Turn off the ventilation

Check that the ceramic kiln is off before shutting off the ventilation. Laser and kiln share ventilation.

Turn off the ventilation.

Laser cutter guide

Figure 1: Our laser cutter

Theory

Figure 2: Uppsala Makerspace

Contents

Turn off computer

Turn off the computer.

Figure 33: Buttons inside the laser cutter

Foreword

This is a book about using the laser cutter at the Uppsala Makerspace.

About this book

This book has a CC-BY-NC-SA licence.

Figure 1: Licence for this book

 **The laser can blind you and/or start a fire if used improperly.** 

1. The coloured plastic does not prevent harm from the laser.
2. The laser cutter can **(and will)** operate in unsafe ways, there are no automatic safety systems in place.
3. Make sure you understand how to operate the laser cutter safely before doing so.

Start ventilation

Starting the ventilation has two steps:

- Turn on the ventilation
- Block the fume food

Turn on the ventilation

In the woodshop, press the button to turn on the ventilation.

Find the door to the woodshop.

Figure 2: Door to the woodshop

Go through the door of the woodshop. You are now in the woodshop.

Figure 3: Woodshop

At the backside of the woodshop, find the timer.

Figure 32: The power of the laser cutter is on

Turn off laser

Make sure the laser is not in use.

Open the laser cutter.

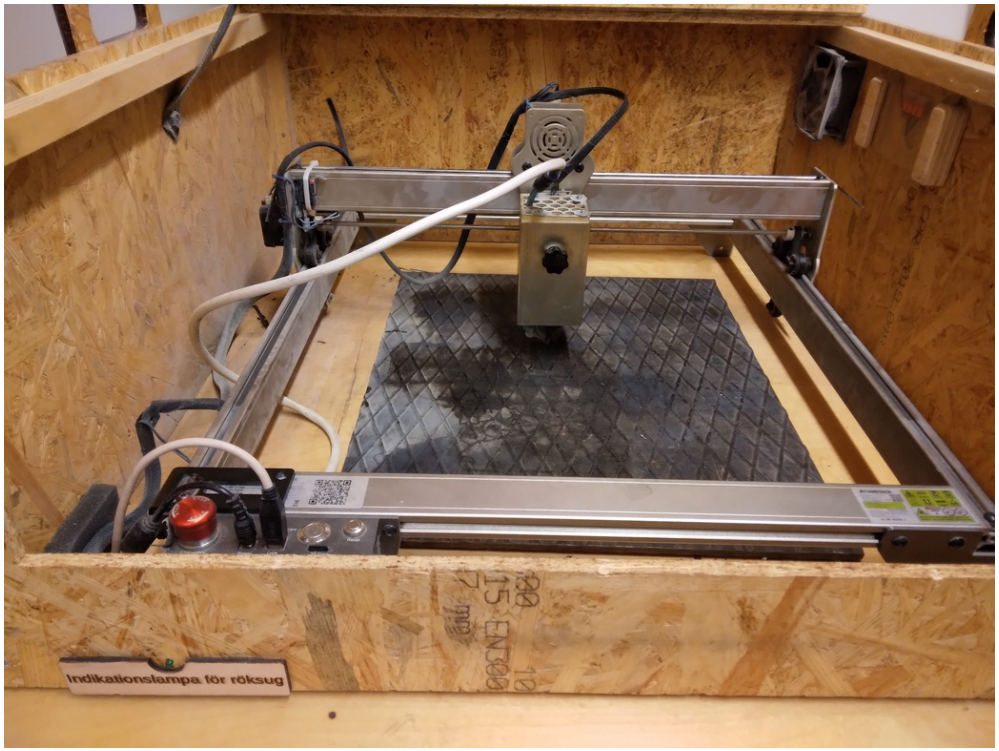


Figure 31: The opened laser cutter

The opened laser cutter

The power button is on: it gives off a red light.

The power of the laser cutter is on

Press the power button.

Now to power button is off.

Close the lid

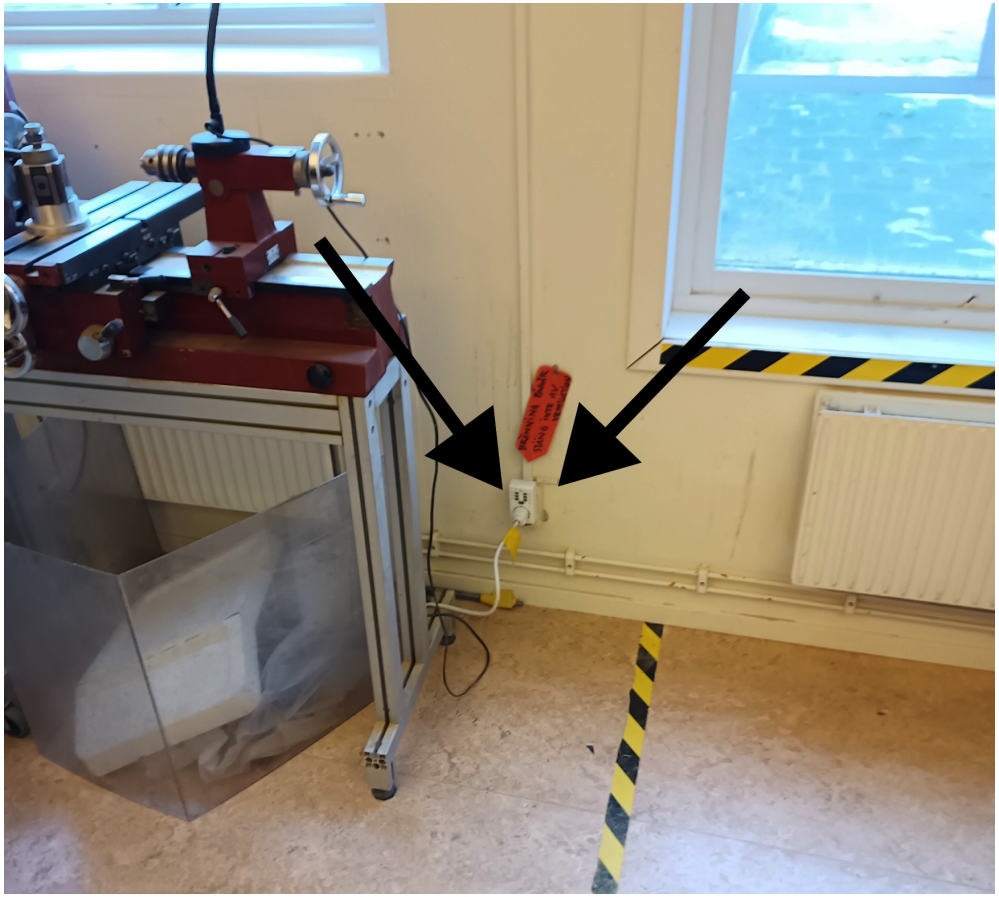


Figure 4: The backside of the woodshop

Go to the ventilation timer. Here is how it looks:

Figure 5: The ventilation timer

Press the button of the right duration on the ventilation timer:

- 15M: 15 minutes
- 2H: 2 hours

Now the ventilation timer is on and you will see a blue LED light up.

You should hear a noise start. This is a fan that will suck out the air from the laser cutter's enclosure.

Note: if the ventilation is already on, don not turn it off after using the laser.

Block the fume food

In the same room as the laser, there is a fume hood, that uses the same ventilation. This is how the fume hood looks:

At the top of the fume hood, there is a slider.

Go?	Check
Yes	No people behind you
Yes	All people behind you wear goggles
No	Not all people behind you wear goggles

Step 5: Countdown

The goal of this step is to allow the procedure to stop.

If somebody says 'stop', you stop.

Step 6: Press start

In LightBurn, press 'Start' to start the laser.

Step 7: Say 'Laser is on' and put hand on casing

Say 'Laser is on' and put your hand on the casing as long as the laser is on.

Use your other hand to move the mouse cursor to 'Stop'.

Step 8: Say 'All is well'

Repeatedly say 'All is well' when all is well.

If a fire starts or someone says 'Stop', click on stop. Laser is safe after stop

Step 9: Say 'Laser is off'

Say 'Laser is off'. You can remove your hand from the casing

Go?	Check	Image
No	Air flow is off	

Step 2: Check goggles of yourself

The goal of this step is to check if you yourself have your goggles on

Go?	Check
Yes	You have your goggles on
No	You do not have your goggles on

Step 3: Check goggles of the other

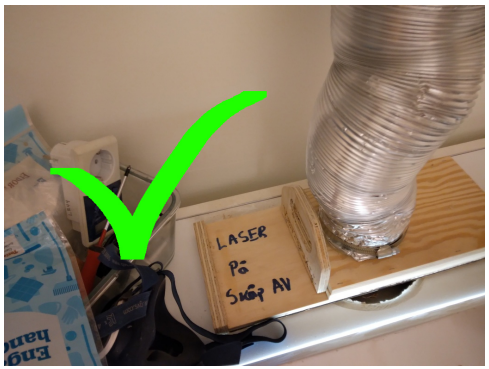
The goal of this step is to check if the other has his/her goggles on

Go?	Check
Yes	Other person has his/her goggles on
No	Other person does not have his/her goggles on

Step 4: Check behind

The goal of this step is to check if all people behind you have their goggles on

Figure 6: The fume hood

How it looks	Description
	Air goes to the fume hood
	Air goes to the laser

Change the slider to shut off the air to the fumehood, then more air gets sucked out of the laser.

Start laser

Operator procedure

Here is the operator procedure, which is described in detail below.

!!! info “The operator procedure”

Step	Do	Check
1	Say ’Air is on’	The green light is on
2	Say ’I am wearing my goggles’	You have your goggles on
3	Say ’You are wearing your goggles’	You assistant has his/her
4	Say ’Those behind us are wearing their goggles’	All those behind you (if
5	Say ’3, 2, 1’	Nobody says ’stop’
6	Press start	Nobody says ’stop’
7	Say ’Laser is on’	Laser is on, hand is on l
8	Say ’All is well’	No fire
9	Say ’Laser is off’	Laser is off

Step 1: Check air flow

The goal of this step is to check if the air flow is on.

Go?	Check	Image
Yes	Air flow is on	

Close enclosure

Close the enclosure.

/pagebreak

Power on laser cutter

Open the laser cutter.

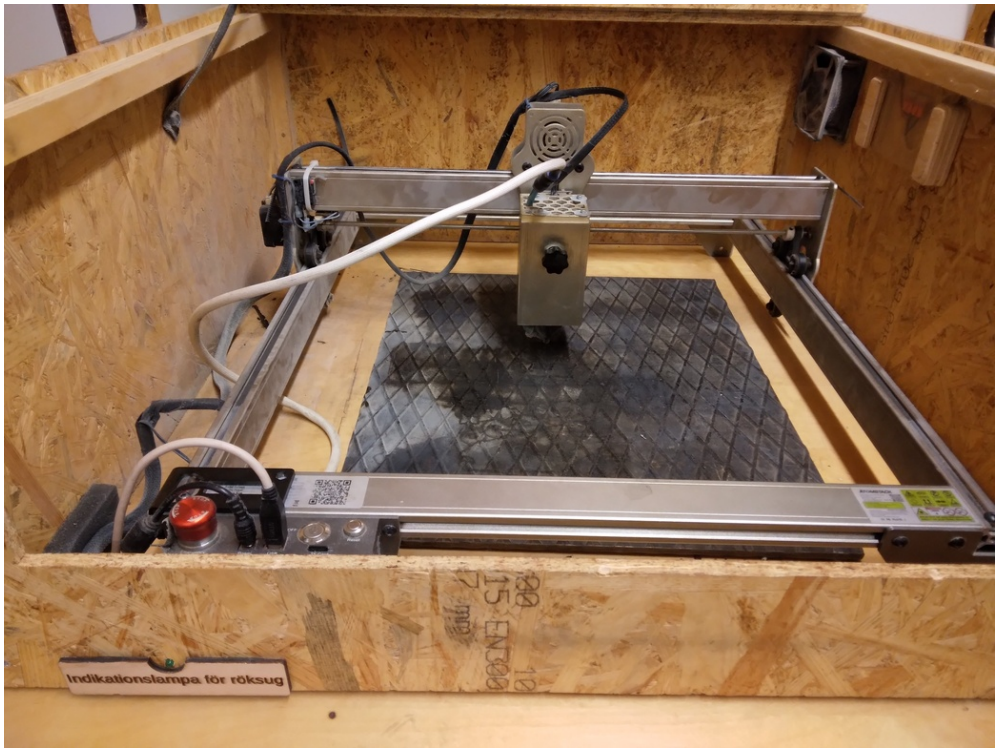


Figure 7: The opened laser cutter

The opened laser cutter

You can see the buttons inside the laser cutter. Press the power button.

The buttons inside the laser cutter

The power of the laser cutter is on.

The power of the laser cutter is on

The air indicator should turn on too.

The air indicator should turn on too

Figure 8: Buttons inside the laser cutter

You will have to find out your values by trial and error. Please contribute the values for your favorite material.

Where the laser cuts

The laser can show where it will cut.

:warning: This laser light is safe! It is at very low power.

In the 'Laser' menu, click 'Frame' (either the square or the oval one) to see the contour of where the laser will cut:

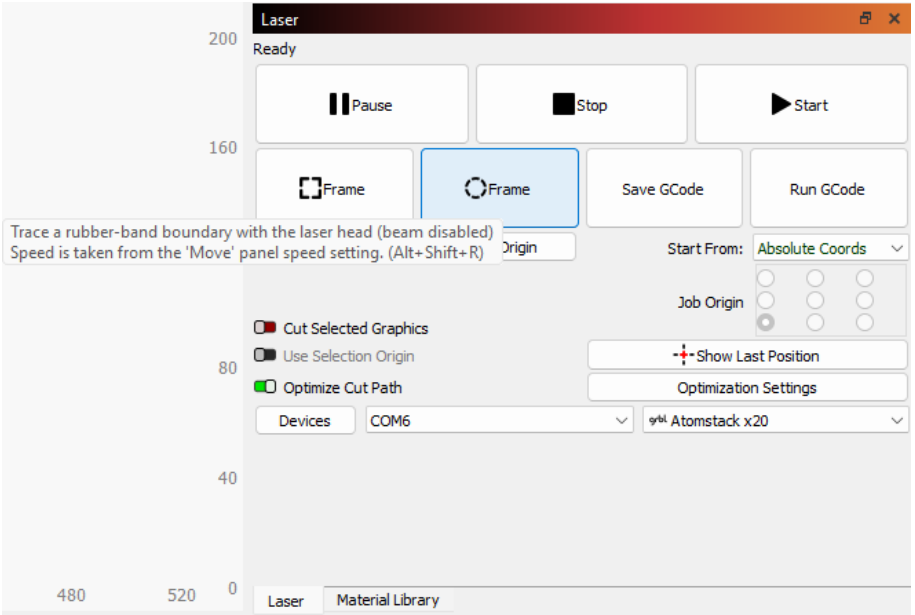


Figure 30: Trace frame

Align the material with where the laser cuts, either by moving the material or by moving the image in LightBurn or both.

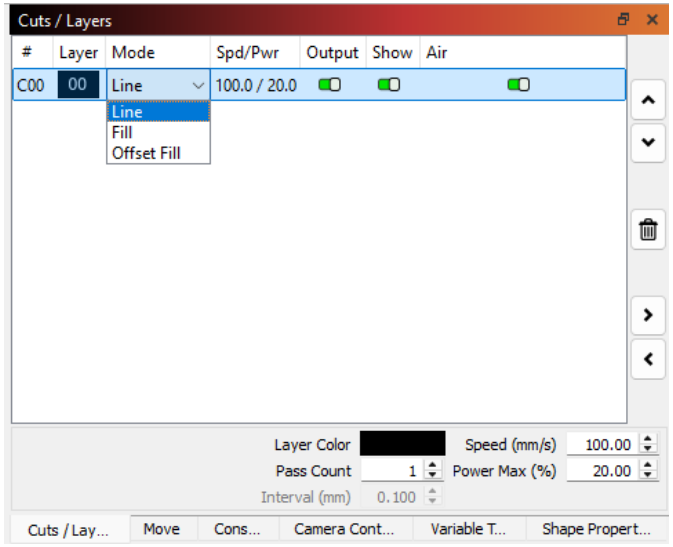


Figure 29: Select 'Line' to cut

Selet mode 'Line' to cut

Here are the modes:

Mode	Description
Line	Cut through
Fill	Will etch the surface
Offset fill	Hard to describe :-)

The pass count, speed and power differ per material.

Here is a list of know values:

Material	Cut	Pass count	Speed (mm/sec)	Power (%)
None (this can be used for practicing)	None	1	10	0
Paper for oil and acryl painting, 290 g/m2	Complete	1	10	75
Paper for oil and acryl painting, 290 g/m2	Half	1	10	20
Paper from printer	Complete	1	10	20
Paper from printer	Half	1	30	25

Figure 9: The power of the laser cutter is on

Figure 10: The air indicator should turn on too

Setup LightBurn

Here you set up:

- How the laser cuts
- Where the laser cuts

How the laser cuts

The 'Cuts/Layers' tab determines how the laser cuts. It is located at the top-right of the screen.

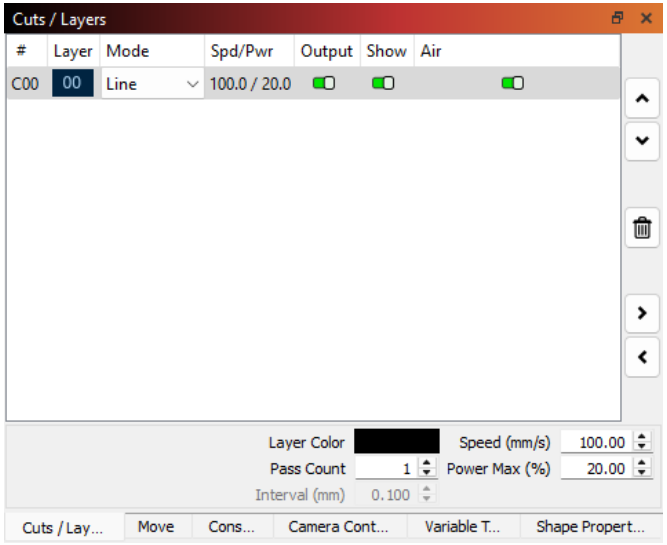


Figure 28: The LightBurn 'Cuts/Layers' menu

In the 'Cuts/Layers' tab, you can set the most important parameters per layer:

Parameter	Description
Mode	The mode of cutting, see below
Output	Run the laser here yes/no
Show	Show this color on the drawing
Air	Have air on yes/no. Have this on for cuts
Speed (mm/s)	The speed of the laser
Power Max (%)	The power of the laser
Pass count	How often the laser cuts each line

Load image

In LightBurn, to load an image, do ‘File | Load’.

Start computer

Press the computer’s power button, at the top right.

Figure 11: The computer’s power button is at the top right

The computer will power up and show a login screen.

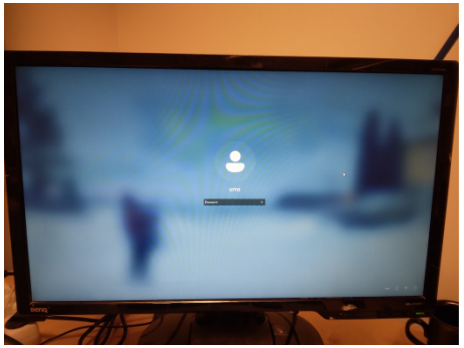


Figure 12: The login screen

Write the password in the rectangle and press enter.

You have now started the computer!

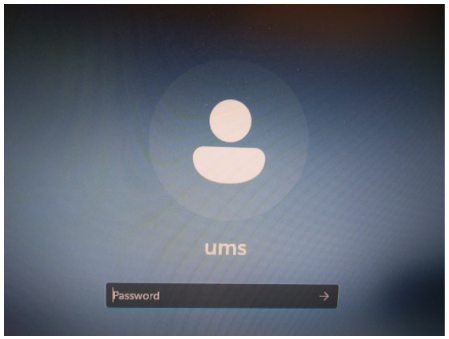


Figure 13: Write the password here and press enter

Start LightBurn

At the desktop of the computer next to the laser, there is a LightBurn icon at the left side of the desktop.

Figure 14: Desktop of the computer next to the laser

Double-click the LightBurn icon.

Now LightBurn starts.

This is how the first screen of LightBurn looks like:

Well done!

Remove the spacer

Place the spacer back in its original spot

Figure 27: Place the spacer back in its proper place

Place the spacer back in its proper place

Figure 26: removing_the_spacer_from_the_laser.jpg

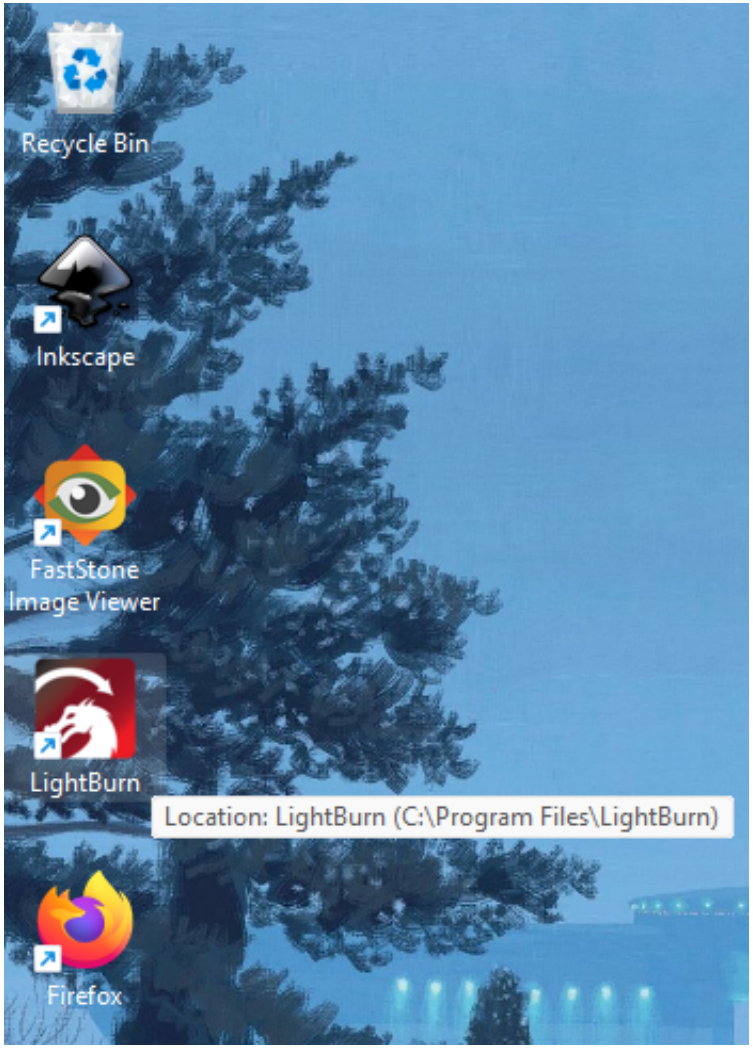


Figure 15: Double-click the LightBurn icon

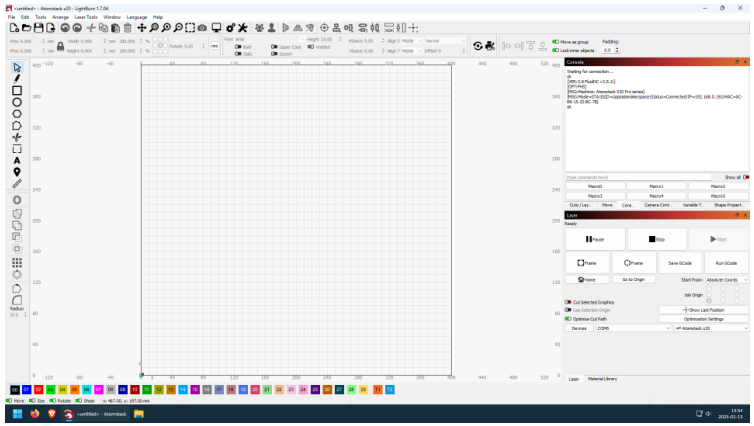


Figure 16: First screen of LightBurn

Setup laser in LightBurn

To setup the laser in LightBurn:

- Connect the the laser cutter
- Home the laser

Connect to the laser cutter

In LightBurn, click at the combo box right of 'Devices'. It will probably say `COM1` or `COM4` or `COM6`.

> Pick a COM port here

Now The Dance starts. The Dance is picking different COM ports, until a connection is established.

Select `COM1`.

> Select `COM1`

Observe the message 'Waiting for connection' at the top-right (in the 'Console' tab). If you need to wait for this connection longer than 3 seconds, The Dance continues.

If The Dance needs to be continued, click `COM4`

> Select `COM4`

Observe the message 'Waiting for connection' at the top-right (in the 'Console' tab). If you need to wait for this connection longer than 3 seconds, The Dance continues.

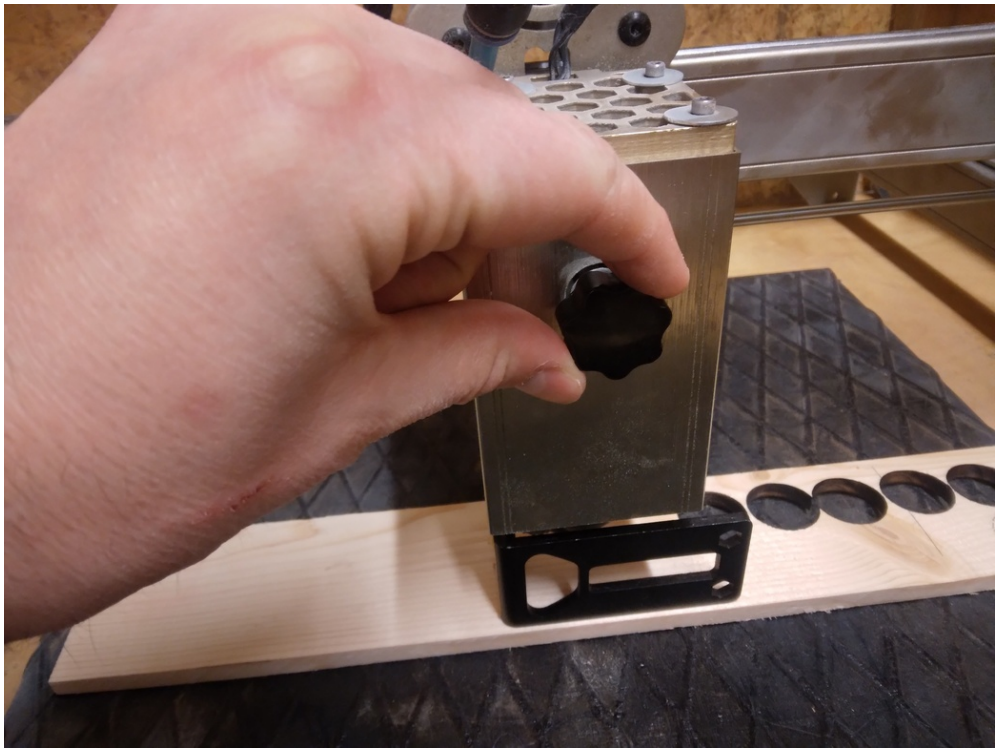


Figure 25: Tighten up the laser again by turning its screw

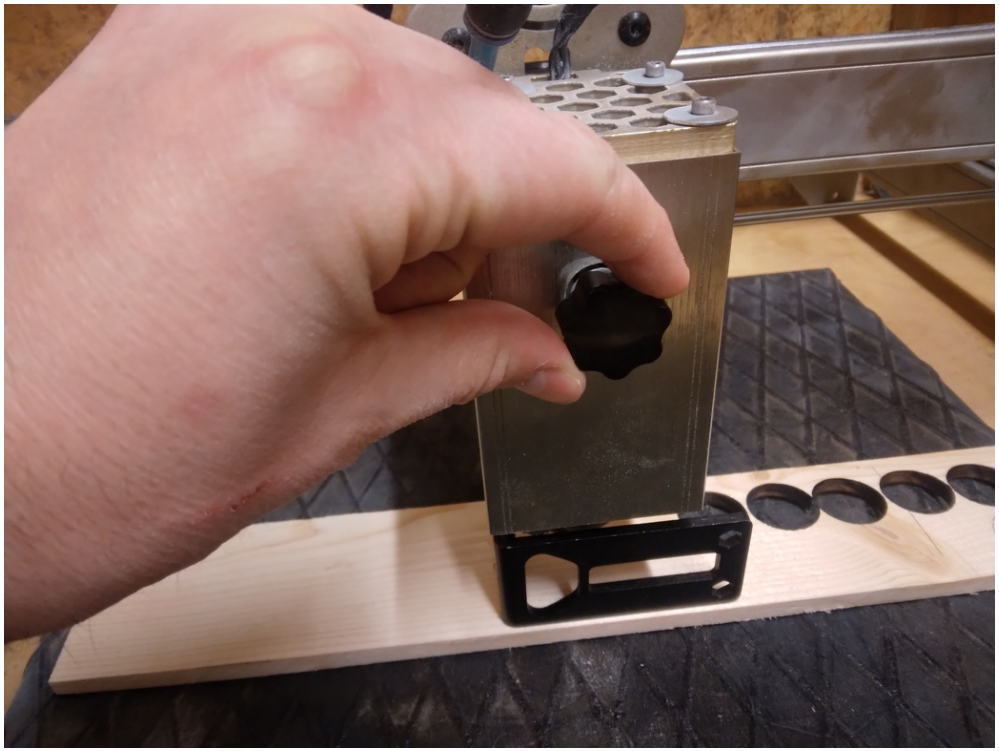


Figure 24: Loosen up the laser by unscrewing it a bit

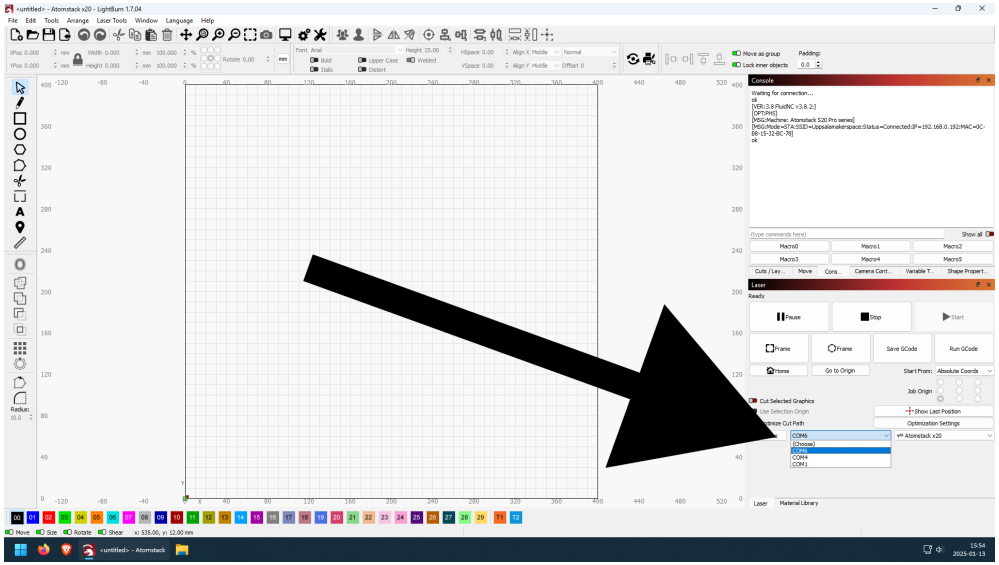


Figure 17: Pick a COM port here

If The Dance needs to be continued, click `COM6`

Select `COM6`

In this case, the message ‘ok’ is shown (in the ‘Console’ tab). The Dance is over!

Home the laser

Check that the laser can move to the front-left side of the enclosure: that is where its home is. Always home it, even when its already in its corner. After homing it should say “ok” in console again.

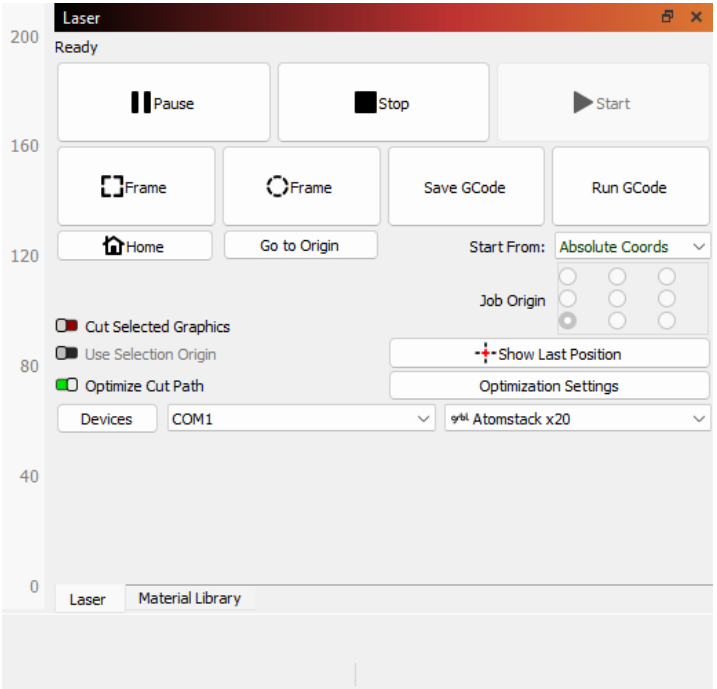
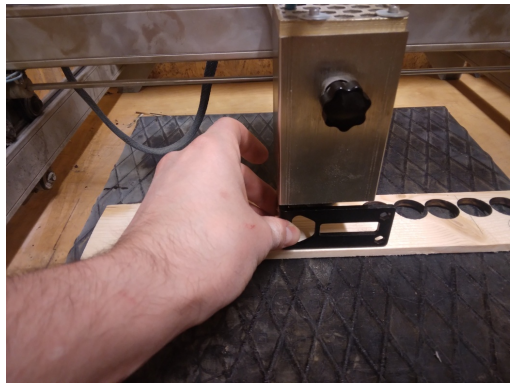
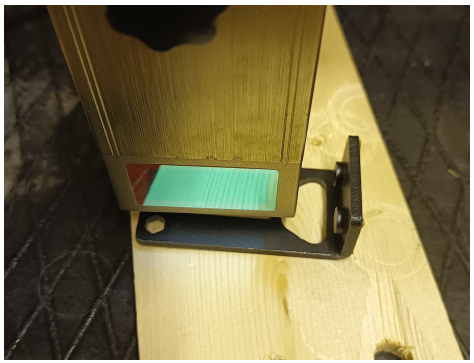


Figure 18: Select `COM1`

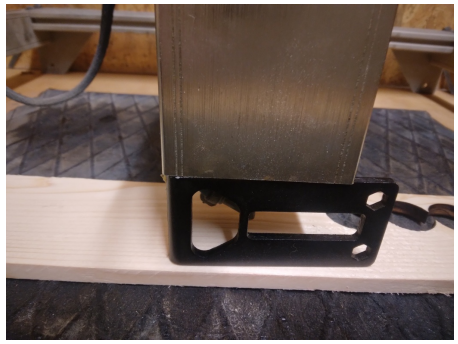
It might look like this	Or like this
	

Place the spacer between laser and material

Loosen up the laser so it can slide up and down, by unscrewing it a bit.

Loosen up the laser by unscrewing it a bit

Slide the laser down, so it rests on the spacer.

It might look like this	Or like this
	

Slide the laser down, so it rests on the spacer.

Tighten up the laser again by turning its screw.

Tighten up the laser again by turning its screw

Remove the spacer

Figure 23: Take the spacer from its proper place.

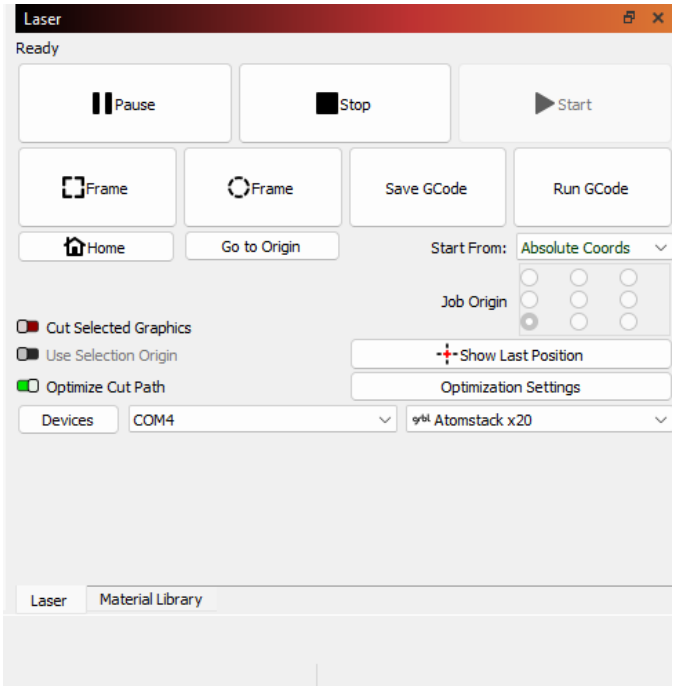


Figure 19: Select `COM4`

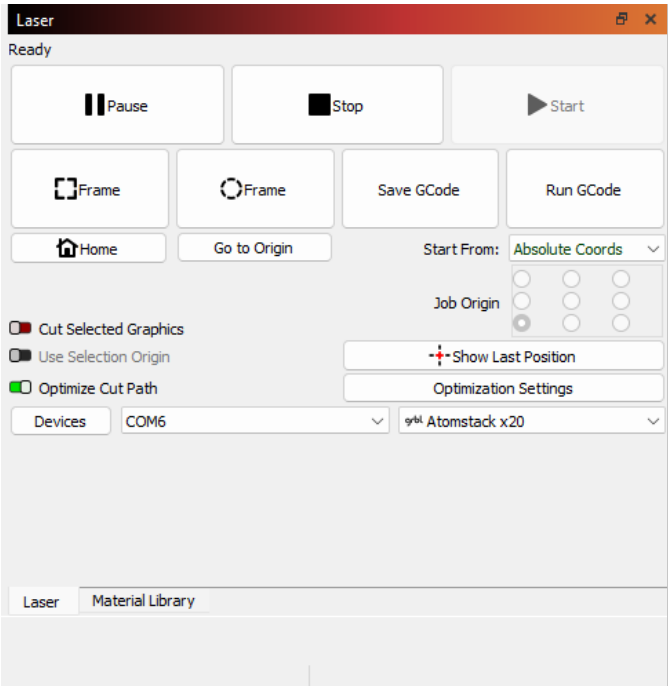


Figure 20: Select `COM6`

Setup laser physically

Take the spacer from the bottom-left of the enclosure.

The spacer's proper place is at the front-left of the enclosure.

The spacer in its proper place

Take the spacer from its proper place.

Take the spacer from its proper place.

Place the spacer between laser and material

Position material

Put the material on the black metal plate in the enclosure.

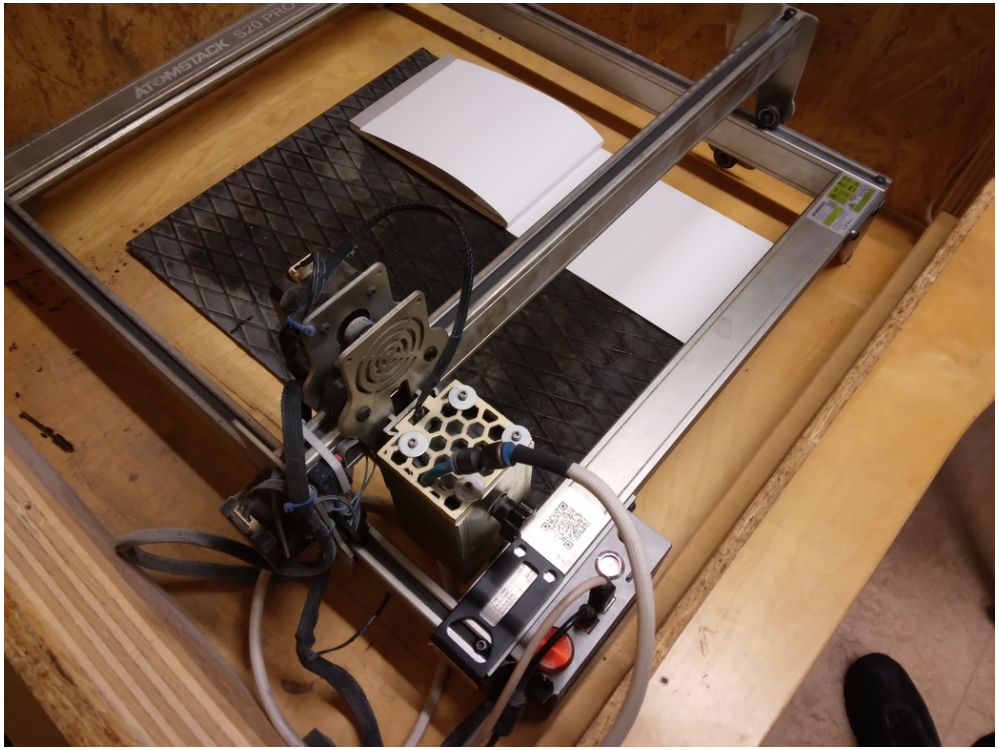
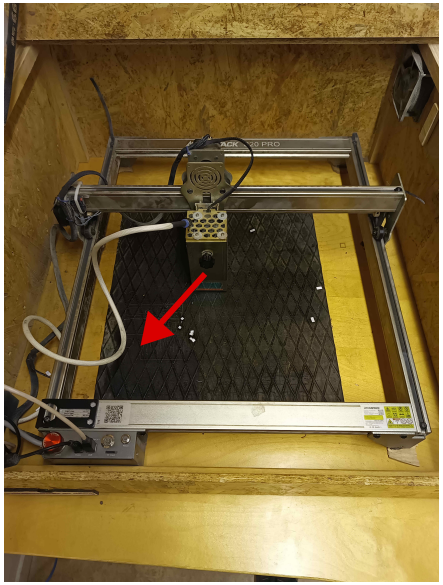
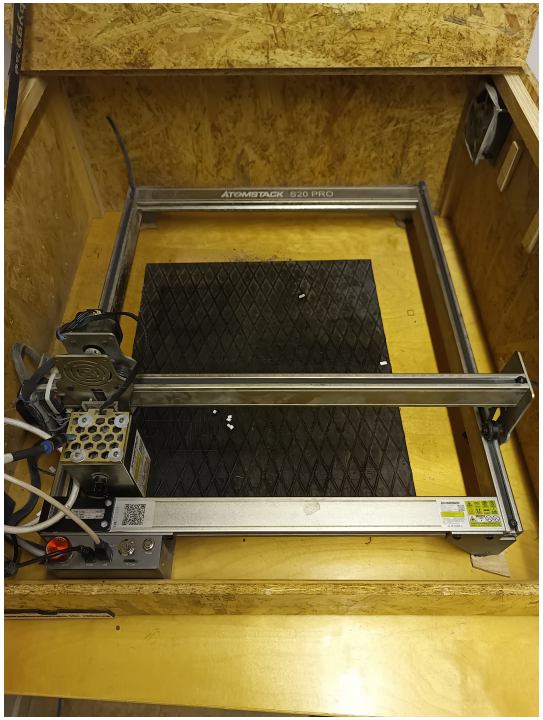


Figure 22: Put the material in the enclosure

Put the material in the enclosure

Laser homing	Laser finished homing
	

Press the Home button to make the laser orient itself.

Press home

The laser will move into the front left corner.

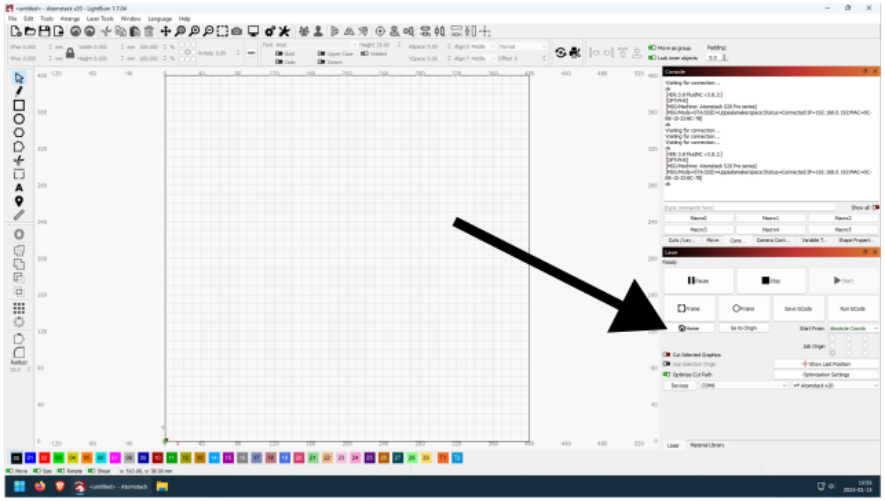


Figure 21: Press the home button

Get material

Get a material that is safe to cut.

Safe materials

- Cork
- Leather, Fake leather is unsafe
- MDF
- Natural fiber cloth, e.g. cotton
- Paper
- Paper for oil and acryl painting, 290 g/m2
- Plywood
- Stone
- Unpainted wood

Unusable

These materials are safe, but do not engrave or cut well.

- Glass
- Metal

Unsafe materials

- Fake leather
- Vinyl
- ABS plastic, for example LEGO
- Carbon fiber
- Fiberglass
- HDPE plastic
- Painted wood
- Polypropylene foam
- Polystyrene foam
- PVC plastic
- Epoxy
- Cyanoacrylate, Super glue

Tips

- K-Rauta sells cheap wood