

COURSE OVERVIEW FE0239
Oil, Gas and Water Corrosion Integrity

Course Title

Oil, Gas and Water Corrosion Integrity

Course Date/Venue

Session 1: February 18-22, 2024/The Mouna Meeting Room, The H Dubai Hotel, Sheikh Zayed Rd - Trade Centre, Dubai, UAE

Session 2: March 03-07, 2024/Kizkulesi, Crown Plaza Istanbul Asia Hotels & Convention Center, Istanbul, Turkey



Course Reference

FE0239

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.



Statistics shows that the total cost of corrosion control in the HC industry in the US alone is estimated at \$3.692 billion. Of this total, maintenance-related expenses are estimated at \$1.767 billion annually, vessel turnaround expenses account for \$1.425 billion annually, and fouling costs are approximately \$0.500 billion annually. Significant cost reduction can be achieved with timely and appropriate corrosion inspection. Asset integrity can be enhanced with corrosion monitoring and corrosion mitigation methods such as materials selection and chemical treatment.



Some types or forms of corrosion can be prevented through good practices in materials selection and design, while others can be cured or controlled if diagnosed early. Corrosion diagnosis involves a number of destructive and non-destructive inspection and examination techniques.

This course is designed to provide sufficient information for lab technicians to identify and apply corrosion control and materials selection procedures to overcome corrosion issues. An in-depth understanding of corrosion is not required to effectively prevent untoward corrosion in 80% of problem areas.

Upon the successful completion of this course, the participant shall have a high quality and in-depth understanding of the corrosion monitoring methods available. The advantages and limitations of each method are detailed and the methods of analysis to convert raw data to useful information are included.

The course covers fundamental aspects of corrosion control and its prevention in Oil and Gas production. The course will enable participants to establish a solid foundation in corrosion before moving on to advanced topics. Exercises, hands-on practical sessions and virtual experiments throughout the course will help participants understand the basic concepts and fundamentals important to corrosion.

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, sample video clips of the instructor's actual lectures & practical sessions during the course conveniently saved in a **Tablet PC**.

Course Objectives

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

- Apply and gain an in-depth knowledge on corrosion prevention and control
- Discuss oil/gas production and HC streams
- Describe the different HC Stream that includes HP, LP, CRU lean gas, CRU 1st stage, X manifolds, export gas, customer networks, etc.
- Identify the plant equipment at the site most affected by corrosion and describe the design methods used to prevent such damage
- Carryout corrosion control techniques, testing for corrosion due to microbial, H₂S and water, corrosion analysis and remedial actions
- Describe the effect of bacteria on oil, water and gas piping and equipment
- Interpret corrosion theory and describe corrosion mechanism and chemical reactions
- Describe material change covering metallic materials and non metallic materials
- Employ cathodic protection, corrosion prevention and control techniques
- Discuss barrier film and chemical treatment
- Recognize corrosion inhibitors used in oil and gas industries, their specs and work mechanism
- Identify the microbial control chemicals, corrosion problems related to design, good engineering and corrosion management
- Explain the cost of corrosion, corrosion key performance indicators KPI's, computer and corrosion management
- Implement corrosion management strategy and corrosion management in the oil and gas industry

Who Should Attend


This course provides an overview of all significant aspects and considerations of corrosion prevention and control for laboratory technicians.

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 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, 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 a **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.



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

Dubai	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.
Istanbul	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.

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

0730 – 0800	<i>Registration & Coffee</i>
0800 – 0815	<i>Welcome & Introduction</i>
0815 – 0830	PRE-TEST
0830 – 0930	Introduction to Oil & Gas Production <i>Origin and Generation of Oil • Reservoir Production Mechanism • Crude Oil Composition</i>
0930 – 0945	<i>Break</i>
0945 – 1100	HC Streams <i>HP • LP • CRU Lean Gas • CRU 1st Stage • X Manifolds • Export Gas • Customer Network, etc.</i>
1100 – 1230	Corrosion Damage <i>Definition of Corrosion • Corrosion Basics • Corrosion Fundamentals • Factors Influencing Corrosion • Basic Corrosion Control in Gas, Oil & Water • Forms of Corrosion • Corrosion Monitoring in Plant and Facilities • Corrosion Failure & Root Cause analysis • Differentiate between Corrosion due to Dissolved Oxygen, Microbiological, CO₂ H₂S, etc.</i>
1230 – 1245	<i>Break</i>
1245 – 1420	Corrosion Control Techniques
1420 – 1430	Recap
1430	<i>Lunch & End of Day One</i>





Day 2

0730 – 0930	Testing for Corrosion due to Microbial, H₂S & Water
0930 – 0945	Break
0945 – 1100	Corrosion Analysis & Remedial Actions Analyze Corrosion Coupons • Corrosion Rings • Corrosion Probes, etc.
1100 – 1230	Material Change Metallic Materials (Alloying Elements, The Effect of Alloying Elements on Steel Properties, Alloying Groups) • Non Metallic Materials (Composites, Manufacturing Processes, Properties of Composite Materials, Flexible Pipelines)
1230 – 1245	Break
1245 – 1420	Exercise I (Team Building)
1420 – 1430	Recap
1430	Lunch & End of Day Two

Day 3

0730 – 0930	Cathodic Protection Cathodic Protection for Onshore Installations • Galvanic Anodes • Impressed Current • System Maintenance
0930 – 0945	Break
0945 – 1100	Barrier Film (Coatings and Lining) Coating Fundamentals • Performance Characteristics of Industrial Coatings • Types of Coating Systems • Screening and Quality Control of Coatings • Coating Defects and Failure Codes • Maintenance
1100 – 1230	Chemical Treatment
1230 – 1245	Break
1245 – 1420	Corrosion Inhibitors Laboratory Evaluation of Corrosion Inhibitor Performance • Application of Corrosion Inhibitors
1420 – 1430	Recap
1430	Lunch & End of Day Three

Day 4

0730 – 0930	Microbial Control Chemicals (Sulphate-Reducing Bacteria) Classification • Bacteria Formation & Effect • Origin of Sulfate-Reducing Bacteria • Biocide Selection & Treatment
0930 – 0945	Break
0945 – 1100	Corrosion Problems Related to Design
1100 – 1230	Good Engineering and Corrosion Management
1230 – 1245	Break
1245 – 1420	Cost of Corrosion Engineering Best-Practice • Corrosion Management and Cost Saving • Corrosion Market Size • Lesson learned & Knowledge Transfer
1420 – 1430	Recap
1430	Lunch & End of Course

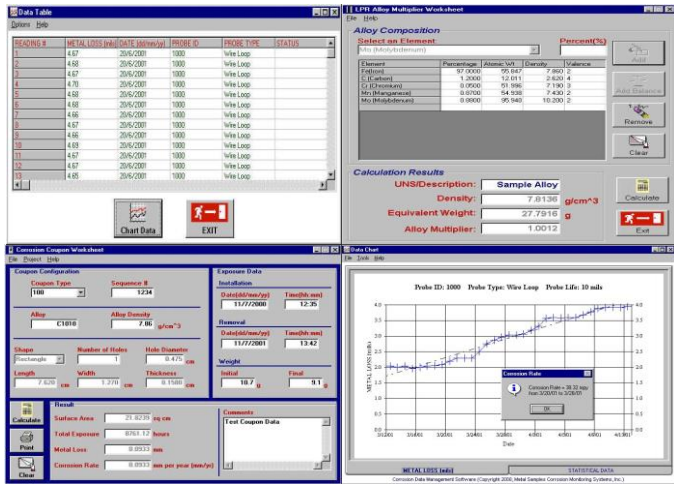


Day 5

0730 – 0930	Corrosion Key Performance Indicators KPI's
0930 – 0945	Break
0945 – 1100	Computer and Corrosion Management Computers and Corrosion Management • Data Management
1100 – 1230	Corrosion Management Strategy Background • Objectives • Fundamentals • Coverage • Asset Integrity and Corrosion Management
1230 – 1245	Break
1245 – 1345	Corrosion Management in the Oil & Gas Industry Pipelines • Process Equipment • Offshore Structures • Wells and subsurface Facilities
1345 – 1400	Course Conclusion
1400 – 1415	POST-TEST
1415 – 1430	Presentation of Course Certificates
1430	Lunch & End of Course

Simulator (Hands-on Practical Sessions)

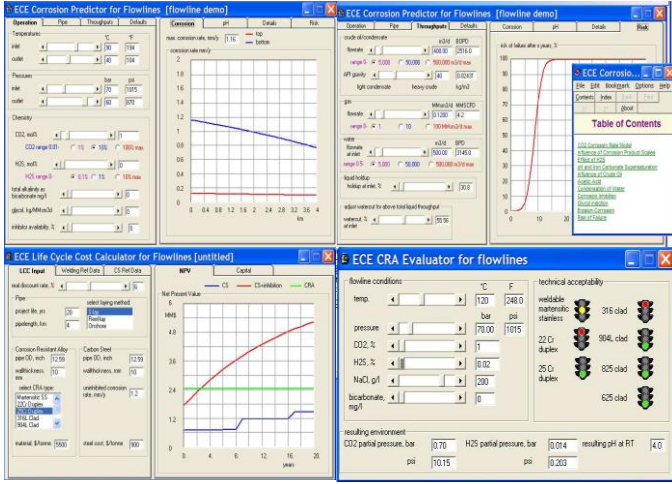
Practical sessions will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using the simulators “Corrosion Data Management Software (CDMS)” and “Electronic Corrosion Engineer (ECE®) 5”.



The screenshot displays the Corrosion Data Management Software (CDMS) interface. It features several windows:

- Data Table:** A table with columns for ID, Date, Weight, Probe Type, and Status, containing multiple rows of data.
- Alloy Composition:** A window showing chemical composition data for various elements like Fe, C, S, Mn, and Mo.
- Calculation Results:** A window displaying calculated values for UNS Description, Density, Equivalent Weight, and Alloy Multiplier.
- Corrosion Configuration:** A window for setting up corrosion tests, including coupon type, alloy, and dimensions.
- Exposure Data:** A window for recording exposure details like date, time, and location.
- Graph:** A line graph showing Weight Loss (mm) versus Time (days) for a specific probe.

Corrosion Data Management Software (CDMS)



The screenshot displays four windows from the ECE software suite:

- ECE Corrosion Predictor for Flowlines (flowline demo):** Shows input parameters like temperature, pressure, and material, along with a graph of corrosion rate over time.
- ECE CRA Evaluator for flowlines:** Displays technical acceptability results for various materials (316 clad, 904L clad, 825 clad, 625 clad) based on flowline conditions.
- ECE Life Cycle Cost Calculator for Flowlines [unfitted]:** Shows a graph of NPV (Net Present Value) over time, comparing different corrosion prevention methods.
- ECE Corrosion Table of Contents:** A navigation window for the software's documentation.

Electronic Corrosion Engineer (ECE®) 5

Course Coordinator

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