

Laser Cutter Safety

LASER cutting devices are versatile tools that can be used to cut or drill wood, plastics, and metals. These devices are often economical, efficient, and can easily be automated.

Classification

These devices are rated as Class 1 LASERs by the American National Standards Institute (ANSI); however, enclosed within these devices are often Class 3B or 4 LASERs. Therefore, the beams generated by these devices are safe when operated according to manufacturer's instructions, but only trained personnel should perform maintenance and other procedures that involve breaching the enclosure.

Hazards associated with use

LASER cutters typically pose little hazard from the beam itself, these devices can pose a hazard when the beam is used to cut or drill certain metals, plastics, and other materials. As the beam strikes these materials, there is the potential to produce Laser-Generated Air Contaminants (LGAC). These contaminants may be gaseous or particulate and can, under certain conditions, pose health risks to those exposed to them. The contaminant generated will depend on the type of material that is being cut or drilled. Cutting or drilling of some materials can generate airborne benzene, toluene, hydrochloric acid, isocyanates and other by-products, which may be hazardous.

Exposure control

To control the LGAC associated with cutting or drilling certain metals, plastics, and other materials, filtration and/or exhaust systems must be used to reduce or eliminate personnel exposures. In addition to reducing or eliminating personnel exposures, proper removal of contaminants is essential to ensure a properly functioning LASER cutter, as well as producing a quality product.

Filtration Systems

- Air from the LASER cutter is passed through one or more filters.
- Contaminants filtered will depend on what types of filters are used
- High Efficiency Particulate Air (HEPA) filters are used to filter out dust and metal fumes.
- Charcoal filters are used to filter out chemical gases and vapors.
- Filters must be changed according to frequency of use and/or as specified by the manufacturer. Filters can be safely disposed of via ordinary trash.

Exposure control

Exhaust Systems

- Air from the LASER cutter is exhausted via duct work outside of the building through the use of a blower.
- Exhaust systems must be installed by OPP or Commonwealth Campus maintenance staff.
- Exhaust systems must be cleaned and maintained as specified by the manufacturer.

Fire Hazards

In addition to LGAC, LASER cutters also pose a fire hazard. LASER cutters use a high intensity beam of LASER light that can produce extremely high temperatures as it comes into contact with the materials it is engraving, marking or cutting. To further increase the risk, some of the materials used in the LASER cutter are flammable and can ignite inside the cutter. The following tips will help reduce fire hazards when using LASER cutters:

- NEVER operate the system unattended.
- Always keep the area around the cutter free of debris, clutter and flammable materials.
- Always keep a properly maintained and inspected fire extinguisher in the area. Typically, Carbon Dioxide (CO₂) chemical fire extinguishers should be used.
- Always use the “air assist” feature when vector cutting.
- Keep the interior of the LASER cutter, including the table tray, clean and free of debris. To clean the table tray, remove the vector grid and clean out the tray using a cloth, small brush or vacuum cleaner. A high-efficiency particulate air (HEPA) filter rated for use, by the manufacturer, for metal particles is recommended.
- Ensure your filtration or exhaust systems are properly cleaned and maintained.

TRAINING

Prior to use, all users must complete LASER safety training and read the LASER cutter manual to understand its use and how to use it safely. In addition, written procedures should be present and reviewed by users prior to use. These procedures should include steps to take in the event of fire or other emergency.

The Laser Fundamentals and Safety training course is found at the Penn State EHS training website under the Radiation Safety category. Visit www.ehs.psu.edu and use the “quick link” on the homepage to access the EHS training website. For additional information, read the LASER safety snapshot, http://ehs.psu.edu/sites/ehs/files/ehs_snapshot_-_laser_safety_program_2-2016.docx.

LASER REGISTRATION

LASER cutters must be registered with EH&S upon purchase.