

Increased safety through 3D temperature profiling in hydrotreater and isomerization units

Benefits at a glance

Reduced risk of unplanned shutdowns

Increased process efficiency through:

- intelligent, 3-dimensional sensor routing
- No need for disturbing additional support structures
- Undisturbed media flow through the reactor beds

Less invasive solution without dedicated ring support frame

More efficient process flow through the catalytic beds



The customer, a producer of sustainable aviation fuel and renewable diesel, sought to increase safety in seven green field catalytic bed reactors (Isomerization, Hydrotreatment, Hydrogenation, Pre-Reformer) in their plant. Overall, safety was the most important point for the customer, given that the devices had to be used in reactors with hazardous media, high temperature and pressure.

The results

- Long-lasting solution considering a turnaround period of 5 years
- Solution enables the customer to establish a precise temperature profile
- Maximization of process efficiency
- Yield of a high-quality product according to strict industry specifications
- Increased safety: Leakage prevention/detection/management

Customer challenge The harsh process conditions of approximately 58 bar and 400 °C (752 °F) under which the reactor is operating, as well as the presence of corrosive chemicals such as Hydrocarbon and H₂, called for a robust and long-lasting solution.

Our solution Endress+Hauser manufactured a highly complex Temperature Engineered Solution. Special alloy material and the iTHERM TMS02 MultiSens Flex in advanced design were the perfect recipe for a long-lasting and safe solution. The customer's material expert selected the suitable special alloy (Inconel 625 Grade 2, final annealing 1100°C (2012 °F)), while Endress+Hauser engineered the thermometer design. The iTHERM TMS02 MultiSens Flex in this case comes without protecting thermowells or a guiding tube. A special MgO cable with extra thick walls is in direct contact with the process.

Advanced design

The advanced design of the iTHERM MultiSens TMS02 was the winning argument for the customer, and caught their attention.

- Increased maintenance level: extension cables connected to removable stump-inserts that can be individually inspected and replaced
- The release of the insert-stump is done by means of the compression fittings placed on diagnostic chamber head. An interruption is located inside the diagnostic chamber and allows to any leakage to be vented into the chamber and be detected.
- The leakages can come from the welded joints between the sensors and process connection or from the sensor itself. This phenomenon might occur when unforeseen high corrosion rates compromise the insert sheath integrity.
- With this feature an unforeseen crack on the sensor's sheath will be collected inside the diagnostic chamber without external leakage



Devices:

- 14 x iTHERM TMS02 MultiSens Flex in advanced design (4 and 12 measuring points) for Isomerization, Hydrotreatment units
- 9 x iTHERM TMS11 MultiSens Linear Multipoint (3, 35 and 42 measuring points) for Hydrogenation, Pre-Reformer

Services:

- 3D routing design in accordance with reactor internal supplier
- EPC supervisor visit in Pessano's facility during the production/test phase
- Continuous professional support during all phases of the project
- FAT
- Installation supervision (spread in a ten month period)

Testings and Documentation:

- Dye penetrant test
- Ultrasonic inspection
- X-ray analysis on diagnostic chamber and on TC hot joints
- Internal helium leak test
- PMI test
- TC calibration
- Welding documentation acc. to TS01279T/09 (including welding map) with PQRs PED certification

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