



LASER CUTTER SAFETY

University units and departments should follow the precautions below to safely operate a laser cutter.

LASER CUTTER HAZARDS

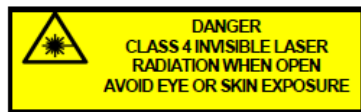
A laser cutter focuses a high energy laser beam onto a material or substrate resulting in a high quality and accurate cut. Laser cutters pose potential hazards from exposure to the **laser light**, high temperatures that could result in a **fire**, and toxic **air contaminants** that may be inhaled. Proper setup, training, operation, and engineering hazard controls must be implemented for safe use of a laser cutter.

LASER LIGHT

Laser cutters have an invisible high energy laser beam that can cause severe eye damage, including blindness and serious skin burns; however, the risk of exposure to the beam is low due to a safety feature that disables the laser beam when the doors are opened. The American National Standard Institute (ANSI) Standard Z136.1 classifies laser based on the risk of injury from the laser, with Class 1 being the lowest risk and Class 4 being the highest risk. Typically, a laser cutter will contain a Class 3B or 4 laser; however, **laser cutters are classified as a Class 1 laser device when used as designed** (without manipulation of the safety features). Class 1 laser devices are exempt from UW laser registration and other control measures.

FIRE

The high intensity laser beam can produce extremely high temperatures and significant amounts of heat as the substrate material is burned away while cutting. Some materials can catch fire during cutting operations creating fumes and smoke inside the device. Dirt and debris may cause a fire, a poor-quality cut or mechanical component failure. Personal



protective equipment (PPE) must be worn, and fire extinguishers must be located near the equipment.

AIR CONTAMINANTS

Laser cutters will generate fumes, vapors, and particulates from substrates that can be highly toxic. Air contaminants can damage the machine and harm your health. Engineering controls must be in place prior to use, and materials must be compatible with the equipment.



UW Mechanical Engineering laser cutter

LASER CUTTER PURCHASE APPROVAL

The purchase of a laser cutter/engraver requires prior approval from Environmental Health and Safety (EH&S). EH&S recommends buying a laser cutter/engraver that contains a “Class I Laser Product” label or classification on the equipment, in the brochure, or in the operating manual. Contact EH&S for assistance in determining the product compliance.

A laser cutter/engraver that is *not* a Class 1 Laser Product will require additional controls which may include EH&S Radiation Safety authorization, laser registration, laser control area, adding safety interlocks, laser protective eyewear, laser safety

training, hazard posting, control access, operating procedures, and other safety measures.

LASER CUTTER SETUP

1. Properly **install and maintain** the laser cutter according to manufacturer specifications.
2. Ensure laser cutter is equipped with a **fume exhaust system and/or filtration system** that meets manufacturer specifications. Contact EH&S at (206) 543-7388 or ehsdept@uw.edu for more information.
3. Develop a **standard operating procedure** (refer to the [Laser Cutter Template SOP](#)).
4. Maintain a **list of materials** acceptable for use in the laser cutter.
5. Obtain the **safety data sheet (SDS)** from each material's manufacturer to ensure safe handling or processing of the materials.

LASER CUTTER USE

Proper setup, training, operation, and engineering controls must be implemented for safe use of a laser cutter.

BEFORE USE

- All users are required to take the online **fire extinguisher training** prior to using the laser cutter.
- **Check the filter** and change it according to manufacturer's guidelines.
- **Verify that all users are trained** on the potential hazards, control measures, UW and manufacturer's operating procedures and proper use of equipment (including which materials are permissible to cut), PPE, emergency procedures, and cleaning of the equipment.
- **Put on the required PPE:** Safety glasses to protect eyes from particles and debris, and heat-resistant gloves to protect skin from burns.

DURING USE

**REPORT ALL FIRES, INJURIES, AND NEAR-MISS INCIDENTS
(including property damage without injury).**

Visit the [Accident and Injury Reporting page](#) for more information.

- Always **supervise** the laser cutting or engraving process in case combustible materials ignite.
- Keep the area around the laser cutter **free of combustible materials**.
- Keep a properly maintained carbon dioxide (class B) **fire extinguisher nearby**.
- Only use **materials approved** for use by the laser cutter manufacturer.
- Ensure all **covers** are in place and **interlocks** are working properly.
- **Leave material** on the cutting bed until it is cool to the touch.
- If the **air filter or exhaust system** is malfunctioning, immediately stop operating the laser cutter and notify your supervisor or shop coordinator.

AFTER USE: Always clean up clutter, debris and flammable materials in the laser cutter after use.

DOS AND DONT'S

- **DO NOT** modify or disable any manufacturer safety features of the laser system.
- **DO NOT** look directly into the laser beam.
- **DO NOT** modify or disable any safety features of the laser system.
- **DO NOT** operate the laser unless all covers are in place and interlocks are working properly.
- **DO NOT** remove material from the cutting bed before it has cooled.
- **DO NOT** leave a laser cutter operating unattended.
- **DO NOT** use materials that are highly flammable, explosive or could produce toxic byproducts (refer to the safety data sheet).
- **DO NOT** use a laser cutter with a malfunctioning exhaust system or clogged air filter.
- **DO NOT** use a laser cutter with a malfunctioning exhaust system or clogged air filter.
- **DO** keep a properly maintained fire extinguisher nearby.
- **DO** visit the [Shop and Maker Space Safety](#) page on the EH&S website for resources and more information.