

## Safety Laser Scanners vs. Safety Mats – Which One Do I Choose?

For over half a century, safety mats have been used in virtually every industry as a standard form of area protection in the plant environment. For an old technology in a technological age, safety mats have proven quite resilient.

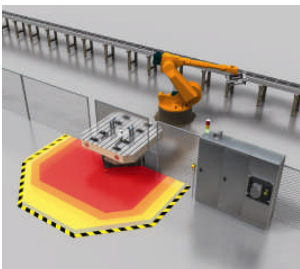
Typically, safety mats operate using an open switch. When a specified minimum weight is brought to bear on the safety mat, the switch closes. This sends a signal to the mat controller that subsequently sends a protective stop signal to the machine being guarded by the mat, stopping its operation. However, safety mats are subject to abuse: physical, environmental, and operational. Obviously, for safety mats to perform their designed function, they must be contacted, which wears them out.

Since the introduction of safety mats in the 1950s, a host of new technologies have emerged for safety applications, including safety laser scanners in the 1990s. Until recently, the argument for safety mats has been that scanners are four times the cost. But now, the initial price point of laser safety scanners has fallen by 50 percent; when total cost-of-ownership is considered, the overall ROI for safety scanners is significantly better than safety mats. If you have to replace a safety mat once or twice, you've exceeded the cost of a safety scanner; this doesn't even factor in the improved safety and higher productivity scanners enable. These latter factors are the principal reasons laser scanners have largely supplanted safety mats in the EU, particularly the improved safety functionality.



### ***A Closer Look at Scanner Technology***

State-of-the-art safety laser scanners use time-of-flight technology. A pulsed laser beam is emitted and reflected if it meets an object. The scanner's receiver registers the reflection. The time between transmission and reception of the impulse is directly proportional to the distance between the scanner and the object. This method represents time-of-flight technology that is best in its class. An internal rotating mirror deflects the pulsed laser beam so that a fan-shaped scan is made of the surrounding area. The contour of the target object is determined from the sequence of impulses received. The measurement data is available in real time for evaluation via the data interface.



Safety laser scanners define safety and warning fields, also referred to as zones. These zones are freely programmable (with configuration access rights) and can be changed dynamically by an input to the safety scanner. Once an object is detected in the defined warning field, the scanner initiates a warning output signal (an audible or visible indicator) that can be used to notify someone in the area that they are entering an area where there are potential hazards. When an object enters the safety field, a safety stop can be initiated to safely stop the hazardous motion of the machine.

### ***Powerful Advantages***

Laser safety scanners provide a number of key advantages over safety mats:

- Non-contact functionality
- Adjustability
- One-piece design
- Warning field protection

### Non-contact functionality

Safety laser scanners function without needing physical object contact by providing protection through infrared lasers. One of the biggest issues with safety mats is that they stop working, either because people repeatedly step on them (after all, that's what they're designed to do) or because tools, products, lubricants, fork trucks, or other environmental "hazards" come into contact with them. This causes downtime and increases the frequency of replacement.

In contrast, safety laser scanners are typically mounted in a secure, recessed area of the machine, out of harm's way. Since its only active mechanism is an outgoing laser, nothing physical will impair operation. Further, scanners have enhanced flexibility. For example, oil and grease seepage problems in a protected environment will not cause the laser scanner to trip because parameters can be adjusted so the device ignores these types of issues.

If a mat fails because of physical contact, a machine will likely have to be shut down, depending on a company's internal processes and procedures regarding safeguarding. This shut down will remain in effect until the safety mat is replaced by one in stock or another is purchased and shipped. This process takes time and disrupts production, in addition to incurring capital costs, including shipping costs. Laser safety scanners are not subject to this risk.

### Adjustability

Safety mats are often limited in use by their initial application. In manufacturing facilities, safety mats are purchased to cover specific machines; for example, one machine setup may require 4 x 4 mats, while another uses 6 x 6 mats. In other cases, such as when new machines are bought, an operation grows into new facilities, or floor plans are adjusted within existing facilities, an original safety mat designed for a 4 x 4 area may no longer satisfy the requirement. A new mat must be purchased or a different one secured from stock. On the other hand, with the safety laser scanner and its warning and safety fields, everything is freely programmable. Using the original scanner, a user can easily configure the fields to whatever size needed for operations, however they change.

### One-piece design

Safety laser scanners are self-contained devices. Some types have a "system plug"—basically, a memory module, which enables the data to be automatically downloaded into the new scanner head to define the safety field. From a replacement perspective, there's no fudging or re-programming. In contrast, safety mats typically have multiple parts: the mat and a control box. If a safety mat needs to be replaced, sometimes the control box will need to be changed, too.

Because they are not "one-size fits all," mats also present stocking issues. For example, if a manufacturer has 20 machines, he might have to stock various sizes of mats for the different machines and floor plans required. Moreover, if the manufacturer buys new safety mats, and there's a change in version, there may be an incompatibility problem with some control boxes. With the laser safety scanner, you simply take the output and go into any safety relay.

### Warning field protection

The importance of the warning field is that it provides another indication—to operators, people moving through the area, fork truck drivers—that they are getting too close to the machine, and will interfere with its operation if they come any closer. Like the safety field, the warning field is freely programmable. If the scanner senses somebody in the described warning field, it gives a discrete output, typically attached to a flashing light or some sort of horn.

Consider this alternative: a machine is running, producing parts. In a typical safety mat situation, you can see where the safety mat is if you are paying attention. If you are not paying attention—reading prints or watching the machine—and step on the mat, you will stop the machine.

From a company standpoint, production is lost for the time it takes to reset the machine. Depending on the machine, this can be a complicated process. So stepping on the safety mat can cause anywhere from a 10-second delay to a several hour delay—unlikely to occur if a warning field had been activated beforehand.

***A Smart Choice***

There was a time when safety mats made sense, but safety laser scanners are relegating that period to history. By providing better protection and ensuring continuity of production at less cost over the life of a machine or facility, safety laser scanners have become the component of choice for machine safeguarding and other safety applications within the plant environment.

Maximum productivity and protection at minimum cost over time: that's the smart choice.

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