COURSE OVERVIEW ME0652(ES2)

EAF Steel Making

Course Title
EAF Steel Making

Course Date/Venue
Session 1: June 15-19, 2025/Boardroom 1, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE
Session 2: November 16-20, 2025/Crowne Meeting Room, Crowne Plaza Al Khobar, KSA

Course Reference
ME0652(ES2)

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

Course Description

This practical and highly-interactive course includes real-life case studies and exercises where participants will be engaged in a series of interactive small groups and class workshops.

This course provides an in-depth understanding of Electric Arc Furnace (EAF) steelmaking, emphasizing modern practices and metallurgical principles. Students will analyze the EAF melting process with a focus on refining steel, slag chemistry, and refractory protection. The course covers ladle furnace operations, enabling the evaluation and application of secondary refining techniques.

Participants will explore continuous casting processes, delving into casting metallurgy and strategies to prevent re-oxidation. The impact of non-metallic inclusions (NMIs) on steel properties will be discussed, alongside methods to minimize, control, and shape NMIs. Additionally, students will study the development and optimization of ferro-alloys and alloying elements, integrating factors from all stages of steelmaking to enhance steel quality and performance.

During this interactive course, participants will learn the EAF melting using mainly RI; the importance of slag (refining steel and protection of refractories) and process; the ladle furnace; the continuous casting through metallurgy of casting and re-oxidation prevention; the effects of non-metallic inclusions and NMI's steel properties; the factors from all steel making process; minimizing and shaping control of NMI's; developing and controlling ferro-alloys and alloying elements.

Course Objectives

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

- Apply the latest techniques and procedures in steel making
- Analyze EAF melting using mainly RI and discuss the importance of slag (refining steel and protection of refractories) and process
- Evaluate and apply knowledge on the ladle furnace
- Practice continuous casting through metallurgy of casting and re-oxidation prevention
- Discuss the effects of non-metallic inclusions and NMI's steel properties
- Contribute the factors from all steel making process
- Minimize and shape control of NMI's
- Develop and control ferro-alloys and alloying elements

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 is intended for those who wish to gain a fundamental understanding of the electrical, thermomechanical and technical aspects of modern electrical electric furnace steelmaking. EAF furnace operators, maintenance personnel, upstream/downstream personnel, metallurgists and suppliers would benefit from this course. Further, the course is also suitable for specialty steelmakers who need an introduction to stainless steel melting, refining remelting and ingot casting, as well as meltshop employees, foundry workers, process engineers, new employees and suppliers.

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.

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. George Poulos, MBA, MSc, BSc, CEng, is a **Senior Naval & 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 **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**. Further, he is also well-versed in **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 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 and **Metallurgy Techniques**.

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$ 10,000 per Delegate + **VAT**. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

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	***EAF Melting Using Mainly DRI*** *Importance of Slag (Refining Steel and Protection of Refractories)*
0930 – 0945	*Break*
0945 – 1100	***EAF Melting Using Mainly DRI (cont'd)*** *Importance of Slag (Refining Steel and Protection of Refractories) (cont'd)*
1100 – 1230	***EAF Melting Using Mainly DRI (cont'd)*** *Process Efficiency*
1230 – 1245	*Break*
1245 – 1420	***EAF Melting Using Mainly DRI (cont'd)*** *Process Efficiency (cont'd)*
1420 – 1430	***Recap***
1430	*Lunch & End of Day One*

Day 2

0730 – 0930	***Ladle Furnace (Secondary Metallurgy) Best Refining Practices*** *Alloy Adjustment*
0930 - 0945	*Break*
0945 – 1100	***Ladle Furnace (Secondary Metallurgy) Best Refining Practices (cont'd)*** *Alloy Adjustment (cont'd)*
1100 – 1230	***Ladle Furnace (Secondary Metallurgy) Best Refining Practices (cont'd)*** *Homogenazation of Bath*
1230 – 1245	*Break*

1245 – 1420	***Ladle Furnace (Secondary Metallurgy) Best Refining Practices (cont'd)*** *Homogenazation of Bath (cont'd)*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Two*

Day 3

0730 – 0900	***Continuous Casting*** *Best Practices-Metallurgy of Casting*
0900 – 0915	*Break*
0915 – 1100	***Continuous Casting (cont'd)*** *Re-Oxidation Prevention*
1100 – 1230	***Continuous Casting (cont'd)*** *Casting Defects and Prevention*
1230 – 1245	*Break*
1245 – 1420	***Continuous Casting (cont'd)*** *Special Difficulty with Peritectic Alloys*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Three*

Day 4

0730 – 0900	***Non Metallic Inclusions*** *Effects of NMI's in Steel Properties*
0900 - 0915	*Break*
0915 – 1100	***Non Metallic Inclusions (cont'd)*** *Factors Contributing from All Steel Making Processes*
1100 - 1230	***Non Metallic Inclusions (cont'd)*** *Minimization and Shape Control of NMI's (Best Practices for Clean Steel)*
1230 – 1245	*Break*
1245 - 1420	***Non Metallic Inclusions (cont'd)*** *Minimization and Shape Control of NMI's (Best Practices for Clean Steel)*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Four*

Day 5

0730 – 0900	***Ferro-Alloys & Control of Alloying Elements***
0900 – 0915	*Break*
0915 – 1100	***Ferro-Alloys & Control of Alloying Elements (cont'd)***
1100 – 1230	***Advancement in EAF Steelmaking Technology***
1230 – 1245	*Break*
1245 - 1345	***Advancement in EAF Steelmaking Technology (cont'd)***
1345 – 1400	***Course Conclusion***
1400 – 1415	***POST-TEST***
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:-

Course Coordinator

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