



**Pipeline Inspection, Maintenance, and
Integrity in the oil & gas industry**



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Introduction:

Pipeline systems for the oil and gas industry play an important role in modern industrial operations. This oil and gas pipeline integrity, inspection, and maintenance training course presents the basic characteristics of efficient pipeline operation in various engineering applications.

This oil and gas pipeline integrity, inspection, and maintenance training course will cover pipelines' interaction with flow-moving equipment, such as pumps and compressors, and the technical characteristics of pump and compressor station operation.

Participants will be introduced to the main points of inspection, gas pipelines, and testing according to relevant API standards. They will also develop familiarity with cleaning methods and other maintenance activities, including necessary repairs to prevent failures. Enhancing the reliability and safety of pipeline systems is essential in the oil and gas pipeline industry.

This oil and gas pipeline integrity, inspection, and maintenance course is meticulously designed for professionals to grasp the advanced aspects of pipeline integrity, including cutting-edge inspection methods and maintenance practices and a keen focus on integrity and safety within the oil and gas sector.

Targeted Groups:

- Process, chemical, and mechanical engineers working in the petrochemical and process industry, including oil refineries and gas production companies where operation and maintenance of pipelines are of high importance.
- The operation, technical service, and maintenance professionals from various processing plants are involved in the everyday operation, control, inspection, and maintenance of pipelines.
- Engineers and consultants deal with planning new production lines, retrofitting plants, and introducing new technologies.
- Technical professionals are responsible for the maintenance and repair of equipment.

Course Objectives:

At the end of this oil and gas pipeline integrity, inspection, and maintenance course, the participants will be able to:

- Identify basic principles of safe operation and efficient maintenance of pipelines for various industrial applications.
- Develop a deep understanding and familiarity with the practical aspects of operation and maintenance activities.
- Illustrate the concepts discussed and be provided with the necessary experience in applying them.
- Follow the guidelines and best industrial practices for operating, controlling, inspecting, and testing pipelines.

Targeted Competencies:

By the end of this oil and gas pipeline integrity, inspection, and maintenance training, the participant's competencies will be able to improve:

- Main aspects of pipeline efficiency and safe operation.
- Approaches to pipeline flow control and measurements.
- Processes of material degradation due to ageing and workload.
- Best practices for pipeline cleaning and maintenance.
- Inspection procedures and estimating the remaining life of the equipment.

Course Content:

Unit 1: Overview of Technical Characteristics of Pipelines

- Selection and sizing of pipelines: flow rate, MAWP, pumping power: ASME B31.3.
- Selection of pipeline material and interaction with working fluid.
- Operation of pump and compressor stations.
- Pipeline flow control and measurements: custody transfer.

Unit 2: Operation & Material Degradation:

- Pipeline material ageing: erosion, corrosion and stress corrosion cracking.
- Corrosion Direct Assessment: External ECDA and internal ICDA Methods.
- Cathodic protection, coating and other technologies: outer & inner surface.
- Metal loss inline inspection ILI and smart pigging NDT monitoring.
- Pipeline fatigue, cracks, seam defects and ruptures.

Unit 3: Operation & Safety Management:

- Safety Instrumentation, Control Valves and Other Safety Accessories.
- Transient operation and effects and water hammer.
- Pipeline failure prevention and root cause analysis.
- Leak detection methods LDAR and patrolling and surveillance: SCADA.
- Inspection RBI, Hydrostatic test methodology.

Unit 4: Maintenance Technologies:

- Pipeline maintenance and cleaning technologies: pipeline reconditioning.
- Monitoring of pipeline vibrations and support integrity.
- Repair technologies: welding of composite sleeves and segment replacements.
- Maintenance of valves, fittings, and accessories.
- Valve repair: hot tapping, temporary plugging stopple.

Unit 5: Testing & Monitoring in Operation:

- Hydrostatic testing: allowable operating pressure and hydrostatic test pressure.
- Reliability and availability of pipelines in operation.
- Risk-based inspection RBI.
- Fitness for Service FFS.
- The estimate of the remaining life of the equipment.

Unit 6: Environmental Impact & Sustainability:

- Assessment of environmental impact during pipeline construction, operation, and decommissioning phases.
- Implementation of sustainable practices in pipeline management, such as minimizing carbon footprint and reducing emissions.
- Compliance with environmental regulations and standards governing pipeline operations.
- Integration of renewable energy sources and green technologies in pipeline infrastructure.
- Monitoring and mitigation strategies for environmental risks, including spills, habitat disruption, and water contamination.

Unit 7: Advanced Technologies & Innovations:

- Exploration of cutting-edge technologies shaping the future of pipeline engineering, such as robotics, drones, and artificial intelligence.
- Utilization of remote sensing and monitoring systems for real-time data collection and analysis.
- Development of smart pipelines equipped with sensors for predictive maintenance and anomaly detection.
- Integration of blockchain technology for enhanced security and transparency in pipeline operations and transactions.
- Adoption of advanced materials and coatings for improved durability, corrosion resistance, and leak prevention.