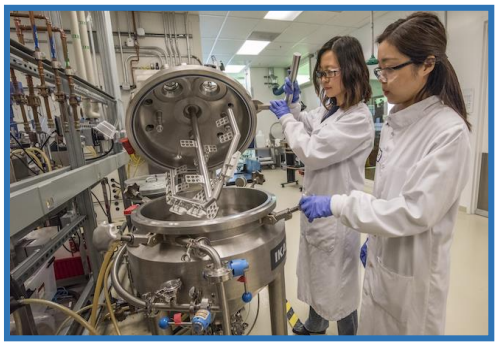
COURSE OVERVIEW PE0055-4D
Process Reactors
Operation, Troubleshooting, Start-Up & Shutdown

Course Title
Process Reactors: Operation, Troubleshooting, Start-Up & Shutdown



Course Date/Venue
Session 1: September 02-05, 2024/Club B Meeting Room, Ramada Plaza by Wyndham Istanbul City Center, Istanbul, Turkey
Session 2: December 09-12, 2024/Boardroom 1, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE

Course Reference
PE0055-4D

Course Duration/Credits
Four days/2.4 CEUs/24 PDHs

2.4 CEUs (24 PDHs) AWARD

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.

This course is designed to provide participants with a detailed and up-to-date overview of Chemical Reactors Design, Operation & Control. It covers the role and importance of chemical reactors in industry; the types of reactors and basic reactor design equations; the thermodynamics and kinetics in reactor design, heat and mass transfer in reactors and reactor sizing and scale-up principles; the types of catalysts and their impact on reactor design; the non-ideal flow patterns in reactors, multiphase reactor design and reactor modeling and simulation; the optimization techniques in reactor design; the safety considerations in reactor design; the startup and shutdown procedures and best practices monitoring; and the proper monitoring and control of reactor conditions.

During this interactive course, participants will learn to troubleshoot the common operational issues; the reactor maintenance and reliability, quality control in reactor operations and environmental and regulatory compliance; the reactor control systems, reactor control strategies, reactor safety and emergency control systems; the process optimization and efficiency by maximizing output while minimizing waste and energy use; integrating reactors with plant operations; the emerging technologies in reactor design; the green chemistry and sustainable reactor design; and the digitalization and smart reactors, future challenges and opportunities in reactor technology.

Course Objectives

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

- Apply and gain an in-depth knowledge on chemical reactors design, operation and control
- Discuss the role and importance of chemical reactors in industry and identify the types of reactors and basic reactor design equations
- Describe thermodynamics and kinetics in reactor design, heat and mass transfer in reactors and reactor sizing and scale-up principles
- Recognize the types of catalysts and their impact on reactor design
- Illustrate non-ideal flow patterns in reactors, multiphase reactor design and reactor modeling and simulation
- Carryout optimization techniques in reactor design as well as safety considerations in reactor design
- Apply startup and shutdown procedures and best practices including proper monitoring and control of reactor conditions
- Troubleshoot common operational issues and implement reactor maintenance and reliability, quality control in reactor operations and environmental and regulatory compliance
- Recognize reactor control systems, reactor control strategies, reactor safety and emergency control systems
- Implement process optimization and efficiency by maximizing output while minimizing waste and energy use
- Integrate reactors with plant operations and discuss emerging technologies in reactor design
- Discuss green chemistry and sustainable reactor design, digitalization and smart reactors, future challenges and opportunities in reactor technology

Who Should Attend

This course provides a complete and up-to-date overview of chemical reactors design, operation and control for process engineers, production engineers, section heads, shift supervisors and other operational staff.

Course Fee

Istanbul	**US$ 5,000** per Delegate + **VAT**. This rate includes Participants Pack (Folder, Manual, Hand-outs, etc.), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.
Dubai	**US$ 4,500** 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:-

- 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 **2.4 CEUs** (Continuing Education Units) or **24 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. Henry Beer is a **Senior Process Engineer** with over **35 years** of indepth industrial experience within the **Petrochemical**, **Oil & Gas** industries specializing in **Hydrocarbon Process** Equipment, **DOX Unit** Operation & Troubleshooting, **Polyethylene & Polypropylene** Processing, **Oil Movement** Storage & Troubleshooting, **Power Plant Chemistry**, **Fuel Quality** Monitoring System Fundamentals, **Liquid Bulk Cargo Handling**, **Oil Refinery Cost Management**, **Flare & Blowdown** Operation, **Pressure Relief Systems** Maintenance & Troubleshooting, Refinery **SRU**, **Tail Gas** Treating, **Sour Water & Amine Recovery** Units, **Propylene** Compressor and Turbine, **Clean Fuel** Technology & Standards, Principles of **Operations Planning**, **Heat Exchangers & Fired Heaters** Operation & Troubleshooting, **Plastic Extrusion Technology** Operation & Troubleshooting, **Chemical Engineering** for Non-Chemical Engineers, **Process Plant** Troubleshooting, **Process Plant Optimization** Technology, **Engineering Problem Solving**, **Process Plant** Performance & Efficiency, **Process Plant** Start-up & Shutdown, **Process Plant** Commissioning, **Process Plant** Turn-around & Shutdown, **Pumps & Compressors** Troubleshooting, **Fired Heaters & Air Coolers** Maintenance, **Pressure Vessels & Valves** Repair, **Polymers**, **Plastics**, **Polyolefin** & **Catalysts**, **Polymerization**, **Thermal Analysis Techniques**, **Rheology**, **Thermoplastics**, **Thermosets**, **Coating Systems** and **Fibre Reinforced Polymer Matrix Composites**. Further, he is also well-versed in **Water Hydraulic Modelling**, **Efficient** Shutdowns, Turnaround & Outages, **Pump** Selection and Installation, Operation and Maintenance of **Pumps**, **Demand & Supply** Management, **Catalyst Manufacturing Techniques**, **Fuel Systems Management**, **Aviation Fuel**, **Diesel**, **Jet Fuel**, **Petrol** and **IP Octane**, **Cetane Control** and related Logistics, Road, Rail and Pipeline Distribution, **Process Design** and **Optimisation**, **Boiler Feed Water Preparation**, **Flocculation Sedimentation**, **Hot Lime Water Softening Processes**, **Desalination Processes**, **Reverse Osmosis**, **Molecular Sieves**, activated **Sludge Aerobic/Anaerobic**, **Sludge Removal** and **Incineration Process Control**, **Domestic Sewage Plants Optimisation**, **Process Cooling Water System**, **High Pressure** and **Low Pressure Tank Farm Management**, **Hydrocarbon** and **Chemical products** and **GTL** (**Gas to Liquids**).

During his career life, Mr. Beer holds significant key positions such as the **Director**, **Global Commissioning Manager**, **Process Engineering Manager**, **Senior Business Analyst**, **Process Engineer**, **Chemical Engineer**, **Senior Technician**, **Technical Sales Engineer**, **Entrepreneur**, **Financial Consultant**, **Business Analyst**, **Business Financial Planner** and **Independent Financial Planner** to various international companies such as the **Sasol**, **SASOLChem**, **TAG Solvents**, **Virgin Solvent Products**, **SARS** & **SAPIA** (**South African Petroleum Industry Association**) and **RFS Financial Services** (**Pty**) **Ltd**.

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 Program

The following program is planned for this course. However, the course instructor(s) may modify this program before or during the workshop 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	***Introduction to Chemical Reactors in Industry**: Overview of their Role & Importance*
0930 – 0945	*Break*
0945 – 1015	***Types of Reactors**: Batch, Continuous, PFR, CSTR, etc.*
1015 – 1045	***Basic Reactor Design Equations**: Understanding Material & Energy Balances*
1045 – 1045	***Thermodynamics & Kinetics in Reactor Design**: Fundamentals & their Application*
1045 - 1215	***Heat & Mass Transfer in Reactors**: Principles & Considerations in Design*
1215 – 1230	*Break*
1230 – 1330	***Reactor Sizing & Scale-Up Principles**: Techniques & Challenges in Scaling Up Reactors*
1330 – 1420	***Catalysis in Chemical Reactors**: Types of Catalysts & their Impact on Reactor Design*
1420 – 1430	***Recap***
1430	*Lunch & End of Day One*

Day 2

0730 – 0830	***Non-Ideal Flow Patterns in Reactors**: Deviations from Ideal Behavior & their Implications*
0830 – 0930	***Multiphase Reactor Design**: Designing for Liquid-Liquid, Gas-Liquid & Solid-Liquid Systems*
0930 – 0945	*Break*
0945 – 1030	***Reactor Modeling & Simulation**: Tools & Techniques for Reactor Design Simulation*
1030 – 1130	***Optimization Techniques in Reactor Design**: Approaches to Optimize Reactor Performance*
1130 - 1215	***Safety Considerations in Reactor Design**: Recognizing & Mitigating Potential Hazards*

1215 – 1230	*Break*
1230 – 1300	***Startup & Shutdown Procedures**: Best Practices for Starting & Stopping Reactors Safely*
1300 – 1330	***Monitoring & Control of Reactor Conditions**: Temperature, Pressure & Flow Controls*
130 - 1420	***Troubleshooting Common Operational Issues**: Identifying & Addressing Operational Problems*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Two*

Day 3

0730 – 0830	***Reactor Maintenance & Reliability**: Ensuring Ongoing Operational Efficiency*
0830 – 0930	***Quality Control in Reactor Operations**: Ensuring Product Quality & Consistency*
0930 – 0945	*Break*
0945 – 1030	***Environmental & Regulatory Compliance**: Adhering to Environmental Regulations & Standards*
1030 – 1130	***Reactor Control Systems**: Introduction to Control Theory & Applications*
1130 - 1215	***Reactor Control Strategies**: PID Control, Cascade Control, Feedforward Control*
1215 – 1230	*Break*
1230 – 1330	***Reactor Safety & Emergency Control Systems**: Implementing Safety Interlocks & Alarms*
1330 – 1420	***Process Optimization & Efficiency**: Maximizing Output While Minimizing Waste & Energy Use*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Three*

Day 4

0730 – 0830	***Integration of Reactors with Plant Operations**: Ensuring Smooth Operation within the Larger System*
0830 – 0930	***Case Studies of Reactor Control Challenges**: Real-World Examples & Solutions*
0930 – 0945	*Break*
0945 – 1030	***Emerging Technologies in Reactor Design**: Latest Advancements in Reactor Technology*
1030 – 1130	***Green Chemistry & Sustainable Reactor Design**: Eco-Friendly Approaches in Chemical Processing*
1130 - 1215	***Digitalization & Smart Reactors**: The Role of IoT, AI & Big Data in Reactor Operations*
1215 – 1230	*Break*
1230 – 1300	***Future Challenges & Opportunities in Reactor Technology**: Predicting Future Industry Needs*
1300 - 1345	***Interactive Workshop**: Problem-Solving & Design Exercises Based on Real Scenarios*
1345 – 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

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