

Next Generation ILI Crack Inspection Service

Phased Array Ultrasonic Solution



Challenge

Hydrostatic testing has historically been the accepted approach to detect critical pipeline flaws. While hydrostatic testing is an alternate approach to ensure the reliability of a line, it is not ideal due to the possibility of damage to the asset as well as the interruption in the product flow.

As ILI is the most efficient pipeline integrity management tool, an operator published a request for proposal (RFP) to develop and provide a solution that delivered a step-change in crack inline inspection (ILI) performance for challenging seam-weld geometries. End-user expectations were defined, allowing vendors to propose a solution they believed would be most likely to deliver on those expectations.

The RFP included a series of aspirational goals for feature characterization in a range of seam welds, flaw types and morphologies, operational characteristics, and management of human factors. While accuracy and consistency for characterization of the types and severity of cracking in a pipeline was the primary goal, the operator also expected a new technology to fit within or improve upon the operational envelope of the currently available ILI crack tools.



Axial Cracks



Circumferential Cracks



Metal Loss



Geometry Ovalities



Mapping

Solution

Having successfully been awarded the RFP, NDT Global began extensive technological research assessments of operational and other constraints which led to the development of an ultrasonic phased array inspection platform - PROTON™.

This technology provides crack and local wall thickness measurements in a single platform. Phased array technology can be configured via firmware for sample scenarios that include shear wave (crack) and/or compression (metal loss) samples without mechanical modifications to the tool. Having the flexibility to configure our solution allows us to quickly optimize for the environment such as medium, velocity, weld type (DSAW, ERW, FW) and feature type to obtain the best data possible for the individual application and increase operational efficiency.

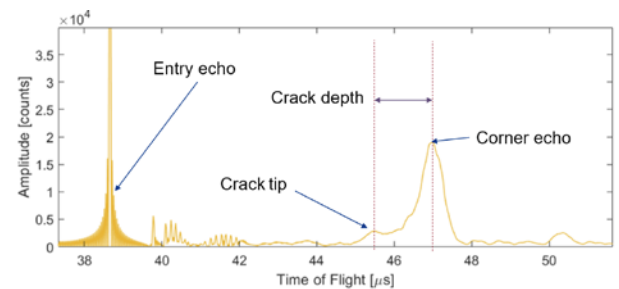
The achieved performance enabled the operator to move forward with a crack management program that successfully eliminates the need for hydrostatic testing on a challenging pipeline. PROTON has been accepted by the operator based on the performance against specifications. A robust qualification program, including a large set of pump test results, and a dig program with metallurgical validation allowed for acceptance with high confidence.



Results

- The achieved performance, nearly comparable to an NDE depth tolerance, is possible due to the direct measurement of the crack tip depth.
- Depth sizing accuracy, in combination with the delivery of the local wall thickness in the weld, allows the operator to improve the assessment and move towards an effective and efficient crack management program.
- PROTON's versatility allows the configuration of multiple ultrasonic techniques (i.e., pulse echo, pitch & catch) for unparalleled detection, identification, and sizing depending on the inspection application.
- Optimized measurement scenarios for a variety of threats can be programmed – including axial and circumferential resolution and the refracting angle of each single shot. This provides the most accurate results as the inspection system is tailored to the unique conditions of each pipeline.
- PROTON's accuracy and versatility was configured for this specific application, which was a key piece in the removal of the hydrostatic testing.

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Recorded A-Scan exhibiting a tip echo and a corner echo



Direct sizing capabilities using the crack tip