

DOT 460 Quarterly Report – Public Page

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Prepared for: DOT

Project Title: “MWM-Array Characterization of Mechanical Damage and Corrosion”

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Public Page Section-

This project is aimed at advancing the JENTEK MWM-Array technology to provide quantitative characterization of corrosion and mechanical damage. This includes characterization through coatings/insulation; followed by higher resolution imaging with coatings/insulation removed. For mechanical damage, quantitative characterization includes geometric variations and multidirectional residual stresses (near the surface and deeper within the pipeline). In addition, this program will develop capability to detect cracks at damage sites. For corrosion, enhanced high resolution imaging of both external and internal corrosion will be developed for specific applications to support life management decisions. This team will build on demonstrated MWM-Array (and MR-MWM-Array) detection capabilities to deliver substantially enhanced characterization of damage and practical means for implementation. This technology has been successfully applied in the aerospace and manufacturing industries and provides substantially improved performance for imaging surface and buried damage through coatings and for curved surfaces compared to conventional NDE methods.

During the ninth quarter of this program, we have: (1) Performed a preliminary demonstration of low frequency capability for internal corrosion imaging. JENTEK performed a capability demonstration, at the facility of an oil major, to image internal corrosion through insulation and metallic weather jacket; (2) Continued development of enhanced SCC and external corrosion imaging through coatings. JENTEK has continued to perform 3D simulations to determine relationships between the crack/notch depth and the MWM-Array sensor response. Progress is also being made in the development of enhanced models for the MWM and MR-MWM-Array, under DOT and JENTEK IR&D funding, which will enable more robust detection and characterization capability for corrosion under insulation; (3) Continued design and development of enhanced scanners to support laboratory testing and field trials. JENTEK has initiated design and development of a prototype field deployable CUI (external corrosion) and through wall (internal corrosion) scanner, based on lessons learned from recently-completed field trials; and (4) Initiated internal discussions and planning for performance evaluations, specifically for corrosion under insulation, crack depth and mechanical damage.

The point of contact for this program is Todd Dunford (Email: todd.dunford@jenteksensors.com; Phone: 781-577-2315).

General Information required on all Public Quarterly Reports

Results and Conclusions:

This section summarizes progress made in this program. This project is aimed at advancing the JENTEK MWM-Array technology to provide quantitative characterization of corrosion and mechanical damage.

Progress has been made in a number of areas:

- Low frequency internal corrosion imaging capability – Capability demonstration – Completed a preliminary capability demonstration of JENTEK’s low frequency MR-MWM-Array sensor technology for imaging of internal corrosion through insulation and weather jacket. The demonstration, performed at the facility of an oil major, included real and fabricated corrosion samples with varying insulation thicknesses. Measurements were performed using JENTEK’s magneto-resistive (MR) sensors and Generation 4, 8200 Pre- α low frequency instrumentation (being developed under DOT and JENTEK IR&D funding).
- Enhanced SCC and external corrosion imaging capability – Continued to perform 3D simulations to determine relationships between the crack/notch depth and the MWM-Array sensor response. Progress is also being made in the development of enhanced models for the MWM and MR-MWM-Array, under DOT and JENTEK IR&D funding, which will enable more robust detection and characterization capability for corrosion under insulation.
- Enhanced capability scanner development – JENTEK has initiated the design and development a prototype field-deployable CUI and through wall scanner. Refinements are being made to the design of the current generation scanner based on lessons learned from field trials performed in 2012. The prototype scanner is expected to operate over weather strap buckles and in proximity of nearby pipes. Also completed the development of an enhanced scanner for imaging and characterization of mechanical damage regions.
- Performance evaluation of characterization capability – JENTEK has initiated internal discussions and planning for performance evaluations, specifically for corrosion under insulation, crack depth, and mechanical damage.

Plans for Future Activity:

1. Prepare of enhanced capability demonstration of mechanical damage imaging.
2. Continue development of enhanced low frequency capability for internal corrosion imaging.
3. Continue problem definition refinement and measurement and calibration procedures to demonstrate preliminary inspection capability for ferrous and non-ferrous welds.
4. Continue the design and development of enhanced field deployable scanners and equipment.