DOT 460 Quarterly Report – Public Page

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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 seventh quarter of this program, we have: (1) Continued demonstration of preliminary capability for mechanical damage imaging. We performed a two-day demonstration of JENTEK's MWM and MWM-Array technology for imaging and characterization of mechanical damage on laboratory mechanical damage pipeline sections in Houston, Texas. Several mechanical damage pipe samples – containing dents of different dimensions, as well as dents with cracks – were made available to JENTEK by an oil company; (2) Continued development of our preliminary low frequency instrumentation and probe electronics unit (in coordination with internal, commercial product development efforts) for internal corrosion imaging; (3) Continued development of enhanced SCC and external corrosion imaging through coatings. We have performed preliminary laboratory measurements for detection of external corrosion on a straight pipe sample through 3 in. coating/insulation and aluminum weatherjacket; and (4) Continued development of a preliminary inspection capability for ferrous and non-ferrous welds. We have performed demonstration of JENTEK's MWM-Array technology for imaging and characterization of mechanical damage, near and away from welds, on laboratory mechanical damage pipeline sections. We have also continued discussion with pipeline operators and oil majors to refine the problem definition.

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:

- Demonstration Measurements – Enhanced mechanical damage imaging capability – Performed a two-day demonstration of JENTEK technology for imaging and characterization of mechanical damage on laboratory mechanical damage pipeline sections in Houston, Texas. Several mechanical damage pipe samples – containing dents of different dimensions, as well as dents with cracks – were made available to JENTEK by an oil company.
- Low frequency measurement capability – Continued development of the new low-frequency instrumentation and probe electronics unit (in coordination with internal, commercial product development 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 – Enhanced SCC and external corrosion imaging capability – Performed preliminary laboratory measurements on a straight pipe section through 3 in. coating/insulation and aluminum weatherjacket. Scans were performed with JENTEK's low-frequency MR-MWM-Array sensor, MRA002 on a representative pipe sample with fabricated defects on the OD.
- Demonstration Measurements – Welds – Performed demonstration of JENTEK technology for imaging and characterization of mechanical damage, near and away from welds, on laboratory mechanical damage pipeline sections. Several mechanical damage pipe samples – containing dents of different dimensions as well as dents with cracks, on or near welds – were made available to JENTEK by an oil company.

Plans for Future Activity:

1. Complete development of enhanced mechanical damage imaging capability.
2. Demonstrate preliminary mechanical damage imaging capability.
3. Demonstrate preliminary low frequency capability for internal corrosion imaging.
4. Continue measurement procedure adaptation to demonstrate preliminary inspection capability for ferrous and non-ferrous welds.
5. Initiate plan for development of enhanced capability scanners and equipment for field implementation.