# COURSE OVERVIEW PE0337
# Hydrogen Energy Infrastructure Design & Maintenance

**Course Title**
Hydrogen Energy Infrastructure Design & Maintenance


**Course Date/Venue**
Please see page 3



**Course Reference**
PE0337

**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 Hydrogen Energy Infrastructure Design and Maintenance. It covers the properties, applications and benefits of hydrogen energy; the hydrogen production methods covering steam methane reforming (SMR), electrolysis and biomass gasification; the comparative analysis of hydrogen production technologies; the types, efficiency and applications of electrolysis; the renewable hydrogen production, material selection basics and how hydrogen interacts with various materials; the hydrogen storage technologies and the design and engineering considerations for hydrogen storage systems; and the safety aspects of hydrogen storage.

Further, the course will also discuss the hydrogen transportation methods for pipelines, tankers and trucks; the pipeline design and construction for hydrogen transport; the logistics and infrastructure for hydrogen distribution; the corrosion concerns related to hydrogen transportation; the design and layout of hydrogen refueling stations; the components and equipment of hydrogen refueling stations; and the safety standards and regulations for refueling stations and fuel cell technologies.

During this interactive course, participants will learn the integration of fuel cells in transportation and stationary applications and fuel cell maintenance; the properties, hazards and mitigation strategies of hydrogen safety; the risk assessment and management in hydrogen infrastructure; the international and national safety standards and regulations; the environmental impact assessment of hydrogen energy projects; the life cycle analysis of hydrogen production and utilization; the carbon capture and storage (CCS) in hydrogen production and regulations related to hydrogen infrastructure; the maintenance and inspection procedures for hydrogen infrastructure; the non-destructive testing (NDT) techniques for hydrogen systems; and the condition monitoring, predictive maintenance and economic analysis of hydrogen energy projects.

## Course Objectives

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

- Apply and gain an in-depth knowledge on hydrogen energy infrastructure design and maintenance
- Discuss the properties, applications and benefits of hydrogen energy
- Explain hydrogen production methods covering steam methane reforming (SMR), electrolysis and biomass gasification
- Apply comparative analysis of hydrogen production technologies and identify the types, efficiency and applications of electrolysis
- Identify renewable hydrogen production, material selection basics and how hydrogen interacts with various materials
- Recognize the hydrogen storage technologies, design and engineering considerations for hydrogen storage systems and safety aspects of hydrogen storage
- Apply hydrogen transportation methods for pipelines, tankers and trucks as well as pipeline design and construction for hydrogen transport
- Describe logistics and infrastructure for hydrogen distribution and corrosion concerns related to hydrogen transportation
- Illustrate the design and layout of hydrogen refueling stations and recognize the components and equipment of hydrogen refueling stations
- Apply safety standards and regulations for refueling stations and discuss fuel cell technologies
- Integrate fuel cells in transportation and stationary applications and fuel cell maintenance
- Identify the properties, hazards and mitigation strategies of hydrogen safety
- Carryout risk assessment and management in hydrogen infrastructure and review the international and national safety standards and regulations
- Explain the environmental impact assessment of hydrogen energy projects and life cycle analysis of hydrogen production and utilization

- Discuss carbon capture and storage (CCS) in hydrogen production and regulations related to hydrogen infrastructure
- Apply maintenance and inspection procedures for hydrogen infrastructure and non-destructive testing (NDT) techniques for hydrogen systems
- Carryout condition monitoring, predictive maintenance and economic analysis of hydrogen energy projects

## 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 hydrogen energy infrastructure design and maintenance for energy engineers, chemical engineers, mechanical engineers, civil engineers, maintenance technicians, safety officers, project managers, government officials and those who are interested in the development of hydrogen energy infrastructure.

## Course Date/Venue

| Session(s) | Date | Venue |
|---|---|---|
| 1 | April 21-25, 2025 | Ajman Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE |
| 2 | June 15-19, 2025 | Meeting Plus 9, City Centre Rotana, Doha Qatar |
| 3 | August 24-28, 2025 | Boardroom 1, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE |
| 4 | November 16-20, 2025 | Al Khobar Meeting Room, Hilton Garden Inn, Al Khobar, KSA |

## 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

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**. 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.

## Accommodation

Accommodation is not included in the course fees. However, any accommodation required can be arranged at the time of booking.

**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. Manuel Dalas**, PEng, MSc, BSc, is a **Senior Process Engineer** with almost **30 years** of industrial experience within the **Oil & Gas**, **Refinery**, **Petrochemical** and **Refinery** industries. His expertise widely includes in the areas of **Process Engineering & Systems Failure** Analysis, **Equipment & Mechanical Integrity**, **Process Failure** Prevention, **Engineering Modifications & Systems Failures**, Root Cause Failure Analysis (**RCFA**) Techniques, **Methodology Selection** based on Specific Scenarios, **Process Plant** Optimization, **Revamping & Debottlenecking**, **Process Plant** Troubleshooting & Engineering Problem Solving, **Process Plant** Operations, **Mass & Material Balance**, **Oil & Gas Processing**, **Process Plant** Performance & Efficiency, **Crude Distillation** Process Saturated Gas Process Technology, **Crude Dehydration & Desalting**, **Crude** Stabilization Operations, **Heat Exchangers & Fired Heaters** Operation & Troubleshooting, **Pressure Vessels** Maintenance & Operation, **Piping Support**, **Ironworks**, **Rotating & Static Equipment** (**Pumps**, **Valves**, **Boilers**, **Pressure Vessels**, **Tanks**, **Bearings**, **Compressors**, **Pipelines**, **Motors**, **Turbines**, **Gears**, **Seals**), **Hydrogen Sulphide Stripping**, **Crude Oil De Salting** Process, **Gas Conditioning**, **NGL Recovery & NGL Fractionation**, **Flare** Systems, Pre-Fabrication of **Steel Structure**, Alloy Piping Pre-Fabrication, **Vertical Columns/Pressure Vessels**, **Distillation Column**, **Steel Structures**, **Construction** Management, **Building** Structures and **Electrical-Mechanical Equipment**. Currently, he is the **Technical Consultant** of the **Association of Local Authorities** of **Greater Thessaloniki** wherein he oversees mechanical engineering services while focusing on system reviews and improvements. His role involves a strategic approach to enhancing operational efficiencies and implementing robust solutions in complex engineering environments.

During his career life, Mr. Dalas has gained his practical and field experience through his various significant positions and dedication as the **Technical Manager**, **Construction Manager**, **Senior Process Engineer**, **Process Safety Engineer**, **Process Design Engineer**, **Project Engineer**, **Production Engineer**, **Construction Engineer**, **Consultant Engineer**, **Technical Consultant**, **Safety Engineer**, **Mechanical Engineer**, **External Collaborator**, **Deputy Officer** and **Senior Instructor/Trainer** for various companies including the Alpha Astika, Anamorfosis Technical Firm, EKME, ASTE, Elof Consulting and Hypergroup.

Mr. Dalas is a **Registered Professional Engineer** and has a **Master's** degree in **Energy System** from the **International Hellenic University** and a **Bachelor's** degree in **Mechanical Engineering** from the **Mechanical Engineering Technical University**, **Greece** along with a **Diploma** in **Management & Production Engineering** from the **Technical University** of **Crete**. Further, he is a **Certified Internal Verifier/Assessor/Trainer** by the **Institute of Leadership and Management** (**ILM**), a **Certified Project Manager Professional** (**PMI-PMP**), a **Certified Instructor/Trainer**, a **Certified Energy Auditor** for **Buildings**, **Heating & Climate Systems**, a **Member** of the **Hellenic Valuation Institute** and the **Association of Greek Valuers** and a **Licensed Expert Valuer Consultant** of the **Ministry of Development and Competitiveness**. He has further delivered numerous trainings, courses, seminars, conferences and workshops internationally.

## Course Fee

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

## 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 – 0900* | ***Introduction to Hydrogen Energy:*** *Properties, Applications & Benefits* |
| *0900 – 0930* | ***Overview of Hydrogen Production Methods:*** *Steam Methane Reforming (SMR), Electrolysis, Biomass Gasification, etc.* |
| *0930 – 0945* | *Break* |
| *0945 – 1030* | ***Comparative Analysis of Hydrogen Production Technologies*** |
| *1030 – 1130* | ***Detailed Exploration of Electrolysis:*** *Types, Efficiency & Applications* |
| *1130 – 1215* | ***Renewable Hydrogen Production:*** *Solar, Wind & Biomass Integration* |
| *1215 – 1230* | *Break* |
| *1230 – 1330* | ***Case Studies:*** *Hydrogen Production Plants & Projects* |
| *1330 – 1420* | ***Material Selection Basics & How Hydrogen Interacts with Various Materials*** |
| *1420 – 1430* | ***Recap*** |
| *1430* | *Lunch & End of Day One* |

***Day 2***

| | |
|---|---|
| *0730 – 0830* | ***Hydrogen Storage Technologies:*** *Compressed Gas, Liquid Hydrogen, Solid-State Storage* |
| *0830 – 0930* | ***Design & Engineering Considerations for Hydrogen Storage Systems*** |
| *0930 – 0945* | *Break* |
| *0945 – 1030* | ***Safety Aspects of Hydrogen Storage*** |
| *1030 – 1130* | ***Hydrogen Transportation Methods:*** *Pipelines, Tankers, Trucks* |
| *1130 – 1215* | ***Pipeline Design & Construction for Hydrogen Transport*** |

| | |
|---|---|
| 1215 – 1230 | *Break* |
| 1230 – 1330 | ***Logistics & Infrastructure for Hydrogen Distribution*** |
| 1330 – 1420 | ***Corrosion Concerns Related to Hydrogen Transportation*** |
| 1420 – 1430 | ***Recap*** |
| 1430 | *Lunch & End of Day Two* |

***Day 3***

| | |
|---|---|
| 0730 – 0830 | ***Design & Layout of Hydrogen Refueling Stations*** |
| 0830 – 0930 | ***Components & Equipment of Hydrogen Refueling Stations*** |
| 0930 – 0945 | *Break* |
| 0945 – 1030 | ***Safety Standards & Regulations for Refueling Stations*** |
| 1030 – 1130 | ***Fuel Cell Technologies:*** *Types, Principles & Applications* |
| 1130 – 1215 | ***Integration of Fuel Cells in Transportation & Stationary Applications*** |
| 1215 – 1230 | *Break* |
| 1230 – 1330 | ***Hands-on Exercises:*** *Simulation of Refueling Station Operations* |
| 1330 – 1420 | ***Fuel Cell Maintenance*** |
| 1420 – 1430 | ***Recap*** |
| 1430 | *Lunch & End of Day Three* |

***Day 4***

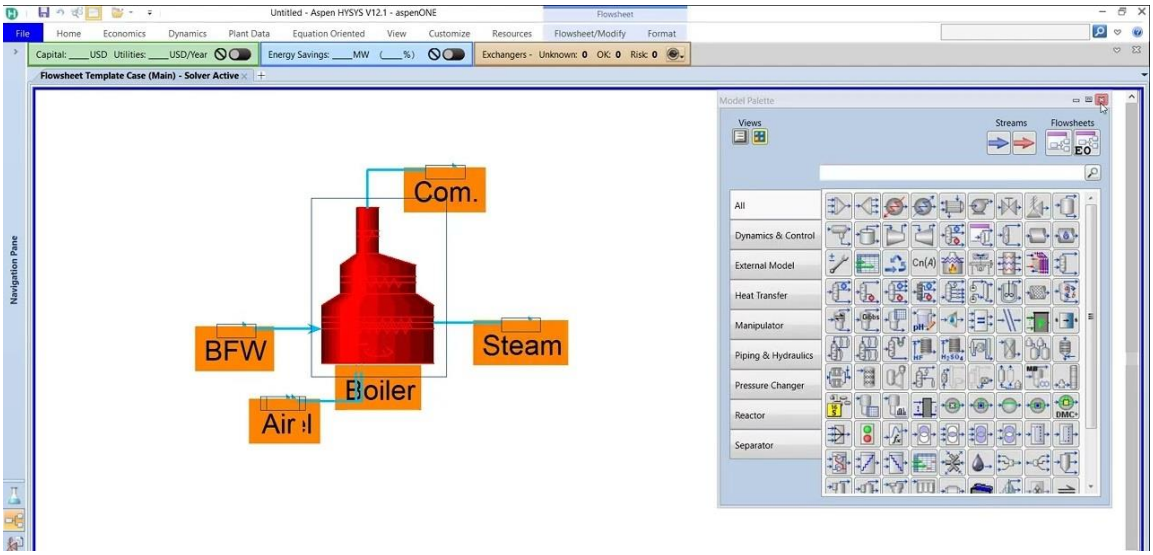
| | |
|---|---|
| 0730 – 0830 | ***Hydrogen Safety:*** *Properties, Hazards & Mitigation Strategies* |
| 0830 – 0930 | ***Risk Assessment & Management in Hydrogen Infrastructure*** |
| 0930 – 0945 | *Break* |
| 0945 – 1030 | ***Overview of International & National Safety Standards & Regulations*** |
| 1030 – 1130 | ***Environmental Impact Assessment of Hydrogen Energy Projects*** |
| 1130 – 1215 | ***Life Cycle Analysis of Hydrogen Production & Utilization*** |
| 1215 – 1230 | *Break* |
| 1230 – 1330 | ***Carbon Capture & Storage (CCS) in Hydrogen Production*** |
| 1330 – 1420 | ***Regulations Related to Hydrogen Infrastructure*** |
| 1420 – 1430 | ***Recap*** |
| 1430 | *Lunch & End of Day Four* |

***Day 5***

| | |
|---|---|
| 0730 – 0830 | ***Maintenance & Inspection Procedures for Hydrogen Infrastructure*** |
| 0830 – 0930 | ***Non-Destructive Testing (NDT) Techniques for Hydrogen Systems*** |
| 0930 – 0945 | *Break* |
| 0945 – 1030 | ***Condition Monitoring & Predictive Maintenance*** |
| 1030 – 1130 | ***Economic Analysis of Hydrogen Energy Projects*** |
| 1130 – 1215 | ***Future Trends in Hydrogen Technology & Infrastructure*** |
| 1215 – 1230 | *Break* |
| 1230 – 1345 | ***Group Project:*** *Developing a Hydrogen Infrastructure Plan* |
| 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 “ASPEN HYSYS” simulator.




**ASPEN HYSYS V14 Simulator**

## Course Coordinator

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