

**COURSE OVERVIEW PE0987**  
**De-Sulfurization Technology**

**Course Title**

De-Sulfurization Technology

**Course Date/Venue**

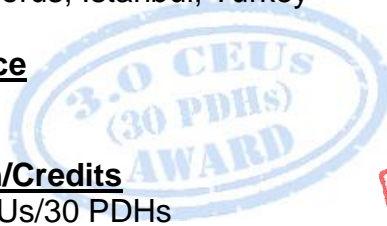
January 12-16, 2025/Seminar 1 Meeting Room,  
 Gezi Hotel Bosphorus, Istanbul, Turkey

**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 H<sub>2</sub> purification process and hydrocracking consumption; and carryout H<sub>2</sub>S 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<sub>2</sub> purification process and hydrocracking consumption
- Carryout H<sub>2</sub>S 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 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\$ 6,000** per Delegate + **VAT**. 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:-


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USA International Association for Continuing Education and Training (IACET)

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 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.

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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. Emad Al-Hasany is a Senior Process & Petroleum Engineer with Offshore & Onshore experience within the Oil & Gas, Refinery and Petrochemical industries. His wide expertise covers in the areas of Process Plant Commissioning, Cost Estimation, Process Plant Start-Up Management, Clean Fuel Technology & Standards, De-Sulfurization Technology, Heat Exchangers & Fired Heaters Operation & Troubleshooting, Heat Medium Fired Heater Troubleshooting & Maintenance, Process Reactor Operation & Troubleshooting, Process Equipment Design, Sizing, Selection, Applications & Troubleshooting, Process Engineering**

**Calculations, Gas Processing Plant Operations & Control, Gas Processing Monitoring & Troubleshooting, Process Plant Optimization & Energy Conservation, Hydro-Treating Technology, Oil & Gas Field Operations, Oil Movement, Storage & Troubleshooting, Start-Up & Shutdown, Gas/Oil Separates, Surge Vessels, Sludge Catcher, Knockout LP & HP Flare System, Close & Open Drain System, Skimmer Pit Evaporation Pit System, Filters, Driers, Pumps, Turbines, Compressors, York Refrigeration Compressors, Heaters & Combustion Gases Fire, Emergency Diesel Generators, Electrical & Diesel Fire Water Pumps, Gas & Fire Detectors, Pig Launcher, Purging Pipelines, Pressurized Vessels, Heat Exchangers, Atmospheric, Flash, Vacuum, Azeotropic, Weiss Fractional Distillation, Oil & Gas Treatment, Separators, Filtration, Dehydration (Glycol & Molecular Sieves System), Fire Tube Heaters, Combustion Gas, Temperature Level, Control Valves, Solenoid Valves, Cascade Control, Switches, Transmitter, Transducer, RTD Sensitivity, Orifice Plat, I/P Converter, Rot Meter, Floating, Displacer, DP Cells, PIDs, Flare Blowdown & Pressure Relief Systems, Pumps, Compressors, Turbines & Troubleshooting, Centrifugal Compressor & Steam Turbine, Valves, Safety Relief Valve Sizing, Selection, Operation, Inspection, Maintenance & Troubleshooting, Tank & Tank Farms, Hydraulic Pump, Well Engineering, Acidation, Wellheads Preparing & Maintenance, Well Operations & Surveys, Well Stimulation, Logging and Reservoir Engineering. Further, he is also well-versed in HYSYS, PRO II, OLGA, PIPESIM, PETREL, Artificial Lift, First Aid & Firefighting, Environment Protection, NORM Awareness, SHOC (Safe Handling of Chemicals), Permit to Work (PTW), HSE Auditing & Reporting, Emergency Response, Defensive Driving, H2S, Accident/Incident Investigation, Process Safety Management, Root Cause Analysis, OSHA General Industry, Water Injection, Water Treatment, HAZOP, Risk Assessment, Gas Chromatography, Corrosion and Cathodic Protection.**

During his career life, Dr. Emad has gained his practical and field experience through his various significant positions and dedication as the **Production Main Station Manager, Manager, Production Superintendent, Production Supervisor, Production Engineer, HAZOP Consultant, Instructor** and **Lecturer** for various companies and universities such as the AL-Euphrates University, Dero Oilfields, Syrian Petroleum Company (SPC), Kokab Co. and Alharratah Oilfield.

Dr. Emad has a **PhD in Reservoir Management**, a **Master's degree in Production Engineering** and a **Bachelor's degree in Petroleum Engineering**. Further, he is a **Certified Instructor/Trainer** and has further delivered numerous training, courses, workshops, seminars and conferences worldwide.

### 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, 12<sup>th</sup> of January 2025

0730 – 0800	Registration & Coffee
0800 – 0815	Welcome & Introduction
0815 – 0830	<b>PRE-TEST</b>
0830 – 0900	<b>Introduction to Atmospheric Residue Desulfurization Unit (ARDS)</b>
0900 – 0930	<b>Hydrotreating Chemistry</b>
0930 – 0945	Break
0945 – 1045	<b>Thermodynamics</b>
1045 – 1130	<b>Hydrodesulfurization</b>
1130 – 1200	<b>Hydrodenitrogenation</b>
1200 – 1245	<b>Hydrodeasphalting</b>
1245 – 1300	Break
1300 – 1330	<b>Aromatic Hydrogenation</b>
1330 – 1420	<b>Feedstock Effects</b>
1420 – 1430	<b>Recap</b>
1430	Lunch & End of Day One

#### Day 2: Monday, 13<sup>th</sup> of January 2025

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

#### Day 3: Tuesday, 14<sup>th</sup> of January 2025

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



**Day 4: Wednesday, 15<sup>th</sup> of January 2025**

0730 – 0800	<i>Catalyst Regeneration &amp; 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>Cherovon Lummus Global Ebullated Bed Bottom-of-the-Barrel Hydroconversion (LC-Fining) Process</i>
1420 – 1430	<i>Recap</i>
1430	<i>Lunch &amp; End of Day Four</i>

**Day 5: Thursday, 16<sup>th</sup> of January 2025**

0730 – 0830	<i>Start-up &amp; Shutdown</i>
0830 - 0930	<i>Isocracking-Hydrocracking for Superior Fuels &amp; Lubes</i>
0930 – 0945	<i>Break</i>
0945 – 1015	<i>UOP Unicracking Process for Hydrocracking</i>
1015 - 1045	<i>Recycle H<sub>2</sub> Purification Processes</i>
1045 - 1115	<i>Hydrogen Consumption</i>
1115 – 1200	<i>H<sub>2</sub>s 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	<i>POST-TEST</i>
1415 – 1430	<i>Presentation of Course Certificates</i>
1430	<i>Lunch &amp; 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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