

Laser cutter guide



Figure 1: Our laser cutter

Theory



Figure 2: Uppsala Makerspace

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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.

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Figure 1: Licence for this book

You can do whatever you like with this book, as long as you give proper credit to us and/or mention the website https://github.com/uppsala-makerspace/laser_cutter_guide.

This guide will always be free (as in beer) and free (as in freedom).

Get material

Get the material to cut

Material that is safe:

- Paper
- Paper for oil and acryl painting, 290 g/m²
- Unpainted wood
- Plywood
- MDF
- Leather
- Cork
- Natural fiber Cloth, for example Cotton
- Stone
- Glass does not engrave or cut well
- Metal, does not engrave or cut well
- [more]

Material that is unsafe:

- PVC plastic
- ABS plastic
- HDPE plastic
- Carbon fiber'
- Fiberglass
- Polypropylen foam
- Polystyrene foam

Tips:

- K-Rauta sells cheap wood

Start ventilation

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

Go through the door of the woodshop:



Figure 2: Door to the woodshop

The door to the woodshop

Go to the back of the woodshop

The woodshop

At the backside of the woodshop, find the timer.

The backside of the woodshop

Go to the ventilation timer

The ventilation timer



Figure 3: Woodshop

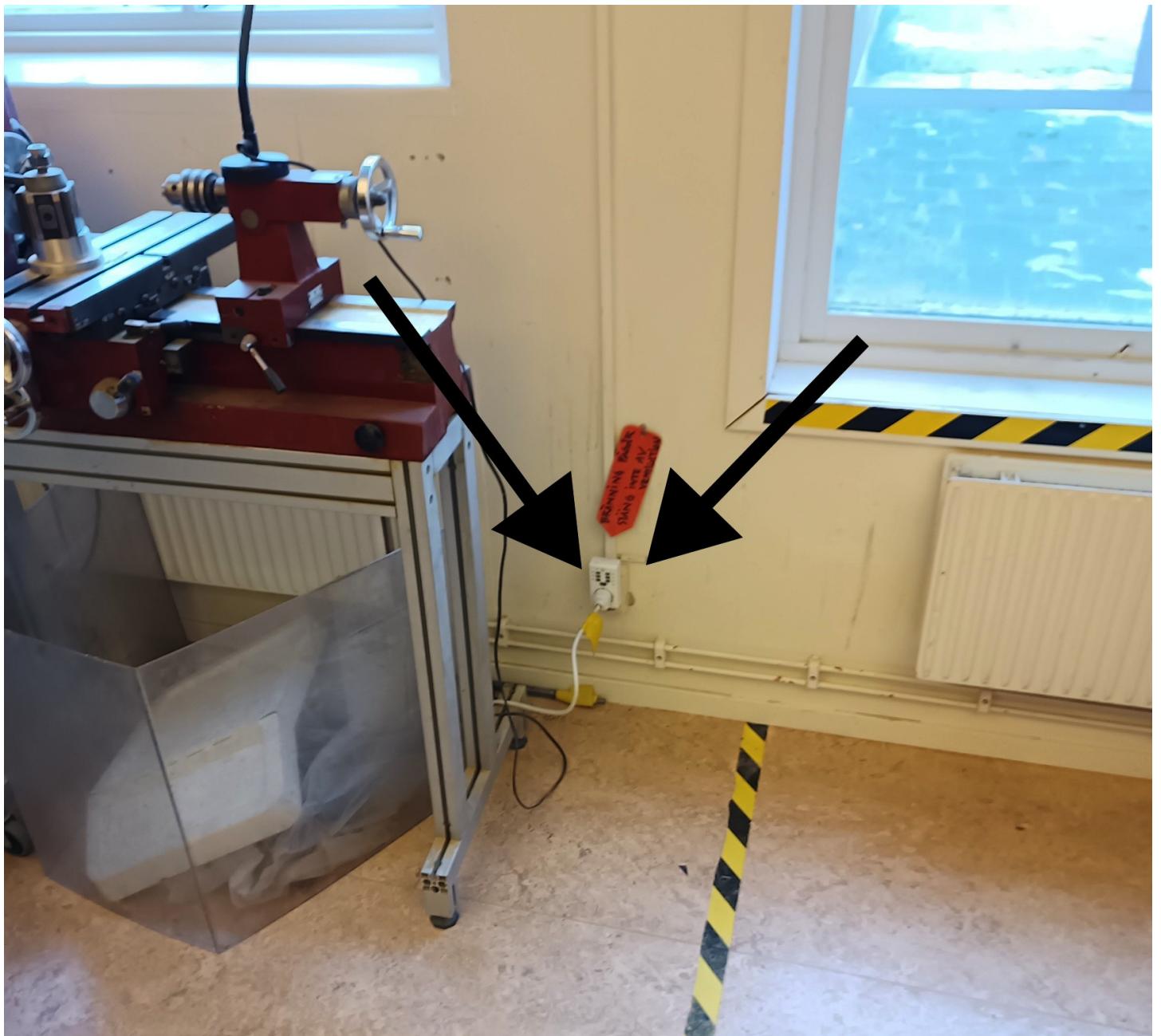


Figure 4: The backside of the woodshop



Figure 5: The ventilation timer



Figure 6: The ventilation timer and its label

The label on 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.

The ventilation timer is on

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

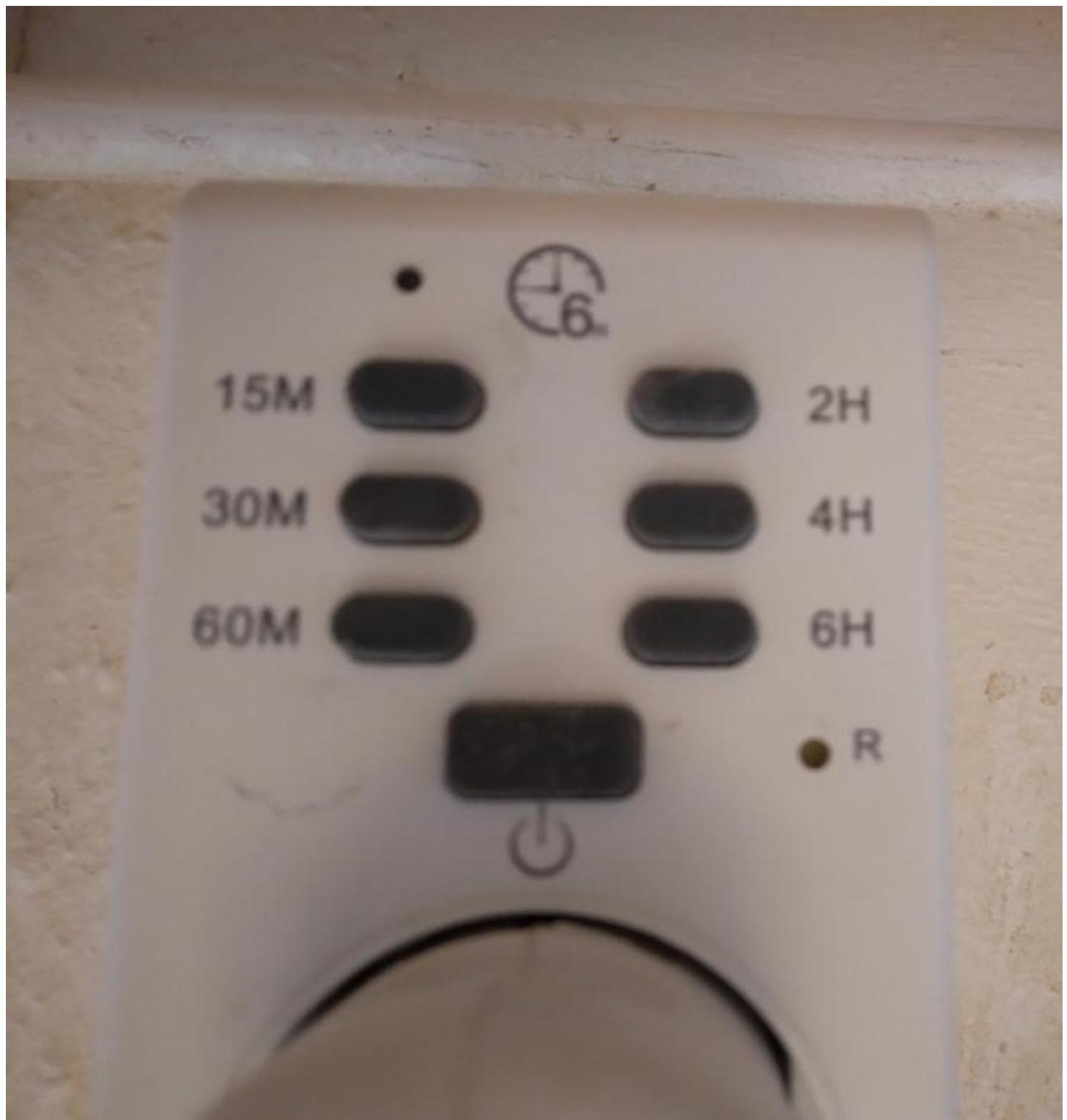


Figure 7: The button on the ventilation timer



Figure 8: The ventilation timer is on

Power on laser cutter

Open the laser cutter.

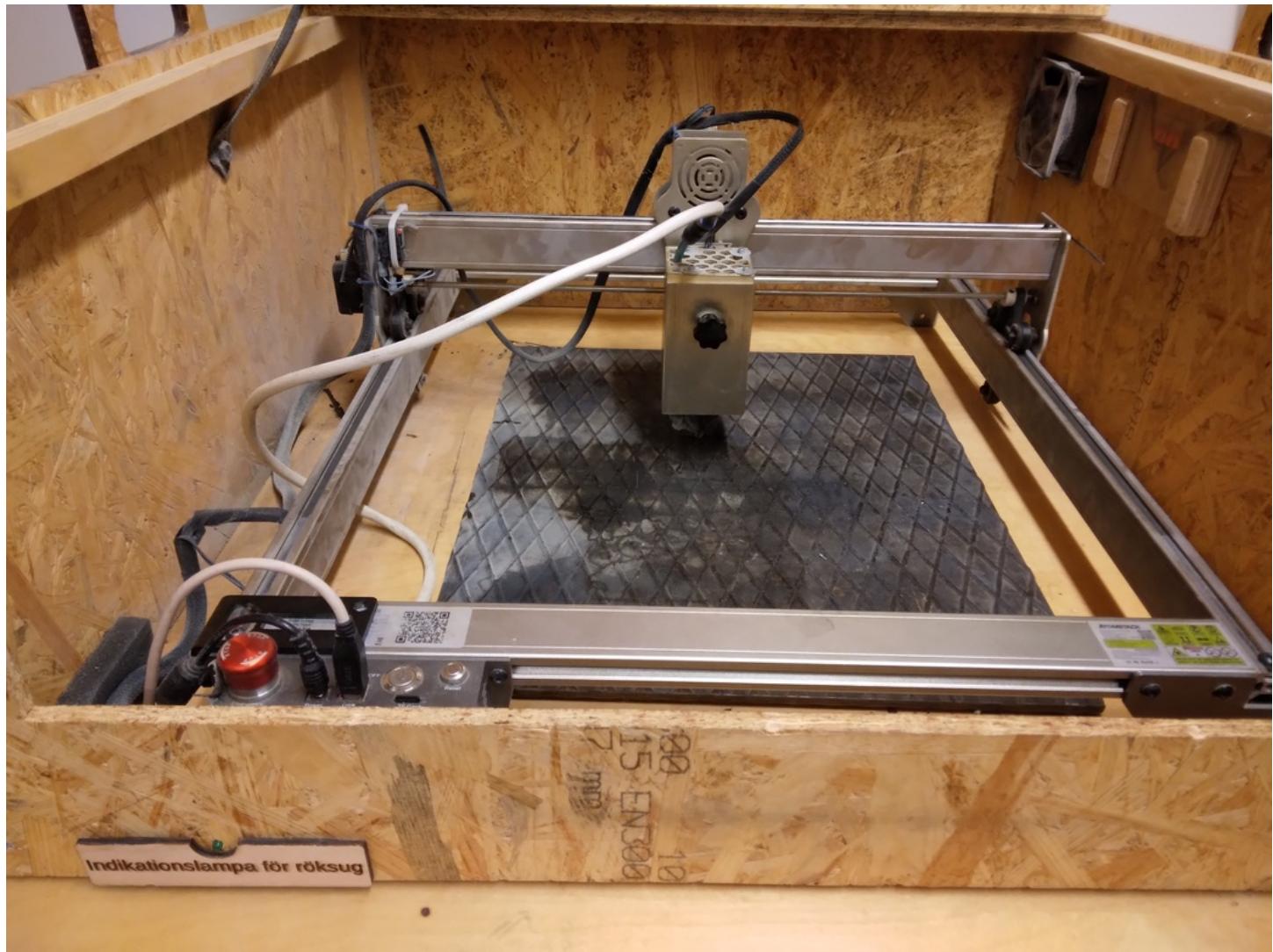


Figure 9: The opened laser cutter

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 10: Buttons inside the laser cutter



Figure 11: The power of the laser cutter is on



Figure 12: The air indicator should turn on too

Start computer

Press the computer's power button



Figure 13: The computer's power button is at the top right

The computer's power button is at the top right

The computer will power up and show a login screen

The login screen

Write the password in the rectangle.

Write the password here and press enter

You have now started the computer!

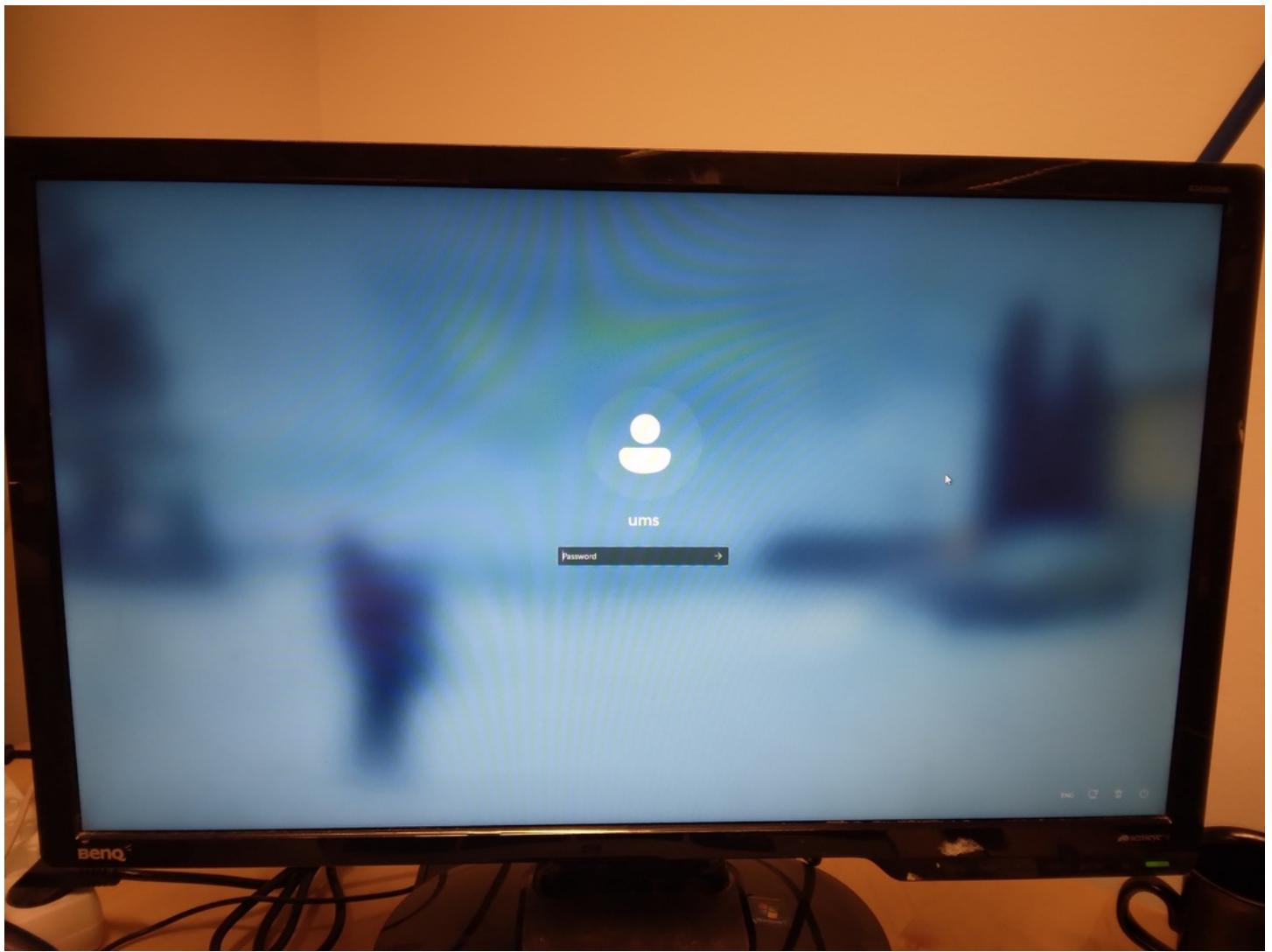


Figure 14: The login screen

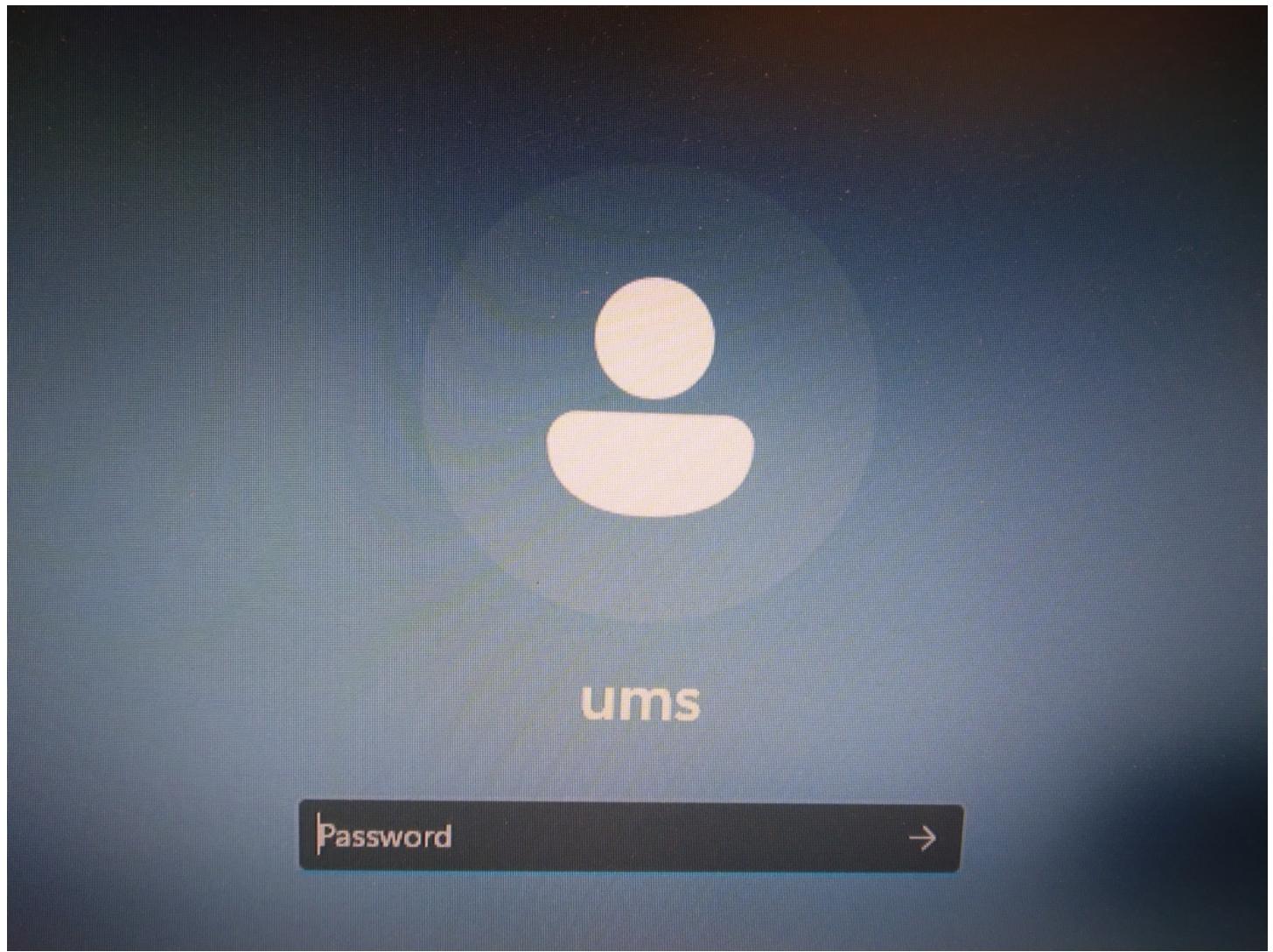


Figure 15: Write the password here and press enter

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 16: 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!



Figure 17: Double-click the LightBurn icon

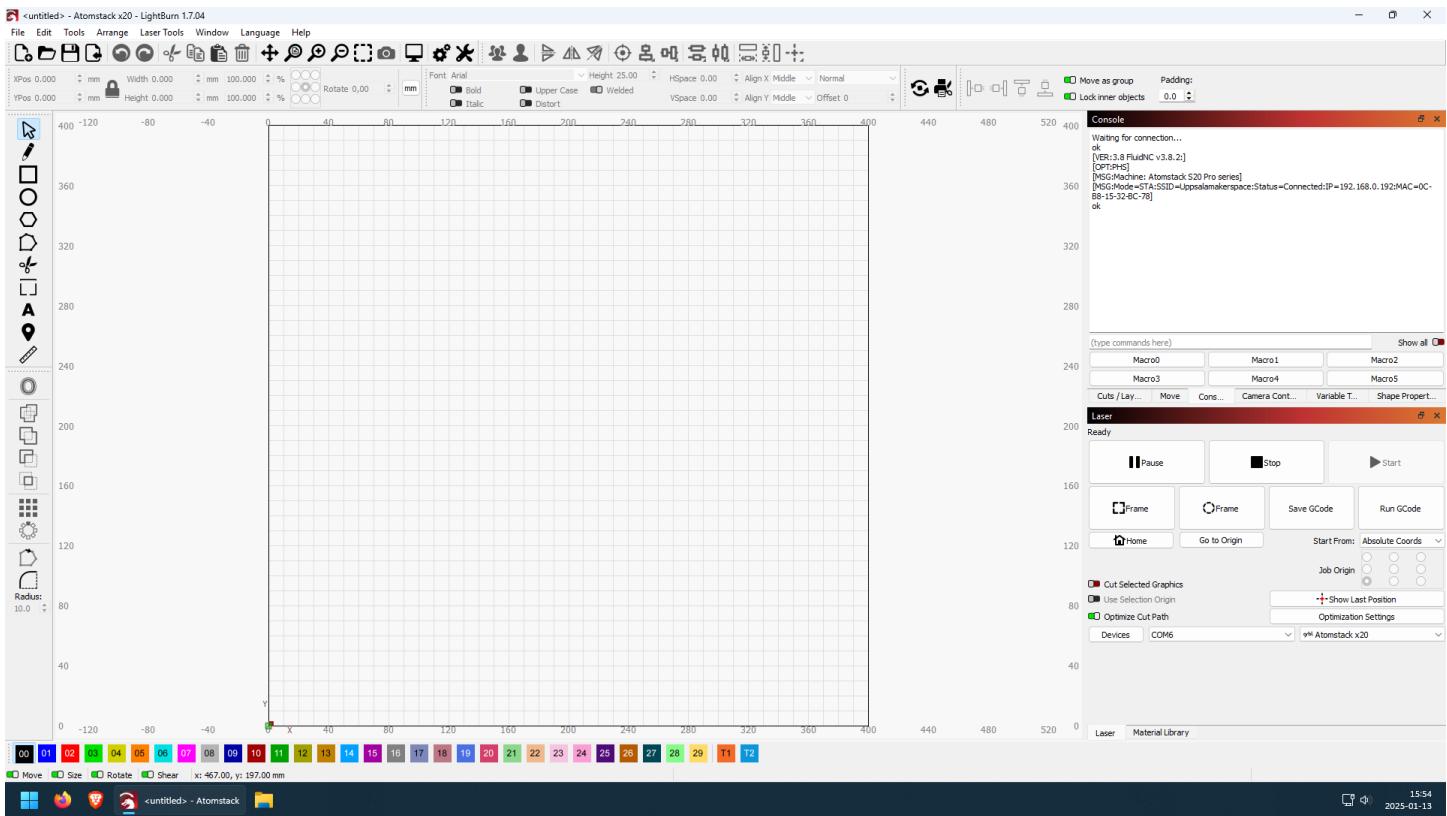


Figure 18: First screen of LightBurn

Position material

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

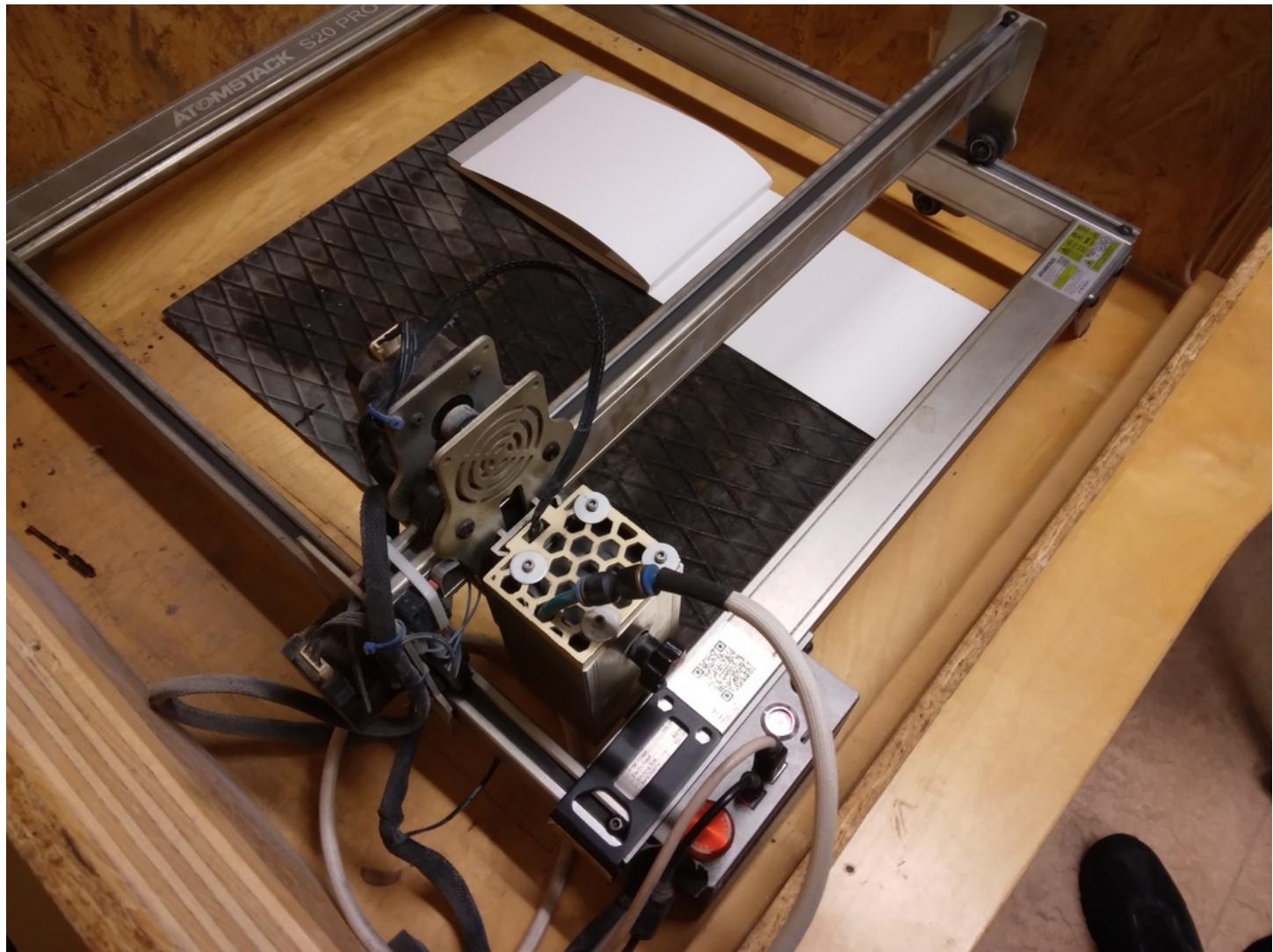


Figure 19: Put the material in the enclosure

Put the material in the enclosure

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



Figure 20: Take the spacer from its proper place.

It might look like this



Or like this



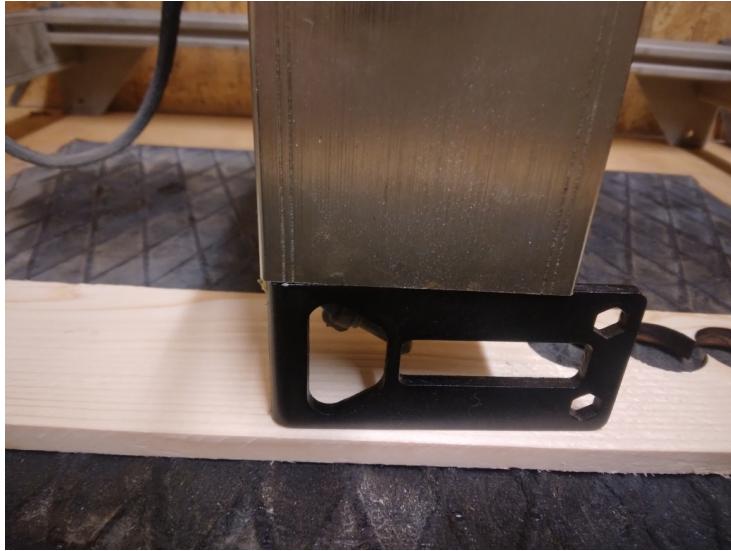
Place the spacer between laser and material

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

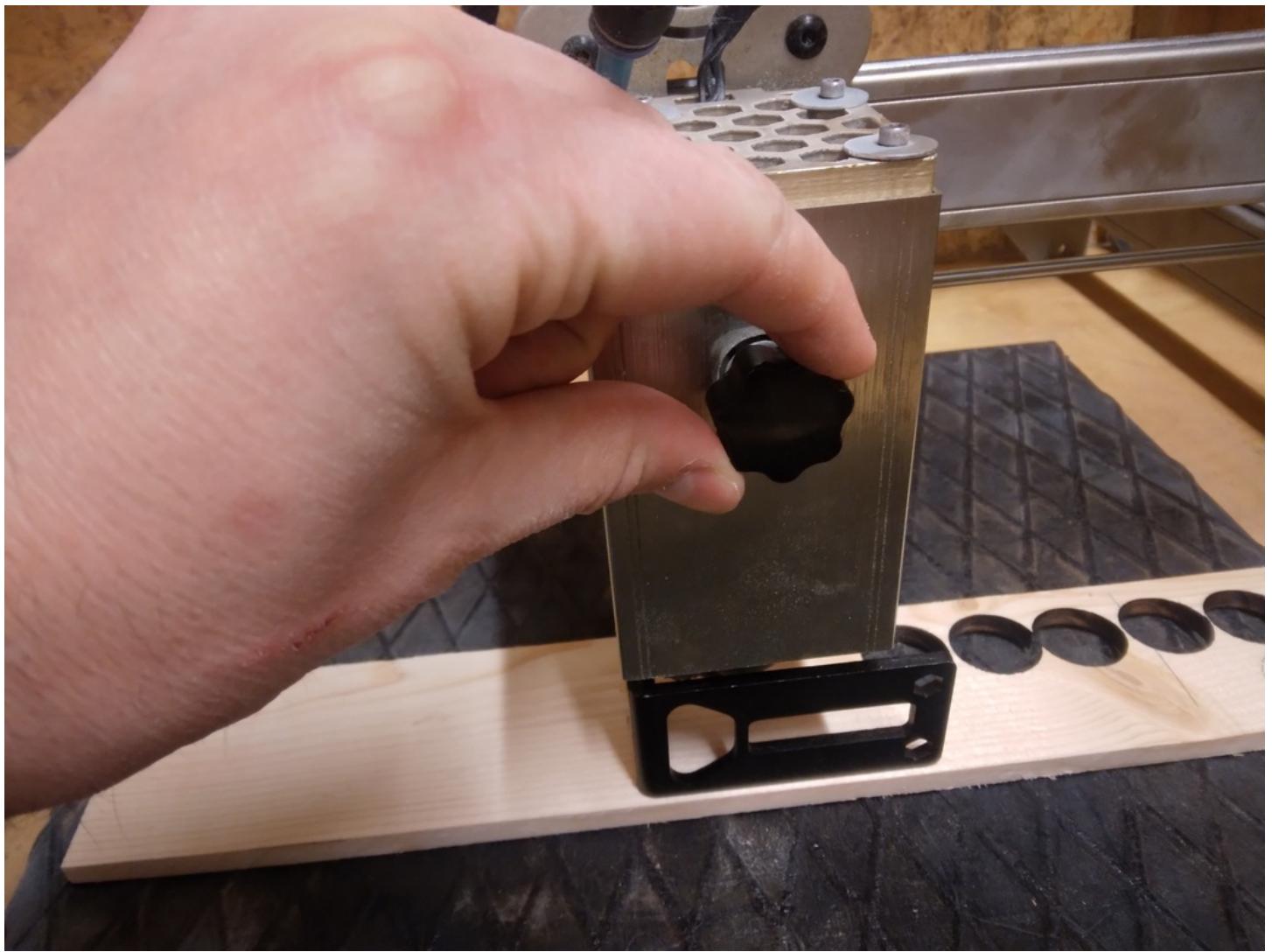


Figure 21: Loosen up the laser by unscrewing it a bit

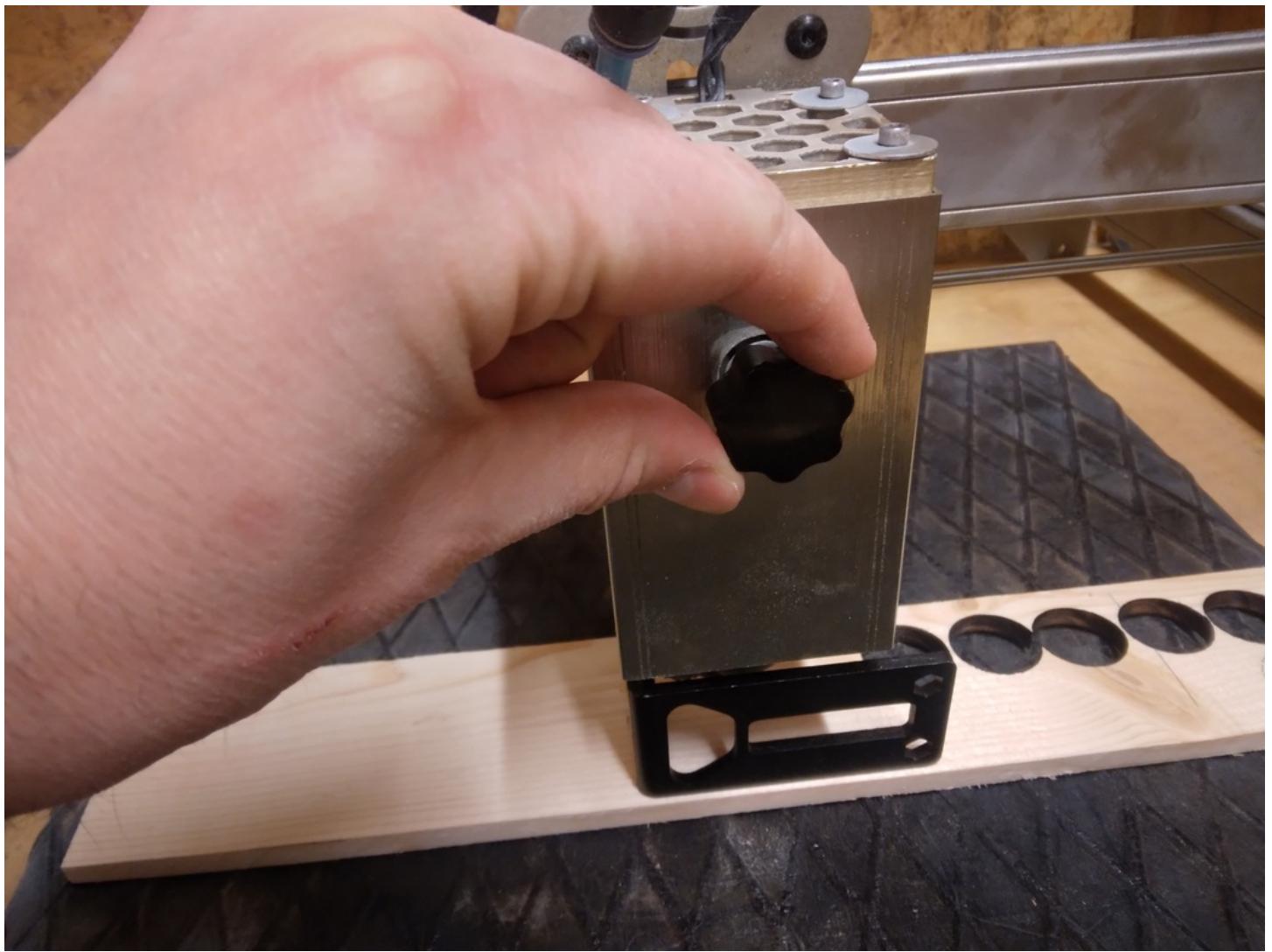


Figure 22: Tighten up the laser again by turning its screw



Figure 23: removing_the_spacer_from_the_laser.jpg

Remove the spacer

Place the spacer back in its original spot

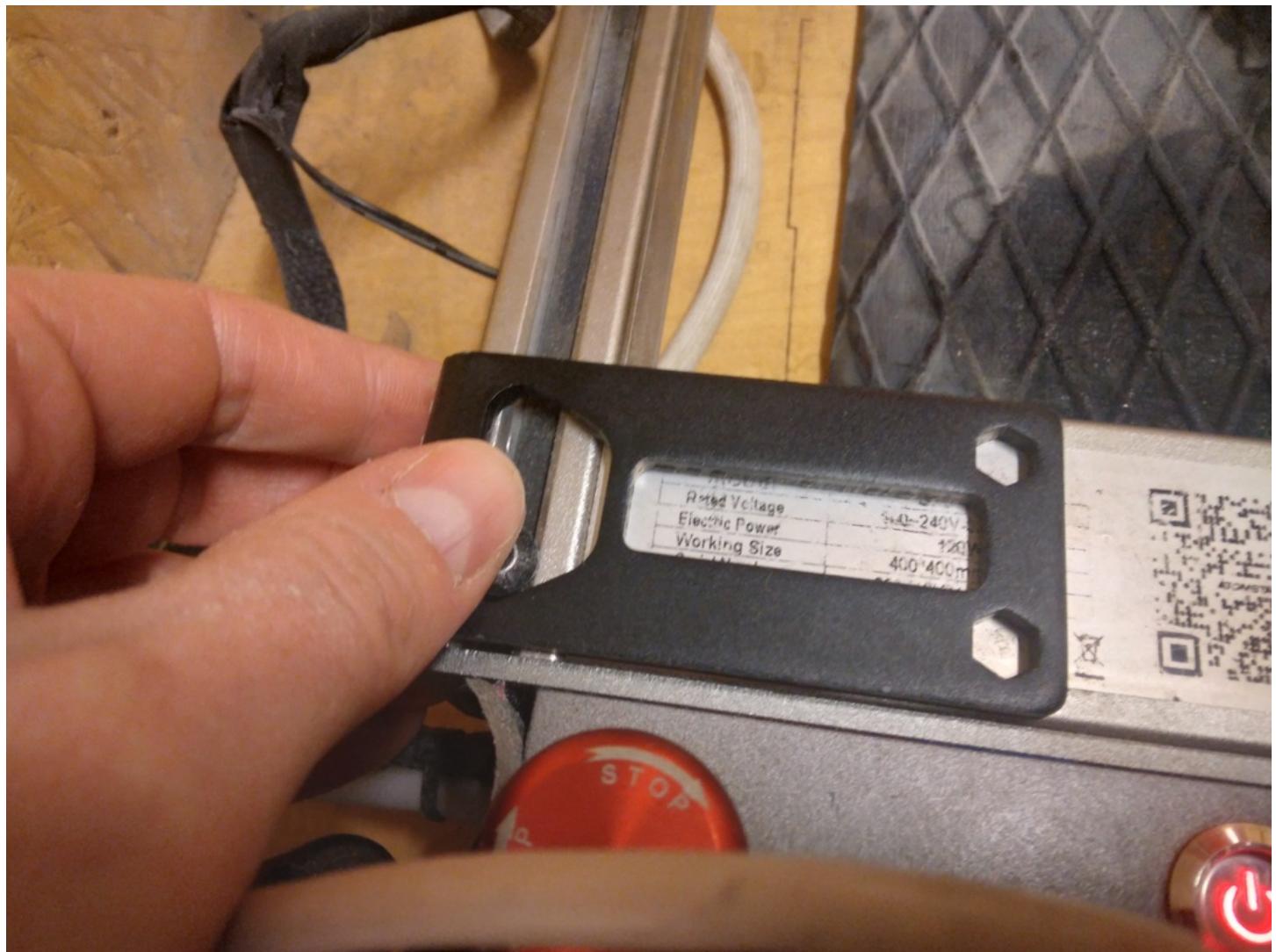


Figure 24: Place the spacer back in its proper place

Place the spacer back in its proper place

Setup laser in LightBurn

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

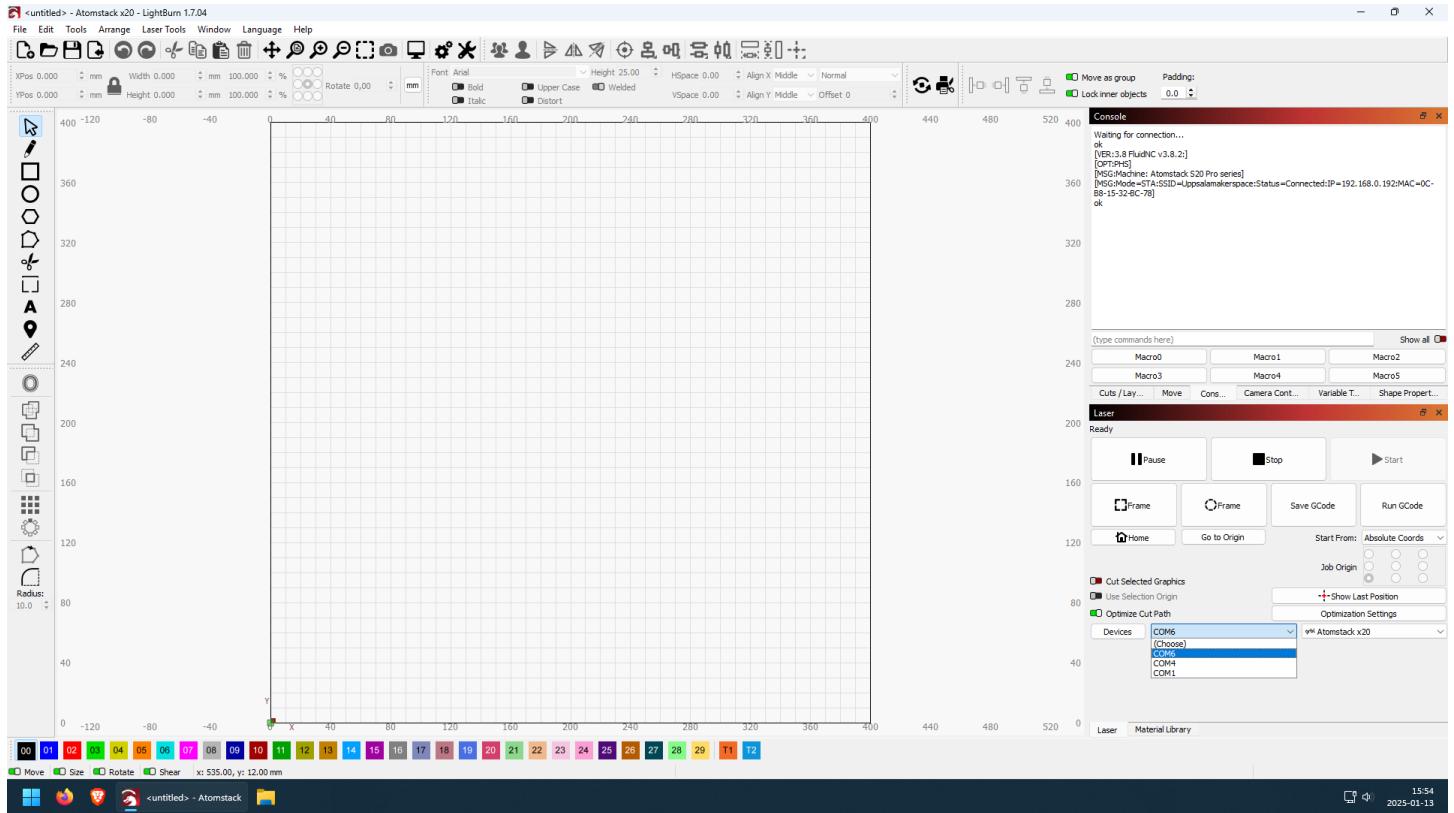


Figure 25: Pick a COM port here

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.

If The Dance needs to be continued, click COM6

Select COM6

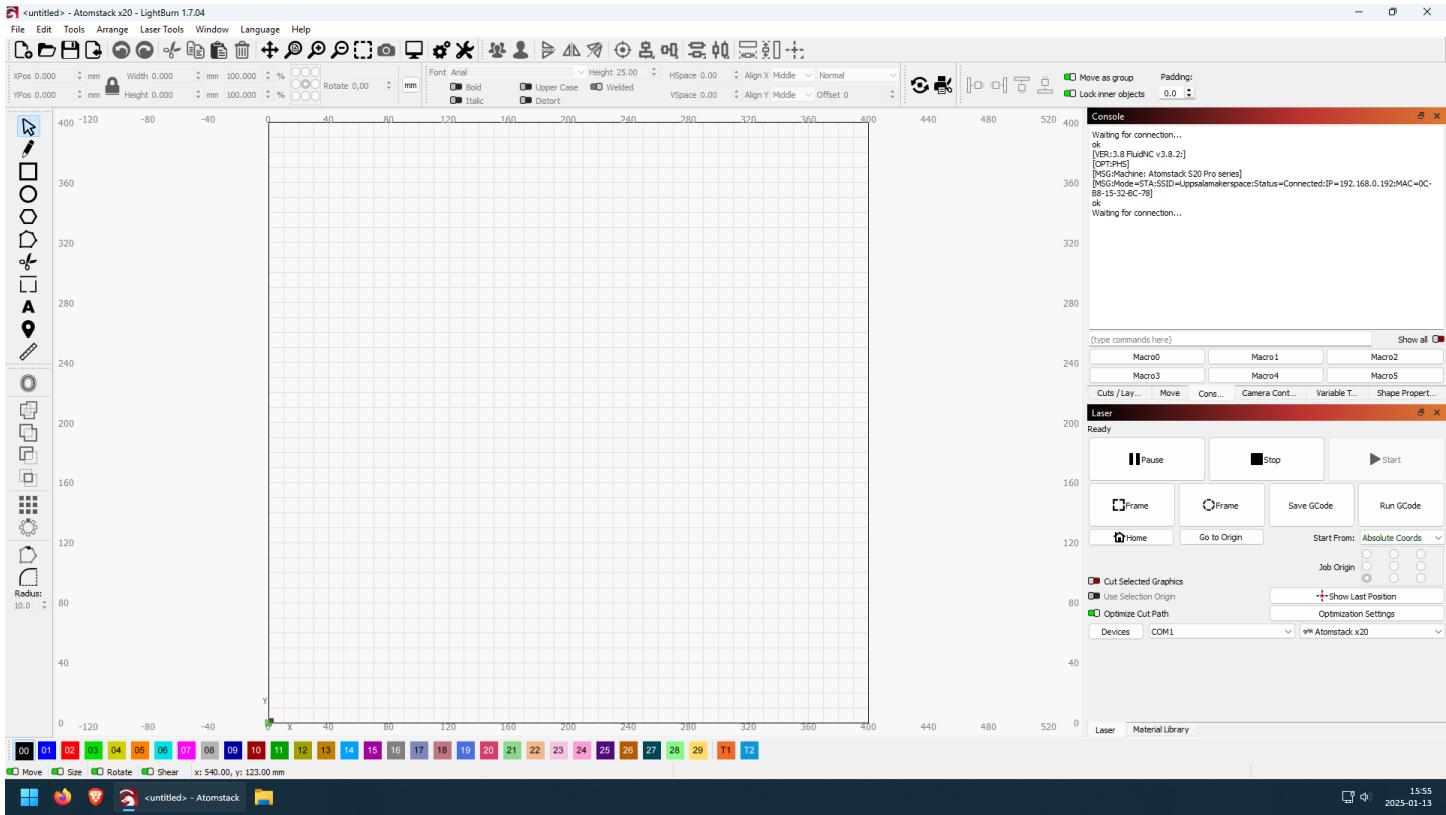


Figure 26: Select COM1

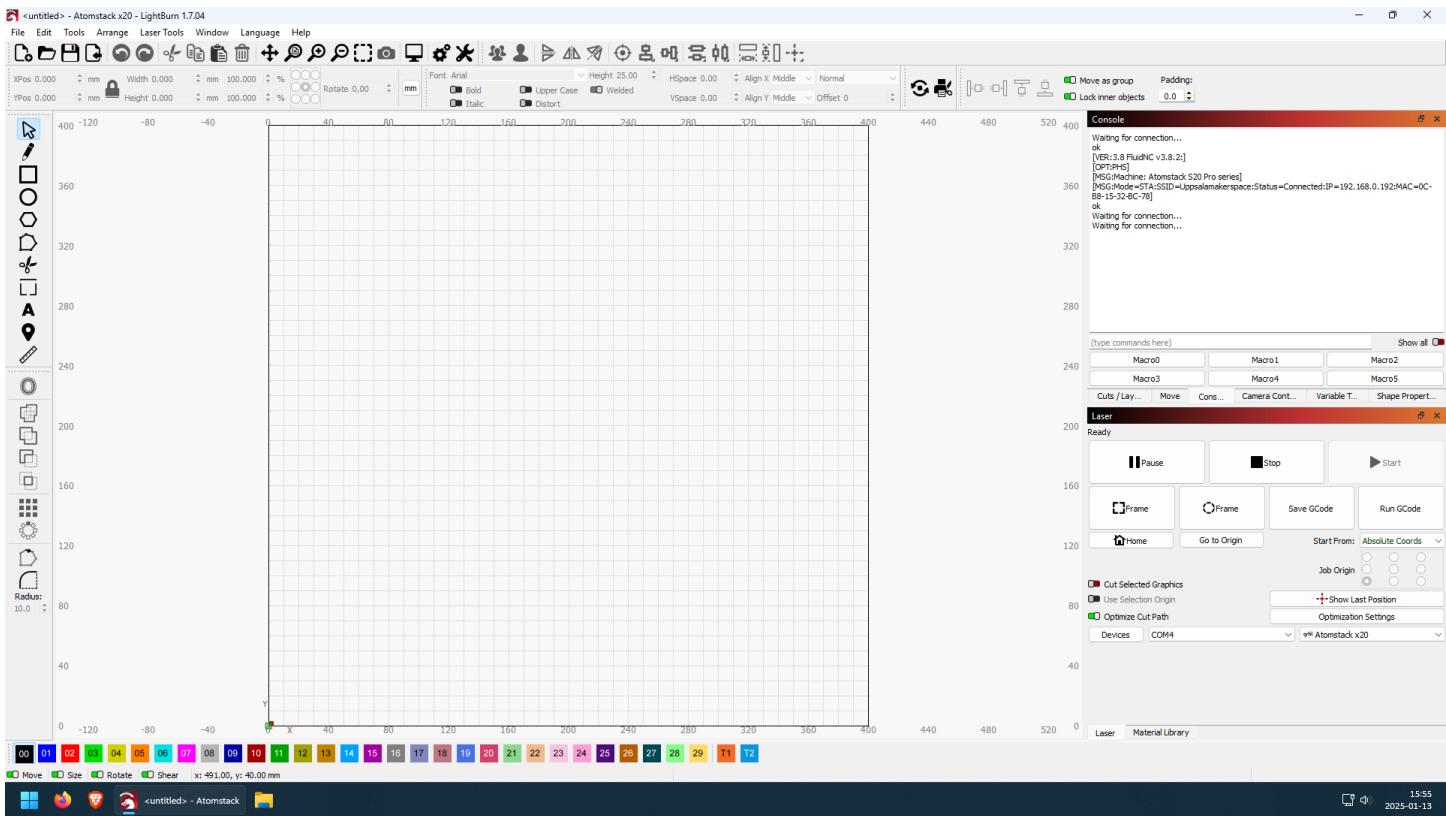


Figure 27: Select COM4

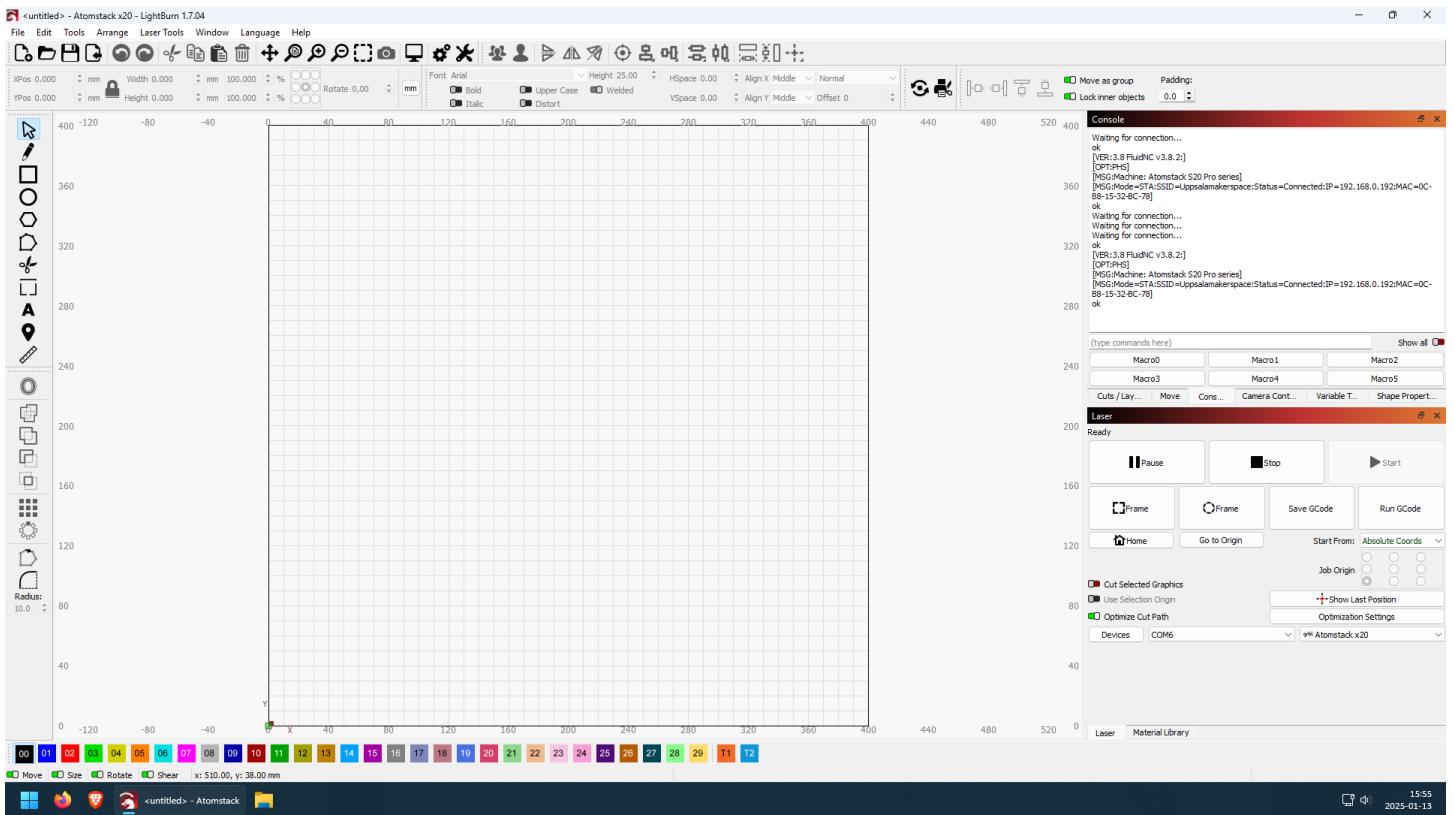
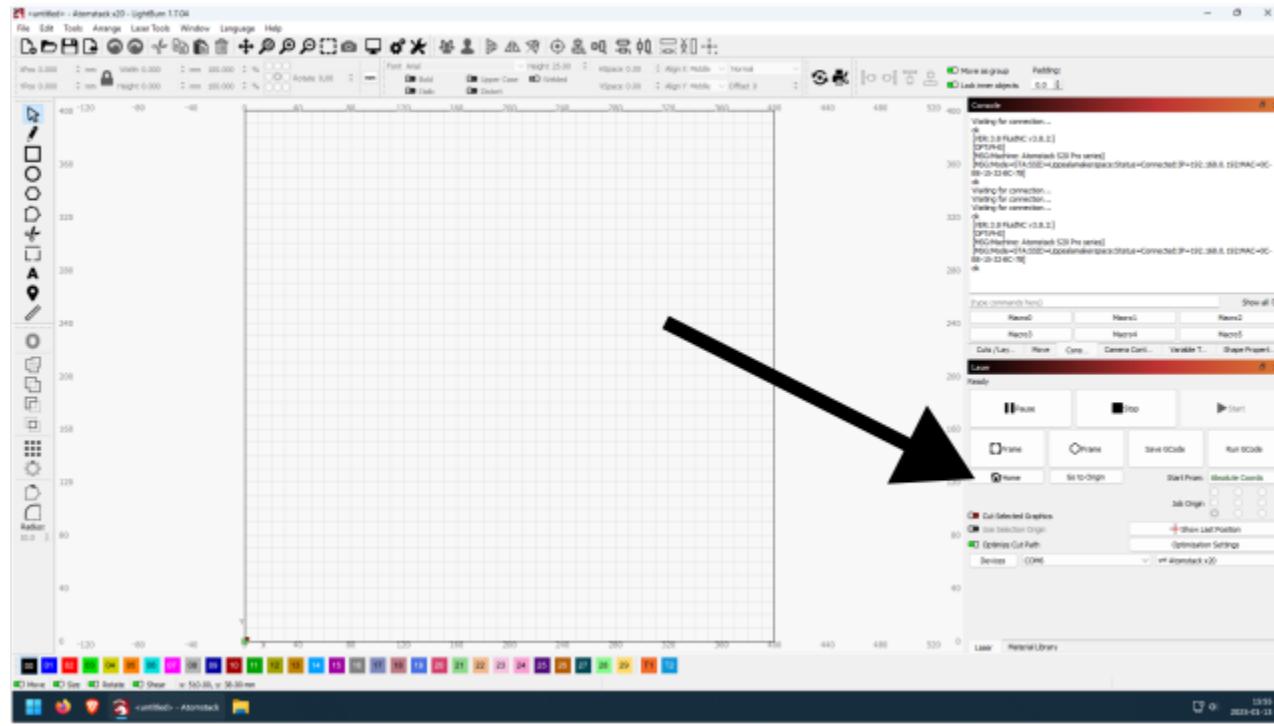


Figure 28: Select COM6

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

Press the Home button to make the laser orient itself (It will move into the front left corner) Before pressing home check that the lasers movement is unobstructed



home

>Press

Load image

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

Setup LightBurn

- ensure line Mode
- Air on
- Speed
- Power
- Pass count

Material	Cut	Pass count	Speed (mm/sec)	Power (%)
Paper for oil and acryl painting, 290 g/m ²	Complete	1	10	75
Paper for oil and acryl painting, 290 g/m ²	Half	1	10	25

Close enclosure

Close the enclosure.

Start laser

Operator procedure

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

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 goggles on
4	Say 'Those behind us are wearing their goggles'	All those behind you (if any) have goggles on
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 laser casing
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	 A close-up photograph of a wooden plaque. In the center is a small circular green LED light. Below the light, the text "Indikationslampa för röksug" is printed in a dark, sans-serif font. The plaque is set against a background of light-colored wooden slats, likely part of a wall or ceiling structure.

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

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

As a graph

```
flowchart TD
    start[Start]
    check_air[1.Air is on]
    check_my_glasses[2.My glasses are on]
    check_your_glasses[3.Your glasses are on]
    check_behind_glasses[4.Behind us have glasses on]
    countdown[5.Three, two, one]
    press_start[6.Press start]
    laser_is_on[7.Laser is on]
    all_is_well[8.All is wll]
```

```
laser_is_off[9.Laser is off]

start --> check_air
check_air --> check_my_glasses
check_my_glasses --> check_your_glasses
check_your_glasses --> check_behind_glasses
check_behind_glasses --> countdown
countdown --> press_start
press_start --> laser_is_on
laser_is_on --> all_is_well
all_is_well --> laser_is_off
```

Turn off laser

Make sure the laser is not in use.

Open the laser cutter.

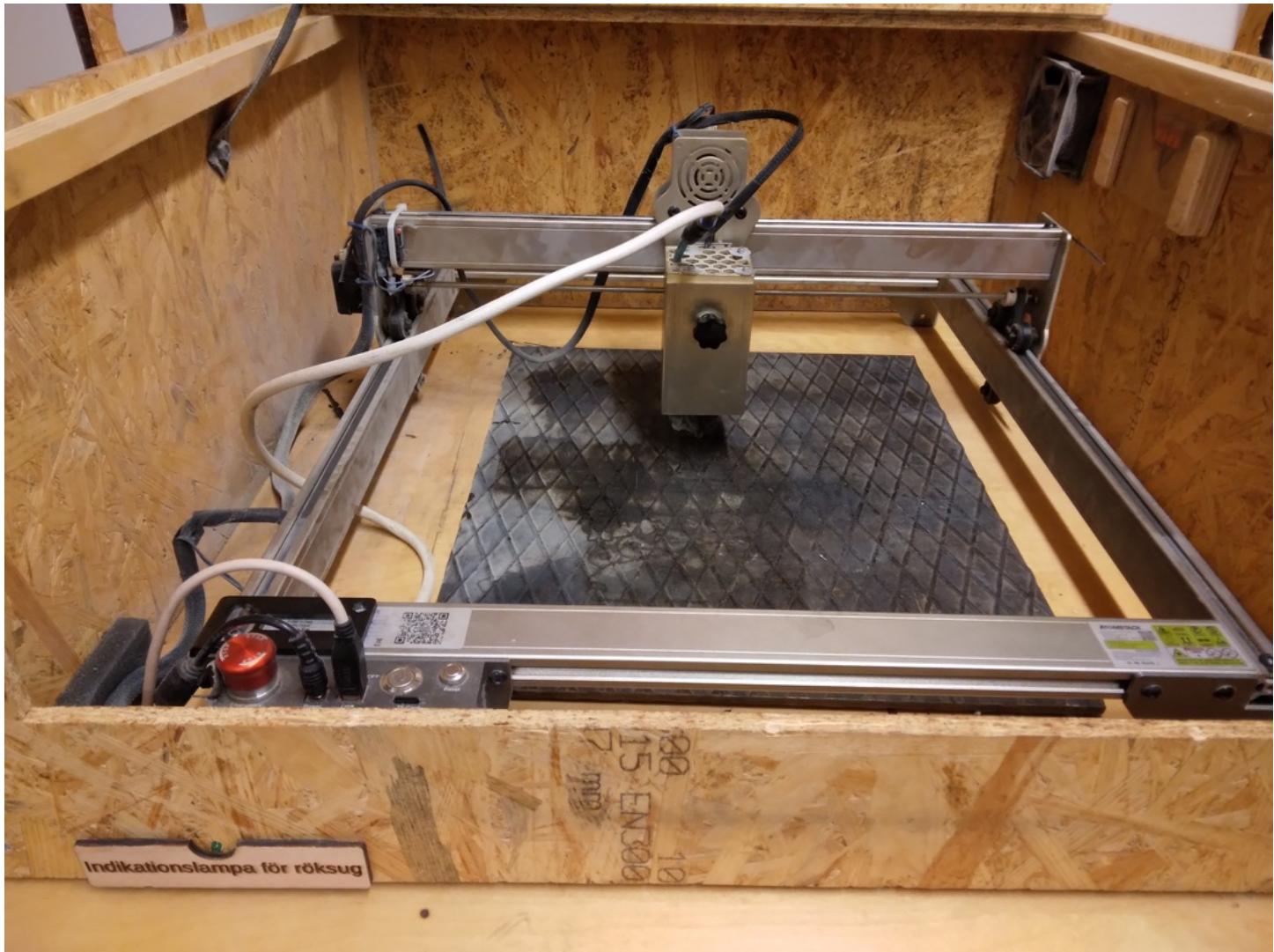


Figure 29: The opened laser cutter

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 the power button is off.

Close the lid



Figure 30: The power of the laser cutter is on



Figure 31: Buttons inside the laser cutter

Turn off computer

Turn off the computer.

Turn off the ventilation

Turn off the ventilation.