



Best Technology Solutions (BTS)

Metallurgy, Corrosion & Prevention of Failures Training program

Introduction:

This course presents a history of metals and the background on the origins of various metals. It provides an explanation of physical characteristics of metals, including the reason metals behave differently than non-metals. This course also explains how and why different metals are selected for specific environmental purposes, including resistance to wear, corrosion, heat, cold, repeated stress, and impact. It also deals with metallurgical aspects of welding. Emphasis will be placed on mechanical metallurgy, material selection, and the fundamentals of welding technology, welding metallurgy, inspection and quality of welds.

The course focuses on the fundamentals of corrosion as well as the potential problems caused by corrosion. It provides a review of the causes of corrosion and the methods for identification, monitoring and control. An understanding of corrosion and its control is vital for any company hoping to avoid the high costs that can directly or indirectly attribute to corrosion. This course also presents fundamental principles of corrosion and assists participants in recognizing corrosion problems, determining their causes, and understanding & selecting control methods. Emphasis is on the practical applications of corrosion technology to solve industrial corrosion problems. It focuses on the prevention of failures, the assessment of the state of damage in plant and equipment, and the use of failure analysis, inspection data, and operating history in predicting safe operating life or determining necessary remedial measures. Maintenance requirements, risk-based inspection (RBI) procedures, and the fitness for service (FFS) approach will be discussed



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along with the various mechanisms leading to damage and potential failure, mechanisms of accumulation, and predictive methods.

Who Should Attend?

Corrosion Control Engineers & Personnel, Process Engineers, Metallurgists, Inspection Personnel, Mechanical Engineers, Material Selection Personnel, Plant Contractors, Operations Engineers, Team Leaders & Supervisors, Maintenance Supervisors, Senior Plant Supervisors, Mechanical Engineers, Corrosion Control & Monitoring Systems Personnel, Oil and Gas Production Facilities Personnel, Chemists, Chemical Engineers, Technicians and Supervisors, New Petroleum Engineers, Asset Management Personnel, Design & Construction Engineers, Team Leaders & Coordinators, Construction Coordinators, Maintenance Engineers, Technologists, Maintenance Team Leaders & Engineers, Personnel who are / will be responsible for detecting, inspecting, monitoring, controlling corrosion in oil and gas piping, pipelines used in production operations and Personnel responsible for metallurgy, corrosion or the prevention of failures in plant and equipment

Course Objectives:

By the end of this course delegates will learn about:

- Develop a good understanding of physical and mechanical metallurgy
- Conduct a review of nonferrous alloys and stainless steels
- Become familiar with the classification and heat treatment of steels
- Have a good background on metallurgy and ferrous metals



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- Gain a deeper understanding of materials and metallurgy
- Understand welding metallurgy, non-destructive examinations and electrochemical principles
- Know the fundamentals of corrosion and identify its different forms
- Learn about passivity and passive films on stainless steels
- Improve knowledge on cathodic protection, protective coatings and inhibitors
- Understand various aspects of high temperature corrosion, prediction and control
- Increase awareness on the different damage and failure mechanisms
- Be familiar with the methods of failure prevention and inspection
- Demonstrate preventative and predictive maintenance
- Recognize the OSHA requirements for mechanical integrity
- Appreciate and define the different API and ASME codes and standard

Course Outline:

Introduction

Metallurgy

Introduction to Steel

- Classification of steels, Heat treatment of steels

Physical and Mechanical Metallurgy

- Crystal structure, Phase diagrams, Diffusion, Phase transformations



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Review of Nonferrous Alloys and Stainless Steels

- Aluminum, Copper, Nickel based, Stainless steel
- Heat treatment of nonferrous and stainless steels

Materials and Metallurgy

- Mechanical properties, Metals and alloys
- General characteristics of metals, Alloying

Welding Metallurgy

- Glossary, Fundamentals, Characteristics of weld solidification
- Weld microstructure, Temperature changes in welding, Residual stresses
- Welding processes, Heat input, Shrinkage and distortion in welding, Weld defects

Non-Destructive Examinations

- Glossary, Quality control, Standards for NDT, Welding, Inspection techniques

Electrochemical Principles & Forms of Corrosion

Corrosion by Water & Steam

Atmospheric Corrosion & Cathodic Protection



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Introduction to Protective Coatings

Inhibitors & High Temperature Corrosion

Failure Prevention & Prevention & Predictive Maintenance

Mechanical Integrity