

Energy from Waste Wall Loss Monitoring

In-service, high- temperature high-precision corrosion monitoring of critical assets in UK Energy Recovery Facility (ERF)



Overview

A UK-energy-from-waste (EfW) plant faced uncertainty regarding the condition of its deaerator. These components are integral to the steam generation process within the Energy Recovery Facilities (ERF) across the fleet, converting waste materials into energy. Due to a zero-corrosion allowance, high-rates of inspection are required, and any reduction in wall thickness necessitated an immediate shutdown, disrupting plant operations until repairs or replacements could be made. With the plant processing varying feedstocks with fluctuating process conditions it led to an unknown impact on the integrity of the vessel causing significant business uncertainty and risk. Previously, due to limited access and thick insulation, risk-based inspections (RBI) were only feasible during shutdown periods. With the installation of the monitoring solution, the plant can now perform routine, high-precision wall-thickness measurements, ideal for trending, giving the plant the assurance that they are operating within their IOWs, and that an unexpected shutdown due to corrosion of this asset can be foreseen, thereby minimising operational disruption.

Key deliverables

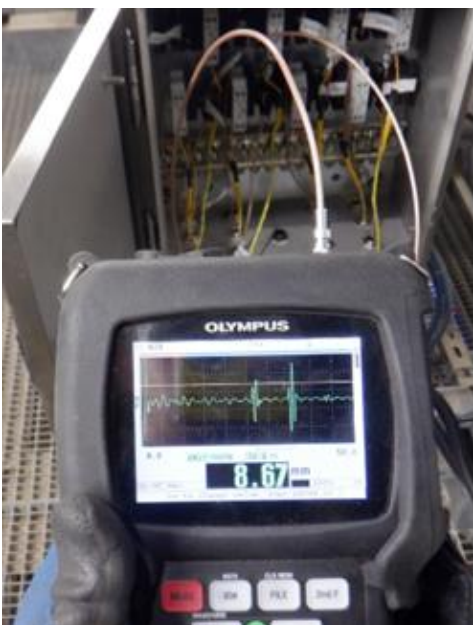
- The asset integrity and process control teams are able to operate the asset with the confidence of knowing that it is within safe operating limits.
- HotSense Measurement Hubs provide high precision wall thickness measurements to the operator at high frequency, without needing to remove lagging or access the asset.
- The operator has a method for detecting any change in the wall loss that can be linked to process events, that would cause the asset and plant to be taken offline.
- Outages have been reduced and the uncertainty of condition of the asset has been reduced.
- The cost of inspecting the asset was reduced and the safety of the inspectors has been increased.

The Challenge

The assets are large diameter pressure vessels operating continuously at up to 190 °C. Key inspection locations were identified based on historical ultrasonic testing (UT) data, and high-precision continuous monitoring system was sought to provide precise wall thickness data trends without requiring access to the vessel and removal of lagging. A series of thickness monitoring locations (TML's) were required to be monitored across the vessel.

The Solution

- The HotSense™ 380 sensors with a solid couplant were chosen to provide a sensor that could survive and deliver stable and reliable thickness measurements. Fixed point HotSense™ 380 sensors with a solid couplant were chosen to provide a sensor that could survive and deliver stable and reliable thickness measurements with a detectable wall loss of ± 0.025 mm.
- The HotSense™ welded stud deployment system was utilised to deploy on various locations on the large diameter vessel. The HotSense™ welded stud deployment system was utilised to deploy on TML's across each vessel.
- HotSense™ sensors were connected to Ionix Measurement Hubs to allow quick and simple measurements to be collected from easy-to-access connection points to get started before upgrading to a wireless solution. The data from the Measurement Hubs was collected and verified using a commercially available thickness gauge.
- The system was deployed, and measurement collected by the incumbent NDT service provider, IRISNDT, who provided traceability and compliance to relevant procedures.
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Execution

- The solution was successfully deployed by IRISNDT during a small shut down window period, <48hrs.
- 16 sensors with thermocouples for accurate compensation were installed, under insulation, with Ionix Measurement Hubs.
- Following installation, stable, repeatable measurements are being collected with temperature compensation being applied by the gauge.
- Wall thickness data is now being collected frequently by inspection technicians whilst the plant is on-stream, prior to upgrading to an autonomous wireless solution.
- The cost of inspecting the asset has been reduced and the safety of the inspectors has been increased.