



# GAS PIPELINE

## IDENTIFYING GIRTH WELD CRACKING THREATS IN A CRA CLADDED PIPE

### CASE STUDY

#### CHALLENGE

Identification of circumferential cracks in girth weld of a CRA cladded pipe. A liquid coupling medium to use ultrasonic technology in a gas pipeline.

#### SOLUTION

Full project management including pipeline preparation, inspection run and re-establishment. Ultrasonic ILI for both circumferential cracking and metal loss.

#### RESULTS

Independently verified, highly accurate circumferential crack detection. Full project management by NDT Global.

### CHALLENGE

In August 2013, a new gas line with internal 3 mm (0.12 in) stainless steel CRA cladding experienced a failure. This 16" pipeline was commissioned early in 2013 and only occasionally used prior to the incident. The failure consisted of circumferential cracking in a girth weld at a pipe bend and an investigation team recommended a complete inspection of all weld joints on this 10 km (6 mile) line.

Following the failure, the line was shut down and depressurized. However, this critical piece of infrastructure could be required to be operational at short notice, so an accelerated solution was needed to ensure the safe resumption of this operation. The inspection needed to identify additional areas with lack of fusion or other crack-like anomalies in all girth welds along the pipeline.

Identification of circumferential cracks is one of the most challenging tasks for inline inspection (ILI). Older magnetic flux leakage (MFL) technology is not suitable for identification of these types of features and in addition cannot be used with cladded pipes due to the non-magnetic CRA lining. EMAT technology is similarly unsuitable and so only an ultrasonic technology (UT) inspection was appropriate for these specific threats.

Although UT inspection was the only feasible means to inspect this line, doing so required that a liquid coupling medium be introduced and NDT Global was awarded this project having the skills and experience to manage both setup and inspection.

## SOLUTION

To inspect this 16" gas pipeline, NDT Global prepared a complete project plan to facilitate the inspection which included pipeline preparation, inspection run and a re-establishment procedure.



Example of a cladded pipe

*“IN A CRA CLAD PIPELINE WITH COMPLEX FEATURES, THERE IS A NEED TO CAREFULLY SELECT THE RIGHT TECHNOLOGY TO ENSURE SUCCESS.”*



Example of cracking in girth weld

The first stages involved cleaning and gauging pigs in a gas medium followed by line purging with nitrogen. When the line was sufficiently clean and gas levels were verified as safe, the line was filled with fresh water.

Due to the importance of the pipeline, a sequence of two inspection runs was selected. The first run was completed using an NDT Global Evo Series 1.0 ultrasonic circumferential crack (UCc) tool to address the detection of circumferential cracks and crack-like anomalies within the base material, girth welds and stainless steel cladding. The second tool selected was the Evo Series 1.0 ultrasonic metal loss with pitting resolution (UMp) tool to detect metal loss anomalies, pitting, laminations and inclusions within base material and stainless steel cladding. This second run also required the tool to be configured for XYZ mapping with an inertial navigation system (INS).

As the pipeline is CRA cladded, this combined inspection could identify any separation between the stainless steel and carbon steel, any lamination and any corrosion threats. The pipeline passes through an area with a high water table which added to the importance of checking for external corrosion. Since this was a new pipeline, no corrosion anomalies were expected, but this was an ideal opportunity to have a detailed baseline survey with the highest resolution direct measurement inspection available on the market.

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## RESULTS

**Reduced risks:** A complex CRA pipeline with complex features required the correct technology to ensure success. In this case, a combination of specialized ultrasonic inspections was required. NDT Global took full responsibility to prepare and clean this line along with a complete re-establishment procedure to ensure the pipeline was turned over in operational condition.

**Independently verified:** Highly accurate circumferential crack detection. The circumferential crack detection run found weld crack-like anomalies which were independently verified by Bureau Veritas (a global leader in testing, inspection and certification (TIC), delivering high quality services to help clients meet the growing challenges of quality, safety, environmental protection and social responsibility.). Inspection performance was confirmed to be within the specification as per guidance in API 1163. The crack-like defects were only 1 mm (0.04 in) deep, but were successfully identified by the inspection.

**Responsiveness:** This gas line is a critical asset, so NDT Global strived to deliver express reports within 5 days of each run and full reports within the agreed timelines. Express reporting has been instrumental in bringing back the pipeline to normal operation.