

€ TRAINING

Pipeline Construction & Maintenance
Planning & Management Best Practices



Pipeline Construction & Maintenance Planning & Management Best Practices

Introduction:

Pipeline systems for the oil and gas industry play an important role in modern industrial operations. The purpose of this training course is to present the basic characteristics of efficient operation of pipelines in various engineering applications. This training course will cover the interaction of pipelines with flow moving equipment, i.e. pumps and compressors, and technical characteristics of operation of pump and compressor stations. The delegates will be introduced to the main points of inspection and testing according to relevant API standards. They will also develop familiarity with methods of cleaning and other maintenance activities, including necessary repairs as prevention of failures. The program will include several workshops with real problems from industrial practice which will enable discussions and exchange of experiences.

Course Objectives:

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

- Identify basic principles of safe operation & efficient maintenance of pipelines for various industrial applications
- Develop deep understanding & familiarity with the practical aspects of operation and maintenance activities
- Illustrate the concepts discussed and be provided with the necessary experience in applying them
- Use & follow the guidelines & best industrial practices related to operation, control, inspection & testing of pipelines
- Gain the knowledge and failure analysis skills they need to conduct damage and failure analysis to prevent similar failures from happening.
- Understand the principles of gas valve operation.
- Identify different types of gas valves and their applications.
- Perform routine maintenance tasks to ensure optimal valve performance.

Targeted Audience:

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

Course Outlines:

Unit 1: Pipeline Preparation:

- Pipeline code and standards
- Preliminary survey
- The flow of fluid in pipelines

Unit 2: Multiphase Flow:

- Two-phase
- Flow pattern maps
- Flow system
- Troubleshooting

Unit 3: Gathering System and Pipeline Design:

- Gathering system
- Pipeline configuration
- Pipeline design
- Location classification

Unit 4: Pipeline Construction and Testing:

- Pipeline construction
- Hydrostatic test
- Corrosion considerations

Unit 5: Pipeline Operation, Inspection, Maintenance, and Integrity:

- Maintenance Programs
- Repair and Alteration of Pressure Equipment and Piping
- Rating Piping and Pressure Vessels
- Estimation of Consequences of Pressure Vessels and Piping Failures
- Failure Analysis Techniques

Unit 6: Inspection, Assessment, and Maintenance:

- Inspection Strategies Plans and Procedures - Risk-Based Inspection API 580
- Developing an RBI Plan
- Fitness-For-Service Assessment API 579
- NDT Methods and Techniques
- Probability of Detection
- Damage Characterization
- Selecting the correct techniques
- Pigging of Pipelines
- Smart pigging
- Cleaning
- Operational procedures

Unit 7: Failure Prevention By Design:

- Failure Causes - Design, Operation; Maintenance, Other Causes
- Material properties, and selection
- Physical properties and limitations of components
- Physical properties of steel and alloy piping and tubing
- Physical properties of fittings
- Basic Design
- Pressure Vessels

- Piping Systems
- Liquid Storage Tanks
- Operation and Maintenance of Process Equipment
- Damage Mechanisms Affecting Process Equipment

Unit 8: Piping Systems:

- Materials of construction and standards
- Basic Design Methodology - hydraulic design, pressure integrity, mechanical integrity
- ASME B31.1 and B31.3
- Piping flexibility and support
- Piping system components - valves and fittings; classes, ratings
- Worked Examples

Unit 9: Process Equipment Failures:

- Failures in Pressure Vessels, Piping, and Boilers
- Strength reduction through material loss
- Case histories
- Piping System Vibration
- Mechanical & Flow-Induced Resonance
- Transient Hydraulic pulsation
- Pipe supports and restraints
- Wind Loading
- Industry Practices for Failure Prevention

Unit 10: Degradation and Condition Assessment of Process Equipment:

- Degradation processes
- Corrosion, erosion, fatigue, hydrogen attack
- Overview of API 571
- Industrial Failures and Failure Prevention
- Inspection and Testing
- Inspection strategies, plans, and coverage - A real function of inspection
- Nondestructive Testing NDT methods and their characteristics and applicability
- Risk-Based Inspection RBI
- Overview of API 580 and API 581
- Fitness-For-Service Assessment
- Overview of API 579
- Worked examples
- Maintenance Strategies and Best Practices
- Optimum mix of reactive, preventive and predictive methods
- Reliability Centered Maintenance RCM

Unit 11: Gas Valve Installation and Maintenance

- Proper Installation Procedures for Gas Valves
- Pre-Installation Inspection and Safety Checks
- Lubrication and Sealing Methods for Valve Components
- Preventive Maintenance Practices
- Record Keeping and Documentation for Maintenance Activities

Unit 12: Fundamentals of Gas Valves

- Importance of Gas Valves in Industrial Applications
- Basic Components of a Gas Valve
- Types of Gas Valves: Manual vs. Solenoid vs. Control Valves
- Gas Valve Operating Principles
- Safety Precautions when Handling Gas Valves