

Controlling Corrosion in the Oil and Gas Exploration Sector

Mitigating corrosion in oil and gas exploration.

Introduction

In the global oil and gas exploration industry, the yearly losses resulting from corrosion and the associated rectification expenses amount to many billions of dollars. The need for innovative materials with unique failure behaviours arises from high production under harsh and demanding operating circumstances. As a result, industry operators are always reviewing various corrosion management techniques. However, unanticipated corrosion-related failures of top-side, subsurface, and subsea infrastructure result in both production loss and fatalities. For production wells and other facilities to operate safely and profitably, corrosion management techniques include corrosion preventive measures, prediction of failure behaviours, and remaining useful life. Effective corrosion control ensures cost-effective selection, which affects the business's financial performance.

Objectives

The purpose of this course is to provide engineers and operators working in the oil and gas exploration sector with a fundamental understanding of corrosion, including its causes and controls in the production and processing of oil and gas. An overview of corrosion and the main problems with it in upstream oil and gas operations will be covered in this course. Understanding how materials corrode, how to monitor corrosion, and some basic principles of corrosion control will be the main topics of discussion. The concepts of cathodic protection, corrosion monitoring in field applications, and inhibitors will be presented to the participants. The course gives participants the fundamental knowledge and abilities to manage and resolve corrosion problems. It is delivered from the perspective of real-world manufacturing processes.

Training Methodology

- The course integrates appropriate standards, methodologies, and solid engineering principles.
- Every lecture is available as a vibrant Power Point presentation.
- Interactive discussions are incorporated throughout every lesson.
- Every lecture includes exercises, a case history, and a group discussion.
- Both real-world significant events and industry expertise are examined.

- Each student is given a multicoloured course handbook.
- Images of actual occurrences as well as case studies are displayed.
- Videos are displayed about the topic.

Organizational impacts

By using effective corrosion control techniques based on entire life cycle corrosion economy, the company will be able to improve its corrosion management system.

Personal Impact

It will be easier for participants to actively contribute to lowering the likelihood of unanticipated failures in corrosion control strategies as a whole.

Through increased productivity and competency, participants will improve their performance and competence in the field of corrosion management systems, adding value to their organisations.

Who should attend?

Personnel who deal directly or indirectly with corrosion monitoring and control while employed in technical fields relating to assets integrity management.

Course Outline

Day 1

Part 1: Production Fluid for Oil and Gas

- The Source and Production of Gas and Oil
- The chemical makeup of production fluids
- Equipment for Oilfields
- Summary of Operations and Processes in the Oilfield

Part 2 : Metallurgy

- Metals' Chemical Properties
- Mechanical Characteristics
- Overlying Aspects

- Crystallinity in Metal Forms
- Metal Imperfections
- UNS Numbers
- Common Oilfield Metals and Alloy Properties
- Petroleum Field Equipment Metallurgy

Day 2

Part 3 : Damage from Corrosion

- Fundamentals of Corrosion
- Typical Corrosion Forms
- Monitoring of Corrosion in Plants and Facilities
- Testing Without Destruction (NDT)
- Analysis of the Root Causes of Corrosion Failure
- Group Discussion: Standard Study That Is Relevant for Corrosion Monitoring

Part 4 : Corrosion Particular to Oilfields

Internal Corrosion

- Corrosion of Water
- Acid Corrosion
- Sweet Corrosion
- Oxygen Corrosion
- High-Level Corrosion (TLC)
- Corrosion Induced by Microbes (MIC)
- Erosion of Sand

External Corrosion

- Marine Atmospheric Corrosion
- Under Insulation Corrosion (UIC)
- Flange corrosion in pipes
- Subterranean Corrosion
- Current Stray Corrosion
- Corrosion caused by seawater
- Corrosion of Oilfield Equipment
- Case Study: Programme for Plant Ageing and Life Extension

Day 3

Part 5 : Strategies for Preventing and Controlling Corrosion

- Operational Control of Corrosion
- Processes for Controlling Corrosion
- Design of Corrosion Control
- Controlling Corrosion through Material Selection
- Group Discussion: Materials Resistant to H₂S Corrosion: NACE MR0175/ISO 15156-1

Part 6: Systems for Cathodic Protection (CPS)

- Basics of Cathodic Protection
- CPS Galvanic Anodes
- Enhanced Present CPS
- CPS System Upkeep

Day 4

Part7 : Barrier Film (Coatings and Lining)

- Fundamentals of Coatings
- Functional Properties of Industrial Coatings
- Coating System Types
- Surface Get Ready
- Applications for Coatings
- Coating Impurities

Part 8: Chemical Processing

- Inhibitors of corrosion
- Assessment of Corrosion Inhibitor Performance
- Using Inhibitors of Corrosion

Day 5

Part 9: Treatment of Biocide

- Corrosion Influenced by Microbiology (MIC)
- Sulfur-Reducing Microbes
- The Selection & Treatment of Biocide

Part 10: Materials That Are Not Metallic

- Polymers
- Composite Substances

Part11: Corrosion Management Strategy (CMS)

- Oilfield Equipment Corrosion Management
- Economy of Corrosion
- Key Performance Indicators (KPIs) for Corrosion
- Asset Protection and Corrosion Control
- Standards and Codes
- Data Management for Corrosion
- Case Study: Devastating Corrosion Error