Course Title: Subsea Pipeline Engineering

Duration: 3 Days

Course Description:

This comprehensive "Subsea Pipeline Engineering" course comprises of lectures, photos and video presentations, some case studies and workshops providing an overview of subsea pipelines engineering. This course provides an insight to fundamental issues for a robust, safe, and economical design of subsea pipeline systems. The topics of the course are carefully selected to cover pipeline engineering aspects from conceptual to detailed design and maintenance. The principal code followed in this course is DNV-OS-F101 "Submarine Pipeline Systems" together with other DNV recommended practices such as DNV-RP-F105, DNV-RP-F109, DNV-RP-F110 and DNV-RP-F112. However, alternative codes such as ASME and PD8010 will be mentioned for comparison.

The attendees will receive a certificate from Z-Subsea by completion of the training course.

This training course helps to gain understanding on:

- Steps involved in engineering and design of subsea pipeline systems from route selection to pre-commissioning;
- Key topics related to engineering of subsea pipeline systems;
- Physical concept behind pipeline design philosophy;
- Criteria for robust and safe design of pipelines.

Who should attend:

- Pipeline engineers;
- Marine engineers;
- Naval architects;
- Subsea and offshore engineers;
- Project engineers and managers;
- Engineers from other sectors of the Oil and Gas industry who wish to gain understanding of subsea pipeline engineering.

Course Contents

1. **Subsea Field Components**
   - Flowlines & Pipelines
   - Tie-in Spools & Jumpers
   - Risers
   - Xmas Trees
   - Umbilicals
   - Deep Water Manifolds and Templates
   - Flanges & Diverless Connectors
   - Subsea Structures

2. **Field Layout and Pipeline Route Selection**
   - Development Options
   - Field Architecture
   - Subsea Features and Obstructions
   - Geophysical Survey
   - Geotechnical Survey
   - Pipeline Route Selection

3. **Pipeline & Riser system**
   - Single pipes
   - Piggybacked Pipes
   - Pipe-In-Pipe
   - Bundles

4. **Safety Considerations**
   - 500m Zone
   - Protection Requirements

5. **Design Codes**
   - Safety Considerations
   - Main Standards for Subsea Pipelines
   - Battery Limits
   - Design Format

6. **Material selection**
   - Cost and Safety
   - Suitability for Process Conditions
   - Operational Reliability
   - Design for Integrity
   - Optimization of Life Cycle Costs
   - Mechanical Properties
   - Corrosion Resistance
   - Ease of Fabrication
   - Coatings
   - Design Life

7. **Wall Thickness Design**
   - Safety classification
   - Limit States Deign
   - Burst Criterion
   - External Collapse Criterion
   - Hydrogen Induced Stress Cracking (HISC)

8. **Local Buckling for Stress/Strain Based Design**
   - Load Controlled Condition
   - Displacement Controlled Condition
   - Axial Strain Checks
   - Strain Limits and ECA
   - Hydrogen Induced Stress Cracking
   - Alternative Design Codes

9. **Expansion, Tie-in Spools, and Flanges**
   - Expansion of Pipelines
   - Calculating Expansion
   - Code Requirements for Tie-in Spools
   - Types of Flanges

10. **Pipeline Global Buckling**
    - Reasons for Global Buckling
    - Various Modes of Buckling
    - Key Factors in Global Buckling
    - Integrity of a Pipelines

11. **On-bottom stability**
    - Factors Influencing On-Bottom Stability
    - Checks for Pipeline Stability
    - Remedial Actions for Stability

12. **Pipeline Spanning & VIV Assessment**
    - Free Span
    - In-line and Cross flow VIV
    - Parameters Affecting Free Spans
    - Screening Criteria
    - Detailed Assessment of Free Spans
    - VIV Fatigue
    - Direct Wave Fatigue

13. **Pipeline Installation Methods**
    - S-Lay
    - J-Lay
    - Reel Lay
    - Towing

14. **Pre-commissioning**
    - Testing and Pre-Commissioning Process
    - Onshore Hydrotest
    - Offshore Strength Test
    - Tie-in of Components
    - Offshore Leak Test
    - Dewatering and Drying
    - Nitrogen Packing

15. **Introduction to Pipeline Integrity Management**
    - Overview of Integrity Management Codes and Standards
    - Identification of Pipeline Typical Threats/Failures
    - Definition of Pipeline Integrity Management Systems
    - Assessment and Management of Risk (Quantitative and Qualitative)
    - Pipeline Inspection Techniques
    - Pipeline Monitoring Techniques
    - Pipeline Repair Techniques