

# Laser Cutting

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# Laser Safety

The laser creates a very narrow, very hot band of light that rapidly heats what it touches, and will quickly burn, melt, vaporize, crack, or otherwise damage a variety of materials, including you.

Primary Dangers:

- Vision: ***The laser can cause blindness if misused.***
- Fire: Work catches fire, or machine or table starts to catch.
- Breathing: Smoke and vapors.
- Sharp edges: Some materials can have sharp edges when freshly cut.

Never tamper with the safety settings or use if anything is not working correctly.

Always use the fume extractor with the exhaust hose connected to the laser you are operating.

If you see anything unsafe, please report it immediately.

Know where the emergency stops are located and how to use them for the laser you are using. Depending on the laser they can be:

- Red button on the touch screen
- Circular button under the screen
- Toggle switch on the back
- Opening the lid

Never use two materials on top of each other. Fires can start more easily in the area between.

Minimize the number of people near the laser.

Never use flammable liquids or gasses near the laser cutter or on materials that are going to be used in the laser cutter. If flammable substances are used to clean parts (alcohol, solvents, etc.), make sure they are fully removed and everything is clean and dry before the next use.

Never leave the laser unattended, it can start a fire.

We have different lasers with different capabilities. None of the following materials should be used in any of our lasers. They give off toxic fumes or just won't cut:

- Unidentified materials
- PVC sheet, pipe, or fabric (this includes vinyl and imitation leather)
- Other types of plastic not specifically approved (For example ABS and polycarbonate melt and burn rather than cut)

- Any metal not specifically approved for use (the fiber laser can engrave some soft metals)
- Carbon fiber, fiberglass, or any composite containing epoxy
- Artificial leather or chrome-tanned leather
- Styrofoam / Foamcore board

## **Vision Safety**

Make sure all vision safety guards are in place before operating. If in any doubt wear a pair of laser safety glasses also. Be super careful with semi-reflective surfaces. Never insert a mirror finished or highly reflective surface shiny side up in a laser.

Despite the temptation, do not stare at the laser light while it is operating. Monitor the operation in the software.

## **In Case of Fire**

Hit the emergency stop.

For tiny fires (e.g. candle size): Shout “Flare up!”, open the lid and spray with water. Close the lid and allow to ventilate for a few minutes. Confirm that it is out cold and get permission from staff or volunteer on duty before continuing.

If a flare up doesn’t go out immediately, or if the fire is growing: turn off the air assist and the blower using the keypad (if the laser has these), or turn off or unplug the power strip.

For more serious fires (e.g. the entire piece of work is starting to burn), shout “FIRE!”, use the small fire extinguisher in the can with the yellow trigger. If possible, turn off air assist and blower or unplug the entire power strip. Alert everyone in the space to the danger.

If the can extinguisher with the yellow trigger is not enough, or if the fire is electrical: The red fire extinguisher with the blue tip, and the one attached to the wall near the green workbench, both use caustic chemicals that can damage or destroy the laser. However, it is better to destroy the laser than to burn the building down.

For a big scary fire that cannot be put out safely, help staff or volunteer on duty evacuate everyone from the building. Proceed quickly and calmly to the safest exit. Call 911. Everybody in the Makerspace should meet on the corner in front of Starbucks.

Laser cutter fires usually have one of more of the following contributing factors:

- Not observing the laser cutter while operating
- Incorrect power and pulse settings
- Insufficient exhaust
- Unsuitable material
- Dirty optics
- Laser cutter not cleaned out regularly

# Training and Reference

## Material Compatibility for Laser Cutters

- General
- <https://laserengravingtips.com/laser-test-file/>
- Linoleum: <https://community.glowforge.com/t/materials-supported-question/8558>

## Misc. Links of Interest

- Big list of misc. tools for various laser cutting projects:  
<https://www.mylasertools.com/?tags=3d-print%2Claser-cut>

# Reserving the laser

# xTools F1 Ultra

# xTools D1 Pro

# Muse 3D

# Smoke Purifier