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Asset Integrity Management for the Petroleum Industry

25 – 29 April 2027
Sharm El-Sheikh (Egypt)

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Asset Integrity Management for the Petroleum Industry

Ref: 321588_141636 **Date:** 25 – 29 April 2027 **Location:** Sharm El-Sheikh (Egypt) **Fees:** 4900 GBP

Asset integrity management for the petroleum industry is the discipline of keeping wells, pipelines, vessels, rotating machines and topside and subsea systems able to perform safely and reliably through their life, by combining design, technical and operational integrity. This 1-week course is for engineers, inspectors and maintenance and integrity staff, and its final deliverable is an asset integrity improvement plan for one production or process system.

Introduction

The course rests on three references. ISO 55000, the international standard series for asset management, defines the management system of policy, strategy and plans in which integrity work sits. Reliability-centred maintenance RCM selects maintenance tasks from the functions and failure modes of each asset, supported by failure mode, effects and criticality analysis FMECA. Risk-based inspection RBI sets inspection scope and intervals for static equipment from the likelihood and consequence of failure. The level is practitioner, and teaching uses failure case studies, an FMECA worksheet exercise and an improvement planning session.

Course Objectives

- Define design, technical and operational integrity and distinguish the controls each requires
- Apply a risk matrix, risk register and hazard log to rank integrity threats at asset and system level
- Apply FMECA within the RCM steps to choose a maintenance task for a rotating equipment item
- Distinguish risk-based from time-based inspection and justify inspection intervals for static equipment
- Interpret integrity KPIs and RAMS specifications to judge asset performance across the lifecycle
- Select improvements that balance cost and benefit in an asset integrity improvement plan

Target Audience

- Integrity and inspection engineers, who must decide inspection scope and intervals for pressure vessels, piping and tanks
- Maintenance and reliability engineers, who must select maintenance strategies for pumps, compressors and turbines
- Operations supervisors on onshore and offshore facilities, who must judge when an operating deviation threatens integrity
- Engineering and project staff, who must determine how design choices affect integrity later in an asset's life
- Asset and HSE managers, who must assess integrity performance and prioritise improvement spending



Course Outline

Day 1: AIM Concepts and the Asset Management System

- Design vs Technical vs Operational Integrity: Three Pillars of AIM Compared
- Asset Management Landscape Process Model: How Policy Flows into Asset Plans
- Asset Management System Elements: Policies, Strategies and Management Plans Linked Together
- ISO 55000 Series: Asset Management Requirements and the Role of Certification
- Topside and Subsea Systems: Integrity Challenges of Production and Process Assets

Day 2: Integrity Risk Assessment

- Qualitative vs Semi-Quantitative Risk Assessment: Matrix Ratings Compared with Scored Methods
- Risk Matrix, Risk Register and Hazard Log: Recording and Ranking Integrity Threats
- Business, System and Asset-Level Risk: Linking Threats Across Management Layers
- Key Integrity Management Approaches: Prevention, Detection and Mitigation of Failures
- Contingency Planning: Responding When Integrity Barriers Degrade or Fail

Day 3: RCM, FMECA and Risk-Based Maintenance

- Risk-Based Maintenance vs Reliability-Centred Maintenance: Risk Priority Compared with Function Focus
- Deterioration and Failure Modes: Corrosion, Erosion, Fatigue and Wear Mechanisms
- Seven RCM Steps: Functions, Failures, Effects, Consequences and Task Selection
- FMECA Worksheet Exercise: Rating Severity, Occurrence and Criticality for a Pump
- Onshore vs Offshore Failure Behaviour: Environment, Access and Consequence Differences

Day 4: Inspection, Maintenance Strategy and Lifecycle

- Risk-Based Inspection vs Time-Based Inspection: Targeted Intervals Compared with Fixed Schedules
- Static Equipment Inspection: Vessels, Piping and Tanks with Common Inspection Techniques
- Rotating Equipment Maintenance Planning: Choosing Tasks and Strategies for Machines
- Lifecycle Management and Life Extension: Sustaining Assets from Design to Late Life
- Systems Engineering and RAMS: Reliability, Availability, Maintainability and Safety Specifications

Day 5: Asset Integrity Improvement Plan Practice

- Leading vs Lagging Integrity KPIs: Early Warnings Compared with Outcome Measures
- Operational Workflow and Performance Measurement: Applying KPIs to Current AIM Performance
- Human Factors and Project Management: Applying Earlier Methods to People and Change
- Cost-Benefit Prioritisation: Ranking RCM, RBI and Lifecycle Improvements for Funding
- Asset Integrity Improvement Plan: Completing the Plan for One Production System



Skills You Will Gain

- Integrity Risk Ranking
- FMECA Analysis
- RCM Task Selection
- Risk-Based Inspection Planning
- Rotating Equipment Maintenance Planning
- RAMS Specification Review
- Integrity KPI Design

Why Attend This Course

- From maintaining every item on the same calendar to choosing tasks by function, failure mode and criticality
- From fixed inspection schedules to intervals set by the likelihood and consequence of failure
- From integrity data spread across logs to one risk register and hazard log for a system
- From general concern about ageing assets to an asset integrity improvement plan ranked by cost and benefit

Conclusion

Asset integrity management keeps petroleum assets fit for purpose by joining sound design, good technical condition and disciplined operation under one management system. The course makes three distinctions clear: design against technical and operational integrity, reliability-centred against risk-based maintenance, and risk-based against time-based inspection. Over one week it suits engineers and supervisors who need the core methods in working order, rather than the full lifecycle integrity system development of a longer course.

Course FAQs

What is asset integrity management in the petroleum industry?

Asset integrity management is the management of oil and gas assets so that they perform safely, reliably and efficiently over their life, combining design integrity, technical integrity through inspection and maintenance, and operational integrity through correct operation.

What is the difference between RCM and risk-based inspection in asset integrity management?

RCM chooses maintenance tasks for an asset from its functions and failure modes, mainly for active equipment. Risk-based inspection sets what to inspect and how often on static equipment, from the likelihood and consequence of failure.



Which standards does the asset integrity management for the petroleum industry course follow?

The course follows the ISO 55000 series for the asset management system, reliability-centred maintenance with FMECA for maintenance tasks, and risk-based inspection for static equipment.

Is the asset integrity management for the petroleum industry course right for a maintenance engineer?

Yes. Maintenance engineers practise FMECA, the RCM steps and maintenance planning for rotating equipment, and see how their tasks fit with inspection and the wider integrity plan.

What do delegates produce in the asset integrity management for the petroleum industry course?

Delegates produce an asset integrity improvement plan for one production or process system, with a ranked risk register, chosen maintenance and inspection strategies, integrity KPIs and costed improvements.

