

DOT 460 Quarterly Report – Public Page

Date of Report: December 29, 2011

Contract Number: DTPH56-10-T-000009

Prepared for: DOT

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

Prepared by: JENTEK Sensors, Inc.

Contact Information: Todd Dunford, todd.m.dunford@gmail.com, 781-577-2315

For quarterly period ending: December 31, 2011

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 fifth quarter of this program, we have: (1) Continued development of our low frequency instrumentation that will serve as the basis of our next generation commercial product. We have also completed fabrication and testing of our next generation (3rd) low frequency MR-MWM-Array; (2) Performed preliminary laboratory measurements for detection of external and internal corrosion through thick insulation and metallic weather protection. We recently completed a preliminary field trial with our prototype low frequency instrumentation; and (3) Continued preliminary development of scanning fixtures to support laboratory measurements as well as field demonstrations.

The point of contact for this program is Todd Dunford (Email: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:

- Low frequency measurement capability – Continued development of the new low-frequency instrumentation. Improvements have been made in the overall robustness of the instrumentation. We have made adjustments so that measurements could be taken in multiple sensor configurations without any changes to the instrumentation electronics. Improvements have also been made with regards to overall durability of the instrument in laboratory and field demonstrations.
- Demonstration Measurements – Detection of Internal Corrosion through Insulation – (1) Performed thickness measurements on flat steel plates with the new MR-MWM-Array. Measurements were taken on these flat steel plates at almost 2 inches of insulation thickness. These measurements demonstrate the ability of the MR-MWM-Array to measure wall thickness of up to 0.5 inches using an air calibration. (2) Acquired a sample with internal material loss from an industry partner. Scan measurements were performed on this sample with varying insulation thicknesses up to 1.5 inch at 0.5 inch per second scan speed.
- Demonstration Measurements – Detection of External Corrosion through Insulation and Metallic Weather Protection – Acquired a sample with external material loss from an industry partner. Scan measurements were performed on this sample through 1 inch of insulation and aluminum weather protection.
- Preliminary field trials and Scanner Development – Continued with the design and development of prototype scanners for laboratory testing and field demonstrations. These prototypes will serve as the foundation for future scanner design and development. Performed preliminary field trials at an industry partner's facility. The objective of the preliminary field trial was to perform preliminary measurements on straight pipe sections in the field to gain better understanding of the real-world challenges, such as scanning over straps, screws and overlaps on weather protection. It was also aimed at gaining insight to enable scanner enhancements, as well as improved durability of the electronics and instrumentation.

Plans for Future Activity:

1. Continue development of enhanced scanning techniques for mechanical damage imaging in the field.
2. Continue adapting instrumentation to support low frequency measurements.
3. Continue to adapt procedures for weld assessment.
4. Continue design and development of scanners and equipment for field implementation.