Strategic Pipeline Integrity: In-Line Inspection Tools and Maintenance Protocols

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Overview

This is an in-depth course on the practical aspects of piping and pipeline integrity, maintenance and repair. Participants will be introduced to the technical basis of the ASME and API integrity rules, as well as their application to case studies and exercises. The participants will be able to recognise causes of degradation in service, whether mechanically induced (pressure, vibration, fatigue, pressure transients, external damage) or due to corrosion (wall thinning, pitting, cracking), and apply integrity analysis techniques to make run-or-repair decisions. The participants will become knowledgeable in the technical basis and application of ASME B31.3, B31.4, and B31.8 piping codes, as well as ASME B31G and API 579 Fitness-for-Service and Flaw Evaluation. The participants will review inspection techniques, from the most common (PT, MT, UT, RT, MFL pigs) to the most recent (AE, PED, UT pigs and multi pigs), and the use of hydrotesting for integrity assessment and the implementation of integrity management programs, periodic inspections and evaluation of results. The course will review the various repair techniques, their advantages and shortcomings, and the logic to be followed in making repair decisions and selecting the applicable repair.

Course Objectives

At the end of this course, the participants will be able to:

- Provide a comprehensive introduction to all aspects of utility and inline inspection pigging
- Implement the standard procedure of piping and pigging during operation, maintenance and construction
- Practice in-line inspection tools with performance, theory and detection limits
- Design and implement an inline inspection using the ILI tool and a specific design
- Discuss post-in-line inspection issues and observe regulatory requirements for developing protocols and response

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Course Content

1. Piping for Operation and Maintenance
   - Pigging during construction
   - Pigging during operation
   - Utility Pigs
   - Cleaning pigs
   - Sealing pigs
   - Gauging pigs
   - Dual diameter pigs
   - Magnetic cleaning pigs
   - Designing a Pipeline for Pigging
   - Pig traps and pigging stations
   - Location and tracking devices

2. In-Line Inspection (ILI) Tools –Theory, Performance, and Detection Limits
   - Metal loss In-line Inspection
   - Other In-Line Inspection Tools
   - Crack detection pigs
   - Mapping
   - Geometry and bend-detection pigs
   - Wax deposition measurement
   - Spanning pigs
   - Semi-intelligent pigs

3. Designing and Implementing an In-Line Inspection (ILI) Program
   - Selecting an ILI Tool
   - Specific Design Considerations for Running ILI Tools
   - Launch and Receive trap design
   - Bends, tees, and valves
   - Issuing an Inquiry
   - Schedule requirements

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4. Preparation for Ili
   - Controlling Operational Parameters During the Inspection Run
   - Strategy for Contract Development and Negotiations
   - Developing a good specification
   - Contingency Planning for a Stuck Pig
   - Offshore risers
   - Onshore flowlines, gathering system main sections or laterals

5. Post In-Line Inspection Issues

6. Quality Assurance Check of the Data

7. Development of Protocols for Response

8. Prioritisation of the Dig Plan
   - US regulatory requirements
   - Criteria for corrosion-caused metal loss
   - Criteria for dents

9. Validation of Results:
   - Planning and preparation for field NDE
   - Comparison between ILI, field NDE and actual:
   - Corrosion
   - Dents - effects of rounding
   - Establish a level of confidence

10. Fitness for Purpose: Assessment
    - Assessment of defects
    - Establish a long-term integrity management program
    - Incorporation of results in risk programs
    - Potential Repair Consideration

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Targeted Audience

The course is especially designed for project managers, engineers, maintenance and technical personnel responsible for pipeline integrity assurance, flow assurance, corrosion control, and safety.

Course Methodology

Facilitated by an experienced professional trainer, this training course will be conducted as a highly interactive workshop session. A variety of training methodologies and facilitation techniques will be employed before and during the course, as applicable. These methods are aimed at enhancing individual and group interaction while maximising learning. Some of these methods are:

- Online Pre-post Test
- Colourful Visual Aids
- Gamification
- Self-Assessment Instruments
- Simulations
- Case Studies
- Videos
- Group Exercises & Discussions
- Role plays
- Indoor & Outdoor games