COURSE OVERVIEW PE0120
Catalyst Selection & Production Optimization

Course Title
Catalyst Selection & Production Optimization

Course Date/Venue
November 02-06, 2025/TBA Meeting Room, Hilton Kuwait Resort, Mangaf, Kuwait City, Kuwait

3.0 CEUs (30 PDHs) AWARD

Course Reference
PE0120

Course Duration/Credits
Five days/3.0 CEUs/30 PDHS

H-STK© INCLUDED

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.

Most process plant operations are divided into two sectors; the reactor section and the separation section. The high value products are produced in the reactor section and purified in the separation section. The proper reactor design and catalyst selection can greatly improve company profit margins. The net effect is to produce increasing amounts of higher value products by improving selectivity.

Reactor design and catalyst developments are one of the largest Research and Development (R&D) Divisions in Chemical Engineering. To stay abreast of the current reactor designs and catalyst developments should be an operations personnel's target.

This course will guide the participants to develop key concepts and techniques to operate, select and optimize catalytic processes in process plants. These key concepts can be utilized to make proper design and operating decisions in order to optimize production.

The course is intended to give engineers and senior operators who work with solid catalysts the knowledge on different types of catalysts used in the petroleum and petrochemical industries.

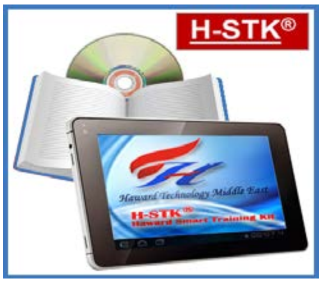
The course will provide concise description of today's most important catalytic processes, including petroleum refining, supported metal catalysis, zealot catalysis, oxidation catalysis, air pollution control and synthesis gas reactions.

Course Objectives

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

- Develop key concepts and techniques to operate, select and optimize catalytic processes
- Apply catalyst development and catalyst evaluation techniques in alkylation, hydrogenation, dehydrogenation, isomerization, hydro cracking and de-alkylation, fluidized catalytic cracking, hydrodesulphurization and catalytic reforming
- Implement and optimize Ziegler-Natta polymerization processes
- Operate and select Metallocene Catalysts
- Command the key requirements and implications of the Reaction Mechanisms
- Describe Post Metallocene Single-site Catalysts
- Analyze current problems and future trends in single-site catalysis
- Recognize competitive advances in Zeigler-Natta technology for polypropylene and polyethylene

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 catalyst selection and production optimization for those who are making day-to-day decisions regarding production, operation, economics, troubleshooting and solving catalyst problem in process plant, R&D, R&T, or laboratory. This includes managers, superintendents, supervisors, process engineers, chemical engineers, chemists and other senior technical staff.

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 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 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.

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 **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**, **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 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, 02nd of November 2025***

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0930	***Introduction*** *Chemistry Overview ● Refinery Overview Petrochemical Plant Overview*
0930 – 0945	*Break*
0945 – 1100	***Alkylation*** *Introduction, History, Process Overview & Process Chemistry Feedstock, Reaction, Catalyst ● Process Variables & Common Problems ● Advanced in Catalyst Development ● Catalyst Evaluation Techniques*
1100 – 1230	***Hydrogenation*** *Introduction, History, Process Overview & Process Chemistry ● Feedstock, Reaction, Catalyst ● Process Variables & Common Problems ● Advance in Catalyst Development ● Catalyst Evaluation Techniques*
1230 – 1245	*Break*
1245 – 1420	***Dehydrogenation*** *Introduction, History, Process Overview & Process Chemistry ● Feedstock, Reaction, Catalyst ● Process Variables & Common Problems ● Advance in Catalyst Development ● Catalyst Evaluation Techniques*
1420 – 1430	***Recap***
1430	*Lunch & End of Day One*

Day 2: Monday, 03rd of November 2025

0730 – 0900	***Isomerization*** *Introduction, History, Process Overview & Process Chemistry ● Feedstock, Reaction, Catalyst ● Process Variables & Common Problems ● Advance in Catalyst Development ● Catalyst Evaluation Techniques*
0900 – 0915	*Break*
0915 – 1100	***Hydrocracking & De-Alkylation*** *Introduction, History, Process Overview & Process Chemistry ● Feedstock, Reaction, Catalyst ● Process Variables & Common Problems ● Advance in Catalyst Development Catalyst Evaluation Techniques*
1100 – 1230	***Fluidized Catalytic Cracking*** *Introduction, History, Process Overview and Process Chemistry ● Feedstock, Reaction, Catalyst ● Process Variables & Common Problems ● Advance in Catalyst Development ●Catalyst Evaluation Techniques*
1230 – 1245	*Break*
1245 – 1420	***Hydrodesulfurization*** *Introduction, History, Process Overview & Process Chemistry ● Feedstock, Reaction, Catalyst ● Process Variables & Common Problems ● Advance in Cat Development ● Catalyst Evaluation Techniques*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Two*

Day 3: Tuesday, 04th of November 2025

0730 – 0900	***Catalytic Reforming*** *Introduction, History, Process Overview & Process Chemistry ● Feedstock, Reaction, Catalyst ● Process Variables & Common Problems ● Advance in Catalyst Development ● Catalyst Evaluation Techniques*
0900 – 0915	*Break*
0915 – 1100	***Ziegler-Natta Polymerization*** *Commercial Ziegler-Natta Polymers*
1100 – 1230	***Ziegler-Natta Polymerization (cont'd)*** *Heterogeneous Ziegler-Natta Catalysts and Mechanism of Polymerization*
1230 – 1245	*Break*
1245 – 1420	***Ziegler-Natta Polymerization (cont'd)*** *Stereochemistry of Ziegler-Natta Polymerization*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Three*

Day 4: Wednesday, 05th of November 2025

0730 – 0900	***Ziegler-Natta Polymerization (cont'd)*** *Homogeneous Ziegler-Natta Polymerization*
0900 – 0915	*Break*
0915 – 1045	***Ziegler-Natta Polymerization (cont'd)*** *Metathesis & Ring-Opening Metathesis Polymerization*
1045 – 1215	***Basic Principles of Metallocene & Single-Site Chemistry & Catalysts*** *Ziegler-Natta Olefin Polymerization ● Metallocene Chemistry: General Aspects*
1215 – 1230	*Break*

1230 – 1330	***Historical Development of Metallocene Catalysts*** *Titanocene & Lanthanide Catalysts ● Zirconocene Catalysts ● Current Scope of Metallocene Catalyst Applications*
1330 – 1420	***Reaction Mechanisms*** *Catalyst Activation, Propagation, Chain Transfer, Deactivation ● Active Site Structure: Key Requirements & Implications ● Co-catalysts ● Influence of Counterions, Lewis Bases, TMA ● Kinetic Profiles ● Comparison of Single-Site & Multi-Site Catalysts*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Four*

Day 5: **Thursday, 06th of November 2025**

0730 – 0900	***Post Metallocene Single-Site Catalysts*** *Constrained Geometry Ti Catalysts ● Amide-Based Ti & Zr Catalysts ● FI Catalysts ● Living Olefin Polymerization ● Discrete V and Cr Catalysts ● Key Design Issues for Late Metal Catalysts ●Di-imine Ni & Pd Catalysts ● Pyridine-Bis-Imine Fe and Co Catalysts ● New Catalysts Derived from SHOP Systems*
0900 – 0915	*Break*
0915 – 1100	***Current Problems & Future Trends in Single-Site Catalysis*** *Ligand & Metallocene Synthesis: Problems & Prospects ● Cocatalysts, Activators & Anions ● Polar Monomers: Toward Functionalized Polyolefins ● Functionalized Polynorbornenes ● Ethylene-acrylate Copolymerization ● Prospects for Vinyl Halides, Vinyl Acetate & other Polar Monomers ● General Strategies for Catalyst Design & Development*
1100 – 1230	***Competitive Advances in Zeigler-Natta Technology for Polypropylene & Polyethylene*** *Advanced Zeigler-Natta Catalysis & Multiple Process Technology vs. Metallocene Revolution, Competition & Complementarity ● Stepping Out of the Box with Zeigler-Natta & Metallocene Catalyst for Propylene Based Resins*
1230 – 1245	*Break*
1245 – 1345	***Competitive Advances in Zeigler-Natta Technology for Polypropylene & Polyethylene (cont'd)*** *NovaCat T: A New Zeigler-Natta Catalyst for Polyethylene Production in Gas Phase Reactors*
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*

Practical Sessions
This practical highly-interactive course includes the following real-life case studies:-

Course Coordinator
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