



Working together to solve the age-old problem of apples vs. oranges

PII applies innovative software for point-to-point comparison of ultrasonic and magnetic data for a comprehensive assessment of complex internal corrosion and validation of ILI tool specification

Challenge

In 2012, [PII Pipeline Solutions](#), a GE Oil & Gas and Al Shaheen joint venture, completed a MagneScan (MFL) in-line inspection (ILI) of a subsea pipeline in the Middle East. The findings from that inspection were used to conduct a RunCom corrosion growth assessment against 2006 MFL inspection data, and the results were utilized in a fitness-for-purpose (FFP) assessment to determine the location and extent of remediation requirements. However, the recommendations differed from those following an UltraScanWM (USWM) ILI and FFP undertaken in 2010.

The pipeline was significantly corroded but, because ultrasonic (UT) and MFL technologies gather, display, and report data quite differently, the precise nature and extent of the corrosion was unclear. For instance, the 2010 UltraScan data showed 4,000 areas of continuous long corrosion, whereas the 2012 MagneScan data identified 600,000 areas of pitting. The inherent differences between the UltraScan and MagneScan technologies made it challenging for the client to fully understand the remediation requirements.

Nonetheless, the client still needed to ensure zero failures and comply with all regulations. Consequently, PII committed to collaborate with them to find a way to overcome the technology differences and validate the ILI results. Our shared goal was to deliver the highest possible level of certainty about the integrity of PII's data and, hence, the integrity of this crucial asset.



CHALLENGE

Different in line inspection (ILI) technologies yield different views of the pipeline. The challenge was to identify appropriate remediation based on all the information available.



SOLUTION

PII collaborated with the client to combine different data types and, using our innovative new software, do a point by point comparison with in field AUT data to validate the ILI results and remediation requirements.



BENEFITS

MagneScan exceeded its published specification, giving the customer and regulators the high degree of confidence needed to proceed with remediation actions and bring the pipeline back to service.

Solution

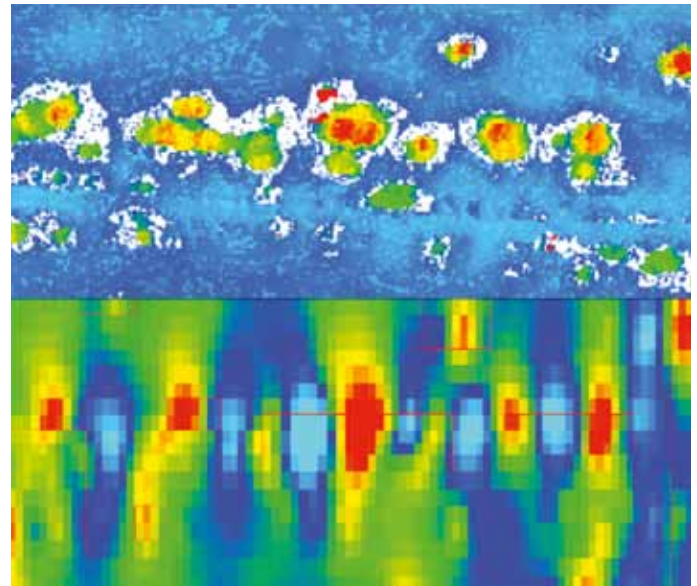
Combining results from the UltraScan and MagneScan inspections was a unique and difficult task but necessary to provide a worst-case scenario on the nature and extent of the corrosion in the pipeline, and from there, to use the corrosion growth rates obtained from RunCom to provide an updated remediation plan. The client committed to validating PII's results and remediation plan by contracting with a third-party vendor to carry out a series of external subsea Automated Ultrasonic Testing (AUT) scans.

The AUT scan results were provided to PII in digital format. This data was compared with PII's ILI data using our unique dig comparison software. It was developed originally to validate external corrosion obtained from laser scanning of onshore pipelines. We were able to adapt the software to validate the internal corrosion results of the third-party subsea AUT scans.

“This was a lot bigger than anyone expected. It wouldn't be right to just deliver data and walk away. The client needed our help.”

Derek Balmer, PII Integrity Engineer

Our solution allows true point-to-point matching of corrosion defects using two different technologies to ensure true and accurate corrosion depth validation. Point-to-point matching over relatively short scan distances (meters) resulted in hundreds of accurate matches, allowing our analysts to resolve the challenge of comparing data from different technologies and provide true validation of the complex internal corrosion in this subsea pipeline.



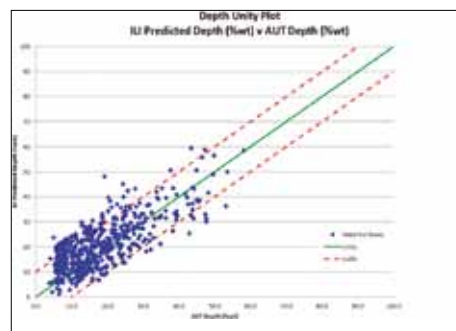
Top: AUT data, with warmer colors signifying deeper pits
Bottom: MagneScan data colored to match AUT data

Benefits

PII analysts mapped the MagneScan data directly onto the AUT scan data using weld numbers and relative distances, visually aligning and scaling the data to ensure location accuracy. They were then able to investigate and compare individual site depths embedded within complex corrosion features.

Results Summary

- Samples taken from nine spools; included a range of feature depths
- Statistically significant sample size obtained
- >550 internal defect sites matched
- MagneScan depth sizing accuracy: achieved >95% within +/- 10% wt, vs specification of 80% within +/- 10% wt
- ILI results validated



Both our customer and the regulators now have a high degree of confidence in the ILI results and the associated integrity and remediation strategy.

Close collaboration was key to the success of this complex project. Working together allowed us to adapt advanced technologies developed for use in a different application to work toward our shared objective of zero pipeline failures.