CONCEPT

Offshore Structures Design: Jacket Platforms, Installation and Structural Integrity



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Introduction:

Offshore structures design errors on fixed platforms surface late: a jacket brace joint that cracks from fatigue within a decade, piles short of axial capacity after a scour event, or a topsides lift that overloads its padeyes. This Core Concept course takes structural, civil and integrity engineers through the full life of fixed steel platforms, from jacket and topsides configuration, metocean loading and pile foundations to in-place, fatigue and seismic checks, load-out, transport and lift analysis, and structural integrity management. Participants build a Jacket Structural Assessment and Integrity Plan for a case platform.

Course Objectives:

- Define the design basis for a fixed steel jacket and topsides, covering configuration, water depth, air gap and metocean criteria
- Calculate wave, current and wind actions on jacket members and topsides and verify pile axial and lateral capacity for the governing combinations
- Apply ISO 19902 and API RP 2A principles to in-place member and tubular joint checks, fatigue life estimates and seismic screening
- Review load-out, sea transport and heavy lift analyses and the fabrication and installation sequence for a jacket and its topsides
- Set up a structural integrity management programme that links underwater inspection findings to evaluation, strategy and repair
- Prepare a Jacket Structural Assessment and Integrity Plan that supports life extension or decommissioning decisions for an ageing platform

Target Audience:

- Structural engineers responsible for jacket and topsides design calculations and analysis models
- Civil and geotechnical engineers responsible for pile foundation design and seabed data interpretation
- Structural integrity engineers responsible for inspection planning, damage evaluation and platform reassessment
- Installation and marine engineers responsible for load-out, transport and lift engineering
- Technical reviewers and verification specialists responsible for checking offshore structural design reports

Course Outline:

Day 1: Fixed Offshore Platform Types, Jacket Anatomy and Design Basis

- Fixed Steel Jackets, Monotowers, Caissons and Compliant Towers Compared
- Jacket Anatomy: Legs, Brace Framing, Tubular Joints, Conductor Guides and Mudmats
- Topsides Structural Systems: Integrated Deck, Module Support Frame and Deck Legs
- Metocean Design Criteria: Significant Wave Height, Peak Period, Current Profile and Wind Gust
- Design Basis Document: Water Depth, Design Life, Exposure Category and Air Gap

Day 2: Design Codes, Environmental Actions and Pile Foundations

- ISO 19902 and API RP 2A Structure: Working Stress and Partial Factor Design Approaches
- Morison Equation Wave and Current Loading with Marine Growth and Kinematics Factors
- Wind Loading on Topsides Modules, Flare Booms and Exposed Deck Structures
- Driven Pile Axial Capacity, Lateral Soil Response and P-Y and T-Z Curves
- Scour Allowance, Mudline Settlement and Grouted Pile-to-Sleeve Connections

Day 3: In-Place, Fatigue, Seismic and Software-Based Analysis

- In-Place Analysis: Operating and Storm Load Combinations with Member Unity Checks
- Tubular Joint Punching Shear Checks for K, T and Y Joint Classifications
- Spectral Fatigue Analysis with Stress Concentration Factors and S-N Curves
- Seismic Screening: Strength Level and Ductility Level Earthquake Concepts for Jackets
- SACS-Type Software Workflow: Model Build, Wave Load Generation and Code Check Post-Processing

Day 4: Temporary Phases, Construction and Structural Integrity Management

- Load-Out and Sea Transport Analysis: Barge Ballasting, Motions and Seafastening Design
- Heavy Lift Analysis: Dynamic Amplification, Sling Loads, Padeye Design and Weight Control
- Fabrication and Installation: Node Welding, Weld NDT, Jacket Upending and Pile Driving
- Structural Integrity Management Cycle to ISO 19901-9: Data, Evaluation, Strategy and Programme
- Underwater Inspection Methods: General Visual, Close Visual, Flooded Member Detection and Cathodic Protection Surveys

Day 5: Case Study: Jacket Structural Assessment and Integrity Plan

- Case Brief Review: Ageing Four-Legged Jacket with Inspection Findings and Revised Metocean Data
- Dented Brace and Damaged Member Assessment from Case Underwater Inspection Records
- Life Extension Reassessment Using Ultimate Strength Pushover Results and Reserve Strength Ratio
- Decommissioning Option Screening for the Case Jacket: Full Removal, Partial Removal and Reuse
- Jacket Structural Assessment and Integrity Plan Drafting and Technical Panel Review

Skills You Will Gain:

- Offshore Design Basis Definition
- Hydrodynamic Load Calculation
- Pile Capacity Verification
- Tubular Joint Checking
- Fatigue Life Estimation
- Lift and Transport Engineering Review
- Inspection Finding Evaluation
- Platform Reassessment

Why Attend This Course:

- Leave with a Jacket Structural Assessment and Integrity Plan built on a case platform with realistic inspection findings
- Challenge contractor analysis models, code checks and fatigue results before design reports are approved
- Reduce the risk of lift, load-out and transport incidents by knowing which checks each temporary phase requires
- Compare offshore structural practice with engineers from operators, EPC contractors, fabrication yards and verification bodies

Conclusion:

Fixed offshore platforms stay safe when design, temporary phases and in-service integrity are treated as one engineering record. The one week move from platform types, jacket and topsides anatomy and metocean criteria, through ISO 19902 and API RP 2A principles, hydrodynamic and wind loading and pile foundations, to in-place, joint, fatigue, seismic and software practice. Load-out, transport, lift, fabrication, installation, integrity management and underwater inspection follow, and the final day produces a Jacket Structural Assessment and Integrity Plan covering life extension and decommissioning options.