

**COURSE OVERVIEW FE0430**

**Welding Engineering: Welding, Fabrication and Inspection (AWS, ASME and API Codes)**

**Course Title**

Welding Engineering: Welding, Fabrication and Inspection (AWS, ASME and API Codes)

**Course Reference**

FE0430

**Course Duration/Credits**

Five days/3.0 CEUs/30 PDHs



**Course Date/Venue**

Session(s)	Date	Venue
1	April 28-May 02, 2024	Oryx Meeting Room, Doubletree By Hilton Doha-Al Sadd, Doha, Qatar
2	June 23-27, 2024	The Kooh Al Noor Meeting Room, The H Dubai Hotel, Sheikh Zayed Rd - Trade Centre, Dubai, UAE
3	September 29-October 03, 2024	Kizkulesi, Crown Plaza Istanbul Asia Hotels & Convention Center, Istanbul, Turkey
4	February 24-28, 2025	Hampstead Meeting Room, London Marriott Hotel Regents Park, London, United Kingdom

**Course Description**



**This practical and highly-interactive course includes various practical sessions and exercises. Theory learnt in the class will be applied using the following practical methods: -**



**(1) Industrial Facility Visit:** Course participants will be taken to an industrial facility where they will practice welding, fabrication and inspection. In case that this course is organized inside client premises (In-House), then client shall provide access to its welding and fabrication workshop for practical sessions.

**(2) Welding Simulator:** Participants will use in the class the welding & fabrication software and AWS Tool Kit & Structural Weld Replica Kit to practice some of the skills learnt.



Welding Technology plays a major role in all maintenance and fabrication activities in the industry. Production equipment, a highly sophisticated welding technique and qualified personnel allow processing or production of steel products for different applications within short periods. This course provides a much-needed source of authoritative information on the complex subject of welding. It provides a comprehensive run-down of the complex science of welding-processes, selection of power sources, weld metallurgy, weldability of metals, testing and inspection techniques.

The course will cover welding processes (GTAW, SMAW, MIG, FCAW, SAW, OAW), welding consumables, design of welded joints, applied welding metallurgy and heat treating, welding quality control, non-destructive testing and major International Welding Codes and Standards such as AWS and API.

Each session will be conducted in a lecture/discussion format and videos designed to provide intensive instruction and guidance. The director will be available following each day's session to provide participants with further opportunity for discussion and consideration of specific problems.

The course includes detailed discussions about welding of pipelines and related facilities in accordance with API 1104, AWS D1.1, ASME IX and API 577 codes and standards.

### Course Objectives

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

- Apply and gain an in-depth knowledge on welding technology including welding, fabrication and inspection in accordance with AWS, ASME and API codes and standards
- Differentiate the various welding process such as SMAW, GTAW, GMAW, FCAW and OAW
- Identify the arc welding consumables including welding wires, coated electrodes, sub arc wires and fluxes, neutral and active fluxes and shielding gases
- Describe the properties and strength of materials and carryout destructive testing
- Analyze the fatigue of welded structures, joint design as well as dissimilar welds and weld overlays
- Characterize the metallurgical properties of steel and heat treatment and implement welding quality control
- Practice the latest standards and procedure for welding pipeline and employ related facilities
- Discuss the history and structure of API 1104, AWS D1.1 and ASME code
- Explain the standards and specification of ASME Sec IX and practice the correct welding procedures as well as supplemental variables and special consideration for notch toughness
- Implement welding safety with proper procedure and specification
- Inspect welding in accordance with API 577 standard

### Exclusive Smart Training Kit - H-STK®



Participants of this course will receive the exclusive "Howard 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 is intended for welding engineers, inspection engineers, facility integrity engineers, fabrication engineers, mechanical engineers, NDT personnel, quality assurance personnel, testing laboratory personnel, and maintenance personnel. Further, this course is a must for anyone involved in inspection of welding construction, qualifying welders, brazers and operators; or involved in writing and qualifying welding and brazing procedure specifications; those responsible for reviewing supplier procedures, auditing or reviewing in-house procedures and qualifications; and those who estimate jobs in compliance of ASME code.

**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**

Doha	<b>US\$ 6,000</b> per Delegate. This rate includes H-STK® (Howard Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.
Dubai	<b>US\$ 5,500</b> per Delegate + <b>VAT</b> . This rate includes H-STK® (Howard Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.
Istanbul	<b>US\$ 6,000</b> per Delegate + <b>VAT</b> . This rate includes Participants Pack (Folder, Manual, Hand-outs, etc.), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.
London	<b>US\$ 8,800</b> per Delegate + <b>VAT</b> . This rate includes Participants Pack (Folder, Manual, Hand-outs, etc.), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

**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**

Haward Technology is accredited by the following international accreditation organizations: -

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American Welding Society (AWS)

Haward Technology is the **International Agent** of the **American Welding Society (AWS)** and the Authorized Provider of AWS international certification examinations outside the USA. Haward Technology exhibits compliance and adherence to **AWS Quality Control Standards** in the development, conduct and delivery of certification courses and exams for welding and inspection professionals on behalf of the American Welding Society.

The American Welding Society’s certification programs are internationally recognized and are used as a benchmark of quality workmanship and skills within the welding industry around the world.


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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.

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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 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<sub>2</sub>S 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**.

### 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	<b>PRE-TEST</b>
0830 - 0930	<b>Welding Processes</b> Fundamentals • SMAW (Shielded Metal Arc) • GTAW (Gas Tungsten Arc) • GMAW (or MIG) (Gas Metal Arc) • FCAW (Flux Cored Arc)
0930 - 0945	Break
0945 - 1030	<b>Welding Processes (cont'd)</b> SAW (Submerged Arc) • Stud Welding • OAW (Oxy Acetylene) • High Energy, Special & Hybrid Welding Processes • Power Sources for Arc Welding • Brazing & Cutting Processes
1030 - 1130	<b>Classification of Arc Welding Consumables</b> Coated Electrodes • GMAW & GTAW Wires • FCAW Wires
1130 - 1230	<b>Classification of Arc Welding Consumables (cont'd)</b> Sub Arc Wires & Fluxes • Neutral & Active Fluxes • Shielding Gases
1230 - 1245	Break
1245 - 1420	<b>Properties &amp; Strength of Materials</b> Material Properties • Destructive Testing
1420 - 1430	<b>Recap</b>
1430	Lunch & End of Day One

#### Day 2

0730 - 0830	<b>Fatigue of Welded Structures</b> Fatigue Mechanisms • Weld Finish Classifications
0830 - 0930	<b>Joint Designs</b> Joints • Symbols • Preparation • Design for Productivity
0930 - 0945	Break
0945 - 1045	<b>Dissimilar Welds &amp; Weld Overlays</b>
1045 - 1215	<b>Metallurgical Properties of Steel &amp; Heat Treatment</b> Metallurgical Properties of Steel • Preheating • Post Weld Heat Treatment (PWHT) • Field Heat Treating Equipment • Plans for PWHT
1215 - 1230	Break
1230 - 1420	<b>Welding Quality Control</b> Planning for QC • Welding Problems & Defects • Visual Inspection • Employment of NDT • Welder Training & Qualification • CSWIP vs. ASNT Qualification
1420 - 1430	<b>Recap</b>
1430	Lunch & End of Day Two

### Day 3

0730 – 0845	<b>Welding of Pipelines &amp; Related Facilities (API 1104)</b> General • Referenced Publications • Definition of Terms • Specifications • Qualification of Welding Procedures for Welds Containing Filler-Metal Additives • Qualification of Welders • Design & Preparation of a Joint for Production Welding
0845 – 0945	<b>Welding of Pipelines &amp; Related Facilities (API 1104) (cont'd)</b> Inspection & Testing of Production Welds • Acceptance Standards for Nondestructive Testing • Repair & Removal of Defects • Alternative Acceptance Standards for Girth Welds • In-Service Welding
0945 – 1000	Break
1000 – 1115	<b>Welding of Pipelines &amp; Related Facilities (API 1104) (cont'd)</b> Procedures for Nondestructive Testing • Automatic Welding • Automatic Welding without Filler-Metal Additions
1115 – 1230	<b>API 1104 &amp; AWS D1.1: History &amp; Structure</b> Historical Development of AWS D1.1 & API 1104 • Pre-Qualification & Qualification of Welding Procedures • The Use of Pre-qualified Procedures • Base Metal Classifications to AWS & API
1230 – 1245	Break
1245 – 1420	<b>ASME Code, History &amp; Structure</b> Historical Development of Section IX • Relationship of Section IX to Other Codes (ASME V111 & B31.3) • Organization, Structure & Mechanics of Using Section IX–Essential, Non-Essential & Supplemental Essential Variables
1420 – 1430	<b>Recap</b>
1430	Lunch & End of Day Three

### Day 4

0730 – 0900	<b>ASME Section IX: Base &amp; Filler Metal Specifications</b> P numbers & Base Metal Classifications • F-numbers • A-Numbers • SFA & Non-SFA Filler Metal Specifications • The Use of Standard Welding Procedures
0900 – 0930	Break
0930 – 1130	<b>ASME Section IX: Selecting &amp; Preparing the Test Coupon for Both Procedure &amp; Welder Qualifications</b> Obtaining Maximum Cost-Effectiveness from Test Coupons • Preparation & Welding of the Test Coupon • Recording Both Necessary & Worthwhile Data • Demonstrating Code Compliance
1130 – 1230	<b>ASME Section IX: Writing Welding Procedure Specification</b> Meeting Code Requirements • Addressing Customer Requirements • Providing Direction to the Welder • Sources of Information for Preparing Intelligent & Meaningful Welding Procedure Specifications
1230 – 1245	Break
1245 – 1420	<b>ASME Supplemental Variables – Special Consideration for Notch-Toughness</b> How Welding Influences Toughness • Toughness Requirements of Construction Codes • Measuring & Recording Heat Input Data • Translating Heat Input Data Into Useful Directions for a Welder • Typical Construction Code Requirements
1420 – 1430	<b>Recap</b>
1430	Lunch & End of Day Four



**Day 5**

0730 – 0900	<b>Welding Safety</b> Electric Shock • Radiation • Fire & Explosions • Eye Injuries • Fume • Hearing Impairment
0900 – 0915	Break
0915 – 1100	<b>Procedure Specification</b> Use of Section IX Form • Other Formats • Procedure Qualification Record Forms • Revisions to Records & Procedures • Take-Home Test
1100 – 1230	<b>API 577 Welding Inspection</b> Welding Inspection Procedure • NDT
1230 – 1245	Break
1245 – 1345	<b>API 577 Welding Inspection (cont'd)</b> Metallurgy • Refinery & Petrochemical Plant Welding Issues
1345 – 1400	<b>Course Conclusion</b>
1400 – 1415	<b>POST-TEST</b>
1415 – 1430	Presentation of Course Certificates
1430	Lunch & End of Course



**Practical Sessions**

This practical and highly-interactive course includes real-life case studies and exercises:-



## Simulator (Hands-on Practical Sessions)

### Welding & Fabrication

Advanced E-Learning Programme

Aligned to National Occupational Standards







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6: MIG Welding, 3: The Welding Process

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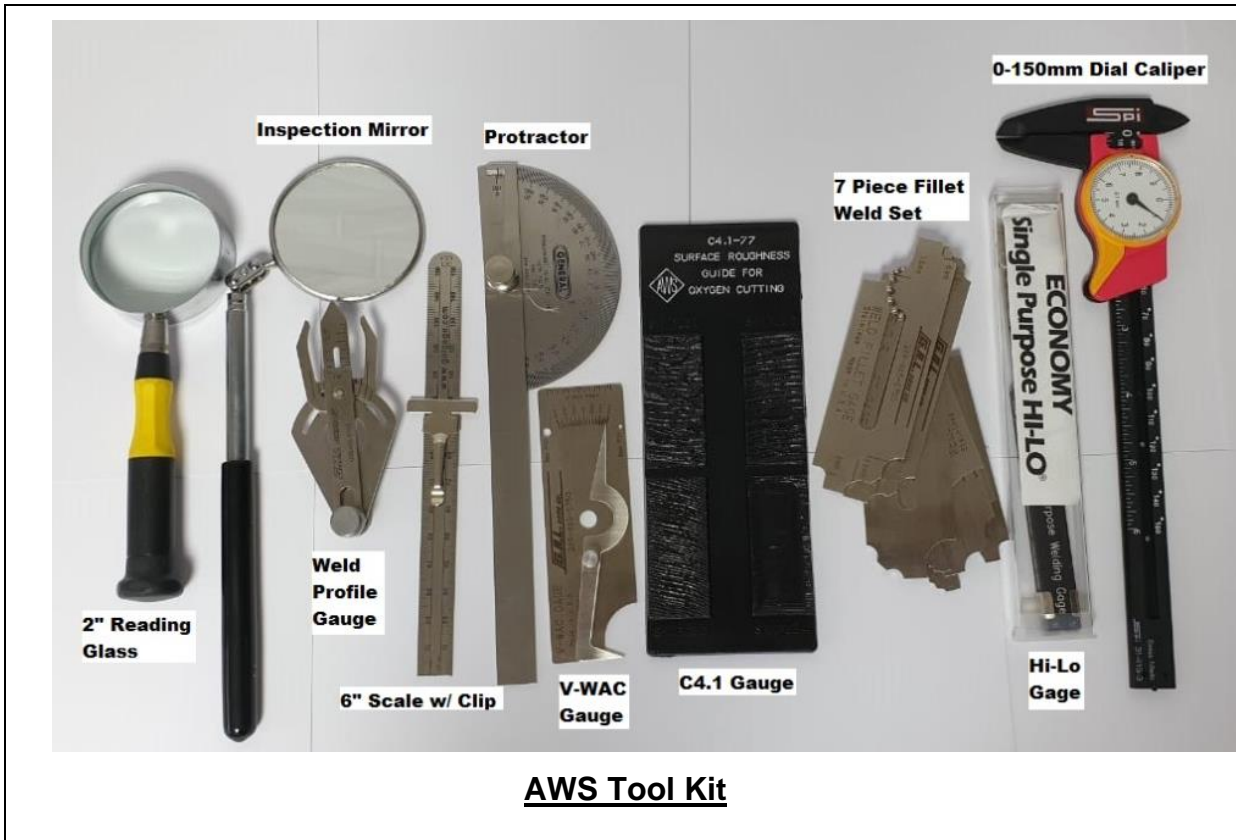
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E-Welding & Fabrication



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