Training Title

MECHANICAL ENGINEERING FOR NON MECHANICAL ENGINEERS

Training Duration

5 Days

Training Dates & Venue

REF ME012	Mechanical Engineering For Non Mechanical Engineers	5	01-05 August 2021	$4,500	Dubai, UAE

Training will be conducted in any 5 star hotels. Exact venue will be informed later.

Training Fees

4,500 US$ per participant for Public Training includes Materials/Handouts, tea/coffee breaks, refreshments & Buffet Lunch.

Training Certificate

Define Management Consultancy & Training Certificate of course completion will be issued to all attendees.

TRAINING OVERVIEW

TRAINING INTRODUCTION

Mechanical engineering is one of the largest, broadest, and oldest engineering disciplines. It deals with the principles of energy, materials, and mechanics to design and manufacture machines and devices of all types. They create the processes and systems that drive technology and industry. All industrial systems cannot do without mechanical engineering.

This five-day course is prepared to provide non-mechanical personnel who have an engineering background, with a guide to the fundamentals of mechanical systems. This course focuses on engineering considerations. This course will focus on four areas: key mechanical engineering principles, rotating equipment, stationary equipment, and interfaces with other aspects of a facility, such as process, electrical and structural systems. This course is intended to pave the way to more detailed courses.

Oil and gas industry highly depends on a lot of mechanical equipments such as pipes, vessels, boilers, towers and others, non mechanical technicians and engineers in the that field must understand the mechanical equipments and how they work and their functions. The course covers the fundamental technology of machines, in terms of how they work and how they fail. It addresses wear and fatigue related failure mechanisms, and the role of lubrication. The interaction of the machine with the process is discussed, and the need for maintenance and condition monitoring personnel to work more closely together is

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demonstrated. The course includes an introduction to condition based maintenance and condition monitoring, and in this respect it aims to dispel rumors and demonstrate capabilities.

TRAINING OBJECTIVES

By the end of this course trainees will be able to:

1. To clarify the basic concepts mechanical branches and t Mechanical Engineering.
2. Codes & standards for Oil and Gas Industries, namely ,ASME, API, ASTM, NACE etc
3. To understand the Properties of Iron & Steels and other construction Materials.
4. Basic Workshop technology, Metal-Removal Processes and Machine Tools.
5. To Know Practical applications of thermodynamics, Basic laws of thermodynamics.
6. To know Fundamentals of Heat Transfer, selection and applications of Heat Exchangers.
7. Get a general overview of welding technology, Procedure and Performance Qualifications
8. Understand the role of mechanical equipment and systems in production facilities, transportation systems, and process plants.
9. Recognize general codes and standards applicable to mechanical systems.
10. Distinguish mechanical equipment types and functions.
11. Identify varieties of mechanical drivers and driven equipment.
12. Recognize mechanical interfaces with process, electrical and structural systems.

WHO SHOULD ATTEND?

All the facility engineers, all the administrative staff especially those involved in budget and planning, This course is intended for supervisory and technical staff working in maintenance related roles, who need either a greater awareness of, or to get more involved in, preventive maintenance activities and the project team . Because the methods and examples are generic, personnel from all industries will benefit.

TRAINING METHODOLOGY

A combination of class lectures, case studies or examples and group discussion. The course will be intensive but practical and highly interactive. Participants are encouraged to participate actively and to ask questions especially pertaining to specific problems. At the end of the session there will be a question-and-answer session to allow participants enough time to seek answers to grey areas and to seek clarifications to any misconceptions or

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problems they may have regarding the subject concerned to the course. There will also be some indoor experiential activities to enhance learning.

- **30% Lectures**
- **30% Workshops and work presentation**
- **20% Group Work& Practical Exercises**
- **20% Videos& General Discussions**

TRAINING OUTCOME

At the end of this training Participants will be able to understand:

1. **To clarify the basic concepts mechanical branches and t Mechanical Engineering.**
2. **Codes & standards for Oil and Gas Industries, namely ,ASME, API, ASTM, NACE etc**
3. **To understand the Properties of Iron & Steels and other construction Materials.**
4. **Basic Workshop technology, Metal-Removal Processes and Machine Tools.**
5. **To Know Practical applications of thermodynamics, Basic laws of thermodynamics.**
6. **To know Fundamentals of Heat Transfer, selection and applications of Heat Exchangers.**
7. **Get a general overview of welding technology, Procedure and Performance Qualifications**

TOPICS COVERED

Course Content

1. Fundamentals and applications of Material Engineering.

- **Overview of Strength of Material**
- **Mechanical Properties of Materials**
- **Failure of Materials in Tension, Fatigue and Creep**
- **Brief over view of materials of Construction**
- **Iron, Steel and alloys**
- **Basic Heat treatments**
- **Various Steel Grades used in Industry**

2. Practical applications of thermodynamics

- **Basic laws of thermodynamics**
- **Concepts of Energy, Work, heat etc.**
- **Thermodynamic processes.**
- **Process laws and combustion**

3. Practical applications of fluid engineering and heat transfer

- **Flow characteristics of liquids & Concept of Reynolds number**
- **Fundamentals of Heat Transfer**
- **Mechanical design of piping systems**

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- Pipe, Pipe Fittings, flanges
- Selection and use of Valves

4. Overview of Codes & standards for Oil and Gas Industries; Construction Codes and In-service Inspection codes

- Codes & standards for Pressure vessel design, ASME Sec. VIII Div.1, API 510
- Codes & standards for Piping Systems ASME B 31.3, API 570
- Heat exchangers- TEMA Codes
- Codes & standards for Storage tanks API 650, API 653
- Fabrication installation, testing of pr. Vessels, heat Exch. & Piping.
- To perform basic Mechanical design of Pressure vessels and Heat Exchangers, Piping and Storage Tanks.

5. Basic Workshop technology

- Metal-Removal Processes and Machine Tools
- Various Machining, operations.
- Metal shaping operations- Casting, Forging,
- Metal forming operations-Pressing, rolling, drawing, extrusion.

6. Overview of welding technology

- Welding Processes-Their merits and demerits
- Types of weld joints
- Selection of filler materials
- Procedure and Performance Qualifications.
- NDT of welded constructions.

7. Specific Mechanical applications in Oil and gas industries

- Manifolds and Gathering
- Pipelines and Risers
- Separators, De-salters
- Refinery equipments, Distillation columns.
- Heat Exchangers, Scrubbers and reboilers
- Test Separators and Well test
- Case Studies in Oil and Gas industries

COURSE DETAILED OUTLINE

Following topics will be covered in 5 days.

First day

1- **Brain storm for the course contents.**
2- **What are the branches of mechanical since?**
   (Static and rotary mechanical since).

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3- Static mechanical since branches. (codes and Standards, static components, metallurgy, metal processes , workshop tools, metal removal processes)
4- Codes and standards understanding.
5- Codes and standards types. ASME, API, ASTM, NACE Etc…...
6- Effect of codes and standards in components and systems design.
7- Static components pipes, valves, flanges, strainers, types and standards.
8- Pipes types, fabrication methods standards. ASME b 31 .3 , API 570
9- Valves types and selection (ball, globe, butterfly etc…..)
10- Flanges and fitting types and standards.

Second day

11- Vessels introduction and types
12- Vessels design code ASME Sec VIII Div. 1
13- Manifolds, gathering and riser's introduction and information.
14- Separators , de-salters, distillation columns
15- How to design a piping system and other vessels.
16- Storage tank codes API 650 , API 653
17- Fabrication of storage tanks and vessels.
18- Simple piping system design

Third day

19- Metallurgy since introduction
20- Iron , steels types and other constructions materials.
21- Iron and steels fundamentals and understanding.
22- Iron and others materials properties.
23- Rigidity, hardness, flexibility and fragility etc
24- (Fe – c) phase diagram, steel construction and other metal engineering.
25- Steel grade and properties.
26- Stainless steel information and advantage.
27- Strength and Stresses of materials.
28- Tension, fatigue, creep and torsion .etc.
29- Metal machining processes introduction
30- Workshop machines and metal processes.
31- Lathe, milling and other workshop operations.
32- Casting, technology and operations.
33- Alloy introduction and properties.

Fourth day

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34- Casting operation
35- Forging operation
36- Rolling operation
37- Drawing operation
38- Extrusion operation
39- Pressing operation
40- Welding introduction
41- Welding joint types and processes.
42- Welding test and certifications.

Fifth day

43- Thermodynamic and fluid mechanics since introduction
44- First and second lows of thermodynamic.
45- Work and energy fundamental and concept.
46- Heat exchanger types and application in gas and oil industries.
47- Tema code for heat exchanger
48- Reynolds number concept and fluids mechanics.
49- Test and production separators.

NOTE:
Pre & Post Tests will be conducted
Case Studies, Group Exercises, Group Discussions, Last Day Review & Assessments will be carried out.

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