

REACTOR SKIN TEMPERATURE MONITORING USING "TATUS"

Distributed Temperature Sensing (DTS) is a technology used for monitoring temperature along a fibre optic cable. It can be applied to various applications, including the monitoring of reactor skin temperature. In the context of a reactor, the term "skin temperature" typically refers to the outer surface temperature of the reactor vessel or other critical components.

Many chemical reactors are operated at high temperatures. They have heat-sensitive structures and layers of refractory materials to reduce heat losses and to protect the pressure vessel and other structures from overheating. It is essential to monitor the temperature of the reactor skin to detect critical operation states early, ensure the integrity of the refractory layers and other reactor structures. Temperature monitoring can save valuable maintenance time, reduce maintenance intervals, and ensure an optimizing of the chemical process parameters.

Here's how DTS can be used for reactor skin temperature monitoring:

Fiber Optic Cable Installation: A fibre optic cable is installed on or near the surface of the reactor vessel or critical components. The cable consists of an optical fibre that is capable of measuring temperature variations. It can be integrated in the refractory layers or mounted directly on the vessel surface without welding or drilling by using proprietary high-temperature magnets.



Optical Measurement Principle: DTS works based on the principle of measuring the changes in the optical properties of the fibre optic cable as temperature changes. The cable contains a series of fibre optic sensors, usually made of an optical material with temperature-dependent properties.

Data Acquisition: The DTS system emits pulses of light along the fibre optic cable. As the light travels through the cable, it interacts with the fibre optic sensors, and the backscattered light is analysed. The intensity of the backscattered light is affected by temperature variations along the cable.

Temperature Calculation: By analysing the backscattered light, the DTS system can calculate the temperature at different points along the fibre optic cable. The system uses algorithms to interpret the changes in the backscattered light and convert them into temperature readings.

Real-Time Monitoring: The DTS system continuously monitors the temperature variations along the fibre optic cable and provides real-time temperature data. This data can be displayed on a monitoring system or integrated with other control and safety systems.

Benefits of DTS for reactor skin temperature monitoring:

High Spatial Resolution: DTS provides temperature measurements at numerous points along the fibre optic cable, offering detailed information about temperature distributions on the reactor's surface.

Continuous Monitoring: DTS enables continuous, real-time temperature monitoring, allowing for immediate detection of temperature anomalies or abnormal behaviour.

Non-Intrusive: The fibre optic cable used in DTS is typically attached to the outer surface of the reactor vessel or components without requiring any physical intrusion or modification to the structure.

Wide Temperature Range: DTS systems can be designed to operate within a wide temperature range, making them suitable for monitoring high-temperature environments, such as reactor vessels.

Reliability: DTS is a robust and reliable technology, capable of withstanding harsh environments and providing accurate temperature measurements over long distances.

GASIFIERS

Gasifiers are large vessels lined with several layers of refractory brick to contain the high operating temperatures within. They produce syngas, a mixture of hydrogen and carbon monoxide, from oil, coal, or waste materials with the help of steam and oxygen. Syngas is used in synthesis of oxo-chemical compounds like alcohols, aldehydes, ketones, etc.

