

## **FAR MORE THAN ROBUST**

### **SENSOR TECHNOLOGY FOR PAPER MACHINE CLEANING SYSTEMS**

#### **SENSORS FOR PAPER MACHINE CLEANING SYSTEMS**

Inductive sensors are highly valued, especially due to their sensing qualities for tough industrial applications. If robustness and higher temperature resistance alone are not enough, so-called atmospheric-change resistant sensors from ipf electronic can be real alternatives, as the experience of the IBS Paper Performance Group from Austria shows.

The company, headquartered in Teufenbach-Katsch (Styria), specializes in products, services and system solutions for optimizing cardboard boxes, pulp, tissue and paper machines. With 800 employees at 21 locations worldwide, 13 brands and more than 25 patents, the IBS Paper Performance Group is one of the technology leaders in the paper industry.

As a subsidiary of IBS, Maschinenfabrik Berger focuses on stainless steel construction within the Group. "Here at our site in Knittelfeld, with our high-end machinery and around 100 employees, we manufacture products such as the FabriCare ultra-high-pressure cleaners for paper machines," says Simon Taurer, Product Manager for high-pressure spray tubes and traversing cleaners for the IBS brand James Ross.

#### **THREE DECISIVE PROCESS STEPS FOR PAPER PRODUCTION**

In simple terms, a paper machine consists of three areas: a wire section, a press section and a dryer section with a machine clothing supported by several rolls as a conveying system. While the so-called sheet formation and dewatering (supported by gravity or vacuum) takes place in the sieve section (99% water, 1% fibers) with one or more permanently rotating filters, the water is first mechanically removed from the paper fiber or fiber web in the press section and then thermally removed in the subsequent dryer section until a paper web is finally obtained for further processing.

#### **ULTRA HIGH PRESSURE CLEANING MAKES THE DIFFERENCE**

In all three areas of a paper machine, contamination occurs on the machine clothing during production, which must be cleaned regularly via its entire width to ensure high production quality. "This is usually done using high-pressure cleaning systems, which can consume around 30 to 150 liters of water per minute, depending on the machine width. 150 liters per minute, depending on the machine width. However, retrofitting a paper machine with our traversing cleaners can save around 80 to 90 percent of water. An ultra-high pressure water jet is used to clean the paper side of the roll-supported clothing with very low water consumption," explains Simon Taurer. The cleaning water and soiling bounce off the roller and clothing surface into the cleaning head, where they are sucked away. The high pressure combined with the low volume of water also prevents streaking or damage to the fabric.

For Simon Taurer, the decisive advantages of this process along with lower water consumption are obvious: "Improved cleaning of the clothing without machine downtimes due to additional manual cleaning. No tearing of the paper web and thus avoidance of longer production downtimes due to dirt accumulation on the clothing. Increased efficiency in the machine's drying groups, as the accumulated dirt on the clothing acts as an insulating layer that prevents the paper web from drying. In addition, there is a consistently high permeability of the clothing."

**SENSORS FOR INQUIRY OF DISTANCE, DIRECTION AND POSITION**

For cleaning, the cleaning head attached to a transport carriage permanently moves along the paper side of the fabric in the area of a roller via a chain drive. As the cleaning unit moves back and forth along the fabric, a sensor solution is required for linear measurement and to detect the direction of rotation of the drive for the cleaning system. In addition, another sensor system is required for the end position sensing of the traversing unit in order to reset the counter for the linear measurement and also to detect the parking position of the cleaning head on the transport carriage. The product manager explains: "The cleaning unit must assume this position when the machine is switched off for service or maintenance work, for example. switched off for service or maintenance work, for example. In addition, the dirt deposits that build up on the cleaning head after some time are removed in a wash box provided for this purpose. The traversing unit is therefore moved from the park position into this box after a predefined time."



View of a paper machine. Part of the machine clothing supported by rolls can be seen on the right. (Image: IBS Paper Performance Group)

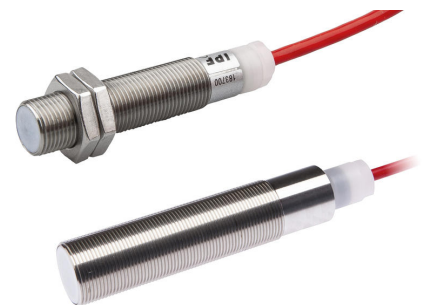
**HARSH ENVIRONMENT MAKES IT DIFFICULT TO FIND A SOLUTION**

Conventional encoders were not an option for these tasks, however, as the environmental conditions in a paper machine are particularly harsh, e.g. high temperatures, hot, humid ambient air, sometimes with cold spray mist and spray water. "Temperature fluctuations can also occur during operation or when the machine is at a planned standstill. The sensor technology must therefore be very robust to ensure reliable operation," emphasizes Simon Taurer.

In the search for a solution, the initial choice fell on inductive sensors from ipf electronic specially designed for use in an extended temperature range of up to +150 °C. After initial practical experience, however, it became clear that it was not just the ambient temperatures, but above all the humid conditions in the machines that were extremely hard on the sensors. "In our search for an alternative, ipf electronic finally recommended so-called climate-change resistant devices," says Simon Taurer.

**WHAT DOES "ATMOSPHERIC-CHANGE RESISTANT" MEAN?**

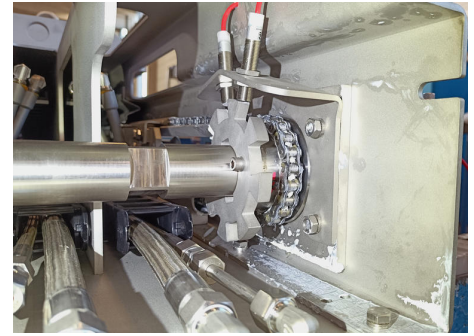
These sensors with ranges from 2mm to 10mm are characterized by some special features compared to conventional inductive sensors and therefore bear the title "atmospheric-change resistant" for good reasons. For example, the front cap of the active sensor surface is made of Teflon with a Viton ring seal. As the cable tail for the electrical connection is also firmly compound-filled in the housing made of corrosion-free V4A steel, these devices have the high protection class IP69k and are therefore absolutely leak-proof. The sensors are also designed for rapid temperature fluctuations or changes in the range from -25° C to +120° C and, thanks to the high switching frequency of 1kHz, are suitable for precise presence detection, positioning, counting, speed detection or distance measurement of metallic objects in all conceivable applications.



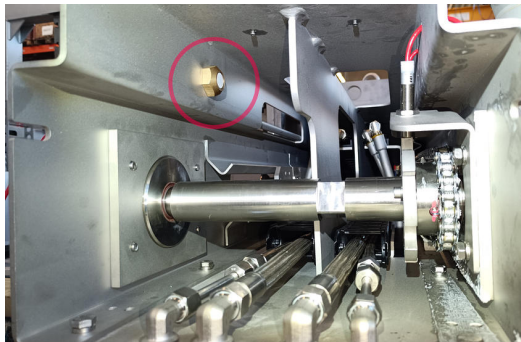
Atmospheric-change resistant inductive sensors such as the **IB1201K0** (above) and **IB1804K0** from ipf electronic are absolutely sealed with protection class IP69k and can withstand rapid temperature fluctuations and changes in the range from -25 °C to +120 °C. (Image: ipf electronic gmbh)

### VERSATILE SENSORS IN M12 AND M18 DESIGN

For the specific application in the ultra-high pressure cleaning system, a total of three inductive sensors are used to process the switching signals. For linear measurement and detection of the direction of rotation of the drive, two inductive sensors **IB1201K0** inductive sensors from ipf electronic are mounted in front of an encoding disk that is connected to the driveshaft of the traversing unit. The third sensor (**IB1804K0**) in M18 design is located inside the traversing beam. This sensor is used to detect a metal release lug and thereby reset the distance measuring system detected by the other two sensors. In addition, the **IB1804K0** queries the parking position of the cleaning head.



The two inductive sensors **IB1201K0** for linear measurement and inquiry of the direction of rotation are mounted in front of a coding disk on the driveshaft (left) of the chain drive. (Image: IBS Paper Performance Group)



The third sensor **IB1804K0** (shown here laterally in the traversing beam) is used to reset the position measuring system and inquire the parking position of the cleaning head. (Image: IBS Paper Performance Group)



The two inductive sensors **IB1201K0** for linear measurement and inquiry of the direction of rotation are mounted in front of a coding disk on the driveshaft (left) of the chain drive. (Image: IBS Paper Performance Group)

### UNBROKEN HIGH DEMAND FOR CLEANING SYSTEMS

According to Simon Taurer, the atmospheric-change resistant inductive sensors from ipf electronic have proven themselves many times over: "The solutions have now been in use for several years without any problems. And as the demand for our ultra-high pressure cleaning systems is very high, more than 1500 of these sensors can be found in the traversing systems of paper machines around the world."