

Comprehensive Corrosion Control and Monitoring

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Energy Milestones Corporation Advancing Professionals to the next level

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Comprehensive Corrosion Control and Monitoring



Overview

This corrosion course covers fundamental aspects of corrosion control and its prevention. The course will enable beginners to establish a solid foundation in corrosion before moving on to advanced topics. Exercises, hands-on practical sessions and virtual experiments. Throughout the course, participants will understand the basic concepts and fundamentals important to corrosion.

Course Objectives

- Understand why and how corrosion occurs
- Know how to control and prevent corrosion
- Gain an understanding of corrosion ramifications in oil production operations
- Recognise the various forms of corrosion attack
- Carry out a corrosion failure analysis
- Utilise the most appropriate method for corrosion control
- Adopt the most appropriate monitoring techniques and
- Utilise the current information sources, including the current corrosion software

Course Content

1. Introduction

- Definition of corrosion
- Corrosion in action: examples of corrosion
- Liabilities due to corrosion
- Basic concepts in corrosion
- Primer in chemistry and electrochemistry
- Understanding electrochemical cells



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Course Content

2. Corrosion in Specific Environments

- Corrosion in the atmosphere
- Corrosion in waters
- Corrosion in soil
- Corrosion in concrete
- Corrosion in high temperature environments

3. Why Do Metals Corrode? The Driving Force for Corrosion

- Thermodynamics
- Faraday's Law
- Electrode potentials
- Reference electrodes
- Electromotive force (EMF) series vs. galvanic series
- Nernst equation
- Pourbaix diagram (potential-pH diagram)
- Passivity

4. Practical Corrosion Cells Important to Corrosion Diagnosis

- Galvanic cell
- Concentration cell
- Active/passive cell
- Thermogalvanic cell
- Stress cell



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Course Content

5. Kinetics: The Rate of Corrosion

- Polarization
- Rate of reaction and rate constant
- Anodic and cathodic current densities
- Exchange current density
- The mixed potential theory
- E-log(i) Evans diagram
- Tafel Equation and Tafel plot for corrosion rate determination
- Linear polarisation and the Stern-Gerlach Equation
- Type of polarisation and rate-controlling steps
- Concentration polarisation and the importance of dissolved oxygen
- Effect of oxidizer concentration on the rate of corrosion
- Effect of velocity on the rate of corrosion
- Area effect
- Depolarisers and Depolarisation

6. Different Forms of Corrosion: Mechanisms, Recognition and Prevention

- General attack/uniform corrosion
- Galvanic corrosion/de-alloying
- Pitting corrosion
- Crevice corrosion
- Filiform corrosion
- Intergranular corrosion/exfoliation
- Environmental cracking
- Liquid metal embrittlement
- Hydrogen damage
- Corrosion fatigue
- Flow-assisted corrosion
- Fretting corrosion
- High temperature corrosion



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Course Content

7. Methods for Corrosion Control and Prevention

- Materials selection and design
- Protective coatings and linings
- Cathodic protection and anodic protection
- Modification of the environment (chemical treatment)
- Corrosion testing and monitoring



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Targeted Audience

Corrosion practitioners, designers, technical managers, inspection and maintenance engineers, quality control personnel and those involved in failure analysis.

Course Methodology

Facilitated by an experienced professional trainer, this training course will be conducted as a highly interactive workshop session. A variety of training methodologies and facilitation techniques will be used before and during the course whenever applicable. These methods are aimed at enhancing individual and group interaction while maximizing learning. Some of these methods are:

- Online Pre-post Test
- Colorful Visual Aids
- Gamification
- Self-Assessment Instruments
- Simulations
- Case Studies
- Videos
- Group Exercises & Discussions
- Role-plays
- Indoor & Outdoor games

