



COURSE OVERVIEW FE0928 **Metallurgy for Non-Metallurgist**

Course Title

Metallurgy for Non-Metallurgist

Course Date/Venue

September 07-11, 2025/Tamra Meeting Room,
Al Bandar Rotana Creek, Dubai, UAE

Course Reference

FE0928

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 learned 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 Metallurgy for Non-Metallurgist. It covers the importance and applications of metallurgy in the petroleum industry; the basic concepts of metals and alloys and the structure of metals; the characteristics of different metal alloy systems like steel, aluminum and copper alloys; the phase diagrams and their significance in understanding material behavior; the basic principles and common phase transformations in metals; the mechanical properties of metals; and testing methods for mechanical properties.



Further, the course will also discuss the factors affecting the selection of materials in engineering applications; the thermal properties, electrical properties and chemical properties of metals; the purpose and importance in altering metal properties; the techniques and methods of heat treatment through annealing, quenching and tempering as well as case hardening; and the effects of heat treatment on microstructure.



During this interactive course, participants will learn the types of corrosion and its significance in the petroleum industry; the mechanisms of corrosion and the factors influencing corrosion; the methods of corrosion testing and corrosion protection; the corrosion behavior of different metals and alloys used in the petroleum industry; the special alloys and their applications; the common causes of metal failure and techniques for failure analysis; the welding and joining of metals as well as non-destructive testing (NDT) methods; and the future trends in metallurgy.

Course Objectives

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

- Apply and gain a comprehensive knowledge on metallurgy for non-metallurgist
- Discuss the importance and applications of metallurgy in the petroleum industry
- Identify the basic concepts of metals and alloys and the structure of metals
- Recognize the characteristics of different metal alloy systems like steel, aluminum and copper alloys
- Understand phase diagrams and their significance in understanding material behavior
- Discuss the basic principles and common phase transformations in metals
- Identify the mechanical properties of metals and apply testing methods for mechanical properties
- Recognize the factors affecting the selection of materials in engineering applications
- Explain thermal properties, electrical properties and chemical properties of metals
- Discuss the purpose and importance in altering metal properties
- Apply proper techniques and methods of heat treatment through annealing, quenching and tempering as well as case hardening
- Understand the effects of heat treatment on microstructure
- Identify the types of corrosion and its significance in the petroleum industry
- Discuss the mechanisms of corrosion and the factors influencing corrosion
- Apply effective methods of corrosion testing and corrosion protection
- Recognize corrosion behavior of different metals and alloys used in the petroleum industry
- Discuss special alloys and their applications as well as the common causes of metal failure and techniques for failure analysis
- Carryout welding techniques and joining of metals as well as non-destructive testing (NDT) methods and discuss future trends in metallurgy



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 metallurgy for those who need a working understanding of metals and their applications. It has been designed for those with no previous training in metallurgy, such as technical, laboratory, and sales personnel; engineers from other disciplines; management and administrative staff; and non-technical support staff such as purchasing and receiving agents who order and inspect incoming material.

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 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's 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**. Haward's certificates are internationally recognized and accredited by the British Accreditation Council (BAC). 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. Talaat Mohamed, PGDip, BSc, is a **Certified Inspection Engineer (NDT-ASNT) & Certified Welding Inspector (CWI-AWS)** with **over 30 years** of extensive experience within the **Oil, Gas, Petrochemical, Petroleum and Refinery** industries. His thorough experience widely covers **Metallurgy for Non-Metallurgists, Corrosion & Metallurgy, Metallurgy, Welding Technology Testing & NDT Procedures, Corrosion Monitoring Prevention & Control, Corrosion Prevention & Control, Corrosion Management in Production/Processing Operations, Corrosion Inhibitor, Basic Corrosion, Corrosion Technology & Inspection, Corrosion Control in Gas, Oil & Water, Corrosion & Corrosion Protection, Corrosion Prevention, Corrosion Assessment, Ultrasonic, Penetrant, Magnetic Particle, Visual Testing and Welding Inspection**. Further, he is also an expert in **Equipment Analysis & Piping Design, Welding, Corrosion & Risk Based Inspection, Fitness-for-Service Assessment, Boiler & Pressure Vessel, Fabrication, Vibration, Heat Treatment, Inspection & Repair Procedures, Material Damage Mechanism, Material Failure Analysis, Mechanical Integrity, Isomerization, Distillation & Reforming Units, Pipelines, Pressure Piping, Stationary Equipment, Tank Inspection, Fired Boilers & Heaters, Heat Exchangers, Coolers, Pressure Vessels, Drums, Storage Tanks, Furnaces, Heaters, Pipelines, Columns, Reactors, Strippers and Safety Valves**. He is also well-versed in UltraPIPE software, PCMS software and Lloyd's Register RBMI software as well as the API 571, API 510, API 572, API 570, API 653, API 560, Welding & Brazing Qualifications, API 573 and ASME B31.3 standards. He is currently the **Inspection General Manager** of Cairo Oil Refining Company (CORC) wherein he is responsible in developing the strategies for inspection and testing as well as designated as a certifying authority for ASNT-NDT levels certification according to SNT-TC-1A Personnel Qualification and Certification in Non-destructive Testing.

During his career life, Mr. Talaat has gained his practical and field experience through his various significant positions such as the **Inspection General Manager, Technical Studies Department Manager, Isomerization Inspection Department Manager, NDT & Inspection Section Head, Training Instructor, Technical Trainer, NDT Instructor, Inspection Engineer, QA/QC Team Leader and Team Leader** for numerous international companies like the Khalda Petroleum Company, Suez Oil Processing Co., Agiba Co., El-Nasr Petroleum Co., Suez Oil Co., General Petroleum Co., Petrobel Co., Egyptian Gas Co., Gulf Petroleum Co., as well as for Cairo Oil Refining Company, Welding Academy, GASCO and United Gas Derivatives Company.

Mr. Talaat has a **Bachelor** degree in **Mechanical Engineering** and a **Post-Graduate Diploma** in **Metallurgy & Material Engineering**. Further, he is a **Certified ASNT Level III NDT Inspector** in **Radiographic Testing (RT), Ultrasonic Testing (UT), Penetrant Testing (PT), Magnetic Particle Testing (MT) and Visual Non-destructive Testing (VT)**; a **Certified Welding Inspector (CWI-AWS)**, a **Certified Instructor/Trainer**; a **Certified Trainer/Assessor/Internal Verifier** by the **Institute of Leadership & Management (ILM)**; and holds a certification in Quality Assurance, ISO 9000, API Heat Exchangers & Cooling Towers, Internal Quality System Auditing and Internal Quality System Auditing for ISO 9001/2000. Moreover, he is an active member of the American Society of Non-destructive Testing (**ASNT**), the Engineers Syndicate, the Society of Mechanical Engineers, the American Welding Society (**AWS**) and the Supreme Committee of Quality and delivered countless trainings, workshops and seminars worldwide.



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, 07th of September 2025

0730 – 0815	Registration & Coffee
0815 – 0830	Welcome & Introduction
0830 – 0845	PRE-TEST
0845 – 0915	Overview of Metallurgy: Definition, Importance and Applications in the Petroleum Industry
0915 – 0935	Break
0935 – 1030	Basic Concepts of Metals & Alloys: Definition, Types and Classification of Metals and Alloys
1030 – 1100	The Structure of Metals: Crystalline Structures, Grains, and Grain Boundaries
1100 – 1215	Characteristics of Different Metal Alloy Systems: Properties and Uses of Common Alloys such as Steel, Aluminum and Copper Alloys
1215 – 1230	Break
1230 – 1300	Phase Diagrams - Fundamentals: Introduction to Phase Diagrams and their Significance in Understanding Material Behavior
1300 – 1420	Phase Transformations: Basic Principles and Common Phase Transformations in Metals
1420 – 1430	Recap
1430	Lunch & End of Day One

Day 2: Monday, 08th of September 2025

0730 – 0845	Mechanical Properties of Metals: Strength, Ductility, Hardness, Toughness and Fatigue
0845 – 0915	Testing Methods for Mechanical Properties: Tensile Test, Hardness Test, Impact Test and Fatigue Test
0915 – 0930	Break
0935– 1100	Material Selection Criteria: Factors Affecting the Selection of Materials in Engineering Applications
1100 – 1215	Thermal Properties: Conductivity, Expansion and Heat Capacity of Metals
1215 – 1230	Break
1230 – 1300	Electrical Properties: Conductivity, Resistivity and Applications in the Petroleum Industry
1300 – 1420	Chemical Properties: Reactivity, Corrosion Resistance and Chemical Stability
1420 – 1430	Recap
1430	Lunch & End of Day Two

Day 3: Tuesday, 09th of September 2025

0730 – 0845	Heat Treatment: Purpose and Importance in Altering Metal Properties
0845 – 0915	Annealing: Process, Purpose and Effects on Metal Properties
0915 – 0930	Break
0930 – 1100	Quenching & Tempering: Techniques, Applications and Effects on Mechanical Properties



1100 – 1215	Case Hardening: Methods such as Carburizing and Nitriding
1215 – 1230	Break
1230 – 1300	Effects of Heat Treatment on Microstructure: Changes in Grain Size, Phase Distribution and Mechanical Properties
1300 – 1420	Practical Applications of Heat Treatment in the Petroleum Industry: Case Studies and Examples
1420 – 1430	Recap
1430	Lunch & End of Day Three

Day 4: Wednesday, 10th of September 2025

0730 – 0845	Corrosion & Its Prevention: Definition, Types and Significance in the Petroleum Industry
0845 – 0915	Mechanisms of Corrosion: Electrochemical Principles and Various Forms of Corrosion such as Uniform, Pitting and Galvanic Corrosion
0915 – 0930	Break
0930 – 1100	Factors Influencing Corrosion: Environmental Factors, Material Properties and Operational Conditions
1100 – 1215	Corrosion Testing Methods: Techniques to Evaluate Corrosion Resistance and Rate
1215 – 1230	Break
1225 – 1300	Corrosion Protection Methods: Coatings, Cathodic Protection and Material Selection
1300 – 1420	Comparative Corrosive Potential of Metals: Corrosion Behavior of Different Metals and Alloys Used in the Petroleum Industry
1420 – 1430	Recap
1430	Lunch & End of Day Four

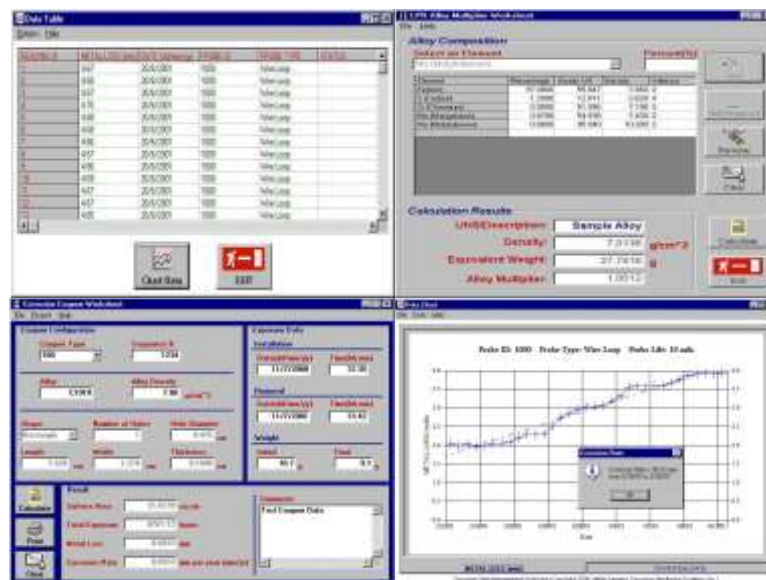
Day 5: Thursday, 11th of September 2025

0730 – 0845	Special Alloys & Their Applications: Overview of Superalloys, Titanium Alloys and their Use in Extreme Environments
0845 – 0915	Failure Analysis: Common Causes of Metal Failure and Techniques for Failure Analysis
0915 – 0930	Break
0935 – 1100	Welding & Joining of Metals: Welding Techniques, Challenges and Metallurgical Considerations
1100 – 1215	Non-Destructive Testing (NDT) Methods: Techniques such as Ultrasonic Testing, Radiography and Magnetic Particle Inspection
1215 – 1230	Break
1230 – 1300	Future Trends in Metallurgy: Emerging Materials, Nanomaterials and Advanced Manufacturing Techniques
1300 – 1400	Case Studies & Real-World Applications: Discussion of Real-World Examples and Best Practices in Metallurgy within the Petroleum Industry
1400 – 1415	Course Conclusion
1415 – 1430	POST-TEST
1430	Lunch & End of Course

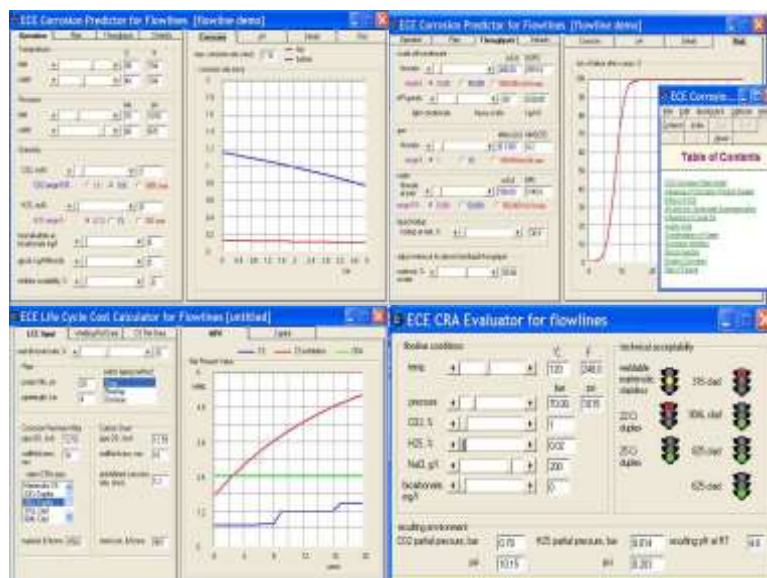


Simulator (Hands-on Practical Sessions)

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 simulators “Corrosion Data Management Software (CDMS)” and “Electronic Corrosion Engineer (ECE®) 5”.



Corrosion Data Management Software (CDMS)



Electronic Corrosion Engineer (ECE®) 5

Course Coordinator

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