Test Bed — Design, Construction & Operation

Description: An above and below ground pipeline network with engineered features for testing a variety of pipeline integrity technologies

Status: Project is complete. Facility continues to host tests and demonstrations.

BENEFITS

The NYSEARCH/NGA Test Bed is a versatile, calibrated and characterized pipe network that can be used to test robotic and non-robotic pipe inspection tools and train personnel on the use of direct assessment (DA) technologies.

The test bed network is a multi-functional pipe network with the ability to test a number of different technologies under a variety of conditions. The facility ensures that tests are performed on pipes with defects of known quantity and at severity levels that are useful for evaluation. Excavation and restoration costs at live field sites are avoided, saving approximately $30,000 per site (based on rural field tests conducted in 2004).

Figure 1: OPS Collaborative Guided Wave Demo

Advantages of the test bed network over typical field sites are the controlled nature of the test, known conditions and the ability to vary influences such as cathodic protection. By having a controlled non-operating pipeline site, tests and demonstrations become more repeatable, casings do not have to be removed to verify defects, excavations and restorations are not made at multiple sites, and technologies can seek actual defects rather than risk testing in the absence of defects.

BACKGROUND

The NGA Direct Assessment Working Group, an experienced group of corrosion engineers (Figure 1) and NYSEARCH have been active in preparing for and responding to OPS/DOT plans to increase inspection requirements for transmission lines. In its evaluation of pipe inspection technologies, NYSEARCH/NGA has sought to find technologies that can provide information about pipe wall conditions.

Participants in pipeline integrity test work have also identified a critical need to develop and test prospective and newer technologies that can assess coating integrity and quantify metal loss. As a result, NYSEARCH/NGA has chosen to fund the development of both robotic and non-robotic inspection technologies.

During the development of the test bed, many of the technologies were in the R & D phase of development, and the need had grown for a convenient means for controlled field testing under a range of site conditions. Therefore, members of NYSEARCH and the NGA DA Working Group designed, constructed and operated a test bed network.

TECHNICAL APPROACH

NYSEARCH/NGA has constructed a system that addresses a range of pipe diameters: 12-inch, 16-inch and 20-inch. Four different types of pipe coatings exist on the networked segments: bare steel, coal tar enamel coated pipe, TFG-3 coal tar, and fusion bonded epoxy coated pipe. The overall length of pipe in the network is approximately 1,400 feet. The network is connected with several flanges,

Figure 2: No-Pig Above Ground Inspection

reducers, elbows, tees, and a 20-inch plug valve. Multiple conditions have been installed including machined and natural defects, random defects created by construction equipment, coating issues, and adjustable cathodic protection arrangements. The majority of the test bed is buried having some above and below ground cased pipe. Two vaults access the below ground cased section. Finally, points of entry and exit have been installed to facilitate the launching of robotic inspection equipment.

The test bed is located in Johnson City, NY.

PROGRAM STATUS

Since 2005, the test bed has been completed and functional. Numerous technologies have been tested or demonstrated to evaluate their performance. Substantial tests and demonstrations of guided wave and above ground technologies have taken place; Figure 2 illustrates a remote assessment inspection technique.

Robotics testing has been invaluable in that the Test Bed becomes the blind field test with known defects before bringing the robot to an actual utility pipeline for real inspection work. Figure 3 illustrates the robotics platform, TIGRE, prepared to launch into the Test Bed pipeline.

Figure 3: TIGRE Robot Testing

Highlights

- Capable of testing a variety of inspection technologies and other pipeline innovations
- Capable of testing technologies for cased crossings

For more information contact:
admin@NYSEARCH.org

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