COURSE OVERVIEW PE1069
Introduction to Oil & Gas Refinery Process, Design & Operation

Course Title
Introduction to Oil & Gas Refinery Process, Design & Operation

Course Date/Venue
July 13-17, 2025/Tamra Meeting Room, Al Bandar Rotana Creek, Dubai, UAE

Course Reference
PE1069

Course Duration/Credits
Five days/3.0 CEUs/30 PDHs

Course Description

This practical and highly-interactive course includes real-life case studies and exercises where participants will be engaged in a series of interactive small groups and class workshops.

This course is designed to provide participants with a detailed and up-to-date overview of Introduction to Oil & Gas Refinery Process, Design & Operation. It covers the global oil and gas market dynamics and the role of refineries in the value chain; the crude oil characteristics, refining processes and major products and their markets; the global refining industry trends and basic refinery economics; the atmospheric and vacuum distillation, conversion processes, hydrotreating and desulfurization; and the reforming and isomerization, blending operations, gas processing and sulfur recovery.

Further, the course will also discuss the refinery design philosophy, layout and utilities including process flow diagrams (PFDs), P&IDs and key equipment in refineries; the refinery expansion and revamping; the API, ASME, ISO standards, regulatory requirements, design safety and reliability and environmental standards in design; the daily refinery operations and production planning and scheduling; and the energy and utilities optimization.

During this interactive course, participants will learn the refinery losses and efficiency, digitalization in refinery operations and health, safety and environment (HSE) in refineries; the product value chains, pricing and benchmarking of products and refinery supply chain and logistics; the product hedging strategies, trading desks and market exposure, futures, option and swaps and marketing and commercial decision impact; and the green refining, carbon intensity of products, regulatory trends, product innovation and circular economy.

Course Objectives

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

- Apply and gain a fundamental knowledge on oil and gas refinery process, design and operation
- Discuss global oil and gas market dynamics and the role of refineries in the value chain
- Explain crude oil characteristics, refining processes and major products and their markets
- Recognize global refining industry trends and basic refinery economics
- Identify atmospheric and vacuum distillation, conversion processes, hydrotreating and desulfurization
- Illustrate reforming and isomerization, blending operations, gas processing and sulfur recovery
- Explain refinery design philosophy, layout and utilities including process flow diagrams (PFDs), P&IDs and key equipment in refineries
- Illustrate refinery expansion and revamping as well as discuss API, ASME, ISO standards, regulatory requirements, design safety and reliability and environmental standards in design
- Employ daily refinery operations, production planning and scheduling and energy and utilities optimization
- Explain refinery losses and efficiency, digitalization in refinery operations and health, safety and environment (HSE) in refineries
- Determine the product value chains, pricing and benchmarking of products and refinery supply chain and logistics
- Apply product hedging strategies and discuss trading desks and market exposure, futures, option and swaps and marketing and commercial decision impact
- Identify green refining, carbon intensity of products, regulatory trends, product innovation and circular economy

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 oil and gas refinery process, design and operation for fresh graduate engineers (chemical, mechanical, petroleum), process engineers, plant operators, control room operators, maintenance technicians, shift supervisors, refinery project engineers, process design engineers, piping and instrumentation designers, HSE officers and environmental engineers, QA/QC engineers and lab technicians, sales and marketing staff (oil & gas sector), procurement and supply chain specialists, finance and costing personnel (related to refinery projects), production supervisors and junior plant managers, regulatory and compliance officers, government or ministry staff (oil & gas sector) and other technical staff.

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

US$ 5,500 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 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:

Mr. Mervyn Frampton is a **Senior Process Engineer** with over **30 years** of industrial experience within the **Oil & Gas**, **Refinery**, **Petrochemical** and **Utilities** industries. His expertise lies extensively in the areas of **Process Troubleshooting**, **Distillation Towers**, **Fundamentals of Distillation** for Engineers, **Distillation** Operation and Troubleshooting, **Advanced Distillation** Troubleshooting, **Distillation** Technology, Vacuum **Distillation**, **Distillation Column** Operation & Control, **Oil Movement** Storage & Troubleshooting, **Process Equipment** Design, Applied **Process Engineering** Elements, **Process Plant** Optimization, **Revamping & Debottlenecking**, **Process Plant** Troubleshooting & Engineering Problem Solving, **Process Plant** Monitoring, **Catalyst** Selection & Production Optimization, Operations Abnormalities & Plant Upset, **Process Plant** Start-up & Commissioning, **Clean Fuel** Technology & Standards, Flare, Blowdown & Pressure Relief Systems, **Oil & Gas Field Commissioning** Techniques, **Pressure Vessel** Operation, **Gas Processing**, **Chemical** Engineering, **Process Reactors** Start-Up & Shutdown, **Gasoline Blending** for Refineries, **Urea Manufacturing** Process Technology, Continuous Catalytic Reformer (**CCR**), **De-Sulfurization** Technology, Advanced Operational & Troubleshooting Skills, Principles of Operations Planning, **Rotating Equipment** Maintenance & Troubleshooting, **Hazardous Waste Management & Pollution Prevention**, **Heat Exchangers & Fired Heaters** Operation & Troubleshooting, **Energy Conservation** Skills, **Catalyst Technology**, **Refinery & Process Industry**, **Chemical Analysis**, **Process Plant**, **Commissioning & Start-Up**, **Alkylation**, **Hydrogenation**, **Dehydrogenation**, **Isomerization**, **Hydrocracking & De-Alkylation**, **Fluidized Catalytic Cracking**, **Catalytic Hydrodesulphuriser**, **Kerosene Hydrotreater**, **Thermal Cracker**, **Catalytic Reforming**, **Polymerization**, **Polyethylene**, **Polypropylene**, Pilot Water Treatment Plant, **Gas Cooling**, **Cooling Water Systems**, Effluent Systems, Material Handling Systems, **Gasifier**, **Gasification**, Coal Feeder System, **Sulphur Extraction Plant**, **Crude Distillation Unit**, **Acid Plant Revamp** and **Crude Pumping**. Further, he is also well-versed in HSE Leadership, Project and Programme Management, Project Coordination, Project Cost & Schedule Monitoring, Control & Analysis, Team Building, Relationship Management, Quality Management, Performance Reporting, Project Change Control, Commercial Awareness and Risk Management.

During his career life, Mr. Frampton held significant positions as the **Site Engineering Manager**, **Senior Project Manager**, **Process Engineering Manager**, **Project Engineering Manager**, **Construction Manager**, **Site Manager**, **Area Manager**, **Procurement Manager**, **Factory Manager**, **Technical Services Manager**, **Senior Project Engineer**, **Process Engineer**, **Project Engineer**, **Assistant Project Manager**, **Handover Coordinator** and **Engineering Coordinator** from various international companies such as the **Fluor Daniel**, **KBR** South Africa, **ESKOM**, MEGAWATT PARK, CHEMEPIC, PDPS, CAKASA, **Worley Parsons**, Lurgi South Africa, **Sasol**, **Foster Wheeler**, **Bosch** & **Associates**, **BCG** Engineering Contractors, Fina Refinery, Sapref Refinery, Secunda Engine Refinery just to name a few.

Mr. Frampton has a **Bachelor's degree** in **Industrial Chemistry** from **The City University** in **London**. Further, he is a **Certified Instructor/Trainer**, a **Certified Internal Verifier/Trainer/Assessor** by the **Institute of Leadership & Management** (**ILM**) and has delivered numerous trainings, courses, workshops, conferences and seminars internationally.

Course Program

The following program is planned for this course. However, the course instructor(s) may modify this program before or during the workshop for technical reasons with no prior notice to participants. Nevertheless, the course objectives will always be met:

Day 1: ***Sunday, 13th of July 2025***

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0930	***Overview of the Oil & Gas Industry*** *Upstream, Midstream, Downstream Sectors • Global Oil & Gas Market Dynamics • Role of Refineries in the Value Chain • Key Players & Business Models*
0930 – 0945	*Break*
0945 – 1030	***Crude Oil Characteristics*** *Composition & Properties of Crude Oil • Classification (Sweet versus Sour, Light versus Heavy) • Crude Assay & Pricing Impact • Implications on Product Yield*
1030 – 1130	***Basics of Refining Processes*** *Purpose of Refining Crude Oil • Overview of Refining Complexity • Refinery Configurations (Topping, Hydroskimming, Conversion) • Major Output Products*
1130 – 1215	***Major Products & their Markets*** *Gasoline, Diesel, Jet Fuel, LPG & Petrochemical Feedstocks • Product Specifications & Quality Standards • Pricing Mechanisms & Indices (Platts, Argus) • Regional Demand & Market Trends*
1215 – 1230	*Break*
1230 – 1330	***Global Refining Industry Trends*** *Geopolitical Influences on Refining • Emerging Markets & Demand Centers • Refining Margins & Profitability Indicators • Shift Towards Low-Carbon & Bio-Refining*
1330 – 1420	***Basic Refinery Economics*** *Crude Purchase versus Product Sales • Gross Refining Margin (GRM) Calculation • Product Value versus Yield Optimization • Impact of Refinery Configuration on Margins*
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: ***Monday, 14th of July 2025***

0730 – 0830	***Atmospheric & Vacuum Distillation*** *Separation Principles by Boiling Point • Column Design & Operation Basics • Key Products & their Uses • Impact on Downstream Processes*
0830 - 0930	***Conversion Processes*** *Fluid Catalytic Cracking (FCC) • Hydrocracking • Coking (Delayed & Flexi-Coking) • Role in Upgrading Heavy Fractions*
0930 – 0945	*Break*

0945 – 1100	***Hydrotreating & Desulfurization*** *Purpose & Process Overview • Impact on Fuel Quality & Emissions • Hydrogen Supply & Consumption • Product Specifications & Market Relevance*
1100 – 1215	***Reforming & Isomerization*** *Octane Improvement for Gasoline • Catalytic Reforming Process • Isomerization of Light Naphtha • Aromatics & Petrochemicals Feedstock*
1215 – 1230	*Break*
1230 – 1330	***Blending Operations*** *Blending Economics • Meeting Product Specifications • Additives & Branding Impact • Blending Challenges in Multi-Product Refineries*
1330 – 1420	***Gas Processing & Sulfur Recovery*** *Treatment of Refinery Off-Gas • Recovery of Hydrogen & LPG • Claus Process for Sulfur Recovery • Environmental Compliance & Emissions*
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 Two*

Day 3: ***Tuesday, 15th of July 2025***

0730 – 0830	***Refinery Design Philosophy*** *Design Basis & Feasibility Studies • Market Demand & Product Slate • Process Unit Integration • Site Selection Considerations*
0830 – 0930	***Refinery Layout & Utilities*** *Plot Plan & Unit Arrangement • Power, Steam & Cooling Requirements • Water Treatment & Effluent Handling • Safety & Fire Protection Systems*
0930 – 0945	*Break*
0945 – 1100	***Process Flow Diagrams (PFDs) & P&IDs*** *Reading & Understanding PFDs • Equipment Symbols & Connections • Importance of P&IDs in Design & Operation • Case Examples for Marketing Professionals*
1100 – 1215	***Key Equipment in Refineries*** *Reactors, Distillation Columns, Heat Exchangers • Pumps, Compressors & Furnaces • Equipment Sizing & Function • Relevance to Product Throughput & Quality*
1215 – 1230	*Break*
1230 – 1330	***Refinery Expansion & Revamping*** *Debottlenecking Strategies • Brownfield versus Greenfield Expansion • Business Drivers & Market Alignment • Case Studies of Successful Revamps*
1330 – 1420	***Design Codes & Standards*** *API, ASME, ISO Standards • Regulatory Requirements (Local/Global) • Design Safety & Reliability • Environmental Standards in Design*
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 Three*

Day 4:	Wednesday, 16th of July 2025
0730 – 0830	***Daily Refinery Operations*** *Shift Structure & Control Room Operations • Process Monitoring & Alarms • Maintenance Strategies (Preventive & Predictive) • Operator Training & Competency*
0830 – 0930	***Production Planning & Scheduling*** *Linear Programming (LP) Models in Refineries • Crude Selection & Product Planning • Supply/Demand Balancing • Impact on Marketing & Logistics*
0930 – 0945	*Break*
0945 – 1100	***Energy & Utilities Optimization*** *Energy-Intensive Units & Consumption Trends • Heat Integration & Pinch Analysis • Energy Cost Impact on Product Pricing • Emissions & Energy Balance*
1100 – 1215	***Refinery Losses & Efficiency*** *Inventory Losses & Product Shrinkage • Mass Balance versus Yield Loss • Internal Benchmarks (MB, LB, EB) • Role of Marketing in Loss Analysis*
1215 – 1230	*Break*
1230 – 1330	***Digitalization in Refinery Operations*** *Smart Sensors & Automation • Digital Twins & Simulation Tools • AI in Predictive Maintenance • Impacts on Marketing Agility*
1330 – 1420	***Health, Safety & Environment (HSE) in Refineries*** *Process Safety Management Principles • Hazard Identification & Risk Control • Environmental Monitoring & Compliance • Community Relations & Public Perception*
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:	Thursday, 17th of July 2025
0730 – 0830	***Understanding Product Value Chains*** *From Crude to Consumer: Value Chain View • Influence of Crude Quality on Product Pricing • Export versus Local Sales Strategy • Product Differentiation & Branding*
0830 – 0930	***Pricing & Benchmarking of Products*** *Spot Pricing versus Term Contracts • Reference Pricing (Brent, WTI, Dubai) • Cracks & Spreads in Pricing • Market Arbitrage Opportunities*
0930 – 0945	*Break*
0945 – 1030	***Refinery Supply Chain & Logistics*** *Crude Import Logistics • Storage & Blending Terminals • Distribution Methods: Pipeline, Truck, Rail, Ship • Inventory Optimization & Cost Control*
1030 – 1215	***Trading & Risk Management*** *Product Hedging Strategies • Trading Desks & Market Exposure • Futures, Options & Swaps • Marketing & Commercial Decision Impact*
1215 – 1230	*Break*

1230 – 1345	***Sustainability & Future Trends*** *Green Refining: Biofuels & Renewables • Carbon Intensity of Products • Regulatory Trends (IMO, EVs, Carbon Pricing) • Product Innovation & Circular Economy*
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*

Practical Sessions

This practical and highly-interactive course includes real-life case studies and exercises:-

Course Coordinator

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