

CATHARINA DAUM

# Better safe than sorry: unmasking dangerous lasers

**Carelessly built enclosures, fake safety glass, bridged light barriers - anyone working on the wrong laser is living dangerously. Unfortunately, not all suppliers meet the justifiably high standards for laser safety. This is especially true for solid-state lasers. Incorrectly installed, their radiation can injure eyes, cause blindness and lead to burns. Five characteristics that indicate when a system is laser-safe:**

## Enclosed beams

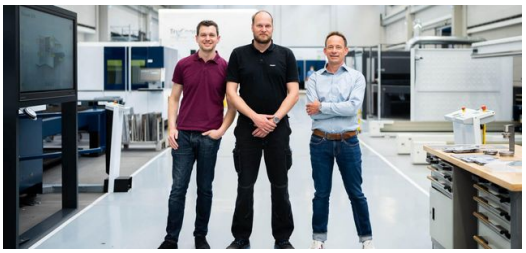
If the enclosure of a machine has no gaps, it protects against laser beams. This is the case with systems that can be loaded and unloaded outside the machine body, such as 2D laser cutting machines from TRUMPF. This is yet more difficult with punch laser machines - here, more design know-how is required. Operators must be able to load and unload them directly at the work table with the laser cutting head. Automatically raised protective walls are one measure to intercept dangerous radiation. Once the machine has finished its work, they go down again, allowing the operator to approach the machine directly.

## Hoods for shielding

In order to intercept as much radiation as possible directly at the source, reputable manufacturers rely on additional measures for machines without a closed enclosure. With punch laser machines from TRUMPF, for example, this job is performed by hoods that are placed over the processing heads. On laser tube cutting machines, several layers of strips cover the enclosure of the work area on the unloading side. This curtain is designed to prevent laser light from escaping while the machine guides the tube out of the processing chamber.

## Lasers only seen through protective windows

In many systems, the production process can be monitored through a window. To ensure that the operator remains unharmed, the plastic window must not allow any radiation to pass through. This is not just a matter of the light of the original laser beam. Because while cutting with solid-state lasers, so-called secondary beams in other frequencies can be generated in addition to this infrared cutting beam. For example, ultraviolet (UV) rays can be formed during the processing of metals. The pane must also reliably shield this light. Laser-safe windows can usually be identified by their green color. But be careful: not every pane is automatically safe. In addition to a CE marking, a laser-safe pane also bears other information, such as its protection level.



In Ditzingen, many colleagues deal with the topic of laser safety, for example Andreas Pfaff, Florian Reckziegel and Axel Körner (from left to right). As Safety Architect, Mr. Körner is responsible for machine tool safety. Andreas Pfaff and Florian Reckziegel work in 2D laser development and test machines at an early stage.




On the <a href="https://www.trumpf.com/en_INT/products/machines-systems/punch-laser-machines/trumatic-3000-fiber/">TruMatic</a>, hoods shield the processing head, and protective walls on the work table move up if necessary.



Laser-safe windows can usually be identified by their green color. In addition to a CE marking, a laser-safe window comes with further information, for example, on the protection level.

## The intervention of light barriers and sensors

If a person enters the processing area of a laser cutting or welding system, the machine must stop immediately. The laser beam must be switched off. Light barriers and safety switches should be available for this purpose. The same applies to worn equipment: if the cable that guides the laser light to the cutting head is damaged, sensors automatically switch off the laser. Protective devices take care of this. In addition, sensors in the laser light cable detect whether it is connected to the cutting head without any gaps, so that radiation does not escape anywhere.

## The clean extraction, filtering and disposal of hazardous substances

Hazardous substances are generated during laser material processing. We are talking about tiny particles and gases. They can damage equipment and are dangerous for people and the environment. For this reason, the machine must be equipped with an extraction system. It captures the hazardous substances and feeds them to a filtration system. Thanks to it, pollutants can be separated from the air and disposed of cleanly.



It’s not only in Ditzingen that TRUMPF has laser safety experts. Employees at TRUMPF Schweiz AG in Grüsch also deal with this topic, for example Roger Toenz. Together with his team, he is responsible for the housing and trim of the 2D laser and punch laser machines. We asked him about the challenges of his work: 
"The "cladding" of a machine must not only be visually appealing, but also meet the highest standards in terms of laser safety. That's why we address this issue at an early stage and examine every prototype for potential gaps where dangerous laser radiation could escape. If we find such gaps, our colleagues in the design department have to take another look. Later, during series production, the production staff also inspects the systems on the basis of documents specially prepared by us. This also happens on site at the customer’s during installation, or when machine parts are mounted and dismounted during a service visit. Here, too, the service engineer subsequently checks the cladding elements that play a role in laser safety. When it comes to this issue, the rule is: Better safe than sorry!"



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