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Seven tips for choosing safety switchgear Cover Story - Factory Automation

The securing of danger point and danger zones is one of the „classic“ activities of a designer and is also one of the especially demanding tasks, as a comprehensive set of regulations must also be taken into account here. To simplify this task for the designer, the following article provides several tips from the standpoint of a safety switchgear manufacturer.

Probably the worst way to meet the machine safety requirements is the following: The designer initially drafts the machine or system with all its functions and without taking safety into account. In the second step he concerns himself with the required protection equipment and the safety switchgear. A procedure of this kind will definitely be sub-optimal. These seven tips show how to do it better:

Tip one: Optimal integration in processes

The name of the game for the acceptance and function of the protective device is its optimum integration in the process. Therefore, the safety should be „designed into“ the machine or the automated system from the outset (Fig. 1). Then a key condition is created for the highly productive and at the same time safe operation of the machine.



Figure 1
The machine safety should be „designed into“ the machine and systems from the outset.

Tip two: Observe directives and standards

This procedure is also described in the machinery directive, which requires an „inherently safe design“ or „immediate safety“. This is not, however, the only reason why it is a matter of course and the duty of the designer to observe the applicable directives and standards. This can definitely be considered an asset and not an additional burden. For especially the newer standards offer practice-oriented assistance for the configuration of protection devices (prEN 14120) and the choice of safety switchgear (DIN EN ISO 14119; see text box).

Tip three: Take maintenance and troubleshooting into account

During the risk evaluation and generally during the configuration of the protection device, it is not sufficient to take normal operation of the machine or system into account. During maintenance and – very important – during troubleshooting, an over-proportional number of occupational accidents occur. The protection devices should be attuned to this by already considering during the design phase which risks can occur during maintenance and troubleshooting.

Tip four: Check all possibilities during risk protection

It need not always be a movable guard, i.e. a safety gate. Alternatives, such as optoelectronic or tactile protection devices (e.g. safety light curtains and safety mats;

Figure 2), are available to the designer which enable additional flexibility in many cases. There are also a broad range of possibilities for position monitoring of safety guards. For example, contact-free safety sensors can be used instead of electromechanical safety switches. The latest series are equipped with safe RFID technology and are available in various coding versions (Figure 3). With the solenoid interlocks there are new series with innovative mechanical operating principles and contact-free systems with electromagnetic interlocking (Figure 4).

Tip five: Use additional functions

Especially (but not only) new designs of safety switchgear offer interesting functions which above all simplify the integration of the protection device in the process. An example of this is the specific beam muting or blanking for safety light curtains, which enables a differentiation of people and materials, therefore optimising the material flow. Another example are solenoid interlocks with an integrated latching function. The door does not spring open when unlocked. The adjustability of the latching force is a useful

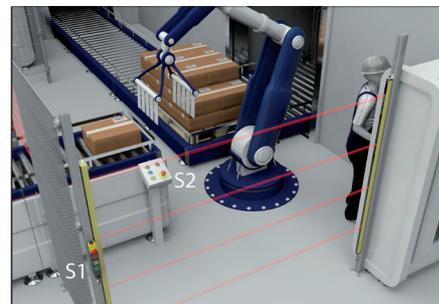


Figure 2
Optoelectronic protection devices contributes flexibility to the process.



Figure 3
The latest generations of safety sensors with RSS technology are available in various coding versions

detail. On safety switchgear with this function, the force which has to be applied when opening the safety gate can be adjusted to the requirements (or the physical strength) of the operator.

With the signal transmission and evaluation as well, there are many possibilities which, for example, simplify the integration of the safety switchgear in the communication networks (AS-i safety) or increase the diagnostic capability (SD bus).

Tip six:
Think of the ergonomics

Simple, intuitive operation should be one of the development goals for any protection device. This means that the operating and display elements are located as close as possible to the safety gate and can be operated with a clear view of the process (Figure 5). This also includes



Figure 4
Design diversity: There are also solenoid interlocks without a mechanical interlock system.

the operating knowing or recognizing how to stop the hazardous movement in an emergency. Here as well, maintenance and troubleshooting should be considered. An example: In accessible danger zones it is advisable to install an emergency release („panic handle“) which enables (service or cleaning) personnel accidentally locked in to exit the danger zone.

Tip seven:
Reduce tampering incentives

Several studies have shown that there are machines in approximately one-third of the producing companies with protection devices which have been tampered with. So the user should not underestimate this risk. And the designer should prevent this by not creating any incentives for tampering. This is best achieved (see tip number one) when safety has been „designed into“ the machine. In addition, the use of coded safety switchgear, which can only be tampered with at considerable expense, is advisable. Corresponding designs are described in the new standard ISO 14119 (see above).

Conclusion:
The designer has the choice

As the quintessence for Good Engineering Practice when designing and/or choosing protection devices, it can first of all be stated that the machine safety should already be taken into account at a very early stage of the design process. Second, maintenance and troubleshooting should be included in the risk evaluation. Third, the designer should not underestimate the subject of „Tampering with protection devices“.

When implementing these recommendations, various designs and models of safety switchgear are available for the machine builder to choose from. Furthermore, comprehensive information materials (see text box) and advice and support in the form of consulting services are offered by the manufacturers, like the Schmersal Group, mechanical engineering and the machine users.

Brochure on ISO 14119 – Book on Machine Safety

The new standard ISO 14119 describes how the designer should design the position monitoring of movable guards (i.e. safety gates). It replaces the previously valid EN 1088 and is valid worldwide as an ISO standard, i.e. beyond the European Union. The transition period already ends on 1 May 2015.

The Schmersal Group has summarized the main changes that arise due to the new standard in a 24-page brochure. A poster is given with the brochure as a further aid which clearly illustrates the standard-compliant sequence when configuring protection devices and the selection of safety switchgear. The free brochure can be requested by E-mail (info@schmersal.com). It is available as a download (www.schmersal.com).

For designers who would like to study the subject in greater depth, Schmersal has published the book „Machine Safety in Europe“. In 30 essays, 26 authors present the applicable rules of machine safety on 400 illustrated pages. In the process they cover everything from functional safety to fluid technology and the pressure equipment directive. The book is available at a price of Euro 29.90 Euro in book stores under the ISBN 978-3-935966-25-2.

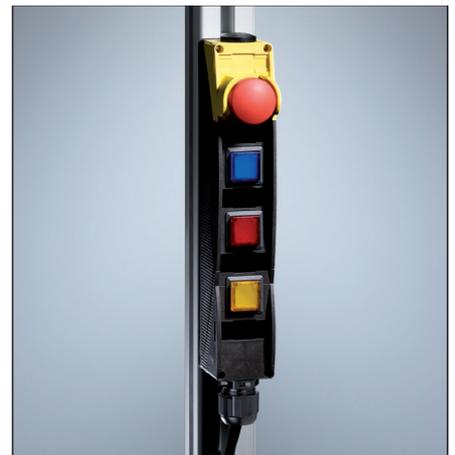


Figure 5
Ergonomics of the safety gate: The controls should be mounted close to the gate and therefore within the operator's field of view of the machine functions.

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