

COURSE OVERVIEW FE0015
Piping Mechanical Design & Specification

Course Title

Piping Mechanical Design & Specification

Course Date/Venue

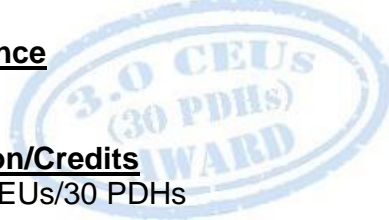
September 01-05, 2024/Meeting Plus 8, City Centre Rotana Doha Hotel, Doha, Qatar

Course Reference

FE0015

Course Duration/Credits

Five days/3.0 CEUs/30 PDHs



Course Description



This practical 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 Piping Mechanical Design and Specification. It covers the principles of piping mechanical design and the role of mechanical design in piping systems; the codes and standards relevant to piping mechanical design and considerations for various process conditions and materials; the material selection criteria based on process conditions and fluid properties; the piping material specifications and standards; the corrosion resistance and material compatibility considerations, temperature and pressure limitations for different materials; and the documentation and traceability requirements for piping materials.



Further, the course will also discuss the types of loads acting on piping systems; the methods for determining loads and stresses; the stress categories and allowable stress analysis, thermal expansion, contraction analysis and software tools for stress analysis; the pipe wall thickness calculation, pressure design thickness calculation methods, accounting for corrosion allowances and mill tolerance; the external pressure design calculations and verification of pipe wall thickness using applicable codes and standards; the piping supports and restraints; the load distribution and selection of support types; the design considerations for spring hangers, snubbers and restraints; and the analysis of piping systems with variable loads and movements.



During this interactive course, participants will learn the pipe stress analysis, load case development and analysis procedure, flexibility analysis and pipe displacement evaluation; the piping vibration analysis and mitigation measures for addressing excessive vibration; the piping component design and selection, expansion joints and flexible joints; and the piping specification development and documentation.

Course Objectives

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

- Apply and gain an in-depth knowledge on piping mechanical design and specification
- Discuss the principles of piping mechanical design and the role of mechanical design in piping systems
- Explain the codes and standards relevant to piping mechanical design and considerations for various process conditions and materials
- Discuss material selection criteria based on process conditions and fluid properties and identify piping material specifications and standards
- Analyze corrosion resistance, material compatibility considerations, temperature and pressure limitations for different materials and documentation and traceability requirements for piping materials
- Identify the types of loads acting on piping systems and calculate methods for determining loads and stresses
- Recognize stress categories and allowable stress analysis, thermal expansion and contraction analysis and software tools for stress analysis
- Carryout pipe wall thickness calculation, pressure design thickness calculation methods, accounting for corrosion allowances and mill tolerance, external pressure design calculations and verification of pipe wall thickness using applicable codes and standards
- Identify piping supports and restraints, load distribution and selection of support types, design considerations for spring hangers, snubbers and restraints and analysis of piping systems with variable loads and movements
- Apply pipe stress analysis, load case development and analysis procedure, flexibility analysis and pipe displacement evaluation
- Employ piping vibration analysis and mitigation measures for addressing excessive vibration
- Determine piping component design and selection, expansion joints, flexible joints and piping specification development and documentation

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 of piping mechanical design and specification for piping engineers, mechanical engineers, plant designers, project managers, construction professionals, piping inspectors and those who are interested in pursuing a career in mechanical engineering or related fields.

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

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.

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 **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.

- 

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:



Dr. Faysal Eliyan, PhD, MSc, BSc, is a Senior Mechanical Engineer with extensive years of experience within the Oil & Gas, Petroleum and Refinery industries. His expertise widely covers in the areas of Insulation Maintenance & Repair, Insulation Installation Techniques, Insulation Retrofitting, Insulation Testing & Quality Assurance, Thermal Insulation, Insulation Materials & Selection, Piping System Insulation, Tanks & Vessels Insulation, Insulation Standards & Regulations, Insulation Inspection & Quality Control, Insulation & Corrosion Protection, Insulation Thickness Calculation, Pipeline &

Piping Insulation, Heat Exchanger & Boiler Insulation, Heat Exchanger Inspection & Testing, Pumps & Compressor Operation & Maintenance, Gas & Steam Turbine Troubleshooting & Repair, Rotating Equipment & Turbomachinery, HVAC, Fans & Blowers, Hydraulic & Pneumatic System Maintenance & Troubleshooting, Valve Selection & Repair, Machinery Alignment & Balancing, Bearing & Gearboxes, Heaters & Boilers, Cooling Towers, Piping System, Applied Fluid Mechanics, Thermodynamics, Automotive Mechanics Technology, Heat Transfer, Material Science, Thermal Power Plant, Pressure Vessel Fabrication & Testing, Machinery Lubrication, Flange & Stress Analysis, Diesel Engine Maintenance, Roll Pass & Mill Configuration, Heat Load Calculation, Lubrication Technology, Steel Making Process, CAESAR Pipe Stress Analysis, Vibration Analysis & Troubleshooting, Pipeline Design & Construction, Asset Integrity Management, Pipeline Pigging, Corrosion & Cathodic Protection, Material Selection & Failure Analysis, Metallurgy & Welding Techniques, Welding Safety & Protection Coatings, Piping Systems, Corrosion Control & Materials Selection in Oil and Gas and Water System, Maintenance & Reliability Management, Maintenance Scheduling & Planning, Condition Monitoring & Diagnostics, Preventive & Predictive Maintenance and Root Cause Failure Analysis.

During his career life, Dr. Faysal has gained his practical and field experience through his various significant positions and dedication as the **Engineering Manager, Senior Project Engineer, Thermal Insulation Engineer, Trainee Engineer, Post Doctoral & Laboratory Instructor, Assistant Professor, Lecturer, Volunteer Tutor, Mentor, Advisor, Corrosionpedia Website Contributor, Senior Consultant, Catalyst Environmental Consultant, Senior Thermal Insulation Technician and Adjudicator** from various institutions and universities such as the Community College of Qatar, American University of the Middle East, McMaster University, The University of British Columbia, The University of British Columbia, Qatar University and General Electric, just to name a few.

Dr. Faysal has a **PhD, Master's and Bachelor's** degree in **Engineering** from the **University of British Columbia (Canada)**. He is a **Certified Instructor/Trainer**, a member of the **Chamber of Civil Engineers, Structural Stability Research Council, American Institute of Steel Construction and American Society of Civil Engineers (ASCE), USA**. He also published numerous books, researches and scientific papers and received several awards and recognitions for Journal of Materials Engineering and Performance and has further delivered numerous trainings, courses, seminars, workshops 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: Sunday, 01st of September 2024

0730 – 0800	Registration & Coffee
0800 – 0815	Welcome & Introduction
0815 – 0830	PRE-TEST
0830 – 0930	Introduction to Piping Mechanical Design Piping Mechanical Design Principles • The Role of Mechanical Design in Piping Systems • Codes & Standards Relevant to Piping Mechanical Design • Mechanical Design Considerations for Various Process Conditions & Materials • Stress Analysis & Its Relationship to Mechanical Design
0930 – 0945	Break
0945 – 1100	Piping Material Selection & Specifications Material Selection Criteria Based on Process Conditions & Fluid Properties • Piping Material Specifications & Standards (ASME B31.3, ASTM, etc.)
1100 – 1215	Piping Material Selection & Specifications (cont'd) Corrosion Resistance & Material Compatibility Considerations • Temperature & Pressure Limitations for Different Materials
1215 – 1230	Break
1230 – 1420	Piping Material Selection & Specifications (cont'd) Documentation & Traceability Requirements for Piping Materials
1420 – 1430	Recap
1430	Lunch & End of Day One

Day 2: Monday, 02nd of September 2024

0730 – 0930	Piping Loads & Stresses Types of Loads Acting on Piping Systems (Thermal, Pressure, Deadweight, etc.) • Calculation Methods for Determining Loads & Stresses • Stress Categories & Allowable Stress Criteria (ASME B31.3)
0930 – 0945	Break
0945 – 1100	Piping Loads & Stresses (cont'd) Thermal Expansion & Contraction Analysis • Introduction to Software Tools for Stress Analysis (e.g., Caesar II)
1100 – 1215	Pipe Wall Thickness Calculation Design Considerations for Determining Pipe Wall Thickness • Pressure Design Thickness Calculation Methods (ASME B31.3) • Accounting for Corrosion Allowances & Mill Tolerance
1215 – 1230	Break
1230 – 1420	Pipe Wall Thickness Calculation (cont'd) External Pressure Design Calculations • Verification of Pipe Wall Thickness Using Applicable Codes & Standards
1420 – 1430	Recap
1430	Lunch & End of Day Two

Day 3: Tuesday, 03rd of September 2024

0730 – 0930	Piping Supports & Restraints Introduction to Piping Support Design Principles • Types of Supports & Restraints in Piping Systems • Load Distribution & Selection of Support Types
0930 – 0945	Break
0945 – 1100	Piping Supports & Restraints (cont'd) Design Considerations for Spring Hangers, Snubbers & Restraints • Analysis of Piping Systems with Variable Loads & Movements
1100 – 1215	Pipe Stress Analysis & Flexibility Pipe Stress Analysis Principles • Load Case Development & Analysis Procedures • Flexibility Analysis for Accommodating Thermal Expansion & Contraction
1215 – 1230	Break
1230 – 1420	Pipe Stress Analysis & Flexibility (cont'd) Evaluating Pipe Displacements, Nozzle Loads & Equipment Interactions • Case Studies & Practical Exercises Using Stress Analysis Software
1420 – 1430	Recap
1430	Lunch & End of Day Three

Day 4: Wednesday, 04th of September 2024

0730 – 0930	Piping Vibration Analysis & Mitigation Piping Vibration & Its Impact on Mechanical Design • Types of Vibration & their Causes (Flow-Induced, Mechanical, etc.) • Vibration Analysis Techniques & Criteria
0930 – 0945	Break
0945 – 1100	Piping Vibration Analysis & Mitigation (cont'd) Mitigation Measures for Addressing Excessive Vibration • Design Considerations for Supporting & Isolating Vibrating Equipment
1100 – 1215	Piping Component Design & Selection Design Considerations for Pipe Fittings, Valves & Flanges • ASME B16.5 & ASME B16.9 Standards for Flange & Fitting Design • Material Selection & Specifications for Components
1215 – 1230	Break
1230 – 1420	Piping Component Design & Selection (cont'd) Gasket Selection & Flange Face Design Considerations • Valve Selection Criteria Based on Process Requirements
1420 – 1430	Recap
1430	Lunch & End of Day Four

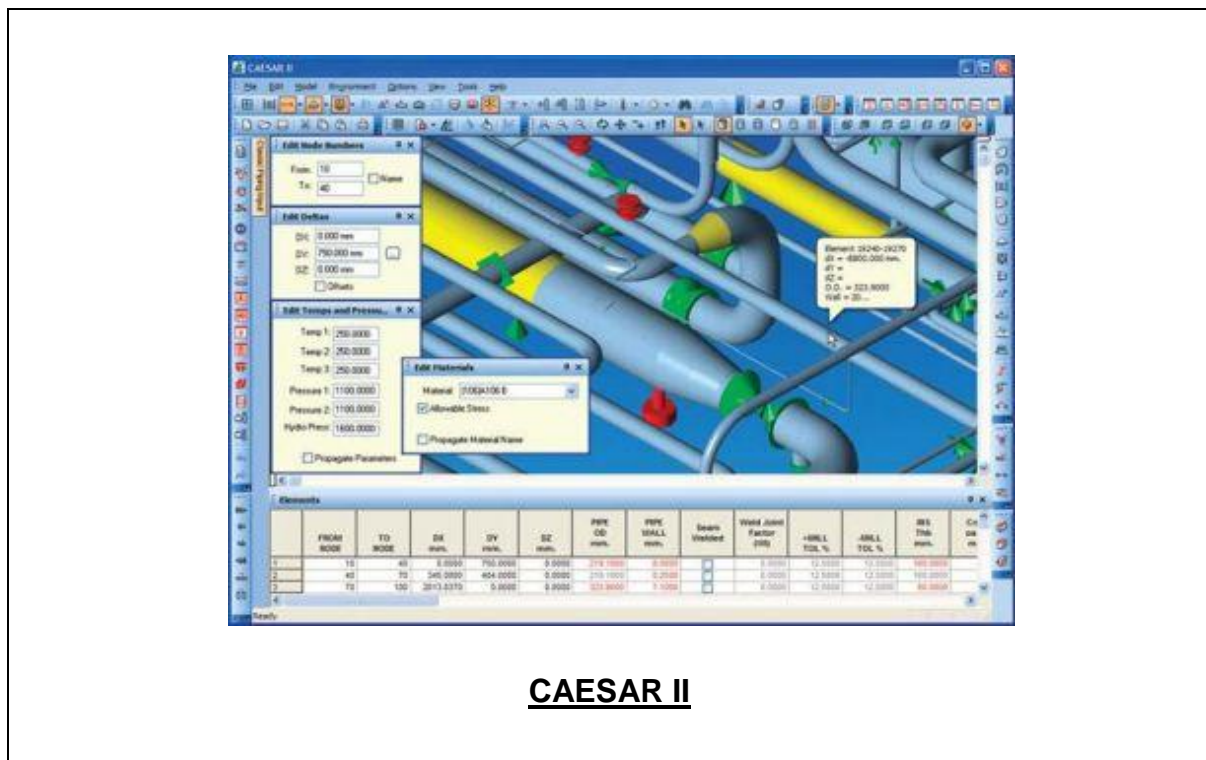
Day 5: Thursday, 05th of September 2024

0730 – 0830	Expansion Joints & Flexible Elements Introduction to Expansion Joints & Their Function in Piping Systems • Types of Expansion Joints (Bellows, Gimbal, Universal, etc.) • Selection Criteria & Design Considerations for Expansion Joints
0930 – 0945	Break
0945 – 1100	Expansion Joints & Flexible Elements (cont'd) Flexible Hoses & Connectors in Piping Systems • Installation, Maintenance & Inspection of Expansion Joints

1100 – 1215	Piping Specification Development & Documentation Creating Piping Specifications Based on Project Requirements • Documenting Mechanical Design Considerations in Specifications • Piping Material Takeoff & Bill of Materials Development
1215 – 1230	Break
1230 - 1345	Piping Specification Development & Documentation (cont'd) Coordinating with Other Engineering Disciplines (Civil, Electrical, etc.) • Reviewing & Finalizing Piping Mechanical Design Deliverables
1345 – 1400	Course Conclusion
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 “CAESAR II” simulator.



Course Coordinator

Jaryl Castillo, Tel: +974 4423 1327, Email: jaryl@haward.org