Bespoke Training for the Energy Industries

COURSE TITLE: Surface Production Operations - Facilities Design for Hydrocarbon Processing

Course Duration: 5 days

Course Level: Foundation / Intermediate

Overview of Course:

This course is a broad introduction to oil and gas development aimed at surface facilities engineers. It conveys a background understanding of the origins of oil and gas, exploration and appraisal technologies and how subsurface and drilling developments are decided. The course provides a basic understanding of subsurface and well developments and illustrates how these link with the selection of the surface facilities development.

Primary surface oil and gas production systems are covered including oil, gas and water processing to meet product specifications. Gas processing is dealt with in some depth including dehydration, hydrocarbon dewpointing, NGL extraction and sour gas treatment.

Offshore production platform types are examined from fixed structures to floating systems and subsea systems to some specialist platform types. The challenges of deepwater development including an introduction to flow assurance are described.

The course looks at stranded gas reserves and a variety of emerging solutions, such as GTL, FLNG, ammonia production and gas-to-wire, are discussed.

The course also provides a brief introduction to the role of Operations in managing the reservoir, wells and facilities through field life and how these requirements impact facilities design.

DESIGNED FOR YOU, IF YOU ARE...

- A Facilities or Process Engineer, either a Graduate or a more experienced Technical Professional looking to develop your theoretical competence
- An engineer primarily involved in surface facilities design seeking a broader understanding of sub-surface and wells developments and their impact of surface facilities
- A Project Manager who seeks a broader understanding of the whole oil & gas development lifecycle
- An Operations Engineer looking to deepen your knowledge of the design principles of the plants
- A Sub-Surface Engineers seeking to broaden your technical knowledge, particularly in how subsurface development decisions impact surface facilities

HOW WE BUILD YOUR CONFIDENCE

The course links theory to application. It reinforces this through real industry problems and examples which are solved by the participants as part of the sessions.

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The course is highly interactive and participants are encouraged to share their own experiences and problems to the benefit of all.

THE BENEFITS FROM ATTENDING

By the end of the course, you will have a basic understanding of the different types of oil and gas reservoirs and how they can be developed from a subsurface perspective. You will be able to link the selection of the subsurface and wells developments to the choices for the surface handling and product export facilities.

You will appreciate the technical differences between the major concepts for offshore production systems; fixed structures, floating systems and subsea systems. You will also have seen examples of a variety of onshore production systems.

Case Studies will be used to give some hands-on experience of how to apply knowledge learnt about subjects such as produced water treatment, gas-condensate processing, hydrate mitigation, multi-phase flow challenges and stranded gas development opportunities.

You will also appreciate the important role that Operations have in the management of wells and reservoir production throughout field life; and particularly how operational requirements can impact surface facilities choices.

TOPICS

- Origins of Oil & Gas
- Exploration Techniques and Subsurface Development
- Drilling, Wells, Well Completions, Wireline & Workover Systems
- Subsurface Terminology pertaining to Surface Facilities Design
- Primary Surface Production Systems for Oil, Water & Gas
- Oil & Gas Processing Systems including Dehydration, Desalting and Treatment for Sour Gases and CO_2 Removal
- Gas Dehydration, Refrigeration & Turbo-Expansion for NGL and LPG Extraction
- Offshore Structures Shallow Water to Deepwater
- Floating Production Systems, Subsea Engineering & Flow Assurance
- Pipeline Design and Installation
- Stranded Gas Options
- Introduction to Operations and Designing Facilities for Well & Reservoir Management

DAILY AGENDA

Day 1: Oil & Gas Origins, Exploration, Subsurface Development, Wells and Completions

- Origins of Oil & Gas
    - Reservoir & Trap Types
- Overview of Exploration to Abandonment
- Participants Projects - Discussion
- Exploration & Appraisal

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- Seismic Surveys and Seismic Interpretation
- Subsurface Uncertainties – why they impact surface design

- Exercise 1 : Subsurface Quiz
- Sub-Surface Development
  - Terminology – GRV, Porosity, Saturation etc.
    - Probabilistics – P10, P50, P90
  - Estimating Volumes of Reserves
  - Reservoir Recovery & Production Mechanisms
    - Phase Envelopes – Subsurface to Surface
    - Equations of Sate
    - Impact of Depletion Plan on Surface Production Profiles
  - Artificial Lift, Secondary, Tertiary & Enhanced Oil Recovery
- Exercise 2 : Case Study : Deepwater Black Sea Exploration Well
- Wells
  - Overview of a Well and Well Completions
- Well Hydraulics
  - Vertical flow performance, tubing sizing
  - Effect of Well Type on Water & Gas Breakthrough
  - Terminology – CITHP, FTHP, BHP etc.
  - Basic well integrity – SSSVs & Surface Control Equipment
  - Smart Wells & Surface Control Systems
- Well Production Testing
- Exercise 3 : Selection of Tubing Size

Day 2: Surface Facilities – Oil & Gas Production

- Surface Facilities
  - Primary Production Systems
    - Flowlines & Primary Separation
  - Oil Processing (Stabilisation. Dehydration, Desalting)
    - Separator Design
- Exercise 4 : Separator Sizing – Impact of Rising Water Cut
    - Stabilisation
    - Dehydration
    - Types of Dehydration Systems for Onshore & Offshore
    - Desalting Oil
- Exercise 5 : Case Study : ‘Hurra’ Conceptual Onshore Field Development

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- Produced Water Processing
    - Typical composition analysis of PW
    - Produced Water Treatment & De-oiling
- Water Injection
    - Subsurface Aspects – and how they impact surface system design
    - Combining Seawater & Produced Water
    - Seawater Treatment
    - Water Injection Pumps

- Exercise 6 : 'Hurra' Produced Water Treatment Concept Design
    - Gas Production
        - Introduction to Natural Gas Compositions and Specifications
        - Typical Hydrocarbon and non-Hydrocarbon compounds
        - Impact of Reservoir Phase Envelopes on Surface System Design
- Exercise 7 : Black Sea Case Study - Producing a Gas-Condensate Field

Day 3: Surface Facilities – Gas Production & System Designs

- Primary Gas Production & Separator Design
- Water Content of Gas & Hydrates
    - Gas Dehydration (Cooling, Absorption, Adsorption & Membranes)
    - Gas Dewpoint Control
    - NGL & LPG Production
        - Refrigeration & Turbo-Expansion
        - Fundamentals of Distillation

- Exercise 8 : 'Hurra' Gas Processing Schematic
    - Gas Dewpointing & NGL Extraction
        - Refrigeration Systems
        - Refrigeration Equipment, Heat Exchangers & Compressors
        - Turbo-Expansion
- Exercise 9 : Black Sea Case Study – Gas Processing Conditions Estimation
    - NGL Production & Extraction
    - Introduction to Stabilisation & Distillation
- Exercise 10 : Black Sea Case Study – Economics of NGL Extraction
    - Other Cas Treatment Systems
    - Gas Sweetening
        - Physical & Chemical Solvent Systems
        - Hybrid & Proprietary Processes

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        - Membrane Separation
        - Other Contaminants Removal

Day 4: Offshore Production Systems

- Overview of Offshore Production Structures and Vessels
- Exercise 11a : Platform Water Depth Applications
- Exercise 11b : Shallow Water – Drilling & Platform Feasibility Assessment
- An Introduction to Flow Assurance
    - Multi-phase Flow
    - Hydrates, Wax & Asphaltenes
- Exercise 12 : Black Sea Case Study - Hydrate Inhibition
- Subsea Engineering
    - Overview of Subsea Systems
    - Dry vs Wet Trees
    - Case Example – Deepwater Gulf of Mexico
    - Subsea System Components
    - Risers & Umbilicals
- Exercise 13 : Black Sea Case Study - Deepwater Development Platform Options
- Summary of Deepwater Options

Day 5: Pipelines, Stranded Gas & Onshore Plants

- Pipelines
    - Design, Design Safety & Flow Assurance
    - Construction & Installation (Onshore & Offshore)
- Exercise 14 : Black Sea Case Study – Flowlines & Pipeline Challenges
- Stranded Gas
    - Introduction to Types of Stranded Gas
    - Introduction to Case Study
    - Economically-Stranded Gas
        - Gas Conversion Technologies
            - GTL, Hydrogen, Methanol & Ammonia
        - FLNG & Mini-LNG Concepts
        - Gas-to-Wire schemes
- Exercise 15 : Stranded Gas Case Study
- Onshore Plants
    - Examples from Borneo, Coal-Seam Gas & Tarsands / Shale Gas
- A Brief Introduction to Operations & Maintenance

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    - Introduction to Well & Reservoir Management
- Exercise 16 : ‘Hurra’ Case Study - Planning for WRM in Facilities Design
- Course Wrap-up

INSTRUCTOR:

Phil Tudhope is currently Director of a consulting company, specialising in technical and project management training for graduates and more senior technical staff. He has a first class honours B.Sc. in Mechanical Engineering from Bristol University and is a Chartered Engineer, Fellow of the Institution of Mechanical Engineers and Affiliate Member of the Institution of Chemical Engineers.

Phil has over 40 years’ experience in Project Management, Technical Development and Change Management in the oil & gas industry and proven technical and managerial capabilities to achieve results with a strong business focus and to effect significant positive change. He is a specialist in front-end (feasibility & concept selection) phases of upstream oil & gas developments with midstream (LNG) experience and project execution experience and has the ability to perform analysis and development work as well as lead and motivate teams.

Amongst other roles, he was Specialist Front End Advisor at Petronas Carigali, Chief Process Engineer at BG Group and Head of Upstream Engineering at Shell Technology India. He has experience worldwide in differing political, social and remote environments, having worked overseas for 28 years including the Far East, USA, Europe, the Middle East and India.

Phil is an experienced instructor including the development and delivery of technical and project management courses.

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