

# Expedited Reporting

## Of a Hydrogen Service Pipeline



### Challenge

A European refinery operates a multi-size (8"-10") hydrogen pipeline, in service since 1956. Made of seamless line pipe, this line has girth weld defects attributable to poor welding techniques of the time.

The aim of this inspection was to validate previous ILI inspections and provide enhanced accuracy of the true condition of this pipeline using high-resolution ultrasonic technology. This inspection focused on an API 5L B steel grade pipeline with a nominal wall thickness of 8.74 to 9.27 mm (0.34 to 0.36 in).

A previous hydrotest and high-resolution magnetic flux leakage (MFL) inspection, reported several girth weld anomalies, such as lack of penetration or incomplete welding. Including a 60 mm (2.4 in) open circumferential crack associated with the weld and reported by the high-res MFL inspection that has been excavated and repaired.

Previously excavated girth welds revealed no crack, but other typical welding defects however, the Operator wanted to rule out the presence of any circumferential-oriented cracks in the girth weld or HAZ areas for the entire pipeline.


- The remaining two pipeline sections needed to be inspected as well, due to the same metallurgical origin and service parameters.
- The operator requested full data on the locations and dimensions of any circumferential open crack or initial crack in an expedited timeline.

### Solution

TECMA S.r.l, a pipeline integrity service company headquartered in Italy, held an integrity operations and consultancy contract with the Operator's Italian business unit. They requested that NDT Global address this specific inspection issue and a dedicated analyst team from its Data Analysis department was set up.

After reviewing previous NDE results performed with PAUT and manual UT checks, hydrotests, and high-resolution MFL inline ILI inspections, NDT Global's team of experts performed a complete assessment to determine the best inspection solution to detect and size girth weld anomalies that might be present at girth welds for each pipeline section. Once the assessment was completed, NDT Global recommended a circumferential crack inspection using its EVO 1.0 UCcx tool.

 Axial Cracks

 Circumferential Cracks

 Metal Loss

 Geometry Ovalities

 Mapping



## Results

- **Successful inline inspection:** NDT Global provided a successful inline inspection, collecting detailed and precise information about the different anomalies and threats in the Operator's pipelines in only 7 days.
- **Expedited data analysis reporting:** The data analysis process took 4 weeks, delivering accurate information regarding crack-like anomalies; verified weld anomalies, including lack of fusion, lack of penetration, weld misalignments; localized metal loss at GW, HAZ, and mid-wall anomalies.
- **Data Analysis support:** TECMA and the Operator requested additional sessions with NDT Global's data analysts for further clarification to better interpret the inspection results moving forward.

**Advanced high-accuracy ultrasonic ILI technology overcomes inspection barriers in girth weld anomalies**

### Key Performance Specifications (referring to API 1163)

POD for circumferential cracks, crack-like anomalies and linear indications  $\geq 90\%$

Min. depth of crack with  $L \geq 30$  mm (1.18 in)

- |                           |      |         |
|---------------------------|------|---------|
| • Base material & at weld | 1 mm | 0.04 in |
| • In weld                 | 2 mm | 0.08 in |

Depth sizing accuracy at 80% certainty

- |                                     |               |               |
|-------------------------------------|---------------|---------------|
| • 1 ... < 4 mm (0.04 ... < 0.16 in) | $\pm 1$ mm    | $\pm 0.04$ in |
| • $\geq 4$ mm (0.16 in)             | not specified | not specified |

Length sizing accuracy at 90% certainty	$\pm 10$ mm	$\pm 0.39$ in
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Location in pipe wall

- |                     |     |     |
|---------------------|-----|-----|
| • Internal/external | Yes | Yes |
|---------------------|-----|-----|