



A Complete Program for Corrosion
Control in Gas, Oil, & Water



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Introduction:

This Corrosion Control in Gas, Oil, and Water program equips professionals in the gas, oil, and water industries with advanced knowledge and skills in corrosion control. It covers theoretical foundations, practical applications, and corrosion prevention and management technology. Participants will be well-versed in combating corrosion, which can drastically reduce maintenance costs and extend equipment lifespan.

Understanding and managing corrosion is crucial in the gas, oil, and water sectors. This Corrosion Control in Gas, Oil, and Water training course addresses the complex challenges posed by corrosion in these industries. Skilled corrosion control ensures the durability and integrity of infrastructure, which is fundamental to preventing hazardous incidents, ensuring safety, and optimizing operational efficiency.

Corrosion can result in operational disruptions and environmental hazards in the oil and gas sector. Therefore, a dedicated corrosion control program is imperative to ensure asset safety, reliability, and longevity. Emphasizing corrosion control in oil and water systems is a safety and cost-saving strategy. It concerns metallurgy and corrosion control in oil and gas production.

Participants will delve into the properties of different materials, how they affect their susceptibility to corrosion, and the systematic methods used to protect these materials from premature degradation. Corrosion control encompasses all the technical methods used to prevent or reduce corrosion. It includes material selection, design considerations, protective coatings, corrosion inhibitors, and cathodic protection.

The Corrosion Control in Gas, Oil, and Water Program illuminates these aspects to foster an in-depth understanding of efficient corrosion management. By integrating these components, participants will glean substantial knowledge and skills in corrosion control, qualifying them for certifications and fostering their growth as experts in corrosion engineering.

Targeted Groups:

- Petroleum Engineers.
- Welding Engineers.
- Process Engineers.
- Inspectors and Inspection Supervisors.
- Equipment Engineers.
- Maintenance Engineers and Planners.
- Design Engineers.
- Service Company Representatives.

Course Objectives:

After this Corrosion Control in Gas, Oil, and Water program, attendees will be capable of:

- Exploring the materials of construction used in the oil, gas, and water fields.
- Learning about the corrosion theories and mechanisms.
- Understanding the typical types of corrosion related to oil, gas, and water fields.
- Discovering corrosion control monitoring and inspection methods.
- Applying practical methods of controlling corrosion, such as corrosion water control.

Targeted Competencies:

At the end of this Corrosion Control in Gas, Oil, and Water training, attendees competencies will be capable of:

- Metallurgy and engineering material properties.
- The cost of corrosion damage in industries.
- Comprehensive understanding of corrosion mechanisms in oil, gas, and water fields.
- Development of core corrosion control and mitigating programs.
- Advanced techniques for corrosion monitoring.

Course Content:

Unit 1: Construction Material Grades and Principles of Corrosion Engineering:

- Engineering material properties, including metallurgy.
- Materials testing destructive testing.
- Material identification according to API 5L and ASME code.
- Economic impacts of corrosion and defining what corrosion engineering is.
- Fundamentals of corrosion theory and measurement.

Unit 2: Understanding Types of Corrosion:

- Insight into galvanic corrosion.
- Identifying localized or pitting corrosion.
- Impact of stray currents on corrosion.
- Soil corrosion phenomena.
- Mechanisms of crevice corrosion.
- Exploration of Microbiologically Induced Corrosion MIC.

Unit 3: Further Exploration of Types of Corrosion:

- Wet hydrogen sulfide H₂S corrosion mechanisms.
- Corrosion Under Insulation CUI.
- Challenges with Corrosion Under Support CUS.
- Assessing Flow assisted corrosion Erosion Corrosion.
- Preventing Cl stress corrosion cracking.
- Strategies against Intergranular Corrosion.

Unit 4: Corrosion Control in Oil, Gas & Water Fields:

- Protective measures through design alteration.
- Techniques in active Cathodic protection Sacrificial anode.
- Employing cathodic protection Impressed Current.
- Implementing passive Protection Coating.
- Various types of protective paints.
- Utilizing inhibitors as part of corrosion control training.

Unit 5: Corrosion Monitoring in Oil, Gas & Water Fields:

- Utilizing thickness measurements with ultrasonic testing.
- Radiographic examinations for corrosion detection.
- Employing corrosion coupons.
- Electronic probes application.
- Intelligent pigging systems.
- Incorporating Risk-Based Inspection RBI, leading to corrosion control certification and advanced corrosion engineering training.

Unit 6: Advanced Corrosion Prevention Strategies:

- Evaluation of material selection criteria for extreme environments.
- Advanced design principles to minimize corrosion impact.
- Integration of corrosion-resistant alloys in oil, gas, and water systems.
- Exploring the latest advancements in nano-coatings for corrosion prevention.
- Application of composite materials in high-corrosion areas.

Unit 7: Environmental Factors and Corrosion Control:

- Impact of temperature, pressure, and salinity on corrosion rates.
- Influence of pH and chemical composition of fluids on material degradation.
- Strategies to mitigate environmental-assisted cracking.
- Techniques to manage corrosion in high-CO₂ and H₂S environments.
- Analysis of climatic and soil conditions in corrosion management.

Unit 8: Corrosion Failure Analysis and Case Studies:

- Principles and methodologies of failure analysis in corrosion-related incidents.
- Detailed examination of historical oil, gas, and water corrosion failures.
- Root cause analysis of pipeline and equipment failures.
- Lessons learned from real-world corrosion control interventions.
- Development of proactive failure prevention strategies.

Unit 9: Corrosion Risk Management and Safety Compliance:

- Risk assessment methodologies for corrosion-prone infrastructure.
- Developing and implementing corrosion risk management plans.
- Overview of industry standards and regulatory frameworks e.g., NACE, API, ISO.
- Integration of safety compliance with corrosion control measures.
- Cost-benefit analysis of corrosion control investments.

Unit 10: Emerging Trends and Innovations in Corrosion Engineering:

- Exploration of digital tools for corrosion monitoring e.g., IoT sensors, AI-driven analytics.
- Advancements in predictive maintenance for corrosion-prone systems.
- Implementation of smart coatings with self-healing properties.
- Future technologies in cathodic protection and inhibitor formulations.
- Case studies on adopting green corrosion control practices in sustainable operations.