

Safety and ergonomics on machine-tools

Processing metal productively and safely

Any visitor of EMO, who has checked out the latest machine-tools, will have noticed that many machines have once more become more powerful. The safety technology supports this general trend as well: new safety switchgear provide for an optimal integration of the safety functions in the processes and the work cycles of the operators.

The user requires that machine-tools feature a high productivity as well as short cycle times. The so-called non-productive times, e.g. for set-up and retrofitting, must be kept as short as possible as well. In addition to these requirements, the machinery safety also plays a role. The safety equipment must not interfere with the performance of the machine and, if possible, should not have



Image 1
The AZM 200 solenoid interlock is already intensively used in the machine-tools construction

a delaying effect onto the processes. The new generations of safety switchgear take these requirements into account. They were developed, bearing in mind the new operating modes which are explicitly allowed by the

revised Machinery Directive. The market of safety switchgear moreover encourages the differentiation as well: for instance, component series are available, which have been especially developed for the machine-tools construction or for defined categories of processing machines.

Safety during laser machining – also in set-up mode

These series include for instance a new variant of the AZM 200 solenoid interlock, which has been developed in collaboration with a manufacturer of laser machining plants. When the plant is running in "set-up mode", a service technician enters the hazardous area of the plant through a safety guard to adjust the (stationary) laser or parts-feeding robot. In this situation, any outward projection of the laser beam due to a deflection by a metal part must be avoided. It therefore is imperative that the technician closes the safety guard behind him. At the same time, it must be ensured that no second person accesses to the hazardous area or that the plant is shutdown due to the safety guard being opened.

The smart way of protecting

In order to meet these requirements, former machine generations were equipped with a safety sensor, besides the solenoid interlock, to retrieve the guard door's position "closed and not locked". The designers of the machine builder however searched a simpler and integrated solution to realise the protection. The engineers of Schmersal's Application Center solved this problem by modifying the AZM 200 solenoid interlock.



Image 2
A new variant of the AZM 200 solenoid interlock also detects the position "Guard door closed, but not

The basic version of this safety switchgear, which is already used by the machine builder for some years to protect the safety guards installed on accessible hazardous areas, offers, amongst other things, the advantage that no second safety switch with different operating principle is required. And as all functions are combined in two compact units, no additional door-handle is needed either (image 1).

The normal version of the AZM 200 retrieves the position of the door and the actuator through an integrated non-contact CSS sensor. Only when both targets are detected, both safety outputs are enabled. The new variant AZM 200 D (image 2) evaluates both targets separately and two safety outputs are assigned to each target. In set-up mode, only the door target is retrieved so that the plant can be set up with the door ajar. In this situation, the

safety circuit detects the safety guard position "closed though not locked". However, in normal mode, both targets – door detection and actuation – are evaluated. Because of this modification, two safety functions can be realised with a single safety switchgear.

The practical advantage for the user of the laser plant is that the service technician can leave the hazardous area at all times, since the door is not locked. Simultaneously, it is ensured that no second technician can access the hazardous area: as soon as the door is opened, the laser-machining plant will be immediately switched to a safe state. In this way, all safety requirements are met and the machine builder does not have to install other components such as a separate latch key: this solution simplifies the fitting, reduces the costs and simply looks good.



Image 3 (AZM 200 mit B 40)
For laser-machining plants and sound-insulating doors: AZM 200 with enlarged door plate

Special actuator for sound-insulating doors and laser plants

Another variant of the AZM 200 was developed for laser-machining plants: an actuator with enlarged door plate (image 3). It bridged the additional distance resulting from the overlapping of the safety guard and the machine enclosure.

The system includes also an emergency release with red "panic handle". This feature enables an operator, who is trapped inside the hazardous area, to open the safety guard from the inside. The "extended" actuator is the perfect choice, not only for laser-machining plants, but also for all other machines equipped with overlapping safety guards and special sound-insulating doors.

New industry portal for the machine-tools construction

The Schmersal Group strengthens its industry focus, not only by developing safety switchgear dedicated to the individual industries. It also provides the target industries, which requires a further enhancement of their already strong market presence, with a selection of industry-specific information and news. Since a couple of months, industry portals for, amongst others, the food-processing industry, the packing technology, the elevator industry and the wood-working industry have been activated, which are directly accessible from the central homepage www.schmersal.com. Right before the EMO trade fair, the industry portal for the machine-tools construction has been released.

Enabling switch for special operating modes

The new Machinery Directive (2006/42/CE) allows the use of so-called special operating modes. This means that the machine may be operated with the safety guard open under accurately defined circumstances, e.g. during set-up.

Formerly, these operating modes were only described in C-standards for individual groups of machinery, e.g. in EN 12417 for machining centres. They considerably facilitate retrofitting or maintenance activities and therefore distinctly reduce the period of inactivity of the machine. The machine builder anyhow must implement additional measures to guarantee the standard-compliant protection of persons when special operating modes are applied.

The focus here is on manually operated enabling switches (image 4), which the operator must hold down in centre position when the machine is operated in a special operating mode at reduced speed with the safety guard open. If the operator releases the button of the switch or depresses the button beyond a centre position, the control command is interrupted in a safe manner.

The machine builder can choose between different types of enabling switches, which can all be integrated into the safety circuit in accordance with the standards, despite their



Image 4 (Zustimmungstaster)
The enabling switches provide the builder of machine-tools with new degrees of freedom for the use of special operating modes.

distinctive enclosure design and additional functionalities. These series also include a wireless variant communicating through the safety-related „ESALAN Wireless“ radio standard. It is highly recommended that the machine-tools builders make use of these safety switchgear and the new degrees of freedom they offer, thus offering the advantages to the machine users. These degrees of freedom also include for instance the possibility to check new format settings or to accurately program or teach movement sequences. They enhance the ease of use and minimise the retrofitting and set-up times.

Outlook: innovations in optoelectronics

Schmersal has exhibited the here-described safety switchgear at EMO. They will also be presented at SPS/ IPC/ DRIVES 2011. For this fair, other innovations, e.g. in the field of optoelectronic safety devices are prepared, which are also interesting and advantageous to the machine-tools construction.

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