

CAAP Quarterly Report

Date of Report: July 7th, 2019

Prepared for: *U.S. DOT Pipeline and Hazardous Materials Safety Administration*

Contract Number: 693JK31850013CAAP

Project Title: A Fast and Low-cost Method to Automate Detecting, Locating, and Mapping Internal Gas Pipeline Corrosion using Pig-mounted Thermal and Stereo Cameras

Prepared by: Zhigang Shen

Contact Information: Zhigang Shen,
Associate Professor
College of Engineering
University of Nebraska–Lincoln
113 Nebraska Hall, P.O. Box 880500
900 N. 16th Street, Lincoln, NE 68588-0500
Email: shen@unl.edu
Phone: (402) 472-9470

For quarterly period ending: 6/30/2019

Business and Activity Section

(a) Contract Activity

- 1) **Contract modification:** No contract modification is expected in this quarter.
- 2) **Material purchased:** No major material was purchased in this quarter.

(b) Status Update of Past Quarter Activities

In this quarter, the prototype inspection vehicle was assembled and tested in a lab pipeline environment. The design of testing bed was completed and ready for assembling in next quarter.

(c) Cost share activity

The PI dedicated 0.4 FTE in this quarter to the project, which is equivalent to 0.2×3 months = 0.6 month of cost share. The portion of cost share in this quarter is \$12,753. The primary task included in this cost-share is the prototype inspection vehicle and testing bed design and testing. So far, a total of 3.0 months of cost share was spent in the 1st year, which is equivalent to \$63,765. The PI is expected to dedicate total 2.91-month research time in the first year, which is amounted to \$61,853.

(d) Tasks

Task 1.1: Design, prototype, and test the pig device with all the mounted devices and cameras

This task is approx. 100% completion by the end of the quarter. The prototype design was modified based on some preliminary testing results of the received parts.

Task 1.2 Setup the testing pipe platform in the working space of UNL Structural Lab.

The detailed design of the testing bed detailed was completed and ready for assembling in the basement of UNL Structural Lab for initial evaluation of the inspection vehicle. This task is 80% completion.

(e) Detailed discussion and descriptions

1. Experimental Program in the 3rd Quarter:

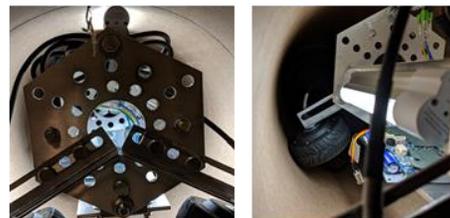
The major experimental activities in the 3rd quarter were 1) assembling and testing the prototype of the inspection vehicle; and 2) completing the final design of the testing bed. The results of each of the two activities were illustrated in the following paragraphs.

2. Results and Discussions

2.1. The prototype inspection vehicle was designed, assembled and tested in a simple shorts pipeline section.

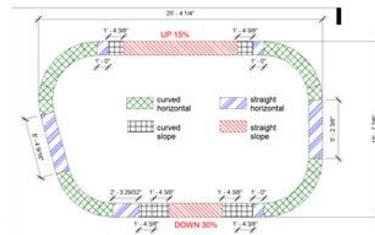
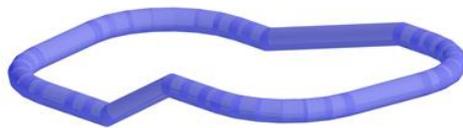


The assembled inspection vehicle



The Inspection Vehicle being tested in Pipeline

2.2. The design of the pipeline testing bed was completed and ready for ordering parts for assembling. The 80' long pipeline loop has 4 curve sections and 2 slope sections (15% degree and 30%-degree slopes). The diameter of the pipe is 14".



The design of the pipeline testing bed (80 feet long loop of 14" diameter pipeline)

3. Future work

In the 1st half of the 4th quarter the team will complete the testing bed assembly for evaluating the inspection vehicle's performance. The team will start the initial evaluation of the impacts of environmental and camera designs on the performance of the inspection vehicle in different pipeline illumination environment and in different layouts of the camera arrays in the pipeline.

References: N/A