

COURSE OVERVIEW FE1021

Materials & Testing Foundation

Course Title

Materials & Testing Foundation

Course Date/Venue

Please refer to page 2

Course Reference

FE1021

Course Duration/Credits

Five days/3.0 CEUs/30 PDHs

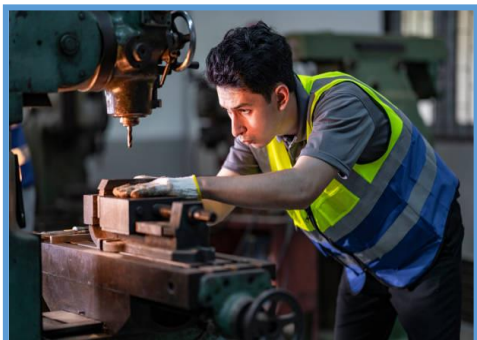
Course Description



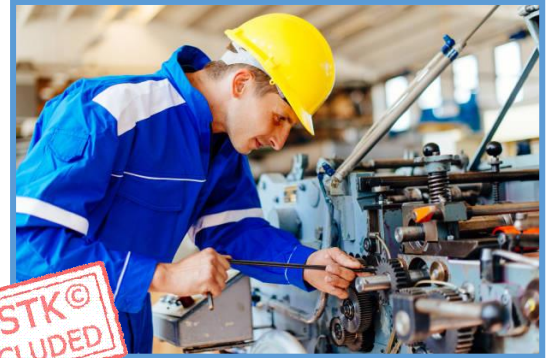
This practical and highly-interactive course includes various practical sessions and exercises. Theory learnt will be applied using our state-of-the-art simulators.



This course is designed to provide participants with a detailed and up-to-date overview of Materials & Testing Foundation. It covers the materials engineering in oil and gas, classification of engineering materials, mechanical and physical properties of materials and material degradation mechanisms; the materials testing, tensile testing, hardness testing, impact testing, fatigue testing, creep testing and bend and flexural testing; and the NDT methods, visual testing (VT), ultrasonic testing (UT), radiographic testing (RT), magnetic particle testing (MPT) and liquid penetrant testing (LPT).



Further, the course will also discuss the crystal structures (BCC, FCC, HCP), grain size and boundaries; the solidification and phase transformation and alloying elements and effects; the heat treatment of metals, annealing, normalizing, quenching, tempering and precipitation hardening; the heat-affected zone (HAZ), welding defects and causes, post-weld heat treatment (PWHT) and welding metallurgy and material compatibility; the corrosion mechanisms and testing, uniform corrosion, pitting and crevice corrosion; and the stress corrosion cracking and corrosion testing methods.



During this interactive course, participants will learn the material selection criteria, service temperature and pressure, corrosive environment resistance, mechanical property requirements and economic and availability considerations; the industry standards and codes, ASTM material testing standards, ASME material specifications, ISO quality management in materials testing and API standards for oil and gas materials; the material certification and traceability and quality control in materials testing; and the failure analysis procedures and laboratory safety in materials testing.

Course Objectives

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

- Apply and gain a basic knowledge on materials and testing foundation
- Discuss materials engineering in oil and gas including classification of engineering materials, mechanical and physical properties of materials and material degradation mechanisms
- Carryout materials testing, tensile testing, hardness testing, impact testing, fatigue testing, creep testing and bend and flexural testing
- Employ NDT methods, visual testing (VT), ultrasonic testing (UT), radiographic testing (RT), magnetic particle testing (MPT) and liquid penetrant testing (LPT)
- Identify crystal structures (BCC, FCC, HCP), grain size and boundaries, solidification and phase transformation and alloying elements and effects
- Apply heat treatment of metals including annealing, normalizing, quenching and tempering and precipitation hardening
- Recognize heat-affected zone (HAZ), welding defects and causes, post-weld heat treatment (PWHT) and welding metallurgy and material compatibility
- Carryout corrosion mechanisms and testing covering uniform corrosion, pitting and crevice corrosion, stress corrosion cracking and corrosion testing methods
- Apply material selection criteria comprising of service temperature and pressure, corrosive environment resistance, mechanical property requirements and economic and availability considerations
- Discuss industry standards and codes covering ASTM material testing standards, ASME material specifications, ISO quality management in materials testing and API standards for oil and gas materials
- Review material certification and traceability and apply quality control in materials testing, failure analysis procedures and laboratory safety in materials testing

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 materials and testing foundation for project managers, construction supervisors, civil engineers, geotechnical engineers, site engineers, technical inspectors, project coordinators, quality control / quality assurance (QC/QA) technicians, laboratory technicians and other technical staff.

Course Date/Venue

Session(s)	Date	Venue
1	March 29-April 02, 2026	Pierre Lotti Meeting Room, Movenpick Hotel Istanbul Golden Horn, Istanbul, Turkey
2	June 22-26, 2026	Ajman Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE
3	September 27-October 01, 2026	Crowne Meeting Room, Crowne Plaza Al Khobar, an IHG Hotel, Al Khobar, KSA
4	December 20-24, 2026	Tamra Meeting Room, Al Bandar Rotana Creek, Dubai, UAE

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

Istanbul	US\$ 6,000 per Delegate + VAT . This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.
Al Khobar/ Abu Dhabi/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.

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.

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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.

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 Corrosion & Metallurgical Engineer** with over **30 years** of extensive experience within the **Oil & Gas, Petrochemical, Refinery, Construction, Aircraft & Shipbuilding** Industry. His wide experiences cover in the areas of **Pressure Vessels, Piping Inspection, Risk-Based Inspection, Fitness-for-Service (FFS), Metallurgical Failure, Metallurgy & Metallurgical Processes, Metallurgical Lab, Corrosion and Metallurgy, Analysis & Prevention, Corrosion Fabrication & Inspection, Fabrication & Repair, Corrosion Prevention, Corrosion Engineering, Corrosion Control, Corrosion Inhibition, Corrosion Management in Process Operations, Corrosion & Prevention of Failures, Material Selection & Properties, Material & Inspection Foundation Cathodic Protection Systems, Steel Metallurgy, Steel Structure Welding, Steelmaking Slag, Steel Making Application, Steel Making Process, Steel Manufacturing, Steel Forging, Steel Manufacturing & Process Troubleshooting, Hot Rolling Process, Hot Strip Mill, Mill Operations, Roll Mill, Electric Arc Furnace (EAF), Slit Rolling, Carbon Steel Pipe Wall Thickness & Grade Selection, Ferro-Alloys, Heat Treatment & Prevention Techniques 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 **EWFIW** (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.

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	Overview of Materials Engineering in Oil & Gas Role of Materials in Operations • Common Engineering Materials Used in Refineries • Relationship Between Design, Materials & Safety • Lifecycle Considerations in Material Selection
0930 – 0945	Break
0945 – 1030	Classification of Engineering Materials Metals, Non-Metals & Composites • Ferrous versus Non-Ferrous Metals • Polymers, Ceramics & Advanced Materials • Applications in Industrial Environments
1030 – 1130	Mechanical Properties of Materials Strength & Hardness • Ductility & Brittleness • Elasticity & Plasticity • Toughness & Resilience
1130 – 1215	Physical Properties of Materials Density & Specific Gravity • Thermal Conductivity & Expansion • Electrical Conductivity & Resistivity • Magnetic Properties
1215 – 1230	Break
1230 – 1330	Material Degradation Mechanisms Corrosion Basics & Types • Wear & Abrasion • Fatigue & Creep • Environmental Effects (Temperature, Humidity, Chemicals)
1330 – 1420	Basics of Materials Testing Purpose & Importance of Testing • Destructive versus Non-Destructive Testing • Laboratory versus Field Testing • Standards & Compliance (ASTM, ISO, ASME)
1420 – 1430	Recap Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow
1430	Lunch & End of Day One

Day 2

0730 – 0830	Tensile Testing Purpose & Principles • Stress-Strain Curves • Yield Strength & Ultimate Tensile Strength • Elongation & Reduction of Area
0830 – 0930	Hardness Testing Brinell Hardness Test • Rockwell Hardness Test • Vickers Hardness Test • Conversion Between Hardness Scales
0930 – 0945	Break
0945 – 1100	Impact Testing Charpy & Izod Methods • Energy Absorption Concepts • Notch Sensitivity • Test Specimen Preparation

1100 – 1230	Fatigue Testing <i>Fatigue Life Curves (S-N Curves) • Low-Cycle versus High-Cycle Fatigue • Crack Initiation & Propagation • Fatigue in Oil & Gas Applications</i>
1230 – 1245	Break
1245 – 1330	Creep Testing <i>Definition & Importance • Primary, Secondary & Tertiary Creep • Factors Affecting Creep Resistance • Creep Testing Equipment</i>
1330 – 1345	Bend & Flexural Testing <i>Purpose of Bend Testing • Three-Point & Four-Point Bending • Measuring Flexural Modulus • Applications in Piping & Structural Materials</i>
1420 – 1430	Recap <i>Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow</i>
1430	Lunch & End of Day Two

Day 3

0730 – 0830	NDT Methods <i>Benefits Over Destructive Testing • Surface versus Volumetric Inspection • Cost & Time Considerations • Typical Applications in Refinery Operations</i>
0830 – 0930	Visual Testing (VT) <i>Direct & Remote Visual Inspection • Use of Borescopes & Endoscopes • Surface Defect Identification • Acceptance Criteria</i>
0930 – 0945	Break
0945 – 1100	Ultrasonic Testing (UT) <i>Basic Principles & Sound Wave Propagation • Pulse-Echo Method • Thickness Measurement • Defect Characterization</i>
1100 – 1230	Radiographic Testing (RT) <i>X-Ray & Gamma-Ray Sources • Film versus Digital Radiography • Interpreting Radiographs • Radiation Safety Precautions</i>
1230 – 1245	Break
1245 – 1330	Magnetic Particle Testing (MPT) <i>Magnetic Field Application • Wet versus Dry Methods • Fluorescent Magnetic Particles • Defect Interpretation</i>
1330 – 1345	Liquid Penetrant Testing (LPT) <i>Surface Preparation • Application of Penetrant & Developer • Inspection Under Visible & UV Light • Limitations of LPT</i>
1420 – 1430	Recap <i>Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow</i>
1430	Lunch & End of Day Three

Day 4

0730 – 0830	Basic Metallurgy Concepts <i>Crystal Structures (BCC, FCC, HCP) • Grain Size & Boundaries • Solidification & Phase Transformation • Alloying Elements & Effects</i>
0830 – 0930	Heat Treatment of Metals <i>Annealing • Normalizing • Quenching & Tempering • Precipitation Hardening</i>
0930 – 0945	Break

0945 – 1100	Welding Metallurgy Heat-Affected Zone (HAZ) • Welding Defects & Causes • Post-Weld Heat Treatment (PWHT) • Welding Metallurgy & Material Compatibility
1100 – 1230	Corrosion Mechanisms & Testing Uniform Corrosion • Pitting & Crevice Corrosion • Stress Corrosion Cracking • Corrosion Testing Methods
1230 – 1245	Break
1245 – 1330	Material Selection Criteria Service Temperature & Pressure • Corrosive Environment Resistance • Mechanical Property Requirements • Economic & Availability Considerations
1330 – 1345	Case Studies in Refinery Material Failures Common Failure Modes in Refinery Equipment • Lessons Learned from Industry Incidents • Root Cause Analysis Methods • Preventive Measures
1420 – 1430	Recap Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow
1430	Lunch & End of Day Four

Day 5

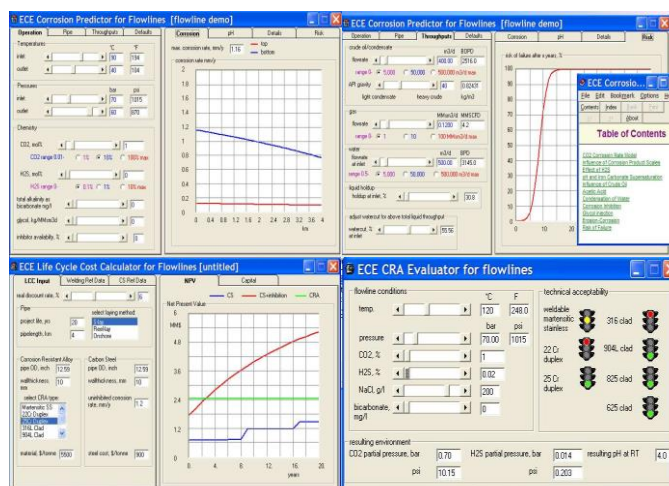
0730 – 0830	Industry Standards & Codes ASTM Material Testing Standards • ASME Material Specifications • ISO Quality Management in Materials Testing • API Standards for Oil & Gas Materials
0830 – 0930	Material Certification & Traceability Mill Test Certificates (MTC) • Heat Numbers & Batch Identification • Traceability Requirements in Refinery Projects • Supplier Quality Verification
0930 – 0945	Break
0945 – 1100	Quality Control in Materials Testing Calibration of Testing Equipment • Test Procedure Qualification • Sample Preparation & Handling • Documentation & Reporting
1100 – 1230	Failure Analysis Procedures Gathering Background Data • Visual Examination • Laboratory Analysis Techniques • Reporting & Recommendations
1230 – 1245	Break
1245 – 1315	Laboratory Safety in Materials Testing Handling of Hazardous Materials • Safe Use of Testing Equipment • PPE Requirements • Emergency Procedures
1315 – 1345	Practical Workshop & Course Review Hands-On Testing Demonstrations • Interpretation of Test Results • Group Discussion & Problem-Solving
1345 – 1400	Course Conclusion Using this Course Overview, the Instructor(s) will Brief Participants about the Course Topics that were Covered During the Course
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”.



Corrosion Data Management Software (CDMS)



Electronic Corrosion Engineer (ECE®) 5

Course Coordinator

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