Detection of different foils for data cables

High process reliability thanks to light guiding sensors

HIGH PROCESS RELIABILITY THANKS TO FIBER OPTIC SENSORS

At BizLink Special Cables Germany GmbH in Friesoythe, data cables are wrapped with foils using so-called rewinding systems or taping machines in order to optimize their application-specific properties. Light guide sensors from ipf electronic ensure reliable production processes in the machines developed specifically for this purpose.

BizLink, which today has around 16,000 employees worldwide, was founded in Silicon Valley (USA) in 1996 to develop and produce network cables for the IT industry, among other things. BizLink Special Cables Germany GmbH was established in 2022 as part of the acquisition of the then LEONI Industrial Solutions Business Group by BizLink Holding Inc.
However, cable and wire production in Friesoythe was established by Siemens back in 1972. Currently, around 650 employees at the site southwest of Oldenburg primarily manufacture cables for automation technology, telecommunications and medical technology, with some of the products, e.g. for medical technology, leaving the company already ready-made.

SPECIAL TECHNICAL SOLUTIONS FOR CABLE PRODUCTION

"Among other things, our production consists of both core lines and so-called stranding lines. In the core lines, individual copper cores are extrusion molded with plastic in extruders and rolled up after quality assurance. By twisting the individual plastic-coated cores, entire cable harnesses are created in the stranding lines, which we process further. Most of the cables are produced on standard machines, but we have also developed special solutions for them with regard to special process steps and integrated them into the production lines," says Hermann-Josef Bicker, development engineer for automation at BizLink Special Cables Germany.

SPECIAL PRODUCTION LINE FOR DATA CABLES

In the course of implementing a completely new type of production line for manufacturing data cables at the time, so-called taping machines were developed. In these systems, individual cores, pairs of cores or cores with additional wire braiding are wrapped in foil or foil tapes, for example. "Among other things, this serves to improve the electrical properties of the data cables, for example with regard to electromagnetic shielding. Within the production line, several taping machines are arranged one behind the other in order to wrap the cores with a wide variety of films in successive process steps, which can have very different material properties, e.g. transparent, colored, aluminum-laminated, with an adhesive surface, to name just a few examples," says H. Bicker.

HIGH PROCESS RELIABILITY THROUGH SEAMLESS MONITORING

During wrapping or spinning, the film rotates around the cores in a cone shape, whereby the respective rotation speed of the spinning head in the taping machine depends on the film thickness, the film width and the bracket of the film to the cores and can be up to 4,000 rpm. "In order to ensure a high level of process reliability, we wanted to permanently monitor whether the film being fed into the taping machine is present or not," explains development engineer Bicker, because in the event of a film tear, the machine must stop instantaneously to prevent a faulty cable tail from entering the subsequent production step in the first place. "The particular challenges in this context are the sometimes very high rotation speeds of the foils around the cores, which make detection difficult. In the search for a sensor solution that reliably recognizes films with very different material-specific properties despite such requirements, ipf electronic recommended an optical fiber barrier in combination with an amplifier," reports H. Bicker.

RELIABLE DETECTION REGARDLESS OF THE OBJECT CHARACTER

The contactless and therefore wear-free one-way barrier **LS208161** with a switching distance of up to 200mm can be used in conjunction with the photoconductive **OL100340** is able to recognize objects regardless of their nature (e.g. shape, color, surface structure, material, etc.). As the fiber optic ends have very small dimensions, in this case a front end diameter of only 4 mm, object detection can be elegantly solved even in places that are very difficult to access. The through-beam sensor is set simply by teach-in with the amplifier **OL100340which** has a switching output and, with a switching frequency of 7,000 Hz, enables the reliable detection of objects even in very fast-running processes.

CONTINUOUS MONITORING OF SIGNAL INTERRUPTION

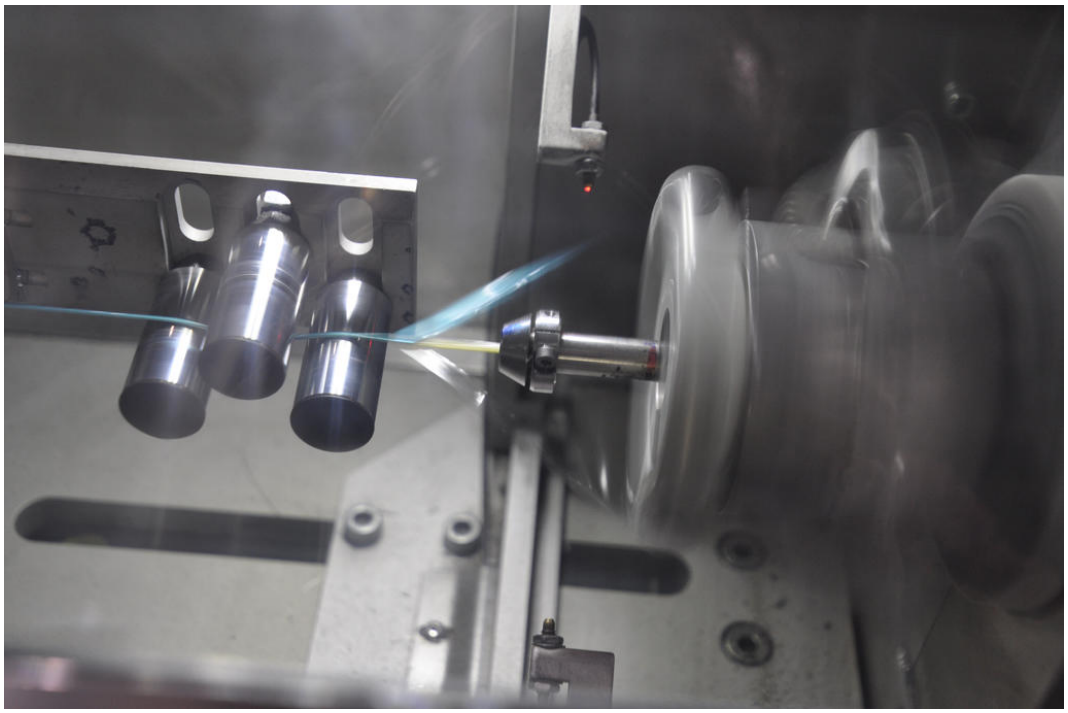
In the specific application at BizLink Special Cables Germany, the transmitter and receiver of the system solution are positioned laterally to the conical axis of rotation of the film behind the spinning head. The continuous signal from the through-beam barrier is interrupted by the film strip a total of two times per revolution of the spinning head. H. Bicker explains: "We continuously monitor the interruption of the fiber optic barrier, triggering the time that elapses each time. This works in a similar way to a timer, which counts down from an interruption via a predefined time. At the next interruption, this time must have elapsed for the timer to start again." If the light barrier is not interrupted again after the specified time has elapsed, this is an unmistakable sign that there is no more film. "The amplifier then sends a signal to the machine's PLC (programmable logic controller), which stops the ongoing process instantaneously," explains H. Bicker.

EASY TO INSTALL AND TRIED AND TESTED

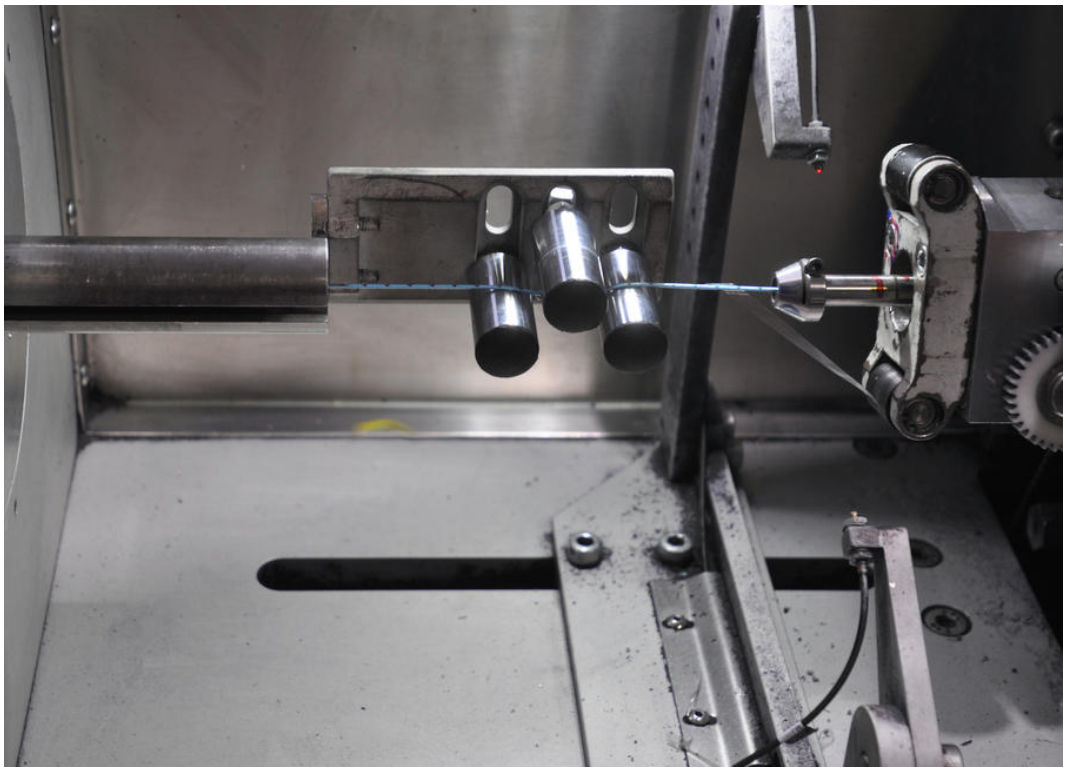
A total of around 40 coilers were equipped with the fiber optic barriers **LS208161** in combination with the photoconductive amplifier **OL100340** from ipf electronic. According to Hermann-Josef Bicker, all systems have worked perfectly since the initial installation: "The solution is ideal for us because the light barriers can be integrated into the machines with little effort and always work reliably, regardless of the rotation speed of the spinning head and the material properties of the film. There has therefore been no reason for us to think about alternatives so far."

The contactless one-way barrier **LS208161** (below) in combination with the photoconductive amplifier **OL100340** is able to detect objects regardless of their nature.

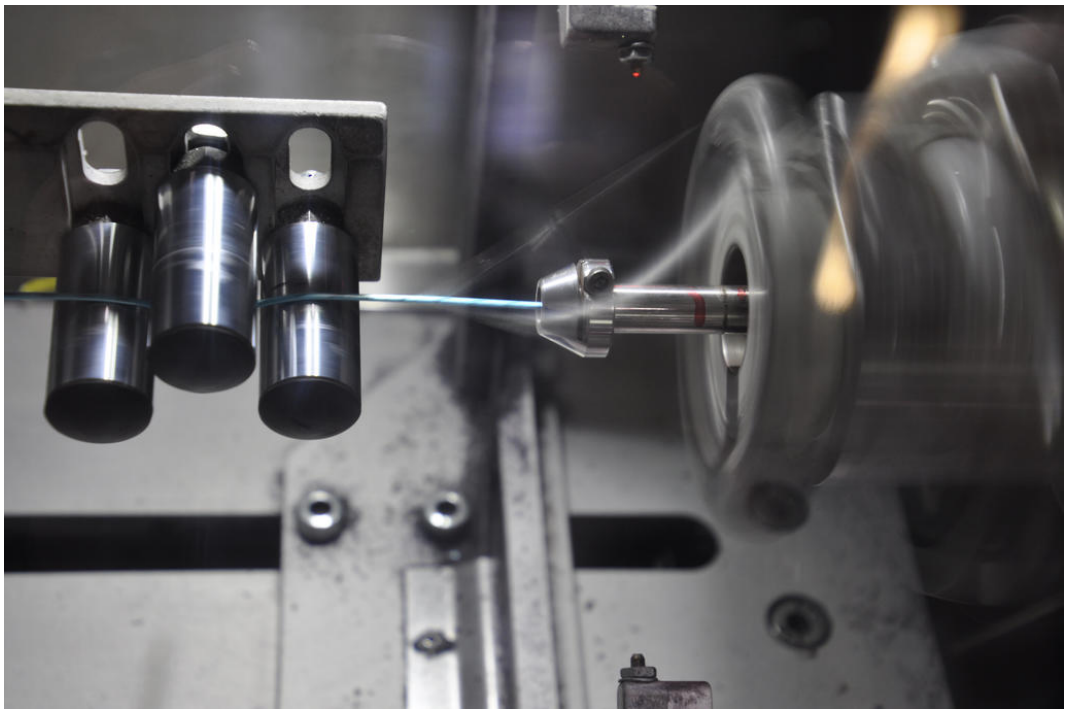
regardless of their nature. (all images: ipf electronic gmbh)



During spinning, the film rotates around the cores in a cone shape, whereby the respective rotation speed of the spinning head depends on the film thickness, the film width and the bracket of the film to the cores. The transmitter and receiver of the light barrier can be seen in the center of the image.



Recording with the machine stopped. The transparent film (shown here below the spinning head) is wrapped around the core. The interruption of the light barrier is continuously monitored.



Transmitter and receiver of the **LS208161** are positioned laterally to the conical axis of rotation of the film behind the spinning head. The continuous signal from the through-beam sensor is interrupted by the film strip a total of two times per revolution of the spinning head.

Detailed view of the amplifier. The displayed value shows the signal strength of the light barrier when the light signal is interrupted.