

COURSE OVERVIEW PE0825 **Heavy Cuts Processing**

Course Title

Heavy Cuts Processing

Course Date/Venue

October 04-08, 2026/Meeting Room B,
Centro Corniche Al khobar by Rotana, Al
Khobar, KSA

Course Reference

PE0825

Course Duration/Credits

Five days/3.0 CEUs/30 PDHs

Course Description



This practical and highly-interactive course includes real-life case studies 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 Heavy Cuts Processing. It provides participants with a comprehensive understanding of heavy cuts processing technologies including vacuum residues, atmospheric residues, heavy gas oils, conversion processes, upgrading technologies, product quality optimization, operational challenges and refinery economics.

Further, the course will also discuss the heavy refinery streams classification, the role of heavy cuts in modern refineries and refinery configuration for heavy oil processing; the crude oil composition and heavy fractions, heavy oil feedstock characterization, refinery distillation and heavy cut generation; the physical properties of heavy fractions, environmental and safety considerations and fundamentals of thermal cracking; the visbreaking technology, delayed coking process and fluid coking and flexicoking; the thermal conversion product management and operational challenges in thermal processes; and the fluid catalytic cracking (FCC) for heavy feeds, residue FCC (RFCC) and hydrocracking of heavy cuts.

During this interactive course, participants will learn the residue hydroprocessing and catalysts used in heavy oil processing; the hydrogen management, product yield optimization and quality control of upgraded products; the refinery process integration, fouling and corrosion management and energy efficiency in heavy cuts processing; the advanced process control applications, economics of heavy cuts processing and troubleshooting heavy oil processing units; and the reliability and asset management, emerging upgrading technologies and environmental sustainability in heavy oil processing.

Course Objectives/Outcomes & Benefits for the Participants

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

- Apply and gain a comprehensive knowledge on heavy cuts processing
- Classify heavy refinery streams, identify the role of heavy cuts in modern refineries and apply refinery configuration for heavy oil processing
- Recognize crude oil composition and heavy fractions, heavy oil feedstock characterization, refinery distillation and heavy cut generation
- Identify physical properties of heavy fractions, environmental and safety considerations and fundamentals of thermal cracking
- Discuss visbreaking technology, delayed coking process and fluid coking and flexicoking
- Apply thermal conversion product management and recognize operational challenges in thermal processes
- Determine fluid catalytic cracking (FCC) for heavy feeds, residue FCC (RFCC) and hydrocracking of heavy cuts
- Describe residue hydroprocessing and catalysts used in heavy oil processing
- Carryout hydrogen management, product yield optimization and quality control of upgraded products
- Apply refinery process integration, fouling and corrosion management and energy efficiency in heavy cuts processing
- Employ advanced process control applications, economics of heavy cuts processing and troubleshooting heavy oil processing units
- Implement reliability and asset management, emerging upgrading technologies and environmental sustainability in heavy oil processing

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 heavy cuts processing for refinery process engineers, production and operations engineers, crude and vacuum distillation unit personnel, residue upgrading and conversion process engineers, refinery technical services engineers, process optimization and troubleshooting specialists, maintenance and reliability engineers supporting refining units, laboratory and quality control professionals, refinery supervisors and shift leaders, technical managers responsible for heavy oil and residue processing operations.

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: -

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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. Karl Thanasis, PEng, MSc, MBA, BSc, is a **Senior Process & Mechanical Engineer** with **30 years** of extensive industrial experience within the **Oil & Gas, Refinery and Petrochemical** industries. His wide expertise includes **Heavy Cuts Processing & Refinery Operations, Heavy Hydrocarbon Processing & Conversion Technologies, Atmospheric & Vacuum Distillation Operations, Vacuum Distillation Unit (VDU) Operation & Optimization, Residue Upgrading & Heavy Oil Processing, Heavy Gas Oil (HGO) & Vacuum Gas Oil (VGO) Processing, Control Valve Maintenance & Testing, Advanced Operational Skills, Process Equipment Design & Troubleshooting, Process Plant Optimization & Continuous Improvement, Production Process Optimization, Operations Planning Optimization, Process Equipment Design, Process Plant Performance & Efficiency, Process Integration & Optimization, Root Cause Analysis (RCA) Methods, Root Cause Analysis, Process Equipment & Piping System, Rotating Equipment Reliability Optimization & Continuous Improvement, Material Cataloguing, Mechanical & Rotating Equipment Troubleshooting & Maintenance, Rotating Equipment for Process Industry, Rotating Machinery Best Practices, Centrifugal Pumps Operation, Positive Displacement Pumps Repair, Pump Maintenance & Troubleshooting, Pressure Vessels, Heat Exchanger Maintenance & Repair, Heat Exchanger Inspection & Troubleshooting, Fin-fan Coolers, Fundamentals of Engineering Drawings, Codes & Standards, P&ID Reading Interpretation & Developing, Boiler Design, Boiler Inspection & Maintenance, Boiler Operation & Control, Boiler Troubleshooting & Inspection, Boiler Instrumentation & Control, Steam Boiler Maintenance, Boiler & Steam Generation System, Boiler Failure Analysis & Prevention, Boiler Burner Management, Boiler Water Treatment Technology, Machinery Failure Analysis, Preventive & Predictive Maintenance, Condition Monitoring, Root Cause Analysis (RCA), Root Cause Failure Analysis (RCFA), Reliability Centred Maintenance (RCM), Risk Base Inspection (RBI), Metallurgical Failure Analysis, Corrosion Failure Analysis, Steam Generation, Steam Turbines, Power Generator Plants, Gas Turbines, Combined Cycle Plants, Boilers, Process Fired Heaters, Air Preheaters, Induced Draft Fans, All Heaters Piping Work, Refractory Casting, Heater Fabrication, Thermal & Fired Heater Design, Heat Transfer, Coolers, Pumps, Turbo-Generator, Turbine Shaft Alignment, Lubrication, Mechanical Seals, Packing, Blowers, Bearings, Couplings, Clutches and Gears. Further, he is also versed in **Wastewater Treatment Technology, Networking System, Water Network Design, Industrial Water Treatment** in Refineries & Petrochemical Plants, **Piping System, Water Movement, Water Filtering, Mud Pumping, Sludge Treatment and Drying, Aerobic Process of Water Treatment** that includes **Aeration, Sedimentation and Chlorination Tanks**. His strong background also includes **Design and Sizing** of all **Waste Water Treatment Plant Associated Equipment** such as **Sludge Pumps, Filters, Metering Pumps, Aerators and Sludge Decanters**.**

Mr. Thanasis has acquired his thorough and practical experience as the **Project Manager, Plant Manager, Area Manager, Maintenance Manager, Engineering Manager, Technical Consultant & Trainer, Head of Capital Projects, Refractory Specialist, Construction Superintendent, Maintenance Supervisor, Project Engineer, Maintenance Engineer and Thermal Design Engineer** of various companies worldwide in the **USA, Germany, England and Greece**.

Mr. Thanasis is a **Registered Professional Engineer** in the **USA and Greece** and has **Master's and Bachelor's** degree in **Mechanical Engineering with Honours** from the **Purdue University and Southern Illinois University (USA)** respectively as well as an **MBA** from the **University of Phoenix (USA)**. Further, he is a **Certified Instructor/Trainer, Certified Internal Verifier/Trainer/Assessor** by the **Institute of Leadership & Management (ILM)**, a member of the **American Society of Heating, Refrigeration and Air-Conditioning Engineers** and delivered various trainings, courses, seminars and workshops worldwide.

Training Methodology

Our courses employ an interactive, learner-centred methodology that integrates theoretical knowledge with practical application. The training is delivered through a suitable combination of some or all of the following methods, selected according to the course content and learning objectives:

- Instructor-led presentations and facilitated discussions
- Practical workshops and participant presentations
- Hands-on exercises and real-world case studies
- Equipment demonstrations and technical drawings
- Hardware- and software-based simulations
- Gamification & Role Play in soft-skills courses only
- Virtual Reality (VR) and Augmented Reality (AR)
- Instructional videos and other relevant training resources

This blended approach encourages active participation, strengthens practical skills and supports the effective application of acquired knowledge in the workplace.

Learning Design & Customization

This course can be customized to the exact requirements of clients. Haward Technology is so proud of our huge capabilities in tailoring our courses to the training needs of our valued clients.

Course Fee

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 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, 04th of October 2026
0730 – 0800	<i>Registration & Coffee</i>
0800 – 0815	<i>Welcome & Introduction</i>
0815 – 0830	PRE-TEST
0830 – 0930	Introduction to Heavy Cuts Processing <i>Definition and Classification of Heavy Refinery Streams • Role of Heavy Cuts in Modern Refineries • Refinery Configuration for Heavy Oil Processing • Challenges Associated with Heavy Feedstocks</i>
0930 – 0945	<i>Break</i>
0945 – 1030	Crude Oil Composition & Heavy Fractions <i>Hydrocarbon Families in Crude Oil • Distribution of Heavy Fractions • Properties of Atmospheric and Vacuum Residues • Impact of Crude Quality on Processing</i>
1030 – 1130	Heavy Oil Feedstock Characterization <i>API Gravity and Density Measurements • Sulfur, Nitrogen and Metal Content Analysis • Conradson Carbon Residue (CCR) • Asphaltene and Resin Determination</i>

1130 – 1215	Refinery Distillation & Heavy Cut Generation Atmospheric Distillation Principles • Vacuum Distillation Operations • Generation of Vacuum Gas Oils and Residues • Yield Patterns from Different Crude Oils
1215 – 1230	Break
1230 – 1330	Physical Properties of Heavy Fractions Viscosity Characteristics • Boiling Range Distributions • Thermal Stability Considerations • Solubility and Compatibility Issues
1330 – 1420	Environmental & Safety Considerations Handling Heavy Hydrocarbons Safely • H ₂ S and Toxic Contaminants • Environmental Regulations • Waste Management Practices
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, 05th of October 2026

0730 – 0830	Fundamentals of Thermal Cracking Thermal Cracking Mechanisms • Free Radical Reactions • Product Distribution • Factors Affecting Conversion
0830 – 0930	Visbreaking Technology Process Objectives and Benefits • Coil and Soaker Visbreaking • Product Quality Improvements • Operational Limitations
0930 – 0945	Break
0945 – 1100	Delayed Coking Process Delayed Coker Unit Configuration • Coke Drum Operation • Product Yields and Quality • Coke Handling and Disposal
1100 – 1215	Fluid Coking & Flexicoking Process Principles • Reactor Operation • Product Recovery Systems • Advantages Over Delayed Coking
1215 – 1230	Break
1230 – 1330	Thermal Conversion Product Management Gas Production Control • Naphtha Quality Considerations • Gas Oil Recovery Optimization • Coke Quality Management
1330 – 1420	Operational Challenges in Thermal Processes Fouling Mechanisms • Coke Formation Control • Equipment Reliability Issues • Maintenance Best Practices
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, 06th of October 2026

0730 – 0830	Fluid Catalytic Cracking (FCC) for Heavy Feeds FCC Process Fundamentals • Heavy Feed Processing Limitations • Catalyst Selection Criteria • Product Yield Optimization
0830 – 0930	Residue FCC (RFCC) RFCC Technology Overview • Feed Pretreatment Requirements • Catalyst Deactivation Mechanisms • Operational Performance Indicators
0930 – 0945	Break
0945 – 1100	Hydrocracking of Heavy Cuts Hydrocracking Reaction Chemistry • Reactor Configurations • Catalyst Systems • Product Upgrading Benefits
1100 – 1215	Residue Hydroprocessing Resid Hydrotreating Objectives • Demetallization Processes • Sulfur and Nitrogen Removal • Feed Preparation Requirements
1215 – 1230	Break
1230 – 1330	Catalysts Used in Heavy Oil Processing Catalyst Composition • Catalyst Poisoning Mechanisms • Activity and Selectivity • Catalyst Regeneration Techniques
1330 – 1420	Hydrogen Management Hydrogen Consumption Calculations • Hydrogen Purity Requirements • Hydrogen Recovery Systems • Refinery Hydrogen Balance
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, 07th of October 2026

0730 – 0830	Product Yield Optimization Maximizing Valuable Products • Yield-Performance Relationships • Conversion Severity Optimization • Economic Yield Evaluation
0830 – 0930	Quality Control of Upgraded Products Distillate Specifications • Sulfur Content Control • Stability Requirements • Product Certification Methods
0930 – 0945	Break
0945 – 1100	Refinery Process Integration Integration of Conversion Units • Energy Optimization Opportunities • Material Balance Management • Utility System Interactions
1100 – 1215	Fouling & Corrosion Management Fouling Mechanisms in Heavy Oil Units • Corrosion Types and Causes • Monitoring Techniques • Mitigation Strategies
1215 – 1230	Break
1230 – 1330	Energy Efficiency in Heavy Cuts Processing Heat Integration Methods • Furnace Efficiency Optimization • Steam System Management • Energy Benchmarking

1330 – 1420	Advanced Process Control Applications APC Fundamentals • Real-Time Optimization • Process Monitoring Systems • Performance Improvement Case Studies
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, 08th of October 2026

0730 – 0830	Economics of Heavy Cuts Processing Refinery Margin Analysis • Feedstock Valuation • Product Pricing Impacts • Investment Evaluation Techniques
0830 – 0930	Troubleshooting Heavy Oil Processing Units Common Operating Problems • Root Cause Analysis • Diagnostic Methodologies • Corrective Action Planning
0930 – 0945	Break
0945 – 1100	Reliability & Asset Management Reliability-Centered Maintenance • Equipment Integrity Programs • Risk-Based Inspection • Lifecycle Management
1100 – 1230	Emerging Upgrading Technologies Slurry Hydrocracking • Ebullated-Bed Technologies • Solvent Deasphalting Innovations • Novel Catalyst Developments
1230 – 1245	Break
1245 – 1300	Environmental Sustainability in Heavy Oil Processing Carbon Footprint Reduction • Emission Control Technologies • Circular Economy Opportunities • ESG Considerations in Refining
1300 – 1345	Industry Case Studies & Future Trends Successful Refinery Upgrades • Heavy Crude Processing Case Studies • Digital Transformation Applications • Future Outlook for Heavy Residue Conversion
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

Expected Learning Outcomes

By the end of this course, participants will be able to:

- Characterize heavy oil feedstocks and refinery residues
- Understand thermal and catalytic conversion technologies
- Optimize heavy cuts upgrading operations
- Troubleshoot processing and operational issues
- Evaluate economic and environmental aspects of heavy oil processing
- Assess emerging technologies and future industry trends



Practical Sessions

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



Course Coordinator

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