N734: Onshore Pipeline Engineering

Instructor(s): Prof. David Newman

Format and Duration

Classroom - 3 Days

Summary

A vast and global network of onshore pipelines are in evidence with new pipelines being designed and built on a month-by-month basis globally – to safely and reliably deliver oil and gas, fuels and other commodities to end users.

This course will provide delegates with a detailed and comprehensive insight into Onshore Pipelines Mechanical Engineering Design, together with the supporting requirements to ensure Pipeline Safety, Integrity And Reliability over their lifetime.

Importantly, the course will also present how risks, which pipelines are exposed to, are managed in order to maintain pipeline integrity and safety while complying with legislative and regulatory requirements.

Learning Outcomes

Participants will learn to:

1. Understand the principles of onshore pipeline design, including material selection and engineering considerations for functionality and durability.
2. Gain proficiency in various onshore pipeline construction and installation methodologies and their challenges.
3. Explore the process involved in pipeline testing and commissioning.
4. Demostrate theoretical and practical knowledge of pipeline protection (mechanical and corrosion protection).
5. Discuss Pipeline Integrity Management and its application to ensure operational safety and compliance, including aspects of pipeline inspection, maintenance and repair.
6. Acquire an understanding of the legal and environmental regulations that impact pipeline operations.
7. Analyse real-world case studies to identify best practices and lessons learned in subsea pipeline projects.

Training Method

This is a classroom course consisting of lectures, videos, discussions sessions, case studies and course assessments.

Who Should Attend

The course is intended for graduate engineers, pipeline, materials and corrosion, integrity, facilities, operations & maintenance, and construction & installation engineers, health and safety personnel and project managers.

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Course Content

Part 1

Introduction to Onshore Pipelines

- Overview of onshore pipelines network
- Industry codes and standards and regulatory frameworks (API, DNV, ISO, etc.)

Pipeline Design Requirements

- Pipeline route selection and Location Classes
- Onshore geotechnical surveys - methodologies
- Wall thickness design: pressure containment, collapse, and buckling criteria
- Stress analysis: axial, hoop, and bending stresses
- Pipeline expansion
- Flow Assurance
- Pipeline materials design and selection
- Pipeline protection - mechanical and corrosion protection (Cathodic Protection and coating systems)

Case Studies & Exercises

Part 2

Pipeline Construction and Installation

- Pipeline permits and Pipeline Works Authorisation (PWA)
- Pipeline fabrication, welding and NDT tools and techniques
- Pipeline laying/lowering – Right of Way (RoW), Trenching details and techniques
- Pipeline pre-commissioning and commissioning activities: flooding, cleaning, and gauging (FCG)
- Pipeline crossings

Case Studies & Exercises

Part 3

Pipeline Integrity Management, Inspection Maintenance and Repair

- Threats and Hazards to Pipelines
- Internal and External Corrosion – types and mechanisms – cause and effects
- Pipeline integrity management systems (PIMS)
- Inspection methods: intelligent pigging (IP/ILI)
- Pipeline ageing – cause and consequences

- Regulatory framework and industry standards (API 1160, ASME B31.8S, ISO 55000).
- Pipeline repair strategies
- Leak detection systems
- Pipeline abandonment and decommissioning

Risk Assessment and Safety

- Hazard identification (HAZID) and risk assessment (QRA)
- Pipeline failure modes: corrosion, fatigue, geohazards
- Emergency response planning
- Case studies on pipeline incidents

Case Studies & Exercises