



Guided Wave Inspection Systems for Large Vessel Applications

Nondestructive evaluation of large metallic vessels such as above-ground storage tanks and nuclear power plant containment structures is challenging, given their size and access restrictions. Southwest Research Institute[®] (SwRI[®]) has recently developed and field-deployed an inspection system suitable for rapid screening of these structures.

SwRI's advanced guided wave inspection system combines these unique features:

- Innovative guided wave sensors designed for thick-walled structures
- High-power, low-noise electronics to maximize defect detection
- Synthetic aperture signal processing used to combine multiple signals
- Color-mapped imaging of tank and vessel features

Custom Guided Wave Sensors

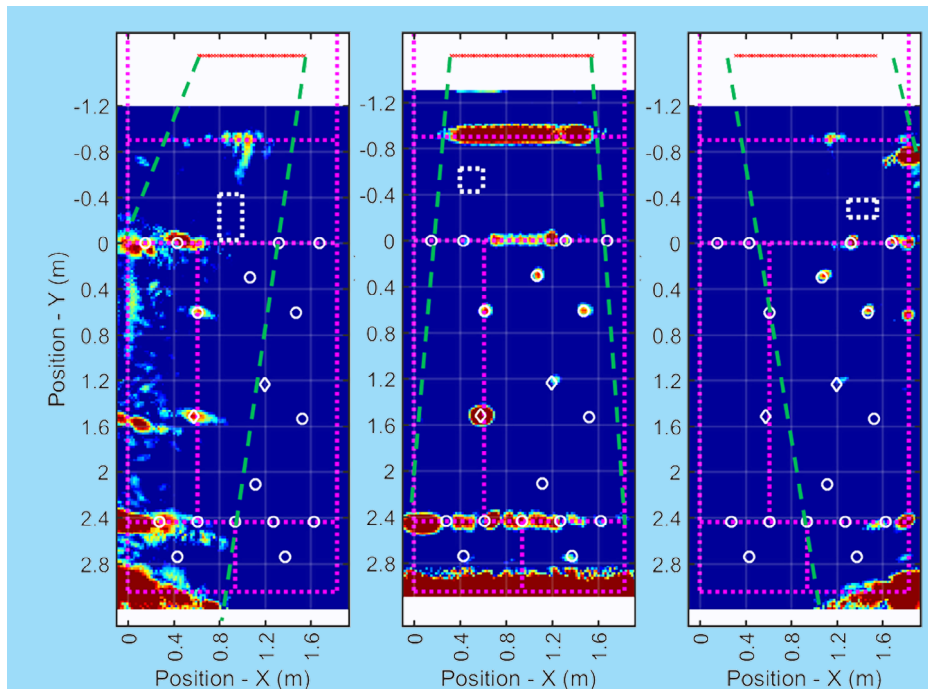
Magnetostrictive Transducer (MsT)

- Unique patented SwRI technology
- Small, lightweight sensor
- Best for inspections with access challenges

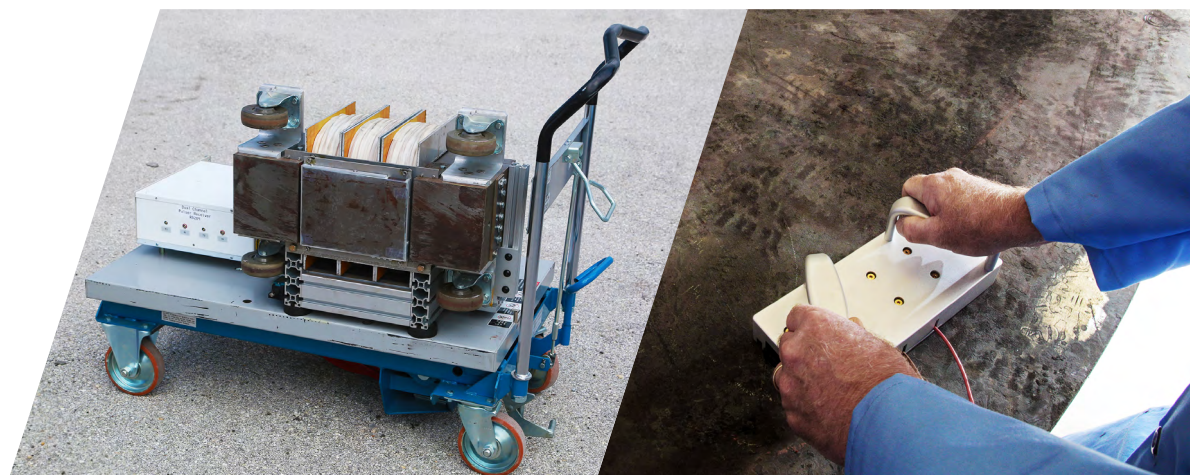
Electromagnetic Acoustic Transducer (EMAT)

- Consistent data quality (no coupling fluids)
- Improved guided wave mode selectivity
- Less physically demanding inspection

Example Inspection Results



Data collected on mockups of double-shelled storage tank showing inspection results with different sensor configurations. The magenta dotted lines indicate mockup boundaries and internal welds; white markers denote known (circles) and suspected (diamonds) flaw locations; and red "x" marker lines show where data was collected. The dashed cyan line highlights coverage areas of three different sensor angles: left tilt, no tilt, and right tilt. Color intensity indicates where damage is likely to be located.



Advantages and Benefits

- Rapid screening of large areas of the vessel using guided waves
- Ability to inspect inaccessible areas, including buried portions
- Suitable for combining with robotic delivery system for inspecting dangerous locations
- Provides guidance to other inspection techniques for defect characterization

Inspection Process

Preparation



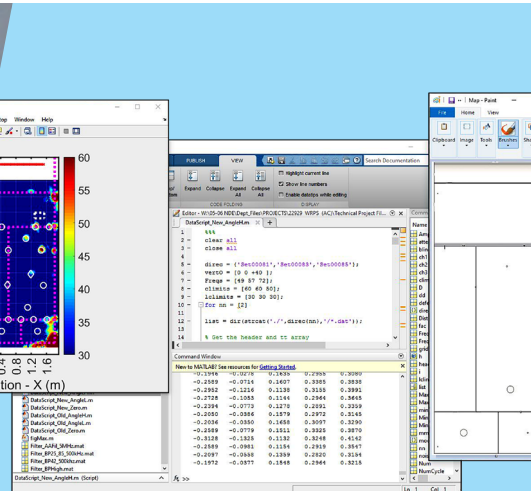
Simply indicate data collection locations; no need to clean surface or remove coatings

Examination



Incrementally move sensor along structure, pausing for regular data collection

Data Analysis



Use efficient algorithms on computer workstations to quickly inform users of results

We welcome your inquiries.
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SOUTHWEST RESEARCH INSTITUTE

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