

TRAINING TITLE

FUNDAMENTALS OF MECHANICAL ENGINEERING

Training Duration

5 day

Training Venue and Dates

Ref. No. ME119	Fundamentals of Mechanical Engineering	5	06-10 Oct 2025	\$5,500	DUBAI, UAE
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In any of the 4 or 5-star hotels. The exact venue will be informed later.

Training Fees

- \$5,500 per participant for Public Training includes Materials/Handouts, tea/coffee breaks, refreshments & Lunch

Training Certificate

Define Management Consultants Certificate of course completion will be issued to all attendees.

TRAINING DESCRIPTION

This comprehensive five-day training program is designed for professionals seeking to enhance their understanding of mechanical engineering principles and their applications in the oil and gas sector. Whether you're an engineer, technician, or operations manager, this course will provide you with the foundational knowledge necessary to navigate the complex mechanical systems that drive the oil and gas industry.

TRAINING OBJECTIVES

By attending this course, participants will:

- Understand the role of mechanical engineering across various sectors of the oil and gas industry, including upstream, midstream, and downstream.
- Gain practical knowledge of mechanical systems such as pumps, compressors, piping, and pressure vessels used in oil and gas operations.
- Develop skills in material selection, stress analysis, fluid mechanics, and thermodynamics as they apply to oil and gas operations.
- Learn about the maintenance, reliability, and safety considerations critical to operating mechanical systems in challenging environments.
- Explore emerging technologies and trends in mechanical engineering that are shaping the future of the industry.

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WHO SHOULD ATTEND?

This course is ideal for:

- Mechanical engineers and technicians
- Operations and maintenance personnel
- Project engineers and managers
- Anyone interested in the fundamentals of mechanical engineering as it pertains to the oil and gas industry

TRAINING METHODOLOGY

A highly interactive combination of lectures and discussion sessions will be managed to maximize the amount and quality of information and knowledge transfer. The sessions will start by raising the most relevant questions and motivating everybody to find the right answers. You will also be encouraged to raise your own questions and to share in the development of the right answers using your own analysis and experiences. Tests of multiple-choice type will be made available on daily basis to examine the effectiveness of delivering the course.

Very useful Course Materials will be given.

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

COURSE PROGRAM:

Day 1: Introduction to Mechanical Engineering in Oil and Gas

- **Overview of the Oil & Gas Industry**
 - History and importance of mechanical engineering in oil and gas.
 - Key challenges in oil and gas operations (exploration, production, refining).
 - Role of mechanical engineering in upstream, midstream, and downstream sectors.
- **Fundamentals of Mechanical Engineering**
 - Basic principles: mechanics, thermodynamics, fluid mechanics, material science.
 - Core mechanical engineering concepts and their application in oil and gas.
- **Key Mechanical Systems in Oil & Gas**
 - Pumps, compressors, and turbines.
 - Heat exchangers and pressure vessels.
 - Piping systems and valves.

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Day 2: Materials & Stress Analysis

- **Materials in the Oil & Gas Industry**
 - Types of materials used: metals, polymers, composites.
 - Material selection criteria (corrosion resistance, high temperature, etc.).
 - Overview of offshore vs onshore material considerations.
- **Stress and Strain in Mechanical Systems**
 - Introduction to stress and strain analysis.
 - Stress calculations and strain considerations in piping and pressure vessels.
 - Fatigue analysis in mechanical components.
- **Corrosion and Material Failure**
 - Types of corrosion in oil and gas environments.
 - Preventive measures and material choice.
 - Case studies on material failure in critical equipment.

Day 3: Fluid Mechanics and Thermodynamics

- **Fluid Mechanics in the Oil & Gas Industry**
 - Fluid flow principles and pipe network design.
 - Pressure drop calculations in piping and fluid transport systems.
 - Flow assurance and challenges in pipelines (wax deposition, hydrate formation).
- **Thermodynamics and Heat Transfer**
 - Basic thermodynamic laws and their applications in oil and gas.
 - Heat exchangers and their operation.
 - Power generation (e.g., steam turbines, gas turbines).
- **Pump and Compressor Operations**
 - Working principles of centrifugal and positive displacement pumps.
 - Compressor types and performance in oil and gas operations.
 - Maintenance and troubleshooting basics.

Day 4: Mechanical Equipment Design and Maintenance

- **Design Principles for Mechanical Equipment**
 - Design standards and codes (ASME, API, etc.).
 - Designing for safety, reliability, and efficiency in the oil and gas sector.
 - Equipment selection and specification for various operational environments.
- **Maintenance and Reliability Engineering**
 - Predictive maintenance techniques (vibration analysis, thermography).
 - Reliability-centered maintenance (RCM) and failure modes effects analysis (FMEA).
 - Case studies on optimizing equipment lifespan and reducing downtime.

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- **Advanced Topics in Equipment Management**
 - Risk-based inspection (RBI) strategies.
 - Condition monitoring technologies.
 - Asset management and life-cycle costing in oil and gas projects.

Day 5: Safety, Environmental Impact, and Future Trends

- **Safety and Risk Management**
 - Mechanical engineering's role in safety (hazard identification, risk assessments).
 - Safety systems and pressure relief valves.
 - Regulations and standards (HSE, API).
- **Environmental Considerations in Mechanical Design**
 - Minimizing environmental impact in mechanical systems.
 - Sustainable practices in design and operation (energy efficiency, waste reduction).
 - Case studies of environmental incidents and mechanical system failures.
- **Emerging Trends in Mechanical Engineering for Oil & Gas**
 - Industry innovations (automation, robotics, AI, 3D printing).
 - Trends in renewable energy and mechanical engineering's role in the energy transition.
 - Future challenges and opportunities in mechanical engineering for oil and gas.

NOTE:

Pre-& Post Tests will be conducted.

Case Studies, Group Exercises, Group Discussions, Last Day reviews, and assessments will be carried out.

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