

Onshore Pipeline Design Fundamentals

Course Price

£2750

Course Description

This onshore pipeline design course delivers the basic requirements involved in engineering designing onshore pipelines for all relevant industry sector technical and non-technical professionals.

Course Objectives

- APPRECIATE the fundamentals of onshore Pipeline design
- BE MADE AWARE of innovative pipeline technologies.
- UNDERSTAND what is required to Engineer and design Pipelines.
- CONSIDER the construction and operation of pipelines and the impact on the design.
- ADDRESS the decisions to be made to arrive at a design for construction and operation.
- EVALUATE the Pipeline design variables.
- COMPARE the various Pipeline design codes and standards.
- LEARN the major elements of Pipeline Design.

Who Should Attend

This training is highly recommended for Managers and Engineers involved in the following capacities:

- Oil, Gas, Refined Products, LPGs, CO₂ and other products Pipelines
- Operations and maintenance of pipelines
- Health, Safety and Environment
- Inspection
- Loss Prevention
- Technical i.e. Mechanical and Piping Design
- Production and Process
- Project Planning
- Pipeline facilities (Fuel Storage/ Pumping/ Gas Compression)
- Regulatory approval and planning of pipelines
- Environmental protection
- It is also crucial for personnel to have at least 3-5 years' technical experience

within these industries:

- Oil and Gas
- Refining
- Chemical and Petrochemical
- Industrial Assets

Course Content

Day 1

SESSION 1 – PIPELINE DESIGN CODES AND STANDARDS

- Design Codes and Standards: ASME B31.4 and B31.8. ISO 13623, EN , IGE/TD/1, DNV, comparison and overview
- Setting the Pipeline Design Basis: data required for designing the pipeline... factors to be considered pressure, temperature, yield strength, MAOP.

SESSION 2 – PIPELINE ROUTING

- Fundamentals in Pipeline Routing: optimising routing, assessing pinch points, factors that influence routing, understanding impact on construction.
- Pipeline Location Classification: impact of location, population and selection of design factor.
- Techniques: mapping and use of GIS
- Defining Survey Requirements: what to specify

SESSION 3 – PIPELINE MECHANICAL DESIGN Part 1

- Design Factors: meaning of design factors, selection, 0.72 Design Factor, inherent Safety factors.
- Calculating Hoop (circumferential) and Longitudinal Stresses in Pipelines: basic formulae and limiting stresses and basic wall thickness calculations, equivalent stress: Von Misses.
- Pipeline Material Plastic deformation; Failure pressures, upheaval buckling, span calculations.
- Pipeline Material; Sizes, thicknesses, material grades, longitudinal seamed and seamless piping.

SESSION 4 – PIPELINE MECHANICAL DESIGN Part 2

- Restricting the expansion; restraint by burial.
- Coatings; factory applied coatings, site coatings, types, applications, testing.
- River / Road Crossings; Directional drilling,

Boring, open cut, typical crossing engineering details.

- Pipeline Testing and Pre-Commissioning: basics for hydrotesting, gauging, swabbing, and handover; intelligent PIG surveying, As-builts.

CASE STUDIES:

West Africa – Engineering and Design conceptual study for a gas pipeline network.

Day 2

SESSION 5 – OPTIMIZING PIPELINE SIZING & CONFIGURATION

- Basics on Hydraulic Design
- Impact of Overpressure and Surge
- Location of Block Valves and AGI Facilities
- Optimizing Pipeline Sizing: impact of diameter (and wall thickness) v cost effective pumping / gas compression and use of basic NPV model to arrive at optimum design.

SESSION 6 – PIPELINE DESIGN GROUND – GEOTECHNICAL INFORMATION.

- Buoyancy forces and control (ground with high water table).
 - Static, Live, Earthquake and Thermal Loads
 - Pipe Soil interaction; structural assessment.
- Longitudinal ground movements, vertical uplift and downward bearing ...
- Burial types
 - Protection of Pipelines from Geotechnical hazards.

SESSION 7 – PIPELINE DESIGN CONSTRUCTABILITY

Part 1

- Pipeline RoW (Right of Way) Design; types of construction plant machinery and working width
- Pipeline Welding; Manual welding techniques, Semi-Automatic welding techniques.
- Trench Excavation and Backfill: practical issues, equipment, what to do with poor ground,
- Pipeline Coatings: coating systems, field joint coating techniques

SESSION 8 – PIPELINE DESIGN CONSTRUCTABILITY

Part 2

- Pipeline Crossings: basics for road, rail and waterway crossings and construction techniques, open cut/HDD/Auger Bore .

- Pipeline Testing and Pre-Commissioning: basics for hydrotesting, gauging, swabbing, and handover; intelligent PIG surveying, As-builts.

CASE STUDIES: Based on an actual pipeline project: engineering papers of intent, evaluations for

Day 3

SESSION 9 – CATHODIC PROTECTION Part 1

- Principles of Cathodic Protection: electric current, Anode, Cathode, materials.
- Application of Cathodic Protection: factors to be considered – coatings, electrical continuity, isolation.
- Practical Applications of Cathodic Protection: identification of factors governing the corrosion process, criteria for Cathodic protection of steel, current density, determining Cathodic Protection system type.

SESSION 10 – CATHODIC PROTECTION Part 2

- Galvanic Anode System Design: determining anode parameters of type, weight and location.
- Impressed Current Anode System Design: soil resistivity, power supply, remoteness, ease of construction, land acquisition, ground bed type, anode type, backfill. Design calculations, current attenuation, transformer rectifiers, test posts, special considerations.

SESSION 11 – RELATED STANDARDS SPECIFICATIONS AND DESIGNS

- Material Selection; importance of specifying appropriate material, manufacturing requirements and coatings.
- Component Specifications; specification of valves, traps, barred tees, fittings and flanges, bends etc.
- Design Drawings; standard details, crossing schedules and alignment sheets.
- QRA and EIA; safety and environmental studies and impact on design.
- Tender Packages; what is required for a Concept/ FEED or EPC / Construction type contract, contracting approaches.

CLOSE OUT

Summary of Design Methods

Key Aspects for Design Consideration

CPD Unit

Continuing Professional Development

21 HOURS CPD

