



## Course Introduction

This course provides a comprehensive overview of the fundamentals of oil and gas pipeline systems including codes and standards, mechanical design, materials selection, construction, operations & maintenance. Practical examples are used throughout and the lectures are supplemented by video presentations.

## Who should attend

Pipeline Engineers, Pipeline Construction Engineers, Project Managers, Maintenance Engineers, Contractors, Supervisors, Inspectors, Operators, Equipment Suppliers, Inspection and Quality Engineers, Pipeline Design Engineers.

Engineers who need a wider appreciation of onshore pipeline engineering

## Learning Objectives

- The objective throughout is to provide a sound understanding of the underlying engineering Principles in each area of Pipeline Engineering.
- To provide methodologies for the mechanical design of pipelines in accordance with industry codes ASME B31.4 and B31.8 and best practices
- To discuss the key elements of pipeline integrity management based on best industry practices and standards (ASME B31.8S, API 1160); in-line inspection using smart pigs (API 1163), fitness-for-service assessment (ASME B31G, RSTRENG, etc), and repair/rehabilitation options.
- Attendees will receive a comprehensive set of notes

## Workshop Contents

1. Introduction to Pipelines
  - Introduction to Oil and Gas Pipelines
  - Pipeline & Pipeline Products
  - Gathering, Transmission and Distribution
  - Pipeline Engineers – Responsibilities and Duties
  - Introduction to Stages of Pipeline Project
  - Introduction to Pipeline design, Construction and Installation
2. Pipeline Codes and Standards
  - Major Codes and Standards governing Design, operation and maintenance of Pipelines
  - Common Features of Pipeline Codes and Standards
  - Features of ASME B31.4 and ASME B31.8
  - API Standards
  - Standards and Guidelines for Pipeline Operation and Maintenance



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### 3. Pipeline Materials

- Steels Used for Line Pipe
- Compositional Limitations, Mechanical Properties and Grades
- Fabrication of Line Pipe – Seamless, ERW, Longitudinal, Spiral
- Introduction to Pipeline Material Selection Requirements, including Code requirements

### 4. Mechanical Design of Pipelines

- Introduction
- Forces and Stresses In Pipelines
- Mechanical Design Criteria
- SMYS of Pipeline Materials
- Pipeline Design Factors
- Mechanical Design of Pipelines ( Maximum Allowable Pressure and Min. Required Wall thickness of Pipelines) ASME B 31.4 and ASME B 31.8
- Sustained Loads in Pipelines
- Stresses due to Thermal Expansion and Contraction
- Estimating Weight of Pipelines
- Estimating Maximum Span of Unsupported Pipe
- Case Study

### 5. Pipeline Routing

- Introduction to Routing
- Factors Affecting Pipeline Routing
- Easements and ROW
- Pipeline Routing Thumb Rules
- Tools & Data Used in Pipeline Routing
- Case Study

### 6. Pipeline Welding

- Basics of Welding
- Types of Welding Processes
- Welding Procedures
- Inspection of Welds

### 7. Pipeline Construction

- Introduction
- Sequence of Construction Activities
- Construction Equipment
- ROW ( Right of Way ) of Pipeline
- Stringing the Pipeline
- Bending
- Welding and Post Welding Qualification
- Lowering
- Tie-in Assembly
- Testing and Inspection
- Back filling of Trench
- Water Crossing
- Commissioning the Pipeline
- Cleaning & Restoration
- Case Study

### 8. Pipeline Testing

- Hydrostatic Testing
- Pipeline Construction Video



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### 9. Pipeline Design Consideration

- Valves
- Bends
- Crossings
- Leak Detection

### 10. Pipeline Protection & Maintenance

- Causes of Pipeline Damage
- Consequences of Pipeline Damage
- Prevention of Pipeline Damage
- Characteristics and Properties of Pipeline Damage
- Corrosion Fundamentals
- Cathodic Protection
- Internal Corrosion
- Stress Corrosion Cracking
- Pipeline Integrity Programs
- Case Study

### 11. Internal Pipeline Corrosion & Coatings

- Why Pipes Corrode
- Sweet Corrosion, Sour Corrosion etc.
- Local and Generalized Corrosion
- Soils and Microbiologically Induced Corrosion
- Cracking Mechanics
- Calculating Corrosion Rates
- Coating on Pipes
- Application , Refurbishment and Repair of Coatings

### 12. Pipeline Corrosion Prevention

- Internal Pipeline Corrosion
  - Inhibition of Corrosion
  - Biocide Treatment of Pipelines
  - Monitoring Internal Corrosion
- External Pipeline Corrosion
  - External Corrosion in Soils
  - Coating & their Applications

### 13. Pipeline Repair

- Pipeline Defects
- Pipeline Repairs ( Grinding, Weld Deposition, Sleeves, Clamps, Hot Tapping, Composite Wraps).
- Dressing, Shell Repairs, Fibre Wraps

### 14. Pipeline Pigging

- Why PIG
- Types of PIGS
- Intelligent Smart PIGS- Metal Loss ( MFL, UT)
- Geometry, Mapping, Crack Detection

### 15. Pipeline Cathodic Protection

- How Cathodic protection works
- Monitoring of CP at Test Points

### 16. Pipeline Economics & Asset Management

- Introduction to Pipeline Economics
- Terminology Used in Pipeline Economics
- Case Study
- Pipeline Performance – Key Performance Indicators
- KPI's for Monitoring and Assessing Pipeline Assessment
- Economic Analysis
- Capital Costs
- Operating Costs

Feasibility Studies and Economic Pipe Size

## About the Course Instructor



MOHAMMED KAMAL UDDIN AHMED

Bachelor of Engineering in Mechanical Engineering from Osmania University, Hyderabad, India in the year 1998.

- Piping Specialist since 1998, administered many courses in Piping Engineering, Onshore Pipeline Design & Construction, Pipe Stress Analysis, ASME B31.3, and API 570 Piping Inspection Examination Training & HVAC.

Piping & Pipeline Engineering Specialist

Profile at a glance:

Fourteen years of Progressive experience in projects management, design & maintenance engineering including piping material specifications, pipe stress analysis, mechanical systems, pipe support design, valves specifications and piping specialty items. It includes Design, evaluation, testing, fabrication interpretation, & modification of piping systems. Lead major projects for piping discipline with the world's most recognized design and owner companies.

- Currently engaged as Engineering Manager - Piping for M/S IPEBS, a engineering firm, based in Hyderabad, India into design and stress analysis of piping and pipeline systems and leading provider of technical trainings globally.
- Special interests include projects management for detailed engineering and mechanical integrity of piping and pipeline systems and Technical Trainings.

M/S IPEBS, Hyderabad, India Engineering Manager- Piping (July 2007 - Present)

Currently engaged as Engineering Manager of M/S IPEBS, an engineering firm based in Hyderabad, India, into engineering design of piping and pipeline systems and technical trainings.

M/S IPEBS was founded and incorporated in 2007, in Hyderabad, India. Today, the company consists of twenty-five executive, managerial, technical and administrative employees who manage, coordinate and execute projects successfully.