

## COMPREHENSIVE DETECTION

### INDUCTIVE SENSORS DETECT EVEN SMALL PARTS ON CONVEYOR BELTS

For the contactless detection of conductive metals, inductive sensors are mostly recommended. If the inspection area is larger, e.g. due to a wider conveyor belt, and also objects with different dimensions or even very small or filigree parts must be detected, then the task is rather demanding. A baler plant at Schaeffler faced this challenge.

The stamping department at the Schaeffler plant premises spans several halls, which include production machines with press forces of up to several thousand tonnes to manufacture individual parts for the automotive sector. Each machine produces a specific range of parts, which is processed in the neighboring plants or required for the assembly of end products. The production breadth of the department is thus extremely large, ranging from components with a weight of 8kg and a diameter of about 650mm, to small parts with the size of a fingernail, which bring just 1 gram on the scales.



The stamping department at the Schaeffler plant premises spans several halls, which include production machines with press forces of up to several thousand tonnes to manufacture individual parts for the automotive sector. (Image: Schaeffler LuK)

### SENSOR SOLUTION FOR SAFE MATERIAL TRANSPORT

The lighter punched parts with a diameter of about 40 to 250mm are transported from the punching tools of the machines via conveyor belts to grid boxes or unloading tables. "We have a total of 15 mobile conveyor belts, both with a width of about 220mm and 150mm, which can be flexibly used on a variety of machines. A sensor solution has to ensure that the stamped parts actually fall from the tool onto the conveyor belt during production. If this does not happen, it can lead to a material jam, which can lead in the worst case to the failure of tools. The sensors in the conveyor belts must ensure that the punched parts are transported away continuously and that there is no jam," reports Tobias Kimmig.

### DETECTION OF SMALL PARTS ALSO IN THE EDGE AREA OF THE CONVEYOR BELT

In order to find a reliable solution for the described task, various sensors were tested. The focus was in this context especially on the wider conveyor belts, since in particular the smaller parts can be located at the edge areas after discharge from the tool. "The sensor solution should therefore be able to cover the entire width of the belt and also cover the entire spectrum of parts transported on the belts during detection," summarizes Martin Resch, Team Leader of Production, the essential requirements.



The lighter punched parts are transported from the punching tools of the machines via mobile conveyor belts to grid boxes or unloading tables. (Image: Schaeffler LuK)

### NO SUCCESS EVEN WITH MULTIPLE SENSORS

First, an inductive sensor was mounted on a bracket above a conveyor belt to detect the punched parts from above. Decisive shortcoming: When converting a press to a new product batch, also the distance between the sensor and the belt had to be changed for a reliable detection. Martin Resch: "We have made such corrections partly over the bracket. If this did not lead to a satisfactory result, the conveyor belt was raised or lowered accordingly."

As this solution appeared neither very reliable nor practicable, several cuboid sensors were installed below the conveyor belt between the pulleys. But even these devices could not meet the requirements according to Kimmig: "Despite several sensors, we were not able to capture the entire width of the tape. In addition, the devices interfered with each other. Therefore, we finally turned to ipf electronic, because the company is known to us by its sensor special designs. And ipf electronic was indeed able to offer us two promising solutions for the wider and the narrower conveyor belts."

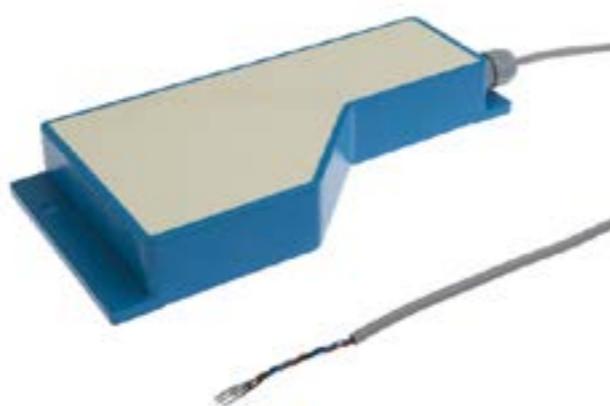
#### LARGE-AREA DETECTION ACCORDING TO THE DYNAMIC MODE OF ACTION

Specifically meant are the sheet-like inductive sensors **IY98E167** and **IY98E189**.

The two-part systems consist of a sensor and identical amplifiers for both devices to set the sensitivity.

A special feature compared to conventional inductive proximity switches are the large active surfaces of the **IY98E167** with 140x205x30mm and the **IY98E189** with 95x205x30mm. The system solutions are thus able to cover an extensive inspection area and also reliably detect the edge areas of the conveyor belts as used at Schaeffler. Further advantage: The sensors work according to a dynamic mode of action and therefore only detect moving metal parts. If there is a stationary object in its detection area, this generates no signal and is thus not recognized.

In contrast to statically operating sensors, the dynamic action principle also enables a much higher metal sensitivity, so that even small objects can be reliably detected.



A special feature in comparison to conventional inductive proximity switches are the large active surfaces of the solutions from ipf electronic. The picture shows an IY98E189 with an active surface of 95x205x30mm. (Image: ipf electronic)

#### PARAMETERIZE ONCE, NEVER READJUST

For initial tests, the **IY98E167** was mounted below a wider conveyor belt, as these tapes proved to be particularly critical for the detection of small parts in the edge areas.

"To determine the correct sensitivity, we took the most difficult punched part to be detected from each product batch and adjusted the required sensitivity of the sensor signal via the amplifier," explains Sebastian Schindler, Project Manager Mechanical Maintenance. Further adjustments, according to Schindler, were not necessary in order to be able to use the conveyor belt with the sensor on different machines for detecting components of different sizes.

"Intense trials with the **IY98E167** showed that the system is very reliable and that even parts with a small contact surface on the conveyor belt are reliably detected, even in the edge areas."



An inductive sensor mounted below a conveyor belt. (Image: ipf electronic)

#### PROCESSES ARE MORE SECURE AND RELIABLE

"After several months of successful testing, we have now decided to equip our remaining mobile conveyor belts with these systems as well. The current solutions from ipf electronic have already helped to make the processes involved in transporting parts via the tapes much more reliable and, above all, more secure," concludes Tobias Kimmig.

#### For the „mobility of tomorrow“

With approximately 92,500 employees, the Schaeffler Group is one of the world's largest family-owned companies. With around 170 locations in more than 50 countries, it has a worldwide network of production sites, research and development facilities and distribution companies. In 2018, the globally active automotive and industrial supplier generated sales of around 14.2 billion euros.

Since January 2018, Bühl has been the new headquarter of the Schaeffler Automotive OEM head office in Baden-Württemberg. The LuK company (lamella and clutch construction), which was co-founded in 1965 by the Schaeffler brothers, has been fully owned by the Schaeffler Group since 1999.

With precision components and systems in the engine, transmission and chassis as well as rolling and plain bearing solutions for a large number of industrial applications, the Schaeffler Group is already making a decisive contribution to "mobility for tomorrow."



Tobias Kimmig, project manager electrical maintenance, is very satisfied with the solution. "We will now equip all mobile conveyor belts with solutions from ipf electronic." (Image: Schaeffler LuK)