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# LASER CUTTING GUIDEBOOK

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# Safety 101

The laser cutter and engraver is an inclosed machine. It is made to be user-friendly and safe to use. However, you might hurt yourself if not handled properly or carefully.

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## LASER

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A laser is used to cut or engrave. Do not look directly at it when the program starts.

## VAPOR

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Cutting or engraving produces smoke. Keep the door open and wait for the fumes to dissipate before opening the top cover.

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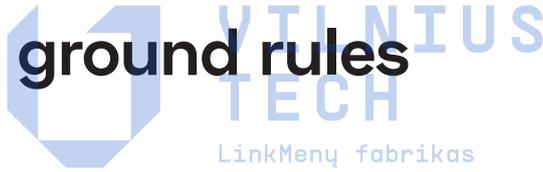
## BURNING

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Risk of burning or flames if not set correctly.

# Few ground rules



## 1

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Book your session before use.

## 2

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Use the provided laptop for the software. It might not work properly on yours.

## 3

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Always clean after you. Don't leave trash on the tables. It's always nice to work in a clean environment



## 4

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If you have any doubts, don't hesitate to ask for help. It's better to ask for help than to do something wrong.



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# The Machine

How does it work?



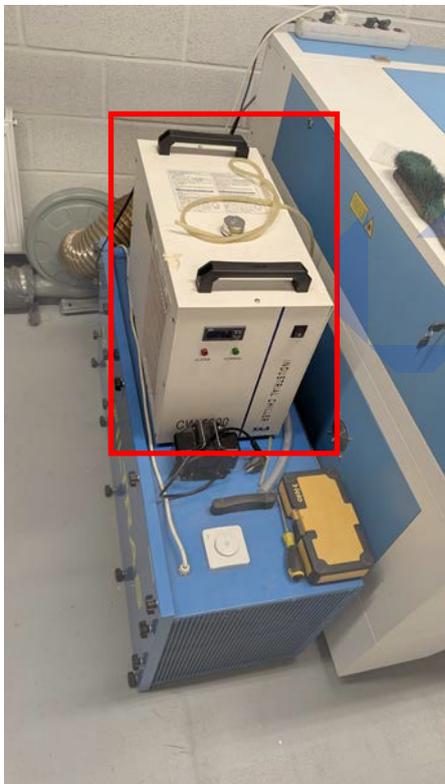
The work station



Indicator lights. Don't touch it.



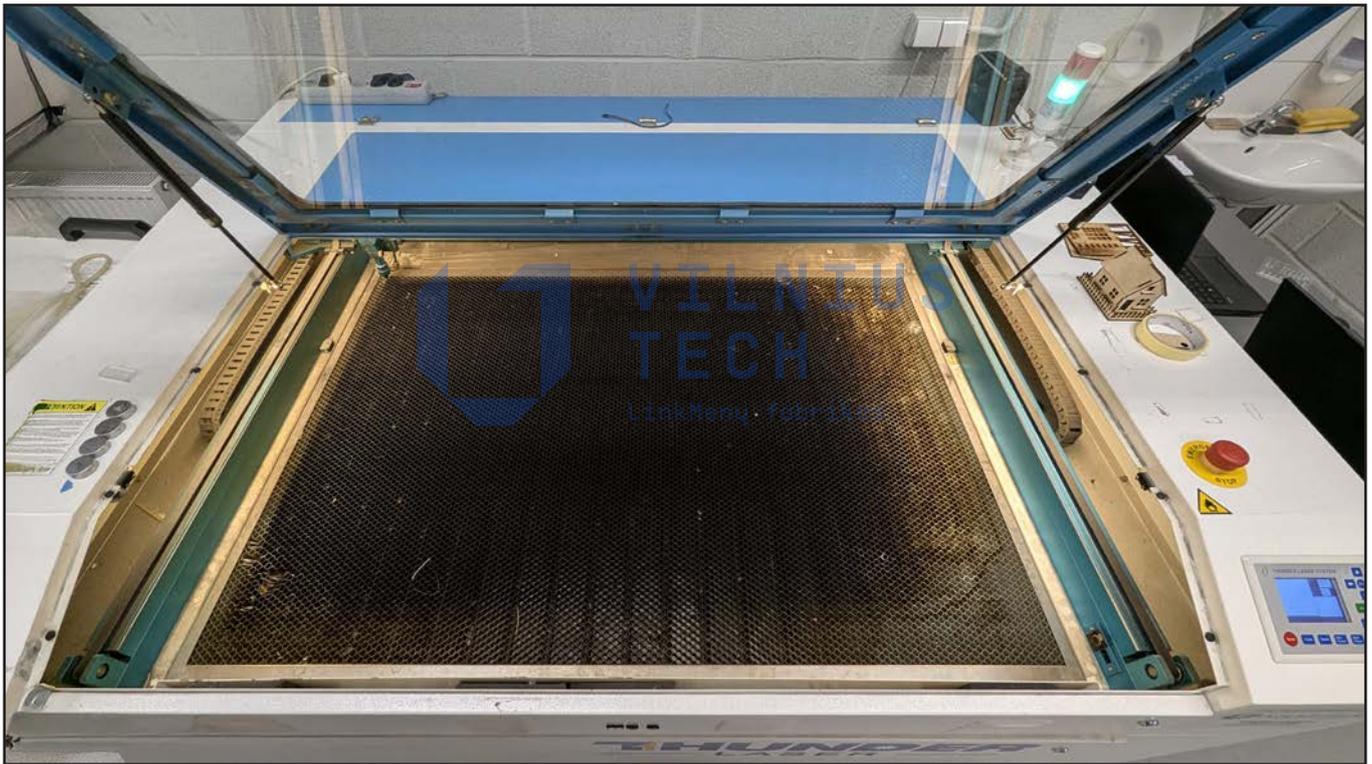
Control panel on which you set the machine.



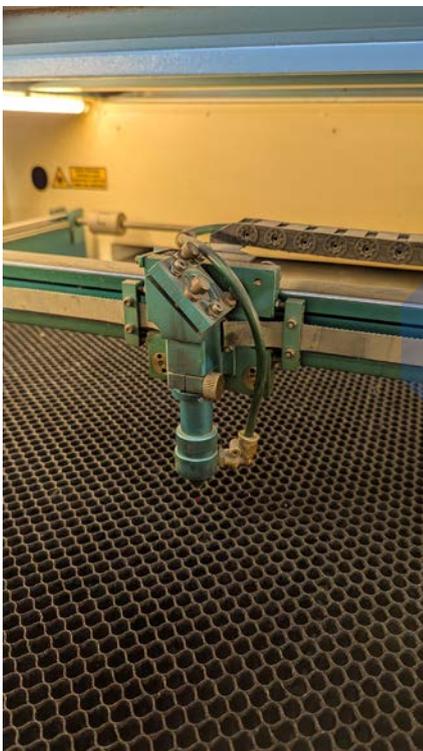
Laser cooler, don't touch it.



Power on switch to turn on the machine.



This is the cutting surface. It has a working surface of 130mmx90mm.



The laser head cut or engrave. There is two laser, one visible used to calibrate the machine, the other one isn't and is used for cutting.



Those two lights indicate whether the sheet is flat or not. It is important that the sheet sits flat.



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When the light is red, the sheet isn't flat.

You cannot adjust the height while the led are red.



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# Four basic steps to Laser cut

(More details in the following pages)

## 1

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Export your file in **.DXF** format

## 2

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Import your file in RDWorks. Set-up the file by adjusting the colors and settings according to your needs. Download the file on the laser cutter.

## 3

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Prepare the laser cutter, load your sheet, set the origin and the laser height by using the **provided scale**. It should have some resistance between the laser and your sheet when sliding the scale.

## 4

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Start the cutting and **STAY** during the process.



# How To ?

- [How to prepare your file](#)
- [How to set-up the machine](#)

## How to prepare your file?

### 1

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Import your **.DXF** file into RDWorks.

### 2

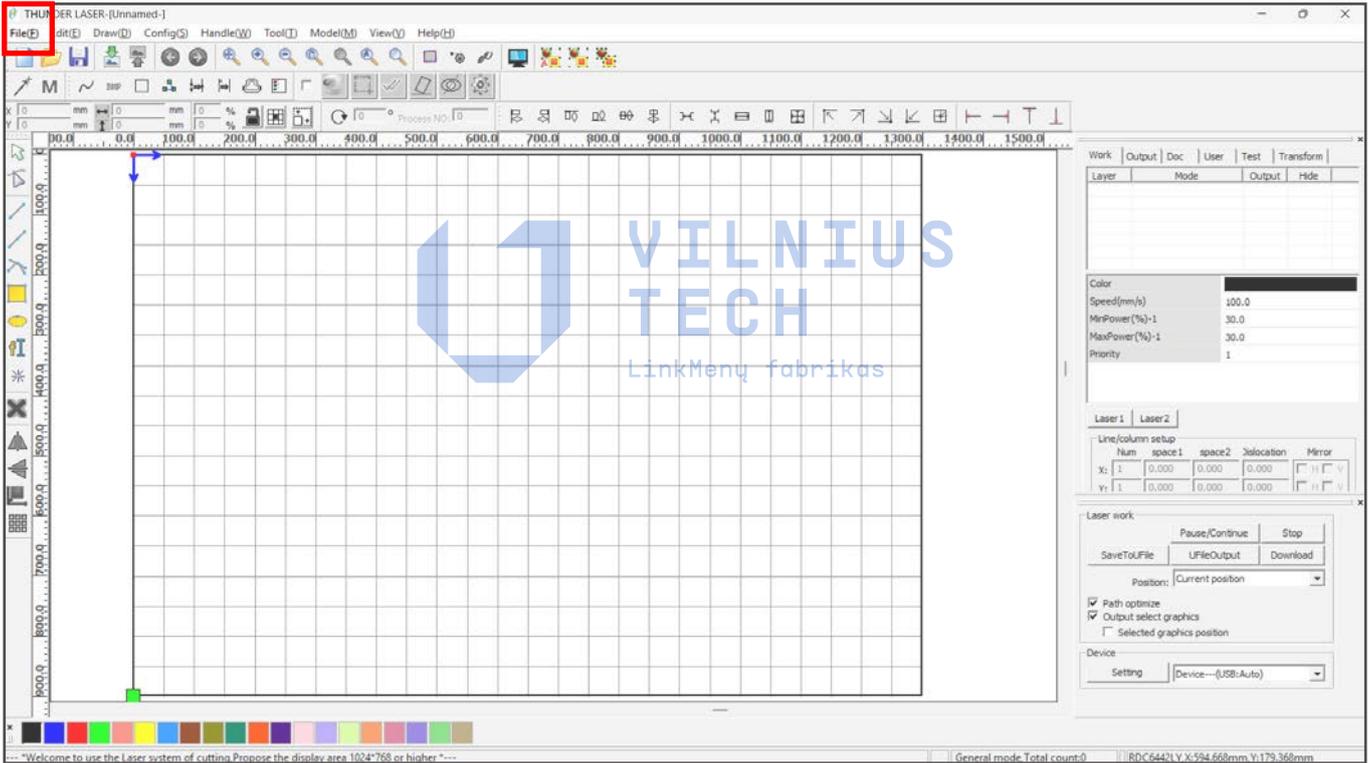
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Set the colors for each parts. Each color correspond to a setting and an action. Choose between “cut, scan or dot”. “Pen” isn’t nused. (annex [p.26](#))

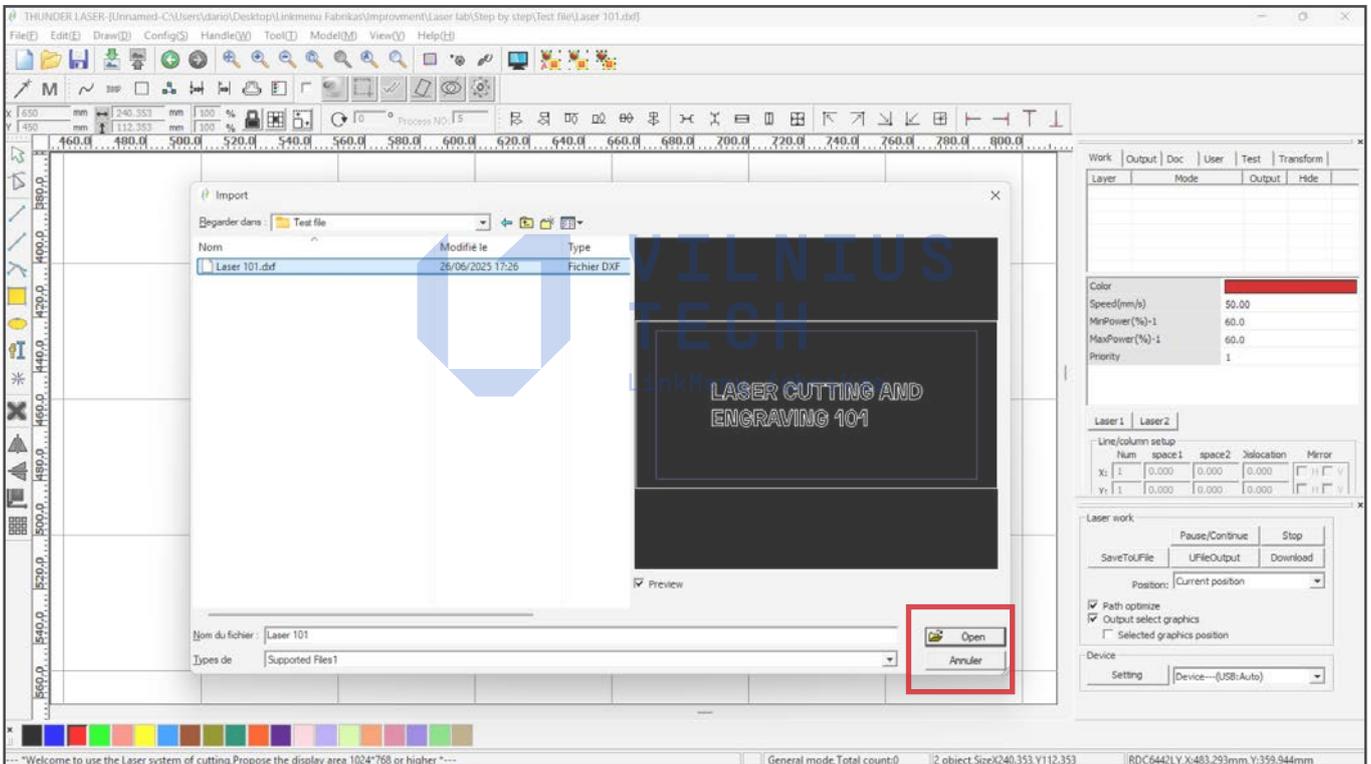
### 3

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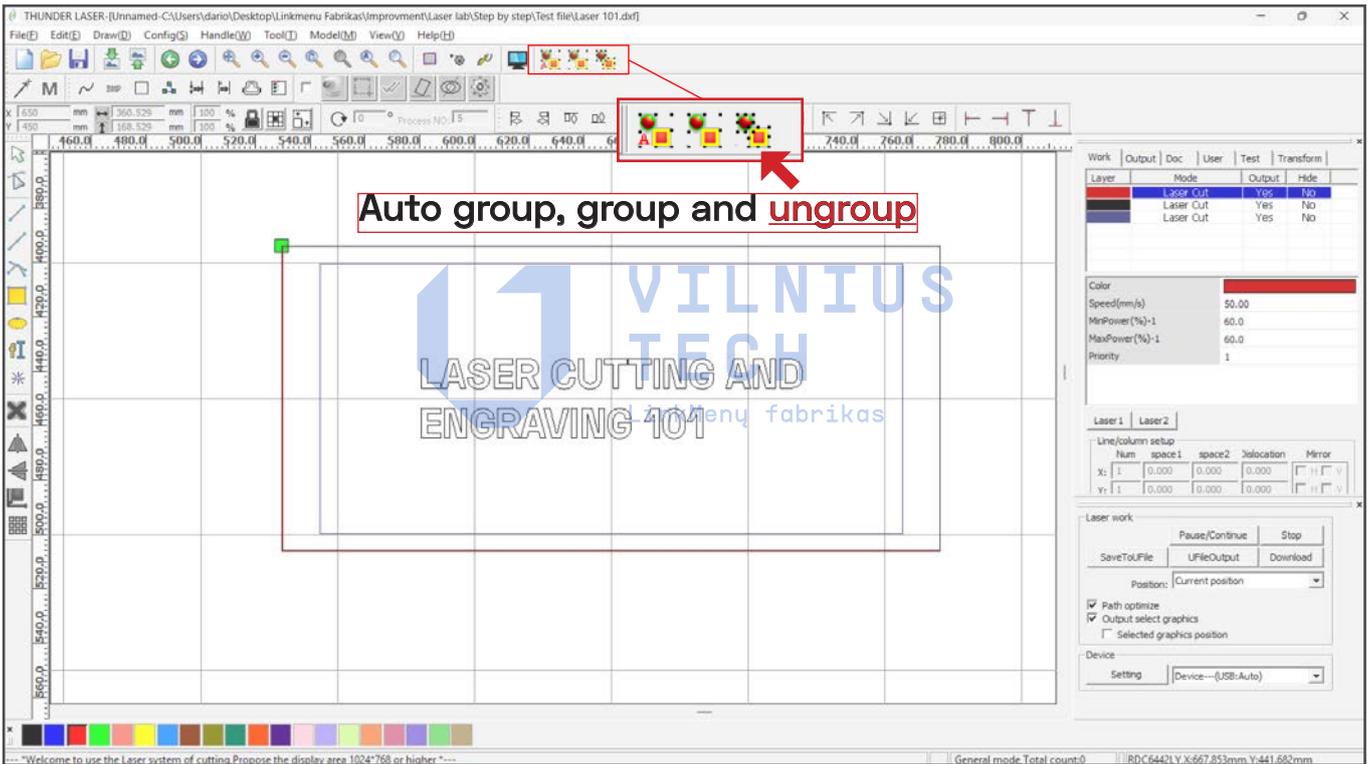
Select the lines you intend to cut or engrave then select “preview”. It will show how the laser understand your file. Click “download” if everything appears correctly.



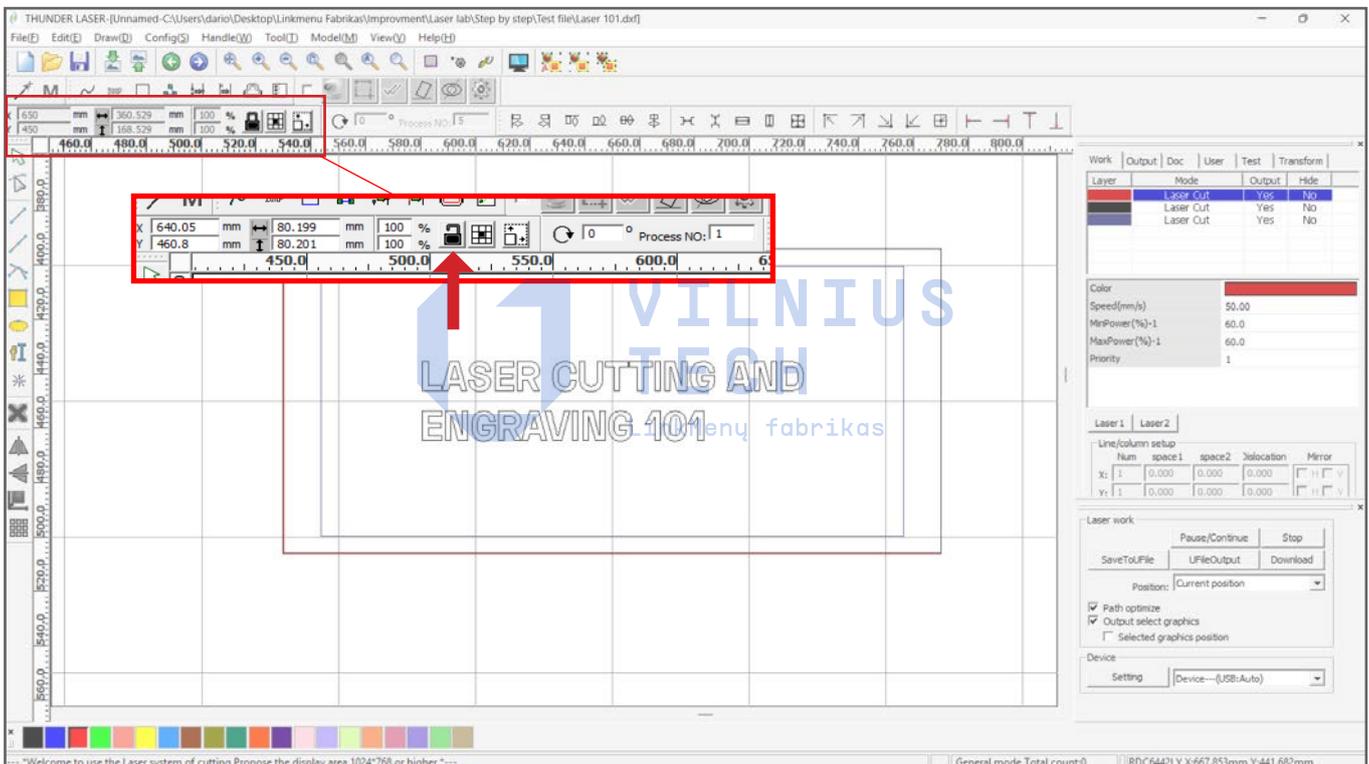
1. Open RDWorksV8 and click “File” then select “Import”



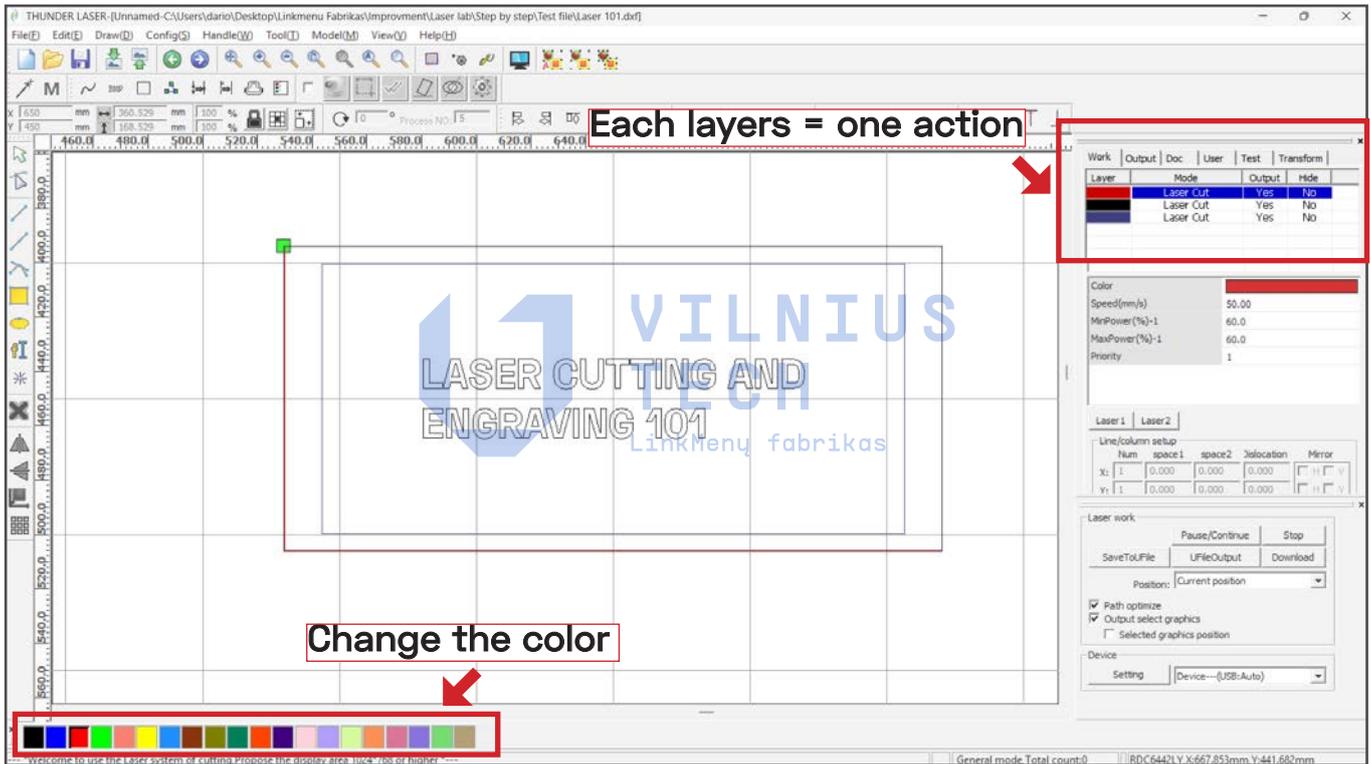
2. Select the your file then click “open”.



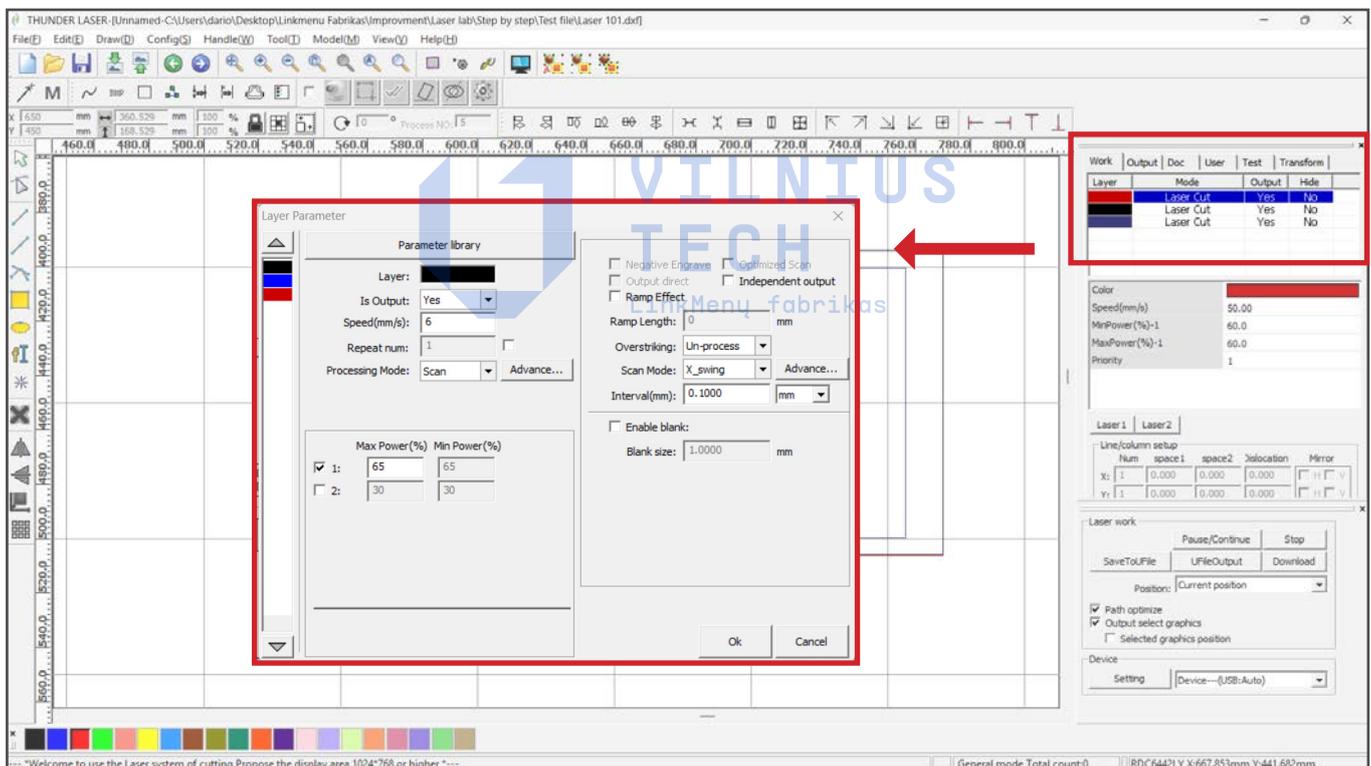
3. When loaded, the file is grouped, ungroup-it in order to be editable



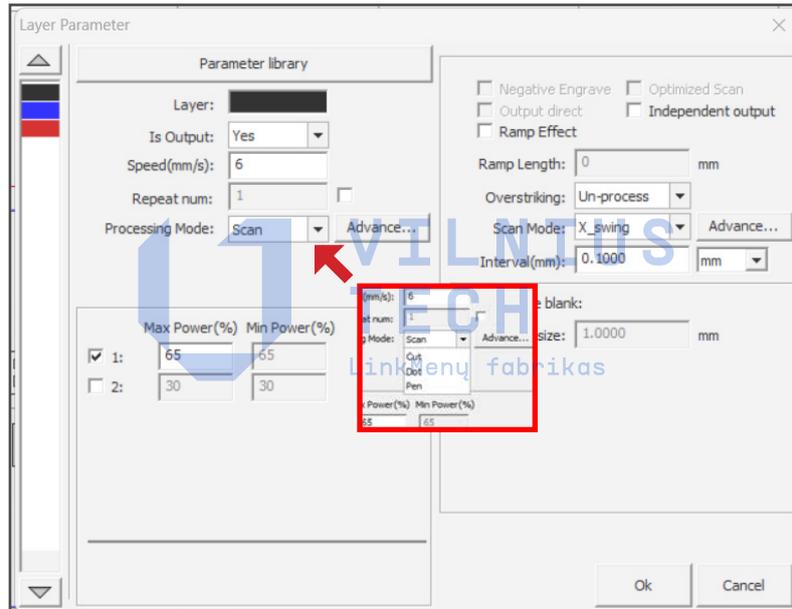
4. Sometimes, the file appears smaller than it should be. You can adjust the size by changing dimensions or the scale. Be sure to click on the lock to keep the proportions.



5. Each color correspond to a layer and a function. Group the lines of your model according to the input you need (cut or engrave). You can change the color by selecting the line then the color on the bottom left.



6. To change the settings and the input/function, double click on the layer. A window will pop-up.



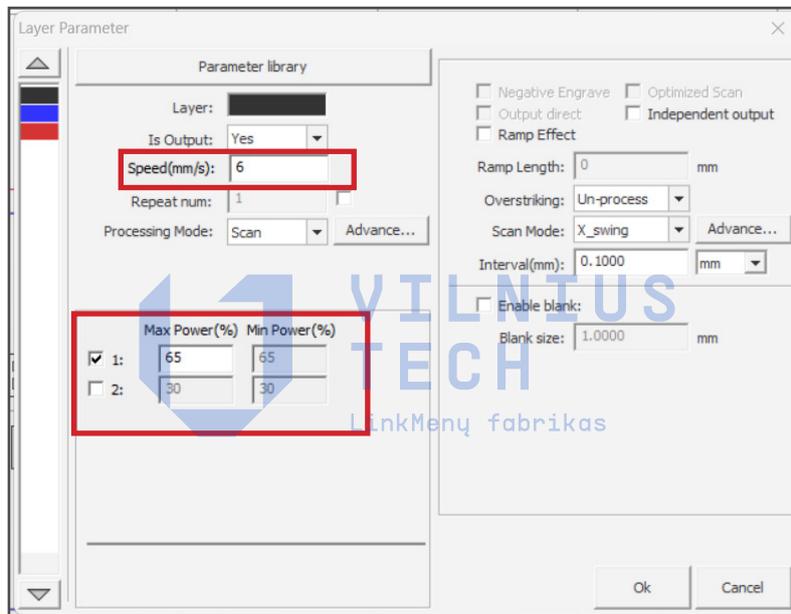
7. Select whether you need to cut or engrave. “Cut” is both used for cutting and engraving depending on the power and speed. “Scan” is only used to engrave.

### Words of wisdom

In most case scenario, you will only need to use Cut and Scan.

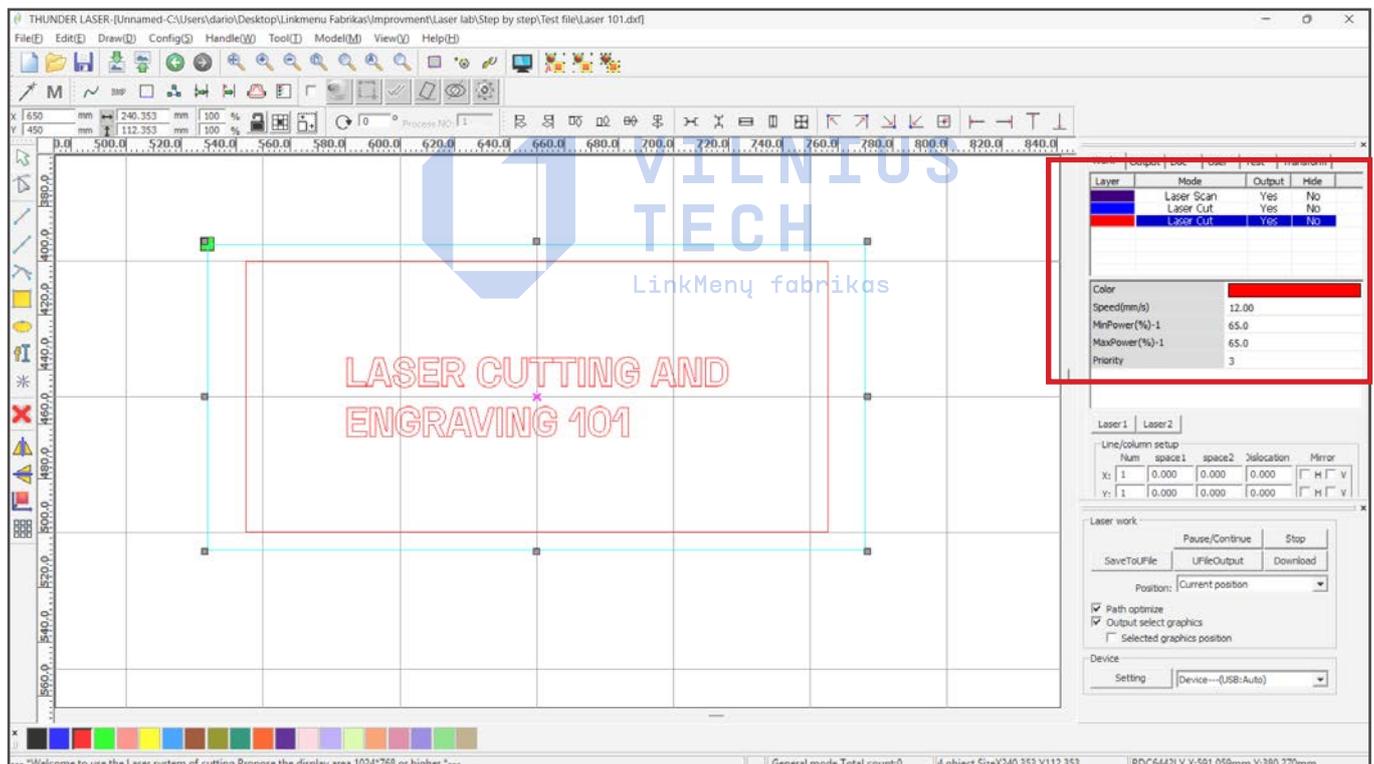
**Cut:** Cut through the material following the vector lines. Higher power and lower speed result in cutting through the material. Lower power and faster speed result in engraving. See the annex page 26 for all the main settings.

**Scan:** Will black-out the inside of the line. It can be used for a text.

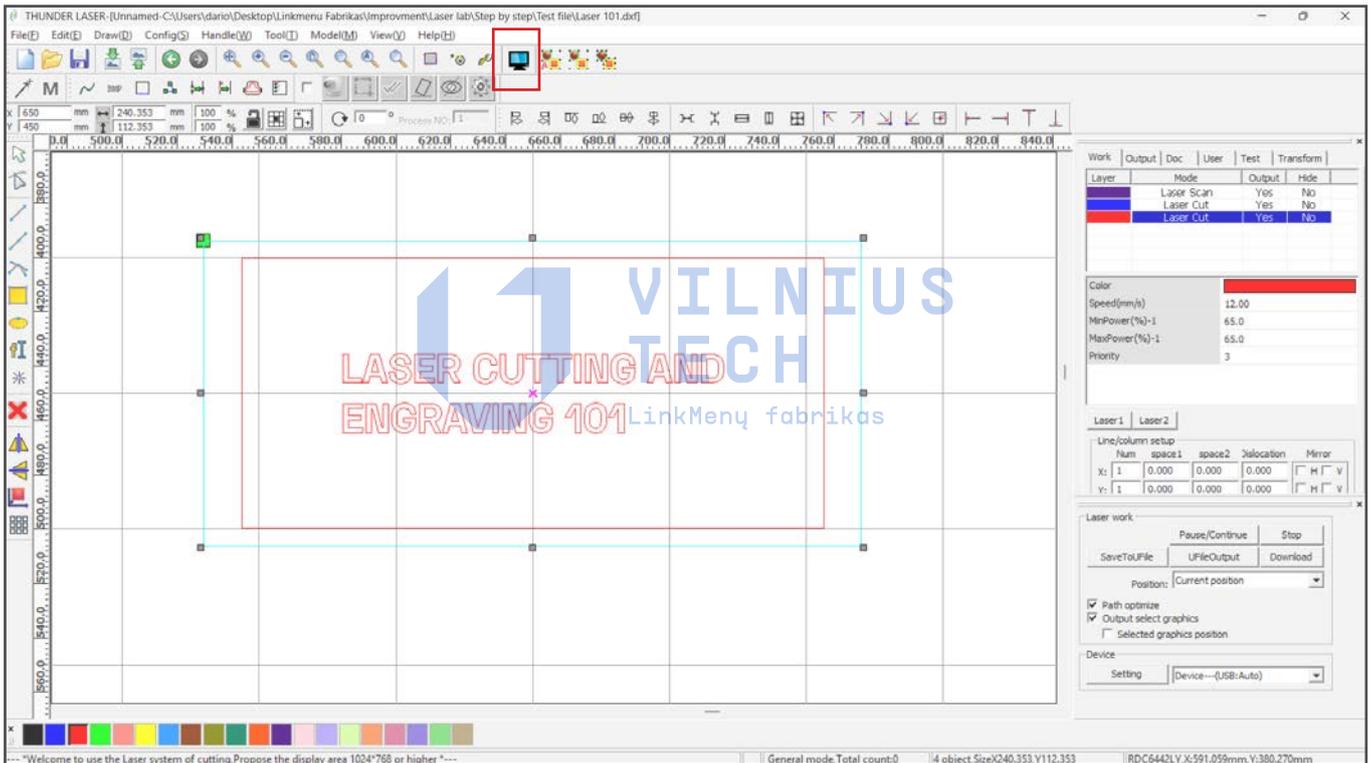


8. Adjust the speed and power according to the needs. Decreasing the speed will result in deeper engravure or cuts but will produce more burn marks. Increasing it will result in lighter cuts or engravures. Same goes for the power.

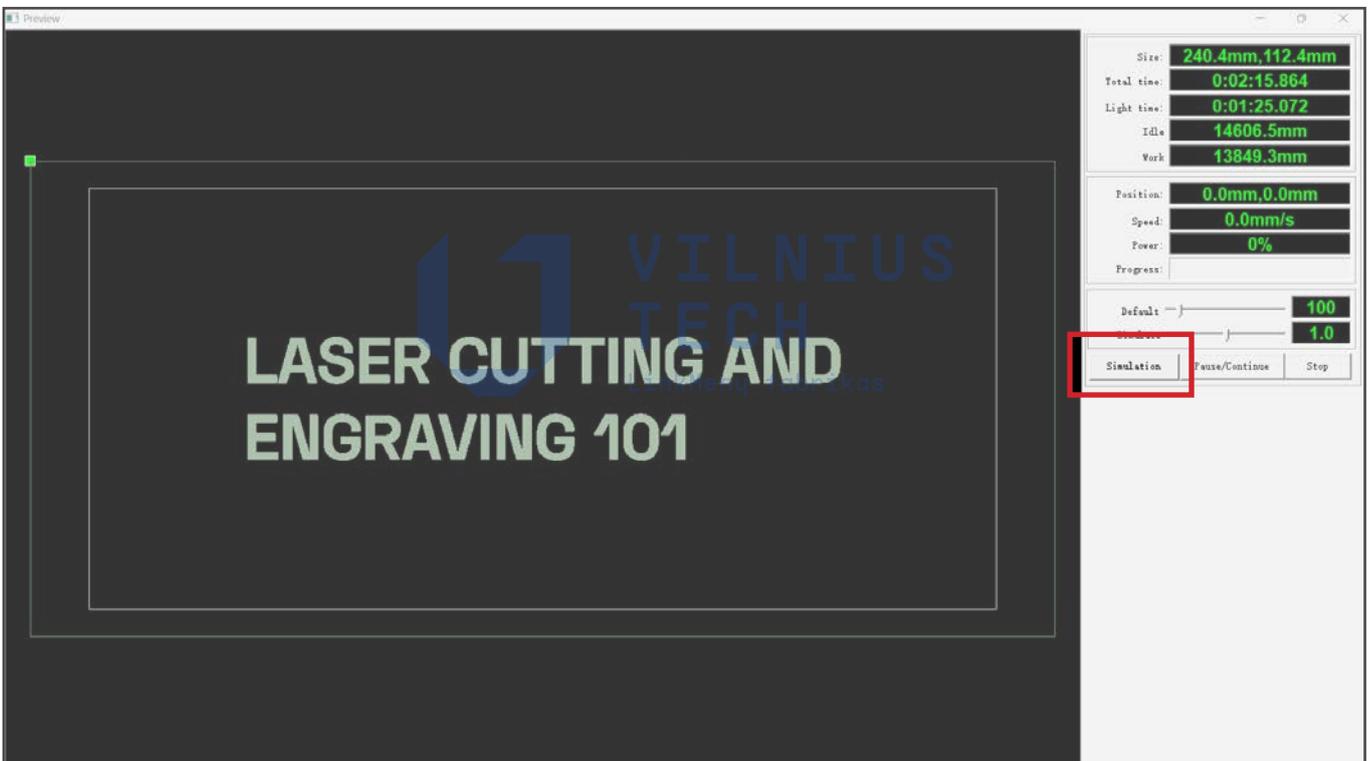
Refer to annex p.26 for all the settings depending on the material.



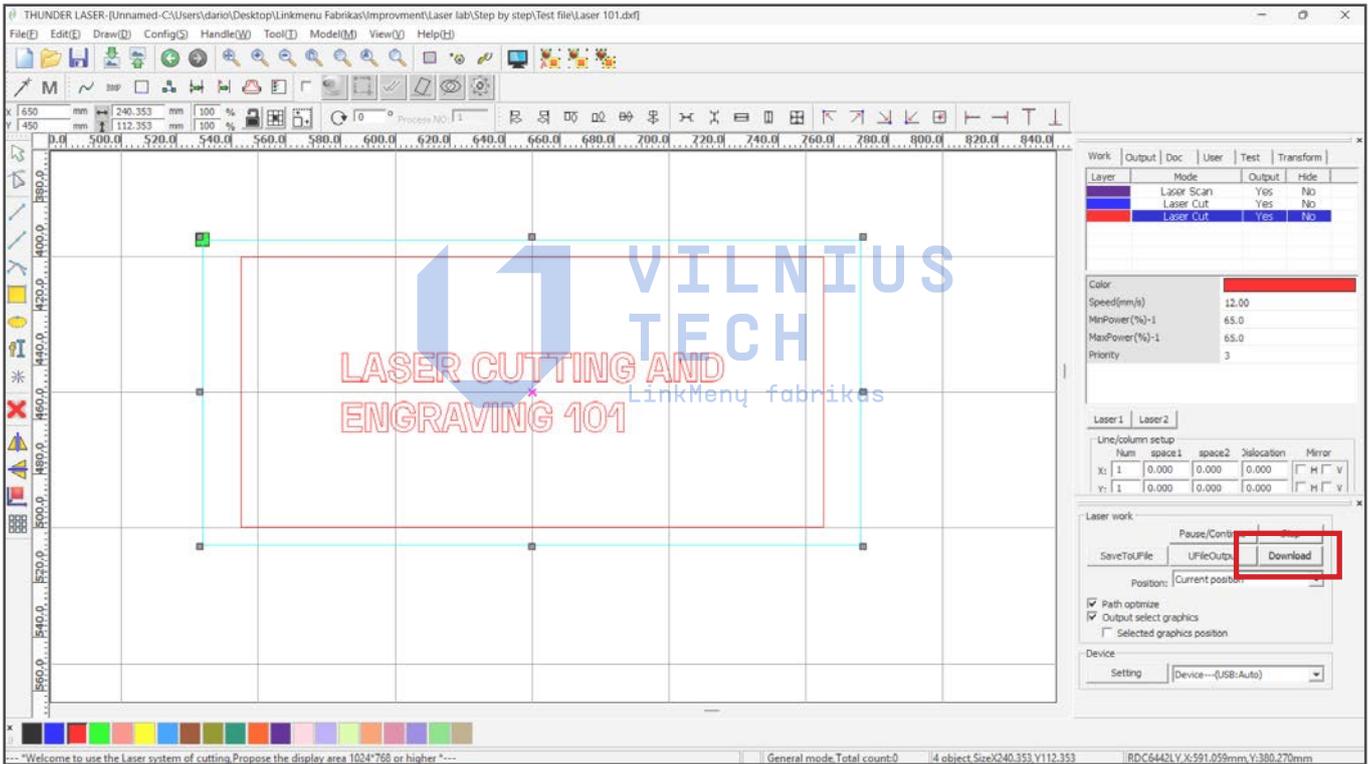
9. The layer position indicate the order in wich it will be processed. Top one is the first one. The last ones should always be the cut parts.



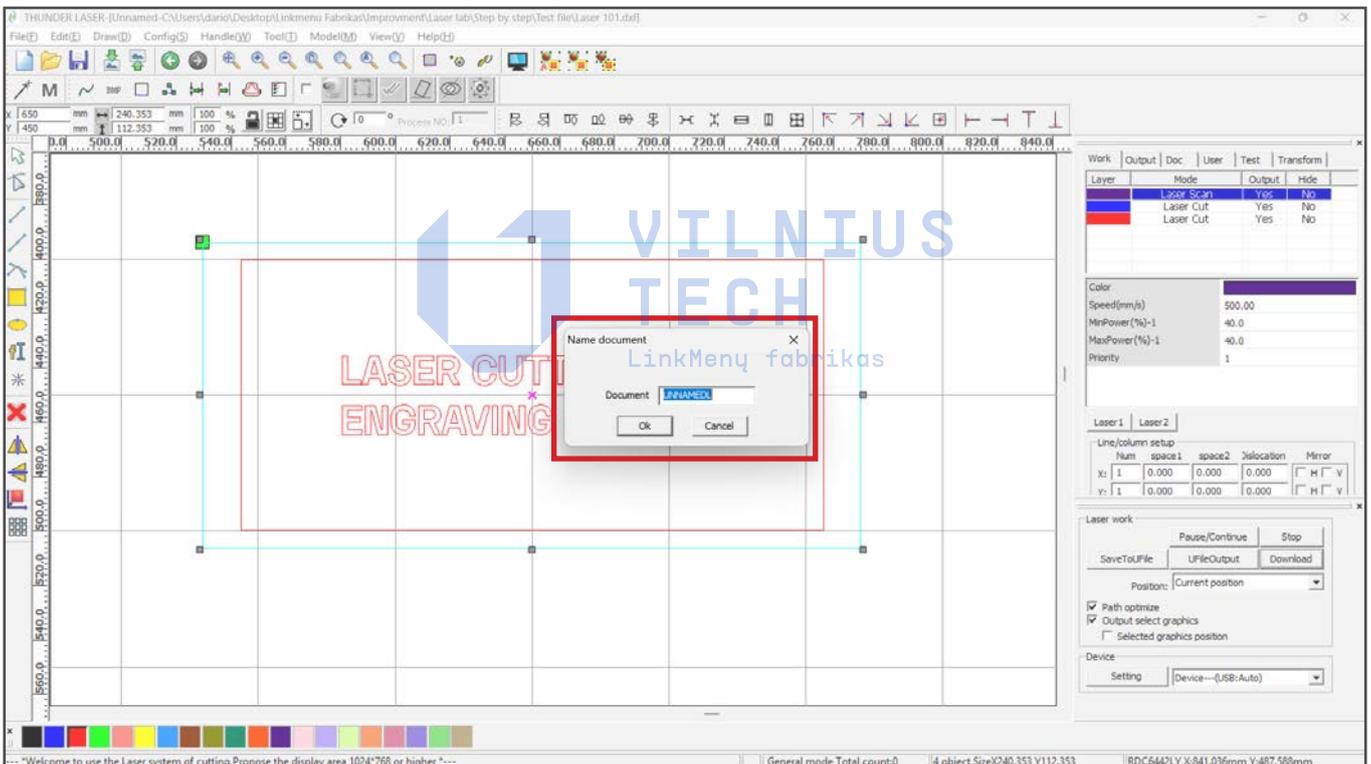
10. When everything is set, select the lines you want to be processed then click on the “tv” logo.



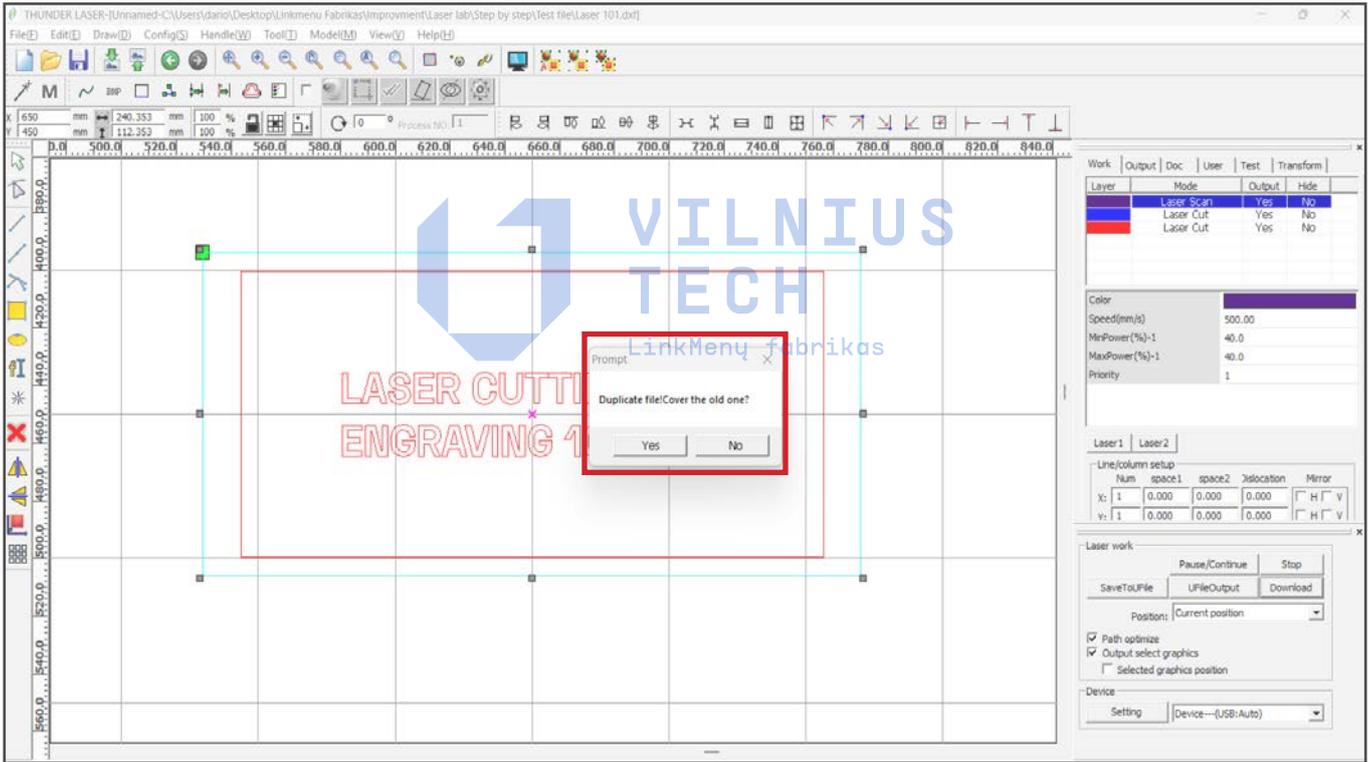
11. This window shows a brief simulation of what will happen. It’s a good way to see if everything is set correctly. All the selected lines should appear correctly.



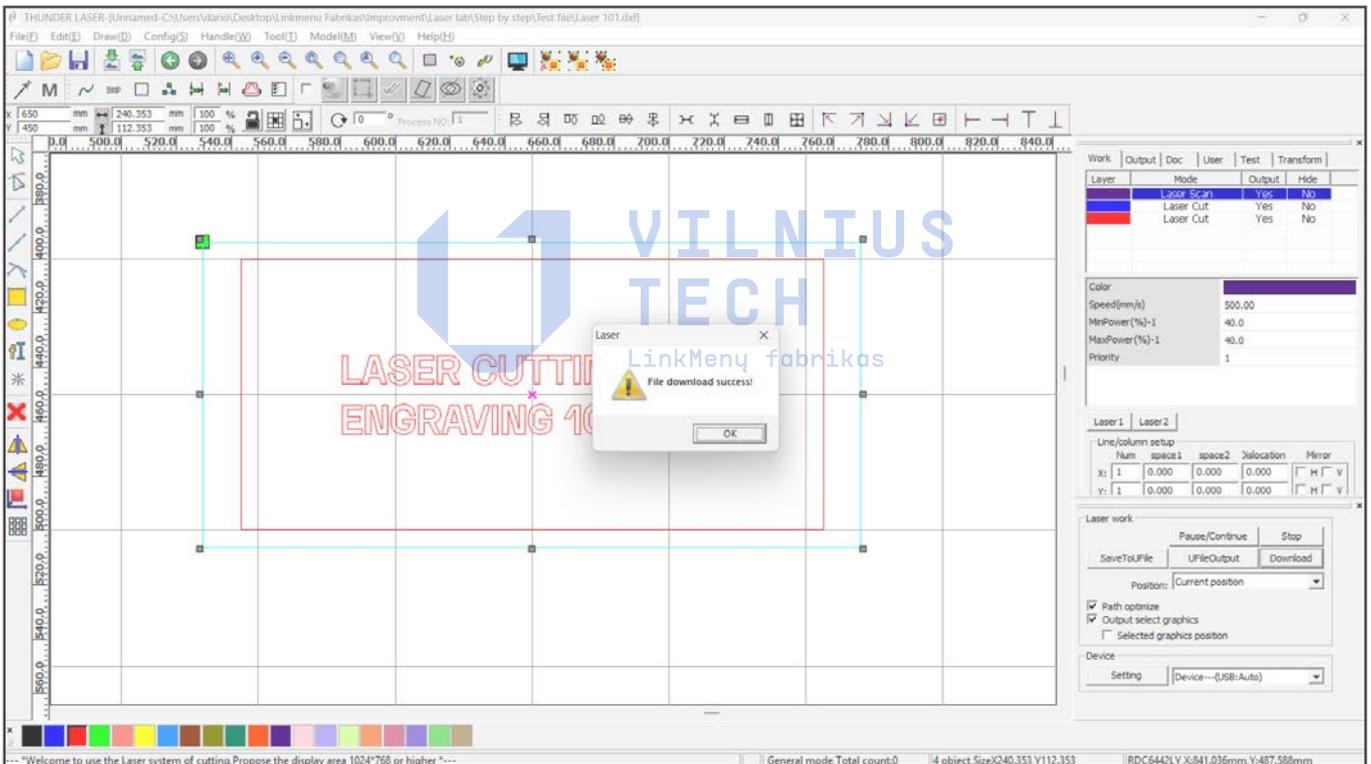
12. If everything is set up correctly, click on “download” to send the file to the machine.



13. This window will pop-up. Keep the name of the file as shown then click “ok”.



13. Click on “Yes” to duplicate the file.



14. Everything is ready! Now lets set-up the machine.

# How to set-up the machine?

## 1

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Place your sheet and make sure it sits flat on the cutting surface.

**IMPORTANT:**

The sheet must be perfectly flat. If the surface isn't leveled, height calibration won't work.

## 2

---

Load the file by pressing on the "file" button. Then move the laser to where you desire to cut by using the arrows and press "origin" to set the origin then press "frame" to see where it will be cutted. Make sure that everything fits in.

## 3

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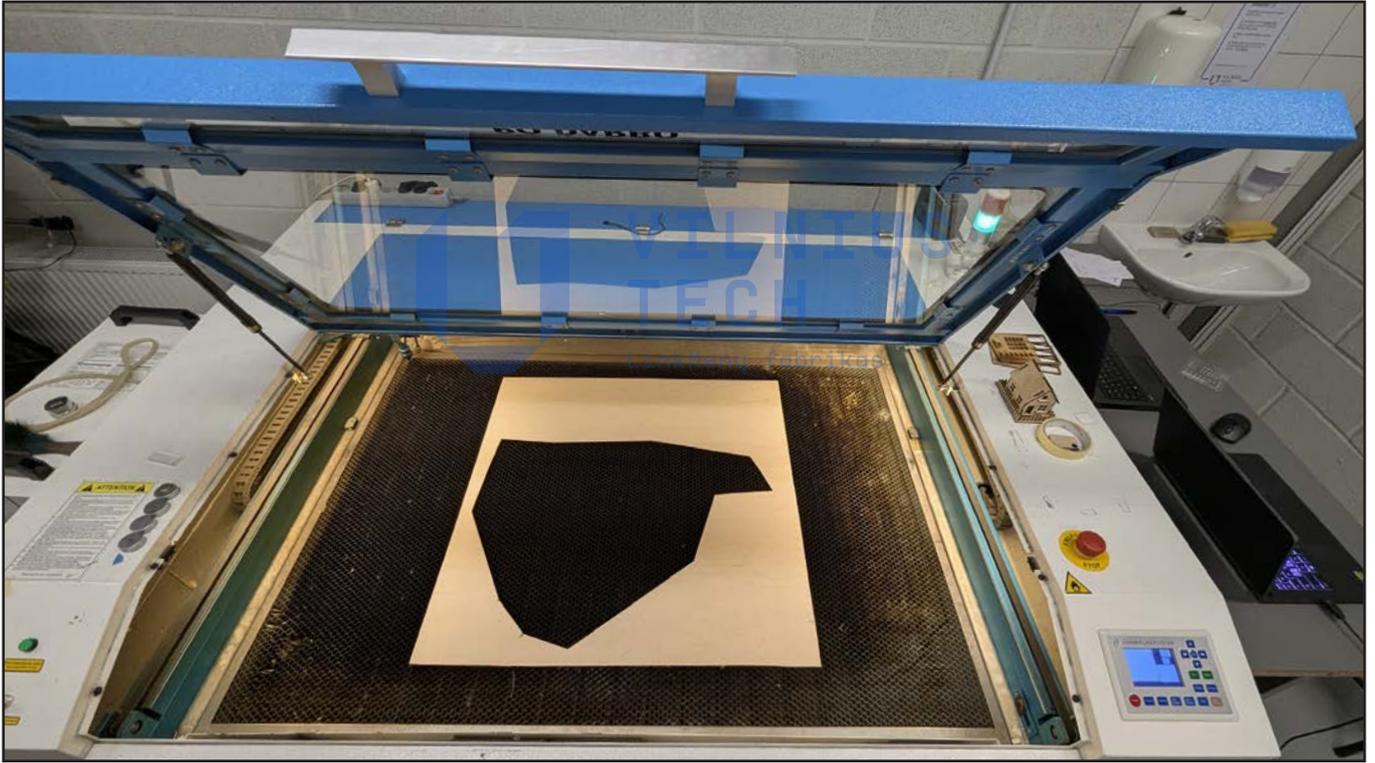
Press "Z/U" and use the left/right arrows to adjust the laser height. Use the provided scale, there should be slight resistance as it slides between the laser and sheet. Press "exit" when done.

## 4

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When everything is set up correctly, press "Start/Pause" to start the program. Stay the whole time to make sure everything goes as planned.

**Don't** stare directly at the laser.



1. Place the sheet on the cutting surface.



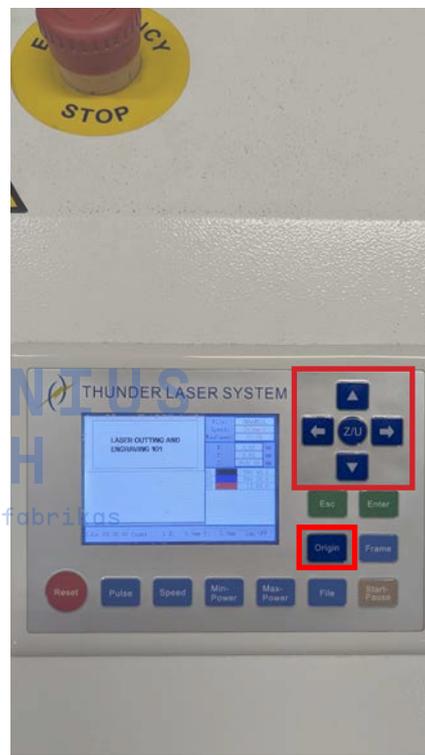
2. Click on "file" to see all the available files



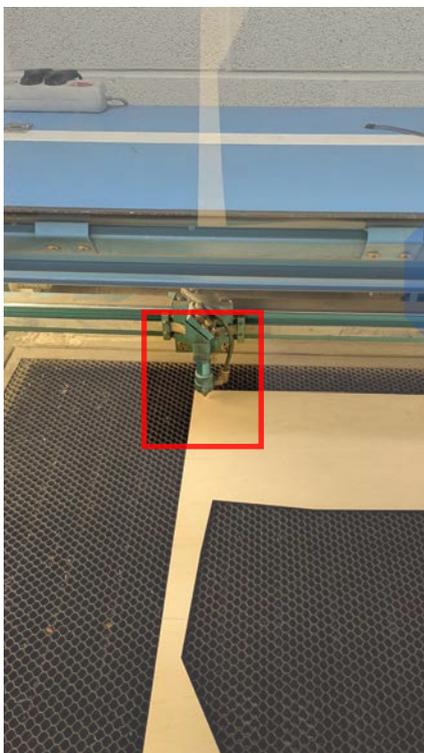
3. Select your file then press "enter" to load it.



4. The file is now loaded and ready to be processed.



5. Use the arrow to move the laser head to the desired spot then press "origin" to set the origin point. It's the start point of the program.



Try to minimize waste by placing the origin in a corner and not in the middle of the sheet.



6. Press "frame" to make sure your project fits on the sheet. The laser will move around and show you the outline of your project.



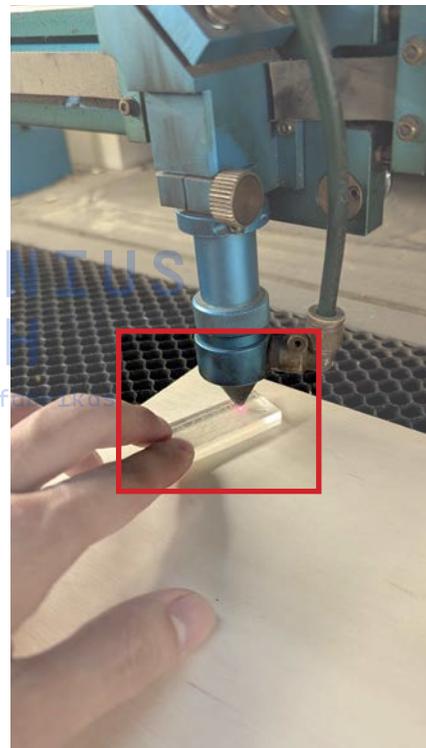
7. Make sure the sheet sits flat on the cutting bed. If the surface is not flat, the indicator will show a red light.



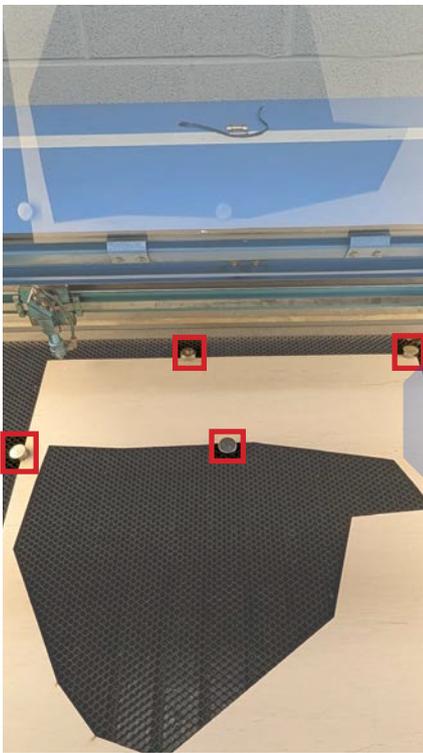
8. Press "Z/U" to open the axes menu.



9. Use the left and right arrow to set the height of the laser head. Doing this will set the focus point of the laser.



10. Use the provided scale, there should be slight resistance as it slides between the laser and sheet.



11. Use the magnet next to the machine to flatten the surface if needed. It should be the last step. Be careful that the laser DON'T hit the magnets while processing the cuts.



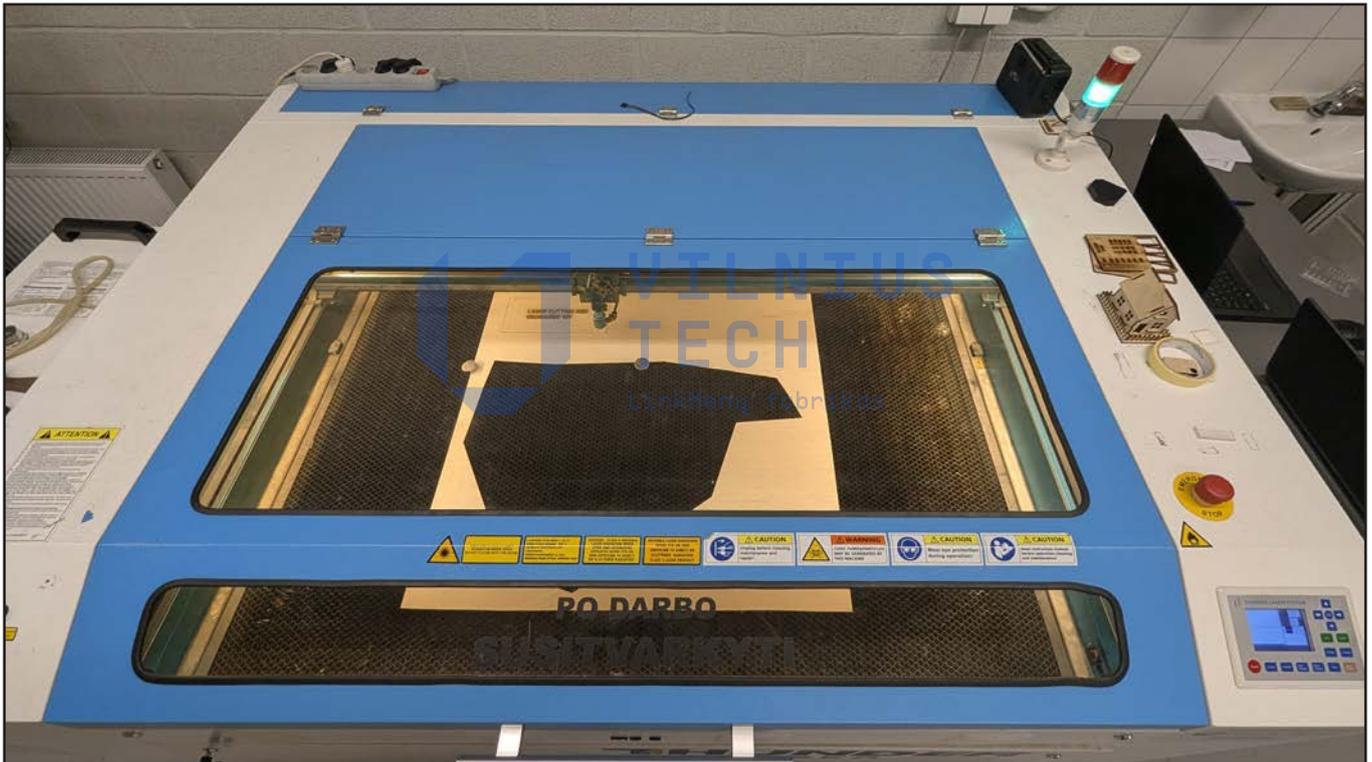
12. Then press "esc" to close the menu.



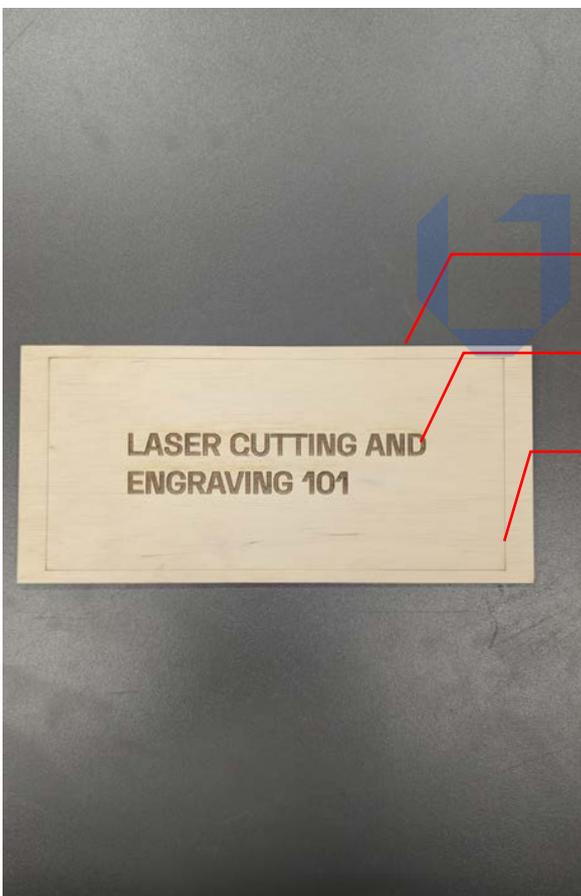
13. When everything is set up correctly, press "Start/Pause" to start the program.

**IMPORTANT NOTE:**

Stay the **WHOLE** time to make sure everything goes as planned.



15. When the machine has ended, wait for the smoke to disappear before opening the lid. Especially for plastics



**Words of wisdom**

When laser cutting or engraving, burn marks might appear on the edges or surfaces where the laser has worked on, especially on wooden materials.

To make the cut piece smoother and more visually appealing, you can sand the surfaces to remove these marks. Use sandpaper that is not too abrasive, such as 400-grit.

# ANNEX



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Name	Cut			Cut (Engrave)			Scan		
	Speed	Pwr Max	Pwr Min	Speed	Pwr Max	Pwr Min	Speed	Pwr Max	Pwr Min
<b>Plywood (laser grade)</b>									
1mm	40mm/s	60	40	500mm/s	10	2	500mm/s	40	40
3mm	12mm/s	65	65	500mm/s	20	1,7	500mm/s	40	40
4mm				500mm/s	20	1,7	500mm/s	40	40
5mm	6mm/s	65	65	500mm/s	20	1,7	500mm/s	40	40
<b>Grey cardboard</b>									
1,5mm	50mm/s	70	60	400mm/s	20	1,5	500mm/s	25	25
2mm	20mm/s	65	65	400mm/s	20	2	500mm/s	25	25
2,5mm	10mm/s	75	75	400mm/s	20	4,5	500mm/s	30	30
<b>White cardboard</b>									
1mm	60mm/s	60	60	500mm/s	15	1,5	500mm/s	30	30
<b>Plexiglass</b>									
1mm	20mm/s	45	45	500mm/s	10	2	500mm/s	30	30
2mm	15mm/s	60	60	500mm/s	15	2	500mm/s	30	30
3mm	12mm/s	65	65	500mm/s	20	1,7	500mm/s	40	40
4mm	6mm/s	65	65	500mm/s	20	1,7	500mm/s	40	40



# CUT? SCAN? Pen? Dot?

## Cut

This setting cut through the material following the vector lines. Higher power and lower speed result in cutting through the material. Lower power and faster speed result in engraving. See the annex page 26 for all the main settings.



## Scan

It will black-out the inside of the line. It can be used for a text.

## Pen

This particular setting only traces the outlines following the vector lines. It doesn't work with our specific machine.

## Dot

It will place dots at an equal distance all along the vector lines. Usualy used to create folding lines.



## Tips and Tricks

Some burn marks can appear during the process. These burn marks usually result from incorrect settings or the reflection of the laser on the metal grid under the sheet of material. Here are some tips to make your cuts cleaner:

### **Focus Your Laser Properly:**

A well-focused beam ensures sharp, clean cuts. For thicker vector scores, defocus the laser slightly to widen the beam.

### **Cut Interior Shapes First:**

Prevent shifting by cutting inner details before outer edges.

### **Sand Lightly:**

For wood, a fine-grit sanding can remove surface burn marks in post-production.

### **Speed and Power:**

Increasing laser speed reduces burn marks, especially on the underside of the sheet, by minimizing heat buildup.

Increasing power results in deeper cuts or engravings but can cause surface burn marks if not balanced with speed.

For cleaner corners during cutting, a lower minimum speed ( $\pm 1.7\%$ ) prevents excessive burning when the laser slows down.

### **Rise up:**

Place a piece of cardboard under your sheet, between it and the honeycomb grid, but make sure the areas being cut have air space underneath, not cardboard. This prevents the laser from reflecting off the honeycomb or burning the cardboard and marking the underside of your cut.



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This manual was made by Dario Arrault,  
at VILNIUS TECH „LinkMenų fabrikas“,  
for internal VILNIUS TECH use and reference.

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