COURSE OVERVIEW PE0899
Refinery Optimization

Course Title
Refinery Optimization

Course Date/Venue
Session 1: August 03-07, 2025/Crowne Meeting Room, Crowne Plaza Al Khobar, KSA
Session 2: November 02-06, 2025/Tamra Meeting Room, Al Bandar Rotana Creek, Dubai UAE

Course Reference
PE0899

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.

The demand for petroleum products is increasing throughout the world. Traditional markets such as North America and Europe are experiencing moderate increase in demand, whereas the other emerging markets are witnessing a rapid surge. This has resulted in a squeeze on existing refineries, prompting a fresh technological approach to optimize efficiency and throughput. Major oil companies and technology suppliers/licensors are investing heavily to revamp their refining technologies in an effort to cater to the growing needs of customers.

Even though the nature of crude oil is changing, refineries are here to stay in the foreseeable future, since petroleum products satisfy wide-ranging energy requirements/demands that are not fully catered to by natural gas, liquefied petroleum gas (LPG), or coal. Refineries are eager to adapt to changing circumstances and are amenable to trying new technologies that are radically different in character. This is evident from the increasing use of different types of refinery process technology and novel separation methods.

This course is designed to provide participants with a complete and up-to-date overview of refinery optimization. On completion of the course, participants will gain a satisfactory understanding of the concepts of optimization fundamentals, design optimization, planning optimization, equipment optimization, process optimization, operations optimization, optimizing process controls, optimizing reliability, optimizing offsites operations, continuous improvement and integrated supply chain optimization. Actual case studies from around the world will be demonstrated to highlight the topics discussed.

Course Objectives

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

- Apply and gain an in-depth knowledge on refinery optimization
- Define and identify the basic optimization fundamentals and tools
- Illustrate breakeven analysis, graphical methods, numerical methods, incremental methods, linear programming, quadratic programming and non-linear optimization techniques
- Describe global and local optima and optimize the design through NP maximization and configuration optimization
- Discuss integer programming, capacity creep and plant debottlenecking
- Optimize operations planning covering linear programs and non-linear models, optimizing unit performance and scheduling
- Apply equipment optimization and process optimization
- Optimize process operations and identify the parameters for optimization, crude unit cut points, reformer severity, FCC conversion and other key parameters
- Integrate unit performance, describe the utilities and process controls and differentiate analogue controls versus digital controls as well as feed-back versus feed-forward controls
- Determine DCS and advanced controls, process analyzers, off-line optimization, real time online optimization, multivariable process control and inferential controls and dynamic versus steady-state
- Optimize reliability and apply RCFA, logic diagrams and fault trees, turnaround planning, materials inventory management, management and information systems, risk management and optimization
- Employ offsite operations optimization, offsites design, storage facilities operation, utilities management, inventory management and blending optimization
- Carryout continuous improvement for lean manufacturing, kaisan and six sigma, benchmarking and best practices and plant optimization versus supply chain optimization
- Identify the elements of supply chain and discuss optimization trends and crude unit optimization

Who Should Attend

This course provides an overview of all significant aspect and considerations of refinery optimization for managers, leaders, section heads, superintendents, supervisors, process engineers, production engineers, plant engineers, planning engineers and operators.

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**.*

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.

Accommodation

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

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.

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 Geoffrey Frampton, BSc, PMI-PMP, CSSBB, 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 Unit Operations & Maintenance**, **Operations Asset Process Plant** Start-up & Commissioning, **Process Plant** Monitoring, **Process Plant** Optimization, **Revamping & Debottlenecking**, **Process Plant** Troubleshooting & Engineering Problem Solving, **Integrity**, **Flare**, **Blowdown & Pressure Relief Systems** Operation, Maintenance & Troubleshooting, Dynamics of the **Petrochemicals Industry**, Understanding the **Global Petrochemical Industry**, **Petrochemicals** Analysis, **Naphtha & Condensate** in **Petrochemicals**, **Feedstock** Handling & Storage, **Natural Gas Liquids & Petrochemical Industry** and **Markets**, **Refinery & Process Industry**, **Refinery** Optimization, **Refinery** Operations Troubleshooting, **Refinery** Production Operations, **Refinery Process Safety**, **Process Safety Design**, **Petroleum Refinery** Process, **Asset Operational Integrity**, **Refinery Induction**, **Crude Distillation**, **Crude Oil Properties**, **Distillation Column** Operation & Control, **Oil Movement** Storage & Troubleshooting, Root Cause Analysis (**RCA**) for **Process & Equipment Failures**, **Process Equipment** Design, Applied **Process Engineering** Elements, **Catalyst** Selection & Production Optimization, Operations Abnormalities & Plant Upset, **Clean Fuel** Technology & Standards, **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**, **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**, **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**, **Project Engineering Manager**, **Construction Manager**, **Site Manager**, **Area Manager**, **Procurement Manager**, **Factory Manager**, **Technical Services Manager**, **Senior Project 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 Project Management Professional** (**PMI-PMP**), a **Certified Six Sigma Black Belt** (**CSSBB**) from **The International Six Sigma Institute**, a **Certified Internal Verifier/Trainer/Assessor** by the **Institute of Leadership & Management** (**ILM**), a **Certified Instructor/Trainer** 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 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 – 0845	***Optimization Fundamentals*** *Definitions and Basic Optimization Tools • Breakeven Analysis • Graphical Solutions • Numerical Methods*
0845 – 0930	***Optimization Fundamentals (cont'd)*** *Incremental Method • Linear Programming (LP) • Quadratic Programming (QP) • Non-Linear Optimization Techniques • Global & Local Optima*
0930 – 0945	*Break*
0945 – 1230	***Optimizing the Design*** *Maximizing NP • Configuration Optimization • Integer Programming (IP) • Capacity Creep • Plant Debottlenecking*
1230 – 1245	*Break*
1245 – 1420	***Optimizing Operations Planning*** *Linear Programs (LP) and Non-Linear Models • Optimizing Unit Performance • Scheduling*
1420 – 1430	***Recap***
1430	*Lunch & End of Day One*

Day 2

0730 – 0930	***Equipment Optimization*** *Heaters/Pumps/Compressors/Heat Exchangers • Critical Parameter Monitoring for Maximum Utilization and Optimization for each Specific Equipment • Resources Optimization like Catalyst/Chemicals/Utilities • Operation*
0930 – 0945	*Break*
0945 – 1100	***Process Optimization*** *IOW • Key Process Parameter Monitoring and Controlling for Maximum Utilization and Optimization for each Area Process • Conversions Losses and Yield Monitoring • Interactions of the Key Parameters Between Processes • Improving Unit Reliability • Reducing Refinery Losses, Energy Conservation • Reducing Flare/Slop Process*
1100 – 1215	***Optimizing Process Operations*** *Key Parameters for Optimization • Crude Unit Cut Points • Reformer Severity*
1215 – 1230	*Break*
1230 – 1420	***Optimizing Process Operations (cont'd)*** *Key Parameters for Optimization • Crude Unit Cut Points • Reformer Severity*
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

0730 – 0930	***Optimizing Process Operations (cont'd)*** *FCC Conversion • Other Key Parameters • Integrating Unit Performance • Utilities*
0930 – 0945	*Break*
0945 – 1100	***Optimizing Process Controls*** *Analogue Controls versus Digital Controls • Feed-back & Feed-forward Controls • DCS (Distributed Control Systems) & Advanced Controls • Process Analyzers*
1100 – 1215	***Optimizing Process Controls (cont'd)*** *Off-line Optimization • Real Time Online Optimization • Multivariable Process Control and Inferential Controls • Dynamic versus Steady-State • Statistical Process Control*
1215 – 1230	*Break*
1230 – 1420	***Optimizing Process Controls (cont'd)*** *Off-line Optimization • Real Time Online Optimization • Multivariable Process Control and Inferential Controls • Dynamic versus Steady-State • Statistical Process Control*
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

0730 – 0930	***Optimizing Reliability*** *Root Cause Failure Analysis • Logic Diagrams & Fault Trees • Turnaround Planning*
0930 – 0945	*Break*
0945 – 1100	***Optimizing Reliability (cont'd)*** *Materials Inventory Management • Management & Enterprise Information Systems • Risk Management & Optimization*
1100 – 1215	***Optimizing Offsites Operations*** *Offsites Design • Storage Facilities Operation • Utilities Management*
1215 – 1230	*Break*
1230 – 1420	***Optimizing Offsites Operations (cont'd)*** *Offsites Design • Storage Facilities Operation • Utilities Management*
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

0730 – 0930	***Optimizing Offsites Operations (cont'd)*** *Inventory Management • Blending Optimization*
0930 – 0945	*Break*
0945 – 1100	***Continuous Improvement*** *Lean Manufacturing • Kaisan and Six Sigma • Benchmarking and Best Practices • Plant Optimization versus Supply Chain Optimization*

1100 – 1215	***Continuous Improvement (cont'd)*** *Elements in Supply Chain • Summary of Refinery Optimization Trends • Crude Unit Optimization Case Study*
1215 – 1230	*Break*
1230 – 1330	***Continuous Improvement (cont'd)*** *Elements in Supply Chain • Summary of Refinery Optimization Trends • Crude Unit Optimization Case Study*
1330 – 1345	***Course Conclusion*** *Using this Course Overview, the Instructor(s) will Brief Participants about t Topics that were Covered During the Course*
1345 – 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

Mari Nakintu, Tel: +971 2 30 91 714, Email: mari1@haward.org