

Description

Laser cutters are commonly used in shops, makerspaces and laboratories across campus. Laser cutters focus a high energy laser to etch surfaces or cut materials into various shapes. To minimize the health hazards and risk of fire associated with their use, it is important to only process approved materials and to ensure the cutter is properly set up and maintained.

Hazards Associated with Laser Cutters

Fire - Materials being cut or etched may ignite and burn. At minimum, this can result in damage to the work and the machine and at worst, extend to the facility. It is imperative to minimize the amount of combustible material both inside and around the laser cutter. Ensure dust and debris are routinely removed from inside the unit and that scrap materials are cooled before disposing of them.



Emissions - Laser cutting and etching creates emissions that require exhausting and careful work practices to prevent inhalation of potentially harmful chemicals. Ensure material being cut is approved for use with the laser cutter. Never operate a laser cutter without sufficient exhaust or air filtration. Wait a bit after work is finished to allow smoke to be exhausted prior to opening the lid.

Laser Injuries - Lasers are classified from 1 through 4 where class 1 presents the least amount of risk and class 4 the most. Never defeat the interlocks or try to access the laser unit. Severe burns or injury to the eyes are possible if the laser is tampered with.

Purchasing Considerations

- Laser cutters use a high-powered Class 4 laser beam to engrave and cut. Manufacturers design the cutter to contain the laser beam so that it can be used safely as a Class 1 laser product. If you are considering the purchase of a laser cutter with higher than a Class 1 product rating, please contact EHRS as added measures may be needed to ensure user safety.
- Laser cutters have robust general ventilation and exhaust requirements. Ensure the proposed location has the infrastructure to support the manufacturer's exhaust requirements. Note that the air filtration unit options discharge a large volume of air into the space and are noisy. Laser cutters may not be installed in offices or other areas where the ventilation system recirculates air to other parts of the facility.
- Only consider laser cutters that carry the approval of a [nationally-recognized testing laboratory](#) such as Underwriters laboratories (UL) among others. The laser cutter top must be designed to help contain a fire on the cutter bed inside the unit.



Laser Cutter Exhausting Requirements

Each laser cutter will provide specifications on exhaust requirements which must be followed. Exhaust can be discharged outdoors by a dedicated exhaust system or connected to specialized HEPA/carbon air filtration unit. These can either discharge outdoors (preferred) or in the work area. The filtration units are not as effective at controlling odors and are quite noisy. If outdoor exhaust is impractical, EHRS can help evaluate your workspace to determine if exhausting back into the

workspace is an option. It is also advisable to consult the manufacturer to determine the feasibility of this approach for your specific setup. Failure to meet manufacturer exhaust specifications could increase debris accumulation in the cutting bed and fire risk.

Training

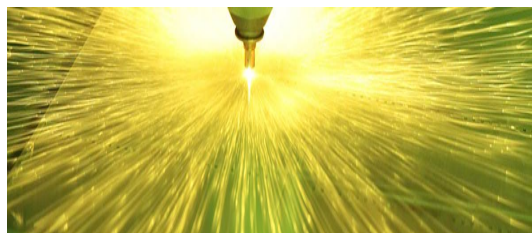
Training is essential for the safe operation of a laser cutter. All users shall be trained in the following topics before using the laser cutter:

- Potential hazards associated with the laser cutter.
- Pre-inspection of the unit to ensure that there is not excessive combustible debris buildup or clogging of the honeycomb bed.
- The materials that are approved to be cut or etched and those that are prohibited.
- The proper laser cutter settings to optimize the cutting depth, speed and path to minimize excess charring and the potential for ignition.
- Adequate cooling of scraps before disposal.
- Required maintenance after the use of the laser cutter.
- How to safely respond to a fire within the unit.

Safe Work Practices

- All laser cutter owners should have a comprehensive list of materials that are allowed and restricted to be cut/etched. This list should also have the proper settings (power, speed, material thickness) to be followed when processing each material. If you do not see a material on the approved materials list, consult with the shop/makerspace supervisor.
- Program the cutter to optimize the cutting depth, speed and cutting path to minimize excess charring to decrease the likelihood of ignition.
- Allow only trained individuals to use laser cutters.
- Closely monitor all cutting, marking, and engraving processes.
- Never leave materials in the laser cutter after processing. Remove all material from the laser cutter after use.
- Ensure all manufacturer recommended cleaning and maintenance are completed.

- Keep combustible materials that are not being processed out of and away from the laser cutter. Do not use combustible materials to increase the cutting bed height.
- Periodically clean the interior and honeycomb bed of debris.
- Do not try to defeat the system interlocks. Serious eye and skin injuries are possible.



Maintenance Requirements

Maintaining a clean system will provide the highest quality results. The frequency of cleaning will depend upon the material being cut/engraved, the performance of your exhaust system, the operating environment, and the amount of usage over a given period. The establishment of a cleaning and maintenance schedule that covers all manufacturer recommendations for their specific laser cutter is required. An example of a maintenance schedule from ULS can be found in the resources below.

Resources

- ULS Safety and Environmental Considerations - <https://www.ulsinc.com/resources/safety-considerations>
- ULS Laser Safety Considerations - <https://www.ulsinc.com/resources/laser-safety>
- [ULS Basic Maintenance Schedule](#)
- 7 Questions to ask before purchasing a Laser Cutter - <https://www.ulsinc.com/resources/uls-blog/7-safety-questions>