"Trial by fire" passed

Extremely high demands on inductive proximity switches

Cathodic dip coating (CDP), or cathaphoresis, is an electrochemical process that can be used to coat workpieces with very high quality. After coating, the workpieces enter a curing oven. If the stoving process is not preceded by a dripping station, the excess coating evaporates abruptly in the oven. The hot and humid climate inside the oven thus places very special demands on inductive proximity switches. Cathodic dip painting has long been a proven process for coating and thus protecting vehicle parts against corrosion. The parts to be coated or painted are immersed in an electrically conductive dip bath, and a DC voltage is applied between the parts and a counter-electrode. This diagnostic coverage allows water-soluble binders to precipitate on the surface of the workpieces connected as cathodes. The result is a coating that is both closed and adheres very well. KTL is therefore particularly suitable for the coating of very complex structures, such as those with cavities or corners that are difficult to access.

Humid, hot climate

In the cathodic dip painting plant of a leading automobile manufacturer, inductive proximity switches in a curing oven are to inquire positions, for example, from a lifting device. For technical reasons, it is not possible to integrate a dripping station in the system between the dip coating and the curing oven. The coated parts therefore enter the oven directly, with the excess coating evaporating abruptly as the workpieces enter, precipitating as condensate on the top of the oven and then dripping onto the system components. The inductive proximity switches must not only be extremely tight to prevent condensate from entering them, but must also withstand the high temperatures of up to + 205°C in the curing oven.

Silicone-free solution far via IP 68

The condensate in the baking oven has much higher creep properties than water, which requires extreme impermeability of the sensors far beyond IP68. However, not only in terms of tightness and temperature resistance was an off-the-shelf sensor solution out of the question and therefore presented ipf electronic gmbh from Lüdenscheid with very special challenges. The new development from ipf electronic was not allowed to contain any silicone, as the outgassing of this material could deposit on the coated parts and thus lead to burn-in defects.

Absolutely tight even with temperature changes

By using special seals and sealing systems, ipf electronic succeeded in developing an absolutely tight and completely silicone-free high temperature sensor, which not only reliably prevents the condensate from penetrating, but can also withstand the high kiln temperatures with its temperature load capacity of maximum + 230°C. What's more, even if the kiln has to be opened for inspection and its internal temperature drops to the ambient temperature of the hall, the sensor remains sealed during this temperature change.

Pluggable system facilitates replacement

However, the automotive manufacturer's wish list for the special properties of the sensor included not only extreme temperature resistance and absolute impermeability as well as the absence of silicone, but also a solution that would ensure rapid replacement in the event of mechanical damage to the device. For this reason, the sensor specialist from Lüdenscheid implemented a pluggable system that nevertheless ensures high impermeability. However, the advantages of the new development are by no means exhausted.

Variable, also in line length

Sensor systems, which are used in particular in such demanding applications, are usually designed in two versions, with the sensor head at the scanning position, in this case inside the oven, and the evaluation unit outside the baking oven. In conventional solutions, the line length between the sensor head and the amplifier is fixed and therefore cannot be changed. The solution from ipf electronic, on the other hand, has a variable line length that can be flexibly adjusted even when the system is installed on site. A total of 34 inductive high temperature sensors from ipf electronic currently detect metallic objects contactlessly in the car manufacturer's 40-meter-long baking oven. The new high temperature sensors were implemented as cylindrical devices with M50 threads to ensure the required switching distance of up to 25 mm in the drying oven.