PHMSA Pipeline Safety Research

Track Session on Anomaly Detection/Characterization
June 24-25, 2009

Detection/Characterization Strategy

- **Detection:**
  - Identifying and locating critical pipeline defects using enhanced inspection, hydrotest or direct assessment.
- **Characterization:**
  - Improving the capability to characterize the severity of defects identified in pipeline systems.

Project Types Underway

- PHMSA's R&D program has sought relevant topics in nearly all research solicitations since 2002.
- Dozens of detection and characterization projects awarded with approximately:
  - $27 M PHMSA + $31 M Industry co-sponsoring
- Projects are relevant to technology development, the strengthening of standards and the generation of general knowledge.
  - The lion share of projects are addressing technology and standards

Project Types Underway

- **Technology Development continues:**
  - Robotic internal inspection platforms for unpiggable gas lines 6”-8” & 20”-24”
  - Expanding/Improving MFL Technology
    - Mechanical Damage (MD) defect detection
    - Coating disbond assessment
  - In Ditch Technology
    - Through coating and handheld tools for cracks and MD
    - Coating removed applied tools for cracks and MD
  - Technology to assist the Direct Assessment processes

Project Types Underway

- **Strengthening Standards:**
  - Projects addressing NACE Standards
    - ECDA, ICDA (dry/wet gas & liquid), SCCDA & MDDA
    - Corrosion Growth Rates (RP 0169)
  - Projects addressing API Standards
    - Std 1104, "Welding of Pipelines and Related Facilities"
    - Publ 1163, "In-line Inspection Systems Qualification Standard"
  - Projects addressing ASME Standards
    - B31.8S, "Managing System Integrity of Gas Pipelines"
    - B31.8, "Gas Transmission and Distribution Piping Systems"

Project Types Underway

- **General Knowledge:**
  - Assessment and validation projects addressing various mechanical damage and welding inspection issues
  - Understanding risk with non-metallic systems
  - Improved defect severity modeling
  - Optimizing hydrotests

Project Impacts To Date

- **Technology Impacts:**
  - Technology to assist DA
    - A wireless sensor system that can flow inside gas pipelines and detect the presence and location of water. The sensor system is in the form of a 1.5" diameter sphere that can roll along the pipe propelled by gas flow.
    - Commercialized with Aginova
  - Through coating Non-Destructive Testing technology
    - An NDE technology capable of anomaly inspection through most coatings less than 3mm thick and in some cases, very thick coatings or insulation greater than 20 mm.
    - Commercialized with multiple vendors

Project Impacts To Date

- **Technology Impacts:**
  - "Cathodic Protection Current Mapping In-Line Inspection Technology"
    - Is the first method to assess the effectiveness of your cathodic protection system from INSIDE the pipe and identifies gaps in protection BEFORE damage occurs.
    - Commercialized with Baker Hughes PMG
  - Improvements to Guided Wave – Two Projects
    - Extension of the inspection length and the physical focus of the ultrasonic energy to increase sensitivity for detection of corrosion and other defects in pipelines.
    - Software/hardware improvements commercialized with 2 vendors.

Project Impacts To Date

- **Consensus Standard Impacts:**
  - API Std 1104, "Welding of Pipelines and Related Facilities" was revised from a project addressing the Improved Inspection and Assessment Methods for Pipeline Girth Welds and Repair Welds
  - API Std 1104, "Welding of Pipelines and Related Facilities" was revised from a project addressing A Comprehensive Update in the Evaluation of Pipelines Weld Defects
  - NACE TG 315, "Liquid Petroleum ICDA Standard" used information from a project Developing ICDA for Liquid Petroleum Pipelines.
  - NACE TG 305, "Wet Gas ICDA Standard" used information from a project addressing Direct Assessment for Internal Corrosion in the Presence of Wet Gas

Remaining Challenges

- Detection/Characterization challenges require solutions having people, process and equipment as part of a comprehensive program.
- Affordable/reliable technology remains challenging to bring to the market.
  - Many current projects need a commercial partner
  - Tools needed that both detect and characterize
  - Detection of other than wall loss type defects (i.e. MD)

Other Issues

- **Remaining Strength Calculation Solicitation**

  Broad Agency Announcement (BAA) #DTPH56-09-BAA-000002 High Strength Line Pipe Anomaly Assessment Methods

  - Solicitation Open until July 31, 2009
  - Proposals for Finite Element Analysis and full scale hydrostatic burst testing
  - X-65, X-70, and X-80 pipe grades and sizes to be tested and various defect dimensions
  - Analyze test data for comparison with related research findings
  - Seeking Industry cost share in the form of Line Pipe contributions, certified welders, and transportation of pipe.
  - http://primis.phmsa.dot.gov/matrix/RfpInfo.rdm?rfp=24

For More Information…

- On the projects addressing detection & characterization, please visit: http://primis.phmsa.dot.gov/rd/splan.htm
- On the impacts measured on projects addressing detection & characterization visit:

  http://primis.phmsa.dot.gov/rd/performance.htm
- Or contact:

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