COURSE OVERVIEW PE0890

Fluid Catalytic Cracker and Associated Units Design

Course Title

Fluid Catalytic Cracker and Associated Units Design

Course Reference

PE0890

Course Duration/Credits

Five days/3.0 CEUs/30 PDHs

Course Date/Venue

Session(s)	Date	Venue
1	June 30-July 04, 2025	Glasshouse Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE
2	August 10-14, 2025	Tamra Meeting Room, Al Bandar Rotana Creek, Dubai, UAE
3	October 26-30, 2025	Tamra Meeting Room, Al Bandar Rotana Creek, Dubai, UAE
4	December 22-26, 2025	Glasshouse Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE

Course Description

This hands-on, 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.

Fluid catalytic cracking (FCC) continues to play a key role in an integrated refinery as the primary conversion process. For many refiners, the cat cracker is the key to profitability in that the successful operation of the unit determines whether or not the refiner can remain competitive in today's market.

Approximately 450 cat crakers are operating worldwide as of June 2007, with a total processing capacity of over 16.5 million barrels per day. Most of the existing FCC units have been designed or modified by six major technology licensers:-

1. ABB Lummus Global
2. Exxon Research and Engineering (ER&E)
3. Kellogg Brown & Root-KBR (formerly The M.W. Kellogg Company)
4. Shell Oil Company
5. Stone & Webster Engineering Corporation (SWEC)/IFP
6. UOP (Universal Oil Products)

Although the mechanical configuration of individual FCC units may differ, their common objective is to upgrade low-value feedstock to more valuable products. Worldwide, about 45% of all gasoline comes from FCC and ancillary units, such as the alkylation unit.

It is essential that the oil industry should adopt a procedure for soliciting, evaluating and awarding contracts, for equipment items or study/development project activities, which is fair, fully competitive and commercially transparent. Rigorously applied, this procedure will result in the acquisition of a fit-for-purpose, high quality equipment item or development project; and staff qualification for new defiance which also meets the Company's health, safety and environmental standards.

This course has been laid out, in logical sequence, in order to assist any employees of Refining Companies engaged in ITB contractual and/or procurement activities to obtain the most satisfactory end result by means of a process which can be clearly seen to be as competitive and unbiased as practically possible. Further, this course will provide information on the technical areas of Fluid Catalytic Cracking and in modern refineries. The course supplies a good overview of design, operation, troubleshooting and optimization of fluid catalytic cracking (FCC). Further, it reveals the latest technologies to help improve profitability and reliability of FCC units.

Course Objectives

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

- Apply and gain an in-depth knowledge on fluid catalytic cracking (FCC) unit, its functions, applications, design and other technical related knowledge
- Prepare professional invitation to bid (ITB) and tender documents including technical specifications
- Facilitate production of ITBs based at baiji for the fluid catalyst cracker (FCC) contract
- Perform first-hand experience in typical ITB development
- Develop and issue contracts to attract premier oil and gas contractors
- Prepare and identify the final product comprising of process/training material and biddable ITB package

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 fluid catalytic cracking for engineers and technical staff who are interested or involved in the design or the operation of an FCC unit.

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: -

- 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.

- 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.

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, Standford 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.

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 Fee

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.

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 – 0930	***FCC Process Description*** *Feed Preheat • Rise-Reactor-Stripper • Regenerator-Heat/Catalyst Recovery • Main Fractionator • Gas Plant • Treating Facilities*
0930 – 0945	*Break*
0945 – 1100	***FCC Feed Characterization*** *Hydrocarbon Classification • Feedstock Physical Properties • Impurities • Empirical Correlations • Benefits of Hydroprocessing*
1100 – 1230	***FCC Catalysts*** *Catalyst Components • Catalyst Manufacturing Techniques • Fresh Catalyst Properties • Equilibrium Catalyst Analysis*
1230 – 1245	*Break*
1245 – 1420	***FCC Catalysts (cont'd)*** *Catalyst Management • Catalyst Evaluation • Additives*
1420 – 1430	***Recap***
1430	*Lunch & End of Day One*

Day 2

0730 – 0930	***Chemistry of FCC Reactions*** *Thermal Cracking • Catalytic Cracking • Thermodynamic Aspects*
0930 – 0945	*Break*
0945 – 1100	***Unit Monitoring & Control*** *Material Balance • Heat Balance*
1100 – 1230	***Unit Monitoring & Control (cont'd)*** *Pressure Balance • Process Control Instrumentation*
1230 – 1245	*Break*
1245 – 1420	***Products & Economics*** *FCC Products • FCC Economics*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Two*

Day 3

0730 – 0930	***Project Management & Hardware Design*** *Project Management Aspects of an FCC Revamp • Process and Mechanical Design Guidelines*
0930 – 0945	*Break*
0945 – 1100	***Troubleshooting*** *Guidelines for Effective Troubleshooting • Catalyst Circulation • Catalyst Losses • Coking/Fouling • Flow Reversal*
1100 – 1230	***Troubleshooting (cont'd)*** *High Regenerator Temperature • Increase in Afterburn • Hydrogen Blistering • Hot Gas Expanders • Product Quantity & Quality*
1230 – 1245	*Break*
1245 – 1420	***Debottlenecking & Optimization*** *Introduction • Approach to Debottlenecking • Reactor/Regenerator Structure • Fuel Gas System • FCC Catalyst • Instrumentation • Utilities/Offsites*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Three*

Day 4

0730 – 0930	***Emerging Trends in Fluidized Catalytic Cracking*** *Reformulated Fuels • Residual Fluidized Catalytic Cracking (RFCC)*
0930 – 0945	*Break*
0945 – 1100	***Emerging Trends in Fluidized Catalytic Cracking (cont'd)*** *Reducing FCC Emissions • Emerging Developments in Catalysts, Processes & Hardware*
1100 – 1230	***Basis of Design, Project Strategy & Organisation*** *Use & Expand on Site Survey/Questionnaire Produced by Contractor, Identify Why Information is Required • Address Key Questions Raised when Initiating a Project • Basis of Design • Review Insufficiency of Information and Discuss Alternatives such as Transferring Responsibility to ITB*
1230 – 1245	*Break*
1245 – 1420	***Basis of Design, Project Strategy & Organisation (cont'd)*** *Project Strategy & Organisation (Option for Implementing the Project) • Organisation & Personnel Required for Implementing ITB (Define Roles & Responsibilities) • Front End Package (Process) Scope • Licensor Selection*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Four*

Day 5

0730 – 0930	***ITB Development & Process Specification*** *Use & Expand on Information Contained within the Case Study & Gap Analysis Produced by Contractor and Identifying why Information is Required and Needs to be Defined • Address Key Questions for Developing an ITB, also Covering Elements that Form Part of Process Specification • Review Insufficiency of Information and Discuss Alternatives such as Transferring Responsibility to ITB • Prequalification and Selection Process of Contractors (Commercial) • Contracting Options (Commercial) • Method of Payment Pros and Cons*
0930 – 0945	*Break*
0945 – 1100	***ITB Development & Process Specification (cont'd)*** *Method of Financing Review Alternatives • Prequalification of Vendors and Contractors • Transparency in Bid Process • Bonus Incentives for Achieving Milestones • Penalty Clauses for Negative Performance • Risk Analysis and Management*
1100 – 1230	***Contract & Commercial*** *Review of ITB Package for the Project Driven by Requirements*
1230 – 1245	*Break*
1245– 1345	***Contract & Commercial (cont'd)*** *Review of Commercial Aspects Determined so that a Coherent Strategy for Issuing Bids, eg. Financing Methods, Prequalification of Contractors, Payment, Best Value etc.*
1345 – 1400	***Course Conclusion***
1400 – 1415	***POST-TEST***
1415 – 1430	*Presentation of Course Certificates*
1430	*Lunch & End of Course*

Practical Sessions

This hands-on, highly-interactive course includes real-life case studies and exercises:-

Course Coordinator

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