

Concepts for secure safety gate monitoring -The right sensor for every requirement

Increasing automation in mechanical engineering means that the demands on machine safety are also rising. Aspects of process safety, availability and cost-effectiveness must all be reconciled. Safety guards or gates ensure that operating personnel are protected against flying metal swarf or hazardous movements on plant and machinery. Their position can be monitored by a wide range of safety switches available on the market, which take into account not only safety-related aspects but economic considerations too. The switch you use will depend partly on the machine and partly on the safety-related requirements.

In accordance with European and domestic law it is the machine manufacturer's responsibility only to place safe machinery on the market. So it is necessary to carry out and document a hazard analysis and risk assessment in advance. The safety concept for the respective plant or machine can then be worked out from the risk assessment. Flaps, fences, enclosures and safety gates are all used to protect operating personal from potentially hazardous processes.



It's also important to protect against potential emissions such as noise, dust or relevant work equipment such as cutting oils and flying metal swarf. In the food industry it is also necessary to satisfy hygiene requirements.

To give operating personnel as much freedom as possible, lift gates and rolling shutter-like constructions have become increasingly popular alongside the classic swing gates or sliding gates. The fact that plant and machinery have become ever more compact means that the sensor technology protecting the safety gates has had to adapt accordingly. This has resulted in a wide range of version types, which meet high IP protection classes or have ATEX approval as well as having the required resistance to cleaning agents.

Machine designers are generally responsible for selecting safety components; they can currently choose from a wide range of safety switches, which offer various design options and operate to different principles. The challenge is to harmonise safety, productivity and user friendliness on the plant or machine. Productivity is the first priority. However, if user-friendliness lags too far behind, it is not unusual for safety equipment to be manipulated. For this reason the designer also has the task of identifying potential reasons why devices might be manipulated and to eliminate these in advance at the machine's development stage.

These days, non-contact safety switches are increasingly used to protect safety gates – in accordance with the risk classification – rather than mechanical safety gate switches or roller switches. The benefits of non-contact solutions are obvious: less work required for precision adjustment and a significantly higher service life.

Robust, non-contact, safe Non-contact safety switches operating to different principles have been available on the market for many years. Rugged and compact, Pilz safety switches PSENmag are used on gates which are operated frequently or in areas with high environmental requirements due to dust or humidity, as in metal processing, the food industry or woodworking, for example.

Coding protects against manipulation

Non-contact safety switches with transponder technology (RFID) are a recent trend, but no less established. They combine all the benefits of non-contact safety switches with maximum manipulation security thanks to individual actuator coding. Built-in “intelligence” means it is possible to achieve a high level of safety with just one switch. When used with machine tools and machining centres with cutting functions, coded safety switches such as Pilz’s PSENcode have the advantage of not attracting metal swarf, unlike non-contact magnetic safety switches.

Guard locking devices provide safety

Safety-related guard locking devices are used where cramped conditions mean that safety guards have to be located close to the hazardous movement. In this case, safety gates not only have to be safely monitored but securely locked as well. A mechanical guard locking device prevents the gate from being opened.

As a result, the operator is still safely protected in the event of a dangerous overrun movement. For safety reasons it may also be necessary to disable the guard locking device only in conjunction with safe standstill detection or a safe delay time.

Another field for guard locking devices can be found in protecting the process cycle. For example, a “gluing process” cannot be interrupted at just any position, whether intentionally or by accident, as this would adversely affect quality. The disadvantages of safe guard locking devices or guard locking devices for process protection lie in their service life and in the amount of mechanical adjustment that is required.

Magnetic force keeps the gate closed

Relatively new to the market are process guard locking devices with integrated, safe position monitoring based on a magnetic action principle. They combine secure safety gate monitoring with a non-contact magnetic interlock of 500 N or 1000 N in one unit. With a compact design and IP67 protection, this guard locking device is also suitable for use in contaminated environments or in environments with high hygiene requirements, such as the food and packaging industry. The demands on safety-related safety gate monitoring are many and varied. A machine's safety-related equipment must also consider the interaction between different components in a safety chain, because this is a key factor, not only in achieving the required safety level, but also for integrating the safety technology harmoniously into the overall control system. In this respect, complete solutions with totally compatible components, composed of sensor technology and safe control technology, are a benefit to users.

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