COURSE OVERVIEW FE0113(GA2)
ASME PCC-2 Repair of Pressure Equipment Piping

Course Title
ASME PCC-2 Repair of Pressure Equipment Piping

Course Date/Venue
October 20-24, 2024/SAS Meeting Room, Holiday Inn Muscat al Seeb, an IHG Hotel, Muscat, Oman

Course Reference
FE0113(GA2)

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

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 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

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$ 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.

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 **Senior Welding & 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 **ASME Post Construction Code**, **Inspection Planning**, **Fitness-for-Service** (**FFS**) (**API 579**), **Repair Techniques**, **Assessment & Repair of Pressure Equipment & Piping**, Risk-Based Inspection (**RBI**), **API 650: Welded Tanks for Oil Storage**, **Welding Technology**, **Welding & Fabrication**, **Welding Inspection**, **Pipeline** Operation & Maintenance, **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 and **Land Surveying** & Property Evaluation. 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, Welding 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 Ingeneria 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 a **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: ***Sunday, 20th of October 2024***

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: ***Monday, 21st of October 2024***

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: Tuesday, 22nd of October 2024

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: 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: 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: Wednesday, 23rd of October 2024

0730 – 0930	***ASME PCC-2: Welded Repairs*** *Butt-Welded Insert Plates in Pressure Components ● Weld Overlay to Repair Internal Thinning*
0930 – 0945	*Break*
0945 – 1130	***ASME PCC-2: Welded Repairs (cont'd)*** *Welded Leak Box Repair ● Full Encirclement Steel Reinforcing Sleeves for Piping*
1130 – 1230	***ASME PCC-2: Welded Repairs (cont'd)*** *Fillet Welded Patches ● Alternatives to Post-Weld Heat Treatment*
1230 – 1245	*Break*
1245 – 1420	***ASME PCC-2: Welded Repairs (cont'd)*** *In-Service Welding onto Carbon Steel Pressure Components or Pipelines ● Weld Build-up, Weld Overlay & Clad Restoration*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Four*

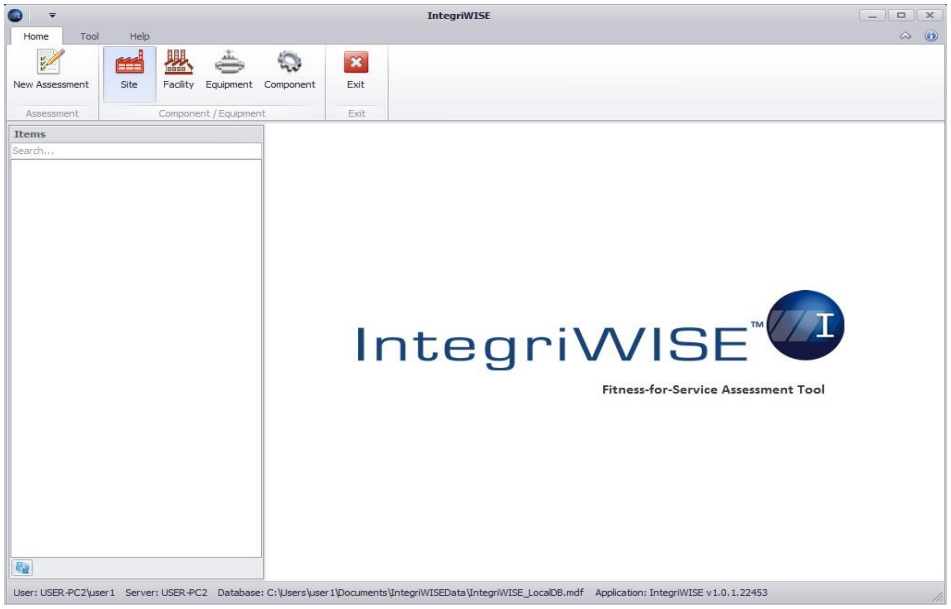
Day 5: Thursday, 24th of October 2024

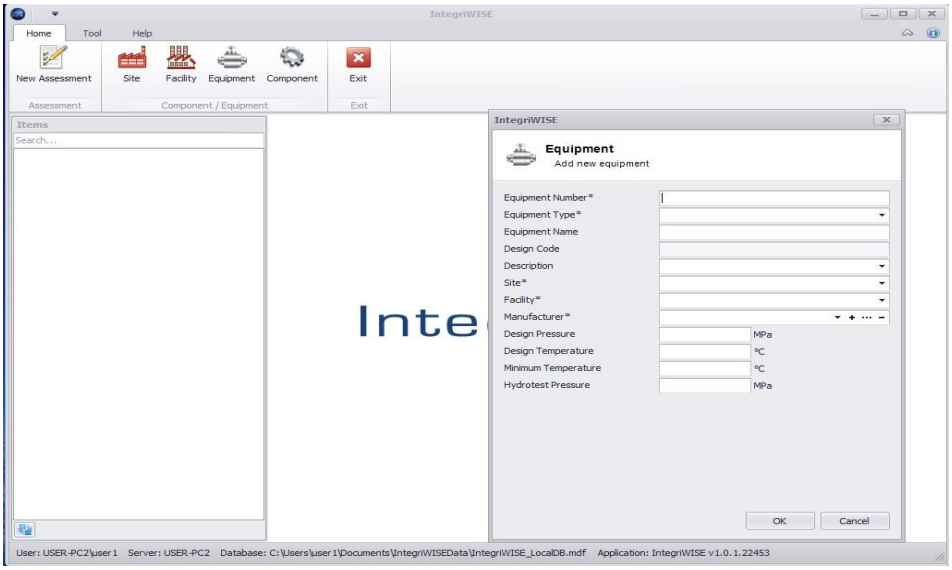
0730 – 0930	***ASME PCC-2: Mechanical Repairs (Non-Welding Repairs)*** *Flange Repair ● Mechanical Clamp Repair ● Inspection & Repair of Shell & Tube Heat Exchangers*
0930 – 0945	*Break*
0945 – 1130	***ASME PCC-2: Mechanical Repairs (Non-Welding Repairs) (cont'd)*** *Examination & Testing ● Pressure & Tightness Testing of Piping & Equipment ● Pneumatic Testing- Do's & Don'ts*
1130 – 1230	***ASME PCC-2: Mechanical Repairs (Non-Welding Repairs) (cont'd)*** *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

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