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CRASH TESTS IN THE BAKERY

HYGIENICALLY ENCLOSED SAFETY LIGHT CURTAINS UNDERGO TESTING AT BAKED GOODS MANUFACTURER COPPENRATH & WIESE

Coppenrath & Wiese is using hygienically enclosed safety light curtains on some of its production and packaging systems. The manufacturer of frozen baked goods and an automation specialist have jointly proven the mechanical stability of the protective covers in a series of tests, and subsequently declared that the series in question is consistent with the company standard.

When it comes to machine safety in food production, special hygiene requirements need to be adhered to. Conventional safety switchgear cannot be used in hygiene-sensitive areas, as the opening for the actuator in particular is considered a 'dead zone', which could become contaminated despite thorough cleaning. In addition, these same cleaning processes – hot steam, high-pressure water jets up to 80 bar and highly effective media – can impair the service life of the switchgear.

Consequently, safety sensors with appropriate surfaces and enclosed enclosures are often used in food production environments where there is a need to monitor the position of guard doors and flaps. Or, where even higher levels of hygiene are necessary, guard systems are dispensed with entirely in favour of opto-electronic protective devices (safety light curtains, light grids). These safety switchgear devices also offer added benefits as they permit an unobstructed view of the machine's working area and introduce additional flexibility to the process.

In this case, however, it is important that the optical sensors are protected from cleaning processes. To this end, Safety Control, based in Mühldorf / Germany – Schmersal's competence centre for opto-electronic protective devices – has developed the SLC/SLG 440 series with IP69 degree of protection.

Protective enclosure – PMMA or PC?

This series differs from the basic series in that it has a protective enclosure, designed from the ground up with the aim of maximising service life and ensuring full availability. The sealing caps, cable entries and attachment parts are made from stainless steel (V4A).

PMMA was the most obvious choice for the transparent protective tube due to its high resistance to cleaning agents – commercially available protective enclosures are typically made from this material. It is, however, susceptible to stress cracking if subjected to mechanical strain. As such, the designers opted for polycarbonate (PC), which ensures a very high mechanical load on the protective devices. The resistance to cleaning agents was tested and proven by the Ecolab laboratory. The polycarbonate protective tube has successfully demonstrated its durability in dairy processing and filling system applications over many years.

The protective tube is carefully secured against the centre unit with sealing caps and an external and internal sealing concept. The compact design of the enclosed safety system, with a diameter of just 50 mm, means that the series can be integrated into the machine design with no wasted space.



Fig. 1: The SLC/SLG 440 IP69 series with permanently mounted protective cover made from polycarbonate was designed to meet the requirements of the food industry.

Central requirement – protective enclosure stability

In everyday food production, high mechanical strain on the enclosure accommodating the opto-electronic protective devices, e.g. from cleaning lances or contact with transport aids, cannot be ruled out. Consequently, the transparent enclosure must be as robust as possible so that it cannot splinter under strain. If it were to splinter, production would become contaminated, leading to a production stop or even a product recall.

Test series – targeted damage without chipping

Coppenrath & Wiese, manufacturer of frozen baked goods, uses hygienic opto-electronic protective devices in several areas of its production processes, with a particular preference for the SLC/SLG 440 IP69 series. A series of tests was conducted jointly with Regional Manager Steffen Richter of Schmersal to determine whether or not the protective cover satisfies the stability and fracture resistance requirements. In an initial test, several enclosures were hit against solid objects, including a table and a vice. The enclosures were then knocked with a hammer. The result: none of the protective covers exhibited chipping, with only scratch marks visible on the surface.

In a second test, the enclosures were clamped in a vice under load until their diameter was reduced to only around 30 per cent of the original value. The heavy deformation led to clouding of the transparent protective tubes, but not chipping.

In a third test, the protective tubes were hit with a pointed object, in this case a centre punch, with which it proved possible to drive crater-shaped cones into the enclosure. Nevertheless, no splinters were released from the protective cover.

Result – tests passed – suitable for food production

These results are all the more impressive as comparative tests with several competitor products (protective covers on safety light curtains) exhibited chipping in all cases, which is entirely unacceptable in food production. As a consequence of the series of tests, operating technicians at Conditorei Coppenrath & Wiese have defined the SLC 440 IP69 safety light curtain series as the standard for corresponding applications and included the series in tender documents for new systems. In addition, the possibility of retrofitting existing systems is also being investigated.

Basis: AOPD with range of additional functions

The basis for the hygienic safety sensors tested is the SLC/SLG 440 or 440 COM standard series, which offers the user a variety of useful additional functions, such as double acknowledgement and contactor monitoring.

Integrated beam blanking makes it possible to guide moving parts through the protection field without triggering a stop signal. Yet another practical function is the dirt indicator. A visual warning message is displayed if the signal from the sensors becomes weaker.

This allows the user to take action before the machine comes to an unscheduled standstill. In addition, the pairs of sensors support the user with a visual setup aid during installation of the safety sensor system on site. Parameter setting without external aids (i.e. without a PC or software) also helps to simplify commissioning. Consequently, the SLC/SLG 440 IP69 series is not only hygienic and mechanically robust, but extremely user friendly and flexible in operation.

Integrated Bluetooth interface

It is worth emphasising the communication and diagnostics capability of the protective devices using Bluetooth technology, giving the user real-time status and diagnostics information by means of an app. The comprehensive system information allows you to plan service cycles and recurring inspections. This function is also useful in identifying sporadic shutdown of safety outputs caused by surface contamination.

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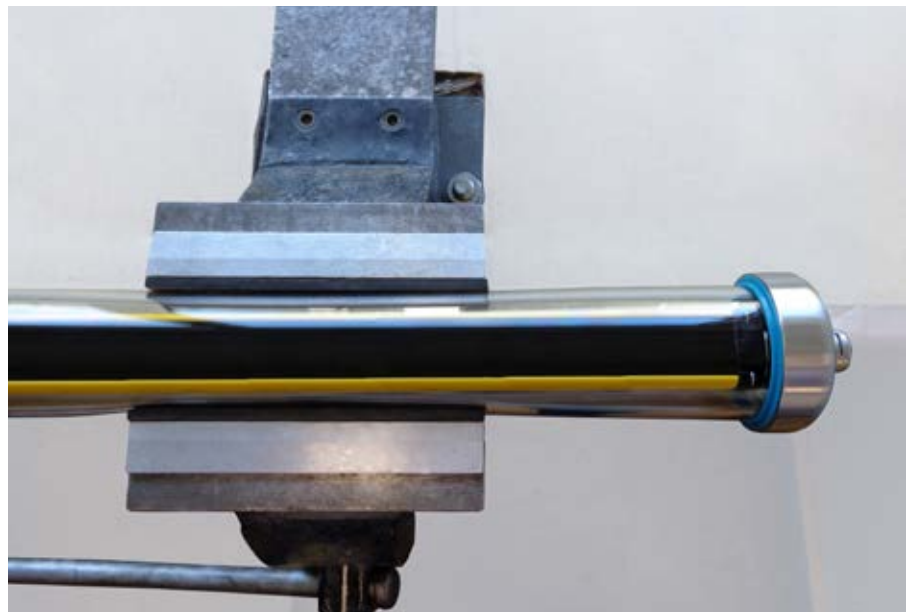


Fig. 2: Experimental setup of a load test for the protective cover of a hygienic safety light curtain