



PA Solution for Immersion Pipeline Testing with a Corrosion Mapping Scanner

with a corrosion mapping scanner

Pipeline transport has become the fifth largest transportation industry after railway, highway, water transport and aviation. However, due to its strong acid, oxidization, flammability, and explosive properties, pipelines are prone to corrosion, and the resulting operational failures and incidents are numerous. Therefore, accurate and effective assessment and monitoring of pipeline corrosion has become a top priority for all industries.



Currently, pipeline corrosion testing includes leakage flux, ultrasonic guided wave, and conventional spot thickness measurement. But these conventional NDT methods may be inadequate inevitably.

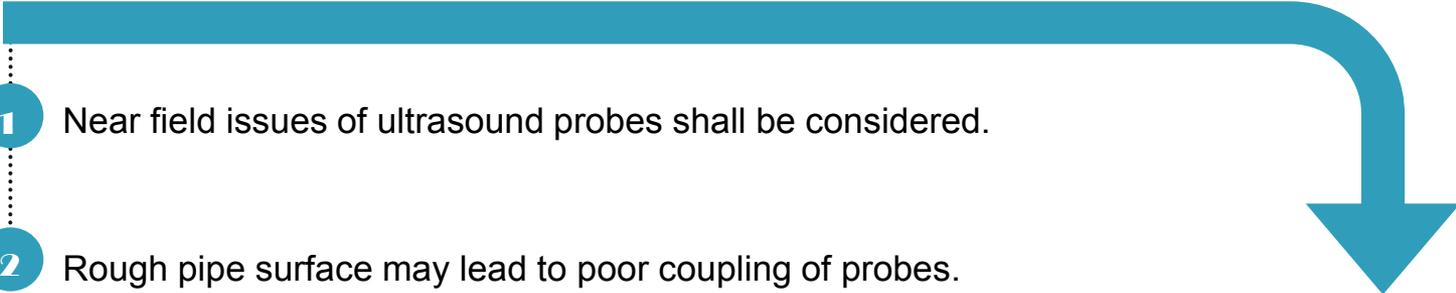
Leakage flux: Due to wall thickness limitation, there are many interference factors; and the variable cross-section structure is prone to false signals.

Ultrasonic guided wave: Point-like defects are difficult to detect; qualitative and quantitative inaccuracy; affected seriously by changed cross sections, verification with other method required.

Conventional spot thickness measurement: Difficult to capture spot corrosion; low efficiency; coupling largely affected by the rough surface.

Therefore, it is particularly important to find a more accurate and reliable detection method.

Problem

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- 1 Near field issues of ultrasound probes shall be considered.
 - 2 Rough pipe surface may lead to poor coupling of probes.
 - 3 A crawler adapted to section changes and structural changes is required.
 - 4 Accurate measurement and evaluation of corrosion depth is required.
 - 5 Testing for high-risk parts with liquid flow changes that may lead to corrosion in elbows, flanges, tees and variable diameters shall be applicable.

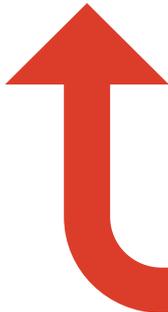
Solution



Ultrasonic phased array is an ultrasonic imaging technology that performs area inspection on pipeline corrosion. It is combined with a corrosion mapping scanner with light weight and simple structure to form an ultrasonic immersion testing system suitable for field conditions. The system has the characteristics of small blind zone, high precision, 100% coverage without missed detection, intuitive test results, traceability and high efficiency. Comparing to leakage flux and guided wave methods, it has advantages of less false signals and improved accuracy in corrosion testing of cross-section structural parts such as elbows, tees and variable diameters.

Solution

- 1 Mini immersion tank testing system adapts to small spaces and irregular pipe fittings, with small detection blind zone and high resolution.
- 2 Immersion coupling instead of ordinary wedges, which enables coupling disregard of rough surfaces.
- 3 Water supply at low flow rate ensures the mini water tank full of water at all times and stable coupling.
- 4 Synchronous gate with interface wave to avoid subsequent errors caused by uneven outer wall.
- 5 Setup of appropriate depth of water layer so that the testing process is not affected by the secondary interface echo.
- 6 The echo pulse method is used to directly measure and monitor the wall thickness, ensuring the accuracy of the measurement.
- 7 Based on linear C-scan to achieve surface thickness measurement of corroded pipes and capture spot corrosion.
- 8 Wide coverage of sound beams to improve testing efficiency.
- 9 Manual encoding scan, compact and flexible.

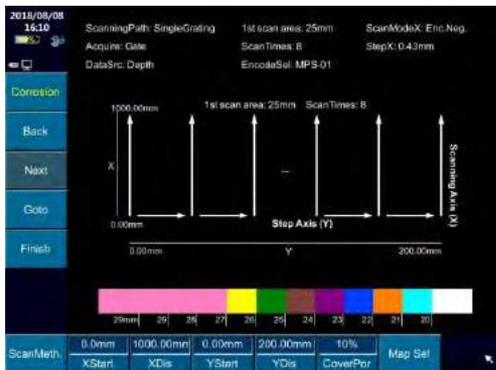
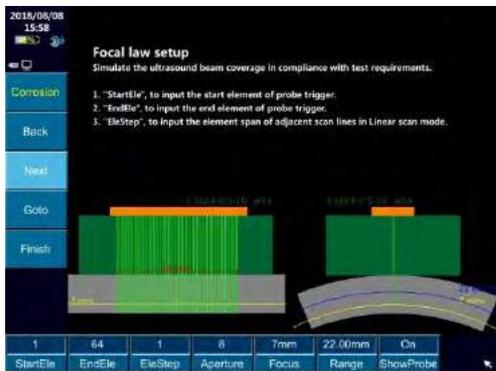


Corrosion mapping scanner MPS-01



- Suitable for straight pipe OD \geq 80mm
- Suitable for elbow OD \geq 168mm
- Suitable for wall thickness \geq 6mm
- Beam coverage: 30mm
- Mouse shape design for easy control; small size and portable.
- Compatible phased array linear probe: 5.0L64-0.5-10-IH
- Mini water storage tank for immersion testing.
- Reasonable bubble discharge design so that the coupling is not affected even by a few bubbles.
- Consumable gasket fits tightly to the surface of the workpiece.
- Irrigation of controlled water flow to adapt to good coupling of rough workpiece surfaces.
- Attraction of strong magnetic wheels to the workpiece for stable operation.
- Structure for easy disassembly, assembly and maintenance.

Software



- Professional testing process wizard, allowing users to quickly get familiar with the testing process and perform quick setup and calibration.
- Workpiece simulation and simulating detection coverage for adjusting the detection process.
- Scanning strategy interface for the operator to understand the scanning plan of the entire workpiece before the scan.
- Tracking gate synchronized with interface wave that monitors minimum wall thickness and high-density C-scan
- Custom color bar according to user's needs, with wall thickness of test results in different colors.
- Permanent storage of scanned data and online report generation.

Solution

Test Result



- Phased array C-scan is used with a corrosion mapping scanner to perform corrosion testing on a certain variable cross-section and its nearby area of the pipeline.
- Near the cross-sections of elbows, tees, welds, tapered parts and insulating flanges with varying flow rates where perennial flushing is severe, the testing shall be focused on the pipe sections with flow pattern change and corrosion risk.
- The ultrasonic guided wave and leakage flux methods may be inadequate in testing the above-mentioned cross-sections with high corrosion risk.
- The C-scan testing with the PA corrosion mapping scanner is not affected by the variable cross-section, and the wall thickness for the variable cross-sections can be expressed in different colors.
- Based on PA C-scan, the shape of the inner wall corrosion is simulated in the intuitive scan result with scattered spot corrosion being captured.

On-site Application



**THANK
YOU!**