



U.S. Department
of Transportation

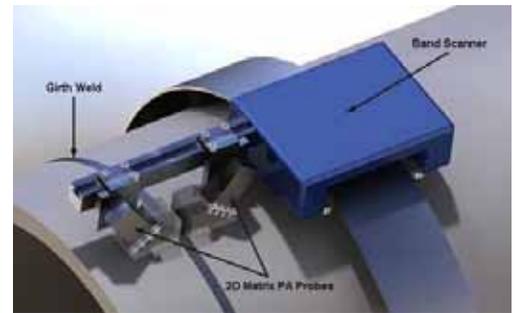
Enhanced Defect Detection and Sizing Accuracy using Matrix Phased-Array Ultrasonic Tools DTPH56-08-T-000002

OPS ACCOMPLISHMENTS

Pipeline Safety Research and De- velopment for De- fect Detection and Characterization

Challenge

Although ultrasonic inspection technology has improved significantly, more accurate detection and assessment tools must be developed to improve size and depth measurement accuracy of crack-like and planar imperfections, cracks in dents, and detection of secondary features within deformed pipe. These defects are the most difficult to size/assess and are inherent to hydrogen-induced damage, stress corrosion cracking failures, mechanical damage failures, and many weld failures. In terms of its ability to detect and size defects, Linear Phased-Array (LPA) Ultrasonic Testing is superior to conventional Automated Ultrasonic Testing (AUT) equipment. By using the next generation of Matrix Phased-Array (MPA) Ultrasonic Testing, defect detection and sizing accuracy can be enhanced to improve predicted pipeline reliabilities.



Pipeline Girth Weld Inspection Concept with 2 Rigid 2D MPA Probes (Top) and MPA Probe Mounted on Plastic Wedge (Bottom)

Technology Objectives

This R&D effort is to accomplish the following tasks:

- 1) Develop and demonstrate a MPA System Concept
- 2) Perform Virtual Optimization study
- 3) Design & fabricate MPA Modules
- 5) Conduct Lab Performance testing
- 6) Initiate In-Field Testing
- 7) Prepare training aids & conduct public workshop to assist in transferring technology to industry

Accomplishments (As of August 2008)

- ◆ Kick-off meeting at EWI -June 2008
- ◆ Draft system concept delivered to DOT and project team for review
- ◆ Outlined MPA module functional specifications.
- ◆ First prototype wedge design fabricated and tested.
- ◆ Second prototype wedge design fabricated.
- ◆ Software development in process.

Contact

James Merritt

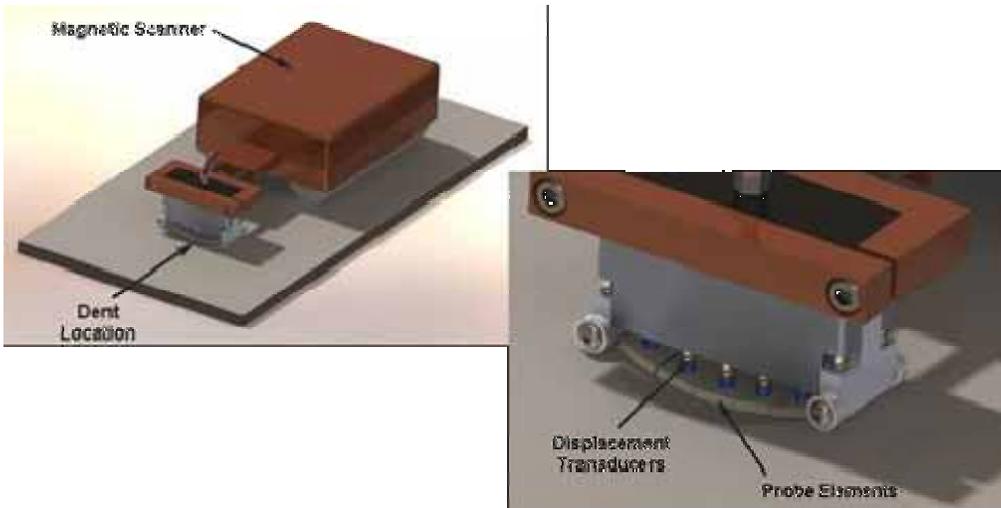
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Office of Pipeline Safety

Pipeline and Hazardous Materials Safety Administration



Flexible 2D MPA Probe Concept to Inspect Localized Damage Areas

Benefits

This research will advance pipeline safety by assisting operators, tools manufacturers, inspection companies and regulators to better understand the capabilities and limitations of the new promising MPA tools. Reduced uncertainties in flaw detection and sizing will result in improved pipeline structural assessments. These improvements will reduce the risk of pipeline failures.

Future Activities

In the remainder of this project, the MPA module concept and functional specification will be finalized, software will be completed, two modules will be fabricated, performance will be validated in the lab and in the field, training will be provided, and a technology transfer workshop will be held at EWI. For additional information contact Nancy Porter at nancy_porter@ewi.org.

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