

Onshore Pipeline Design

Onshore Pipeline Design Basics for Technical and Non-Technical Management Professionals. - 2 days

2018

Major Benefits of Attending

- **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.

Why you Should Attend?

Significant 'engineering' is required to design, build and operate a pipeline. Successful onshore pipeline businesses require personnel who appreciate the integrated approaches to planning, design, construction, operation, and asset integrity management. This intensive, 2-day foundation level course explores best practices for designing pipeline systems based on accepted International Codes, that maximize life cycle reliability and cost efficient, whilst maintaining highest environmental and safety standards. This course is designed for participants requiring needing a broad understanding of pipeline design. Design and team exercises are an integral part of this course.

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

Organised by:



WE SOLVE YOUR TRAINING NEEDS.

▶ Workshop Overview

The '**Aim**' of this course is to provide you with the knowledge, understanding and practical skills necessary to participate in Pipeline design. The '**Objectives**' by the end of the course you will be able to:

- Understand the fundamentals of Pipeline Design
- Have an understanding of pipeline standards
- Understand the importance of route selection and hydraulics for long term profitability and reliability
- Describe the importance of route selection and hydraulics for long term profitability, reliability, and safety
- Demonstrate good Pipeline design practices.
- Demonstrate engineering and design practical experience.

Outline

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

- **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.
- **Restricting the expansion;** restraint by burial.
- **Hydrotest Pressures;** calculations for hydrotest.

SESSION 4 – 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.

Day 1 - CASE STUDIES:

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

DAY 2

SESSION 5 – 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 6 – PIPELINE DESIGN CONSTRUCTABILITY

- **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
- **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.

SESSION 7 – CATHODIC PROTECTION

- **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.
- **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 8 – 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.

Day 2 - CASE STUDIES: Based on an actual pipeline project: engineering papers of intent, evaluations for scoping and preparing ITT proposal BOQ (Bill of Quantities), proposal construction methodology. Technical bid evaluations, planning and scheduling the construction phase, contractor mobilisation, and supervision, consideration of project risks

CLOSE OUT

Summary of Design Methods
Key Aspects for Design Consideration

program schedule

08:30	Registration
09:00	Morning Session Begins
10:40 - 11:00	Refreshments & Networking Break
12:45	Luncheon
14:00	Afternoon Session begins
15:30 - 15:50	Refreshments & Networking Break
17:00	Course Ends

▶ Workshop facilitators



Robin Dargavel

**Key Expert – Engineering, Construction and Maintenance Training
DARGAVEL ENGINEERING LIMITED**

Robin Dargavel is a versatile and highly skilled, BEng (Hons) Degree Qualified Engineer - Project Manager, Senior Facilities Engineer, Chief Surveyor, Consulting Engineer and founder at Dargavel Engineering Ltd. Robin has over 25 year's experience in Oil & Gas, Petrochemical, Process and Nuclear Power Generation industries. That experience includes Engineering, Project Management, Independent Expert Witness/ Adviser on Engineering Issues, positions with responsibility for the engineering, design, procurement, construction, commissioning, and start-up of a variety of projects both in the UK and worldwide. In recent years, Robin has been working extensively in Aberdeen, Scotland on North Sea offshore and associated onshore assets as a consulting Senior Facilities Engineer for major oil and gas operators, since returning to the U.K. after twenty years of working overseas for oil companies in mechanical/ process disciplines in Yemen, Kazakhstan, Vietnam, most of West Africa, Libya, Israel, Qatar, U.S.A. (and others). Robin is an active member of an assortment of Engineering Institutes within the U.K.



Paul Trundle

**Key Expert – Pipeline Engineering, Design and Construction
DARGAVEL ENGINEERING LIMITED**

Paul Trundle is a renowned Senior Chartered pipeline engineer with over 40 years of experience in the engineering design and construction of gas transmission systems worldwide. Paul has had extensive experience in Moldova, Romania, Bulgaria and Greece. He led the concept and FEED designs for the Bulgarian Greece Interconnector project (Stara Zagora to Komitini), NABUCO project, Turkmenistan, through Afghanistan into Pakistan. He advised the Georgian Government on pipeline design and construction issues related to both the 46" diameter Baku-Tbilisi-Ceyhan crude oil pipeline and the 42" diameter South Caucasus gas pipeline. Earlier roles included Project Manager and Construction manager for various pipeline schemes from South America, Middle East and UK and Ireland.



Andrew Band
Key Expert – Pipeline Engineering, Design and Construction
DARGAVEL ENGINEERING LIMITED

Andrew Band is a senior Chartered Mechanical Engineer with over 30 years' project management, engineering and commercial experience in the oil and gas pipeline sector, facilities and process plant, worldwide including leading roles for Penspen, Jacobs/BP and private developers. Particular expertise is in leading the development and preparation for execution of pipeline infrastructure projects worldwide including procurement, construction tendering, cost estimating, planning and procurement.

Experienced in;

- Pipeline Project Management
- Pipeline Feasibility Studies
- Pipeline Conceptual Studies
- Pipeline Engineering and Design
- Pipeline Construction
- Pipeline Operations and Maintenance.
- Storage Tank Engineering and Design
- Storage Tank Construction
- Storage Tank Operations and Maintenance.
- Pipeline and Plant start-up and shutdown
- Pipeline Inspections

Industry Sectors Experience;

- ✓ Oil & Gas
- ✓ Fuel Storage and Distribution
- ✓ CO₂
- ✓ Chemical & Petrochemical
- ✓ Renewable Energy
- ✓ Environmental
- ✓ Power Generation & Utilities
- ✓ Pipelines and Facilities

▶ Professional Memberships: MMechE, MIPlantE, MIET, MIGasE, MWeldI, MInstNDT, SOE, EWI

Industry	Action	Results
Oil and Gas - LNG Plant	Developed a more efficient system to renew LNG Storage Tank Bund Pearlite.	Highly effective reduction in Plant Shutdown durations.
Oil and Gas – Offshore Production	Established a Maintenance Project Costs Control Procedure.	Improved project efficiencies for offshore production projects.
Oil and Gas - Pipelines	Established an Evaluation system for Technical Bid Proposals.	Highly effective Technical Bid Evaluations.
Oil and Gas – Refinery	Developed Oil Storage Tank Repair Engineering Procedures and Method Statements.	Improved repair efficiencies, reduced production shutdown.

▶ Partial List of Clients

- ✓ BP
- ✓ Dietsmann
- ✓ DUSUP
- ✓ ENI
- ✓ Jacobs
- ✓ Lloyd's Register
- ✓ Parsons Brinkerhoff
- ✓ Petronas
- ✓ Penspen
- ✓ Qatar Petroleum
- ✓ Saipem
- ✓ Shell Malaysia
- ✓ TOTAL
- ✓ Yemen LNG Company
- ✓ Zuetina Oil Company

▶ Testimonials

“Robin's training on Pipeline Engineering and Design was extremely appreciated by my team, very knowledgeable. **“Vassia Tsopele, VSK Engineering Ltd.**

“Robin's method of training is from hands-on experience, specifically regarding pipeline engineering and construction.” **Daniel Delahaye, Consultant Pipeline Engineer, Delahaye Engineering Ltd.**

“Dargavel Engineering's experience and enthusiasm has both inspired us and informed us” **Terrence Bekoe, BOST, Ghana.**