COURSE OVERVIEW FE0113(GA2)-4D
API-579 and ASME PCC-2: Repair Practices

Course Title
API-579 and ASME PCC-2: Repair Practices

Course Reference
FE0113(GA2)-4D

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

Course Date/Venue

Session(s)	Date	Venue
1	January 15-18, 2024	Ajman Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE
2	March 04-07, 2024	Boardroom 1, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE
3	June 10-13, 2024	Jubail Hall, Signature Al Khobar Hotel, Al Khobar, KSA
4	September 09-12, 2024	Cheops Meeting Room, Radisson Blu Hotel, Istanbul Sisli, 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.

The latest ASME Post-Construction Code is an extension of the current API standards for Risk-Based-Inspection (API 580, API 581), Fitness-For-Service assessment (API 579), Damage Mechanisms (API 571) and repairs. They are a practical and important addition to the ASME design and construction codes, their objective is to prevent failures by timely detection and analysis of degraded conditions, and application of the right repair technique.

In this highly practical course, participants will learn how to (1) plan inspections, (2) evaluate inspection results and calculate the remaining life of corroded and degraded equipment, and (3) select and implement the right repair by applying the new ASME Post-Construction Codes (PCC).

The course will follow the same outline as the ASME PCC Codes, making the course notes a practical and handy reference to illustrate and explain the various requirements of the new ASME PCC codes. Further, the course will review the recommended practices of API 579 and API 571 and how they can be applied on Fitness-for-Service and damage mechanisms affecting process plant equipment.

This course is design to provide participants with a detailed and up-to-date overview of API-579 FFS and ASME PCC 2 repair practices. It covers the scope and limitations of API 579, fitness-for-service engineering assessment procedure, remaining life assessment and concept of remaining strength factor; the remediation methods including in-service monitoring, assessment techniques and acceptance criteria and the identification and characterization of damage mechanisms; the various methods of FFS assessments and their application to plant equipment/piping; assessing pitting corrosion and proper selection of pitting charts; the ASME PCC-2 standard as well as the applicability and limitations of repair methods covered by ASME PCC-2; the application of welded repairs and mechanical repairs for non-welding repairs; and the NACE standards, material selection and requirements for piping.

Course Objectives

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

- Apply and gain an in-depth knowledge on API-579 FFS and ASME PCC-2 repair practices
- Enhance the knowledge and experience on inspection and assessment of piping in service and assess the integrity of the piping and components in current state of damage
- Provide insights into repair practices to enhance the process safety with optimum cost involvement for maintenance and improvement of plant availability
- Discuss the NACE standards and application to increase the knowledge on material requirement and selection for piping to avoid over specification for optimum maintenance cost
- Enhance the knowledge and experience to assess the reported defects and recommend and identify ideal repair options for pressure and piping equipment in line with codes requirement
- Review in-service degradation and damage suffered by pressure vessels and piping including the damage inspection and evaluation of inspection findings
- Recognize the scope and limitations of API 579, fitness-for-service engineering assessment procedure, remaining life assessment and concept of remaining strength factor
- Carryout remediation methods including in-service monitoring, assessment techniques and acceptance criteria and the identification and characterization of damage mechanisms
- Employ various methods of FFS assessments and their application to plant equipment/piping
- Assess pitting corrosion and proper selection of pitting charts
- Discuss ASME PCC-2 standard as well as the applicability and limitations of repair methods covered by ASME PCC-2
- Apply welded repairs and mechanical repairs for non-welding repairs
- Discuss the NACE standards, material selection and requirements for 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, 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 a wide understanding and deeper appreciation of fitness-for-service, remaining life assessment and repair of pressure equipment and piping for senior piping and inspection engineers, integrity assessment engineers, operations engineers, maintenance engineers, maintenance supervisors, facility integrity supervisors, corrosion engineers, corrosion specialists, site inspection engineers, inspectors, piping engineers, mechanical engineers, plant managers, plant engineers, project engineers and engineers who are responsible for maintaining the integrity of process plant equipment and piping.

Training Methodology

This interactive training course includes the following training methodologies as a percentage of the total tuition hours:-

30% Lectures
20% Workshops & Work Presentations
30% Case Studies & Practical Exercises
20% Software, Simulators & Videos

In an unlikely event, the course instructor may modify the above training methodology before or during the course for technical reasons.

Course Fee

Abu Dhabi	**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.
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.
Istanbul	**US$ 5,000** 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 **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.

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. Mahmoud Shama is a **Senior Inspection Engineer** with over **20 years** of **Offshore** & **Onshore** experience within the **Petrochemical**, **Refinery** and **Oil & Gas** industries. His expertise widely evolves in the construction, installation fabrication, erection, inspection, maintenance, assessment, rating, repair, alteration, reconstruction and integrity assessment of **Piping**, **Pipelines**, **Tanks**, **Fuel Storage Tanks**, **Rotating Equipment**, **Static Equipment**, **Refractory Inspection**, **Pressure Vessels**, **Heat Exchangers**, **Boilers**, **Furnace**, **Cryogenic** (LNG) **Tanks Plant Piping**, **Welding Technology**, **Metallurgy**, **Condition Monitoring**, **Corrosion Monitoring**, **Cathodic Protection**, **Process Inspections**, **Painting**, **Vibration Analysis**, **NDT Activities**, **Construction & Mechanical Integrity**, **Process Piping Design** and **Failure Analysis**. He has further practical experience in **ISO Certifications**, **QA/QC**, Lifting Equipment, Oil Heaters, Coolers, Re-Boilers, Separators, Gas Boots, LPG Bullets, Air Driers, Sand Blasting and at the same time, he is an **international expert** with **several codes** and **standards** in the process industry such as **API**, **ASME**, **CSWIP**, **ANSI**, **ASTM**, **NACE**, **TEMA**, **HEI**, **ISO**, **AUC**, etc.

Throughout his career life, Mr. Mahmoud has provided significant contributions to the industries by acquiring **key positions** such as being the **Lead Integrity Engineer**, **Senior Welding Inspector**, **Inspector Engineer**, **NDT & Document Controller**, **Technical Instructor** and **API & Corrosion Instructor** for international companies such as **SEGAS** and **GPC** just to name a few.

Mr. Mahmoud has a **Bachelor's** degree in **Mechanical Engineering** and is currently taking a **Diploma** in **Applied Chemistry**. He is a Certified Senior Welding Inspector (**CSWIP**), Certified Risk Based Inspection (**API-580**), Certified Tank Inspector (**API-653**), Certified Pressure Vessel Inspector (**API-510**), Certified Damage Mechanisms Inspector (**API-571**), Certified Refractory Inspector (**API-936**), Certified Piping Inspector (**API 570**), Certified **ISO9001-2000 Lead Auditor** as well as a **Certified ASNT Level I & II** in **Radiographic** Testing, Ultrasonic Testing (**UT**), Magnetic Testing (**MT**), Liquid Penetrate Test (**PT**), a **Certified Internal Verifier/Assessor/Trainer** by the **Institute of Leadership & Management** (**ILM**) and a **Certified Instructor/Trainer**.

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*** *Review In-Service Degradation and Damage Suffered by Pressure Vessels & Piping ● Damage Inspection & Evaluation of Inspection Findings*
0930 – 0945	*Break*
0945 – 1130	***API 579 Standard (Fitness for Service)*** *Scope & Limitations of API 579 ● Fitness-for-Service Engineering Assessment Procedure*
1130 – 1230	***API 579 Standard (Fitness for Service) (cont'd)*** *Remaining Life Assessment ● Concept of Remaining Strength Factor*
1230 – 1245	*Break*
1245 – 1420	***Remediation Methods*** *In-Service Monitoring ● Assessment Techniques & Acceptance Criteria (Level 1, 2 & 3 Assessment) ● Identification & Characterization of Damage Mechanisms*
1420 – 1430	***Recap***
1430	*Lunch & End of Day One*

Day 2

0730 – 0930	***Methods of FFS Assessments (Level 1) & Their Application to Plant Equipment/Piping. Decision-making: "Run, Repair & Replace"*** *Concept of Remaining Strength Factor ● Concept of FAD ● Calculating Safe MAWP ● Assessment of Existing Equipment for Brittle Fracture*
0930 – 0945	*Break*
0945 – 1130	***Methods of FFS Assessments (Level 1) & Their Application to Plant Equipment/Piping. Decision-making: "Run, Repair and Replace" (cont'd)*** *Assessment of General Metal Loss Thickness Averaging Method Critical Thickness Profiles ● Concept of COV Acceptance Criteria ● Remediation Methods ● Assessment of Local Metal Loss*
1130 – 1230	***Assessment of Pitting Corrosion, Selection of Pitting Charts*** *Calculation of RSF Calculation of Safe MAWP ● Assessment of Hydrogen Blisters & Hydrogen Damage – HIC & SOHIC ● Determining Dimensions of Affected Area ● Acceptance Criteria ● Assessment of Weld Misalignment & Shell Distortions ● Assessment of Crack-like Flaws*
1230 – 1245	*Break*
1245 – 1420	***Assessment of Pitting Corrosion, Selection of Pitting Charts (cont'd)*** *Crack Characterization ● Crack Orientation & Crack Depth ● Use of Failure Assessment Diagrams ● Assessment of Cracks in the Weld ● Assessment of Cracks Outside the Weld ● Assessment of Components Operating in the Creep Range*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Two*

Day 3

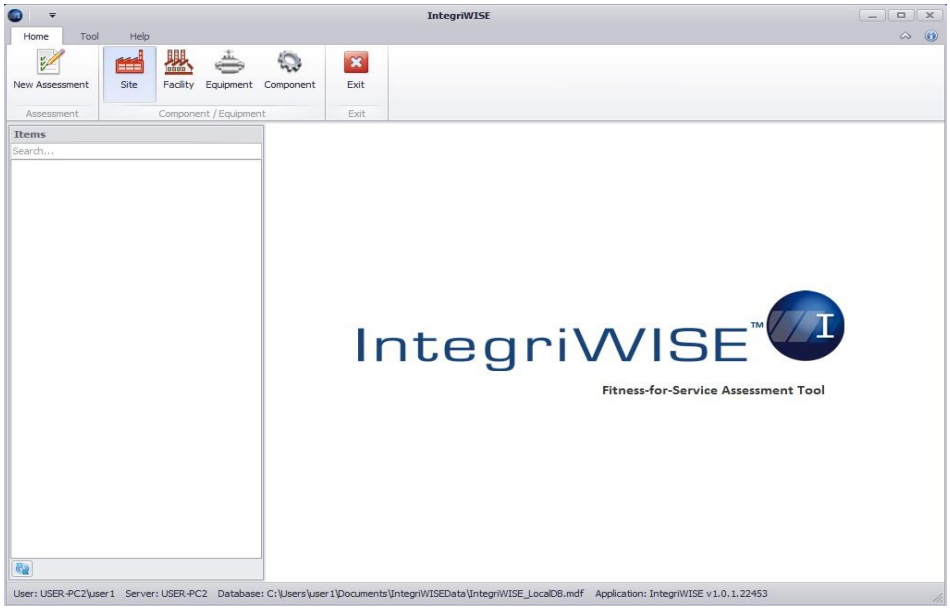
0730 – 0930	***Assessment of Pitting Corrosion, Selection of Pitting Charts (cont'd)*** *Assessment of Fire Damage ● Description of Fire Zones ● Fire Zones Which Cause No Damage ● Fire Zones Which Cause Substantial Damage ● Method to Determine New MAWP of Equipment*
0930 – 0945	*Break*
0945 – 1130	***Assessment of Pitting Corrosion, Selection of Pitting Charts (cont'd)*** *Assessment of Dents, Gouges & Dent-Gouge Combinations ● Assessment of Laminations ● Introduction to Fatigue Analysis ● Relevance of API 579 Standard with Other Codes*
1130 – 1230	***ASME PCC-2 Standard (Repair of Pressure Equipment & Piping)*** *Scope, Organization & Intent ● Applicability & Limitations of Repair Methods Covered by ASME PCC-2 ● Choosing Correct Repair Technique for Given Defects*
1230 – 1245	*Break*
1245 – 1420	***ASME PCC-2 Standard (Repair of Pressure Equipment & Piping) (cont'd)*** *Cost-effective Repairs ● Detailed Repair Methods & Inspection Techniques ● Inspection of Pressure Vessels, Rating, Repair & Alteration ● Remaining Life Calculation of Pressure Vessels*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Three*

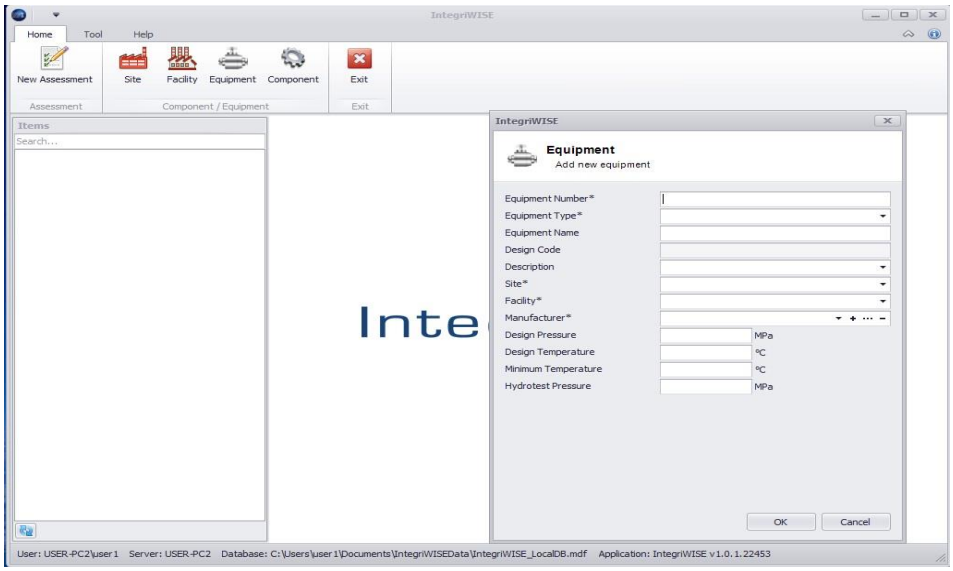
Day 4

0730 – 0930	***Welded Repairs*** *Butt-Welded Insert Plates in Pressure Components ● Weld Overlay to Repair Internal Thinning ● Welded Leak Box Repair ● Full Encirclement Steel Reinforcing Sleeves for Piping ● Fillet Welded Patches ● Alternatives to Post-Weld Heat Treatment ● In-Service Welding onto Carbon Steel Pressure Components or Pipelines ● Weld Build-up, Weld Overlay & Clad Restoration*
0930 – 0945	*Break*
0945 – 1130	***Mechanical Repairs (Non-Welding Repairs)*** *Mechanical Clamp Repair ● Inspection & Repair of Shell & Tube Heat Exchangers ● Examination & Testing ● Pressure & Tightness Testing of Piping & Equipment*
1130 – 1230	***Mechanical Repairs (Non-Welding Repairs) (cont'd)*** *Pneumatic Testing- Do's & Don'ts ● Non-destructive Examination in Lieu of Pressure Testing for Repairs & Alterations ● Relevance of ASME PCC-2 Standard with API 510 & API 570 Codes ● Documentation & Records of Repairs*
1230 – 1245	*Break*
1245 – 1345	***NACE Standards, Material Selection & Requirements for Piping***
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 "IntegriWISE™" simulators.





IntegriWISE™

Course Coordinator

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