PRECISE GUARD FOR THE PIPELINE

FLOW SENSORS MONITOR COOLING CIRCUITS IN INSERT PRODUCTION

Blanks for inserts are hardened in sintering furnaces under high temperatures. This is not possible without complex cooling circuits whose flow rate must be continuously monitored, for example, to prevent thermal damage to furnaces. This is reason enough to rely on robust and reliable flow monitors for this task

A manufacturer of tools specializes in the production of inserts that can be screwed or clamped into tool holders as cutting material carriers for machining metals or wood, for example. ''Our production of inserts runs continuously throughout the year, producing several million of these per year,'' explains the company‘s maintenance manager.

The sintering plant has a large number of furnaces, the operation of which requires a cooling circuit for cooling the power connection of the furnace heaters as well as for the jacket cooling of the furnaces with permanent flow monitoring.
(Image: ipf electronic gmbh)

PRODUCTION WITH HIGH VERTICAL RANGE OF MANUFACTURE

The manufacturer produces the matrices and punches for the production of the cutting materials consisting of different carbide powder compositions in-house. The raw materials for this are purchased. The decisive factor, however, is the recipes based on a great deal of know-how and experience, as the maintenance manager knows: ''And we mix these ourselves in our own powder preparation, so that we come up with very many different powder compositions, depending on the tool and the area of application of the inserts.'' For the actual production of the inserts, the prepared powder is first compressed into blanks in appropriate equipment with the respective required pressing force. These are then sintered in vacuum or pressure furnaces at high temperatures of up to 1,500 degrees Celsius and with the addition of various gases. ''Put simply, this involves material compaction, which hardens the inserts. Various sintering furnaces with different volumes are available for this purpose.''

During machining, inserts for metalworking are subjected to high mechanical stresses, as these used tools show. The ''recipe'' for the cutting materials is therefore crucial for long tool life, apart from the material being machined. (Image: Adobe Stock)

PERMANENT MONITORING NECESSARY

Due to the high temperatures required during sintering, a cooling circuit is required for the power connection of the furnace heaters as well as for the shell cooling of the furnaces, which is permanently monitored for the correct flow rate. ''The cooling circuit is never interrupted, even when a furnace is in stand-by. Depending on the system and thus the manufacturer of the sintering furnace, the flow or the return or both must be monitored- continuously, around the clock.

If the flow is too low, the heating of the furnace must be switched off immediately via the control system of the plant concerned,'' emphasizes the maintenance manager. Otherwise, in the worst case, there is the risk of a furnace fire, which can cause a total loss of the plant and would represent an increased safety risk, since the plant is under 50 to 100bar pressure (argon) during operation.

HIGH MAINTENANCE AND REPAIR COSTS

In total, the sintering plant therefore has far more than 100 flow monitors in use, whereby the number of devices varies depending on the plant and sometimes some solutions also caused problems in the past. For example, one plant already had flow monitors installed at the factory that integrated a type of impeller with magnets and had a coil on the outside. The impeller of a device installed in a pipe was set in motion by the cooling water flow and thus, depending on the flow rate, a minimum voltage of 60 to 300mV was induced, which in turn was transmitted to evaluation electronics for appropriate processing at the plant control system. However, these devices proved to be extremely susceptible to wear and tear and required a great deal of maintenance and repair. The maintenance manager comments: ''In addition, there were always false alarms, for example when dirt particles in the cooling water blocked an impeller and the device was no longer able to determine the correct flow rate. If a guard then had to be opened for cleaning, it was sometimes difficult to get it sealed again afterwards.''

The old devices were replaced by ipf electronic's flow monitors at one plant. (Image: ipf electronic)

MEASUREMENT ACCORDING TO THE CALORIMETRIC PRINCIPLE

Good arguments, therefore, to consider a real alternative, e.g. the **SS410124** from ipf electronic. This compact flow sensor with integrated evaluation electronics is, among other things, extremely robust due to its design, housing and measuring sensor made of stainless steel (protection class IP67), and works according to the calorimetric principle. Here, the sensor is heated up by several degrees Celsius from the inside in relation to the flow medium into which the sensor projects. If the medium flows, the heat generated in the sensor is dissipated by the medium. The temperature developing in the sensor as well as the medium temperature are measured, compared with each other and the flow condition of the monitored medium is derived from the determined temperature difference. The flow intensity and thus also the respective flow rate is visualized via LEDs on the top of the device. There is also a potentiometer for manual adjustment of the desired switching point. ''We replaced all 22 flow monitors at the plant in question with the new solutions from ipf electronic. Since the measuring elements of the old monitors were installed in the direction of flow, we had to adapt the corresponding pipe cross-sections and make a few modifications to the plant so that we could use the new devices,'' reports the maintenance manager.

IMMEDIATELY INFORMED WITH JUST A GLANCE

The **SS410124** has been set so that all LEDs light up when the correct flow is present in the corresponding pipe sections on the supply and return (maximum flow reserve). ''Generally, we check the flow monitors before each furnace start. Thanks to ipf electronic‘s solutions, it is now immediately obvious with just a glance at the LED displays whether there is sufficient flow or not. At the same time, a trend is also clearly visible in this way, so that we can react to a decreasing flow rate very early with suitable measures.'' If, however, the flow rate should drop below the set limit value unnoticed during ongoing production, the sensor‘s switching signal drops, whereupon the plant control system immediately interrupts the power supply to the furnace. In addition, an optical and acoustic fault signal is output.

According to the maintenance manager, the decision to retrofit the plant with the flow monitors from ipf electronic has not been regretted: ''Problems comparable to those with the old devices are now a thing of the past. The sensors work wear-free and extremely reliably. Therefore, we will now successively replace older mechanical flow monitors at some other plants, e.g. in the course of maintenance measures or in case of device defects, with the solutions from ipf electronic.''

A glance at the LED indicators is enough to determine whether there is sufficient flow or not. The robust **SS410124** from ipf electronic is designed for media temperatures up to +80°C and is pressure-resistant up to 100bar. Housing and sensor are made of stainless steel 1.4571 and have protection class IP67. The flow monitor operates according to the calorimetric principle and is absolutely wear-free.

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