COURSE OVERVIEW ME0138
Application of Standards in Boiler, Pressure Vessel & Piping Systems

Course Title
Application of Standards in Boiler, Pressure Vessel & Piping Systems

Course Date/Venue
May 25-29, 2025/Meeting Plus 9, City Centre Rotana, Doha, Qatar

Course Reference
ME0138

Course Duration/Credits
Five days/3.0 CEUs/30 PDHs

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 Application of Standards in Boiler, Pressure Vessel & Piping Systems. It covers the ASME boiler and Pressure Vessel Code (BPVC), ASME B31 piping codes, API, ISO, EN standards and regulatory requirements and compliance; the ASME BPVC sections, ASME B31 piping standards, design codes versus in-service codes and key terminologies and definitions; the design basis for pressure equipment, pressure vessel design: ASME section VIII division 1, design of piping systems: ASME B31.3, power boiler design: ASME section I, design data and material properties: ASME section II and design software and tools.

Further, the course will also discuss the material selection and code compliance, fabrication practices for vessels and boilers and piping fabrication and assembly; the ASME section IX – welding qualifications, welding and brazing requirements, corrosion protection and coating and nondestructive examination (NDE) techniques; the hydrostatic and pneumatic testing; the API 510 and 570 inspection codes, weld defects and acceptance criteria, fitness-for-service (API 579); and the integrity management programs.

During this interactive course, participants will learn the types of pressure relief devices and sizing methods for relief valves; the boiler operation and safety requirements and piping support design and vibration control; the documentation, certification and quality assurance; and the common noncompliance and failure case studies.

Course Objectives

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

- Apply and gain an in-depth knowledge on the application of standards in boiler, pressure vessel and piping systems
- Discuss ASME boiler and pressure vessel code (BPVC), ASME B31 piping codes, API, ISO, EN standards and the regulatory requirements and compliance
- Explain ASME BPVC sections, ASME B31 piping standards, design codes versus in-service codes and key terminologies and definitions
- Illustrate design basis for pressure equipment, pressure vessel design: ASME section VIII division 1, design of piping systems: ASME B31.3, power boiler design: ASME section I, design data and material properties: ASME section II and the design software and tools
- Carryout material selection and code compliance, fabrication practices for vessels and boilers and piping fabrication and assembly
- Identify the ASME section IX – welding qualifications, welding and brazing requirements, corrosion protection and coating and nondestructive examination (NDE) techniques
- Perform hydrostatic and pneumatic testing and discuss API 510 and 570 inspection codes, weld defects and acceptance criteria, fitness-for-service (API 579) and integrity management programs
- Identify the types of pressure relief devices and the sizing methods for relief valves
- Review boiler operation and safety requirements and piping support design and vibration control
- Discuss the documentation, certification and quality assurance as well as common noncompliance and failure case studies

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 provides an overview of all significant aspects and considerations on the design, fabrication, inspection and repair of oil and gas pipeline code in accordance with the international standard ASME B31.4-B31.8 for those who are involved in engineering or technical aspects of pipelines, including designers, engineers, engineering managers, construction supervisors, operations supervisors, inspectors, code compliance managers, asset integrity managers, pipeline safety regulators, consultants and other technical staff. Further, the course is also suitable for those new to pipelines, as well as providing a good refresher for experienced 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.

Accommodation

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

Course Fee

US$ 6,000 per Delegate. 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: -

- 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.

- 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. Karl Thanasis, PEng, MSc, MBA, BSc, is **Senior Mechanical & Maintenance Engineer** with over **30 years** of extensive industrial experience. His wide expertise includes **Piping & Pipeline**, Maintenance, Repair, **Shutdown**, **Turnaround & Outages**, **Maintenance & Reliability** Management, **Mechanical Maintenance** Planning, Scheduling & Work Control, Advanced Techniques in **Maintenance** Management, **Predictive & Preventive** Maintenance, **Maintenance & Operation Cost Reduction** Techniques, Reliability Centered Maintenance (**RCM**), **Machinery Failure** Analysis, **Rotating Equipment Reliability** Optimization & Continuous Improvement, **Material Cataloguing**, **Mechanical & Rotating Equipment** Troubleshooting & Maintenance, **Root Cause Analysis & Reliability** Improvement, **Condition** Monitoring, **Root Cause Failure Analysis** (RCFA), **Steam Generation**, **Steam Turbines**, **Power Generator Plants**, **Gas Turbines**, **Combined Cycle Plants**, **Boilers**, **Process Fired Heaters**, Air Preheaters, Induced Draft Fans, All Heaters Piping Work, Refractory Casting, Heater Fabrication, Thermal & Fired Heater Design, **Heat Exchangers**, Heat Transfer, Coolers, **Power Plant** Performance, Efficiency & Optimization, **Storage Tank** Design & Fabrication, **Thermal Power Plant** Management, **Boiler & Steam** System Management, **Pump** Operation & Maintenance, **Chiller & Chiller Plant** Design & Installation, **Pressure Vessel**, **Safety Relief Valve** Sizing & Selection, **Valve** Disassembling & Repair, Pressure Relief Devices (**PSV**), **Hydraulic & Pneumatic** Maintenance, Advanced **Valve** Technology, **Pressure Vessel** Design & Fabrication, **Pumps**, Turbo-Generator, Turbine **Shaft Alignment**, **Lubrication**, Mechanical **Seals**, Packing, **Blowers**, **Bearing** Installation, **Couplings**, **Clutches** and **Gears**. Further, he is also versed in **Wastewater Treatment** Technology, **Networking** System, **Water Network Design**, Industrial **Water Treatment** in Refineries & Petrochemical Plants, **Piping** System, Water Movement, Water Filtering, Mud Pumping, **Sludge Treatment** and **Drying**, **Aerobic Process** of **Water Treatment** that includes **Aeration**, **Sedimentation** and **Chlorination Tanks**. His strong background also includes **Design** and **Sizing** of all **Waste Water Treatment Plant Associated Equipment** such as **Sludge Pumps**, **Filters**, **Metering Pumps**, **Aerators** and **Sludge Decanters**.

Mr. Thanasis has acquired his thorough and practical experience as the **Project Manager**, **Plant Manager**, **Area Manager - Equipment Construction**, **Construction Superintendent**, **Project Engineer** and **Design Engineer**. His duties covered **Plant Preliminary Design**, **Plant Operation**, **Write-up** of **Capital Proposal**, **Investment Approval**, **Bid Evaluation**, **Technical Contract Write-up**, **Construction** and **Sub-contractor Follow up**, **Lab Analysis**, **Sludge Drying** and **Management** of **Sludge Odor** and **Removal**. He has worked in various companies worldwide in the **USA**, **Germany**, **England** and **Greece**.

Mr. Thanasis is a **Registered Professional Engineer** in the **USA** and **Greece** and has a **Master** and **Bachelor** degrees in **Mechanical Engineering** with **Honours** from the **Purdue University** and **SIU** in **USA** respectively as well as an **MBA** from the **University of Phoenix** in **USA**. Further, he is a **Certified Internal Verifier/Trainer/Assessor** by the **Institute of Leadership & Management** (**ILM**) a **Certified Instructor/Trainer** and has delivered numerous trainings, courses, seminars, workshops and conferences worldwide.

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	***Overview of Pressure Equipment Standards*** *ASME Boiler & Pressure Vessel Code (BPVC) • ASME B31 Piping Codes Overview (B31.1, B31.3, B31.8) • API, ISO, EN Standards Introduction • Comparison of International Standards and Jurisdictional Requirements*
0930 – 0945	*Break*
0945 – 1045	***Regulatory Requirements & Compliance*** *Role of National Boards and Local Authorities • Code Stamping, Registration and Certification • Role of Notified Bodies and Authorized Inspectors • Regulatory Frameworks: PED, OSHA, IBR*
1045 – 1145	***Introduction to ASME BPVC Sections*** *Section I – Power Boilers • Section II – Materials (Parts A–D) • Section VIII – Pressure Vessels (Divisions 1, 2, 3) • Section IX – Welding & Brazing Qualifications*
1145 – 1230	***Introduction to ASME B31 Piping Standards*** *B31.1 – Power Piping • B31.3 – Process Piping • B31.5 – Refrigeration Piping • B31.8 – Gas Transmission and Distribution*
1230 – 1245	*Break*
1245 – 1345	***Design Codes versus In-Service Codes*** *Difference Between Design/Fabrication and Maintenance/Repair Codes • Overview of NBIC and API 510/570 • Fitness-for-Service Concepts (API 579) • Remaining Life Assessments*
1345 – 1420	***Key Terminologies & Definitions*** *Pressure Boundary, MAWP, MDMT • Corrosion Allowance, Hydrotest Pressure • Design Pressure versus Operating Pressure • Design Factor and Safety Factor*
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 – 0830	***Design Basis for Pressure Equipment*** *Design Inputs: Pressure, Temperature, Fluid Properties • Loadings: Internal Pressure, External Pressure, Wind, Seismic • Design Life, Fatigue and Cyclic Loads • Allowable Stress Determination*
0830 – 0930	***Pressure Vessel Design: ASME Section VIII Division 1*** *Cylindrical and Spherical Vessel Design Equations • Head Types: Hemispherical, Ellipsoidal, Torispherical • Nozzle Reinforcement and Branch Connections • UG-27, UG-37, UG-45 Applications*

0930 – 0945	*Break*
0945 – 1100	***Design of Piping Systems: ASME B31.3*** *Wall Thickness Calculations • Bends, Reducers, Tees and Branch Reinforcement • Flexibility and Expansion Stress Considerations • Sustained versus Occasional Loads*
1100 – 1230	***Power Boiler Design: ASME Section I*** *Drum Design Rules • Safety Valve Sizing and Rules for Overpressure Protection • Heat Recovery Steam Generators (HRSG) • Design Requirements for Economizers and Superheaters*
1230 – 1245	*Break*
1245 – 1330	***Design Data & Material Properties: ASME Section II*** *Allowable Stress Values from Section II, Part D • Material Selection and Grades (A106, SA516, etc.) • Temperature-Derated Stresses • Impact Test Exemptions and Requirements*
1330 – 1420	***Design Software & Tools*** *PVElite, COMPRESS for Pressure Vessel Design • CAESAR II for Piping Stress Analysis • Finite Element Analysis (FEA) Overview • Spreadsheet-Based Calculations*
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 – 0830	***Material Selection & Code Compliance*** *Material Specifications from ASME Section II • ASTM versus ASME Equivalence • Impact Testing (Charpy V-Notch) and MDMT Considerations • Traceability and MTR Requirements*
0830 – 0930	***Fabrication Practices for Vessels & Boilers*** *Forming Methods: Rolling, Spinning, Pressing • Weld Preparations and Joint Types • Fit-Up, Tolerances and Dimensional Inspections • Use of PWHT and Dimensional Control*
0930 – 0945	*Break*
0945 – 1100	***Piping Fabrication & Assembly*** *Pipe Cutting, Beveling and Fitting Techniques • Gasket Selection and Flange Assembly • Hydrostatic versus Pneumatic Testing • Hot Tapping and In-Service Welding*
1100 – 1230	***ASME Section IX – Welding Qualifications*** *Procedure Qualification Records (PQR) • Welder Performance Qualification (WPQ) • Essential and Non-Essential Variables • Welding Process Types and Applications*
1230 – 1245	*Break*
1245 – 1330	***Welding & Brazing Requirements*** *SMAW, GTAW, GMAW Applications in Boilers/Piping • Brazing Standards and Procedures • Weld Repairs and Defect Acceptance Criteria • Impact of Welding on Material Properties*

1330 – 1420	***Corrosion Protection & Coating*** *Corrosion Allowances in Design • Internal/External Coating Systems • Cathodic Protection Basics • Inspection of Coatings and Linings*
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 – 0830	***Nondestructive Examination (NDE) Techniques*** *Visual, PT, MT, UT, RT Applications • Acceptance Criteria from ASME V & VIII • Advantages and Limitations of Each Method • Inspector Qualifications and Standards*
0830 – 0930	***Hydrostatic & Pneumatic Testing*** *Test Pressure Calculations • Procedures and Safety Precautions • Leakage versus Strength Tests • Code Requirements for Duration and Documentation*
0930 – 0945	*Break*
0945 – 1100	***API 510 & 570 Inspection Codes*** *In-Service Inspection of Pressure Vessels and Piping • Inspection Intervals and RBI Programs • Thickness Monitoring and Corrosion Rate Calculations • Repair and Rerating Procedures*
1100 – 1230	***Weld Defects & Acceptance Criteria*** *Common Weld Defects: Porosity, Undercut, Lack of Fusion • Code-Based Criteria for Acceptance/Rejection • Rework and Repair Methodologies • Documentation and Weld Tracking*
1230 – 1245	*Break*
1245 – 1330	***Fitness-for-Service (API 579) Overview*** *Assessment Levels 1 to 3 • Local and General Metal Loss Evaluation • Crack-Like Flaw Assessment • Remaining Life and Inspection Planning*
1330 – 1420	***Integrity Management Programs*** *Risk-Based Inspection (RBI) Principles • Data Management and Condition Monitoring • KPIs for Mechanical Integrity • Failure Modes and Effects Analysis (FMEA)*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the T were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day Four*

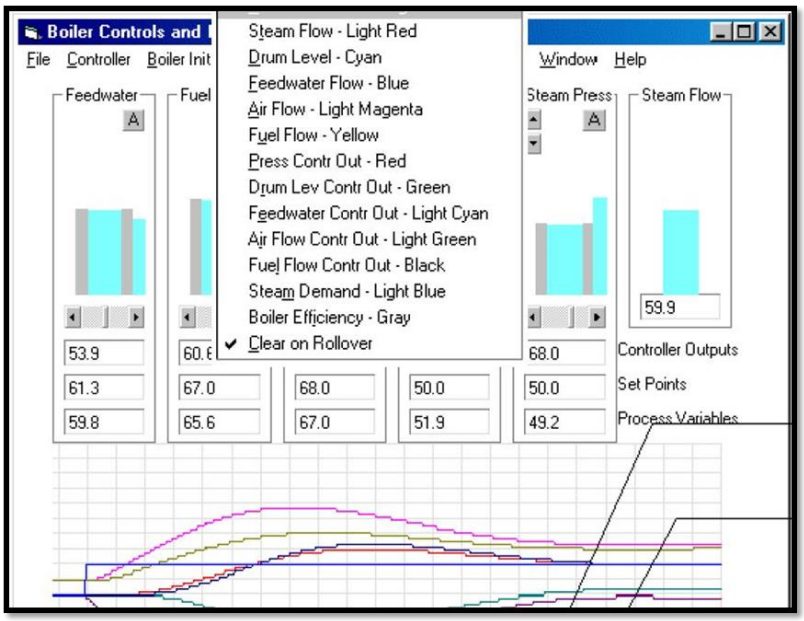
Day 5

0730 – 0830	***Relief Systems & Overpressure Protection*** *Types of Pressure Relief Devices (PRVs, Rupture Disks) • Sizing Methods for Relief Valves • API 520, 521, 526, 2000 Overview • Installation and Maintenance Best Practices*
0830 – 0930	***Boiler Operation & Safety Requirements*** *Operating Parameters Monitoring • Feedwater Systems and Control Devices • Blowdown and Shutdown Procedures • Boiler Explosion Case Studies*

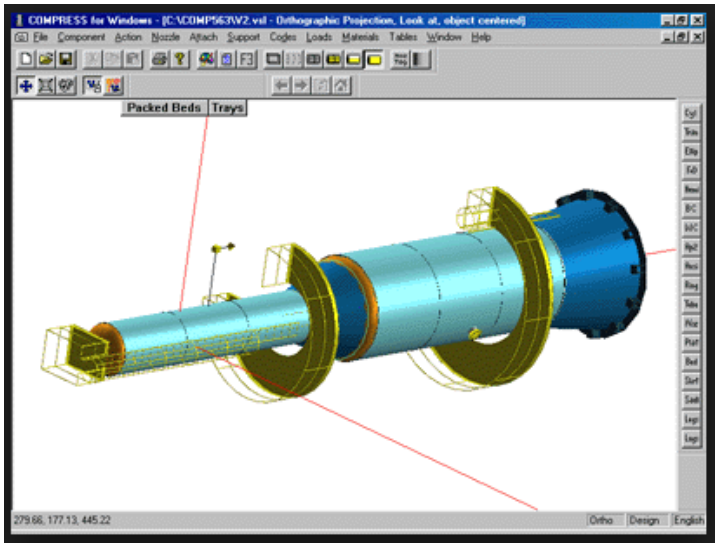
0930 – 0945	*Break*
0945 – 1100	***Piping Support Design & Vibration Control*** *Types of Supports: Rigid, Spring, Snubbers • Expansion Loops and Anchor Points • Thermal Growth Considerations • Vibration Sources and Mitigation*
1100 – 1230	***Documentation, Certification & Quality Assurance*** *Manufacturer's Data Report (U-1, P-1, etc.) • Quality Control (QC) Manual Elements • Welding Records, NDE Logs, Inspection Reports • Turnover Dossiers and Handover Packages*
1230 – 1245	*Break*
1245 – 1345	***Common Noncompliance & Failure Case Studies*** *Pressure Vessel Rupture Due to Design Error • Piping Failure Due to Support Misplacement • Boiler Explosion from Overpressure • Lessons Learned and Root Cause Analyses*
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 session 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 "Win Boiler Sim" and "COMPRESS".



Win Boiler Sim



COMPRESS Simulator

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