

Automated Corrosion Monitoring for Biofuel Refining

Non-invasive, corrosion trending with wireless ultrasonic probes and monitoring system



Overview

A solution was sought to remotely monitor the integrity of critical pipes and vessels in an alkylation unit which was to begin processing novel, biofuels.

Many refinery operators are beginning to explore the processing of biofuels as part of a wider decarbonisation strategy. The change from crude to using feedstocks such as cooking oils and wastes animal fats introduces a range of asset integrity challenges, including an increase in the presence of water and variable feedstock quality and contaminants. Managing this impact on the asset integrity of the plant is critical in maximising feed throughput and minimising outages.

A critical process unit which is heavily impacted by the switch to biofuel feedstocks in the alkylation unit. Alkylation units are vital in refining, producing high-grade fuels. They are economically valuable but vulnerable to severe corrosion, which, if unaddressed, can release hazardous Hydrogen Fluoride (HF), risking production and safety. Adapting to changing conditions and feedstocks is essential for safe and efficient operation.

The Challenge

There were a number of challenges around the deployment which required a flexible monitoring solution:

- High wall loss rates due to corrosion necessitating frequent inspections and conservative replacements.
- Urgent need for rapid detection of changes in wall loss rates for timely process control decisions.
- Operating in a hazardous environment with the presence of HF and ATEX compliance requirements.
- Urgent solution required within a two-week timeframe.
- Limited access in confined and hot spaces.



HotSense CALIPERAY Wireless UT Monitoring System

The Solution

- Implementation of HotSense Field Data Logging Kit with CALIPERAY and HotSense transducers installed.
- Utilization of WirelessHART network and self-contained data server for real-time data collection and analysis.
- Deployment of high precision HotSense 380 UT probes known for durability in harsh and extreme environments
- Wide range of deployment options catering to NPS2" pipes and large vessels and in confined spaces.
- Ensured safe operation within the corrosive alkyl environment.

Execution

- IRISNDT, the local NDT contract holder, executed the project efficiently and within 2 weeks of receiving the order.
- Deployment of the complete solution, including installation, occurred in just two days.
- Pay-per-point model facilitated rapid implementation without the need for capital expenditure.
- Process and integrity teams given immediate access to data, including thickness and temperature measurements at one-hour intervals.
- High-precision trending measurements enabled the detection of wall loss and rate changes within days.
- IRISNDT managed the entire system, measurements, and data presentation.
- Integration of process and asset integrity conditions with 24-hour data access empowered real-time decision-making.

Key deliverables

- **Data-Driven Decision-Making:** On this particular system of concern, Asset and Operations Managers were given access to high precision trends to utilise alongside other data sources to guide decision making to deliver business objectives. Operators benefited from both thickness and temperature trends and were able to identify previously un-expected conditions.
- **Maximizing Operational Efficiency:** Rapid deployment of the system to respond to changing production requirements enables process optimisation to maximise efficiency.
- **Increased Production and Revenue:** Utilising trends to detect changes and forecast future asset integrity requirements, the operator optimised run length, maximising the amount of feeds which could be run between replacements.



Example thickness trends from the included WAMP trending and control software. Corrosion rates for the gated periods are shown in green. The high precision measurements enable rapid detection of wall loss trends.