TEMPERATURE MONITORING OF INDUCTION FURNACES USING "TATUS"

Temperature monitoring of **INDUCTION FURNACES** using fibre optic-based Distributed Temperature Sensing (DTS) systems is a reliable and efficient method in industrial applications. 'TATUS' technology utilizes the principles of optical fibre and Raman scattering to measure temperature along the entire length of the fibre optic cable. The optical signal is not affected by electromagnetic disturbances present in induction furnaces making 'TATUS' a reliable and very accurate technology for detecting progressive wear of the lining as well as local defects. The system provides a highly resolved real-time measurement of the temperature distribution of the exterior lining surface allowing accurate and reliable temperature monitoring of ***Induction Furnaces***.

Here's how the temperature monitoring process using DTS typically works for ***Induction Furnaces***:

Fiber Optic Cable Installation: A fibre optic cable is installed in proximity to the induction furnace. The cable is multimode. It is important to ensure that the cable is properly protected from the harsh environment.

Connection to DTS Unit: The fibre optic cable is connected to a DTS unit, which typically consists of a laser, a data acquisition system, and software for data analysis. The DTS unit sends laser pulses into the fibre optic cable.

Temperature Measurement: As the laser pulses travel along the fibre optic cable, a small portion of the light is scattered back due to the Raman effect. The intensity of the scattered light is influenced by temperature variations along the cable.

Data Acquisition: The DTS unit collects the scattered light signals and converts them into temperature readings. The time it takes for the scattered light to return to the unit is used to determine the temperature at different points along the fibre optic cable.

Data Analysis and Visualization: The temperature data collected by the DTS unit is analysed and visualized in real-time. The data can be displayed graphically, allowing operators to monitor the temperature profile of the induction furnace over time.

Alarm and Control Systems: The DTS system can be integrated with alarm and control systems to provide real-time alerts when temperature thresholds are exceeded. This enables *proactive* measures to be taken to prevent any potential issues or failures.

The advantages of using fibre optic based DTS for temperature monitoring of induction furnaces include:

High Accuracy: DTS systems offer high-precision temperature measurements along the entire length of the fibre optic cable, providing a comprehensive view of the temperature distribution.

Remote Monitoring: The fibre optic cable can be extended over long distances, allowing temperature monitoring of multiple points without the need for additional sensors. This enables remote monitoring and reduces the need for physical access to the induction furnace.

Robustness: Fiber optic cables are immune to electromagnetic interference, making them suitable for high-temperature and high-electromagnetic fields environments.

Real-Time Monitoring: DTS systems provide real-time temperature data, allowing operators to make informed decisions and take prompt action if any abnormalities or overheating is detected.

Overall, temperature monitoring of induction furnaces using fibre optic based DTS systems offers a reliable and efficient solution for industrial applications, helping to enhance process control, optimize energy consumption, and improve safety.

Mounting the fibre optic cable on the furnace for temperature monitoring typically involves securing the cable in a manner that ensures proper positioning and protection from the harsh environment. The fibre optic cable is typically housed within protective sleeves or tubing to shield it from physical damage and environmental factors. These sleeves are made of materials that can withstand high temperatures, such as heat-resistant polymers or metal conduits. The sleeves provide a barrier between the cable Here are some common methods for mounting the cable:

External Mounting: In this method, the fibre optic cable is mounted externally on the surface of the furnace. The cable can be affixed using brackets, clamps, or adhesive materials specifically designed for high-temperature applications. It is important to ensure that the cable is securely fastened to prevent any movement or damage.

Embedded Mounting: Another approach is to embed the fibre optic cable within the refractory lining of the furnace. The cable is placed within a protective conduit or sleeve, which is then embedded in the refractory material during the lining installation process. This method offers additional protection to the cable and minimizes the risk of physical damage.

Coiled or Wrapped Mounting: In some cases, the fibre optic cable may be coiled or wrapped around specific components of the furnace, such as the crucible or the heating coils. This allows for closer proximity to the areas of interest and provides more accurate temperature measurements.

Entry Point Protection: When the fibre optic cable enters the furnace enclosure or control room, proper sealing and protection should be ensured to maintain the integrity of the cable and prevent environmental contaminants from entering. Sealing options may include grommets, conduit fittings, or cable glands designed for high-temperature environments.

It is crucial to consider the temperature range, potential mechanical stress, and electromagnetic interference when selecting the appropriate mounting method for the fibre optic cable. Additionally, proper cable routing and strain relief mechanisms should be implemented to prevent excessive bending or tension, which could lead to signal degradation or cable damage.

Before mounting the cable, it is advisable to consult with the manufacturer or a qualified professional experienced in fibre optic installations to ensure compliance with safety standards and best practices for the specific furnace and operating conditions.