COURSE OVERVIEW PE0489
Crude & Vacuum Process Technology

Course Title
Crude & Vacuum Process Technology

Course Date/Venue
December 07-11, 2025/ Meeting Plus 9, City Centre Rotana, Doha, Qatar

Course Reference
PE0489

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 Crude & Vacuum Process Technology. It covers the role of crude and vacuum distillation in the refining process and the properties and characteristics of crude oil; the crude oil pretreatment, fundamentals of fractional distillation, atmospheric distillation and safety and environmental considerations; the CDU process flow and equipment, heat integration in crude distillation and main column operation and control; the purpose and operation of side strippers, steam stripping principles, control of light ends in side products and stripper reboiler operation; the product quality control and CDU troubleshooting; and the purpose and role of vacuum distillation.

During this interactive course, participants will learn the vacuum system design and operation, VDU column configuration and VDU heater operation; the VDU product handling, VDU troubleshooting, process control strategies and energy efficiency improvements; the fouling and corrosion management, debottlenecking and capacity increase, advanced process monitoring and process safety management; the common CDU/VDU operational issues, shutdown and startup procedures and turnaround planning and maintenance; and the emerging technologies in crude and vacuum processing covering advanced crude preheat systems, structured packing advancements, online fouling monitoring and AI-based process optimization.

Course Objectives

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

- Apply and gain in-depth knowledge on crude and vacuum process technology
- Discuss the role of crude and vacuum distillation in the refining process and the properties and characteristics of crude oil
- Explain crude oil pretreatment, fundamentals of fractional distillation, atmospheric distillation and safety and environmental considerations
- Describe CDU process flow and equipment and apply heat integration in crude distillation including main column operation and control
- Identify the purpose and operation of side strippers, steam stripping principles, control of light ends in side products and stripper reboiler operation
- Carryout product quality control and CDU troubleshooting as well as discuss the purpose and role of vacuum distillation
- Employ vacuum system design and operation, VDU column configuration and VDU heater operation
- Apply VDU product handling, VDU troubleshooting, process control strategies and energy efficiency improvements
- Implement fouling and corrosion management, debottlenecking and capacity increase, advanced process monitoring and process safety management
- Identify the common CDU/VDU operational issues and apply shutdown and startup procedures and turnaround planning and maintenance
- Discuss the emerging technologies in crude and vacuum processing covering advanced crude preheat systems, structured packing advancements, online fouling monitoring and AI-based process optimization

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 crude and vacuum process technology for process engineers, operations engineers/supervisors, technical specialists, maintenance engineers, process technicians/operators and those who involved in process optimization, troubleshooting or efficiency improvement.

Course Fee

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

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.

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. Mohammad Hamami, is a **Senior Process Engineer** with an extensive practical experience within the **Oil**, **Gas**, **Refinery**, **Petrochemical** and **Power** industries. His experience covers **Clean Fuel** Technology & Standards, **Clean Fuel** Specification, Emission Regulation, **Crude Oil** Production, **Desulphurization**, Synthesis **Gas Production**, **Naphtha** Isomerization, **Diesel Fuel Additives**, **Storage Tanks** Filtration, **Fuel Quality** Inspection, **Process Plant** Troubleshooting & Engineering Problem Solving, **Process Equipment** Operation, **Process Plant** Operation, **Process Plant** Start-up & Commissing, **Process Plant** Optimization, **Oil & Gas Field** Operation, **Oil Movement**, Storage & Troubleshooting, **Petroleum Refinery** Process, **Process Reactor** Operation & Troubleshooting, **LPG Oil & Gas** Operation & Troubleshooting, **Crude Oil & LNG** Storage, **LNG & LPG** Plants Gas Processing, **Refinery Process** Operations Technology, **Liquid Bulk Cargo Handling**, **Gas Conditioning** & Processing Technology, **Distillation Column** Design & Operation and **Gasoline & Diesel Fuel** Technology. Further he is also well-versed in **Refinery** Operational Economics & Profitablity, Aromatics Manufacturing Process, **Hydrogen Production** Operation, **Steam Reforming** Technology, **Gas Treating**, **Hydro-treating & Hydro-Cracking**, **Catalyst** Material Handling, Gas Sweetening & Sulfur Recovery, Hydro Carbon Dew Point (HCDP) Control, **Heat Exchangers** & Fired Heaters, **Amine** Gas Sweetening, **Plastic Additives** Selection & Application, **Crude & Vaccum** Process Technology, **Flare & Pressure Relief Systems**, Stock Management & **Tank Dipping** Calculation, **NGL Recovery & Fractionation**, **Refrigerant & NGL Extraction** and **Catalytic Craking & Reforming.**

During his long professional carreer, Mr. Mohammad worked as a **Refinery Manager**, **Operations Manager**, **Section Head/Superintendent** and **Process Engineer** for **Process Units**, **Utilities & Oil Movement** in various companies. He has been responsible for a number of **technological-driven world-scale hydrocarbon processing projects** from **beginning to successful start-up**.

Mr. Mohammad has a **Bachelor's** degree in **Chemical Engineering**. He is an **active member** of the **American Institute of Chemical Engineers** (**AIChE**) and has presented **technical papers** at its **several national meetings**. He has largely participated in the **start-up of seven world-scale process plants** which made him an **International Expert** in **Process Plant Start-Up** and **Oil Movement** and a **Certified Instructor/Trainer**.

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 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, 7th of December 2025

0730 – 0800	*Registration, Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0900	***Introduction to Refinery Operations*** *Role of Crude & Vacuum Distillation in the Refining Process • Overview of Downstream Processes Linked to CDU & VDU • Refinery Configuration & Integration Concepts • Refinery Product Yield Structures*
0900 - 0930	***Properties & Characteristics of Crude Oil*** *Crude Assay Interpretation • API Gravity, Sulfur Content, TAN • Light versus Heavy Crude Behavior • Contaminants & Impurities in Crude*
0930 - 0945	*Break*
0945 - 1200	***Crude Oil Pretreatment*** *Dehydration & Desalting Principles • Electrostatic Desalting Operation • Impact of Salts on Corrosion & Fouling • Water Wash Systems & Optimization*
1200 - 1245	***Fundamentals of Fractional Distillation*** *Phase Equilibrium & Boiling Point Curves • True Boiling Point (TBP) & ASTM Distillation Curves • Vapor–Liquid Equilibrium (VLE) Concepts • Cut Point Determination*
1245 - 1300	*Break*
1300 - 1400	***Atmospheric Distillation Column Overview*** *Main Column Configuration & Internals • Draw-Off Sections & Side Strippers • Reflux Systems & Product Cooling • Overhead Condenser & Receiver*
1400 - 1420	***Safety & Environmental Considerations*** *Hydrocarbon Vapor Hazards & Control • Pressure Relief Systems • Environmental Emissions & Controls • Fire & Explosion Prevention 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 One*

Day 2: Monday, 8th of December 2025

0730 – 0830	***CDU Process Flow & Equipment*** *Process Flow Diagram (PFD) Walkthrough • Heat Exchanger Train Operation • Pre-Flash Drum Function • Fired Heater Configuration & Operation*
0830 – 0930	***Heat Integration in Crude Distillation*** *Preheat Train Optimization • Energy Recovery Concepts • Fouling Impact on Heat Transfer • Pinch Analysis Fundamentals*
0930 – 0945	*Break*
0945 – 1100	***Main Column Operation & Control*** *Column Pressure Profile & Control • Tray & Packing Selection Criteria • Reflux Ratio & Side Draw Management • Overhead System Temperature Control*

1100 – 1230	***Side Strippers & Product Recovery*** *Purpose & Operation of Side Strippers • Steam Stripping Principles • Control of Light Ends in Side Products • Stripper Reboiler Operation*
1230 – 1345	***Product Quality Control*** *ASTM Distillation for Product Control • Monitoring Diesel, Kerosene and Naphtha Cuts • Blending Considerations for Product Specs • Product Sampling & Testing Procedures*
1345 – 1400	*Break*
1400 – 1420	***CDU Troubleshooting*** *Diagnosing Poor Separation • Fouling in Preheat Exchangers • Column Flooding & Weeping • Heater Coking Issues*
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, 09th of December 2025

0730 – 0830	***Purpose & Role of Vacuum Distillation*** *Extending Distillation Range Beyond CDU Limits • Reducing Thermal Cracking Risk • Maximizing Distillate Yield from Heavy Fractions • Integration with Downstream Conversion Units*
0830 – 0930	***Vacuum System Design & Operation*** *Steam Ejector Systems • Surface Condenser Operation • Barometric Condenser Principles • Maintaining Deep Vacuum Conditions*
0930 – 0945	*Break*
0945 – 1100	***VDU Column Configuration*** *Column Internals for Low-Pressure Operation • Slop Wax Draw & Heavy Vacuum Gas Oil (HVGO) Cuts • Pumparound Sections • Flash Zone Design*
1100 – 1230	***VDU Heater Operation*** *Coil Outlet Temperature Control • Avoiding Coke Formation • Firing Control & Fuel Management • Tube Metallurgy & Life Cycle*
1230 – 1345	***VDU Product Handling*** *Vacuum Gas Oil (VGO) Quality Parameters • Slop Wax & Short Residue Characteristics • Interface with Visbreaking & Hydrocracking Units • Controlling Contaminants in Products*
1345 – 1400	*Break*
1400 – 1420	***VDU Troubleshooting*** *Air Leakage Sources & Detection • Column Pressure Control Problems • Heater Coking Diagnosis • Poor Separation Causes & Remedies*
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, 10th of December 2025

0730 – 0830	***Process Control Strategies*** *Temperature, Pressure & Flow Control Loops • Ratio & Cascade Control in CDU/VDU • Steam Injection Control • Reflux Optimization*
0830 – 0930	***Energy Efficiency Improvements*** *Heat Exchanger Network Optimization • Minimizing Flaring & Energy Losses • Integration with Utility Systems • Heater Efficiency Improvements*
0930 – 0945	*Break*
0945 – 1100	***Fouling & Corrosion Management*** *Fouling Mechanisms in Preheat Trains • Corrosion Under Deposits (CUD) • High-Temperature Sulfidation & Naphthenic Acid Corrosion • Mitigation Strategies & Chemical Injection*
1100 – 1230	***Debottlenecking & Capacity Increase*** *Identifying CDU & VDU Capacity Constraints • Heat Integration Modifications • Column Internals Upgrades • Vacuum System Enhancement*
1230 – 1345	***Advanced Process Monitoring*** *Use of Online Analyzers & Instrumentation • Infrared Thermography for Heater Monitoring • Column Gamma Scanning Techniques • Data Trending & Predictive Analysis*
1345 – 1400	*Break*
1400 – 1420	***Process Safety Management*** *HAZOP & LOPA for CDU/VDU • Emergency Shutdown Systems (ESD) • Layer of Protection in Distillation Units • Incident Investigation Methods*
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, 11th of December 2025

0700 - 0830	***Common CDU/VDU Operational Issues*** *Poor Fractionation & Off-Spec Products • Heater Tube Failures • Pump & Compressor Failures • Overhead Corrosion & Salt Deposition*
0830 - 0930	***Shutdown & Startup Procedures*** *Pre-Startup Safety Reviews • Heater Light-Up Sequence • Column Pressurization & Warm-Up • Controlled Shutdown Methods*
0930 - 0945	*Break*
0945 – 1230	***Turnaround Planning & Maintenance*** *CDU & VDU Inspection Planning • Column Internals Maintenance • Heat Exchanger Cleaning & Retubing • Heater Decoking Techniques*
1230 - 1315	***Case Studies in Optimization*** *Energy Savings Through Exchanger Revamp • Improved Cut Point Control • Enhanced Vacuum System Efficiency • Debottlenecking Success Stories*
1315 - 1330	*Break*

1330 - 1400	***Emerging Technologies in Crude & Vacuum Processing*** *Advanced Crude Preheat Systems • Structured Packing Advancements • Online Fouling Monitoring • AI-Based Process Optimization*
1400 - 1415	***Course Conclusion*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Course Topics that were Covered During the Course*
1415 - 1430	***POST-TEST***
1430	*Lunch & End of Course*

Practical Sessions

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

Course Coordinator

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