# COURSE OVERVIEW FE0171
# Pipeline & Piping Inspection, Maintenance, Repair & Integrity Assessment

## Course Title
Pipeline & Piping Inspection, Maintenance, Repair & Integrity Assessment

## Course Reference
FE0171

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

## Course Date/Venue

| Session(s) | Date | Venue |
|---|---|---|
| 1 | June 02-06, 2024 | Kizkulesi, Crown Plaza Istanbul Asia Hotels & Convention Center, Istanbul, Turkey |
| 2 | October 20-24, 2024 | The Kooh Al Noor Meeting Room, The H Dubai Hotel, Sheikh Zayed Rd - Trade Centre, Dubai, UAE |
| 3 | January 12-16, 2025 | Oryx Meeting Room, Doubletree By Hilton Doha-Al Sadd, Doha, Qatar |

## 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 and piping inspection, maintenance, repairing & integrity assessment. It covers the pipeline and piping codes, piping and pipeline materials and equipment; piping vibration measurement, analysis and corrective action; the flow induced vibration, slug flow, surge, piping vibration involving control valves and other sources of vibration; the practical methods for evaluating piping vibration; and the measurement and analysis of vibration.

During this interactive course, participants will learn the options for resolving vibration, acceptance criteria and methods of piping vibration damping; the proper examination and testing as well as pressure and leak testing; the degradation mechanisms; the operation and maintenance strategies, procedures and repair techniques; the fitness-for-service and remaining life overview; and the pipeline failure, overpressure, pipeline life extension, system integrity of gas pipelines, risk-based inspections and pipeline integrity management.

## Course Objectives

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

- Apply systematic techniques on pipeline and piping inspection, maintenance, repairing and integrity assessment
- Recognize the pipeline and piping codes, piping and pipeline materials and equipment
- Employ piping vibration measurement, analysis and corrective action
- Determine flow induced vibration and slug flow including surge, piping vibration involving control valves and other sources of vibration
- Apply practical methods for evaluating piping vibration and explain how to measure and analyze vibration
- Recognize the options for resolving vibration, acceptance criteria and methods of piping vibration damping
- Carryout proper examination and testing as well as pressure and leak testing
- Recognize the degradation mechanisms covering the classification of corrosion mechanisms, general wall thinning, local corrosion, crevice corrosion, pitting corrosion and etc.
- Employ operation and maintenance strategies, procedures and repair techniques
- Discuss fitness-for-service and remaining life overview
- Determine pipeline failure, overpressure, pipeline life extension, system integrity of gas pipelines, risk-based inspections and pipeline integrity management

## Who Should Attend

This course provides an overview of all significant aspects and considerations of pipeline & piping inspection, maintenance, repairing & integrity assessment 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.

## Course Fee

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| 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. |
| 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. |
| Doha | **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: -

- 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. Hesham Moharram**, is a **Senior Inspection Engineer** with over **35 years** of industrial experience in the **Oil & Gas**, **Refineries** and **Petrochemical** industries. His expertise includes **Facility Integrity**, **Technical Integrity**, **Integrated Safety Management Plan**, **Inspection**, **Repair**, **Maintenance**, **Alteration** and **Reconstruction** of **Aboveground Storage Tanks**, **Pressure Vessels**, **Piping** Inspection, **Risk-Based** Inspection, Fitness-for-Service (**FFS**), **Asset Integrity** Management, **Plant Inspection & Corrosion Engineering**, **Pipeline Integrity** Assessment, **Integrity** Management, **Pipeline** Rehabilitation & Repair, **Pipeline** Design & Maintenance, **Corrosion Monitoring & Cathodic Protection**, **Pressure & Leak** Testing, **Metallurgy**, **Corrosion & Prevention of Failures**, **Material Selection & Properties**, **Physical Metallurgy of Steel**, **Welding** Technology, **Fabrication & Inspection**, Conventional & Advanced **Non-destructive Testing** (**NDT**), **Process Safety Hazard Analyses** (**PHA**), **Risk** Assessment, **Pigging & Pipe Support** and **Acoustic Emission**. Further, he is also well-versed in Quality Assurance & Quality Control, **HAZOP**, Permit-to-Work, Hazard Identification, Safety Meeting, Accident Investigation, Emergency Response, Task Risk Assessment, Root Cause & Failure Analysis, Fire Fighting, First Aid Basic, CPR, $H_2S$ Awareness, Distillation Units, Preventive Maintenance, FEED, Contract Management, Stress Management, Coaching & Mentoring Skills, Interpersonal Skills and Communication Skills. He is currently the **Senior Inspection Engineer** wherein he is responsible in various inspection works like fitness-for-service, remaining life assessments, risk based inspection, intelligent pigging, problematic pipe supports, non-destructive testing and acoustic emission.

Throughout his career life, Mr. Hesham has provided significant contributions to the companies he has worked with, having filled key positions such as being the **Senior Inspection Engineer**, **Inspection Engineer**, **Production Engineer**, **API Instructor**, **QA/QC** and **Supervisor** for international companies such as Abu Dhabi Company for Onshore Oil Operations (**ADCO**), Suez Oil Company (**SUCO**), Cairo Oil Refining Company (**CORC**) Refinery, DURA Refinery, State Company for Oil Projects (**SCOP-IRAQ**) and **Iron & Steel**.

Mr. Moharram has a **Bachelor's** degree in **Metallurgical Engineering**, from the Suez Canal University. Further, he is a **Certified Instructor/Trainer**, a **Certified Pressure Vessel Inspector** (**API-510**), **Certified Piping Inspector** (**API-570**), **Certified Aboveground Storage Tanks Inspector** (**API-653**), **Certified Risk Based Inspector** (**API-580**), an **ASNT Certified Level II** in **UT**, **RT**, **MT**, **PT** and **Eddy Current Testing**.

## 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 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***

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| *0730 – 0800* | *Registration & Coffee* |
| *0800 – 0815* | *Welcome & Introduction* |
| *0815 – 0830* | ***PRE-TEST*** |
| *0830 – 0930* | ***Introduction to Piping, Flows Lines & Headers***<br>*History of Piping, Pipeline & Headers Technology • Brief Historical Outline • Types & Classification of Pipelines • Purpose of Pipelines • Routes Across the Environments* |
| *0930 – 0945* | *Break* |
| *0945 – 1030* | ***Pipeline & Piping Codes***<br>*ASME B31 Piping & Pipeline Codes • ASME B31.3 Process Piping • ASME B31.4 Pipeline Transportation of Liquid Hydrocarbons & Other Liquids • ASME B31.8 Gas Transmission & Distribution Piping Systems* |
| *1030 – 1230* | ***Pipeline & Piping Codes (cont'd)***<br>*ASME Boiler & Pressure Vessel Codes • API Codes & Standards 500 Series • API Codes & Standards 600 Series • API Codes & Standards 5 Series • API Codes & Standards 1100 & 2200 Series* |
| *1230 – 1245* | *Break* |
| *1245 – 1420* | ***Pipeline & Piping Codes (cont'd)***<br>*ASME B16 Fitting Standards • NACE Recommended Standards, MSS-SP, PFI Standards • Fundamentals of Design, Fabrication, Operation, Maintenance & Integrity* |
| *1420 – 1430* | ***Recap***<br>*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***

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| *0730 – 0930* | ***Piping & Pipeline Materials & Equipment***<br>*Overview of Ferrous Pipe & Pipeline Materials • Carbon & Alloy Steels • Practical Aspects of Metallurgical Properties • Chemistry & Material Test Reports* |
| *0930 – 0945* | *Break* |

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| *0945 – 1100* | ***Piping & Pipeline Materials & Equipment (cont'd)***<br>*Fabrication of Line Pipe & Forged Fittings • Mechanical Properties: Strength & Toughness • Ductile & Brittle Fracture • API 5L & ASTM Material Specifications • Markings on Pipe & Fittings* |
| *1100 – 1230* | ***Piping Vibration Measurement, Analysis & Corrective Action***<br>*Flow Induced Vibration & Slug Flow (water hammer) • Surge (Pressure Wave Water Hammer) • Piping Vibration Involving Control Valves • Other Sources of Vibration* |
| *1230 – 1245* | *Break* |
| *1245 – 1420* | ***Piping Vibration Measurement, Analysis & Corrective Action (cont'd)***<br>*Practical Methods for Evaluating Piping Vibration • How to Measure Vibration • How to Analyze Vibration & Decide if it is Acceptable* |
| *1420 – 1430* | ***Recap***<br>*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***

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| *0730 – 0930* | ***Piping Vibration Measurement, Analysis & Corrective Action (cont'd)***<br>*Options for Resolving Vibration • Acceptance Criteria (ASME B31 Series) • Methods of Piping Vibration Damping • Simple Piping Vibration Problems • Case Studies • Open Session with Student Vibration Problems • Vibration Simulator* |
| *0930 – 0945* | *Break* |
| *0945 – 1100* | ***Examination, Inspection & Testing***<br>*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* |
| *1100 – 1230* | ***Examination, Inspection & Testing (cont'd)***<br>*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* |
| *1230 – 1245* | *Break* |
| *1245 – 1420* | ***Pressure & Leak Testing***<br>*The Difference Between Leak Testing & Pressure Testing • Review of Different Testing Techniques • The Purpose of Hydrostatic Test • How to Conduct a Hydrostatic test • Pipeline & Piping Systems Testing • Pneumatic Testing* |
| *1420 – 1430* | ***Recap***<br>*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**

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| 0730 – 0930 | ***Degradation Mechanisms***<br>*Introduction to Practical Corrosion • Classification of Corrosion Mechanisms • General Wall Thinning • Local Corrosion: Galvanic Effects • Crevice Corrosion • Pitting Corrosion* |
| 0930 – 0945 | *Break* |
| 0945 – 1100 | ***Degradation Mechanisms (cont'd)***<br>*Environmental Effects • Hydrogen & H2S Effects • Microbiological Corrosion • Corrosion Control & Protection • Cathodic Protection Overview* |
| 1100 – 1230 | ***Operation & Maintenance Strategies & Procedures***<br>*Fundamentals of Maintenance Practice • Corrective & Predictive Maintenance* |
| 1230 – 1245 | *Break* |
| 1245 – 1420 | ***Operation & Maintenance Strategies & Procedures (cont'd)***<br>*Reliability Engineering: Maintenance Analysis & Trending* |
| 1420 – 1430 | ***Recap***<br>*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**

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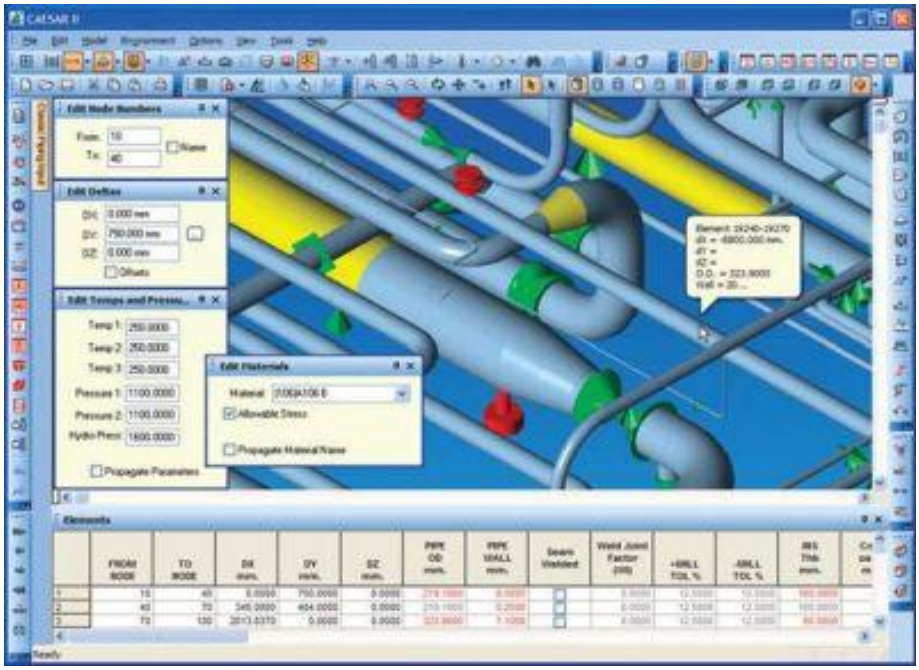
| 0730 – 0930 | ***Fitness-for-Service & Remaining Life Overview***<br>*Making Run-or-Repair Decisions • Analysis of Inspection Results: Integrity Management • How to Evaluate Wall Thinning • Application of ASME B31G to Determine Remaining Life* |
| 0930 – 0945 | *Break* |
| 0945 – 1100 | ***Fitness-for-Service & Remaining Life Overview (cont'd)***<br>*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* |
| 1100 – 1230 | ***Repair Techniques***<br>*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 • 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 | ***System Integrity***<br>*Pipeline Failure, Overpressure • Pipeline Life Extension • System Integrity of Gas Pipelines • Risk-based Inspections • Pipeline Integrity Management • CAESAR II* |
| 1345 – 1400 | ***Course Conclusion***<br>*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 **state-of-the-art** simulators "**CAESAR II**" and "**iLearnVibration**".



**CAESAR II**


**iLearnVibration Simulator**

**Course Coordinator**

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