AMERICAN GLOBAL INSTITUTE
FOR PRIVATE TRAINING

External Training Course

Petroleum Corrosion Masterclass: Advanced Prevention, Monitoring & Control Strategies

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From 27 Oct. To 31 Oct. 2025
From 24 Nov. To 28 Nov. 2025
From 15 Dec. To 19 Dec. 2025

Radisson Blu Hotel, Amsterdam City Center, Netherlands

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External Training Course:

Petroleum Corrosion Masterclass: Advanced Prevention, Monitoring & Control Strategies

From 27 Oct. To 31 Oct. 2025 Fees: 1850 KD
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Course Overview

This comprehensive and advanced masterclass delivers a complete understanding of corrosion phenomena, their impact on petroleum systems, and the best engineering and chemical strategies for corrosion prevention and control. It covers corrosion science fundamentals, advanced monitoring systems, field inspection techniques, failure analysis, and the integration of corrosion management into asset integrity frameworks. Participants will gain deep insights into real industry case studies, practical design applications, and emerging technologies in corrosion protection. The course bridges the gap between theory and field implementation, preparing engineers to make informed, data-driven decisions that improve operational safety and reliability.

Course Objectives

Upon successful completion, participants will be able to:

- Understand advanced corrosion science and electrochemical mechanisms in petroleum environments.
- Identify, classify, and analyze all major corrosion types affecting oil & gas facilities.
- Evaluate environmental and operational factors influencing corrosion rates.
- Select and apply suitable corrosion monitoring, inspection, and testing techniques.
- Implement corrosion control strategies using inhibitors, coatings, and cathodic protection.
- Perform corrosion failure analysis and root cause determination.
- Develop and manage comprehensive Corrosion Management Plans (CMP).
- Apply risk-based inspection (RBI) and fitness-for-service (FFS) methodologies.
- Integrate corrosion management into maintenance, safety, and reliability programs.
- Assess new technologies such as smart sensors, nanomaterials, and digital corrosion monitoring systems.

Target Audience

This masterclass is designed for professionals who are responsible for asset reliability and corrosion control, including:

- Corrosion Engineers, Integrity Engineers, and Inspection Specialists.
- Production, Maintenance, and Process Engineers.
- Pipeline, Refinery, and Facility Engineers.
- Asset Integrity, Reliability, and HSE Managers.
- Materials, Metallurgy, and Quality Engineers.
- Consultants, Technical Supervisors, and Engineering Auditors.
- Professionals involved in oil, gas, petrochemical, and refinery operations.
- Engineers seeking advanced skills in corrosion science, analysis, and control.

Training Methodology

The course is designed for maximum learning engagement and field applicability through:

- Interactive multimedia presentations with real plant visuals.
- Case studies and failure investigation exercises.
- Group problem-solving and team workshops.
- Practical demonstrations on corrosion testing and inspection data analysis.
- Real-world examples from upstream, midstream, and downstream operations.
- Pre- and post-assessment sessions to measure learning outcomes.
- Reference to API, NACE, ISO, and ASME international standards.
- Optional virtual simulation and video-based demonstrations of field inspections.

Organizational Impact

Organizations will benefit through:

- Enhanced reliability and integrity of pipelines, refineries, and process facilities.
- Reduced unplanned downtime, leaks, and shutdowns.
- Improved cost control and asset life extension through proactive corrosion management.
- Increased regulatory and safety compliance with international codes and standards.
- Enhanced decision-making through corrosion risk analysis and monitoring data.
- Improved coordination between engineering, inspection, and maintenance teams.
- Strengthened asset management culture and reduced operational risk exposure.
- Measurable reduction in maintenance costs and production losses.

Personal Impact

Participants will gain:

- Advanced analytical and diagnostic skills in corrosion evaluation and control.
- Confidence in identifying corrosion threats and selecting proper mitigation solutions.
- Broader understanding of materials behavior in aggressive environments.
- Hands-on familiarity with inspection tools and corrosion monitoring systems.
- Capability to develop and implement comprehensive corrosion management frameworks.
- Stronger professional standing and recognition as a corrosion expert.
- Improved leadership in integrity management and asset reliability programs.
- Career growth in technical, inspection, or management roles in the oil and gas sector.

Course Content & Outline

Day 1 – Fundamentals & Mechanisms of Corrosion in Petroleum Systems

- Definition, nature, and importance of corrosion in oil & gas industries.
- Electrochemical theory of corrosion and redox reactions.
- Types of corrosion: uniform, galvanic, pitting, crevice, erosion, SCC, MIC, etc.
- Thermodynamics and kinetics of corrosion reactions.
- Environmental and operational parameters affecting corrosion rates.
- Corrosion behavior in upstream, midstream, and downstream systems.
- Corrosion in production tubing, flowlines, tanks, and refinery equipment.
- Effect of CO_2, H_2S, oxygen, and chlorides on corrosion behavior.
- Field examples of major corrosion failures and lessons learned.

Day 2 – Corrosion Monitoring & Inspection Techniques

- Principles and objectives of corrosion monitoring.
- Direct and indirect corrosion measurement techniques.
- Weight loss coupons, ER probes, and LPR methods.
- Online and offline monitoring approaches.
- NDT techniques: ultrasonic, radiographic, magnetic particle, and eddy current testing.
- Visual inspection and surface evaluation methods.
- Intelligent pigging and pipeline integrity assessments.
- Data interpretation and trend analysis for corrosion rate estimation.
- Corrosion mapping and digital monitoring systems.
- Developing effective corrosion monitoring programs.

Day 3 – Corrosion Control & Prevention Strategies

- Design and material selection principles for corrosion control.
- Cathodic protection systems: design, operation, and maintenance.
- Anodic and impressed current protection systems.
- Selection and application of protective coatings and linings.
- Corrosion inhibitors: classifications, testing, and performance evaluation.
- Environmental control methods (oxygen scavengers, dehydration, pH adjustment).
- Corrosion management in produced water systems, refineries, and storage tanks.
- Pipeline corrosion protection and coating integrity maintenance.
- Real-world success stories of corrosion prevention programs.
- Balancing chemical, mechanical, and operational control methods.

Day 4 – Failure Analysis & Integrity Management

- Principles and methodology of corrosion failure investigation.
- Identification of corrosion damage mechanisms and classification.
- Root Cause Analysis (RCA) and metallurgical examination techniques.
- Corrosion fatigue, hydrogen embrittlement, and stress corrosion cracking analysis.
- Integration of corrosion management into Asset Integrity Management Systems (AIMS).
- Risk-Based Inspection (RBI) planning and implementation.
- Fitness-for-Service (FFS) assessment and life prediction.
- Documentation, reporting, and compliance with international standards.
- Key performance indicators (KPIs) for corrosion management.
- Case studies of integrity failures and improvement strategies.

Day 5 – Advanced Topics & Future Trends in Corrosion Management

- Corrosion Under Insulation (CUI) – causes, detection, and control.
- Corrosion challenges in offshore and subsea environments.
- Advanced materials: composites, alloys, and nanomaterials in corrosion resistance.
- Hydrogen-induced cracking, sour service corrosion, and high-temperature oxidation.
- AI-driven corrosion prediction and data analytics systems.
- Smart coatings and real-time monitoring technologies.
- Digital twin applications in corrosion management.
- Integration of predictive maintenance using IoT and remote sensors.
- Sustainability and green corrosion inhibitors.
- Workshop: Building a complete corrosion management framework for a petroleum facility.

Course Agenda:

(1st Day) Agenda

8.30	9.00	Opening Remarks (30 Min.).
9.00	11.30	DISCUSS COURSE OBJECTIVES: • Fundamentals & Mechanisms of Corrosion in Petroleum Systems. • Corrosion Monitoring & Inspection Techniques. • Corrosion Control & Prevention Strategies. • Failure Analysis & Integrity Management. • Advanced Topics & Future Trends in Corrosion Management.
11.30	12.00	Coffee Break
12.00	14.00	Fundamentals & Mechanisms of Corrosion in Petroleum Systems: • Definition, nature, and importance of corrosion in oil & gas industries. • Electrochemical theory of corrosion and redox reactions. • Types of corrosion: uniform, galvanic, pitting, crevice, erosion, SCC, MIC, etc. • Thermodynamics and kinetics of corrosion reactions. • Environmental and operational parameters affecting corrosion rates. • Corrosion behavior in upstream, midstream, and downstream systems. • Corrosion in production tubing, flowlines, tanks, and refinery equipment. • Effect of CO_2, H_2S, oxygen, and chlorides on corrosion behavior. • Field examples of major corrosion failures and lessons learned.
14.00	14.30	Questions and Discussion
14.30		Buffet Lunch

(2nd Day) Agenda

9.00	11.30	Corrosion Monitoring & Inspection Techniques: • Principles and objectives of corrosion monitoring. • Direct and indirect corrosion measurement techniques. • Weight loss coupons, ER probes, and LPR methods. • Online and offline monitoring approaches. • NDT techniques: ultrasonic, radiographic, magnetic particle, and eddy current testing.
11.30	12.00	Coffee Break
12.00	14.00	Corrosion Monitoring & Inspection Techniques: • Visual inspection and surface evaluation methods. • Intelligent pigging and pipeline integrity assessments. • Data interpretation and trend analysis for corrosion rate estimation. • Corrosion mapping and digital monitoring systems. • Developing effective corrosion monitoring programs.
14.00	14.30	Questions and Discussion
14.30		Buffet Lunch

(3rd Day) Agenda

9.00	11.30	Corrosion Control & Prevention Strategies: • Design and material selection principles for corrosion control. • Cathodic protection systems: design, operation, and maintenance. • Anodic and impressed current protection systems. • Selection and application of protective coatings and linings. • Corrosion inhibitors: classifications, testing, and performance evaluation.
11.30	12.00	Coffee Break
12.00	14.00	Corrosion Control & Prevention Strategies: • Environmental control methods (oxygen scavengers, dehydration, pH adjustment). • Corrosion management in produced water systems, refineries, and storage tanks. • Pipeline corrosion protection and coating integrity maintenance. • Real-world success stories of corrosion prevention programs. • Balancing chemical, mechanical, and operational control methods.
14.00	14.30	Questions and Discussion
14.30		Buffet Lunch

(4th Day) Agenda

9.00	11.30	Failure Analysis & Integrity Management: • Principles and methodology of corrosion failure investigation. • Identification of corrosion damage mechanisms and classification. • Root Cause Analysis (RCA) and metallurgical examination techniques. • Corrosion fatigue, hydrogen embrittlement, and stress corrosion cracking analysis. • Integration of corrosion management into Asset Integrity Management Systems (AIMS).
11.30	12.00	Coffee Break
12.00	14.00	Failure Analysis & Integrity Management: • Risk-Based Inspection (RBI) planning and implementation. • Fitness-for-Service (FFS) assessment and life prediction. • Documentation, reporting, and compliance with international standards. • Key performance indicators (KPIs) for corrosion management. • Case studies of integrity failures and improvement strategies.
14.00	14.30	Questions and Discussion
14.30		Buffet Lunch

(5th Day) Agenda

9.00	11.30	Advanced Topics & Future Trends in Corrosion Management: • Corrosion Under Insulation (CUI) – causes, detection, and control. • Corrosion challenges in offshore and subsea environments. • Advanced materials: composites, alloys, and nanomaterials in corrosion resistance. • Hydrogen-induced cracking, sour service corrosion, and high-temperature oxidation. • AI-driven corrosion prediction and data analytics systems.
11.30	12.00	Coffee Break
12.00	14.00	Advanced Topics & Future Trends in Corrosion Management: • Smart coatings and real-time monitoring technologies. • Digital twin applications in corrosion management. • Integration of predictive maintenance using IoT and remote sensors. • Sustainability and green corrosion inhibitors. • Workshop: Building a complete corrosion management framework for a petroleum facility.
14.00	14.30	Questions and Discussion
14.30		Buffet Lunch