

# DOT 460 Quarterly Report – Public Page

Date of Report: March 30, 2012

Contract Number: DTPH56-10-T-000009

Prepared for: DOT

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

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For quarterly period ending: March 30, 2012

## ***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 sixth quarter of this program, we have: (1) Continued development of enhanced capability for mechanical damage imaging. We are in discussions with an industry stakeholder to perform demonstration for imaging and characterization of mechanical damage; (2) Continued development of our preliminary low frequency instrumentation and probe electronics unit (in coordination with internally-funded efforts) for internal corrosion imaging; (3) Continued development of a preliminary inspection capability for ferrous and non-ferrous welds. We have performed preliminary laboratory measurements with our Generation 3 MR-MWM-Array on a pipe sample that was provided to us by an industry partner. We have also continued discussion with industry stakeholders to refine the problem definition; and (4) Continued development of scanners and equipment for field implementation. We have produced a preliminary set of scanners to support pipeline assessment and we will continue to enhance these designs through the end of the program.

The point of contact for this program is Todd Dunford (Email:[todd.m.dunford@gmail.com](mailto:todd.m.dunford@gmail.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:

- Enhanced mechanical damage imaging capability – Initiated planning discussions with an industry stakeholder to perform demonstrations for imaging and characterization of mechanical damage in pipeline samples. Continued development of algorithms for 3D visualization of mechanical damage regions.
- Low frequency measurement capability – Continued development of the new low-frequency instrumentation and probe electronics unit (in coordination with internally-funded efforts). Improvements are being made on the overall performance of the new instrumentation. We are also investigating ways to improve the overall durability of the instrument in laboratory and upcoming field demonstrations.
- Demonstration Measurements – Welds – We have performed preliminary measurements in the laboratory with our MRA002 MR-MWM-Array sensors on an API 51 reference notch. We have also continued discussions with industry stakeholders to refine the problem definition.
- Scanner Development for Field Implementation – We have continued with the design and development of next generation prototype scanners for ongoing laboratory testing as well as upcoming field demonstrations. We are incorporating design modifications based on the lessons learned from our recently completed field trials.

### **Plans for Future Activity:**

1. Initiate planning for preliminary demonstration of enhanced MWM-Array imaging capability for mechanical damage.
2. Continue development of preliminary low frequency capability for internal corrosion imaging.
3. Continue development of enhanced SCC and external corrosion imaging through coatings.
4. Continue measurement procedure adaptation to demonstrate preliminary inspection capability for ferrous and non-ferrous welds.