PHMSA Pipeline Safety Research

Track Session on Pipelining in Challenging Areas
June 24-25, 2009

Pipelining in Challenging Areas Strategy

- Improving the industry's ability to safely operate in frontier or challenging areas by using new pipe materials, design and construction practices.

Project Types Underway

- PHMSA's R&D program has sought relevant topics in several research solicitations since 2002.
- Dozens of relevant projects awarded with approximately :
  - $19 M PHMSA + $24 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 standards and general knowledge and in onshore/Arctic areas versus offshore.

Project Types Underway

Technology Development Continues:

- Hybrid Laser Welding improvements for High Strength Steel (HSS) pipelines *(two projects - close to commercialization)*
  - The development of a hybrid Yb-Fiber Laser and GMAW process and technologies for pipeline girth welding.
  - The development of a Hybrid Laser Arc Welding (HLAW) system for full circumferential girth welding of large diameter (NPS30 and above) high strength pipelines.

Project Types Underway

Strengthening Standards:

- Strain Based Design – Possible new standard?
  - Validation and Documentation of Tensile Strain Limit Design Models for Pipelines - API/ASME?
  - Second Generation Models for Strain-Base Design – API/ASME
- Weld properties affect on the HSS welding process
  - Development of Optimized Welding Solutions for X100 Line pipe Steel – AWS A5X/B4.0, API 1104
  - Update of Weld Design, Testing, and Assessment Procedures for High Strength Pipelines – ASTM E1820, ASME 31.8/31.4, API 1104

Project Types Underway

General Knowledge work continues:

- The Effect of Cathodic Protection on Stress Corrosion Cracking of High-Strength Pipeline Steels
- Validation of Assessment Methods for Production Scale Girth Welding of High Strength Pipelines with Multiple Pipe Sources
- Optimizing Weld Integrity for X80 and X100 Linepipe

Project Impacts To Date

Technology Impacts:

- None to date
- Two new Hybrid Welding Technologies are close to market with readiness in 12-18 months
- Tech Impacts measured in other Track Sessions but are indirectly related to the scope of this track *(i.e. through thick coating/insulation inspection and airborne leak detection)*

Project Impacts To Date

Strengthening Standards:

- None to date
- Project results sent to relevant committee(s) for use in revising the standard:
  1. Corrosion Assessment Guidance for Higher Strength Pipelines – ASME B31G/RSRTENG
- Several more projects still active as shown earlier with impact measurement planned in future cycles

Project Impacts To Date

General Knowledge:

- Joint Industry Project "DW RUPE: Deepwater GOM Pipeline Damage Characteristics & Repair Options" developed and increased confidence in the industry's response ability to repair underwater pipeline in water depths from 1,000 to 10,000 feet.
- The project "Pipeline Integrity Management for Ground Movement Hazards", is now guiding operators with recommendations and best engineering practices to assess large scale ground movements and to define operational measures for the mitigation of large scale ground displacement effects on buried pipelines.

Other Issues

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

  This BAA #DTPH56-09-BAA-000002 is open until July 31, 2009 and seeks full proposals to secure a recipient that can safely conduct Finite Element Analysis and full scale hydrostatic burst testing on a variety of steel pipeline grades and sizes, and can collect and analyze the necessary test data for comparison with related research findings.

Remaining Challenges

- Complete process and skill set improvements to address the Alaska Gas Pipeline project
- Identify and engage all stakeholders
- Identify regulatory gaps
- Identify and address technical gaps including:
  - Anomaly assessment and repair
  - Acceptance standards for fracture control plans for Arctic environments
  - Composite pipe standards
  - Horizontal directional drilling through permafrost/partial permafrost regions

For More Information…

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

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

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