COURSE OVERVIEW PE0100
Process Plant Optimization & Energy Conservation

Course Title
Process Plant Optimization & Energy Conservation

Course Date/Venue
September 22-26, 2024/SAS Meeting Room, Holiday Inn Muscat al Seeb, an IHG Hotel, Muscat, Oman

Course Reference
PE0100

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.

In a typical processing plant, such as a petrochemical plant or oil refinery, there are hundreds and even thousands of control loops. Each control loop is responsible for controlling one part of the process, such as maintaining a temperature, level or flow. If the control loop is not properly designed and tuned, the process runs below its optimum. The process will be more expensive to operate, and equipment will wear out prematurely. For each control loop to run optimally, identification of sensor, valve, and tuning problems is important. It has been well documented that over 35% of control loops typically have problems.

Process plant optimization is the set of adjustments of the various processes in order to optimize some specified set of parameters without violating some constraints. The most common goals are minimizing cost and maximizing throughput and efficiency. When optimizing a process, the goal is to maximize one or more of the process specifications, while keeping all others within their constraints. This can be done by using a process mining tool, discovering the critical activities and bottlenecks, and acting only on them.

Process plant optimization involves evaluating every process and interaction in order to determine the best possible outcome. It includes the optimization of process equipment, operating procedure and control systems. This can result in improved flexibility, modernization and the best use of equipment, improved automation, decreased production time, and increased innovation.

The aim of this course is to provide participants with a complete and up-to-date overview of process plant optimization. Upon the successful completion of this course, participant will gain a satisfactory understanding of the concepts of optimization fundamentals, process plant design optimization, process plant planning optimization, process plant operations optimization, process controls, optimizing reliability, optimizing offsite 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 process plant optimization technology and continuous improvement
- 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, design optimization, NP maximization and configuration optimization
- Discuss integer programming, capacity creep and plant debottlenecking as well as optimize operations planning, unit performance and process operations
- Explain linear programs and non-linear models, scheduling by 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, multivariable process control and inferential controls and differentiate dynamic versus steady-state
- Discuss statistical process control, optimizing reliability, RCFA logic diagrams and fault trees, turnaround planning, materials inventory management, management and information systems
- Employ risk management and optimization, offsite operations optimization, offsites design, storage facilities operation, utilities management, inventory management, blending optimization and continuous improvement
- Acquire knowledge on the elements in supply chain, lean manufacturing, kaisan and six sigma, benchmarking and best practices
- Distinguish the difference between plant optimization versus supply chain optimization and discuss the summary of refinery and process plant 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 aspect and considerations of process plant optimization technology and continuous improvement for managers, leaders, section heads, superintendents, supervisors, process engineers, production engineers, plant engineers and planning engineers.

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. 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 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

Certificates are accredited by the following international accreditation organizations:

- 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.

- British Accreditation Council (BAC)

  Haward Technology is accredited by the **British Accreditation Council** for **Independent Further and Higher Education** as an **International Centre**. 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.

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 course for technical reasons with no prior notice to participants. Nevertheless, the course objectives will always be met:

Day 1: ***Sunday, 22nd of September 2024***

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0845	***Optimization Fundamentals***
0845 – 0900	***Definitions & Basic Optimization Tools***
0900 – 0930	***Breakeven Analysis***
0930 – 0945	*Break*
0945 – 1000	***Graphical Solutions***
1000 – 1030	***Numerical Methods***
1030 – 1100	***Incremental Method***
1100 – 1130	***Linear Programming (LP)***
1130 – 1200	***Quadratic Programming (QP)***
1200 – 1230	***Non-Linear Optimization Techniques***
1230 – 1245	*Break*
1245 – 1300	***Global & Local Optima***
1300 – 1315	***Optimizing the Design***
1315 – 1330	***Maximizing NP***
1330 – 1345	***Configuration Optimization***
1345 – 1400	***Integer Programming (IP)***
1400 – 1415	***Capacity Creep***
1415 – 1420	***Plant Debottlenecking***
1420 – 1430	***Recap***
1430	*Lunch & End of Day One*

Day 2: ***Monday, 23rd of September 2024***

0730 – 0800	***Optimizing Operations Planning***
0800 – 0830	***Linear Programs (LP) & Non-Linear Models***
0830 – 0900	***Optimizing Unit Performance***
0900 – 0930	***Scheduling***
0930 – 0945	*Break*
0945 – 1015	***Optimizing Process Operations***
1015 – 1045	***Key Parameters for Optimization***
1045 – 1115	***Crude Unit Cut Points***
1115 – 1200	***Reformer Severity***
1200 – 1215	*Break*
1215 – 1245	***FCC Conversion***
1245 – 1315	***Other Key Parameters***
1315 – 1345	***Integrating Unit Performance***
1345 – 1420	***Utilities***
1420 – 1430	***Recap***
1430	*Lunch & End of Day Two*

Day 3:	Tuesday, 24th of September 2024
0730 – 0815	Process Controls
0815 – 0900	Analogue Controls versus Digital Controls
0900 – 0930	Feed-back & Feed-forward Controls
0930 – 0945	Break
0945 – 1030	DCS (Distributed Control Systems) & Advanced Controls
1030 – 1115	Process Analyzers
1115 – 1200	Off-line Optimization
1200 – 1230	Real Time Online Optimization
1230 – 1245	Break
1245 – 1315	Multivariable Process Control & Inferential Controls
1315 – 1345	Dynamic versus Steady-State
1345 – 1420	Statistical Process Control
1420 – 1430	Recap
1430	Lunch & End of Day Three

Day 4:	Wednesday, 25th of September 2024
0730 – 0800	Optimizing Reliability
0800 – 0830	Root Cause Failure Analysis
0830 – 0900	Logic Diagrams & Fault Trees
0900 – 0930	Turnaround Planning
0930 – 0945	Break
0945 – 1015	Materials Inventory Management
1015 – 1100	Management & Enterprise Information Systems
1100 – 1130	Risk Management & Optimization
1130 – 1200	Optimizing Offsites Operations
1200 – 1215	Break
1215 – 1245	Offsites Design
1245 – 1315	Storage Facilities Operation
1315 – 1345	Utilities Management
1345 – 1415	Inventory Management
1415 – 1420	Blending Optimization
1420 – 1430	Recap
1430	Lunch & End of Day Four

Day 5:	Thursday, 26th of September 2024
0730 – 0815	Continuous Improvement
0815 – 0900	Lean Manufacturing
0900 – 0915	Break
0915 – 1000	Kaisan & Six Sigma
1000 – 1045	Benchmarking & Best Practices
1045 – 1130	Plant Optimization versus Supply Chain Optimization
1130 – 1200	Elements in Supply Chain
1200 – 1215	Break
1215 – 1330	Summary of Refinery & Process Plant Optimization Trends
1330 – 1345	Crude Unit Optimization Case Study
1345 – 1400	Course Conclusion
1400 – 1415	POST-TEST
1415 – 1430	Presentation of Course Certificates
1430	Lunch & End of Course

Practical Sessions

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

Course Coordinator

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