

# PIPELINE DESIGN AND MAINTENANCE

## MCE047

### COURSE DESCRIPTION

This course is designed to provide a comprehensive understanding of applied piping and pipeline technology: design aspects of piping and pipeline systems, selection of materials and types of pipes, flanges, valves and fittings, handling of those materials, welding and installation techniques and procedures, and the operation, inspection and maintenance of oil and gas piping and pipeline systems.

### COURSE GOAL

To enhance the participants' knowledge, skills and abilities necessary for pipeline design and the necessary skills for pipeline maintenance.

### COURSE OBJECTIVES

By the end of this course, participant will be able to:

- Pipeline code and standards
- Apply all the knowledge for designing and maintaining pipelines.

### WHO SHOULD ATTEND

- Pipeline engineers.
- Operations and maintenance staff.
- Surface facility design and operation engineers.
- Production managers.
- Maintenance managers.

### COURSE DURATION

5 Working Days

### COURSE OUTLINES

#### 1. Transportation by Pipeline

- Pipeline System Components
- Types of Pipelines
- Piping Overview (pipes – valves – fittings)
- Pipeline material
- Prime movers in Pipeline Systems
- Pipeline Safety

## 2. Pipeline Design

- Design Sequence of P/L network
  - Evaluation of fluid availability
  - Estimate of fluid demands
  - The Basic design of P/L network
  - The Economics of P/L system
- Fluid properties affecting flow
- Design of Gas Pipelines
  - Calculation of compressibility factor
  - Properties of gas mixtures
  - Pressure drop in gas pipeline due to friction
  - Gas pipeline flow equations
  - Friction factor and transmission factor
  - Gas Pipeline velocity and erosional velocity calculation
  - Increasing gas throughput by looping and booster compressor
  - Calculation of pipe maximum allowable operating pressure
  - Fundamental Calculations of gas compressor stations
- Design of Liquid Pipelines
  - Calculation of Liquid Flow Parameters
  - (Line capacity – Pressure drop – Pipe Diameter – Max. Velocity)
  - Designing Loop Systems
  - Heavy Crude Transport
  - Water Hammer Phenomenon
  - Pumps in Liquid Pipeline Systems.

## 3. Pipeline Maintenance

- Pipeline Patrolling
- Corrosion-resistant Material
- Pipeline Coating
- Pipeline Corrosion Inhibitor
- Pipeline Cathodic Protection
- Pipeline Pigging
- Smart Pig

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#### 4. Pipeline Rehabilitation

- Pipe sleeve/clamp
- Pipe clock spring
- Pipe Replacement

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