COURSE OVERVIEW FE0019-4D
Process/Static Equipment Mechanical Design as per ASME/TEMA Code

Course Title
Process/Static Equipment Mechanical Design as per ASME/TEMA Code

Course Reference
FE0019-4D

Course Duration/Credits
Four days/2.4 CEUs/24 PDHs

Course Date/Venue

Session(s)	Date	Venue
1	September 09-12, 2024	Club B Meeting Room, Ramada Plaza by Wyndham Istanbul City Center, Istanbul, Turkey
2	December 09-12, 2024	Fujairah Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE

Course Description

This practical and highly-interactive course includes various practical sessions and exercises. Theory learnt will be applied using our state-of-the-art simulators.

This course is designed to provide participants with a detailed and up-to-date overview of Process/Static Equipment Mechanical Design as per ASME/TEMA Code. It covers the process/static equipment design; the importance of compliance with ASME/TEMA codes and the roles and responsibilities of mechanical designers; the design principles, material selection criteria, material properties and material testing; the certification requirements and considerations for special materials; the scope and applicability of ASME Section VIII Div. 1; and the design conditions and designing pressure calculations, heads, shells, and nozzles.

Further, the course will discuss the reinforcement calculations and minimum thickness requirements; the design supports and attachments, closures openings and reinforcements; the flange and gasket design for pressure vessels; the code requirements for pressure vessel fabrication and testing and examination and inspection requirements; the TEMA standards for heat exchanger design; the types of heat exchangers and their applications and design considerations; and the pass partition design and sealing arrangements, nozzle and piping connections and tube-to-tube sheet joints and tube-to-tube joints.

During this interactive course, participants will learn the heat exchanger fabrication, inspection, and testing requirements including thermal design considerations and calculations; the API 650 and API 620 standards and design considerations for atmospheric and low-pressure storage tanks; designing tank shells, roofs, and bottoms; the nozzle and opening design, tank foundations and anchoring requirements; the tank fabrication, inspection, and testing requirements; the tank integrity assessment and maintenance; the stress analysis and evaluating critical locations; the design optimization and cost considerations; and the quality control, documentation, and compliance.

Course Objectives

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

- Apply and gain an in-depth knowledge on process/static equipment mechanical design as per ASME/TEMA code
- Illustrate process/static equipment design as well as identify the importance of compliance with ASME/TEMA codes and the roles and responsibilities of mechanical designers
- Discuss the design principles, material selection criteria, material properties, material testing and certification requirements and considerations for special materials
- Explain the scope and applicability of ASME Section VIII Div. 1. as well as the design conditions, design pressure calculations and design of heads, shells, and nozzles
- Apply reinforcement calculations and minimum thickness requirements and design supports and attachments, closures, openings and reinforcements
- Carryout flange and gasket design for pressure vessels, code requirements for pressure vessel fabrication and testing and examination and inspection requirements
- Review TEMA standards for heat exchanger design and recognize the types of heat exchangers and their applications and design considerations
- Illustrate pass partition design and sealing arrangements, nozzle and piping connections and tube-to-tube sheet joints and tube-to-tube joints
- Apply heat exchanger fabrication, inspection, and testing requirements including thermal design considerations and calculations
- Discuss API 650 and API 620 standards and design considerations for atmospheric and low-pressure storage tanks
- Design tank shells, roofs, and bottoms, apply nozzle and opening design and identify tank foundations and anchoring requirements
- Employ tank fabrication, inspection, and testing requirements and tank integrity assessment and maintenance
- Perform stress analysis and evaluate critical locations, design optimization and cost considerations and implement quality control, documentation, and compliance

Who Should Attend

This course provides an overview of all significant aspects and considerations of process/static equipment mechanical design as per ASME/TEMA code for mechanical engineers, equipment designers, plant engineers, project managers, inspection engineers, maintenance engineers, quality control and assurance personnel.

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.

Course Fee

Istanbul	**US$ 5,000** per Delegate + **VAT**. This rate includes Participants Pack (Folder, Manual, Hand-outs, etc.), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.
Abu Dhabi	**US$ 4,500** per Delegate + **VAT**. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Accommodation

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

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: -

- 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 **2.4 CEUs** (Continuing Education Units) or **24 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.

- 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.

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. Andrew Ladwig is a **Senior Process & Mechanical Engineer** with over **25 years** of extensive experience within the **Oil & Gas**, **Refinery**, **Petrochemical & Power** industries. His expertise widely covers in the areas of **Ammonia Manufacturing & Process Troubleshooting**, **Distillation Towers**, **Crude Oil Distillation**, **Fundamentals of Distillation** for Engineers, **Distillation** Operation and Troubleshooting, **Advanced Distillation** Troubleshooting, **Distillation** Technology, Vacuum **Distillation**, **Ammonia Storage & Loading** Systems, **Ammonia Plant** Operation, Troubleshooting & Optimization, **Ammonia Recovery**, **Ammonia Plant Safety**, Hazard of **Ammonia Handling**, Storage & Shipping, **Operational Excellence** in **Ammonia Plants**, **Fertilizer Storage** Management (Ammonia & Urea), **Fertilizer Manufacturing** Process Technology, **Sulphur Recovery**, Phenol Recovery & Extraction, **Wax Sweating & Blending**, **Petrochemical & Fertilizer** Plants, **Nitrogen Fertilizer** Production, **Petroleum Industry Process** Engineering, **Refining Process & Petroleum Products**, **Refinery Planning & Economics**, Safe **Refinery Operations**, **Hydrotreating & Hydro-processing**, **Separators** in **Oil & Gas** Industry, **Gas Testing & Energy** Isolations, Gas Liquor Separation, **Industrial Liquid Mixing**, **Wax Bleachers**, **Extractors**, **Fractionation**, Operation & Control of **Distillation**, Process of **Crude ATM & Vacuum Distillation** Unit, **Water Purification**, **Water Transport** & Distribution, **Steam & Electricity**, **Flame Arrestors**, **Coal Processing**, **Environmental Emission Control**, R&D of **Wax Blending**, **Wax** Molding/Slabbing, **Industrial Drying**, Principles, Selection & Design, Certified **Process Plant** Operations, Control & Troubleshooting, **Operator** Responsibilities, **Storage Tanks Operations** & Measurements, **Process Plant** Troubleshooting & Engineering Problem Solving, **Process Plant Performance**, Efficiency & Optimization, Continuous Improvement & Benchmarking, **Process Troubleshooting** Techniques, Oil & Gas Operation/Introduction to **Surface Facilities**, **Pressure Vessel** Operation, **Process Equipment** Performance & Troubleshooting, **Plant Startup & Shutdown**, **Startup & Shutdown** the Plant While Handling Abnormal Conditions, **Flare & Relief** System, **Process Gas Plant** Start-up, Commissioning & Problem Solving, **Process Liquid** and **Process Handling & Measuring** Equipment. Further, he is also well-versed in **Compressors & Turbines** Operation, Maintenance & Troubleshooting, **Heat Exchanger** Overhaul & Testing Techniques, Balancing of **Rotating Machinery** (**BRM**), **Pipe Stress** Analysis, **Valves & Actuators** Technology, Inspect & Maintain **Safeguarding Vent & Relief System**, Certified Inspectors for **Vehicle & Equipment**, Optimizing **Equipment Maintenance** & Replacement Decisions, Certified Maintenance Planner (**CMP**), Certified Planning and Scheduling Professional (**AACE-PSP**), **Tank Design**, Construction, Inspection & Maintenance, **Material Cataloguing**, Specifications, Handling & Storage, **Steam Trap** Design, Operation, Maintenance & Troubleshooting, **Steam Trapping & Control**, **Column**, **Pump & Exchangers**, Troubleshooting & Design, **Rotating Equipment** Operation & Troubleshooting, **Control & ESD** System, **Detailed Engineering Drawings**, Codes & Standards, **Budget** Preparation, Allocation & Cost Control, Root Cause Analysis (**RCA**), **Production Optimization**, Permit to Work (**PTW**), Project Engineering, **Data** Analysis, **Process Hazard** Analysis (**PHA**), **HAZOP** Study, Sampling & Analysis, **Training** Analysis, **Job Analysis** Techniques, Storage & Handling of **Toxic Chemicals & Hazardous Materials**, **Hazardous Material** Classification & Storage/Disposal, **Dangerous Goods**, Environmental Management System (**EMS**), Supply Chain, Purchasing, Procurement, **Logistics** Management & **Transport** & **Warehousing** & **Inventory**, **Risk** Monitoring Authorized Gas Tester (**AGT**), Confined Space Entry (**CSE**), Personal Protective Equipment (**PPE**), Fire & Gas, First Aid and Occupational Health & Safety.

During his career life, Mr. Ladwig has gained his practical experience through his various significant positions and dedication as the **Mechanical Engineer**, **Project Engineer**, **Reliability & Maintenance Engineer**, **Maintenance Support Engineer**, **Process Engineer**, **HSE Supervisor**, **Warehouse Manager**, **Quality Manager**, **Business Analyst**, **Senior Process Controller**, **Process Controller**, **Safety Officer**, **Mechanical Technician**, **Senior Lecturer** and **Senior Consultant/Trainer** for various companies such as the Sasol Ltd., Sasol Wax, Sasol Synfuels, just to name a few.

Mr. Ladwig has a **Bachelor's** degree in **Chemical Engineering** and a **Diploma** in **Mechanical Engineering**. Further, he is a **Certified Instructor/Trainer**, a **Certified Internal Verifier/Assessor/Trainer** by the **Institute of Leadership & Management** (**ILM**) and has delivered various trainings, workshops, seminars, courses and conferences internationally.

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 – 0930	***Introduction to Process/Static Equipment Design*** *Importance of Compliance with ASME/TEMA Codes • Key Codes and Standards (ASME Section VIII Division 1, TEMA, etc.) • Roles and Responsibilities of Mechanical Designers*
0930 – 0945	*Break*
0945 – 1100	***Design Fundamentals & Materials Selection*** *Design Principles and Factors of Safety • Material Selection Criteria for Process/Static Equipment*
1100 – 1215	***Design Fundamentals & Materials Selection (cont'd)*** *Material Properties and their Impact on Design • Material Testing and Certification Requirements*
1215 – 1230	*Break*
1230 – 1420	***Design Fundamentals & Materials Selection (cont'd)*** *Considerations for Special Materials (Corrosion-Resistant Alloys, Refractory Materials, etc.)*
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	***Pressure Vessel Design (ASME Section VIII Division 1)*** *Scope and Applicability of ASME Section VIII Div. 1. • Design Conditions and Design Pressure Calculations • Design of Heads, Shells, and Nozzles*
0930 – 0945	*Break*
0945 – 1100	***Pressure Vessel Design (ASME Section VIII Division 1) (cont'd)*** *Reinforcement Calculations and Minimum Thickness Requirements • Design of Supports and Attachments*
1100 – 1215	***Pressure Vessel Design (ASME Section VIII Division 1) (cont'd)*** *Design of Closures (Flanged, Bolted, Threaded, etc.) • Design of Openings and Reinforcements • Flange and Gasket Design for Pressure Vessels*
1215 – 1230	*Break*
1230 – 1420	***Pressure Vessel Design (ASME Section VIII Division 1) (cont'd)*** *Code Requirements for Pressure Vessel Fabrication and Testing • Examination and Inspection Requirements*
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

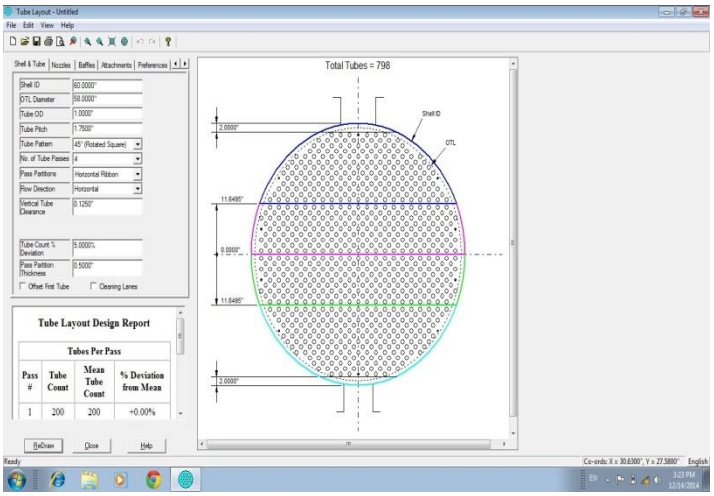
0730 – 0930	***Heat Exchanger Design (TEMA)*** *TEMA Standards for Heat Exchanger Design • Types of Heat Exchangers and their Applications • Design Considerations for Different Types of Heat Exchangers (Shell and Tube, Plate, etc.) • Tube Sheet Design and Tube Layout Considerations • Channel and Baffle Design*
0930 – 0945	*Break*
0945 – 1100	***Heat Exchanger Design (TEMA) (cont'd)*** *Pass Partition Design and Sealing Arrangements • Nozzle and Piping Connections • Tube-to-tube Sheet Joints and Tube-to-Tube Joints • Heat Exchanger Fabrication, Inspection, and Testing Requirements • Thermal Design Considerations and Calculations*
1100 – 1215	***Storage Tank Design (API 650/620)*** *API 650 and API 620 Standards • Design Considerations for Atmospheric and Low-Pressure Storage Tanks • Design of Tank Shells, Roofs, and Bottoms • Nozzle and Opening Design • Tank Foundations and Anchoring Requirements*
1215 – 1230	*Break*
1230 – 1420	***Storage Tank Design (API 650/620) (cont'd)*** *Design of Tank Appurtenances (Manways, Vents, Drains, etc.) • Design of Floating Roofs and Internal Floating Roofs • Tank Insulation and Painting Considerations • Tank Fabrication, Inspection, and Testing Requirements • Tank Integrity Assessment and 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 Three*

Day 4

0730 – 0930	***Mechanical Design Software & Analysis Techniques*** *Software Tools for Process/Static Equipment Design (PV Elite, COMPRESS, etc.) • Finite Element Analysis (FEA) for Equipment Design • Performing Stress Analysis and Evaluating Critical Locations*
0930 – 0945	*Break*
0945 – 1100	***Mechanical Design Software & Analysis Techniques (cont'd)*** *Design Optimization and Cost Considerations • Computational Fluid Dynamics (CFD) for Equipment Design*
1100 – 1215	***Quality Control, Documentation, & Compliance*** *Quality Control and Assurance in Equipment Design • Documentation Requirements and Standards (Design Specifications, Data Sheets, etc.) • Welding and Non-Destructive Examination Requirements*
1215 – 1230	*Break*
1230 – 1345	***Quality Control, Documentation, & Compliance (cont'd)*** *Compliance with Regulatory Authorities and Third-Party Inspections • Equipment Data Book Preparation and Handover*
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*

Simulator (Hands-on Practical Sessions)

Practical sessions will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using the simulator “Heat Exchanger Tube Layout”.



Heat Exchanger Tube Layout Simulator

Course Coordinator

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