COURSE OVERVIEW FE0429
ASME IX: Welding Procedure Specifications (WPS), Procedure Qualification Records (PQR) & Welder Performance Qualification (WPQ)

Course Title
ASME Section IX: Welding Procedure Specifications (WPS), Procedure Qualification Records (PQR) & Welder Performance Qualification (WPQ)

Course Date/Venue
May 25-29, 2025/Tamra Meeting Room, Al Bandar Rotana Creek, Dubai UAE

Course Reference
FE0429

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 course is designed to provide participants with a comprehensive overview of ASME Section IX: Welding Procedure Specifications (WPS), Procedure Qualification Records (PQR) & Welder Performance Qualification (WPQ). It covers the ASME boiler and pressure vessel code, scope and application of Section IX, overall welding technology and key definitions and terminologies; the code organization and interpretation, code organization techniques, work responsibilities, responsibilities of fabricators and inspectors, welding process and welding processes in Section IX; and the procedure qualification record (PQR) requirements, essential variables for PQR, supplementary essential variables (toughness) and nonessential variables and their flexibility.

Further, the course will also discuss the test coupons and test positions covering dimensions and preparation, grove, fillet, and overlay coupons, welding positions and role of ASME Section IX figures; the testing methods and acceptance criteria, writing and reviewing a welding procedure specification (WPS) and essential variables for WPS (by process); the range of qualification covering thickness ranges for base and weld metal, diameter limits for pipes, multiple processes and joint types and qualification for production use; supporting multiple WPS with one PQR; the variables for prequalified WPS (code cases) and welder/welding operator qualification; and the essential variables for welder qualification.

During this interactive course, participants will learn the WPQ test methods and acceptance criteria covering visual inspection, bend test, radiographic and ultrasonic examination and fillet weld break, macro-etch, discontinuity limits and defect rejection; the WPQ recordkeeping and certification, multiple process qualifications and performance qualification exercises; the brazing and other special processes, qualification of non-destructive examination personnel and nonconformities and common errors in Section IX and welding inspection technology; the auditing and compliance verification covering internal and external audit expectations, checklist for code compliance, handling NCRS and observations and roles of QA/QC during ASME audits; and the Section I pressure part qualification, Section VIII vessel manufacturing considerations, Section B31.3 piping system welding and harmonization and cross-reference of variables.

Course Objectives

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

- Apply and gain an in-depth knowledge on welding procedure specifications (WPS), procedure qualification records (PQR) and welder performance qualification (WPQ) in accordance with ASME IX
- Discuss ASME boiler and pressure vessel code, scope and application of Section IX, overall welding technology and key definitions and terminologies
- Recognize code organization and interpretation, code organization techniques, work responsibilities, responsibilities of fabricators and inspectors, welding process and method and welding processes in Section IX
- Identify procedure qualification record (PQR) requirements, essential variables for PQR, supplementary essential variables (toughness) and nonessential variables and their flexibility
- Describe test coupons and test positions covering dimensions and preparation, grove, fillet, and overlay coupons, welding positions and role of ASME Section IX figures
- Apply testing methods and acceptance criteria, inspection method and technology, write and review welding procedure specification (WPS) and identify essential variables for WPS (by process)
- Discuss the range of qualification covering thickness ranges for base and weld metal, diameter limits for pipes, multiple processes and joint types and qualification for production use
- Support multiple WPS with one PQR, recognize variables for prequalified WPS (code cases) and welders and welding qualification
- Review welder/welding operator qualification and essential variables for welder qualification
- Employ WPQ test methods and acceptance criteria covering visual inspection, bend test, radiographic and ultrasonic examination and fillet weld break and macro-etch and discuss discontinuity limits and defect rejection
- Apply WPQ recordkeeping and certification, multiple process qualifications and performance qualification exercises

- Implement brazing and other special processes, qualification of non-destructive examination personnel and identify nonconformities and common errors in Section IX and welding inspection technology
- Carryout auditing and compliance verification covering internal and external audit expectations, checklist for code compliance, handling NCRS and observations and roles of QA/QC during ASME audits
- Discuss Section I pressure part qualification, Section VIII vessel manufacturing considerations, Section B31.3 piping system welding and harmonization and cross-reference of variables

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 an overview of all significant aspects and considerations of welding procedure specifications (WPS), procedure qualification records (PQR) and welder performance qualification (WPQ) in accordance with ASME IX 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 those who are involved in inspection of welding construction, qualifying welders, brazers and operators or involved in writing and qualifying welding and brazing procedure specifications, 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 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: -

- 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.

- 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.

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.

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 **30 years** of industrial experience in the **Oil & Gas**, **Refineries** and **Petrochemical** industries. His expertise includes **ASME Section IX,** Welding and Brazing, **API & ASME** Standards Applicable to Process Industry, **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, **Welding & Cutting Fundamental**, **Advanced Welding**, **Welding Technology & Qualifications**, **Welding Fundamentals**, **Symbols for Welding**, **Welding Techniques and Failure**, **Pipeline Welding Practices**, **Welding Inspection Technology**, **Welding Inspection**, **Resistance Welding**, **Facility Integrity**, **Technical Integrity**, **Repair** of **Pressure Equipment** and **Piping, Process Piping, Valves, Flanges and Fitting Standards**, **Integrated Safety Management Plan**, **Inspection**, **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**.

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:-

Day 1:	***Sunday, 25th of May 2025***
0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0900	***Overview of ASME Boiler & Pressure Vessel Code*** *Structure and Purpose of ASME BPVC • Role of Section IX Within the Code • Scope of Pressure-Retaining Items and Process Piping • Relationship to Sections I, II, V, and VIII*
0900 – 0930	***Scope & Application of Section IX*** *Applicability to Welding and Brazing • Pressure Boundary and Non-Pressure Parts • Manufacturing versus Repair and Alteration Work • Mandatory versus Nonmandatory Appendices*
0930 – 0945	*Break*
0945 – 1015	***Understanding Overall Welding Technology*** *Evolution of Welding Technology • Modern Advancements in Welding Processes • Industrial Applications and Material Types • Key Challenges in Welding Operations*
1015 – 1100	***Key Definitions & Terminologies*** *WPS, PQR, WPQ/WPQTR • Essential, Nonessential, and Supplementary Variables • Base Metals, Filler Metals, F-Numbers, P-Numbers • Backing, Joint Design, and Positions*
1100 – 1130	***Code Organization & Interpretation*** *Understanding Part QW for Welding • Navigating QW Articles and Tables • Use of Figures and Illustrative Examples • How to Use Section IX with Section II and V*
1130 – 1230	***Understanding Code Organization Techniques*** *Code Structure and Logical Flow • Use of Indexes, Tables, and References • Interpretation of Figures and Annexes • Cross-Referencing with Sections II and V*
1230 – 1245	*Break*
1245 – 1330	***Work Responsibilities*** *Roles of Fabricators and Inspectors • Documentation and Procedural Ownership • Coordination with QA/QC and Third-Party Bodies • Compliance Accountability*
1330 – 1420	***Responsibilities of Fabricators & Inspectors*** *Documentation Requirements • Retention and Review of Qualifications • Roles of Certifying Authority and Third-Party Inspectors • Common Compliance Issues*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day One*

Day 2: Monday, 26th of May 2025

0730 – 0830	***Learning of Welding Process & Method*** *SMAW, GTAW, GMAW, SAW Overview • Selection Criteria for Welding Methods • Equipment and Setup Considerations • Heat Input, Penetration, and Distortion*
0830 – 0930	***Review of Welding Processes in Section IX*** *Covered Processes (SMAW, GTAW, GMAW, SAW, etc.) • Advantages and Applications of Each Process • Limitations and Code References per Process • Requirements Unique to Each Process*
0930 – 0945	*Break*
0945 – 1030	***Procedure Qualification Record (PQR) Requirements*** *Purpose and Documentation of PQR • Mechanical Tests: Tension, Bend, Impact Tests • Supporting a WPS with PQR Data • Essential and Supplementary Variables for Qualification*
1030 – 1100	***Essential Variables for PQR*** *Changes Requiring Requalification • Material Groupings and Thickness Ranges • Welding Positions and Joint Types • Heat Input and Interpass Temperature*
1100 – 1130	***Supplementary Essential Variables (Toughness)*** *When Impact Testing is Required • Variables Affecting Notch Toughness • Low-Temperature Service Implications • Test Coupon Preparation and Orientation*
1130 – 1230	***Nonessential Variables & Their Flexibility*** *Changes Allowed Without Requalification • Joint Design, Technique, and Backing • Transfer Modes in GMAW • Limits of Acceptable Modifications*
1230 - 1245	*Break*
1245 – 1330	***Test Coupons & Test Positions*** *Dimensions and Preparation • Groove, Fillet, and Overlay Coupons • Welding Positions: Flat, Horizontal, Vertical, Overhead • Role of ASME Section IX Figures (QW-461.3)*
1330 – 1420	***Testing Methods & Acceptance Criteria*** *Tensile Strength and Elongation • Face and Root Bend Tests • Guided Bend and Side Bend Criteria • Impact Test Procedures per Section II Part D*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day Two*

Day 3: Tuesday, 27th of May 2025

0730 – 0830	***Inspection Method & Technology*** *Overview of Visual, Radiographic, Ultrasonic Testing • Advantages and Limitations • Inspection Planning and Execution • Documentation and Reporting*
0830 – 0930	***Writing & Reviewing a WPS*** *Format and Required Contents • Weld Metal and Base Metal Specification • Filler Metal and Shielding Gas Details • Joint Design, Backing, and Technique*
0930 – 0945	*Break*
0945 – 1030	***Essential Variables for WPS (by Process)*** *Specific Changes Affecting Each Process • Examples for SMAW, GTAW, GMAW, SAW • Overlay and Cladding Process Variables • Interpreting QW-252 Tables*

1030 – 1130	***Range of Qualification*** *Thickness Ranges for Base and Weld Metal • Diameter Limits for Pipes • Multiple Processes and Joint Types • Qualification for Production Use*
1130 – 1230	***Supporting Multiple WPS with One PQR****When and How a Single PQR Supports Several WPS • Limits of Combination and Extrapolation • Using the Same PQR for Different Thicknesses • Format for Referencing PQR in WPS*
1230 – 1245	*Break*
1245 - 1330	***Variables for Prequalified WPS (Code Cases)*** *When Prequalification Applies • Advantages and Limitations • Examples from Industry Practice • Code Cases versus Standard ASME Guidance*
1330 – 1420	***WPS Qualification Examples & Workshop*** *Group Activity on Preparing a Sample WPS • Matching PQR Data with WPS • Peer Review and Critique • Troubleshooting Typical WPS Errors*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day Three*

Day 4: ***Wednesday, 28th of May 2025***

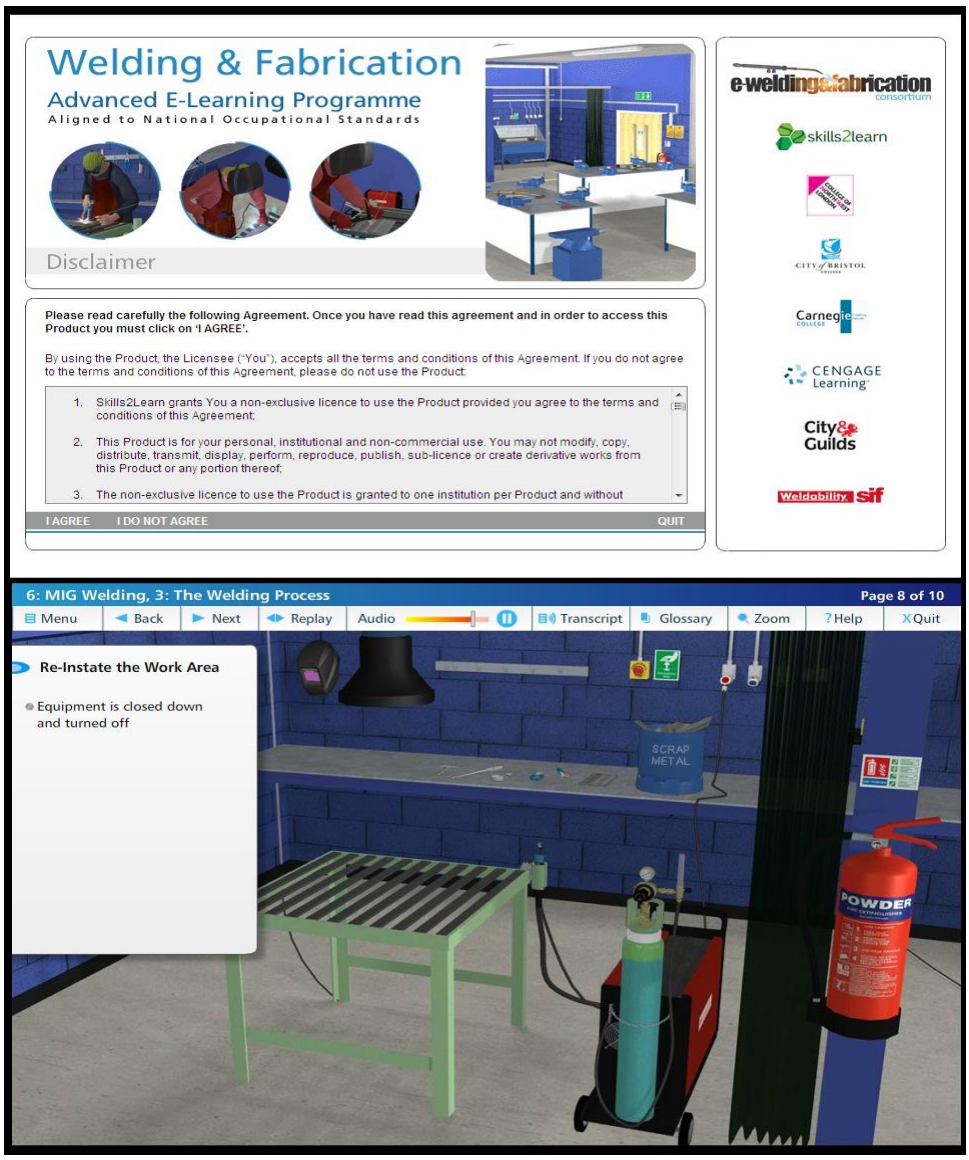
0730 – 0830	***Welders & Welding Qualification*** *Qualification Ranges and Essential Variables • Process-Specific Welder Qualification • Test Coupon Preparation and Evaluation • Maintaining Welder Qualification Status*
0830 – 0930	***Welder/Welding Operator Qualification Overview*** *Requirements for Performance Qualification • Types of Joints and Test Positions • Acceptance Criteria for Welder Tests • Qualified Ranges and Limitations*
0930 – 0945	*Break*
0945 – 1030	***Essential Variables for Welder Qualification*** *Changes that Invalidate WPQ • Position, Process, and Material Group • Joint Design and Base Metal Thickness • Role of Simulated Production Welds*
1030 – 1130	***WPQ Test Methods & Acceptance Criteria*** *Visual Inspection and Bend Test • Radiographic and Ultrasonic Examination • Fillet Weld Break and Macro-Etch • Discontinuity Limits and Defect Rejection*
1130 – 1230	***WPQ Recordkeeping & Certification*** *Documentation Format (WPQTR) • Validity Period and Continuity Log • Responsibility of Employer/Fabricator • Requalification and Retraining Needs*
1230 – 1245	*Break*
1245 - 1330	***Multiple Process Qualifications*** *When to Combine Tests • Multi-Process Joints and Hybrid Qualifications • Use of Combination Coupons • Review of QW-461.9 Table*
1330 – 1420	***Performance Qualification Exercises*** *Mock Qualification Test Scenarios • Group Interpretation of Results • Filling Out WPQTRs • Applying WPS During Actual Welding*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day Four*

Day 5: **Friday, 29th of May 2025c**

0730 – 0830	***Brazing & Other Special Processes (QW-290)*** *Basic Principles of Brazing • Essential/Nonessential Variables for Brazing • Test Requirements for Procedure and Performance • Special Considerations for Dissimilar Materials*
0830 – 0930	***Qualification of Non-Destructive Examination Personnel*** *NDT Levels and Training Requirements • Certification Standards (e.g., ASNT, ISO 9712) • Responsibilities and Limitations • Maintaining Competency*
0930 – 0945	*Break*
0945 – 1030	***Nonconformities & Common Errors in Section IX*** *Incomplete WPS/PQR Documentation • Misapplication of Thickness or Diameter Ranges • Unqualified Welders Performing Code Work • Misunderstanding of Essential Variable Changes*
1030 – 1130	***Welding Inspection Technology*** *Tools and Techniques for Weld Inspection • Interpretation of Inspection Results • Advances in Inspection Technology • Recordkeeping and Analysis*
1130 – 1230	***Auditing & Compliance Verification*** *Internal and External Audit Expectations • Checklist for Code Compliance • Handling NCRs and Observations • Roles of QA/QC During ASME Audits*
1230 – 1245	*Break*
1245 – 1300	***Case Studies & Industry Examples*** *Boiler Tube Welding Failure Analysis • Improperly Qualified PQR and Legal Disputes • Welder Requalification and Root Cause Analysis • Fabrication Errors Due to WPS Misunderstanding*
1300 – 1345	***Integration with ASME Sections I, VIII, & B31.3*** *Section I Pressure Part Qualification • Section VIII Vessel Manufacturing Considerations • Section B31.3 Piping System Welding • Harmonization and Cross-Reference of Variables*
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 "E-Welding & Fabrication" simulator.



E-Welding & Fabrication

Course Coordinator

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