Intelligence increases benefits
Schmersal develops coordinated systems and solutions for the end-to-end networked Smart Factory.

The Schmersal Group develops not only intelligent safety components, but also coordinated systems and solutions for the end-to-end networked Smart Factory. In this way, manufacturers, operators and users of machines also have the possibility of predictive maintenance

As part of Industry 4.0 the holistic consideration of processes must include functional machine safety. One fundamental requirement for this approach is smart components in machines that can communicate with all processes as well as with other machines and components and also with the superordinate control levels. Safety-related components are becoming increasingly important in Industry 4.0. Until now only the safety output of switching states was of interest - for example, the information „open/closed" on a safety guard.

Schmersal now presents new intelligent components for increased safety.

This information is only relevant for the safety function. However, the simple information regarding the switching state turns out to be valuable if one wants to examine more closely why the safety guard has been opened. This is because if this data can be made available in a superordinate analysis tool and correlated with other data, new valuable information is generated. The position and frequency of the door being opened can indicate to the machine manufacturer where a frequent technical fault is occurring, otherwise the door would not have been opened during production. This enables conclusions to be drawn about the production process and the information used to eliminate recurring faults. The Schmersal Group is working on upgrading its safety components to enable them to contribute to greater process transparency as part of Industry 4.0. Today intelligent safety components in combination with new safety systems and safety solutions can make a considerable contribution to predictive maintenance by collecting process and status data relating to the components and forwarding this data to a superordinate system for analysis and evaluation. The aim is to increase and best utilise the service life and maximise the availability of components, machines and systems by minimising malfunctions and downtimes.

An overview of all data

The latest example for the development of intelligent components is the safety light grids with integrated Bluetooth interface from Schmersal. The SLC440/COM type with Bluetooth BLE is an Active Optoelectronic Protective Device   that makes all status and diagnostic data on the operating status of the device available on smartphones or tablets in real time via a Bluetooth interface. One of the advantages offered by the system is the possibility to store data which can be used for documentation to support periodic inspections and predictive maintenance. As the status data of the light grid can be easily accessed in real time errors can be rectified more quickly and machine availability increased. This status information and diagnostic data enables processes to be reactivated more quickly, particularly if the system is shutdown in case of danger. The range and scope in data communication is a real advantage, which is 100 times greater with the Bluetooth interface BLE than with conventional NFC tools. Bluetooth BLE also enables more applications to be used, and as Bluetooth is an international industry standard, the 440/COM light grid series is suitable for worldwide use.

Universally applicable

Schmersal offers different systems for the transmission of safety related and non-safety related data for analysis and evaluation by the controller, depending on the complexity of the facility. One example is the completely new Safety Fieldbox with Profinet/Profisafe fieldbus interface: Thanks to its universal device interface with an eight pole M12 connector, it can be used to connect a wide variety of safety devices to this safety field box: electronic and electro-mechanical safety interlocks, switches, sensors, light curtains and operation panels. When the Safety Fieldbox is used, safety interlocks of different types (both electronic and electro-mechanical) require just one device

connection. The advantage for the user is a significantly simplified and consequently more cost-effective wiring of safety switchgears. Moreover, complex additional installations for controlling the interlock or reading diagnostic information can be avoided.

A good combination

Using the new Safety Fieldbox, it is now possible to connect several safety interlocks of the AZM400 series in a safety chain to a Profinet/Profisafe node. This solution is significantly more cost-effective to install than any individual interlock with a Profinet interface. The AZM400 safety interlock operates with a very high holding force of 10,000 Newton. The degree of safety level is also very high: The two-channel release signal enables this safety interlock to achieve the performance level rating of PL e or SIL 3 for both the interlocking and the guard locking function. An additional digital input on the Safety Fieldbox contributes to higher machine availability: The diagnostic signals from all connected safety switchgears and the AZM400 are transmitted to the controller

Fig. 1: All status and diagnostic data regarding the operating status of the safety light grid can be easily retrieved in real time
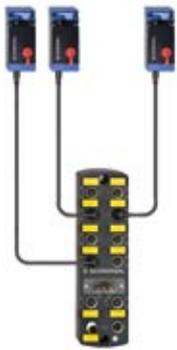
Fig. 2: A good combination with savings potential: The new Schmersal Safety Fieldbox and the safety interlock AZM400.

Fig. 3: A wide range of safety switching devices can be connected to the Safety Fieldbox via universal device interfaces with eight-pin M12 connectors.

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via this input. This provides users with status information for interlocks and error messages for evaluation – users receive a message telling them to readjust the door when it is misaligned, for example. Preventive maintenance measures can thus eliminate machine downtimes.

Take communication needs into account

When selecting the safety architecture, the engineer must not only consider the hardware, but also the communication of the components, both at the functional safety level and at the operational level; consequently, also maintenance-relevant data. Schmersal has developed the SD bus for the transmission and evaluation of operational signals such as limit warnings. Information on the operating status of the safety switchgear, which is transmitted via this bus, is used as an „early warning system" and an alert is issued before the machine shuts down because an item of safety switchgear is no longer functioning. This type of communication is clearly an invaluable and frequently used tool for predictive maintenance.

Scalable control

The Protect PSC1 provides the engineer with a powerful and advanced scalable safety controller. It consists of a programmable safety compact controller as the basic module, which can be supplemented by various safety expansion modules. This enables the system to be perfectly adapted to the individual application. The controller can also be supplemented with a universal communication interface, where the user simply selects and sets various fieldbus protocols such as Profibus, Profinet, Ethercat, EthernetIP or CANopen. This interface also allows safety remote IO communication and the simultaneous connection of up to four systems via safety cross communication via Ethernet.

Schmersal designs safety according to Industry 4.0.

The current generation of the Protect PSC1 is even more communication and integration capable, because its communication interface is equipped with an integrated OPC UA server. The linking of the PSC1 to the industrial machine-to-machine communication protocol enables the extensive information provided by Schmersal products to be included in a manufacturer-independent exchange of data. This includes data on the status of safety outputs, safety-related characteristic values, information on the service life of the sensors, ordering information, data sheets, drawings and images.

Access more information

Safety sensors that have an SD bus can also display information about the actuator, the temperature in the sensor, the serial number of the device and error messages such as a cross-fault or overtemperature. Schmersal products can also use this solution to provide a range of maintenance information, so that the user can replace components in good time as part of preventative maintenance before the end of service life is reached or the performance level is lost.
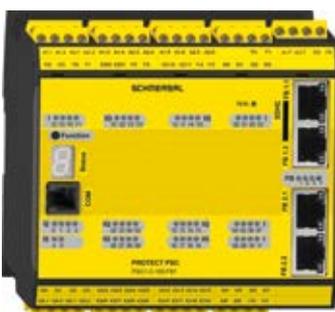
Fig. 4: A new solution compatible with Industry 4.0-: Safety controller Protect PSC1 with an integrated server based on OPC UA.