COURSE OVERVIEW FE0066
Corrosion & Fouling

Course Title
Corrosion & Fouling

Course Date/Venue
February 08-12, 2026/Business II Meeting Room, InterContinental Bahrain, an IHG Hotel, Manama, Bahrain

Course Reference
FE0066

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 Corrosion & Fouling. It covers the basic concepts and importance of corrosion and fouling in refinery maintenance; the types of corrosion like chemical, galvanic, pitting, crevice and intergranular corrosion; the common refinery corrosion problems; the types of fouling like biological, chemical, physical and their characteristics; the effects of corrosion and fouling on equipment performance; the safety risks and environmental impact of unchecked corrosion and fouling; the mechanisms of corrosion including the electrochemical processes and environmental factors affecting corrosion rates; and the fouling mechanisms, how fouling occurs and the factors that accelerate fouling in refineries.

During this interactive course, participants will learn the corrosion and material selection; monitoring corrosion and fouling; the control strategies for corrosion and fouling; evaluating benefits and liabilities of control strategies; the design considerations to mitigate corrosion and fouling; managing less common corrosion and fouling problems; the innovative technologies in corrosion and fouling control; integrating corrosion management into reliability-focused maintenance practices; and the predictive maintenance for corrosion control.

Course Objectives

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

- Apply and gain a comprehensive knowledge on corrosion and fouling
- Identify common refinery corrosion and fouling problems, including where they typically occur
- Describe the type of corrosion or fouling that is present based on location, process conditions, and symptoms
- Identify control strategies for common corrosion and fouling problems, including their benefits and liabilities
- Use problem-solving techniques to resolve corrosion problems
- Apply knowledge of corrosion and fouling management to solve less common problems
- Discuss the basic concepts and importance of corrosion and fouling in refinery maintenance
- Identify the types of corrosion and understand chemical, galvanic, pitting, crevice and intergranular corrosion
- Recognize common refinery corrosion problems as well as locate where corrosion is most likely to occur
- Identify the types of fouling like biological, chemical, physical and their characteristics
- Explain the effects of corrosion and fouling on equipment performance as well as analyze how corrosion and fouling impact refinery operations
- Discuss the safety risks and environmental impact of unchecked corrosion and fouling
- Recognize the mechanisms of corrosion including the electrochemical processes and environmental factors affecting corrosion rates
- Explain fouling mechanisms, how fouling occurs and the factors that accelerate fouling in refineries
- Carryout proper material selection to prevent corrosion and identify corrosion-resistant materials
- Employ appropriate techniques and tools for monitoring including corrosion coupons and electronic probes
- Develop control strategies for corrosion focusing on cathodic protection, coating systems and corrosion inhibitors
- Use control strategies for fouling like mechanical cleaning, chemical cleaning, and antifoulants
- Evaluate benefits and liabilities of control strategies and explain cost-benefit analysis, potential risks and environmental impacts
- Design modifications and process control improvements to mitigate corrosion and fouling

- Apply systematic techniques to resolve specific corrosion and fouling problems
- Manage less common corrosion and fouling problems and apply proper strategies and insights on handling complex issues
- Discuss new advancements in corrosion and fouling control and their practical applications
- Integrate corrosion management into reliability-focused maintenance practices
- Carryout predictive maintenance for corrosion control as well as utilize data analytics and predictive modeling

Who Should Attend

This course provides a wide understanding and deeper appreciation of corrosion and fouling for 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.

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**.*

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.

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

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:

Dr. Mahmoud Nasif, PhD, BSc is a **Senior Inspection Engineer** with over **20 years** of **Offshore** & **Onshore** experience within the **Petrochemical**, **Refinery** and **Oil & Gas** industries. His expertise widely covers in the areas of **Metallurgy and Material** Selection, **Corrosion and Metallurgy**, **Corrosion & Fouling**, Pressure **Vessel** Inspection, **Piping** Inspection, **Pipe & Vessel Damage Mechanism**, **Above Ground Storage** Tank Inspection, Physical **Metallurgy** of Steel, **Metallurgy, Welding Technology** Testing & NDT Procedures, **Metallurgical** Failure Analysis & Prevention, **Welding & Metallurgy**, **Pipeline Design**, Onshore **Pipeline** Repair Methods and Equipment, Process Piping & Piping Fundamentals, Basic AUTOCAD **Piping**, **Pipeline** Design & Construction, Construction, Operation & Maintenance, **Risk-based** Inspection, **Fitness-for-Service**, **Corrosion & Material** Inspection, **Materials** Selection, **Corrosion** Monitoring, Sub-service **Corrosion** Control, **Corrosion Inhibitor** Treatment, **Corrosive** Gas Analysis, **Material Selection**, **Asset Integrity**, **Risk** Management, **Mechanical Integrity** Assessment, Safety Critical Element & Performance Standard, QA/HSEQ & Hazard Mitigation, **Turnaround** Planning & Inspection, Intrusive & Non-intrusive **NDT**, **Corrosion & Cathodic Protection**, **Coatings & Linings**, **Steam Boilers**, Heat Recovery Steam Generation (**HRSG**), One Through Steam Generation (**OTSG**), **Surface** Equipment Inspection, **Surface Facilities** Integrity Assurance, **Casing & Tubing**, **Ultrasonic Thickness** Inspection, **Visual** Inspection, **Natural Gas**, **LNG & LPG**, **Electrolyte** Measurement, **Water** Treatment, **Water Injection** Completion Wells, **Water & Gas Production** Equipment, **Data** Interpretation, **Detailed Engineering**, PROACT **Root Cause Analysis** Methods, **Failure** Investigation, **HAZOP**, Advanced Safety Audit and EMS-ISO 14001. Further, he is also well-versed in various **international codes** and **standards** such as the ASME Sec VIII Div. 1 & 2, ASTM, AWS, TEMA, API 571, API 577, API 580, API 934 NACE, Shell DEP, API 510, API 570, API 653, API 579, BS7910, ASME B31G, ASME, etc. and software like the Meridian-CIMS, SAP, E2g and S-RBI, Velosi. He is currently the **Asset Integrity Authorized Person** of Petroleum Development Oman (**PDO**) wherein he ensures that integrity standards, specifications, manuals and systems for surface facilities are developed, maintained and updated.

During his career life, Dr. Mahmoud has gained his practical and field experience through his various significant positions and dedication as the **Head** of **Integrity**, **Material**, **Corrosion & Inspection Department Manager**, **Senior Integrity Material & Corrosion Engineer**, **Material & Corrosion Protection Engineer** and **Corrosion Engineer** for numerous international companies like the United Gas Derivatives Company (**UGDC**), **ADGAS-LNG**, Khalda Petroleum Co., Suez Oil Petroleum Co. and Arab Pharmaceutical Glass.

Dr. Mahmoud has a **PhD** in **Chemical & Production Engineering** and **Bachelor's** degree in **Mechanical Engineering**. Further, he is a **Certified Instructor/Trainer**, a Certified Pressure Vessel Inspector (**API-510**), a Certified Piping Inspector (**API-570**), a Certified Above Ground Storage Tank Inspector (**API-653**), a Certified Welding & Metallurgy (**API 577**), a Certified Risk Based Inspector (**API-580/581**), a Certified Corrosion & Material Specialist (**API 571**), a Recognized **NACE** Senior Corrosion Technologist, **NACE** Cathodic Protection Specialist, **NACE** Material Selection, a member of **NACE Association** and hold a Certificate in **NACE CP Interference**. He has further published various Technical Journals and delivered numerous trainings, seminars, courses, workshops and conferences internationally.

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, 08th of February 2026***
0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0900	***Overview of Corrosion & Fouling:*** *Introduction to the Basic Concepts, Definitions, and Importance in Refinery Maintenance*
0900 – 0930	***Types of Corrosion:*** *Understanding Chemical, Galvanic, Pitting, Crevice, and Intergranular Corrosion*
0930 – 0945	*Break*
0945 – 1030	***Common Refinery Corrosion Problems:*** *Identification & Locations Where Corrosion is Most Likely to Occur*
1030 – 1230	***Introduction to Fouling:*** *Types of Fouling (Biological, Chemical, Physical) and their Characteristics*
1230 -1245	*Break*
1245 – 1420	***Effects of Corrosion & Fouling on Equipment Performance****: Analyzing How Corrosion and Fouling Impact Refinery Operations*
1420 - 1430	***Recap***
1430	*Lunch & End of Day One*

Day 2:	***Monday, 09th of February 2026***
0730 – 0830	***Safety & Environmental Considerations:*** *Discussing the Safety Risks and Environmental Impact of Unchecked Corrosion and Fouling*
0830 – 0930	***Mechanisms of Corrosion****: Electrochemical Processes, Environmental Factors Affecting Corrosion Rates*
0930 – 0945	*Break*
0945 – 1100	***Fouling Mechanisms:*** *How Fouling Occurs, Factors that Accelerate Fouling in Refineries*
1100 – 1230	***Corrosion & Material Selection:*** *How Material Selection can Prevent Corrosion, Examples of Corrosion-Resistant Materials*
1230 - 1245	*Break*
1245 – 1420	***Monitoring Corrosion & Fouling:*** *Techniques & Tools for Monitoring, including Corrosion Coupons & Electronic Probes*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Two*

Day 3:	***Tuesday, 10th of February 2026***
0730 – 0830	***Case Study Discussion****: Real-World Examples of Corrosion and Its Resolution*
0830 – 0930	***Group Activity:*** *Identifying Corrosion Types from Provided Scenarios & Photographs*
0930 – 0945	*Break*

0945 – 1100	***Control Strategies for Corrosion:*** *Cathodic Protection, Coating Systems, Corrosion Inhibitors*
1100 – 1230	***Control Strategies for Fouling:*** *Mechanical Cleaning, Chemical Cleaning, and Antifoulants*
1230 - 1245	*Break*
1245 – 1420	***Evaluating Benefits & Liabilities of Control Strategies:*** *Cost-Benefit Analysis, Potential Risks, and Environmental Impacts*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Three*

Day 4: ***Wednesday, 11th of February 2026***

0730 – 0930	***Design Considerations to Mitigate Corrosion & Fouling:*** *Design Modifications & Process Control Improvements*
0930 - 0945	*Break*
0945 – 1100	***Problem-Solving Workshop:*** *Applying Techniques to Resolve Specific Corrosion & Fouling Problems*
1100 – 1230	***Interactive Q&A Session:*** *Solving Participant Queries with Expert Responses*
1230 - 1245	*Break*
1245 - 1420	***Managing Less Common Corrosion & Fouling Problems:*** *Strategies and Insights on Handling Complex Issues*
1420 - 1430	***Recap***
1430	*Lunch & End of Day Four*

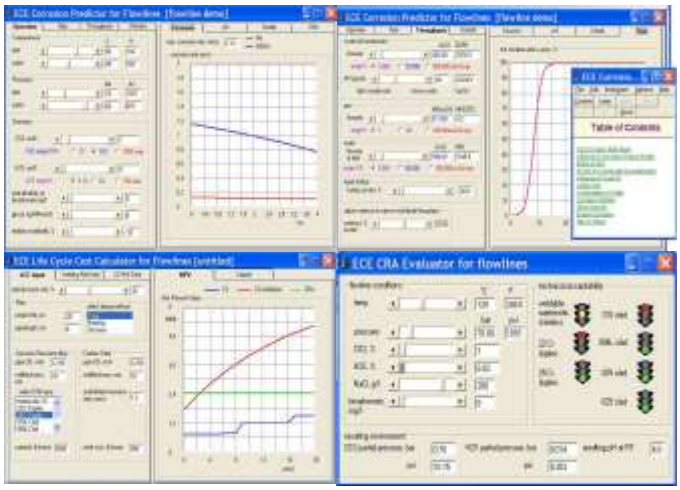
Day 5: ***Thursday, 12th of February 2026***

0730 – 0930	***Innovative Technologies in Corrosion & Fouling Control****: New Advancements and their Practical Applications*
0930 - 0945	*Break*
0945 – 1045	***Reliability Engineering & Asset Integrity****: Integrating Corrosion Management into Reliability-Focused Maintenance Practices*
1045 – 1230	***Predictive Maintenance for Corrosion Control:*** *Utilizing Data Analytics and Predictive Modeling*
1230 - 1245	*Break*
1245 - 1345	***Workshop: Simulation of Corrosion Management:*** *Participants Use Simulation Software to Manage Hypothetical Corrosion Scenarios*
1345 - 1400	***Course Conclusion***
1400 - 1415	***POST-TEST***
1415 - 1430	*Presentation of Course Certificates*
1400	*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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