

Non-Intrusive Inspection Pressure Vessels



Definition

Non-Intrusive Inspection (NII) of pressure vessels and pipework eliminates the need for plant shutdowns and high-risk confined space entries, required by traditional internal visual inspections (IVI).

Utilising advanced non-destructive testing (NDT) technologies, NII offers comprehensive inspection coverage, ensuring safe and reliable operations without costly and time-consuming shutdowns.

By integrating robust risk-based assessments, NII provides detailed data for fitness-for-service evaluations and tracks degradation rates.

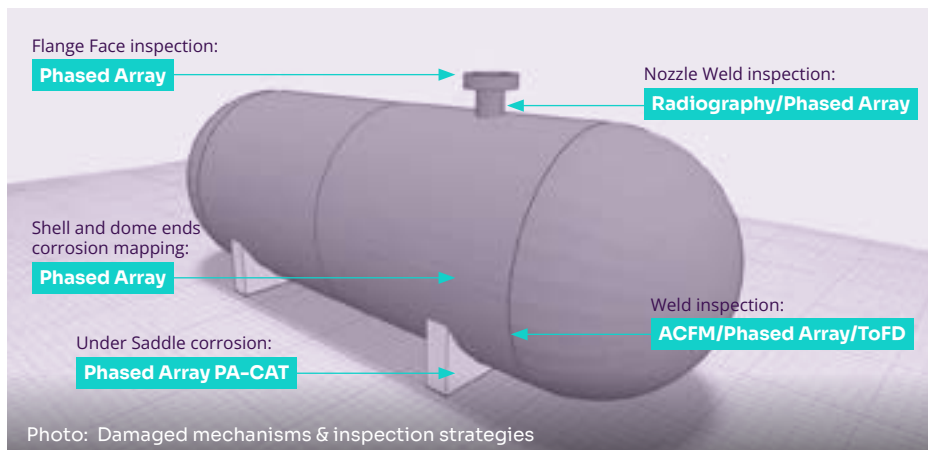
Scope of Work

An agricultural chemical manufacturer awarded Altrad their integrated asset integrity management services contract in 2021.

As part of this, the client requested Altrad to carry out a full NII on a chlorine storage tank at their chemical plant.



Photo: Chlorine storage tank



With our partnership approach to inspection, we deliver comprehensive support and a complete range of inspection and NDT services during every stage of an asset's lifetime - from fabrication through to decommissioning.

We focus on creating innovative inspection techniques that meet the evolving needs of our customers. Our team of level 3 qualified technical experts explore new ideas and transform them into operational solutions.

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Solution

As part of the Non-Intrusive Inspection (NII) strategy, inspection areas were carefully selected based on our vessel inspectors' in-depth knowledge of the tank system, its operational history, and the degradation mechanisms most likely to occur. The inspection plan focused on high-risk areas and known points of susceptibility, ensuring the most appropriate techniques were applied where they would provide the greatest value.

Phased Array Ultrasonic Testing (PAUT) and Time of Flight Diffraction (TOFD) were used to assess internal wall loss across the vessel shell and welds, enabling accurate detection of corrosion and weld defects. PAUT provided high-resolution corrosion mapping, allowing areas of reduced wall thickness to be identified and monitored over time, supporting long-term integrity management and asset life planning.

TOFD is a tried and tested method for weld inspections, particularly when assessing root and weld erosion/corrosion. Using probes positioned either side of the weld, TOFD provides full through-wall coverage, allowing for more accurate detection of root erosion and manufacturing defects.

ACFM (Alternating Current Field Measurement) was also deployed - a clean, efficient, and environmentally friendly surface inspection method capable of detecting and sizing surface-breaking defects on external vessel surfaces without the need for surface preparation or consumables.

In addition, PAUT or radiography were employed for flange face corrosion inspection and complex nozzle weld geometries, where standard ultrasonic scanning techniques can be less effective.

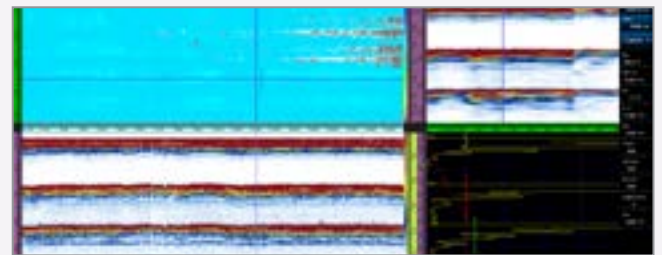


Photo: Example of wall thickness data

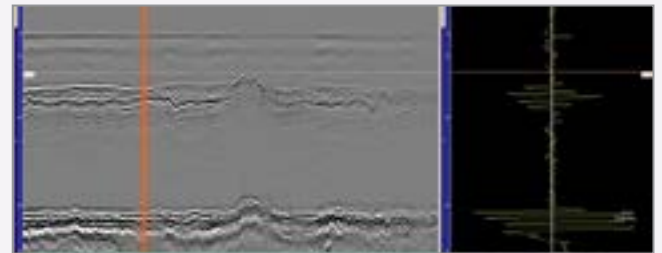


Photo: Example of ToFD data

Outcome

- Inspections were conducted in accordance with HOIS recommended practice HOIS-RP-103.
- All inspections were performed by certified personnel, ensuring the reliability and accuracy of the findings.
- The use of various NDT methods ensured a non-intrusive yet highly effective inspection process, crucial for maintaining the vessel's operational safety, whilst avoiding shutting down the plant.
- The NDT results provided a reliable baseline for future inspections, supporting trend analysis and condition monitoring over time.
- Raw data provides a permanent record of the inspection for auditing and traceability.
- Clear recommendations were made to the client to ensure the continued safe operation of the chlorine storage tank, minimising the risk of corrosion-related failures and maintaining the long-term integrity of the vessel.