Pipeline Research Council International, Inc.

Working Group #3: Anomaly Detection/Characterization

Overview of PRCI Current Projects

PRCI Support Staff: Sean Black, Hans Deeb

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Overall Pipeline R&D Program

- PRCI’s Integrity and Inspection Committee research projects line up in three major categories:
  - MOAP Reconfirmation
  - Anomaly Detection and Characterization (focus of this presentation)
  - Pipe Material Properties
PRCI Integrity & Inspection Program

The focus is to verify the capabilities of inspection technologies to detect various feature types:

- General corrosion & pitting corrosion
- Crack colonies on pipe body
- ERW long seam cracks
- Mechanical damage
- Weld defects

Evaluate the accuracy of inside the pipe (ILI), and over the pipe (NDE) technologies
In-line Inspection (ILI)

- ILI Projects & Program Overview

  - Improve the performance of current tools and develop new tools for the key threats.
  
  - ILI technologies that can detect features that are not currently being characterized as effectively as they could be.
  
  - A suite of ILI technologies to identify all critical features in pipelines and methods for analysis of the data.
Ongoing Work (ILI)

- Develop a State of The Art Pull Test Facility (PHMSA-Cofund)
- Defining Close Metal Object (CMO) Detection Capabilities of MFL ILI Tools
- Development of a PRCI ILI Performance Test Loop for Liquid Coupled Technologies (6 inch and 12 inch)
- Evaluating the Effectiveness of Low Field MFL Technology or Other Electromagnetic Technologies in Measuring Loading Conditions at Branch Connections
New Work (ILI)

- Analysis of ILI Technology Performance Specification for Corrosion Features - Real vs Replicated/Machined Samples

- Pinhole In-line Inspection and Evaluation
Crack Management (CM)

- **CM Projects & Program Overview**
  - Provide operators with a comprehensive framework and guidance for integrity management of longitudinal seam welded pipe
  - Evaluation of ILI Technologies to Characterize Long Seam Features
  - Qualification of NDE Methods for In-ditch Analysis of ERW Pipe Weld Seam Anomalies
Ongoing and New Work (CM)

- Performance Capabilities Evaluation of ILI for Long Seam Features In ERW Pipe (continuing into 2017)
- ILI Crack Tool Reliability and Performance

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<th>Specification</th>
<th>Reality</th>
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<td>(False Negative)</td>
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Significance Test Outcomes

- NDE Crack Depth Sizing Performance Validation for Multiple UT Techniques used to Establish Actual Crack Depths for PRCI Reference Standards and ILI Performance Verification
Non-Destructive Evaluation (NDE)

- NDE Projects & Program Overview

- Technology capabilities to characterize Critical Damage/Feature for integrity assessment (Metal Loss, Mechanical Damage)

- Technology capabilities to characterize Critical Damage/Feature or material parameter for integrity assessment (planar and volumetric) and standardized terminology, data collection and reporting

- Deployment of Technology (Hardware, Procedures, Standards)
Ongoing and New Work (NDE)

- Determining the Impact of Human Factors on the Performance of In-Service Non Destructive Examination
- In Ditch Methodology to Identify Pipe Properties (comminuting in 2017)
- Integrity Assessment of Crack Colonies with the Aid of Advances in NDE including EMAT and Ultrasonic Imaging
- Hard Spot NDE Evaluation
Difficult to Inspect Pipelines (DTI)

- DTI Projects & Program Overview

- Define the capabilities of inspection technology to detect and differentiate mechanical damage features, including coincident and closely aligned features in difficult to inspect pipelines
Ongoing Work

- Evaluation of Large Stand Off Magnetometry (LSM) Technologies for detecting features on buried pipe
- Integrity Assessment of Difficult to Inspect Pipelines Evaluating Select Areas Using High Resolution NDE
- Condition Assessment of Un-piggable Pipelines Using Electromagnetic Impedance Testing (EMIT)
- Un-piggable NDE Tool Evaluation Focus
Mechanical Damage (MD)

- **MD Projects & Program Overview**
  - Define the capabilities of inspection technology to detect and differentiate mechanical damage features, including coincident and closely aligned features.
  - Provide the methods to assess the severity of mechanical damage anomalies to distinguish between benign features and defects that require response action.
Ongoing Work

- Performance Evaluation of ILI Systems for Detecting and Discriminating Metal Loss, Cracks and Gouges in Geometric Anomalies
Technology Development Center - TDC
## Industry Drivers

- **ILI specs vs Trial Results**
  - Work in progress
    - *All metal loss combined (artificial+natural+gouge)*
    - *Needs further NDE checkup*

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<thead>
<tr>
<th>Inside specification</th>
<th>Outside specification</th>
<th>In progress</th>
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### Industry Drivers

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Pipe Sample Inventory at TDC

- 1,158 total pipe samples; pipe size range from 2” to 52”
Thank You