COURSE OVERVIEW PE0987
De-Sulfurization Technology

Course Title
De-Sulfurization Technology

Course Reference
PE0987

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

Course Date/Venue

Session(s)	Date	Venue
1	January 21-25, 2024	Boardroom 1, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE
2	February 11-15, 2024	Oryx Meeting Room, Doubletree By Hilton Doha-Al Sadd, Doha, Qatar
3	March 03-07, 2024	Kizkulesi, Crown Plaza Istanbul Asia Hotels & Convention Center, Istanbul, Turkey

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.

Atmospheric residue desulfurization (ARDS) process is extensively used in upgrading of heavy petroleum oils and residues to more valuable clean environmentally friendly transportation fuels and to partially convert the residues to produce low-sulfur fuel oil and hydrotreated feedstocks. Graded catalyst systems in multiple reactors are used in the process in order to achieve hydrodesulfurization (HDS), hydrodemetallization (HDM), hydrodenitrogenation (HDN), and conversion of residues to distillates at desired levels. The characteristics of the feedstocks processed in different reactors are significantly different. The quality of the feed entering the second reactor is str ongly dependent on the operating severity in the first reactor and can have an important impact on the performance of the catalysts in the following reactor with regard to various conversions and deactivation rate.

Atmospheric Residue Desulfurization (ARDS) is a well established hydro treating process, operated primarily to desulfurize atmospheric residues from Crude units and to prepare feed stocks for downstream conversion units like Hydrocrackers and Delayed Coker units. The product, desulfurized residue, is not only low in sulfur but has improved pour points and lower viscosities as well.

This course is designed to provide participants with a detailed and up-to-date overview of atmospheric residue desulfurization unit. It covers the hydrotreating chemistry, thermodynamics, hydrodesulfurization, hydrodenitrogenation and hydrodeasphalting; the aromatic hydrogenation, the effects of feedstock and non-catalytic residue upgrading processes; the solvent deasphalting and correlations for solvent deasphalting; the thermal process, catalysis, catalysts supports, catalytic processes and residue-fluidized catalytic cracking; the hydroprocessing, fixed bed process, moving bed process, ebullated bed process and slurry bed process; and the aquaconversion, HDM catalysis and catalysts deactivation.

During this interactive course, participants will learn to employ catalyst regeneration, metals recovery and the transportation fuels from the bottom of the barrel of Chevron lummus global RDS/VRDS hydrotreating; apply selective hydrogen processes, UOP unionfining technology, UOP RCD unionfining process and catalytic dewaxing processes; identify the UOP unisar process for saturation of aromatics; apply start-up and shutdown, isocracking-hydrocracking for superior fuels and lubes and UOP unicracking process for hydrocracking; recycle H_2 purification process and hydrocracking consumption; and carryout H_2S removal, reactor internals and FCC FEED hydrotreating.

Course Objectives

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

- Apply and gain an in-depth knowledge on de-sulfurization technology
- Discuss hydrotreating chemistry, thermodynamics, hydrodesulfurization, hydrodenitrogenation and hydrodeasphalting
- Identify aromatic hydrogenation, the effects of feedstock and non-catalytic residue upgrading processes
- Recognize solvent deasphalting and correlations for solvent deasphalting
- Illustrate thermal process, catalysis, catalysts supports, catalytic processes and residue-fluidized catalytic cracking
- Carryout hydroprocessing, fixed bed process, moving bed process, ebullated bed process and slurry bed process
- Apply aquaconversion, HDM catalysis and catalysts deactivation
- Employ catalyst regeneration, metals recovery and the transportation fuels from the bottom of the barrel of Chevron lummus global RDS/VRDS hydrotreating
- Apply selective hydrogen processes, UOP unionfining technology, UOP RCD unionfining process and catalytic dewaxing processes
- Identify UOP unisar process for saturation of aromatics
- Describe Chervon lummus global ebullated bed bottom -of-the barrel hydroconversion (LC-fining) process
- Employ start-up and shutdown, isocracking-hydrocracking for superior fuels and lubes and UOP unicracking process for hydrocracking
- Recycle H_2 purification process and hydrocracking consumption
- Carryout H_2S removal, reactor internals and FCC FEED hydrotreating

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, sample video clips of the instructor's actual lectures & practical sessions during the course conveniently saved in a **Tablet PC**.*

Who Should Attend

This course provides an overview of all significant aspects and considerations of de-sulfurization technology for 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

Dubai	**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.
Doha	**US$ 6,000** per Delegate. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.
Istanbul	**US$ 6,000** per Delegate + **VAT**. This rate includes Participants Pack (Folder, Manual, Hand-outs, etc.), 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:-

- USA International Association for Continuing Education and Training (IACET)

Haward Technology is an Authorized Training Provider by the International Association for Continuing Education and Training (IACET), 2201 Cooperative Way, Suite 600, Herndon, Virginia 20171, USA. In obtaining this authority, Haward Technology has demonstrated that it complies with the **ANSI/IACET 1-2013 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 1-2013 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 Association 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 **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 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

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0900	***Introduction to Atmospheric Residue Desulfurization Unit (ARDS)***
0900 - 0930	***Hydrotreating Chemistry***
0930 – 0945	*Break*

0945 – 1045	***Thermodynamics***
1045 - 1130	***Hydrodesulfurization***
1130 – 1200	***Hydrodenitrogenation***
1200 - 1245	***Hydrodeasphalting***
1245 – 1300	*Break*
1300 – 1330	***Aromatic Hydrogenation***
1330 - 1420	***Feedstock Effects***
1420 – 1430	***Recap***
1430	*Lunch & End of Day One*

Day 2

0730 – 0830	***Non-Catalytic Residue Upgrading Processes***
0830 - 0930	***Solvent Deasphalting***
0930 – 0945	*Break*
0945 – 1030	***Correlations for Solvent Deasphalting***
1030 - 1100	***Thermal Processes***
1100 – 1130	***Catalysis***
1130 - 1215	***Catalyst Supports***
1215 – 1230	*Break*
1230 – 1330	***Catalytic Processes***
1330 - 1420	***Residue-Fluidized Catalytic Cracking***
1420 – 1430	***Recap***
1430	*Lunch & End of Day Two*

Day 3

0730 – 0830	***Hydroprocessing***
0830 - 0930	***Fixed Bed Process***
0930 – 0945	*Break*
0945 – 1030	***Moving Bed Process***
1030 - 1100	***Ebullated Bed Process***
1100 – 1130	***Slurry Bed Process***
1130 - 1215	***Aquaconversion***
1215 – 1230	*Break*
1230 – 1315	***HDM Catalysis***
1315 - 1420	***Catalysts Deactivation***
1420 – 1430	***Recap***
1430	*Lunch & End of Day Three*

Day 4

0730 – 0800	***Catalyst Regeneration & Metals Recovery***
0800 - 0900	***Chevron Lummus Global RDS/VRDS Hydrotreating – Transportation Fuels from the Bottom of the Barrel***
0900 – 0915	*Break*
0915 – 1000	***Selective Hydrogen Processes***
1000 - 1030	***UOP Unionfining Technology***
1030 – 1115	***UOP RCD Unionfining Process***
1115 - 1200	***UOP Catalytic Dewaxing Process***

1200 – 1215	*Break*
1215 – 1315	***UOP Unisar Process for Saturation of Aromatics***
1315 - 1420	***Chervon Lummus Global Ebullated Bed Bottom-of-the-Barrel Hydroconversion (LC-Fining) Process***
1420 – 1430	***Recap***
1430	*Lunch & End of Day Four*

Day 5

0730 – 0830	***Start-up & Shutdown***
0830 - 0930	***Isocracking-Hydrocracking for Superior Fuels & Lubes***
0930 – 0945	*Break*
0945 – 1015	***UOP Unicracking Process for Hydrocracking***
1015 - 1045	***Recycle H_2 Purification Processes***
1045 - 1115	***Hydrogen Consumption***
1115 – 1200	***H_2 s Removal***
1200 – 1215	*Break*
1215 – 1300	***Reactor Internals***
1300 - 1330	***FCC FEED Hydrotreating***
1330 – 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 real-life case studies and exercises:-

Course Coordinator

Kamel Ghanem, Tel: +971 2 30 91 714, Email: kamel@haward.org