

COURSE OVERVIEW ME0455

Fundamentals of Mechanical Engineering

Course Title

Fundamentals of Mechanical Engineering

Course Date/Venue

Session 1: February 17-21, 2025/Fujairah Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE

Session 2: September 14-18, 2025/Boardroom 1, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE



Course Reference

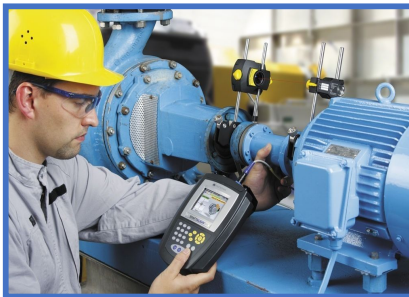
ME0455

Course Duration/Credits

Five days/3.0 CEUs/30 PDHs



Course Description



This practical and highly-interactive course includes real-life case studies and exercises where participants will be engaged in a series of interactive small groups and class workshops.

Engineers from all disciplines and other professionals and technical personnel in both the industrial and commercial environments need a good understanding of the basic concepts that underlie the application of mechanical engineering to the successful and efficient installation and operation of mechanical and plant equipment and systems. This course is aimed at participants who either had no formal training in mechanical engineering or are seeking a refresher to increase and enhance their current knowledge.



Further, the course will also discuss the basic concepts that underlie the application of mechanical engineering; the pumps, drivers and pumping systems; the types and applications of couplings and pressure vessels; the various applications and functions of pipelines; and the types, standards and layout of piping system; the fans, blowers and compressors including rotary compressors, centrifugal compressors and reciprocating compressors.



During this interactive course, participants will learn the operating principles of diesel engines; the types and applications of valves, heat exchangers, bearings and lubrication systems; the characteristics of fired boilers, process heaters, heat recovery equipment, HVAC and refrigeration systems; the various types of storage tanks; and the concepts of instrumentation and control for mechanical equipment.

Course Objectives

Upon the successful completion of this course, each participant will be able to:-

- Recognize the basic concepts that underlie the application of mechanical engineering
- Describe pumps, drivers and pumping systems and identify the types and applications of couplings and pressure vessels
- Discuss the various applications and functions of pipelines as well as the types, standards and layout of piping system
- Identify fans, blowers and compressors including rotary compressors, centrifugal compressors and reciprocating compressors
- Explain the operating principles of diesel engines and enumerate the types and applications of valves, heat exchangers, bearings and lubrication systems
- Illustrate the characteristics of fired boilers, process heaters, heat recovery equipment, HVAC and refrigeration systems
- List the various types of storage tanks and apply the concepts of instrumentation and control for mechanical equipment

Exclusive Smart Training Kit - H-STK®



Participants of this course will receive the exclusive “Haward Smart Training Kit” (H-STK®). The H-STK® consists of a comprehensive set of technical content which includes **electronic version** of the course materials conveniently saved in a **Tablet PC**.

Who Should Attend

This course is intended for professionals who need to upgrade their current experience and knowledge of mechanical engineering such as engineers from other disciplines, mechanical engineers who require practical knowledge of certain aspects of mechanical engineering, industrial and commercial plant and facilities engineers and operators, consultants, property managers, project engineers, design engineers and other technical personnel who are involved in the operation and maintenance of mechanical equipment, systems and processes.

Course Fee


US\$ 5,500 per Delegate + **VAT**. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day

Course Certificate(s)


Internationally recognized certificates will be issued to all participants of the course who completed a minimum of 80% of the total tuition hours.

Certificate Accreditations

Certificates are accredited by the following international accreditation organizations: -

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British Accreditation Council (BAC)

Haward Technology is accredited by the **British Accreditation Council** for **Independent Further and Higher Education** as an **International Centre**. BAC is the British accrediting body responsible for setting standards within independent further and higher education sector in the UK and overseas. As a BAC-accredited international centre, Haward Technology meets all of the international higher education criteria and standards set by BAC.

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The International Accreditors for Continuing Education and Training (IACET - USA)

Haward Technology is an Authorized Training Provider by the International Accreditors for Continuing Education and Training (IACET), 2201 Cooperative Way, Suite 600, Herndon, VA 20171, USA. In obtaining this authority, Haward Technology has demonstrated that it complies with the **ANSI/IACET 2018-1 Standard** which is widely recognized as the standard of good practice internationally. As a result of our Authorized Provider membership status, Haward Technology is authorized to offer IACET CEUs for its programs that qualify under the **ANSI/IACET 2018-1 Standard**.

Haward Technology's courses meet the professional certification and continuing education requirements for participants seeking **Continuing Education Units** (CEUs) in accordance with the rules & regulations of the International Accreditors for Continuing Education & Training (IACET). IACET is an international authority that evaluates programs according to strict, research-based criteria and guidelines. The CEU is an internationally accepted uniform unit of measurement in qualified courses of continuing education.

Haward Technology Middle East will award **3.0 CEUs** (Continuing Education Units) or **30 PDHs** (Professional Development Hours) for participants who completed the total tuition hours of this program. One CEU is equivalent to ten Professional Development Hours (PDHs) or ten contact hours of the participation in and completion of Haward Technology programs. A permanent record of a participant's involvement and awarding of CEU will be maintained by Haward Technology. Haward Technology will provide a copy of the participant's CEU and PDH Transcript of Records upon request.

Course Instructor(s)

This course will be conducted by the following instructor(s). However, we have the right to change the course instructor(s) prior to the course date and inform participants accordingly:



Mr. Mohamed Refaat, MSc, BSc, is a **Senior Mechanical & Maintenance Engineer** with over **30 years** of extensive experience within the **Oil & Gas, Refinery** and **Petroleum** industries. His experience covers widely in the areas of **Rotating Equipment** Operation & Maintenance, **Rotating Equipment** Design, Selection & Troubleshooting, **Rotating Equipment** Start-up & Operation, **Rotating Equipment** Selection, **Preventive Maintenance** Planning, **Maintenance** Strategies & Techniques, **Maintenance** Policies & Procedures, **Predictive & Preventive Maintenance**, **Maintenance** Shutdown Planning, **Shutdown Efficiency & Strategies**, **Maintenance** Best Practices, **Maintenance** Policies & Procedures, **Maintenance** Techniques & Implementation, Planning Methods & Integrated Organization Approach, **Maintenance**

Planning, Business Objective & **Asset Management**, World Class Maintenance Performers, **Maintenance Cost** Control & Review, **Maintenance Contracting Strategy**, Advanced **Vibration**, **Failure Analysis & Troubleshooting**, Plant/Equipment Machinery Specification & Application, **Machinery Maintenance Performance & Reliability**, **Reliability Centered Maintenance (RCM)**, **RCM** Methods & Techniques, **RCM** Implementation, **Condition-Based Monitoring**, **Maintenance Efficiency & Performance**, **Maintenance Strategy**, Advanced **Valve Technology**, **Valves** Selection & Specifications, **Valve** Sizing, **Valve** Maintenance & Repairs, **Valve** Applications, **Valve Actuators**, **Valve Packing**, **Seats & Seals**, **Control Valve & Regulators**, **Gas Compressors**, **Reciprocating Compressors**, **Centrifugal Compressors**, **Pumps**, **Valves**, **Gas & Steam Turbines**, **Motors**, **Turbo-expanders**, **Gears**, **Piping**, **Pipelines**, **Lubrication Technology**, **Vibration Analysis**, **Power System Hydraulics**, **Preventive Maintenance**, **Predictive Maintenance**, **Condition Based Monitoring (CBM)**, **FMEA**, **Root Cause Analysis** and **Failure Analysis** and **Troubleshooting** of machinery and rotating equipment. He is currently the **Mechanical Maintenance Manager/Section Head** of the Arab Petroleum Pipelines Company wherein he is in charge of planning, scheduling & managing the execution of preventive & corrective mechanical maintenance activities for all equipment and for executing the scheduled inspections & major overhauls for gas turbines, valves & pumps, carrying out off-line vibration monitoring plans, troubleshooting, fault diagnosing & investigating failures of machinery.

During his career life, Mr. Refaat was able to modify the gas turbines self cleansing system to improve its maintainability and extend the air filters' lifetime. He was responsible for defining & updating the equipment codes and parameters for replacing the old **CMMS** with **MAXIMO**. He also worked as the **Maintenance Manager**, **Mechanical Engineer**, **Maintenance Engineer** and **Operations Supervisor** wherein he was closely involved with the operation of the crude oil internal pipeline system between the tankers and tank farm, operation & control of the booster pumps for pumping crude oil for main pipelines and the development & implementation of the plans & procedures for draining the main terminal internal lines for maintenance purposes. He also held the position of **Measurement Engineer** where he was responsible for the crude oil custody transfer, performing loss control analysis and operating the crude oil automatic sampler & related equipment. Prior to that, he was the **Design Engineer** responsible for the design phase of the Truck Mixer Manufacturing Project of the Mechanical Design Department.

Mr. Refaat has **Master's** and **Bachelor's** degree in **Mechanical Engineering** and a General Certificate of Education (**GCE**) from the **University of London, UK**. Further, he is a **Certified Instructor/Trainer**, a **Certified Internal Verifier/Assessor/Trainer** by the **Institute of Leadership & Management (ILM)** and a member of the Engineering Syndicate of Egypt. He has further delivered numerous training, courses, workshops, seminars and conferences worldwide.

Training Methodology

All our Courses are including **Hands-on Practical Sessions** using equipment, State-of-the-Art Simulators, Drawings, Case Studies, Videos and Exercises. The courses include the following training methodologies as a percentage of the total tuition hours:-

- 30% Lectures
- 20% Practical Workshops & Work Presentations
- 30% Hands-on Practical Exercises & Case Studies
- 20% Simulators (Hardware & Software) & Videos

In an unlikely event, the course instructor may modify the above training methodology before or during the course for technical reasons.

Accommodation

Accommodation is not included in the course fees. However, any accommodation required can be arranged at the time of booking.

Course Program

The following program is planned for this course. However, the course instructor(s) may modify this program before or during the course for technical reasons with no prior notice to participants. Nevertheless, the course objectives will always be met:

Day 1

0730 - 0800	Registration & Coffee
0800 - 0815	Welcome & Introduction
0815 - 0830	PRE-TEST
0830 - 0900	Mechanical Engineering - An Overview Strength of Materials • Torque and Power • Power Transmission • Fluid Engineering and Piping Systems
0900 - 0945	Break
0945 - 1100	Pumps, Drivers and Pumping Systems Pump Types • Applications • Centrifugal and Positive Displacement Pumps • Suction Head • Cavitations • Gas Binding • Pump Characteristic Curves
1100 - 1215	Couplings Types of Couplings (Flexible Type & Fixed Type) • Applications • Operations • Maintenance
1215 - 1230	Break
1230 - 1420	Pressure Vessels Types • Application • Design • ASME VIII • API 510
1420 - 1430	Recap Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow
1430	Lunch & End of Day One

Day 2

0730 – 0930	Piping System Pipe Types • Fittings • Standards • Design • Testing and Inspection • ASME B31 • API 570
0930 - 0945	Break
0945 – 1100	Pipelines Applications and Functions • Welding and Fabrication • ASME IX • ASME B31 • API 570 • API 579 • API 580/581
1100 – 1215	Fans, Blowers and Compressors Fans • Blowers • Compressors • Application • Standards
1215 – 1230	Break
1230 - 1420	Rotary Compressors Construction of Rotary Screw Compressor • The Function of the Compressor Components • Driving System • Accessories • Operation • Preventive Maintenance
1420 – 1430	Recap Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow
1430	Lunch & End of Day Two

Day 3

0730 – 0930	Centrifugal Compressors Centrifugal Compressor Components • Compressor Seals • Shaft Bearings • Lubrication System • Compressor Drivers & Couplings • Compressor Instrumentation and Control • Compressor Operation & Maintenance
0930 - 0945	Break
0945 – 1100	Reciprocating Compressors Reciprocating Compressor Working Principles • Compressor Components • Cooling Systems • Lubrication • Operation • Maintenance
1100 – 1215	Diesel Engines Operating Principles of 2-Cycle and 4-Cycle Diesel Engines • Operation of Engine Governors • Fuel Ejectors • Typical Engine Protective Features
1215 – 1230	Break
1230 - 1420	Bearing & Lubrication Types of Bearings • Sliding Surface Bearings • Sliding Surface Bearing Failure • Rolling Element Bearings (Anti - Friction Bearings) • Bearing Installation • Lubrication System
1420 – 1430	Recap Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow
1430	Lunch & End of Day Three

Day 4

0730 – 0930	Valves Types of Valves • Applications • Gate Valves • Globe Valves • Ball Valves • Plug Valves • Diaphragm Valves • Reducing Valves • Pinch Valves • Butterfly Valves • Needle Valves • Check Valves • Safety/Relief Valves
0930 - 0945	Break
0945 – 1100	Heat Exchanger Types • Applications • Constructions • Plate Heat Exchangers • Tube and Shell Heat Exchanger • Flow Patterns • Temperature Profiles • Parallel Flow • Counter Flow • Cross Flow
1100 – 1215	Fired Boilers, Process Heaters & Heat Recovery Equipment Boilers • Process Heaters • Furnaces • Heat Recovery Systems • Flowing Systems • Pressure Relief Systems • Refractory System • API 936
1215 – 1230	Break
1230 - 1420	HVAC and Refrigeration Systems and Design Heating • Ventilation • Air Conditioning • Refrigeration • Design • Installation • Maintenance
1420 – 1430	Recap Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow
1430	Lunch & End of Day Four

Day 5

0730 - 0900	Storage Tanks Types of Storage Tanks • Liquid Storage Tanks • Maintenance of Storage Tanks • Hazardous Conditions • Safety Procedures • API TES • API 653
0900 - 0915	Break
0915 - 1115	Instrumentation and Control Pressure • Temperature • Volume • Level • Process Control
1115 - 1230	Instrumentation and Control (cont'd) Flowmeters • Singlephase and Multiphase Flows • PLC • SCADA • DCS
1230 - 1245	Break
1245 - 1345	Question and Answer Forum
1345 – 1400	Course Conclusion Using this Course Overview, the Instructor(s) will Brief Participants about the Course Topics that were Covered During the Course
1400 - 1415	POST-TEST
1415 - 1430	Presentation of Course Certificates
1430	Lunch & End of Course

Practical Sessions

This practical and highly-interactive course includes real-life case studies and exercises:-



Course Coordinator

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