BLACKBIRD FOR TRAINING

Corrosion Control and Prevention



Corrosion Control and Prevention

Introduction

Corrosion is one of the major threats to the integrity, reliability, safety, and service life of industrial assets and infrastructure. Effective corrosion control and prevention requires engineers to understand corrosion mechanisms, damage mechanisms, inspection methods, material selection, protective systems, monitoring techniques, and maintenance strategies.

This one-week course provides a comprehensive engineering-level understanding of corrosion control and prevention, with particular emphasis on corrosion inspection, damage assessment, prevention methods, protection systems, failure analysis, and asset integrity.

The course combines technical concepts with practical engineering applications, inspection scenarios, corrosion assessment activities, case studies, and problem-solving exercises. Participants will develop the ability to identify corrosion mechanisms, assess corrosion risks, interpret inspection findings, evaluate prevention and protection methods, and support effective corrosion management decisions.

Course Objectives

By the end of this course, participants will be able to:

- Understand the fundamental principles and electrochemical mechanisms of corrosion.
- Identify and evaluate major corrosion and damage mechanisms affecting industrial assets.
- Assess corrosion risks and factors influencing corrosion rates and damage.
- Understand corrosion inspection planning, methods, monitoring, and data interpretation.
- Evaluate corrosion damage and support engineering condition assessments.
- Select appropriate corrosion prevention and control strategies.
- Understand protective coatings, surface treatments, corrosion inhibitors, and electrochemical protection.
- Apply material selection and design principles for corrosion prevention.
- Analyse corrosion-related failures and identify potential root causes.
- Integrate corrosion control, inspection, maintenance, and asset integrity practices.



Course Outlines

Day 1 - Corrosion Fundamentals, Mechanisms and Damage Types

- Principles of corrosion and electrochemical corrosion mechanisms.
- Corrosion cells, anodic and cathodic reactions, and corrosion rates.
- Uniform, galvanic, pitting, crevice, and erosion-corrosion.
- Stress corrosion cracking, corrosion fatigue, MIC, and corrosion under insulation.
- Practical Application: Identification and assessment of corrosion mechanisms using engineering case examples.

Day 2 - Corrosion Inspection, Monitoring and Damage Assessment

- Principles and planning of corrosion inspection programs.
- Visual inspection, thickness measurement, and corrosion-rate assessment.
- Common NDT methods for corrosion detection and damage assessment.
- Corrosion monitoring, inspection data collection, and trend analysis.
- Practical Application: Review inspection findings, assess corrosion damage, interpret inspection data, and identify required follow-up actions.

Day 3 - Corrosion Prevention, Protection and Control

- Material selection and compatibility for corrosion prevention.
- Protective coatings, surface preparation, and coating failure mechanisms.
- Cathodic and anodic protection principles and applications.
- Corrosion inhibitors and environmental control strategies.
- Practical Application: Select and compare appropriate corrosion prevention and protection strategies for different operating conditions.

Day 4 - Corrosion Engineering, Failure Analysis and Asset Integrity

- Corrosion-related equipment and infrastructure failures.
- Root-cause analysis of corrosion damage and failure mechanisms.
- Corrosion assessment of pipelines, tanks, pressure equipment, and process equipment.
- Integration of corrosion control with maintenance and asset integrity management.
- Practical Application: Analyse a corrosion-related failure, identify contributing factors, and develop corrective and preventive actions.



Day 5 - Integrated Corrosion Management and Engineering Case Studies

- Development of an integrated corrosion control and prevention strategy.
- Corrosion risk assessment and prioritization of critical assets.
- Development of corrosion monitoring and inspection programs.
- Evaluation of corrosion management performance and continuous improvement.
- Integrated Case Study: Develop a complete corrosion management strategy covering inspection, assessment, prevention, protection, monitoring, maintenance, and asset integrity.

Why Attend This Course? Wins & Losses!

Wins

- Develop a comprehensive engineering-level understanding of corrosion.
- Improve the ability to identify and assess corrosion damage mechanisms.
- Strengthen corrosion inspection and monitoring capabilities.
- Improve selection of appropriate prevention and protection methods.
- Develop stronger corrosion-related failure analysis skills.
- Improve integration between inspection, maintenance, reliability, and asset integrity.
- Support safer, more reliable, and longer-lasting industrial assets.

Losses if Not Attended

- Limited understanding of complex corrosion mechanisms and damage.
- Reduced ability to interpret corrosion inspection findings.
- Greater difficulty selecting appropriate corrosion control methods.
- Limited ability to identify root causes of corrosion-related failures.
- Reduced integration between corrosion inspection and maintenance decisions.
- Greater risk of ineffective corrosion prevention and asset integrity strategies.

Conclusion

This course provides a comprehensive engineering-level approach to corrosion control and prevention, covering corrosion mechanisms, damage assessment, inspection, monitoring, material selection, protective coatings, electrochemical protection, corrosion inhibitors, failure analysis, maintenance, and asset integrity.

Through practical applications and engineering case studies, participants will develop the knowledge and skills required to identify corrosion risks, evaluate inspection findings, select appropriate control measures, and support effective corrosion management throughout the asset life cycle.



Frequently Asked Questions FAQ

1. Who should attend this course?

The course is designed for Corrosion Engineers, Inspection Engineers, Materials and Metallurgical Engineers, Mechanical Engineers, Asset Integrity Engineers, Maintenance Engineers, Reliability Engineers, and other technical professionals involved in corrosion management.

2. Does the course cover corrosion inspection?

Yes. The course includes inspection planning, visual inspection, thickness measurement, corrosion-rate assessment, NDT methods, corrosion monitoring, inspection data analysis, and damage assessment.

3. Does the course cover corrosion prevention and protection?

Yes. It covers material selection, protective coatings, surface preparation, cathodic and anodic protection, corrosion inhibitors, environmental controls, and preventive maintenance strategies.

4. Is the course suitable for engineers?

Yes. The course is structured at an intermediate-to-advanced engineering level and combines technical concepts with practical inspection, assessment, failure-analysis, and asset-integrity applications.

5. Does the course include practical applications and case studies?

Yes. Practical engineering applications are incorporated throughout the course, with an integrated case study on Day 5 covering corrosion inspection, assessment, prevention, protection, monitoring, maintenance, and asset integrity.

A well-structured course delivered by one specialized instructor over one week, four hours per day, combining engineering theory, practical application, inspection scenarios, and integrated case studies.

