The ‘acid test’ has been passed

The extremely high requirements of inductive proximity switches

Cathodic dip coating (CDC) (also known as electro dip coating) is an electrochemical technique using which, high quality components can be coated. After the coating, the components are put in an annealing furnace. If there is no drip station upstream of the annealing process, the excess coating in the furnace vaporizes abruptly. As a consequence, the hot and damp climatic conditions inside the furnace make particular demands on inductive proximity switches.

Fig. 1

CDC has long been a tried and tested technique for coating and in doing so, protecting vehicle parts from corrosion. In this process, the parts to be coated and/or painted are dipped into an electrically conductive immersion bath. A DC voltage is applied between the parts and a counter electrode. As a result of this DC field, a water soluble binding agent settles on the surface of the components that have been connected as cathode.

The result is a complete and well adhesive coating.

CDC is especially suited to the coating of very complex structures e.g. structures with cavities or corners which are difficult to get to.

Damp and hot climatic conditions

In the CDC plant of a leading automobile manufacturer the task was to position inductive proximity switches in an annealing furnace: for instance, to be detected the position of a lifting device.

For technical reasons relating to the system, it is not possible to integrate a drip station into the plant between the dip coating area and the annealing furnace. The coated parts are then transported directly into the furnace. When the components are drawn in, the excess paint vaporises abruptly. Condensation settles on the top side of the furnace and then drops onto the components of the plant. The inductive proximity switches do not just have to be extremely air-tight (so that no condensation can penetrate into them), they must also be able to withstand the high temperatures in the annealing furnace that extend to +205 °C.

A silicone free solution far beyond IP 68

The condensation in the annealing furnace has much greater creep characteristics than water. This requires the sensors to be extremely airtight, far beyond the requirements of IP68. However, it was not just in terms of im-permeability and temperature resistance that there was no ‘off the peg’ sensor solution. This presented particu-lar challenges to the Lüdenscheid-based firm, ipf electronic gmbh.
Another restriction was the fact that the new developments from ipf electronic had to be made without silicone, as the gas emission from this material could afflict the coated parts and in doing so, lead to annealing faults.

Also completely impervious in the case of temperature changes

Through the use of special seals and sealing systems, ipf electronic managed to develop a completely airtight and fully silicone free high temperature sensor. This does not just securely prevent the penetration of condensa-tion, but with its temperature resistance of +230° C (max.), is able to defy the high furnace temperatures. Further still: Even if the furnace has to be opened and as a result, the interior temperature consequently sinks to the ambient temperature of the furnace hall, the sensor retains its seal with this temperature change.

A pluggable system helps exchanges to be made

Concerning the special characteristics of the sensor, the automobile manufacturer did not just want extreme temperature resistance, an absolute seal and no silicone, it also wanted a solution that guarantees quick ex-changeability in the event of mechanical damage to the equipment. For this reason, the sensor specialist from Lüdenscheid developed a pluggable system which nevertheless guarantees an excellent seal. As such, the advantages of the new development are by no means exhausted.

Variable, even in terms of the length of the line

The sensor systems that are especially used in these types of demanding applications are mainly designed in two parts. The sensor head is located in the sampling position (in this case, on the interior of the furnace) and the evaluation unit is located outside the annealing furnace. In the case of conventional solutions, the length of the line between the sensor head and the amplifier is fixed and as such, it cannot be changed. In contrast, the solution from ipf electronic has a variable line length that can still be flexibly adjusted, even in the case of on-site installation of the system.

In all, 34 inductive high temperature sensors from ipf electronic currently detect metallic objects without making contact in the automobile manufacturer's 40 m long annealing furnace. The new high temperature sensors have been realized as cylindrical devices with an M50 thread in order to guarantee the necessary sensing range of up to 25 mm in the dry furnace.