

GUIDED WAVE TECHNOLOGY



Oceaneering Asset Integrity offers the “Wavemaker G3 Pipe Screening System” as a rapid and reliable technique for assessing the condition of small and large diameter pipes. Guided wave technology is used to detect internal and external volumetric change, with the ability to inspect meters of pipe from one location. The technology allows for inspection of difficult to access areas such as buried sections, insulated lines and lines with protective coatings.

Latest technology allows for Dynamic Frequency Animation, Enhanced Focusing Capability, C-Scan Plot, Low Profile Transducer Rings (less clearance between lines required) and Permanently Installed Monitoring Systems (gPIMS).

Technique:

The “Wavemaker G3 Pipe Screening System” uses low frequency guided ultrasonic waves that propagate along the pipe wall and is designed for rapid screening of long lengths of pipe to detect external or internal corrosion as well as axial and circumferential cracking. The system is composed of three primary components: the transducer ring, the Wavemaker G3 instrument, and the controlling computer.

The transducer rings use mechanical or pneumatic pressure to dry couple piezoelectric transducer elements to the pipe being inspected. Transducers attached to the pipe send waves tens of metres in each direction along the pipe wall and the returning echoes indicate flaws and other features as a result

of volumetric changes. Therefore long lengths of difficult to access pipe can be examined from a single location with minimal preparation and while the process is on-line.

Minimal disruption of the plant and high productivity of the Wavemaker G3 equipment (hundreds of metres of pipe can be screened in one day) makes Guided Wave technology a very efficient method of inspection.

Capabilities:

- On-line inspection at elevated temperatures (up to 180° C).
- Fluid and gas does not affect test.
- Inspection of pipe from 2” to 72” diameter.
- 100% of the pipe is inspected (within the diagnostic length of the pipe).
- Pulse echo type operation provides information on feature position and severity.
- Sophisticated analysis aids interpretation of results.
- Interpretation possible between defects and standard pipe features.
- Ability to detect metal loss and planar defects at long range.
- Detects metal loss, whether internal or external
- Detects increase in metal volume such as welds.
- Sensitivity between 1 and 5% loss of cross-section depending on conditions.
- Automatic calibration.



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Applications:

- Sleeved Road Crossings.
- Corrosion Under Insulation (CUI).
- Buried Pipe.
- Wall Penetrations
- Pipe Racks
- Corrosion under supports
- Offshore Risers and Caissons
- Location of previously unrecorded welds
- Sub-Sea Lines

Permanently Installed Monitoring Systems (gPIMS)

Previously inspections have been carried out by Oceaneering Asset Integrity personnel locating a transducer ring at the inspection point for each inspection. However the cost of gaining access to some pipes can far outweigh the cost of inspection. Whenever it is anticipated that multiple inspections will need to be performed at the same location, a Permanently Installed Monitoring System –‘gPIMS’ can be deployed. ‘gPIMS’ can be installed on almost any size of pipe between 2” and 42” diameter on surface temperatures up to 120°C.

The design of ‘gPIMS’ ensures consistency of future inspections for accurate condition monitoring by storing test parameters such as pipe size, orientation and the identification of the original reference file. The software automatically selects all of the appropriate collection parameters greatly reducing the possibility of operator error.

‘gPIMS’ Applications

- **Any location** - where previously traditional ‘flexible’ or ‘fixed’ transducer rings were used.
- **Buried pipe** - a low profile flexible transducer is clamped and bonded in place. The whole transducer is sealed in a polyurethane jacket to provide complete environmental protection from water and hydrocarbon damage.
- **Offshore riser** - installation possible using rope access techniques. Technology will operate in subsea environment.

Limitations Of Guided Wave Technology

- Some wrapping (e.g. Bitumen) can reduce the test range.
- Pipe contact with concrete greatly reduces test range.
- Sections of pipe with numerous features (for example several “T’s” collected together) cannot be tested reliably.
- Technique measures volumetric change and is therefore not suitable for the detection of isolated pits.
- Identified corrosion areas should be inspected using complementary techniques for accurate remaining wall measurements.

