COURSE OVERVIEW FE0070-4D
Process Piping Design, Construction, Inspection, Maintenance & Mechanical Integrity (ASME B31.3 & API 570)

Course Title
Process Piping Design, Construction, Inspection, Maintenance & Mechanical Integrity (ASME B31.3 & API 570)

Course Reference
FE0070-4D

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

Course Date/Venue

Session(s)	Date	Venue
1	June 03-06, 2024	Al Aziziya Hall, The Proud Hotel Al Khobar, Al Khobar, KSA
2	September 02-05, 2024	Boardroom 1, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, 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.

The course provides comprehensive coverage of the ASME B31.3, Process Piping Code requirements. It has been completely revised, reorganized and updated, and includes descriptions of important new requirements in the latest edition of ASME B31.3, including the philosophy behind the changes.

The course will review the basic requirements of the ASME B31 Code for Pressure Piping with emphasis on B31.3, Process Piping. General topics in the course include: Code organization and intent, pressure design, design for sustained loads including support design, flexibility analysis, equipment loads, expansion joints, supports and restraints, materials, fabrication, examination, testing, and, for existing piping systems: mechanical integrity. Applications of these concepts, including simple hand analysis methods and computer-based analysis methods using CAESAR II, will be demonstrated. Examples of the required analysis and sources of further information will be provided. Inspection and maintenance (mechanical integrity) of existing piping systems will also be covered, as provided in API 570, Piping Inspection Code.

The course covers design, fabrication, examination and testing requirements of ASME B31.3. It covers Code requirements from design through start-up of new piping systems, as well as standards for inspection and repair of piping systems that have been in service, as provided in API 570, Piping Inspection Code.

This course provides a working knowledge of the Code, how it is organized, its intent, the basis for requirements, including both design and construction (fabrication, erection and testing) aspects. It provides a foundation of knowledge necessary for those responsible for assuring the mechanical integrity of existing piping systems, as well as those responsible for designing and constructing new piping systems.

Upon the successful completion of this course, the participant will gain an understanding of the physical phenomena which affect the design of piping systems: the ASME Code formulas and other methods by which these phenomena can be analyzed to determine resulting stresses, evaluation of those stresses relative to ASME Code limitations, the methods by which piping systems are fabricated, inspected and tested.

Each session will be conducted in a lecture/discussion format designed to provide intensive instruction and guidance on understanding Code requirements, and also on developing an awareness of other considerations in the design, analysis, fabrication and installation of piping which is not covered by the Codes. There will also be a demonstration of computer software that can be used to assist in piping analysis. The faculty will be available following each day's session to provide participants with further opportunity for discussion and consideration of specific problems.

Participants should bring calculators for working sample problems. Participants may wish to bring a copy of ASME B31.3 if they have a copy available, but the course is designed such that it is not necessary for the students to have copies of the Code for reference.

Course Objectives

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

- Apply and gain an in-depth knowledge on process piping design, construction, inspection, maintenance and mechanical integrity in accordance with ASME B31.3 & API 570
- Design, fabricate, install, assess and maintain the mechanical integrity of process piping system in accordance with ASME B31.3 standard
- Recognize metallic pipe and fitting selection including its system failure, bases for selection and method requirements
- Identify the strengths of materials including its requirements and explain the bases for design stresses
- Determine the components of pressure design and apply the concepts of weld joint strength factor and design pressure & temperature
- Perform the process of valve selection and list the requirements needed for the selection process

- Acquire knowledge on the design of flanged joints and describe its features & functions
- Introduce flexibility & flexibility analysis and explain the general considerations for the layout and support of pipes
- Enumerate the various types and designs of expansion joints and describe their components and use
- Carryout the fabrication and installation methods of pipings and list the requirements and guidelines needed in the inspection, examination and testing of pipes
- Heighten awareness with the concept of instrument piping and pressure relieving systems and determine how these systems can be designed
- Recognize the design, fabrication, installation, inspection, examination and testing methods for nonmetallic piping systems, category M Fluid service & high pressure piping
- Review the concept of API 570 including its inspection, repair, alteration and rerating of in-service piping

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 process piping design, construction, inspection, maintenance and mechanical integrity in accordance with ASME B31.3 & API 570 for those who are involved in the design, analysis, fabrication, installation, maintenance or ownership of piping systems. Engineers, senior draftsmen, maintenance, quality assurance, and manufacturing personnel who work in the chemical, petroleum, utility, plastic processing, pulp and paper, and manufacturing, fields will find it a time-saving means to broaden and update their knowledge of piping. Those who must comply with code requirements will benefit from the practical approach presented in this course in obtaining satisfactory and economical piping systems.

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 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)

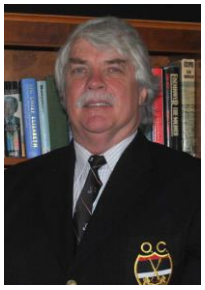
  Haward Technology is accredited by the **British Accreditation Council** for **Independent Further and Higher Education** as an **International Centre**. BAC is the British accrediting body responsible for setting standards within independent further and higher education sector in the UK and overseas.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

Course Fee

Al Khobar	**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.
Dubai	**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.

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. Den Bazley, PE, BSc, is a **Senior Pipeline & Mechanical Maintenance Engineer** with **40 years** of industrial experience in **Oil**, **Gas**, **Refinery**, **Petrochemical**, **Power** and **Utilities** industries. His wide expertise includes **Pipeline & Piping Design**, **Process Piping** Design & Mechanical Integrity, **Piping & Pipeline** Maintenance & Repair, **Pipeline** Operation & Maintenance, **Pigging**, **Integrity** Assessment, Layout of **Piping Systems & Process Equipment**, **Pipe Work** Design & Fabrication, **Mechanical Piping** Systems Design & Specification, **Piping & Storage** Facilities, **Fitness for Service** for Petrochemical Plants, **Pipeline** Equipment Operation, **Pipeline** Rules of Thumb, **Welding** Technology, **Welding & Fabrication**, **Welding & Brazing**, **Mechanical Integrity & Reliability**, Advanced Integrity Management, **Root Cause** Analysis on Technical Failure Investigation Pertaining to Asset Integrity/Engineering, **Pressure Vessel** Fabrication & Testing, **Vacuum** Systems, **Mechanical Rotating Equipment & Turbomachinery**, Centrifugal **Pump & Compressors**, **Pump** Maintenance, **Propylene Compressor & Turbine**, **Safety Relief Valve** (PRV-PSV) Inspection & Testing, **Process Control Valves**, **Valve** Troubleshooting & Repair Procedure, Advanced **Valve Technology**, **Pressure Vessels & Heat Exchangers** Design, **Strainers & Steam Traps**, Advanced **Boiler** Operation & Maintenance, **Gas & Steam Turbine** Operation, Process Design Parameters for **Gas Compressor/Turbines**, **Boilers & Steam System** Management, **Dry Gas Seal** Installation & Commissioning, **Tank** Installation & Maintenance, **Bearing** Mounting/Dismounting, **Mechanical Seals** & Systems, **Gear Boxes** Selection & Inspection, **Machinery** Troubleshooting, **Machinery** Failure Analysis & Troubleshooting, **Rotating Machinery** Best Practices, **Predictive** Maintenance, **Maintenance Planning Scheduling & Work Control**, Maintenance Strategy Development & Cost-Effective Implementation, Alignment & Troubleshooting of **Rotating Machinery**, Planning Managing **Shutdowns & Turnarounds**, **Reliability Centered Maintenance & Total Productivity Maintenance**, Analytical Prevention of Mechanical Failure, Maintenance Planning and Scheduling & Cost Estimation.

During his career life, Mr. Bazley has gained his practical and field experience through his various significant positions and dedication as the **General Manager**, **Branch Manager**, **Refinery Chairman**, **Engineering Manager**, **Maintenance Engineer**, **Construction Engineer**, **Project Engineer**, **Mechanical Engineer**, **Piping Engineer**, **Pipeline Engineer**, **Associate Engineer**, **Oil Process Engineer**, **Mechanical Services Superintendent**, **Quality Coordinator**, **Planning Coordinator**, **Consultant/Instructor**, **Lecturer/Trainer** and **Public Relations Officer** for numerous international companies like **ESSO**, **FFS Refinery**, Dorbyl Heavy Engineering (**VECOR**), Vandenbergh Foods (**Unilever**), **Engen Petroleum**, Royle Trust and **Pepsi-Cola**.

Mr. Bazley is a **Registered Professional Engineer** and has a **Bachelor's** degree in **Mechanical Engineering**. Further, he is a **Certified Engineer** (Government Certificate of Competency GCC Mechanical Pretoria SA), **Certified Instructor/Trainer**, a **Certified Internal Verifier/Trainer/ Assessor**, an active member of the **Institute of Mechanical Engineers** (**IMechE**) and has delivered numerous trainings, courses, seminars and workshops 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*** *General Definitions ● Piping Design Method ● Piping System Standards ● B31 Committee Organization ● B31.3 Scope ● Organization of the Code ● Fluid Service Definitions ● Process Piping Engineering in Petroleum Industry*
0930 – 0945	*Break*
0945 – 1100	***Metallic Pipe & Fitting Selection*** *Piping System Failure ● Bases for Selection ● ASME B36.10 Welded & Seamless Wrought Steel Pipe ● ASME B36.19 Stainless Steel Pipe ● Listed versus Unlisted Piping Components ● Fluid Service Requirements ● Pipe ● Joining Method ● Fittings ● Branch Connections ● Flanges ● Gaskets ● Bolting*
1100 – 1215	***Materials*** *Strength of Materials ● Bases for Design Stresses ● B31.3 Material Requirements*
1215 – 1230	*Break*
1230 – 1330	***Pressure Design (Metallic)*** *Design Pressure & Temperature ● Quality Factors ● Weld Joint Strength Factor ● Pressure Design of Components*
1330 - 1420	***Valve Selection*** *Code Requirements ● Selection by Valve Type*
1420 – 1430	***Recap***
1430	*Lunch & End of Day One*

Day 2

0730 – 0930	***Flanged Joints*** *Design ● Bolt-Up*
0930 – 0945	*Break*
0945 – 1100	***Introduction to Flexibility Analysis*** *What are we Trying to Achieve? ● Sustained Loads ● Displacement Loads ● Reaction Design Criteria ● Flexibility Analysis Example*
1100 – 1215	***Layout & Support*** *General Considerations ● Support Spacing ● Support Locations ● Support Elements ● Fixing Problems*
1215 – 1230	*Break*
1230 – 1330	***Flexibility*** *General Considerations ● Friction ● Stress Intensification ● Elbow Flexibility ● Thermal Expansion ● Spring Hangers ● The Displacement Load Analysis ● Elastic Follow-Up ● Fixing Problems ● Cautions*
1330 - 1420	***Reactions*** *General Considerations ● Fabricated Equipment ● Rotating Equipment ● Supports ● Flanged Joints ● Cold Spring*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Two*

Day 3

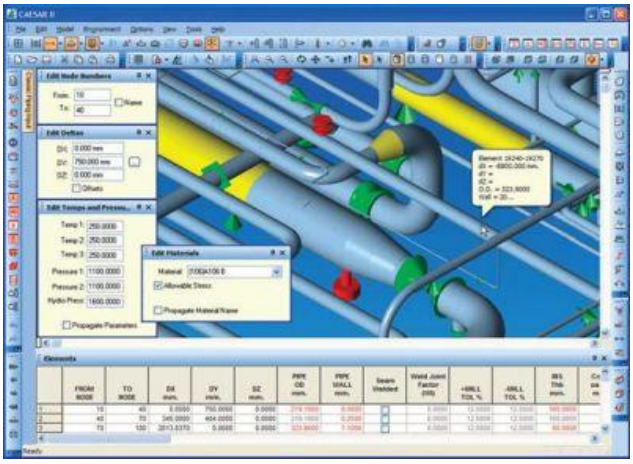
0730 – 0930	***Flexibility Analysis*** *When to Perform a Detailed Analysis ● Computer Program Attributes ● Considerations ● Solving Problems ● Typical Errors ● Sample Computer Flexibility Analysis*
0930 – 0945	*Break*
0945 – 1100	***Designing with Expansion Joints*** *Types of Expansion Joints ● Pressure Thrust ● Installation of Expansion Joints ● Metal Bellows Expansion Joints ● Other Considerations*
1100 – 1215	***Fabrication & Installation*** *Welder/Brazer Qualification ● Welding Processes ● Weld Preparation ● Typical Welds ● Preheating & Heat Treatment ● Bending and Forming ● Typical Owner Added Requirements ● Installation*
1215 – 1230	*Break*
1230 – 1420	***Inspection, Examination & Testing*** *Inspection ● Examination ● Testing*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Three*

Day 4

0730 – 0830	***Instrument Piping & Pressure Relieving Systems*** *What Must be Protected ● How Systems can be Designed*
0830 – 0930	***Nonmetallic Piping Systems*** *Design ● Fabrication & Installation ● Inspection ● Examination & Testing*
0930 – 0945	*Break*
0945 – 1100	***Category M Fluid Service*** *Design ● Fabrication & Installation ● Inspection ● Examination & Testing*
1100 – 1215	***High Pressure Piping*** *Design ● Fabrication & Installation ● Inspection ● Examination & Testing*
1215 – 1230	*Break*
1230 – 1300	***API 570 – Inspection, Repair, Alteration & Rerating of In-Service Piping*** *Responsibilities ● General Considerations ● Frequency & Extent of Inspections ● Remaining Life ● MAWP ● Repairs & Alterations Rerating*
1300 – 1400	*Summary, Open Forum, Course Conclusion & Closure*
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.



CAESAR II

Course Coordinator

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