



COURSE OVERVIEW FE0091 Pipeline Design, Construction, Inspection, Testing & Mechanical Integrity

Course Title

Pipeline Design, Construction, Inspection, Testing & Mechanical Integrity

Course Reference

FE0091

Course Duration/Credits

Five days/3.0 CEUs/30 PDHs



Course Date/Venue

Session(s)	Date	Venue
1	February 04-08, 2024	The Mouna Meeting Room, The H Dubai Hotel, Sheikh Zayed Rd - Trade Centre, Dubai, UAE
2	March 03-07, 2024	Kizkulesi, Crown Plaza Istanbul Asia Hotels & Convention Center, Istanbul, Turkey

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 pipeline design, construction, inspection, testing and mechanical integrity. It covers the pipeline technology, ASME B31, ASME pressure vessel codes, API tank standards, pipeline inspection standard, ASME B16; the fundamentals of maintenance and integrity; the ferrous pipe and pipe materials, carbon and alloy steels, mechanical properties, API 5L and ASTM material specifications; the pressure operation and design; the layout and support, fitness-for-service and vibration in service; the pressure transients, reactions and flexibility analysis; and designing with expansion joints, welding, fabrication and installation.



Further, the course will also discuss the examination and inspection, liquid penetrant testing, magnetic particle testing, radiographic testing and ultrasonic testing; the eddy current, acoustic emission, thermography and pulsed eddy current inspections through insulation; the interpretation of integrity standards and application of inspections and analysis of results; and the different types of flanges and application including the causes of flange leaks and how to resolve.





During this interactive course, participants will learn the mechanical joints comprising of tube fittings, bolted fittings, unlisted components and swage fittings; the bending, pressure and leak testing, instrument piping and pressure relieving systems; the non-metallic, category M and high-pressure piping system; the inspection, repair, altering and re-rating in-service piping as per API 570 standard; the degradation mechanisms, maintenance strategies and repair techniques; and the buried pipe covering soil loads, surface loads, soil settlement and in-service movement of pipeline.

Course Objectives

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

- Apply and gain an in-depth knowledge on pipeline design, construction, inspection, testing and mechanical integrity
- Discuss pipeline technology, ASME B31, ASME pressure vessel codes, API tank standards, pipeline inspection standard, ASME B16 and the fundamentals of maintenance and integrity
- Describe ferrous pipe and pipe materials, carbon and alloy steels, mechanical properties, API 5L and ASTM material specifications
- Operate and design pressure
- Apply layout and support, fitness-for-service and vibration in service
- Describe pressure transients, reactions and flexibility analysis
- Design with expansion joints and employ welding, fabrication and installation
- Carryout examination and inspection, liquid penetrant testing, magnetic particle testing, radiographic testing and ultrasonic testing
- Apply eddy current, acoustic emission, thermography and pulsed eddy current inspections through insulation
- Interpret integrity standards and application of inspections and analysis of results
- Identify the different types of flanges and application including the causes of flange leaks and how to resolve
- Recognize mechanical joints covering tube fittings, bolted fittings, unlisted components and swage fittings
- Illustrate bending, pressure and leak testing, instrument piping and pressure relieving systems
- Recognize non-metallic, category M and high-pressure piping system
- Inspect, repair, alterate and re-rate in-service piping as per API 570 standard
- Describe degradation mechanisms and carryout maintenance strategies and repair techniques
- Discuss buried pipe covering soil loads, surface loads, soil settlement and in-service movement of pipeline



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, sample video clips of the instructor’s actual lectures & practical sessions during the course conveniently saved in a **Tablet PC**.

Who Should Attend

This course provides an overview of all significant aspects and considerations of pipeline design, construction, inspection, testing and mechanical integrity for engineers, maintenance staff and inspectors responsible for the integrity, maintenance and repair of pipelines and piping systems. Further, the course is essential for engineers in charge of pipeline or piping design. Project engineers, site/field engineers and piping/pipeline project managers will be very interested in the pipeline/piping installation part of the course. Senior draftsmen and technical staff in the engineering department will benefit from the pipeline/piping design part of this state-of-the-art course. The fitness-for-service and integrity techniques are based on quantitative analysis, please bring a calculator.

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

Dubai	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.
Istanbul	US\$ 6,000 per Delegate + VAT . This rate includes Participants Pack (Folder, Manual, Hand-outs, etc.), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

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.

Accommodation

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



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. Steve Magalios, CEng, PGDip (on-going), MSc, BSc, is a **Survey & Pipeline Engineer** with almost **40 years** of extensive **On-shore/Offshore** experience in the **Oil & Gas, Construction, Refinery** and **Petrochemical** industries. His expertise widely covers in the areas of **Pipeline** Operation & Maintenance, **Pipeline** Systems, **Pipeline** Design & Construction, **Pipeline** Repair Methods, **Pipeline** Engineering, Pipeline Integrity Management System (**PIMS**), **Pipeline** Pigging, Piping & Pipe Support Systems, **Piping** Systems & Process Equipment, **Piping** System Repair & Maintenance, **Piping** Integrity Management, Computer Aided Design (**CAD**), **Building & Road** Design Skills, **Civil Engineering Design**, **Structural Reliability** Engineering, Road Construction & Maintenance, **Concrete Structures & Building Rehabilitation**, **Reinforced Concrete Structures Protection**, **Geosynthetics & Ground Improvement Methods**, **Blueprint** Reading & Interpretation, **Blue Print** Documentation, **Mechanical Drawings**, **P&ID**, **Flow Diagram** Symbols, **Land Surveying** & Property Evaluation, **Cartographic** Representation, Soil Classification, **Cadastral Surveying** & Boundary Definition, **Project Engineering** & Design, **Construction** Management, **Project Planning** & Execution, **Site Management**, **Site Supervision**, **Effective Resource Management**, **Project Evaluation**, **FEED** Management, **EPC Projects** Design, **Project Completion & Workover**, Quality Control and Team Management. He is also well-versed in Lean & Sour Gas, Condensate, **Compressors**, **Pumps**, Flare Knockout Drum, Block **Valve** Stations, New Slug Catcher, Natural **Gas Pipeline** & Network, Scraper Traps, Burn Pits, Risk Assessment, HSE Plan & Procedures, Quality Plan & Procedures, Safety & Compliance Management, Permit-to-Work Issuer, ASME, API, ANSI, ASTM, BS, NACE, ARAMCO & KOC Standards, MS Office tools, **AutoCAD**, **STAAD-PRO**, GIS, ArcInfo, ArcView, Autodesk Map and various programming languages such as FORTRAN, BASIC and AUTOLISP. Currently, he is the **Chartered Professional Surveyor Engineer & Urban-Regional Planner** wherein he is deeply involved in providing exact data, measurements and determining properly boundaries. He is also responsible in preparing and maintaining sketches, maps, reports and legal description of surveys.

During his career, Mr. Magalios has gained his expertise and thorough practical experience through challenging positions such as a **Project Site Construction Manager**, **Construction Site Manager**, **Project Manager**, **Deputy PMS Manager**, **Head of the Public Project Inspection Field Team**, **Technical Consultant**, **Senior Consultant**, **Consultant/Lecturer**, **Construction Team Leader**, **Lead Pipeline Engineer**, **Project Construction Lead Supervising Engineer**, **Lead Site Engineer**, **Senior Site Engineer Lead Engineer**, **Senior Site Engineer**, **R.O.W. Coordinator**, **Site Representative**, **Supervision Head** and **Contractor** for international Companies such as the Penspen International Limited, Eptista Servicios de Ingenieria S.I., J/V ILF Pantec TH. Papaioannou & Co. – Emenergy Engineering, J/V Karaylannis S.A. – Intracom Constructions S.A., Ergaz Ltd., Alkyonis 7, Palaeo Faliro, Piraeus, Elpet Valkaniki S.A., Asprofos S.A., J/V Depa S.A. just to name a few.

Mr. Magalios is a **Registered Chartered Engineer** and has **Master** and **Bachelor** degrees in **Surveying Engineering** from the **University of New Brunswick, Canada** and the **National Technical University of Athens, Greece**, respectively. Further, he is currently enrolled for **Post-graduate** in **Quality Assurance** from the **Hellenic Open University, Greece**. He has further obtained a Level 4B Certificates in Project Management from the National & Kapodistrian University of Athens, Greece and Environmental Auditing from the Environmental Auditors Registration Association (EARA). Moreover, he is a **Certified Instructor/Trainer**, a **Chartered Engineer** of Technical Chamber of Greece and has delivered numerous 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 History of Pipeline Technology • ASME B31 Piping & Pipeline Codes • ASME B&PV Pressure Vessel Codes • API Tank Standards • API Pipeline Inspection Standards • ASME B16 Fitting Standards • NACE, MSS-SP, PFI Standards • Fundamentals of Maintenance & Integrity
0930 – 0945	Break
0945 – 1100	Materials Overview of Ferrous Pipe & Pipeline Materials • Carbon & Alloy Steels • Practical Aspects of Metallurgical Properties • Chemistry & Material Test Reports • Fabrication of Line Pipe & Forged Fittings • Mechanical Properties: Strength & Toughness • Ductile & Brittle Fracture • API 5L & ASTM Material Specifications • Markings on Pipe & Fittings
1100 – 1230	Operating & Design Pressure How to Establish the System Design Pressure • Introduction to Pressure Relief Valves • Pipe & Pipeline Sizing Formula with Applications • Flange & Fitting Class: Origins & Application • Branch Reinforcement, Stopples & Hot taps
1230 – 1245	Break
1245 – 1330	Layout & Support Rules of Good Practice in Layout • Pump & Compressor Piping • Thermal Expansion & Flexibility • How to Support a Piping System • Review of Support Types & Their Application • Lessons Learned from Poor Support Practices
1330 – 1420	Fitness-for-service Overview Making Run-or-Repair Decisions • Analysis of Inspection Results: Integrity Management • How to Evaluate Wall Thinning • Application of ASME B31G to Determine Remaining Life • Application of API 579 to General & Local Corrosion • Application of API 579 to Analyze Pitting • Analysis of Dents & Gouges in Pipelines • Introduction to Fracture Mechanic • How to Evaluate Cracks in Piping & Pipelines
1420 – 1430	Recap Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today & Advise Them of the Topics to be Discussed Tomorrow
1430	Lunch & End of Day One





Day 2

0730 – 0930	Vibration in Service How to Classify the Cause of Vibration In-Service • Mechanical & Hydraulic Induced Vibration in Piping • How to Measure Vibration • How to Analyze Vibration & Decide if it is Acceptable • Options for Resolving Vibration
0930 – 0945	Break
0945 – 1100	Pressure Transients The Four Classes of Pressure Transients • Recognizing & Solving Liquid Hammer • Pump Station Transients • Study of Pipeline Failures Due to Transients • Two-Phase Liquid-Vapor Transients • Two-Phase Liquid-Gas Transients • Gas Discharge Transients
1100 – 1230	Reactions General Considerations • Fabricated Equipment • Rotating Equipment • Supports • Flanged Joints • Cold Spring
1215 – 1230	Break
1230 – 1330	Flexibility Analysis When to Perform a Detailed Analysis • Computer Program Attributes • Considerations • Solving Problems • Typical Errors • Sample Computer Flexibility Analysis
1330 – 1420	Designing with Expansion Joints Types of Expansion Joints • Pressure Thrust • Installation of Expansion Joints • Metal Bellows Expansion Joints • Other Considerations
1420 – 1430	Recap Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today & Advise Them of the Topics to be Discussed Tomorrow
1430	Lunch & End of Day Two

Day 3

0730 – 0830	Welding, Fabrication & Installation Overview of Pipe & Pipeline Welding Practice • API 1104 & ASME IX Requirements • Weld Properties • Weld Size & Lessons Learned from Weld Failures • Heat Treatment: When & Why • Welding In-Service: Challenge & Solutions
0830 – 0930	Examination & Inspection Weld Inspection Techniques • Liquid Penetrant Testing: Advantages & Limitations • Magnetic Particle Testing: Advantages & Limitations • Radiographic Testing: Advantages & Limitations • Ultrasonic Testing: Advantages & Limitations • Eddy Current, Acoustic Emission, Thermography • Pulsed Eddy Current Inspections Through Insulation • Pigging Technology: Overview of Utility & Smart Pigs • Overview of 49CFR Regulations for In-Line Inspections • What to Inspect & How • Workmanship Standards (ASME B31) • Integrity Standards (B31G, API 1104, API 579) • Application of Inspections & Analysis of Results
0930 – 0945	Break
0945 – 1100	Flange Joints Overview of Different Types of Flanges & Application • Gasket & Bolt Selection • Causes of Flange Leaks & How to Resolve • Case Study of Flange Failure • Assembly of Flange Joints & Leak Tightness



1100 – 1230	Mechanical Joints Tube Fittings • Bolted Fittings • Unlisted Components • Swage Fittings
1230 – 1245	Break
1245 – 1420	Bending Cold Bending of Pipe & Pipelines • Limitations on Cold Bending • Wall Thinning During Bending • Ripples & Buckles in Bends • Ovality & Dents
1420 – 1430	Recap Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today & Advise Them of the Topics to be Discussed Tomorrow
1430	Lunch & End of Day Three

Day 4

0730 – 0930	Pressure & Leak Testing The Difference Between Leak Testing & Pressure Testing • Review of Different Testing Techniques • The Purpose of Hydrotest • How to Conduct a Hydrotest • Pipeline & Piping Systems Testing • Pneumatic Testing
0930 – 0945	Break
0945 - 1100	Instrument Piping & Pressure Relieving Systems What Must be Protected • How Systems can be Designed
1100 - 1230	Nonmetallic, Category 'M' & High Pressure Piping System Design • Fabrication & Installation • Inspection • Examination & Testing
1230 - 1245	Break
1245 – 1330	API 570 – Inspection, Repair, Alteration & Rerating of In-Service Piping Responsibilities • General Considerations • Frequency & Extent of Inspections • Remaining Life • MAWP • Repairs & Alterations Rerating
1330 – 1420	Degradation Mechanisms Introduction to Practical Corrosion • Classification of Corrosion Mechanisms • General Wall Thinning • Local Corrosion: Galvanic Effects • Crevice Corrosion • Pitting Corrosion • Environmental Effects • Hydrogen & H2S Effects • Microbiological Corrosion • Corrosion Protection • Cathodic Protection Overview
1420 – 1430	Recap Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today & Advise Them of the Topics to be Discussed Tomorrow
1430	Lunch & End of Day Four

Day 5

0730 - 0930	Maintenance Strategies Fundamentals of Maintenance Practice • Corrective & Predictive Maintenance • Reliability Engineering: Maintenance Analysis & Trending
0930 – 0945	Break
0945 – 1100	Repair Techniques The New ASME Repair Standards • The Fundamentals of Repair Packages • Welding on Line (In-Service) • Pipe & Component Replacement • Grinding & Welding • Welded Sleeve: Type A & Type B • Flush Patch Repair • Fillet Welded Patch

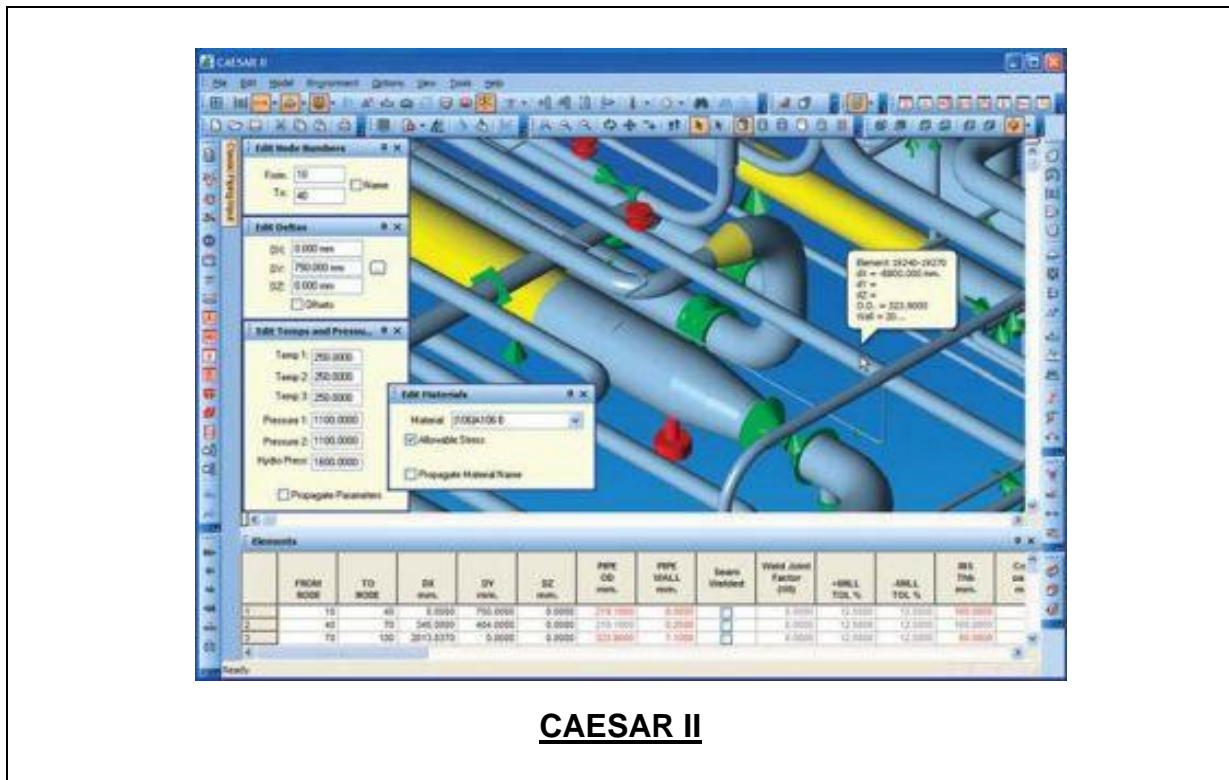




1100 – 1230	Repair Techniques (cont'd) Weld Overlay Repair • Mechanical Clamp with Sealant Injection • Mechanical Clamp without Sealant Injection • Insertion Liners • Painted & Brushed Liners • Pipe Coating
1230 – 1245	Break
1245 – 1345	Buried Pipe Soil Loads • Surface Loads • Expansion of Buried Pipe • Soil Settlement • In-Service Movement of Pipeline
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 “CAESAR II” simulator.



Course Coordinator

Kamel Ghanem, Tel: +971 2 30 91 714, Email: kamel@haward.org