COURSE OVERVIEW FE0116
Cold Welding

Course Title
Cold Welding

Course Date/Venue
August 17-21, 2025/Al Khobar Meeting Room, Hilton Garden Inn, Al Khobar, KSA

Course Reference
FE0116

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.

This course is designed to provide participants with a detailed and up-to-date overview of Cold Welding. It covers the comparison between cold welding with conventional welding methods; the principles, equipment and tools for cold welding; the surface preparation techniques and the methods for mechanical cleaning, chemical cleaning and ultrasonic cleaning; the cold welding process variables, defects and their prevention; and the cold welding in aerospace engineering, electronics and electrical industries, automotive industry, jewelry and precious metals and medical and biotechnology fields.

During this interactive course, participants will learn the cold welding in nuclear power plants, joining wires in telecommunications, underwater cold welding techniques and emerging applications and innovations; the surface preparation and bonding process; testing and evaluating cold welded joints and implementing safety and best practices in cold welding; the latest developments in cold welding techniques, nano-scale cold welding research, role of AI and automation in cold welding; the metal 3D printing, hybrid additive-subtractive processes, repair and joining of 3D-printed parts and future implications for manufacturing; the environmental and economic aspects of cold welding; the industry standards and compliance requirements, ASTM, ISO, and other regulatory bodies; and the quality control protocols.

Course Objectives

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

- Apply and gain an in-depth knowledge on cold welding
- Compare cold welding with conventional welding methods and discuss its industrial significance and applications
- Discuss the principles of cold welding covering solid-state bonding mechanism, intermolecular forces and metallic bonding, required surface conditions for bonding and factors affecting bond strength
- Explain the role of metal ductility, commonly cold-welded materials (Al, Cu, Au, Ag, etc.), surface cleanliness and oxidation effects and microstructural changes during cold welding
- Identify equipment and tools for cold welding including basic manual cold welding tools, automated and industrial cold welding machines, surface preparation tools and inspection and quality control equipment
- Apply surface preparation techniques and the methods for mechanical cleaning, chemical cleaning and ultrasonic cleaning
- Differentiate cold welding versus other welding processes and discuss contact mechanics in cold welding, cold welding process variables and cold welding of different metals
- Recognize defects in cold welding and their prevention and carryout industrial cold welding processes
- Define cold welding in aerospace engineering comprising of bonding aluminum alloys for aircraft structures, role of cold welding in satellite construction and performance requirements for aerospace materials
- Determine cold welding in electronics and electrical industries, cold welding in automotive industry, cold welding in jewelry and precious metals and cold welding in medical and biotechnology fields
- Identify cold welding in nuclear power plants, joining wires in telecommunications, underwater cold welding techniques and emerging applications and innovations
- Illustrate surface preparation and bonding process covering cleaning and preparation of metal surfaces, practical demonstration of effective bonding and measuring surface quality before welding
- Test and evaluate cold welded joints and implement safety and best practices in cold welding
- Discuss the latest developments in cold welding techniques, nano-scale cold welding research, role of AI and automation in cold welding and future potential in materials science
- Describe cold welding in metal 3D printing, hybrid additive-subtractive processes, repair and joining of 3D-printed parts and future implications for manufacturing
- Discuss environmental and economic aspects of cold welding, industry standards and compliance requirements, ASTM, ISO, and other regulatory bodies and quality control protocols

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 cold welding for welders and welding technicians, engineers (mechanical, manufacturing, materials, etc.), industrial production managers, research and development (R&D) professionals, quality control inspectors, technicians in microelectronics, aerospace and automotive professionals, jewelry designers and precious metal technicians, students and graduates in welding technology and those who involved in various aspects of welding, manufacturing, and materials science.

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 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. George Poulos, MBA, MSc, BSc, CEng, is a **Senior Corrosion & Welding Engineer** with over **45 years** of extensive experience within the **Oil & Gas**, **Petrochemical, Refinery**, **Construction**, **Aircraft & Shipbuilding** Industry. His wide experiences covers in the areas of **Welding** & **Cutting**, **Welding** Inspection, **Welding** & **Machine** Techniques, **TIG** & **Arc Welding**, **Shielded Metal Arc Welding**, **Gas Tungsten** & **Gas Metal Arc Welding**, **Welding** Procedure Specifications & Qualifications, **Aluminium Welding**, **Hot & Cold Tapping** Techniques, **Hot Work-Safety**, **SMAW**, **GTAW**, **Welding** Techniques, **Pipeline Welding** Practices, **Welding** Engineering, **Welding** Fatigue & Fracture Mechanics, **Welding Inspection Technology**, **Welding Safety**, **Welding** Defects Analysis, **Welding Technology**, **Welding Problems**, **Welding & Non Destructive** Testing, **Metallurgy Techniques**, **Metallurgical** Failure Analysis & Prevention, **Corrosion** Fabrication & Inspection, **Fabrication** & **Repair**, **Corrosion** Prevention, **Corrosion** Engineering, **Oilfield Corrosion Monitoring & Control**, **Corrosion Inhibition**, **Corrosion** Management in Process Operations, **Corrosion** & Prevention of Failures, **Material** Selection, **Cathodic Protection** Systems. Further, he is also well-versed in **Hot Rolling** Process, **Hot Strip Mill**, **Mill** Operations, **Roll Mill**, **Steel Making** Process, **Steel** Manufacturing, **Electric Arc Furnace** (**EAF**), **Steel Forging**, **Steel** Manufacturing & Process Troubleshooting, **Slit Rolling**, **Carbon Steel Pipe** Wall Thickness & Grade Selection, **Ferro-Alloys**, **Steel Metallurgy**, **Steel** Structure Welding, **Steelmaking** Slag, **Steel** Making Application, **Heat Treatment** & **Prevention Techniques**, **Corrosion** Fabrication & Inspection and **Post Weld Heat Treatment**.

During his career life, Mr. Poulos has gained his practical and field experience through his various significant positions and dedication as the **Chief Executive**, **Head of Technical Studies**, **Manager**, **Senior Consultant**, **Lead Welding Engineer**, **Senior Welding Engineer**, **Design Engineer**, **Sales Engineer**, **Author**, **Welding Instructor**, **Visiting Lecturer** and **Technical Proposal Research Evaluator** from various international companies such as Greek Welding Institute, Hellenic Quality Forum and International Construction Companies such as Shipbuilding, Aircraft Industry and Oil and Gas Industry.

Mr. Poulos is a **Registered Chartered Engineer** and has a **Master's** degree in **Naval Architecture**, a **Bachelor's** degree in **Welding Engineering** and a Master of Business Administration (**MBA**) from the **Sunderland University**, **Aston University** and **Open University**, **UK**, respectively. Further, he is a **Certified Trainer/Instructor**, an active Member of Chartered Quality Institute (**CQI**), The British Welding Institute (**TWI**), The Royal Institution of Naval Architects (**RINA**) and American Welding Society (**AWS**), a Registered **EWF/IW** (European Welding Federation-International Welding Institute W/E) and an **IRCA** Accredited External Quality Systems Auditor through BVQI. He is an **Author** of Technical Book dealing with Protection/Health/Safety in the Welding/Cutting domain and delivered various trainings, seminars, conferences, workshops and courses globally.

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

Accommodation

Accommodation is not included in the course fees. However, any accommodation required can be arranged at the time of booking.

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, 17th of August 2025***

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0900	***Overview of Cold Welding*** *Definition and Historical Background • Comparison with Conventional Welding Methods • Industrial Significance and Applications • Limitations and Challenges*
0900 - 0930	***Principles of Cold Welding*** *Solid-State Bonding Mechanism • Intermolecular Forces and Metallic Bonding • Required Surface Conditions for Bonding • Factors Affecting Bond Strength*
0930 – 0945	*Break*
0945 – 1030	***Material Properties in Cold Welding*** *Role of Metal Ductility • Commonly Cold-Welded Materials (Al, Cu, Au, Ag, etc.) • Surface Cleanliness and Oxidation Effects • Microstructural Changes During Cold Welding*
1030 – 1230	***Equipment & Tools for Cold Welding*** *Basic Manual Cold Welding Tools • Automated and Industrial Cold Welding Machines • Surface Preparation Tools • Inspection and Quality Control Equipment*
1230 – 1245	*Break*
1245 – 1315	***Surface Preparation Techniques*** *Importance of Surface Cleanliness • Methods: Mechanical Cleaning, Chemical Cleaning, Ultrasonic Cleaning • Effect of Contamination on Welding Quality • Case Studies on Improper Surface Preparation*

1315 - 1420	***Cold Welding versus Other Welding Processes*** *Heat-Based versus Solid-State Welding Comparison • Advantages and Disadvantages of Cold Welding • Cold Welding Applications in Various Industries • Examples of Real-World Implementations*
1420 – 1430	***Recap*** *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 Monday, 18th of August 2025

0730 – 0830	***Contact Mechanics in Cold Welding*** *Role of Pressure in Welding • Surface Deformation and Material Flow • Effect of Metal Hardness on Bonding • Experimental Studies on Contact Mechanics*
0830 - 0930	***Cold Welding Process Variables*** *Pressure and Force Requirements • Effect of Material Thickness on Welding Success • Optimal Temperature and Environmental Conditions • Time Required for Successful Bonding*
0930 – 0945	*Break*
0945 – 1100	***Cold Welding of Different Metals*** *Welding Similar versus Dissimilar Metals • Challenges in Bonding Different Metal Types • Influence of Atomic Structure on Bonding • Applications of Dissimilar Metal Cold Welding*
1100 – 1230	***Defects in Cold Welding & Their Prevention*** *Common Defects: Poor Adhesion, Voids, Oxide Layers • Causes of Defects and Troubleshooting Methods • Inspection Techniques for Defect Identification • Preventive Measures for High-Quality Bonding*
1230 – 1245	*Break*
1245 – 1320	***Industrial Cold Welding Processes*** *Roll Bonding and Wire Bonding Techniques • Cold Welding in Microelectronics • Cold Pressure Welding in Manufacturing • Role of Automation in Cold Welding*
1320 - 1420	***Case Studies on Advanced Cold Welding Techniques*** *Analysis of Successful Industrial Applications • Failure Analysis of Poor Cold Welding • Research Trends in Cold Welding Technology • Cold Welding in Aerospace and Automotive Industries*
1420 – 1430	***Recap*** *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: Tuesday, 19th of August 2025

0730 – 0830	***Cold Welding in Aerospace Engineering*** *Bonding Aluminum Alloys for Aircraft Structures • Role of Cold Welding in Satellite Construction • Performance Requirements for Aerospace Materials • NASA and Aerospace Industry Case Studies*
0830 - 0930	***Cold Welding in Electronics & Electrical Industries*** *Wire Bonding in Microelectronics • Cold Welding in Battery Manufacturing • Electrical Conductivity Improvements with Cold Welding • Semiconductor Industry Applications*
0930 – 0945	*Break*

0945 – 1100	***Cold Welding in Automotive Industry*** *Joining Aluminum and Lightweight Materials • Battery and Electrical Connection Applications • Cold Welding for Sensor Components • Future Trends in Automotive Welding*
1100 – 1230	***Cold Welding in Jewelry & Precious Metals*** *Bonding Gold, Silver, and Platinum • Manufacturing High-Purity Metal Components • Quality Control in Jewelry Welding • Preservation of Material Properties*
1230 – 1245	*Break*
1245 – 1320	***Cold Welding in Medical & Biotechnology Fields*** *Applications in Medical Implants • Cold Welding in Surgical Tools • Biocompatibility of Cold-Welded Joints • Precision Welding in Medical Devices*
1320 - 1420	***Custom & Specialized Applications*** *Cold Welding in Nuclear Power Plants • Joining Wires in Telecommunications • Underwater Cold Welding Techniques • Emerging Applications and Innovations*
1420 – 1430	***Recap*** *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: ***Wednesday, 20th of August 2025***

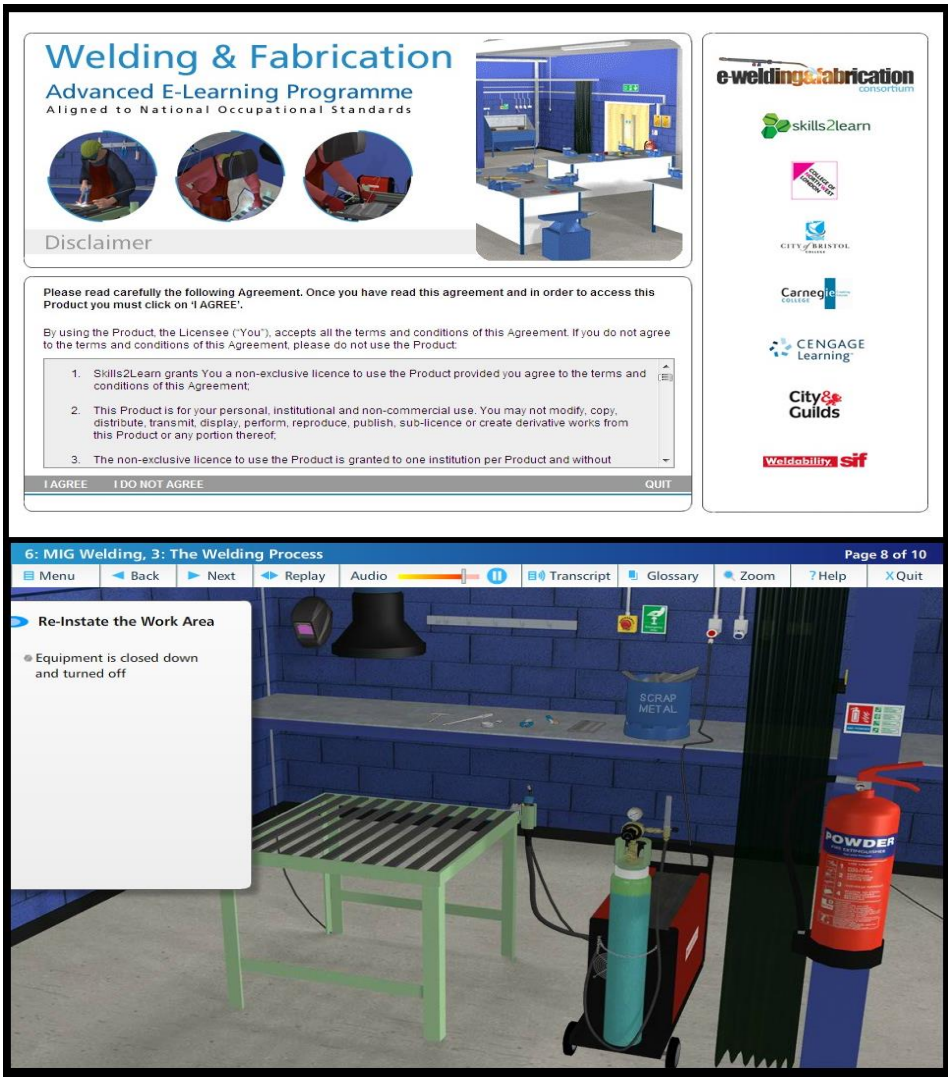
0730 – 0830	***Hands-on Training with Cold Welding Machines*** *Understanding Machine Operation • Demonstration of Different Cold Welding Techniques • Setting Up Parameters for Optimal Results • Troubleshooting Machine Errors*
0830 - 0930	***Surface Preparation & Bonding Process*** *Cleaning and Preparation of Metal Surfaces • Practical Demonstration of Effective Bonding • Measuring Surface Quality Before Welding • Hands-on Exercises on Different Materials*
0930 – 0945	*Break*
0945 – 1100	***Testing & Evaluating Cold Welded Joints*** *Destructive versus Non-Destructive Testing Methods • Microstructural Examination of Welded Joints • Strength Testing and Failure Analysis • Quality Assurance Techniques*
1100 – 1230	***Cold Welding of Dissimilar Materials (Practical Session)*** *Selecting Appropriate Materials for Bonding • Practical Challenges and Solutions • Testing and Performance Evaluation • Case Studies on Mixed Metal Bonding*
1230 – 1245	*Break*
1245 – 1320	***Safety & Best Practices in Cold Welding*** *Handling Equipment Safely • Avoiding Contamination Risks • Personal Protective Equipment (PPE) Guidelines • Industry Safety Regulations*
1320 - 1420	***Group Project – Real-World Cold Welding Application*** *Assigning Industry-Specific Welding Projects • Application of Theoretical Knowledge in Practice • Evaluating Joint Quality and Efficiency • Final Review and Presentation of Projects*
1420 – 1430	***Recap*** *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: **Thursday, 21st of August 2025**

0730 – 0830	***Recent Advances in Cold Welding Research*** *Latest Developments in Cold Welding Techniques • Nano-Scale Cold Welding Research • Role of AI and Automation in Cold Welding • Future Potential in Materials Science*
0830 - 0930	***Cold Welding & Additive Manufacturing (3D Printing)*** *Cold Welding in Metal 3D Printing • Hybrid Additive-Subtractive Processes • Repair and Joining of 3D-Printed Parts • Future Implications for Manufacturing*
0930 – 0945	*Break*
0945 – 1100	***Environmental & Economic Aspects of Cold Welding*** *Energy Efficiency of Cold Welding • Cost Analysis versus Conventional Welding Methods • Environmental Impact Reduction • Sustainable Manufacturing Practices*
1100 – 1230	***Cold Welding Standards & Certifications*** *Industry Standards and Compliance Requirements • ASTM, ISO, and Other Regulatory Bodies • Quality Control Protocols • Certification Programs for Cold Welding Professionals*
1230 – 1245	*Break*
1245 – 1345	***Future Trends & Career Opportunities in Cold Welding*** *Cold Welding in Industry 4.0 • Automation and Robotics in Cold Welding • Job Market Trends and Skill Requirements • Networking and Professional Growth Opportunities*
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 one of our state-of-the-art simulators “E-Welding & Fabrication”, “AWS Tool Kit” and “Structural Weld Replica Kit”, suitable for classroom training.



E-Welding & Fabrication

AWS Tool Kit

Structural Weld Replica Kit

Course Coordinator

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