also displayed in the layer color.)



6.2 Displaying the Processing Pane

Open the "Processing Settings" tab at the upper right of the screen, place the cursor on the layer you want to configure, and double-click it.

Note: If the processing settings pane is not shown on the screen, click the arrow button on the tab bar to display it.

6.3 Changing the Processing Mode

When the layer dialog appears, set the processing mode to Engrave.

A list of modes is displayed; left-click "Engrave".



6.4 Processing Settings

If the "Default" checkbox is selected, the Speed and Min/Max Power settings in this dialog are disabled. While it is checked, the machine processes at the Speed set / Min Power / Max Power values configured on the operation panel. This applies both when starting the job from LaserWork (e.g., with "Start") and when processing data saved to the machine via "Download" from the operation panel — in either case, the Speed set / Min Power / Max Power values are used.

Item	Description
Speed	Sets the processing speed. The unit is [mm/s]. For engraving, this value sets the processing speed (mm/s). The appropriate value varies with the job content, the material, and the processing mode. For engraving it is generally up to about 600. A larger value makes the laser head move faster and shortens the processing time, but the engraving becomes shallower.
Max Power	Sets the maximum laser output. The unit is [%], with a setting range of 0–100. Decimal values can also be entered. A larger value produces a stronger laser output and a deeper engraving. To limit the load on the laser tube, the setting is generally kept to a maximum of about 90[%].
Scan interval	Specifies the scanning interval for engraving. The unit is [mm]. The minimum value is 0.025[mm], and settings are normally made in 0.025 increments (the setting itself can be entered from 0.01 in 0.01 increments, but because of the laser spot diameter and the positioning accuracy of the machine, going as fine as 0.01 is meaningless). A value of 0.05 is usually appropriate. In general, a smaller value improves the mechanical processing precision, but depending on the material and the data, making it too fine serves no purpose. A larger value shortens the processing time. If you want to speed up production even at the cost of a rougher finish, raising this value reduces the production time: for example, if a job engraved at 0.05 is re-engraved at 0.1, the production time is halved.
Scan mode	Select horizontal bidirectional. The laser fires on both passes of the scan; if bidirectional is not selected, the laser fires in one direction only. Horizontal unidirectional scanning can improve processing quality in some cases, but the processing time doubles.
Air	Not supported on the RSD-SUNMAX series.
Advanced	Not normally used. For details of this function, see "Engraving Settings" in the separate LaserWork V6 User Manual.

6.5 How to Determine Engraving Settings

The engraving settings must be adjusted according to the material, the required depth, and the required quality; no single set of values suits every material. For example, even with identical settings, cedar and ebony engrave to completely different depths because of the difference in the hardness of the wood. Rubber and glass also engrave to different depths depending on their composition. With materials that melt (softened by laser irradiation and solidifying as they cool), such as resin, the finish depends on the balance between engraving speed, maximum power, and scan interval. In principle, 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 find the settings is as follows. Easily combustible materials include wood, rubber, paper, leather, resin, and cloth. Materials that do not burn easily include stone, glass, ceramic, and metal.

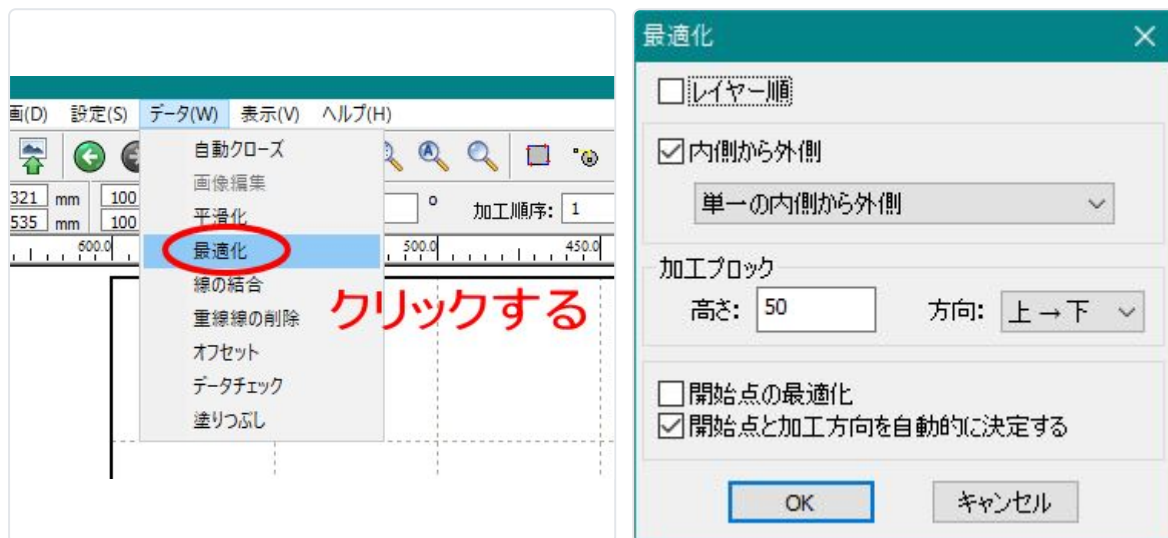
For easily combustible materials, start with a fast engraving speed and low maximum power, gradually raise the maximum power, and then reduce the engraving speed while checking the finish — this is the efficient approach.

For materials that do not burn easily, start with a slow engraving speed and high maximum power, gradually raise the engraving speed, and then reduce the maximum power while checking the finish — this is the efficient approach.

7. Machining Order

When there are multiple layers, the machining order can affect the result. If the perimeter is cut before engraving is performed, a proper machining result cannot be obtained.

The machining order depends on the LaserWork V6 settings. Normally, LaserWork V6 automatically processes the job in an order that avoids problems. Click "Data" – "Optimize" in the LaserWork V6 menu to open the "Optimize" dialog and configure the machining order for each layer.



If "Layer order" is not checked in the "Optimize" dialog, LaserWork V6 determines the machining order automatically according to the settings below it.

If "Layer order" is checked, the layers are processed from top to bottom of the list in the processing settings pane.

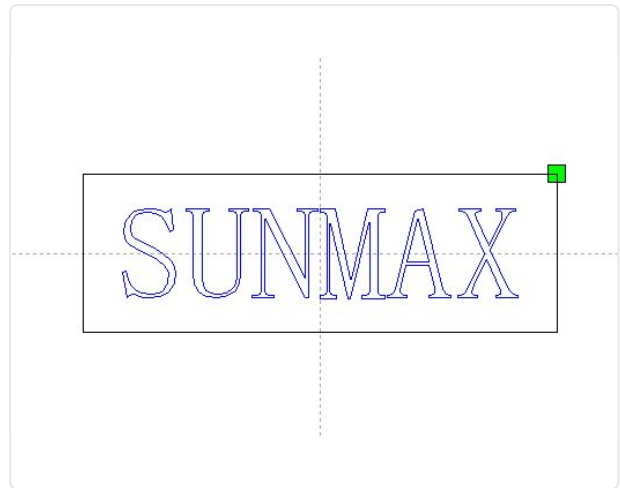
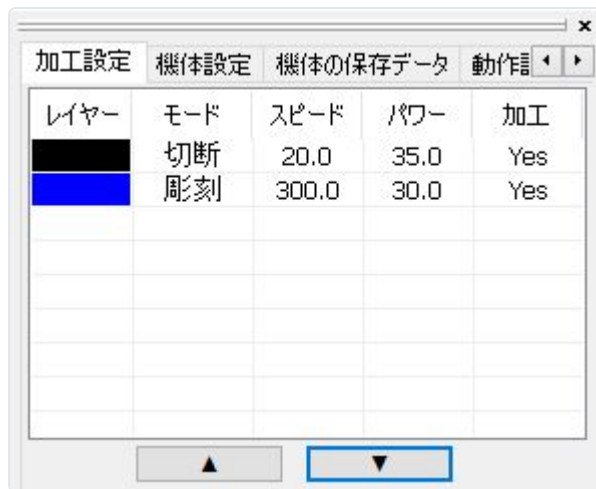
For details on the machining order, see "Processing Settings Pane" – "Processing Settings" – "Processing Settings Section" – "Machining Order" in the separate LaserWork V6 User Manual.

Example: Machining in list order with "Layer order" checked

This job has two layers — engraving and cutting — so the machining order must be checked.

The layers are machined from the top of the list downward. At this stage the cutting layer is above the engraving layer in the list, so change the order so that engraving is machined first.

Click the layer whose position you want to change, and use the arrow buttons in the processing settings pane to move it.



– After the change –

8. About the Machining Start Position

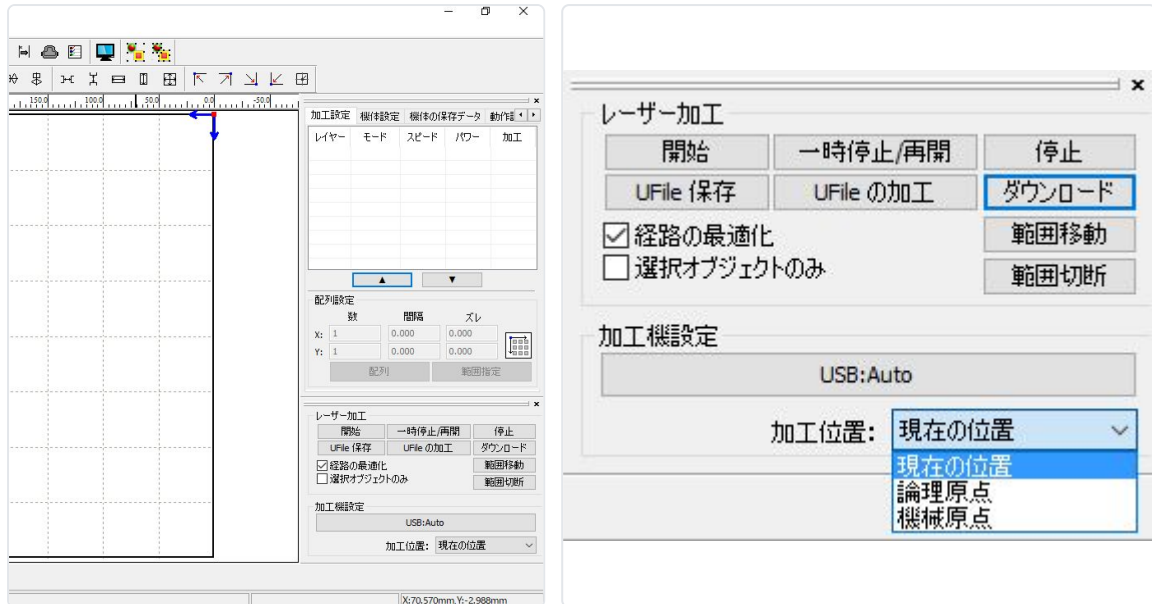
Before starting a job, you must check and set the machining start position.

When starting a job from the operation panel, the logical origin is always the start position. See "Machine Operation Panel" – "About the Logical Origin" in the separate LaserWork V6 User Manual.

When starting a job from LaserWork V6, you can choose among four origins (including absolute coordinates) depending on the settings.

8.1 Machining Position When Starting from LaserWork V6

The machining start position depends on the machining position setting. It can be selected from the machining position options shown in the Laser processing area at the lower right of the screen.



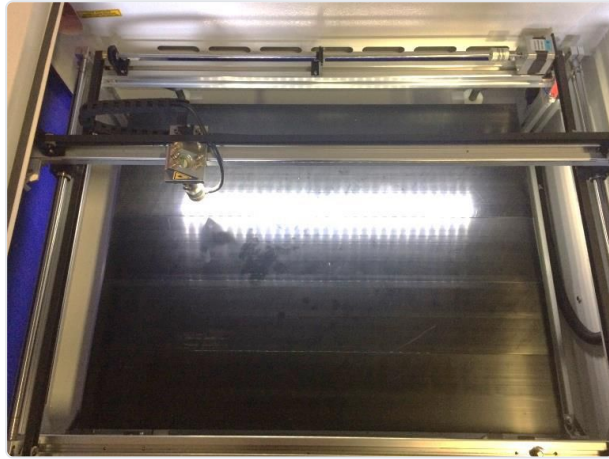
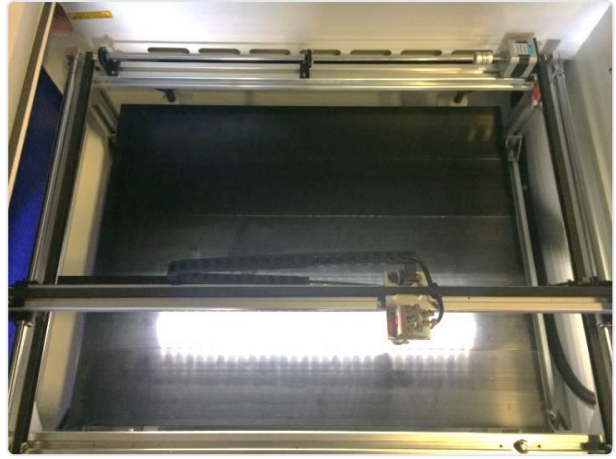
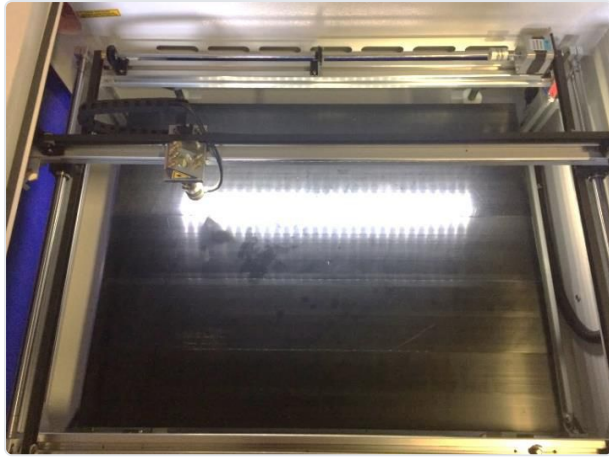
The machining position can be selected from the following three options.

Current position

When "Current position" is selected, clicking "Start" runs the job using the current position of the laser head as the data origin.

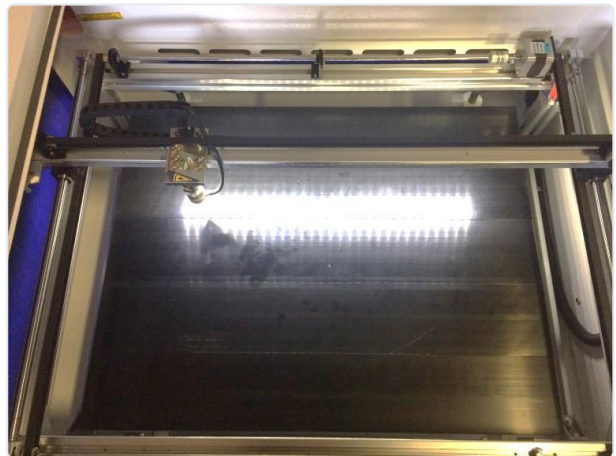
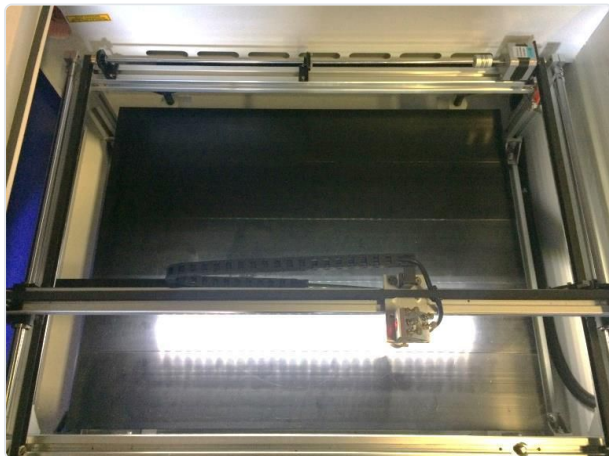
Logical origin

When "Logical origin" is selected, clicking "Start" runs the job using the logical origin — the position set with the "Origin" button on the laser machine — as the data origin.



Machining origin: press the "Origin" button on the machine operation panel.

When "Start" is pressed, the laser head moves to the logical origin and machining begins — even if the laser head has been moved.

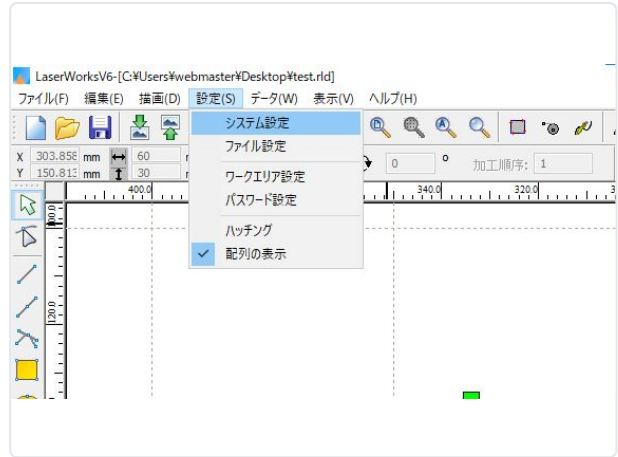
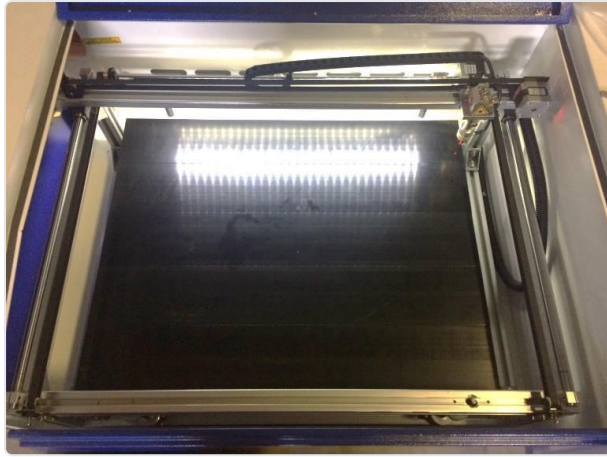


Machine origin

When "Machine origin" is selected, clicking "Start" runs the job using the machine origin of the laser machine (rear right — the position to which the machine homes when it is powered on) as the data origin.

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

When the "Start" button is clicked, the laser head moves to the machine origin and machining begins.



8.2 Absolute Coordinates

When "Absolute origin" is checked, the logical origin set with the "Origin" button on the operation panel and the "machining position" setting used when starting a job from LaserWork V6 are both disabled, and the objects are machined exactly as placed on the design screen. In other words, the coordinates of the objects placed on the PC screen match the actual machining positions.

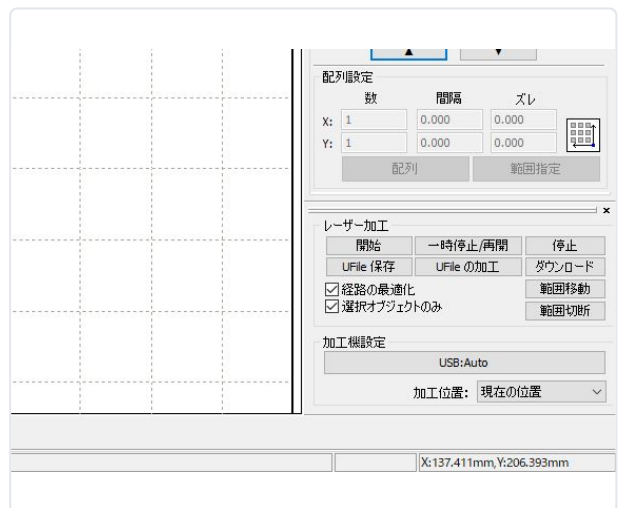
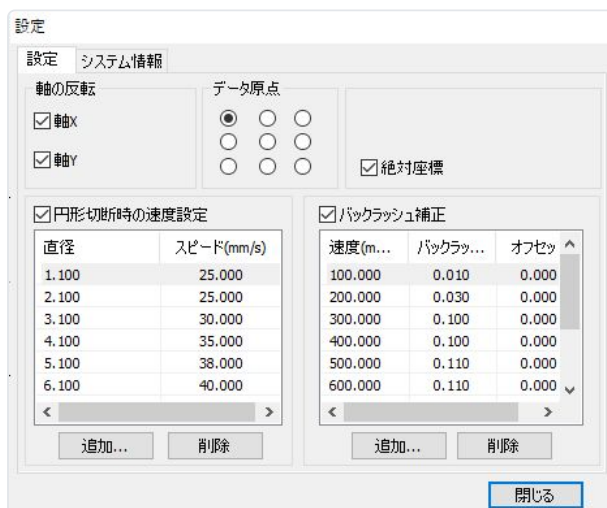
Use this setting when a positioning jig is used to machine at the same position every time.

Setting method

From the tabs on the screen, open Settings → System Settings.

The settings screen appears.

Check the "Absolute coordinates" checkbox to enable this setting.



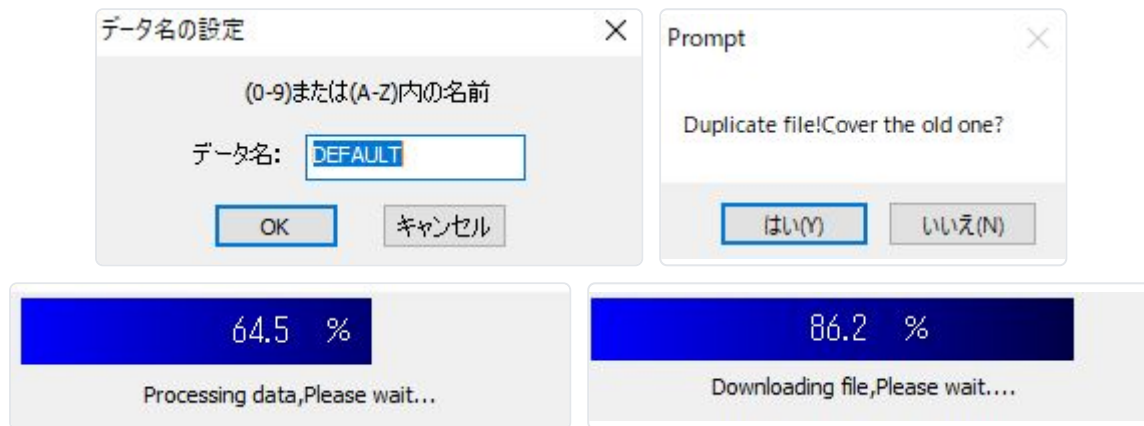
9. Downloading the Data

Once you have finished the machining settings and the machining position setting, send the machining data to the laser machine.

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

Note: If you start machining from the "Start" button in the "Machine Control pane" of LaserWork V6, you do not need to download the data.

1. Click "Download" under "Laser machining" at the bottom right of the screen.
2. When you click the Download button, the "Set data name" dialog appears. Enter a name of your choice.



Note: If a file with the same name already exists on the laser machine, a dialog asking "Overwrite?" is displayed.

Note: Only half-width alphanumeric characters can be used. Japanese or full-width characters will appear garbled on the machine's display.

3. Start the download

Clicking starts the data download.

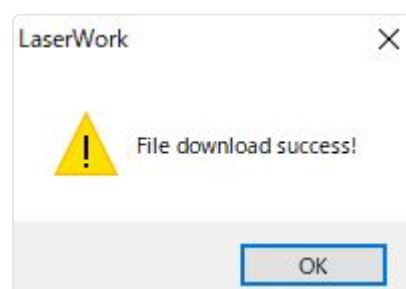
First, the design data is converted into a format the controller can handle. If you have created a large data file, this step may take some time.

When it reaches 100%, the download itself begins.

When the download progress bar reaches 100%, the data download is complete.

4. Download complete

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



Click the OK button.

10. Machining

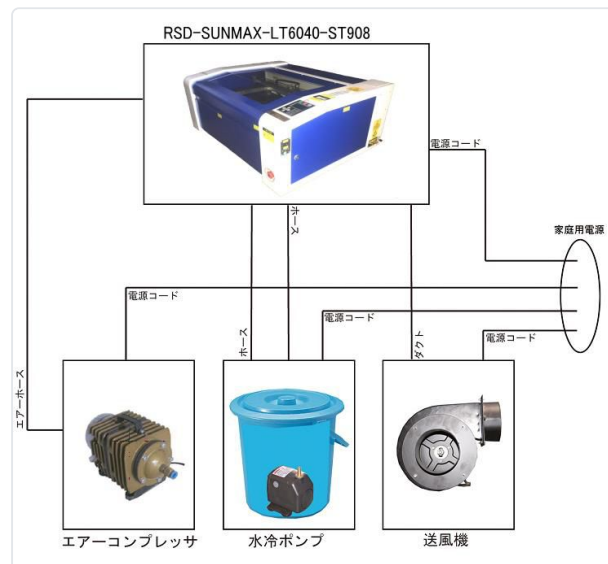
In this work example, we engrave and cut a 2 mm thick wooden board.

10.1 Checking the Power of External Equipment

Turn on the power of the external equipment (blower, water-cooling pump, and air compressor).

Caution: If the water-cooling pump is not powered on, the laser will not fire. If the compressor is not powered on, proper machining is not possible.

— Connection diagram —

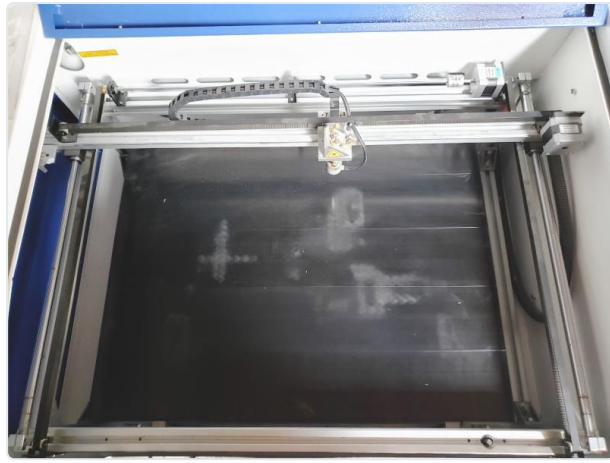


10.2 Selecting the Cutting / Honeycomb Table

The RSD-SUNMAX series lets you use three types of machining tables depending on the job.

Engraving table

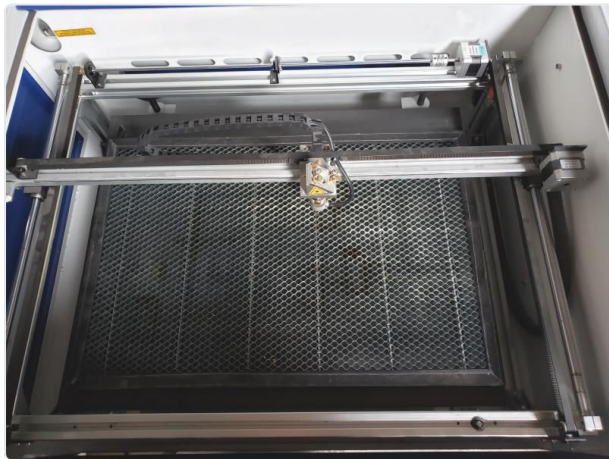
With the engraving table, no attachment is used; you place the material directly on the laser machine's lifting table and machine it.



- As a rule, use it only for engraving. Do not use it for cutting. When cutting, the laser beam must pass through the bottom of the material, but because the engraving table is a flat plate, the beam cannot pass through. It is therefore used for engraving.
- Cutting on the engraving table becomes possible if you place some kind of spacer between the table and the material to create a gap. In general, a gap of about 2 to 5 mm is needed between the table and the material.
- The engraving table is suitable for holding and machining thick materials.

Honeycomb table

The honeycomb table is used by placing it on top of the lifting table. Both engraving and cutting are possible. In addition, by connecting an exhaust blower to the honeycomb table box, the material is suctioned from below, so even light materials such as cloth and paper can be held in place.



Cutting table

In addition to the honeycomb table, the RSD-SUNMAX-LT 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, causes less scorching and melting on the back of the material due to laser reflection.

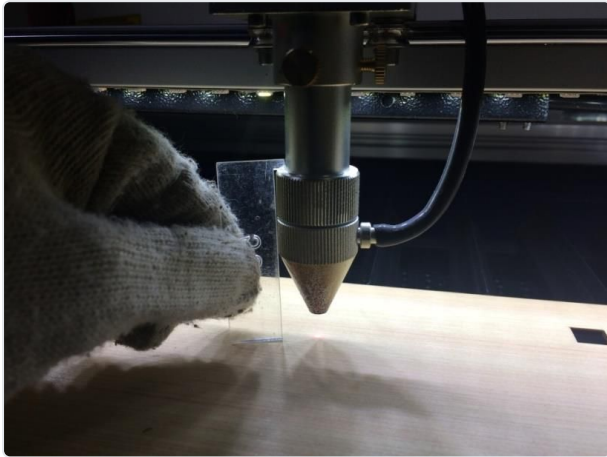
In this work example, we machine using the honeycomb table.

For how to install and remove each table, refer to the RSD-SUNMAX-LT6040 ST908 instruction manual.

10.3 Focusing

Place the workpiece in the work area and adjust the focus.

Set the height using the focus gauge.



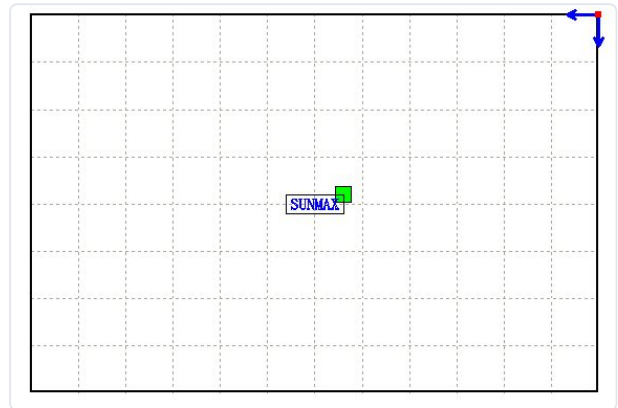
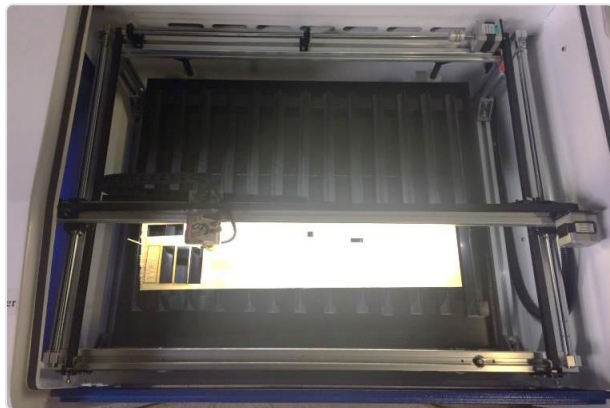
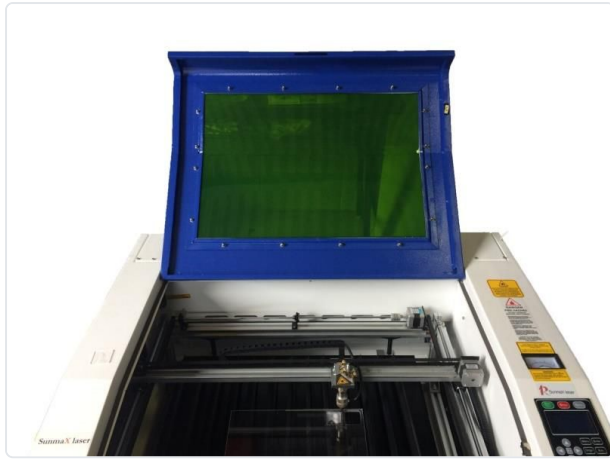
Using the table lifting handle, adjust the height until the focus lens just about grazes the wooden board.

(Turning the handle clockwise raises the table; turning it counterclockwise lowers the table.)

10.4 Closing the Upper Front Door

Close the upper front door.

Caution: If the upper door is open, the laser will not be emitted.



10.5 Machining

The way machining is started differs depending on the machining position setting.

All four machining patterns are described below.

Machining at the "Current position"

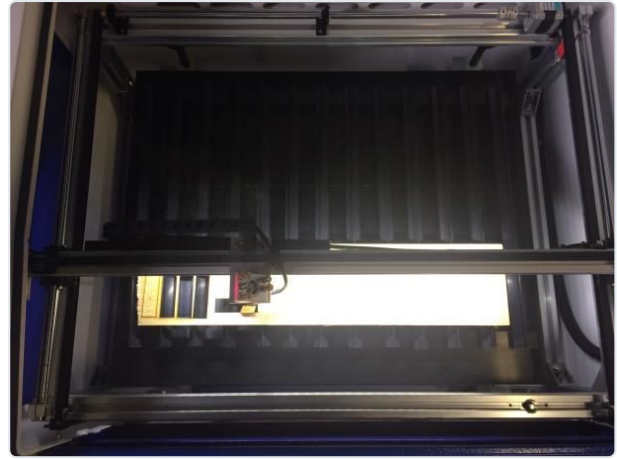
With this method, the current position of the laser head becomes the origin and machining is started from the PC.

The coordinates displayed in LaserWork V6 (on the PC display) are not applied.

Note: If you start machining by pressing the "Start" button on the operation panel, the "logical origin" becomes the machining position.

— Machine laser head position — — LaserWork coordinates —

Set "Machining position" in the "Machine Control pane" of LaserWork V6 to "Current position" and click the "Start" button.



Laser machining starts. The current position of the laser head becomes the data origin.

Machining at the "Logical origin"

With this method, you set the origin using the laser machine's operation panel and then machine.

As with "Current position", the coordinates in LaserWork (on the PC display) are not applied.

Using the operation panel, move the laser head to the position where you want to machine.

You can move the laser head using the arrow keys on the operation panel.

Once the machining position has been determined, press "Origin" on the operation panel to set the origin (logical origin).

After setting the origin, press the "Start" button on the operation panel, or click "Start" in LaserWork V6 (on the PC screen), to begin machining.

When starting machining with the "Start" button in LaserWork V6, set "Machining Position" to "Logical Origin."

Operation panel / LaserWork (PC screen)



Note: With the logical origin, even if the laser head has moved to another position after the origin was set with "Origin," the laser head will move back to the logical origin set with "Origin" and begin machining when the job is started.

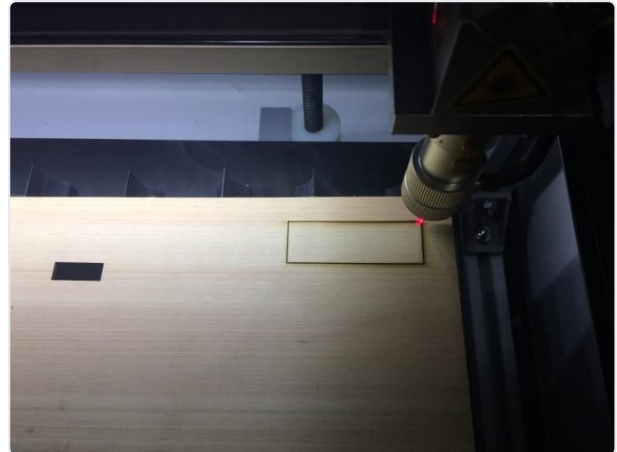
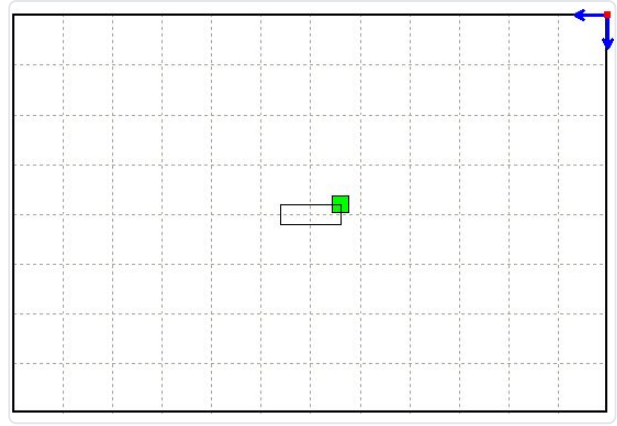
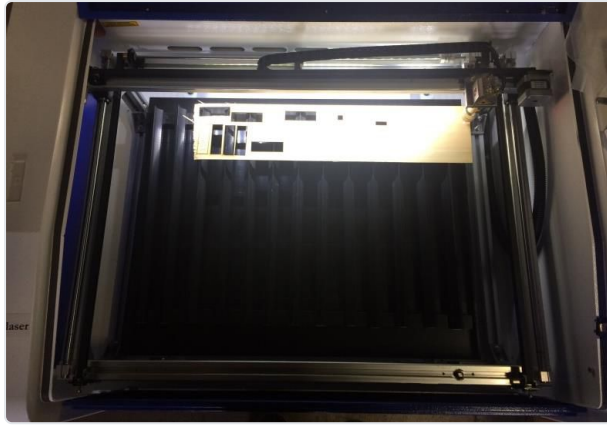
Machining from the Machine Origin

The machine origin of the laser machine is located at the far right rear of the work area. With this method, machining always starts from that position.

Use it when you want to make full use of the width and depth of the work area for cutting.

For engraving, a run-up zone is required, so machining from the machine origin may not be possible depending on the machining position.

Laser machine / LaserWork (PC screen)



Note: The objects placed in LaserWork do not need to be moved to the machine origin.

Move the workpiece to a position where it can be machined from the machine origin, then click "Start" to begin machining.

Note: If you start machining by pressing the "Start" button on the operation panel, the machining position will be the logical origin.

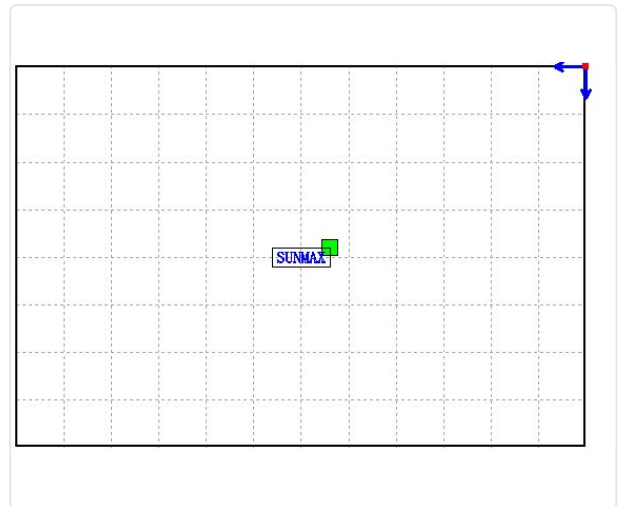
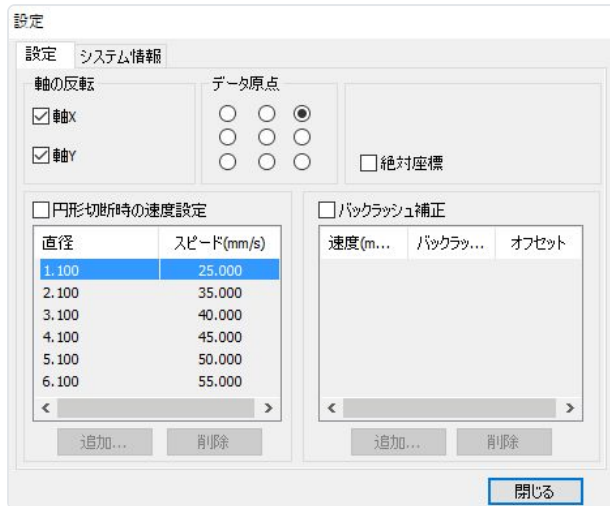
Machining with Absolute Coordinates

With this method, machining is performed at the coordinates displayed in LaserWork (on the PC screen).

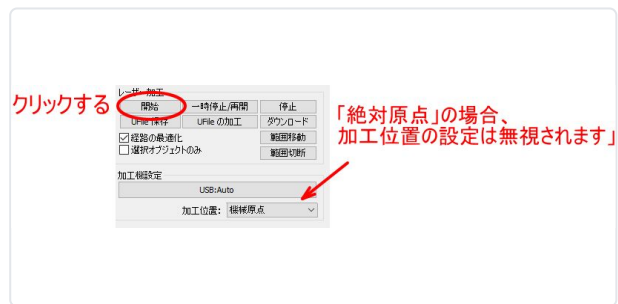
Note: When "Machine Origin" is selected, always place the data origin at the top right. Since the machine origin is at the right rear, if the data origin is anywhere other than the top right, the job will extend beyond the work area and cannot be machined.

This can be configured from the on-screen menu tab: open Settings → System Settings.

Coordinates in LaserWork / Laser machine (machining position)



To machine with absolute coordinates, click "Settings" – "System Settings" in the LaserWork V6 menu to display the "Settings" dialog, then check "Absolute Origin."



Click the "Start" button to begin machining.

Note: If you start machining by pressing the "Start" button on the operation panel, the machining position will be the logical origin.