

## **FINAL PROJECT SUMMARY REPORT**

### **BUSINESS AND FIRM ADDRESS**

[JENTEK Sensors Inc.](#) 121 Bartlett Street Marlborough, MA 01752

### **DOT SBIR Program**

U.S. Department of Transportation/OST-R

### **DOT CONTRACT**

6913G620P800099

### **PERIOD OF PERFORMANCE**

06/01/2020 – 01/21/2021

### **PROJECT TITLE**

MWM-Array Bending Stress and Crack Detection In-Line Inspection Module

### **SUMMARY OF COMPLETED PROJECT**

The purposes of this program were to demonstrate the capability of JENTEK's novel eddy current sensing technology for measuring bending loads and detecting cracks for steel pipes and to evaluate the potential implementation of this technology into an in-line-inspection (ILI) tool format. This type of measurement capability has the potential to address inspection and assessment needs for girth weld crack detection and geologic (i.e., earth movement) hazards for pipelines, which can ultimately improve the integrity management of pipelines.

This report summarizes activities during the Phase I effort on this program. Notable accomplishments included:

1. Demonstrated crack detection capability through hand-scans of a sensor array over pipe sections containing a range of EDM notches.
2. Designed and fabricated a bending test facility for pipe sections.
3. Designed and fabricated an electromagnet for use in the bending test article pipe to emulate operation of a magnetic flux leakage (MFL) tool.

4. Performed several load ramp tests and demonstrated a permeability-to-strain correlation for the steel bending test article with sensors placed on the inside and outside of the pipe.

5. Adapted a prototype ILI tool to incorporate quadri-directional magnetic stress gage (QD-MSG) sensors.

6. Demonstrated capability to scan the prototype ILI tool and provide an assessment of bending loads during bending tests.

Proposed follow-on efforts will continue developing sensor and procedure adaptations to address improving bending load measurement and crack detection capabilities for ILI tools. Additional work is required to establish the portability of the permeability-to-loads correlations, to improve the analysis methods for converting the multi-directional permeability measurements into multi-directional load measurements, and to adapt the instrumentation and data analysis tools into a practical measurement system for ILI applications.

## APPROVAL SIGNATURES

Name	Title	Date
Todd Dunford	VP, Product Engineering	03/03/2021
		