

COURSE OVERVIEW PE0987
De-Sulfurization Technology

Course Title

De-Sulfurization Technology

Course Date/Venue

January 21-25, 2024/Al Safa Meeting Room,
 Grand Millennium Dubai Hotel, Sheikh
 Zayed Rd - Barsha Heights, Dubai, UAE

Course Reference

PE0987

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.

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 strongly 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 H₂ purification process and hydrocracking consumption; and carryout H₂S 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 H₂ purification process and hydrocracking consumption
- Carryout H₂S removal, reactor internals and FCC FEED hydrotreating

Exclusive Smart Training Kit - H-STK®



Participants of this course will receive the exclusive “Howard 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 desulfurization 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

US\$ 5,500 per Delegate + **VAT**. This rate includes H-STK® (Howard 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: -


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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.

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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**. 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:



Dr. John Petrus, PhD, MSc, BSc, is a **Senior Process Engineer** with over **30 years** of **onshore & offshore** experience within the **Oil & Gas, Refinery and Petroleum** industries. His wide experience covers in the areas of **De-Sulfurization Technology, 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), Advanced Operational & Troubleshooting Skills, Principles of Operations Planning, Rotating Equipment Maintenance & Troubleshooting. Further he is also well versed in **Rotating Machinery Principles & Applications, Rotating Equipment Selection, Operation, Maintenance, Inspection & Troubleshooting, Rotating Machine/Equipment in Industry, Control Valves & Actuators, PSV Maintenance & Testing, Pump Selection, Installation, Performance & Control, Screw Compressor Theory and Troubleshooting, Reliability-Centered Maintenance (RCM), Preventive & Predictive Maintenance, Spare Parts Planning & Inventory Management, Computerized Maintenance Management Systems (CMMS), Process Plant Shutdown & Turnaround, Maintenance Optimization & Best Practices, Reliability Centered Maintenance Principles & Application, Efficient Shutdowns, Turnaround & Outages, Effective Reliability Maintenance & Superior Maintenance Strategies, Integrity & Asset Management, Total Plant Reliability Maintenance, Vibration Measurement, Advanced Analytics in Oil & Gas, Business Intelligence Data Analytics, Audit Analytics & Computer-Assisted Audit Techniques (CAATs), Basic Database Concepts & Data Formats, Data Analysis Cycle & Best Practices, Data Importing & Integrity Verification, Advanced Analytics Tools in Auditing, Leveraging AI & Machine Learning in Audits, Data Mining Techniques for Auditors, Data Analytics for Managerial Decision Making, Business Process Analysis, Mapping & Modeling, Research Methods & Analysis, Statistical Data Needs Analysis, Oil & Gas Industry Business Environment & Competitive Intelligence Gathering & Analysis, Petroleum Economics & Risk Analysis, Certified Data Analysis, Risk Management & SWIFT Analysis, Best Practices Management System (BPMS), GIS System Management, Database Management, Strategic Planning, Best Practices and Workflow, Quality Management, Project Management and Risk Assessment & Uncertainty Evaluation.** Further, he is also well-versed in **seismic interpretation, mapping & reservoir modelling tools like Petrel software, LandMark, Seisworks, Geoframe, Zmap** and has extensive knowledge in **MSDos, Unix, AutoCAD, MAP, Overlay, Quicksurf, 3DStudio, Esri ArcGIS, Visual Lisp, Fortran-77 and Clipper.** Moreover, he is a world **expert in analysis and modelling of fractured prospects and reservoirs** and a **specialist and developer of fracture modelling software tools** such as **FPDM, FMX and DMX Protocols.**

During his career life, Dr. Petrus held significant positions and dedication as the **Executive Director, Senior Geoscience Advisor, Exploration Manager, Project Manager, Manager, Process Engineer, Mechanical Engineer, Maintenance Engineer, Chief Geologist, Chief of Exploration, Chief of Geoscience, Senior Geosciences Engineer, Senior Explorationist, Senior Geologist, Geologist, Senior Geoscientist, Geomodeller, Geoscientist, CPR Editor, Resources Auditor, Project Leader, Technical Leader, Team Leader, Scientific Researcher and Senior Instructor/Trainer** from various international companies and universities such as the **Dragon Oil Holding Plc., ENOC, MENA, ENI Group of Companies, Ocre Geoscience Services (OGS), Burren RPL, Ministry of Oil-Iraq, Eni Corporate University, Stanford University, European Universities, European Research Institutes, NorskHydro Oil Company, Oil E&P Companies,** just to name a few.

Dr. Petrus has a **PhD in Geology and Tectonophysics** and **Master and Bachelor** degrees in **Earth Sciences** from the **Utrecht University, The Netherlands.** Further, he is a **Certified Instructor/Trainer, a Certified Trainer/Assessor/Internal Verifier** by the **Institute of Leadership & Management (ILM),** a Secretary and Treasurer of Board of Directors of Multicultural Centre, Association Steunfonds SSH/SSR and Founding Member of Sfera Association. He has further published several scientific publications, journals, research papers and books and delivered numerous trainings, workshops, courses, seminars and conferences 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, 21st of January 2024

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: Monday, 22nd of January 2024

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: Tuesday, 23rd of January 2024

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: Wednesday, 24th of January 2024

0730 – 0800	<i>Catalyst Regeneration & Metals Recovery</i>
0800 – 0900	<i>Chevron Lummus Global RDS/VRDS Hydrotreating – Transportation Fuels from the Bottom of the Barrel</i>
0900 – 0915	<i>Break</i>
0915 – 1000	<i>Selective Hydrogen Processes</i>
1000 – 1030	<i>UOP Unionfining Technology</i>
1030 – 1115	<i>UOP RCD Unionfining Process</i>
1115 – 1200	<i>UOP Catalytic Dewaxing Process</i>
1200 – 1215	<i>Break</i>
1215 – 1315	<i>UOP Unisar Process for Saturation of Aromatics</i>
1315 – 1420	<i>Chervon Lummus Global Ebullated Bed Bottom-of-the-Barrel Hydroconversion (LC-Fining) Process</i>
1420 – 1430	<i>Recap</i>
1430	<i>Lunch & End of Day Four</i>

Day 5: Thursday, 25th of January 2024

0730 – 0830	<i>Start-up & Shutdown</i>
0830 – 0930	<i>Isocracking-Hydrocracking for Superior Fuels & Lubes</i>
0930 – 0945	<i>Break</i>
0945 – 1015	<i>UOP Unicracking Process for Hydrocracking</i>
1015 – 1045	<i>Recycle H₂ Purification Processes</i>
1045 – 1115	<i>Hydrogen Consumption</i>
1115 – 1200	<i>H₂s Removal</i>
1200 – 1215	<i>Break</i>
1215 – 1300	<i>Reactor Internals</i>
1300 – 1330	<i>FCC FEED Hydrotreating</i>
1330 – 1400	<i>Course Conclusion</i>
1400 – 1415	POST-TEST
1415 – 1430	<i>Presentation of Course Certificates</i>
1430	<i>Lunch & End of Course</i>



Practical Sessions

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



Course Coordinator

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