

Exploiters and machine safety

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Although contemporary machinery or units comply with the EC-Directives for Machine Safety, machine buyers or users still have no letter of safe conduct to forget about safety matters. The layout and set-up of safety devices offer many possibilities and the choice also has an influence on machine productivity.

Contemporary machines generally comply with the essential requirements of the Machine Directive and its apparent standards. They all bear the CE marking and the documentation indicates the standards observed during construction. However, the company manager or safety engineer still has to deal with many safety matters and a thorough consideration of the different options for hazardous area monitoring is highly recommended.



Image 1: New safety light curtains and light grids with integrated muting sensors can distinguish between man and material.



Image 2 : Safety switch and safety sensor with the same dimensions

Operating principle: without physical contact or mechanical?

The user always has to determine the best suitable type of safety device for a particular safety function; to this end, he can choose between conventional safety guards and fences or safety devices without physical contact such as safety light barriers and grids. Optoelectronic devices anyhow offer a higher degree of flexibility. For instance, the new safety light curtains and safety light grids with integrated muting sensors (image 1) can distinguish between man and material. Goods and objects can be transported into the hazardous area, without the machine being stopped; the light curtain is temporarily by-passed with a time control. On the other hand, if an operator approaches or enters the hazardous area, the machine will be immediately stopped.

Safety guards: sensors instead of switches

Conventional safety guards allow for a monitoring without physical contact as well, provided

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that safety sensors are used instead of safety switches. Originally, these sensors with their fully smooth surface were mainly used in food industry for hygienic reasons. Meanwhile, the other lines of business also have discovered other advantages of these safety sensors, such as a larger tolerance for the safety guard. The latest safety sensors have the same dimensions as the standard safety switches (image 2), thus allowing for a full compatibility.

Increasing productivity with solenoid interlocks

For productivity reasons, solenoid interlocks are even more suitable than conventional safety switches. Solenoid interlocks can ensure for example that the running production cycle is fully terminated, before the operator is authorised to open the safety guard. To achieve a maximum safety, the solenoid interlock can be combined with a fail-safe standstill monitor or – in case of constant run-down times – a fail-safe delay timer. The Schmersal Group has published an informative brochure containing many practical hints regarding the choice and the integration of solenoid interlocks in the safety circuit.

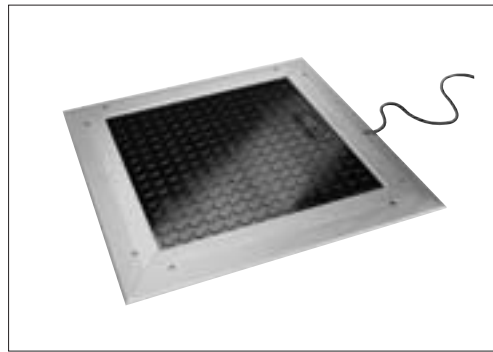


Image 3: Safety mats are frequently used for their robustness, especially in car industry.

A third possibility: tactile safety devices

Apart from electromechanical and optoelectronic safety devices, tactile safety devices such as safety edges and safety mats can be used for hazardous area monitoring as well. Safety mats are used for hazardous area protection in the proximity of industrial robots. They allow for a smooth adjustment and adaptation to changed environmental conditions. Schmersal offers a modular system that can be arbitrarily combined (image 3). Safety mats are a reliable robust and advantageous safety system that is frequently used in automotive.

Safety edges are suitable for the protection of shearing and crushing points. Schmersal offers safety edges with optoelectronic operating principle. Instead of using mechanical contacts, a safety light barrier is integrated in the rubber profile; upon interruption of the light beam, the light barrier instantly transmits a signal to the safety monitoring module (image 4), which immediately shuts down the dangerous movements. These safety edges are fit for self-wiring.

Operation: ergonomics are the key element

Ergonomics are a very important (and often neglected) element that can highly contribute to machine productivity. This applies to handles, which are frequently used, as well as for other components that require an instant action in case of danger, such as the actuation of an emergency stop button. Therefore, the environmental set-up of the emergency stop is very important. For example, larger units preferably are equipped with a pull-wire emergency stop switch that can be operated over the entire cable length (up to 50 meters).

Another important issue is the location of the release button of solenoid interlocks. The best solution certainly is a direct integration in the door handle (image 5). The TG series door handle switches can also be equipped with further safety components such as emergency stop buttons and a reset button.

Indicating elements: information is important

The integrated LED's of the door handle switches also provide the operator with information regarding the condition of the solenoid interlock and the safety guard (locked or released). Although often neglected in praxis, this aspect deserves particular attention. The better the operator is informed, the better he can take care of the machine's and his own safety. Possible danger alerts can be signalled by means of stack lights; Schmersal's modular range includes different colours, luminous sources (filament) bulbs or light emitting diodes), light modules (continuous light, blinking light or flashing light) and mounting accessories to compose a suitable stack light system - if necessary even with integrated sounder module.

Conclusion: many possibilities

In no way, this article claims to give a thorough and complete discussion of all safety issues. The subjects discussed are only intended as reminders, to show the many different ways to realise a particular safety function. In addition to the essential requirements of machine safety – which weren't even considered in this article – the technical safety equipment and adjustment of machinery or their integration in the production environment are open to many solutions.



Image 4: Safety edges with optoelectronic operating principle: an infrared sensor detects the activation of the rubber profile.

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Corporate managers and safety engineers therefore should thoroughly examine the specific situation, so that they can choose the appropriate options to achieve a higher safety level as well as an improved productivity and machine availability.

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Image 5: The TG door handle switch integrates all important elements in one and provides the operator with information regarding the condition of the safety guard.

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