# COURSE OVERVIEW PE0114-4D
# Process Plant Troubleshooting & Engineering Problem Solving

**Course Title**
Process Plant Troubleshooting & Engineering Problem Solving

**Course Reference**
PE0114-4D

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

**Course Date/Venue**

| Session(s) | Date | Venue |
|---|---|---|
| 1 | February 05-08, 2024 | Club B Meeting Room, Ramada Plaza by Wyndham Istanbul City Center, Istanbul, Turkey |
| 2 | May 06-09, 2024 | Fujairah Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE |
| 3 | August 12-15, 2024 | Boardroom 1, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE |
| 4 | November 18-21, 2024 | Al Aziziya Hall, The Proud Hotel Al Khobar, Al Khobar, KSA |

**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.***

Modern industrial processes are large, complex and have a high degree of interaction between both dependent and independent variables. This makes problem solving difficult and leads to the "disappearing problem" syndrome. Problems often disappear without being solved only to reappear again. This course deals with a unique approach of combining cause and effect problem solving thinking with formulation of theoretically correct working hypotheses to provide rapid and effective problem-solving techniques for the process industry.

Problem Solving in the process industry is often characterized by either inference based on cause-and-effect relationships or highly involved theoretical approaches. Neither of these approaches is satisfactory in a modern manufacturing environment. The cause/effect inference approach while being expedient often results in solutions that do not eliminate the problem, but in fact make the problem worse. The more sophisticated highly theoretical approach is rarely expedient enough to satisfy time constraints in a production facility. Thus, one of the most frequent industry requests to the academic world is "give us people that can solve problems".

This course presents an approach that emphasizes the classical problem-solving approach (defining the sequence of events) with the addition of the steps of formulating a theoretically correct working hypothesis, providing a means to test the hypothesis, and providing a foolproof means to eliminate the problem. The initial part of the course focuses on defining the problem that must be solved and obtaining the location, time and quantity-based specifications of the problem. The initial part of the course is suitable for all engineering disciplines as well as non-engineers.

The second part of the course deals with the utilization of chemical engineering fundamentals to develop a technically correct working hypothesis that is the key to successful problem solving. The primary emphasis is on pragmatic calculation techniques that are theoretically correct. These techniques have been developed by the course Instructor in 30+ years of industrial experience. Using these techniques, theoretically correct working hypotheses can be developed in an expedient fashion.

The course includes both sample problems as well as problem working sessions to allow the participants to develop confidence with the approach.

The attendees are encouraged to bring real problems that they are working to use in discussions on the last day of the course. These problems should be of a non-confidential nature that can be discussed without violation of any confidentiality restrictions.

## Course Objectives

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

- Apply and gain an in-depth knowledge on process plant troubleshooting and engineering problem solving
- Enumerate the components of plant problem solving as well as the various troubleshooting techniques on engineering problem solving by familiarizing the potential sources
- Specify the limitations to plant problem solving through sources of historical data and explain the daily monitoring system guidelines by setting trigger points
- Apply the methods of risk analysis particularly HAZOP and MSDS in process plant troubleshooting and practice the process of engineering problem solving through sample problems in troubleshooting
- Discuss the scope of applied economics including other valuation forms & methods, and review the guidelines for problem solving temperature, pressure, and level
- Employ the simplified approach in solving compressor problems, distillation, plates & tray stability, discuss clearly the elements of measurements & verifications and carryout sample exercise on kinetics, flow, mechanical and designs
- Recognize the attributes of equivalent piping lengths, commercial correlations and fluids by means of practical exercises
- Discuss the importance of two-phase flow including its attributes and applications and analyze the characteristics of controllers, feedback, feedforward and cascade controls used in process control
- Recognize process control and optimization, process analyzers, distillation multiple control, volume control, condenser control and control project drawback

- Employ heat transfer and various troubleshooting techniques and applications used in process plant
- Implement the procedures on distillation column packing and identify the different forms of hazards to equip them with the QRA procedures and demonstration
- Carryout proper methodology of MSDS and discuss if the needed information is good enough or incomplete

## Who Should Attend

This course provides a complete and up-to-date overview of the process plant troubleshooting techniques and procedures used to solve engineering problems. Process engineers, plant managers, team leaders, section heads, plant supervisors and other technical staff will definitely benefit from the engineering problem solving approach of the course.

## 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

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| 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. |
| Abu Dhabi | **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. |
| 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. |
| Al Khobar | **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. Adel Abdallah** is a **Senior Process & Chemical Engineer** with over **20 years** of extensive experience within the **Petrochemical**, **Refinery** and **Oil & Gas** industries. His expertise covers **Fundamentals of Process Operations**, **Crude Oil & Refinery Products**, **Sampling & Feed/Product Quality**, **Process Troubleshooting & Problem Solving**, **Hydro-Treating Technology**, **Catalysts**, **Distillation Column**, **Process Heaters/Furnaces**, **Reboilers**, **Condensers**, **Piping System** and **P&ID**. He is also well-versed in **Positive Displacement & Centrifugal Pumps**, **Compressors**, **Turbines**, **Fans**, **Blowers**, **Electric Motors**, **Gears & Transmission Equipment**, **Heat Exchangers**, **Valves**, **Packing & Mechanical Seal**, **Bearing**, **Couplings**, **Alignment**, **Water & Wastewater Treatment**, **Steam Boiler**, **Air Compressors** and ISO system.

During Mr. Abdallah's career life, he has handled challenging positions wherein he has acquired his wide technical and practical experience in the field of process & chemical industry such as the **Technical Instructor/Consultant**, **Senior Chemical Engineer**, **Chemical Engineer**, **Process Engineer**, **Technical Engineer** and **Production Supervisor** for various companies such as the **Jordan Petroleum Refinery**, **Jordanian Tunisian Chemicals Co.**, Al-Mas Resin Factory, **Tabuk Chemical Fertilizer Factory**, **UIP-FCEC JV Design and Build Company**, **Degussa MBT** and **National Chlorine Company** in the Middle East.

Mr. Abdallah has a **Bachelor's** degree in **Chemical Engineering** from the **University of Jordan**. Further, he is a **Certified Instructor/Trainer** and delivered various trainings internally in his previous companies.

## 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***

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| *0730 – 0800* | *Registration & Coffee* |
| *0800 – 0815* | *Welcome & Introduction* |
| *0815 – 0830* | ***PRE-TEST*** |
| *0830 – 0845* | ***Troubleshooting*** |
| *0845 – 0900* | ***Definition, Potential Sources*** |
| *0900 – 0915* | ***Engineering Problem Solving*** |
| *0915 – 0930* | ***Course Approach*** |
| *0930 – 0945* | *Break* |
| *0945 – 1015* | ***Components of Plant Problem Solving*** |
| *1015 – 1045* | ***Limitations to Plant Problem Solving*** |
| *1045 – 1115* | ***Sources of Historical Data*** |
| *1115 – 1145* | ***Daily Monitoring System Guidelines*** |
| *1145 – 1215* | ***Setting Trigger Points*** |

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| 1215 – 1230 | Break |
| 1230 – 1300 | **Disciplined Learned Problem-Solving Approach** |
| 1300 – 1330 | **Step 1 to Step 6 – Considerations** |
| 1330 – 1400 | **Risk Analysis – HAZOP – MSDS** |
| 1400 – 1420 | **Troubleshooting Manual: Sample Problems** |
| 1420 – 1430 | **Recap** |
| 1430 | Lunch & End of Day One |

**Day 2**

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|---|---|
| 0730 – 0800 | **Applied Economics** |
| 0800 – 0815 | **Valuation Principles & Methods** |
| 0815 – 0900 | **Other Valuation Principle & Methods** |
| 0900 – 0930 | **Compressor – Compressor Problems – Simplified Approach** |
| 0930 – 0945 | Break |
| 0945 - 1015 | **Distillation, Plates, Tray Stability** |
| 1015 - 1045 | **Guidelines for Problem Solving Temperature, Pressure, Level** |
| 1045 - 1115 | **Measurements, Verification** |
| 1115 - 1200 | **Sample Exercise Kinetics, Flow, Mechanical, Design** |
| 1200 - 1230 | **Fluid Overview – Basic Principles** |
| 1230 – 1245 | Break |
| 1245 - 1315 | **Fluid Overview – Head Definition** |
| 1315 - 1345 | **Equivalent Piping Lengths** |
| 1345 - 1420 | **Commercial Correlations** |
| 1420 – 1430 | **Recap** |
| 1430 | Lunch & End of Day Two |

**Day 3**

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| 0730 – 0800 | **Practical Exercises** |
| 0800 – 0815 | **Two Phase Flow/Theory & Applications** |
| 0815 – 0900 | **Practical Exercises** |
| 0900 – 0930 | **Process Control – Introduction; PID** |
| 0930 – 0945 | Break |
| 0945 - 1015 | **Controllers, Feedback, Feedforward & Cascade Controls** |
| 1015 - 1045 | **Advanced Control; Multi-loop** |
| 1045 - 1115 | **Controllers; Process Control & Optimization** |
| 1115 - 1200 | **On Line Optimization; Process Analyzers** |
| 1200 - 1230 | **Distillation Multiple Control; Volume Control** |
| 1230 – 1245 | Break |
| 1245 - 1315 | **Condenser Control, Practical Considerations, Advanced** |
| 1315 - 1330 | **Control Project Drawback** |
| 1330 - 1400 | **Heat Transfer Overview** |
| 1400 - 1420 | **Troubleshooting Techniques/Applications** |
| 1420 – 1430 | **Recap** |
| 1430 | Lunch & End of Day Three |

**Day 4**

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| 0730 – 0800 | **Practical Exercises** |
| 0800 - 0830 | **Distillation Column Packing** |
| 0830 - 0900 | **Practical Exercises** |

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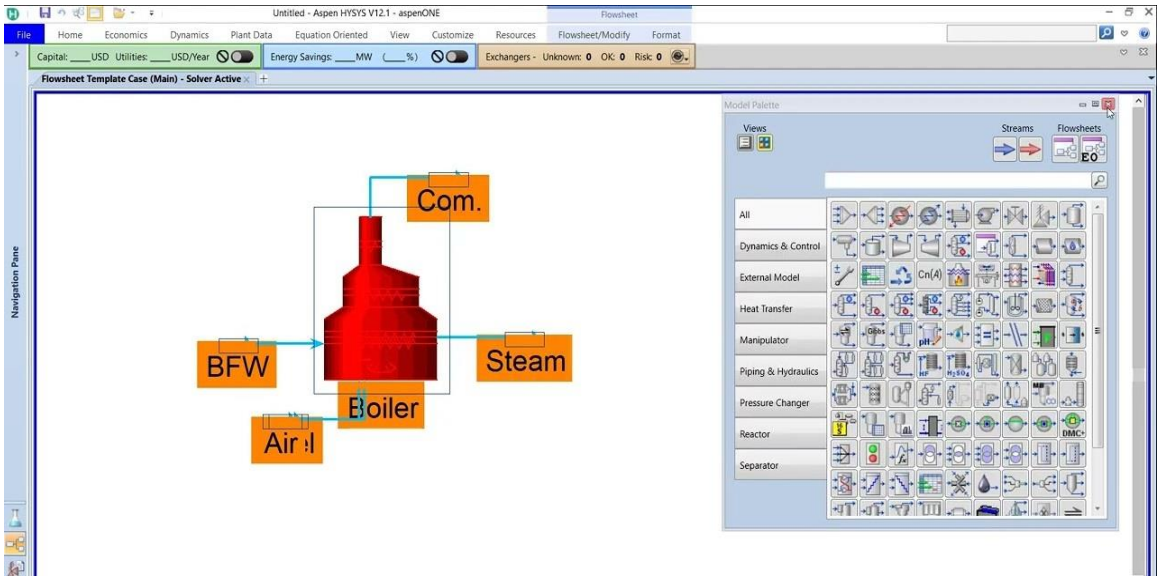
| *0900 - 0930* | ***Hazards*** |
| *0930 – 0945* | *Break* |
| *0945 – 1015* | ***Demonstration*** |
| *1015 - 1045* | ***QRA***<br>*"Ishikawa" Diagrams • Exercises* |
| *1045 - 1115* | ***MSDS*** |
| *1115 - 1145* | ***Needed Information, Is it Good Enough?*** |
| *1145 - 1215* | ***Incomplete?*** |
| *1215 - 1230* | *Break* |
| *1230 - 1245* | ***Accidents*** |
| *1245 - 1315* | ***FLIXBOROUGH ACCIDENT*** |
| *1315 - 1345* | ***Lessons Learned, General Information*** |
| *1345 – 1400* | ***Course Conclusion*** |
| *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 the "ASPEN HYSYS" simulator.




**ASPEN HYSYS V12.1 Simulator**

## Course Coordinator

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