



COURSE OVERVIEW FE0322
Upstream Material & Corrosion Engineering
Metallurgy, Corrosion and Prevention of Failures
(Material Selection and Properties)

Course Title

Upstream Material & Corrosion Engineering:
Metallurgy, Corrosion and Prevention of Failures
(Material Selection and Properties)

Course Date/Venue

March 03-07, 2024/Küçükyalı Meeting Room, Crowne
Plaza Istanbul - Harbiye, an IHG Hotel, Istanbul,
Turkey

Course Reference

FE0322

Course Duration/Credits

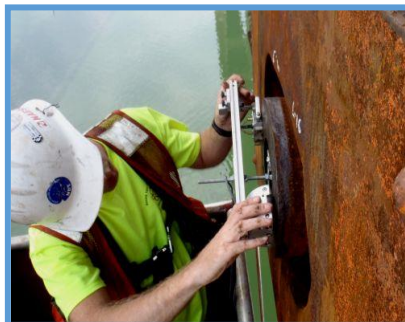
Five days/3.0 CEUs/30 PDHs

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.

Most people are familiar with corrosion in some form or another, particularly the rusting of an iron fence and the degradation of steel pilings or boats and boat fixtures. Piping is another major type of equipment subject to corrosion.



In a modern business environment, successful enterprises cannot tolerate major corrosion failures, especially those involving personal injuries, fatalities, unscheduled shutdowns, and environmental contamination. For this reason, considerable efforts are generally expended in corrosion control at the design stage and in the operational phase. This is particularly true for industries where harsh chemicals are handled routinely.



Corrosion can lead to failures in plant infrastructure and machines which are usually costly to repair, costly in terms of lost or contaminated product, in terms of environmental damage, and possibly costly in terms of human safety. Decisions regarding the future integrity of a structure or its components depend upon an accurate assessment of the conditions affecting its corrosion and rate of deterioration.



This course is designed to provide participants with a detailed and up-to-date overview of upstream material and corrosion engineering including metallurgy corrosion and prevention of failures. It covers the metallurgy, steel and physicochemical metallurgy; the materials, non-ferrous alloys and stainless steels; the electrochemical principles and passivity; the various forms and types of corrosion including the forms of attack and control; the coating and cathodic protection; the failures and failure prevention RCFA; the materials selection for corrosion control and corrosion managements; and the corrosion defect assessment in the code 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 upstream material and corrosion engineering
- Discuss the metallurgy and steel and physicochemical metallurgy
- Identify the materials, non-ferrous alloys and stainless steels
- Explore the electrochemical principles and passivity
- Classify the various forms and types of corrosion including the forms of attack and control
- Carryout coating and cathodic protection
- Recognize failures and failure prevention RCFA
- Apply materials selection for corrosion control and corrosion managements
- Carryout corrosion defect assessment in the code and standards

Who Should Attend

This course provides a wide understanding and deeper appreciation of upstream material & corrosion engineering for those who are responsible for metallurgy, corrosion and prevention of failures in plant and equipment. Facility integrity engineers, inspection engineers, metallurgy and corrosion engineers, materials engineers, design engineers, mechanical engineers, chemical engineers, corrosion field personnel, supervisors and other technical staff will find the course very attractive. Senior engineers and managers will be able to develop their interpretive skills in data analysis. Furthermore, the course is ideal for all engineers and technical staff whose responsibilities include the reduction of corrosion and the prevention of failure either at the design stage or during operation of the facility.

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.

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


Certificates are accredited by the following international accreditation organizations: -

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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 Fee

US\$ 6,000 per Delegate + **VAT**. This rate includes Participants Pack (Folder, Manual, Hand-outs, etc.), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

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:



Dr. Mahmoud Hafez, PhD, MSc, BSc, Senior Corrosion & Metallurgical Engineer with over **20 years** of industrial experience within the **Petroleum, Oil & Gas** industries. His wide expertise widely covers in the areas of **Cathodic Protection Systems, Corrosion Control & Corrosion Monitoring, Metallurgy & Metallurgical Processes, Material Selection, Corrosion Monitoring Prevention & Control, Corrosion Prevention & Control, Corrosion Management in Production/Processing Operations, Corrosion Prevention in Oil and Gas Industry, Corrosion Inhibitor, Corrosion Technology & Inspection, Corrosion Control in Gas, Oil & Water, Corrosion & Corrosion Protection, Corrosion Prevention, Corrosion Assessment, Condition Monitoring & Assessment, Pipeline Corrosion Inspection, Pipeline Design & Construction, Pipeline Engineering, Pipeline Integrity, Pipeline Operations & Maintenance.** His wide range of industrial experience also covers **Cathodic Protection, Offshore Structure & Facilities, Onshore Facilities & Storage Tanks, Corrosion Management & Monitoring and Water Injection Treatment.**

Throughout his career life, Dr. Hafez has provided significant contributions to the companies he has worked with, having filled key positions such as being the **Freelance Consultant, Principle Engineer, Assistance General Manager, Materials and Corrosion Section Head, Senior Lead Material and Corrosion Specialist** and **Senior Chemical Water Treatment Engineer** for international companies such as Petrofac, Egyptian Maintenance Company, Engineering for the Petroleum and Process Industries and Metito Chemical Industries.

Dr. Hafez has **PhD in Corrosion Science and Engineering from University of Manchester (UK)** and **Master & Bachelor degrees in Chemical Engineering from the University of California (UK) & University of Riyadh (KSA).** He is a **Corrosion Specialist** of the **National Association of Corrosion Engineers (NACE-USA).** Moreover, he is a **Certified Internal Verifier/Assessor/Trainer** by the **Institute of Leadership and Management (ILM)** and has further delivered numerous trainings, courses, seminars, conferences and workshops globally

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, 03th of March 2024

0730 - 0800	Registration & Coffee
0800 - 0815	Welcome & Introduction
0815 - 0830	PRE-TEST
0830 - 0930	Introduction to Metallurgy & Steel
0930 - 0945	Break



0945 - 1100	<i>Introduction to Metallurgy & Steel(cont'd)</i>
1100 - 1215	<i>Physicomechanical Metallurgy</i>
1215 - 1230	<i>Break</i>
1230 - 1420	<i>Physicomechanical Metallurgy (cont'd)</i>
1420 - 1430	<i>Recap</i>
1430	<i>Lunch & End of Day One</i>

Day 2: Monday, 04th of March 2024

0730 - 0930	<i>Materials & Non-Ferrous Alloys & Stainless Steels</i>
0930 - 0945	<i>Break</i>
0945 - 1100	<i>Materials & Non-Ferrous Alloys & Stainless Steels (cont'd)</i>
1100 - 1215	<i>Electrochemical Principles & Passivity</i>
1215 - 1230	<i>Break</i>
1230 - 1420	<i>Electrochemical Principles & Passivity (cont'd)</i>
1420 - 1430	<i>Recap</i>
1430	<i>Lunch & End of Day Two</i>

Day 3: Tuesday, 05th of March 2024

0730 - 0930	<i>Forms & Types of Corrosion</i>
0930 - 0945	<i>Break</i>
0945 - 1100	<i>Forms of Attack & Control</i>
1100 - 1215	<i>Coating & Cathodic Protection</i>
1215 - 1230	<i>Break</i>
1230 - 1420	<i>Coating & Cathodic Protection (cont'd)</i>
1420 - 1430	<i>Recap</i>
1430	<i>Lunch & End of Day Three</i>

Day 4: Wednesday, 06th of March 2024

0730 - 0930	<i>Failures & Failure Prevention RCFA</i>
0930 - 0945	<i>Break</i>
0945 - 1100	<i>Failures & Failure Prevention RCFA (cont'd)</i>
1100 - 1215	<i>Materials Selection for Corrosion Control</i>
1215 - 1230	<i>Break</i>
1230 - 1420	<i>Materials Selection for Corrosion Control (cont'd)</i>
1420 - 1430	<i>Recap</i>
1430	<i>Lunch & End of Day Four</i>

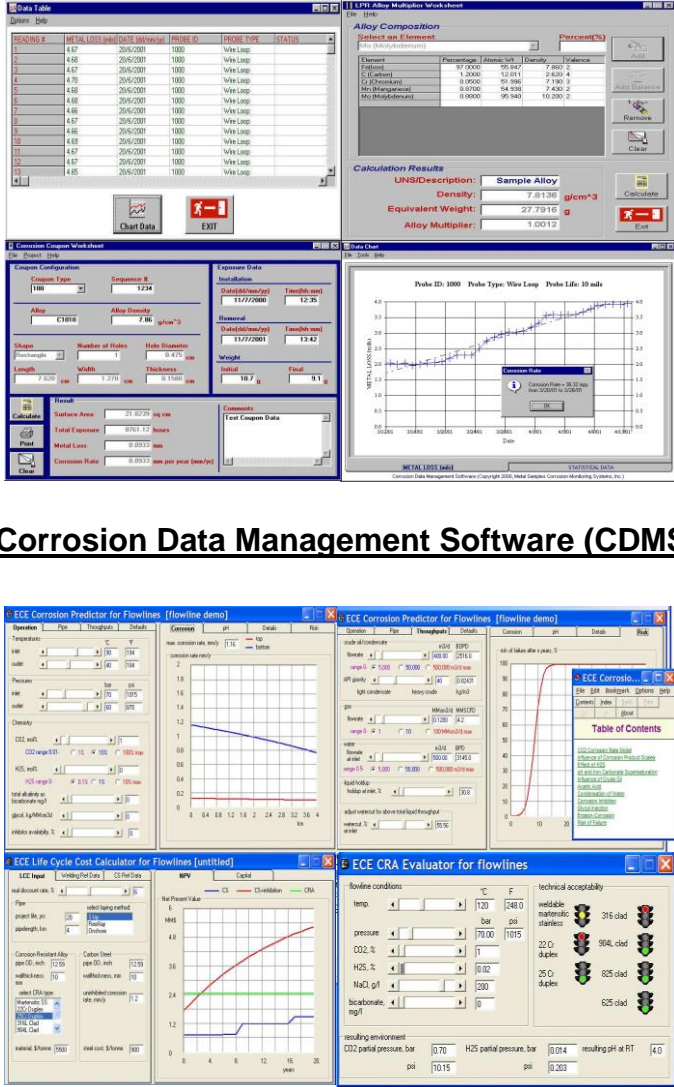
Day 5: Thursday, 07th of March 2024

0730 - 0930	<i>Corrosion Managements</i>
0930 - 0945	<i>Break</i>
0945 - 1100	<i>Corrosion Managements (cont'd)</i>
1100 - 1215	<i>Corrosion Defect Assessment in the Code & Standards</i>
1215 - 1230	<i>Break</i>
1230 - 1345	<i>Corrosion Defect Assessment in the Code & Standards (cont'd)</i>
1345 - 1400	<i>Course Conclusion</i>
1400 - 1415	<i>POST-TEST</i>
1415 - 1430	<i>Presentation of Course Certificates</i>
1430	<i>Lunch & End of Course</i>



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”.



The image displays four screenshots of software used in corrosion engineering:

- CDMS Data Table:** A table listing various corrosion tests with columns for Test No., Metal Loss, Date, Interval, Probe ID, Probe Type, and Status.
- CDMS Alloy Composition:** A window for defining alloy composition, showing a list of elements and their percentages, along with calculation results for UNSIDescription, Density, Alloy Weight, and Alloy Multiplier.
- CDMS Corrosion Configuration:** A detailed setup window for a corrosion test, including exposure date, alloy type, alloy density, shape, dimensions, and calculated surface area and corrosion rate.
- CDMS Data Chart:** A graph showing the corrosion rate over time for a specific probe, with a linear trend line and data points.
- ECE Corrosion Predictor for Flowlines:** A simulation tool with input fields for temperature, pressure, CO2, H2S, and liquid holdup, and a graph showing the resulting corrosion rate.
- ECE Life Cycle Cost Calculator for Flowlines:** A tool for calculating the economic impact of corrosion, showing a graph of NPV over time and various input parameters.
- ECE CRA Evaluator for Flowlines:** A tool for determining the Corrosion Resistance Alloy (CRA) based on flowline conditions, showing a list of recommended alloys and their technical acceptability.

Corrosion Data Management Software (CDMS)

Electronic Corrosion Engineer (ECE®) 5

Course Coordinator

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