



## **COURSE OVERVIEW PE0489** **Crude & Vacuum Process Technology**

### **Course Title**

Crude & Vacuum Process Technology

### **Course Date/Venue**

September 21-25, 2025/TBA Meeting Room,  
Mövenpick Hotel Istanbul Golden Horn, Istanbul,  
Turkey

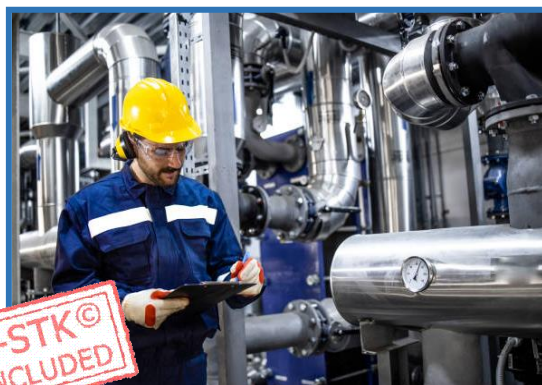
### **Course Reference**

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 + **VAT**. 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.

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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.

### 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:



**Dr. Emad Al-Hasany**, PhD is a **Senior Process & Petroleum Engineer** with **Offshore & Onshore** experience within the **Oil & Gas, Refinery** and **Petrochemical** industries. His wide expertise covers in the areas of **Process Plant Commissioning, Cost Estimation, Hydrocarbon Chemistry, Atmospheric & Vacuum Distillation, Fluid Catalytic Cracking, Crude & Vacuum Technology, Process of Crude ATM & Vacuum, Process Plant Start-Up Management, Clean Fuel Technology & Standards, Heat Exchangers & Fired Heaters Operation & Troubleshooting, Heat Medium Fired Heater**

**Troubleshooting & Maintenance, Process Reactor Operation & Troubleshooting, Process Equipment Design, Sizing, Selection, Applications & Troubleshooting, Process Engineering Calculations, Gas Processing Plant Operations & Control, Gas Processing Monitoring & Troubleshooting, Process Plant Optimization & Energy Conservation, Hydro-Treating Technology, Oil & Gas Field Operations, Oil Movement, Storage & Troubleshooting, Start-Up & Shutdown, Gas/Oil Separates, Surge Vessels, Sludge Catcher, Knockout LP & HP Flare System, Close & Open Drain System, Skimmer Pit Evaporation Pit System, Filters, Driers, Pumps, Turbines, Compressors, York Refrigeration Compressors, Heaters & Combustion Gases Fire, Emergency Diesel Generators, Electrical & Diesel Fire Water Pumps, Gas & Fire Detectors, Pig Launcher, Purging Pipelines, Pressurized Vessels, Heat Exchangers, Atmospheric, Flash, Vacuum, Azeotropic, Weiss Fractional Distillation, Oil & Gas Treatment, Separators, Filtration, Dehydration (Glycol & Molecular Sieves System), Fire Tube Heaters, Combustion Gas, Temperature Level, Control Valves, Solenoid Valves, Cascade Control, Switches, Transmitter, Transducer, RTD Sensitivity, Orifice Plat, I/P Converter, Rot Meter, Floating, Displacer, DP Cells, PIDs, Flare Blowdown & Pressure Relief Systems, Pumps, Compressors, Turbines & Troubleshooting, Centrifugal Compressor & Steam Turbine, Valves, Safety Relief Valve Sizing, Selection, Operation, Inspection, Maintenance & Troubleshooting, Tank & Tank Farms, Hydraulic Pump, Well Engineering, Acidation, Wellheads Preparing & Maintenance, Well Operations & Surveys, Well Stimulation, Logging and Reservoir Engineering.** Further, he is also well-versed in **HYSYS, PRO II, OLGA, PIPESIM, PETREL, Artificial Lift, First Aid & Firefighting, Environment Protection, NORM Awareness, SHOC (Safe Handling of Chemicals), Permit to Work (PTW), HSE Auditing & Reporting, Emergency Response, Defensive Driving, H2S, Accident/Incident Investigation, Process Safety Management, Root Cause Analysis, OSHA General Industry, Water Injection, Water Treatment, HAZOP, Risk Assessment, Gas Chromatography, Corrosion and Cathodic Protection.**

During his career life, Dr. Emad has gained his practical and field experience through his various significant positions and dedication as the **Production Main Station Manager, Manager, Production Superintendent, Production Supervisor, Production Engineer, HAZOP Consultant, Instructor and Lecturer** for various companies and universities such as the **AL-Euphrates University, Dero Oilfields, Syrian Petroleum Company (SPC), Kokab Co. and Alharratah Oilfield.**

Dr. Emad has a **PhD in Reservoir Management**, a **Master degree in Production Engineering** and a **Bachelor degree in Petroleum Engineering**. Further, he is a **Certified Instructor/Trainer** and has further delivered numerous training, courses, workshops, seminars and conferences worldwide.

### 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, 21<sup>st</sup> of September 2025**

0730 – 0800	Registration, Coffee
0800 – 0815	Welcome & Introduction
0815 – 0830	<b>PRE-TEST</b>
0830 – 0900	<b>Introduction to Refinery Operations</b> 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	<b>Properties &amp; Characteristics of Crude Oil</b> Crude Assay Interpretation • API Gravity, Sulfur Content, TAN • Light versus Heavy Crude Behavior • Contaminants & Impurities in Crude
0930 – 0945	Break
0945 – 1200	<b>Crude Oil Pretreatment</b> Dehydration & Desalting Principles • Electrostatic Desalting Operation • Impact of Salts on Corrosion & Fouling • Water Wash Systems & Optimization
1200 – 1245	<b>Fundamentals of Fractional Distillation</b> 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	<b>Atmospheric Distillation Column Overview</b> Main Column Configuration & Internals • Draw-Off Sections & Side Strippers • Reflux Systems & Product Cooling • Overhead Condenser & Receiver
1400 – 1420	<b>Safety &amp; Environmental Considerations</b> Hydrocarbon Vapor Hazards & Control • Pressure Relief Systems • Environmental Emissions & Controls • Fire & Explosion Prevention Measures
1420 – 1430	<b>Recap</b> 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, 22<sup>nd</sup> of September 2025**

0730 – 0830	<b>CDU Process Flow &amp; Equipment</b> Process Flow Diagram (PFD) Walkthrough • Heat Exchanger Train Operation • Pre-Flash Drum Function • Fired Heater Configuration & Operation
0830 – 0930	<b>Heat Integration in Crude Distillation</b> Preheat Train Optimization • Energy Recovery Concepts • Fouling Impact on Heat Transfer • Pinch Analysis Fundamentals
0930 – 0945	Break
0945 – 1100	<b>Main Column Operation &amp; Control</b> Column Pressure Profile & Control • Tray & Packing Selection Criteria • Reflux Ratio & Side Draw Management • Overhead System Temperature Control
1100 – 1230	<b>Side Strippers &amp; Product Recovery</b> Purpose & Operation of Side Strippers • Steam Stripping Principles • Control of Light Ends in Side Products • Stripper Reboiler Operation
1230 – 1345	<b>Product Quality Control</b> 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	<b>CDU Troubleshooting</b> Diagnosing Poor Separation • Fouling in Preheat Exchangers • Column Flooding & Weeping • Heater Coking Issues
1420 – 1430	<b>Recap</b> 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, 23<sup>rd</sup> of September 2025**

0730 – 0830	<b>Purpose &amp; Role of Vacuum Distillation</b> Extending Distillation Range Beyond CDU Limits • Reducing Thermal Cracking Risk • Maximizing Distillate Yield from Heavy Fractions • Integration with Downstream Conversion Units
0830 – 0930	<b>Vacuum System Design &amp; Operation</b> Steam Ejector Systems • Surface Condenser Operation • Barometric Condenser Principles • Maintaining Deep Vacuum Conditions
0930 – 0945	Break
0945 – 1100	<b>VDU Column Configuration</b> Column Internals for Low-Pressure Operation • Slop Wax Draw & Heavy Vacuum Gas Oil (HVGO) Cuts • Pumparound Sections • Flash Zone Design
1100 – 1230	<b>VDU Heater Operation</b> Coil Outlet Temperature Control • Avoiding Coke Formation • Firing Control & Fuel Management • Tube Metallurgy & Life Cycle
1230 – 1345	<b>VDU Product Handling</b> 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	<b>VDU Troubleshooting</b> Air Leakage Sources & Detection • Column Pressure Control Problems • Heater Coking Diagnosis • Poor Separation Causes & Remedies
1420 – 1430	<b>Recap</b> 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, 24<sup>th</sup> of September 2025**

0730 – 0830	<b>Process Control Strategies</b> Temperature, Pressure & Flow Control Loops • Ratio & Cascade Control in CDU/VDU • Steam Injection Control • Reflux Optimization
0830 – 0930	<b>Energy Efficiency Improvements</b> Heat Exchanger Network Optimization • Minimizing Flaring & Energy Losses • Integration with Utility Systems • Heater Efficiency Improvements
0930 – 0945	Break
0945 – 1100	<b>Fouling &amp; Corrosion Management</b> Fouling Mechanisms in Preheat Trains • Corrosion Under Deposits (CUD) • High-Temperature Sulfidation & Naphthenic Acid Corrosion • Mitigation Strategies & Chemical Injection
1100 – 1230	<b>Debottlenecking &amp; Capacity Increase</b> Identifying CDU & VDU Capacity Constraints • Heat Integration Modifications • Column Internals Upgrades • Vacuum System Enhancement
1230 – 1345	<b>Advanced Process Monitoring</b> Use of Online Analyzers & Instrumentation • Infrared Thermography for Heater Monitoring • Column Gamma Scanning Techniques • Data Trending & Predictive Analysis
1345 – 1400	Break
1400 – 1420	<b>Process Safety Management</b> HAZOP & LOPA for CDU/VDU • Emergency Shutdown Systems (ESD) • Layer of Protection in Distillation Units • Incident Investigation Methods
1420 – 1430	<b>Recap</b> 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, 25<sup>th</sup> of September 2025**

0700 – 0830	<b>Common CDU/VDU Operational Issues</b> Poor Fractionation & Off-Spec Products • Heater Tube Failures • Pump & Compressor Failures • Overhead Corrosion & Salt Deposition
0830 – 0930	<b>Shutdown &amp; Startup Procedures</b> Pre-Startup Safety Reviews • Heater Light-Up Sequence • Column Pressurization & Warm-Up • Controlled Shutdown Methods
0930 – 0945	Break



0945 – 1230	<b>Turnaround Planning &amp; Maintenance</b> CDU & VDU Inspection Planning • Column Internals Maintenance • Heat Exchanger Cleaning & Retubing • Heater Decoking Techniques
1230 - 1315	<b>Case Studies in Optimization</b> Energy Savings Through Exchanger Revamp • Improved Cut Point Control • Enhanced Vacuum System Efficiency • Debottlenecking Success Stories
1315 - 1330	Break
1330 - 1400	<b>Emerging Technologies in Crude &amp; Vacuum Processing</b> Advanced Crude Preheat Systems • Structured Packing Advancements • Online Fouling Monitoring • AI-Based Process Optimization
1400 - 1415	<b>Course Conclusion</b> Using this Course Overview, the Instructor(s) will Brief Participants about the Course Topics that were Covered During the Course
1415 - 1430	<b>POST-TEST</b>
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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