Attachment J.1 (DEC 2010)

FINAL PROJECT SUMMARY REPORT

Topic No:	20-PHI
Project Title:	MWM-Array Bending Stress and Crack Detection In-Line Inspection Module
Phase II: ✓ Phase II B: _____	
Firm Name	JENTEK Sensors, Inc.
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To best of my knowledge and belief the data provided below is accurate, complete, and current as of the date of signature below.

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Period of Performance: 08/23/2021 - 06/22/2024

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. The development focused on adapting JENTEK's existing 12in ILI tool for two applications: circumferential crack detection and bending load measurement.

For the circumferential crack detection application, and new sensor was designed and manufactured for the 12in ILI tool. For bending load measurements, a new sensor design was developed and fabricated that is able to measure directional magnetic permeability in multiple directions simultaneously for the purpose of correlating to these measurements with local strain. Improvements were also made to JENTEK's test capabilities and measurement procedures, including MFL emulation tools, strain gauge measurement techniques, bending load facilities, and independent measurements of electrical conductivity and magnetic permeability in steel.

Demonstrations of the crack detection performance of this sensor using EDM notch specimens were performed. Pull tests were perform for the bending load estimation capability using JENTEK's 12in pull test facility and 12in ILI tool. Testing was performed at different temperatures for the pipe under test.

The crack detection demonstration showed the capabilities of this sensor technology subject to the constraints of a practical ILI tool. The bending load estimation demonstration showed the sensor response under varied bending loads. Improvements to the data analysis methods are required in order to turn these measurements into reliable bending load estimates.