LaserCutter Training

Do not look into laser with remaining eye.

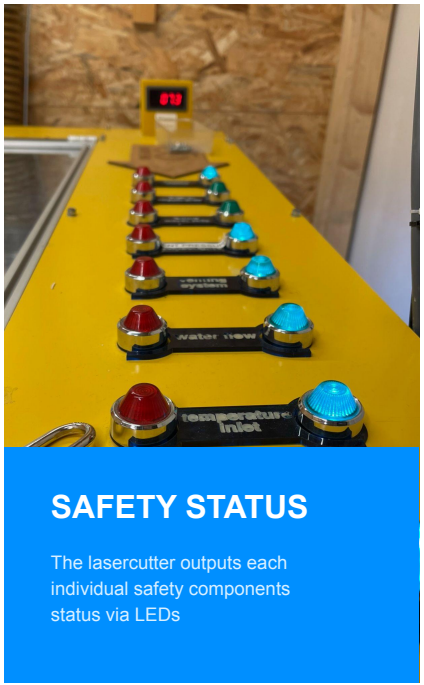
These slides are partially based on work by Jamie Sutzt from MakerFX Orlando.

Training Purpose

- Primary focus on safely using the MuMaLab LaserCutter (operations, materials, safety procedures)
- Understanding basic laser cutting principles
- Using Lightburn to prepare your files for engraving or cutting
- Operating the MuMaLab Laser

MuMaLab LaserCutter
Features

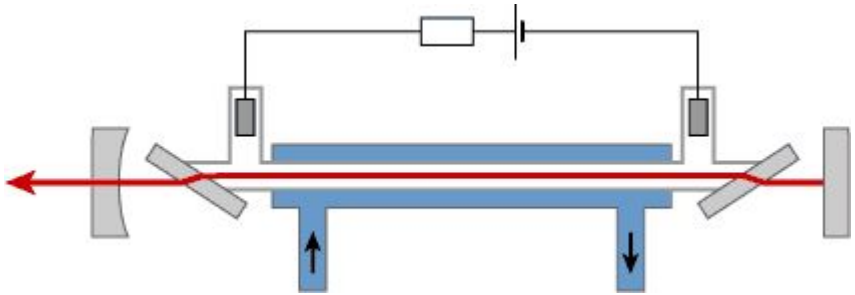
- Trocen AWC7824 Controller Laser Engraving Cutting Controller
- Reci **90W CO2 Laser** Tube
- DY13 **100W Laser PSU**
- OpenLaserSafety v1.0
- Exhaust System including filters
- Air pump (for Nozzle)



What is a laser?

Lasers are highly concentrated beam of light.

The beams are in high enough concentration that they can be used to cut and mark certain materials.



The types of materials that can be used varies with the type and power of the laser.

What powers the laser?

40.000 Volt
up to 28mA

The laser power supplies working voltage is lethal. NEVER attempt to “fix” the machine. Never open any compartments other than the main door.

What cools the laser?

Water

Laser tubes dissipate heat. In order to cool the tube to prevent overheating and extend its lifetime, water runs through glass windings inside the lasertube.

Smoke, Laserbeam and Mirrors

The laser engraver uses a series of mirrors to get light from the tube in the back of the laser to the material.

By nature, laser engraving causes smoke and debris. These byproducts will cause issues with laser performance if the optics and other surfaces of the machine are not taken care of properly.

If you notice the performance of the laser or mechanics is effected and suspect that this is caused by residue/debris, please contact the **#lasercutter** channel

Safety related controls

Laser-Switch: Controls the "enable" pin on the laser power supply. While off, the laser power supply will not turn on.

E-Stop: Shuts off the power supply for stepper motors and the laser power supply (moving parts + laser beam)

Main power switch: Used to turn the machine on/off, disables power to the entire machine (moving parts + laser beam + control/safety circuits)

Additional controls

The pilot laser, provides guidance on where the cutter head is and helps line up workpieces

The air vent button needs to be pressed before you start the laser job

Preparing for fire

Fire is one of the biggest dangers when using a laser cutter.

The most important part: Never leave the laser cutter unattended!

(If you need to pee, press the pause button and you can resume the cut after)

A fire can happen at any time, even when materials we consider ‘safe’ are being laser cut. It is crucial that you monitor the laser job and can act quickly. In case of fire:

- Immediately E-Stop the machine as first step!
- Open the compartment
- Extinguish fire and call for help if necessary
- Report the incident to the board of members or #lasercutter on slack

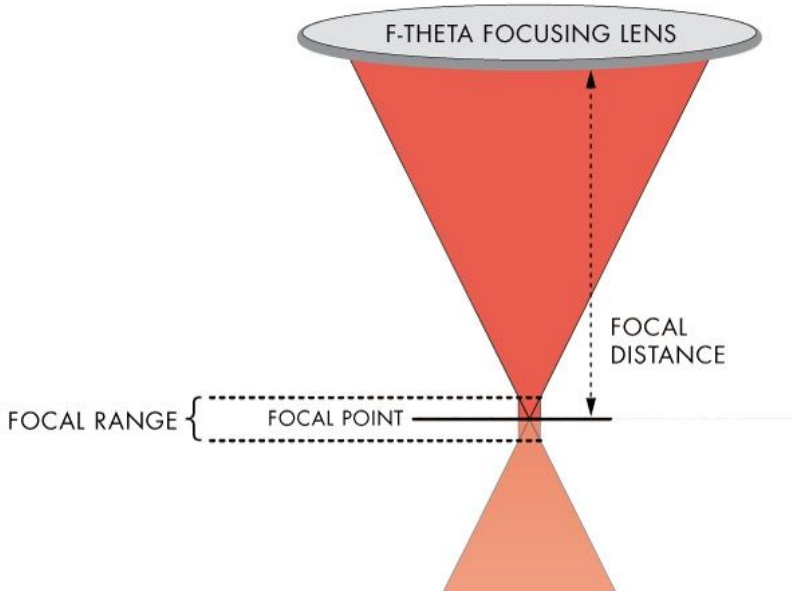
The Laser's Focal Point

The FOCAL POINT of the laser is the most concentrated point of the light beam.

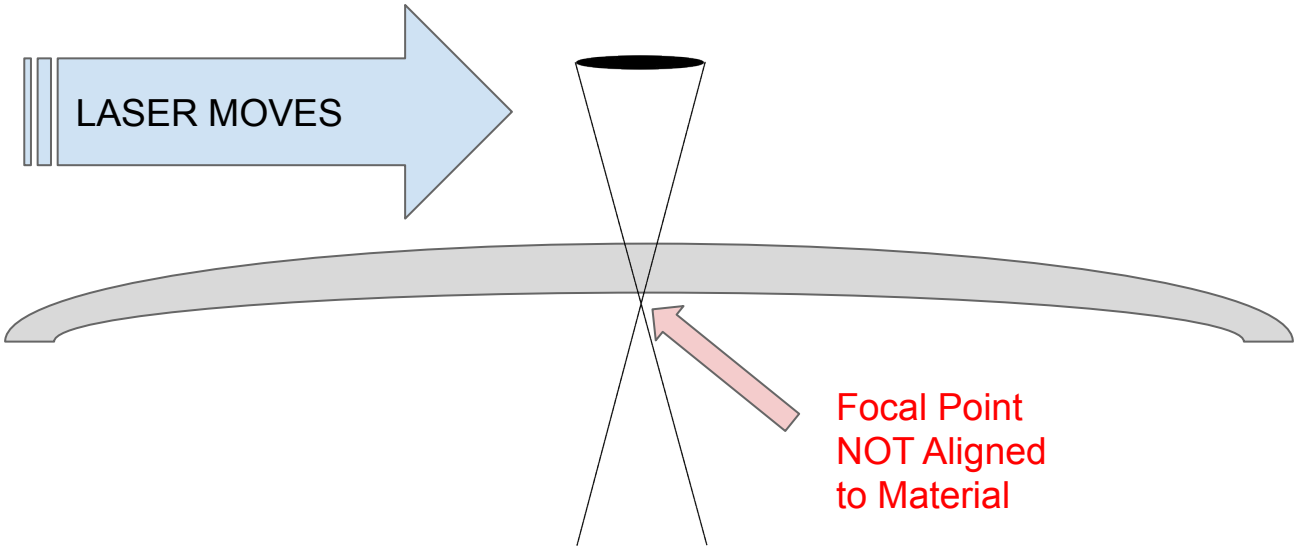
It is a this point the laser will be best suited to cutting / engraving.

If the focal point is too high or too low from the material, the laser will not be efficient in the engrave and may not be able to mark / cut at all.

We usually use a lens with a focal distance of 50mm or 75mm.



The importance of knowing about focal length



Material Safety

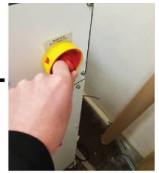
By default, any material should be considered UNSAFE. Worst case you will end up in the same (small) room with chlorine gas, which is extremely dangerous to health and the safety of the machine.

The wiki covers links to a list of safe materials. If you are unsure about a certain material, do not laser cut!

Materials we recommend for beginners are MDF and poplar, they are cheap and easy to laser.

Some free and paid materials can be found in the storage area

General workflow

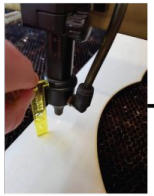


Power the laser cutter on

Make sure the laser switch is OFF

Open the case

Place material and slide it to the cutting area



Use the acrylic spacer to adjust the height and focal point of the cutter head

Use arrows to set the top left of cutting (working area)
Press origin button to set this start position

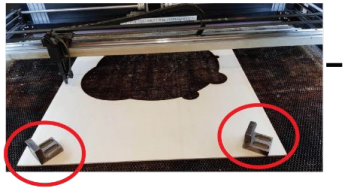
Place key fob on orange box until light turns green

General workflow

Remote desktop into the laser cutter PC

Upload your vector to the lightburn and send

Press the Box button on the touch screen to observe the outline of the working area
(MAKE SURE NOTHING IS IN THE PATH OF THE CUTTER HEAD)



Place weights OUTSIDE of the working area

Close the case

Flip the laser switch to ON position

Press air vent button, Check ALL 6 Indicator lights are green

Press start

Summed up

1. **Make yourself familiar with the laser cutter.**

   Learn how to safely operate the laser and know its limits.

2. **Safety is our #1 priority.**

   No experiments. Make yourself aware of safety equipment. Know the procedures. Never leave the laser cutter unattended.

3. **Know your Material.**

   The default for unknown materials is “unsafe, do not laser”.

4. **Be excellent.**

   Keep the door closed. Wait to open the laser after it is done. Help others. Ask questions.

Remember to join our Slack channel

If you are unsure or have a question

#lasercutter is always available.