

Fundamentals of Mechanical Technology

Oil & Gas Engineering
Barcelona (Spain)
17 - 21 Feb 2025

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Fundamentals of Mechanical Technology

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Introduction

Mechanical engineering is at the center of the chemical, oil, gas, and petrochemical industries. It requires familiarity not only with sound engineering principles, but also with other engineering techniques including inspection, monitoring, and condition evaluation. The mechanical engineer is interested in safe containment and movement of solids, liquids, and gases. Of specific importance are material properties, design, static & rotating equipment design, inspection, and repair as well as an understanding of maintenance strategies and condition monitoring

Course Objectives Fundamentals of Mechanical Technology

- Perform NDE Non-Destructive Examination for static and rotating equipment
- Select proper materials for static and rotating equipment
- Understand the principle of operation and design for this equipment
- Protect the equipment from corrosion
- Identify different mode failures of static and rotating equipment

Fundamentals of Mechanical Technology Course Outlines

Day 1

Introduction & Fundamentals

- Engineering Material Properties
 - Stress and Strain
 - Fracture failure, Modes, Stress concentration, Fracture toughness
 - Fatigue failure, testing, and mechanism
 - Temperature Considerations and Creep Failure
 - Identification of Damage Mechanisms
- Mechanical Design
- ASME & API
- Codes & Standards
- Design for static strength

Day 2

A graphic of a chessboard with several chess pieces (a king, a queen, a rook, and a pawn) on it. The board is white and black, and the pieces are gold and silver. The text 'UK Training PARTNER' is overlaid on the right side of the board.

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Materials Selection and Inspection

- Materials Selection
 - Materials of Construction
 - Carbon Steels
 - Alloy Steels
 - Stainless Steels
 - Nickel Based and Titanium Alloys
- Inspection techniques
- Visual
- Penetrant
- Magnetic Flux
- Eddy Current Inspections
- X-Ray & Gamma-ray
- Ultrasonics - TOFD & Pulse-Echo

Day 3

Valves, Piping & Fitness for Service

- Valves
 - Valve Types
 - Valve Characteristics
 - Valve Applications
 - Valve Selection
 - Valve Actuators
- Piping & Pipelines
- ASME B31
- Pipe Types, construction, and Schedules
- Steel Pipes
- Welded Types and Sections
- Flanges and Gaskets
- Plastic Pipes, Composite Pipes
- Pipe Coatings and Linings
- Pipe Supports and insulation blocks
- Stress relief in Piping Design
- Pigging
- Water hammer
- Overview of API 570 - Inspection & repair of Pipelines & Piping
- API 579 overview
- Fitness for Service

Day 4

Corrosion

- Corrosion Fundamentals
- Types of Corrosion

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- Corrosion Inspection and Monitoring
- Corrosion Minimization
- Coatings
- Inhibitors
- Cathodic Protection

Compressors

- Types of Compressors - Reciprocating, Centrifugal, and Screw
- Blading and Staging
- Performance Curves
- Compressed Air Usage and instruments
- Glands and Mechanical Seals

Day 5

Mechanical Maintenance

- Strategies & Philosophies
 - Maintenance system optimisation
 - Maintenance Management Systems
- Condition Monitoring
- Vibration Analysis
- Shaft Alignment
- Practical Examples

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