# COURSE OVERVIEW PE0274-4D
# Process Design & Engineering including Piping Control Loops and Heat Exchangers

**Course Title**

Process Design & Engineering including Piping Control Loops and Heat Exchangers


**Course Date/Venue**

February 12-15, 2024/The Al Noor Al Ain 2 Meeting room, The H Hotel, Dubai, UAE


**Course Reference**

PE0274-4D

**Course Duration/Credits**

Four days/2.4 CEUs/24 PDHs

**Course Description**

***This practical and highly-interactive course includes various practical sessions and exercises. Theory learnt will be applied using our state-of-the-art simulators.***

This course is designed to provide participants with a detailed and up-to-date overview of Process Design and Engineering including Piping Control Loops and Heat Exchangers. It covers the safety features in process design and piping and instrumentation diagrams (P&ID); the basic principles of process control and regulatory and safety standards; the role of piping in process plants and the criteria for selecting piping materials based on process requirements; the piping layout and design considerations and piping stress analysis; the piping standards and codes and the principles of control loop design; and the types of control loops in process engineering.

During this interactive course, participants will learn the selection and sizing of control valves; the instrumentation and control elements; the sensors, transmitters, controllers and actuators; the techniques and best practices of control loop tuning; the types, thermodynamic principles and design considerations of heat exchangers; the heat exchanger performance and optimization; the standards and codes for heat exchanger design; planning, executing and monitoring design projects; and integrating environmental considerations into process design.

## Course Objectives

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

- Apply and gain an in-depth knowledge on process design and engineering including piping control loops and heat exchangers
- Identify and integrate safety features in process design as well as read and interpret piping and instrumentation diagrams (P&ID)
- Discuss the basic principles of process control and regulatory and safety standards covering the OSHA, ANSI, etc.
- Discuss the role of piping in process plants and the criteria for selecting piping materials based on process requirements
- Illustrate piping layout and design considerations and piping stress analysis
- Discuss piping standards and codes and the principles of control loop design
- Identify the types of control loops in process engineering covering PID control, cascade control and others
- Recognize the key factors and considerations of selection and sizing of control valves and the instrumentation and control elements comprising of sensors, transmitters, controllers and actuators
- Implement techniques and best practices of control loop tuning and optimization and identify the types of heat exchangers covering of shell and tube, plate, finned tube, etc.
- Discuss the thermodynamic principles and design considerations of heat exchangers
- Maintain heat exchanger performance and optimization and discuss the standards and codes for heat exchanger design
- Explain the importance of normatives in process design and incorporate industry best practices for efficiency and safety
- Plan, execute and monitor design projects and integrate environmental considerations into process design

## 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 process design and engineering including piping control loops and heat exchangers for project managers, chemical engineers, process engineers, mechanical engineers, instrumentation and control engineers, consulting engineers, professionals in the oil and gas industry, plant operators and technicians.

## 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 Fee

**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

**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. Kyle Bester** is a **Senior Mechanical & Process Engineer** with extensive years of practical experience within the **Oil & Gas**, **Power & Water Utilities** and other **Energy** sectors. His expertise includes **Bearing & Bearing Failure** Analysis, **Centrifugal**, **Reciprocating** & **Screw** Compressor, **Gas Turbine** Repair, **Pump Installation & Operation**, **Compressors & Turbines** Troubleshooting, Coupling, Gear Boxes, Bearings & Lubrication, Mechanical Seals, Bearings & Seals, **Pressure Vessel** Design & Analysis, **Steam & Gas Turbine**, **High Pressure Boiler** Operation, **Compressors** Operation & Maintenance, **Pipe** Maintenance & Repair, **Centrifugal & Positive Displacement Pump**, **Rotating Machinery**, **PD Compressor & Gas Engine** Operation & Troubleshooting, **Hydraulic Tools & Fitting**, **Mass & Material Balance**, **Water Distribution & Pump Station**, **Tank Farm & Tank Terminal**, **Process Piping** Design, **Stack & Noise** Monitoring, **HVAC & Refrigeration** Systems, **Condition Monitoring** System, **Maintenance Planning & Scheduling**, **Maintenance Shutdown & Turnaround**, **Maintenance Audit** Best Practices, **Maintenance & Reliability** Management, Reliability, Availability & Maintainability (**RAM**), **Root Cause** Analysis, **Reliability-Centered Maintenance** (**RCM**), **Reliability Engineering Analysis** (**RE**), **Root Cause Analysis** (**RCA**), **Asset Integrity Management** (**AIM**), **Reactive & Proactive** Maintenance, **Mechanical & Rotating Equipment** Troubleshooting & Maintenance, **Maintenance Management & Cost Control**, **Operation of the Hydrocarbon** Process Equipment, **Fired Heaters**, **Air Coolers**, **Heat Exchangers**, **Crude Desalter**, **Pressure Vessels & Valves**, **Flare**, **Blowdown & Pressure Relief Systems** Operation, **Separation Techniques**, **Bulk Liquid Storage** Management & **Tanks Cleaning**, **Ammonia Manufacturing** & Process Troubleshooting, Process Equipment **Design**, Process Reactors and **Chemical** Engineering. Further, he is also well-versed in **Water Reservoir**, **Water Tanks**, **Water Pumping** Station, **Water Distribution** System, **Water Network** System, **Water Pipes & Fittings**, **Water Hydraulic** Modelling, **Water Storage Reservoir**, **Reservoirs & Pumping** Stations Design & Operation, **Pumping** Systems, Interconnecting **Pipelines**, **Water Network Hydraulic** Simulation Modelling, **Water Supply** Design, **Water Balance Modelling**, **Water Distribution Network**, **Water Network** System Analysis, **Water Forecasts** Demand, **Water Pipelines** Materials & Fittings, **Water Network** System Design, Pump Houses & Booster Pumping Stations, **Potable Water Transmission**, **Water Distribution Network**, Districts Meters Areas (DMAs), **Water Supply & Desalination Plants** Rehabilitation, **Water Reservoirs & Pumping Stations**, **Water Network System** Extension, Water Network System Replacement & Upgrade, **Water Networks** Optimization, **Water Supply & Distribution** Systems Efficiency & Effectiveness, **Pipe** Materials & Fittings, **Service Reservoir** Design & Operation, **Pipes & Fittings**, **Water Network** System Design & Operation, **Supply Water Network** Rehabilitation, **Water Loss** Reduction, **Main Water** System Construction, **Main Water Line** Construction, Transmission & Distribution **Pipelines**, **Water Distribution** Design & Modelling, **Water Supply** System, Oilfield **Water Treatment**, Best Practice in **Sewage** & Industrial **Wastewater Treatment** & Environmental Protection, **Water Distribution** Design & Modelling, **Desilting**, Treating & Handling Oily **Water**, **Water Chemistry** for **Power Plant**, **Water** Sector Orientation, Environmental Impact Assessment (**EIA**). He is currently the **Part Owner & Manager** of Extreme Water SA wherein he manages, re-designed and commissioned a water and wastewater treatment plants.

During his career life, Mr. Bester has gained his practical and field experience through his various significant positions and dedication as the **Project Manager**, **Asset Manager**, **Water Engineer**, **Maintenance Engineer**, **Mechanical Engineer**, **Process Engineer**, **Supervisor**, **Team Leader**, **Analyst**, **Process Technician**, **Landscape Designer** and **Senior Instructor/Trainer** for various international companies, infrastructures, water and wastewater treatment plants from New Zealand, UK, Samoa, Zimbabwe and South Africa, just to name a few.

Mr. Bester holds a **Diploma** in **Wastewater Treatment** and a **National Certificate** in **Wastewater & Water Treatment**. Further, he is a **Certified Instructor/Trainer**, an **Approved Chemical Handler** and has delivered numerous courses, trainings, conferences, seminars and workshops 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 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:*** ***Monday, 12th of February 2024***

| | |
|---|---|
| *0730 – 0800* | *Registration & Coffee* |
| *0800 – 0815* | *Welcome & Introduction* |
| *0815 – 0830* | ***PRE-TEST*** |
| *0830 – 0900* | ***Fundamentals of Process Design**: The Basics of Process Engineering & Design* |
| *0900 - 0930* | ***Safety Elements in Process Design**: Identifying & Integrating Safety Features in Process Design* |
| *0930 – 0945* | *Break* |
| *0945 – 1030* | ***Piping & Instrumentation Diagrams (P&ID)**: Reading & Interpreting P & IDs* |
| *1030 – 1130* | ***Basic Principles of Process Control**: Overview of Control Systems in Process Engineering* |
| *1130 – 1215* | ***Regulatory & Safety Standards**: Understanding OSHA, ANSI & other Relevant Standards* |
| *1215 – 1230* | *Break* |
| *1230 – 1300* | ***Case Studies of Safety & Control Failures**: Lessons Learned from Past Industrial Accidents* |
| *1300 – 1330* | ***Piping Design Fundamentals**: Understanding the Role of Piping in Process Plants* |
| *1330 - 1420* | ***Materials of Construction for Piping**: Criteria for Selecting Piping Materials Based on Process Requirements* |
| *1420 – 1430* | ***Recap*** |
| *1430* | *Lunch & End of Day One* |

***Day 2:*** ***Tuesday, 13th of February 2024***

| | |
|---|---|
| *0730 – 0830* | ***Piping Layout & Design Considerations**: Planning for Efficiency & Safety* |
| *0830 – 0930* | ***Piping Stress Analysis**: Basics & Importance in Design* |
| *0930 – 0945* | *Break* |
| *0945 – 1100* | ***Piping Standards & Codes**: ASME, API & others* |

| | |
|---|---|
| 1100 - 1215 | ***Principles of Control Loop Design**: Understanding Feedback & Feedforward Control Loops* |
| 1215 – 1230 | *Break* |
| 1230 – 1330 | ***Types of Control Loops in Process Engineering**: PID Control, Cascade Control & others* |
| 1330 – 1420 | ***Selection & Sizing of Control Valves**: Key Factors & Considerations* |
| 1420 – 1430 | ***Recap*** |
| 1430 | *Lunch & End of Day Two* |

***Day 3: Wednesday, 14th of February 2024***

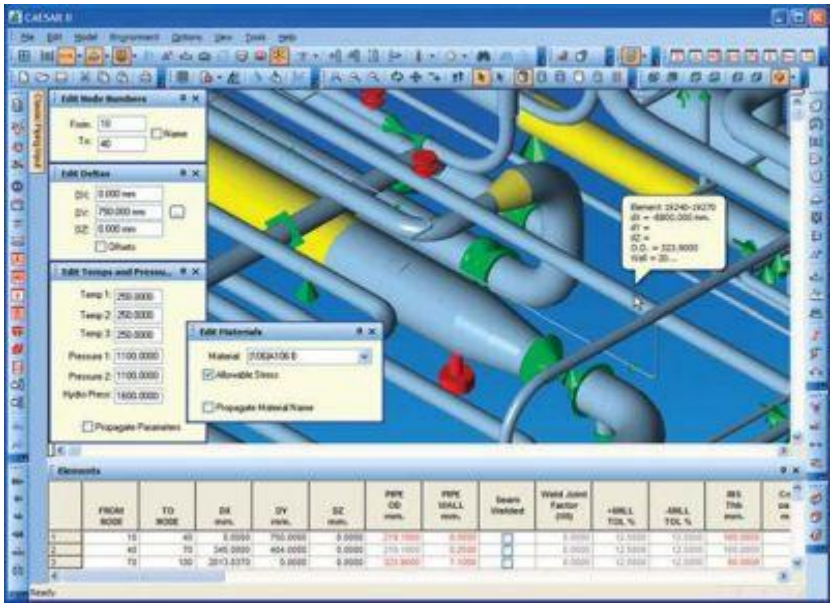
| | |
|---|---|
| 0730 – 0830 | ***Instrumentation & Control Elements**: Sensors, Transmitters, Controllers & Actuators* |
| 0830 – 0930 | ***Control Loop Tuning & Optimization**: Techniques & Best Practices* |
| 0930 – 0945 | *Break* |
| 0945 – 1100 | ***Hands-On Simulation**: Design & Implementation of a Basic Control Loop* |
| 1100 – 1130 | ***Types of Heat Exchangers**: Shell & Tube, Plate, Finned Tube, etc.* |
| 1130 - 1215 | ***Thermodynamic Principles of Heat Exchangers**: Understanding Heat Transfer Mechanisms* |
| 1215 – 1230 | *Break* |
| 1230 – 1330 | ***Design Considerations for Heat Exchangers**: Material Selection, Sizing & Configuration* |
| 1330 – 1420 | ***Heat Exchanger Performance & Optimization**: Efficiency, Fouling & Maintenance* |
| 1420 – 1430 | ***Recap*** |
| 1430 | *Lunch & End of Day Three* |

***Day 4: Thursday, 15th of February 2024***

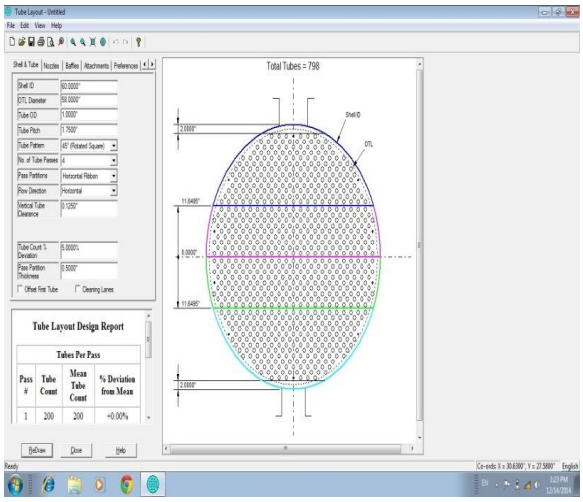
| | |
|---|---|
| 0730 – 0830 | ***Standards & Codes for Heat Exchanger Design**: TEMA, ASME, etc.* |
| 0830 – 0930 | ***Case Study Analysis**: Reviewing Real-World Examples of Heat Exchanger Design & Challenges* |
| 0930 – 0945 | *Break* |
| 0945 – 1100 | ***Overview of Design Normatives**: Understanding the Importance of Normatives in Process Design* |
| 1100 – 1130 | ***Best Practices in Process Design & Engineering**: Incorporating Industry Best Practices for Efficiency & Safety* |
| 1130 - 1230 | ***Project Management in Process Design**: Planning, Execution & Monitoring of Design Projects* |
| 1230 – 1245 | *Break* |
| 1245 – 1315 | ***Sustainability & Eco-Friendly Design**: Integrating Environmental Considerations into Process Design* |
| 1315 – 1330 | ***Advanced Simulation & Modeling Tools**: Utilizing Software for Design & Analysis* |
| 1330 - 1345 | ***Final Project & Presentation**: Participants Develop & Present a Process Design Incorporating Learned Concepts* |
| 1345 – 1400 | ***Course Conclusion***<br>*Using this Course Overview, the Instructor(s) will Brief Participants about t Topics that were Covered During the Course* |
| 1400 – 1415 | ***POST-TEST*** |
| 1415 – 1430 | *Presentation of Course Certificates* |
| 1430 | *Lunch & End of Course* |

## Simulator (Hands-on Practical Sessions)

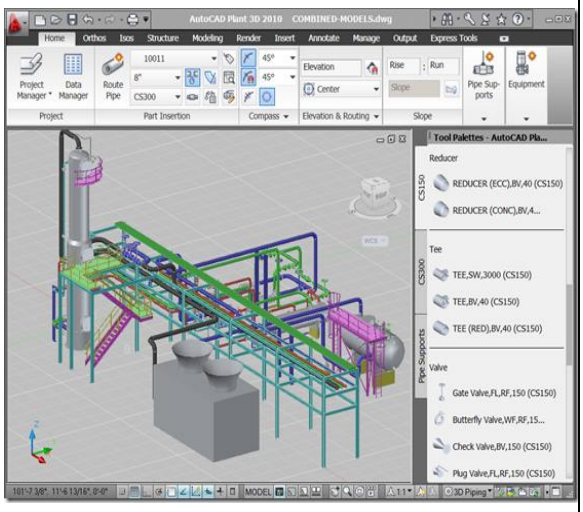
Practical sessions will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using our state-of-the-art simulators "CAESAR II Software", "Heat Exchanger Tube Layout Simulator" and "Autocad Piping Software"



**CAESAR II Software**




**Heat Exchanger Tube Layout Simulator**



**Autocad Piping Software**

## Course Coordinator

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