



Laser Welding & Cutting Safety Basics

LASER - Basics

LASER What is it?

A laser is a device which produces an intense, coherent, directional beam of light. The term LASER is an acronym for Light Amplification by Stimulated Emission of Radiation.

Lasers can be designed to deliver a large amount of energy to a very small area. In welding and cutting operations, this energy can heat metals quickly to very high temperatures.

Much of the radiation that strikes the workpiece is reflected into the environment, creating hazards. Some laser light used in laser welding equipment is invisible, so the hazard may not be readily apparent.

How the LASER Works

Typical lasers use electricity to create the unique coherent light that is very different from ordinary non-coherent light, such as that from a light bulb. Coherent light can be tightly focused and is not diffused or scattered like ordinary light. This coherent light beam is parallel and can be focused to cut or weld metals.

Laser light can be different colors of the visible light spectrum, or can be invisible when the light is ultraviolet or infrared.

Lasers used for welding and cutting may be infrared, and therefore the beam may be invisible. It is very difficult to take precautions against things one cannot see.

It is even more difficult to convince others to take precautions against hazards they cannot see and may not understand.

Potential Hazards

Radiation: Both visible and invisible light radiation are produced when welding or cutting. Due to the interaction with the workpiece, high levels of hazardous blue light and ultraviolet radiation (secondary radiation) are produced.

This light radiation is often reflected from the workpiece into the work area. Radiation from these processes can seriously burn eyes and skin quickly and permanently.

Fire: Since the laser system produces a very small spot of high energy, the hazard of fire is present if the beam hits flammable material. Keep flammables away from the welding or cutting area. Be sure to cover and protect anything flammable in the area, since reflected radiation could start fires in unexpected places.

Fumes and Mists: Lasers easily vaporize metals. In doing so, fumes and mists are created which can present a respiratory hazard. Often the fumes and mists cannot be seen, yet they can pose a serious health hazard. Always use adequate ventilation.

Mechanical: The optical device on the robotic arm or other beam manipulator can malfunction and send the laser beam in unintended directions. Therefore, it is essential that the work cell be shielded in conformance with standards for the laser type and class.



LASERs can do some amazing things, but it is imperative that all employees working with them understand the hazards and comply with all safety precautions.



Electric Shock: Since lasers require a large amount of electrical power to accomplish specific tasks, electrical hazards are present. Conventional hazards associated with any electrical industrial power source are present. Additionally, there are the unique electrical hazards common to lasers in general and the hazard of the individual application. The best source of safety information is provided in the instruction manual from the manufacturer of the laser system. Always read, understand, and follow the manufacturer's recommended safety procedures.

Eye and Skin Damage: In many situations, special laser eye protective devices are required. Eyewear must be labeled with both the optical density (protective factor) and wavelength(s) for which the protection is afforded. In addition to the primary hazard of the laser beam, there may be a considerable eye hazard from high levels of secondary radiation. The eyewear must meet the manufacturer's specifications for the laser system in use and protect from any secondary radiation.

Any laser eyewear protection must be labeled with the wavelength(s) of protection and the optical density at that wavelength(s). In some laser systems, ultraviolet light may be leaked into the workplace. Thus the eyewear should provide primary beam protection, secondary radiation protection, and also ultraviolet protection.

LASER Safety Officer

All laser welding and cutting installations are required to have a laser safety officer (LSO). The LSO is responsible for personnel protection, laser cell class conformance, and enforcement of all laser safety regulations. Be certain to follow recommendations from the laser system manufacturer. In addition, provide certified laser protective eyewear, clothing, and shields where required.

Eye Injury Symptoms

- The onset of a headache shortly after exposure, excessive watering of the eyes, sudden appearance of tiny spots, or threads, that drift in your field of vision (floaters).
- Minor corneal burns cause a gritty feeling, like sand in the eye
- The exposure to a visible laser beam can be detected by a bright colour flash of the emitted wavelength and an after-image of its complementary colour (e.g., a green 532 nm laser light would produce a green flash followed by a red after image).
- Exposure to a near infrared beam 700 to 1400 nm is especially hazardous. There is no blink reflex initiated and may initially go undetected because the beam is invisible and the retina lacks pain sensory nerves. The onset of symptoms may occur a while after the incident.
- Acoustical or thermomechanical retinal damage may be associated with an audible "pop" at the time of exposure. Visual disorientation due to retinal damage may not be apparent to the operator until considerable thermal damage has occurred.



SAFETY TRAINING SIGN-IN

Company Name: _____ Date: _____
 Subject: LASER Welding & Cutting Safety Basics
 The following employees participated in this training.

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2. _____
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