

## COURSE OVERVIEW PE0230

### Process Plant Start-up, Commissioning & Troubleshooting

**Course Title**

Process Plant Start-up, Commissioning & Troubleshooting

**Course Reference**

PE0230

**Course Duration/Credits**

Five days/3.0 CEUs/30 PDHs



**Course Date/Venue**

Session(s)	Date	Venue
1	June 22-26, 2025	Boardroom 1, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE
2	July 20-24, 2025	Hampstead Meeting Room, London Marriott Hotel Regents Park, London, United Kingdom
3	August 24-28, 2025	Meeting Plus 9, City Centre Rotana, Doha Qatar
4	January 18-22, 2026	TBA Meeting Room, Four Seasons Hotels Cairo at Nile Plaza, Cairo, Egypt
5	February 08-12, 2025	Safir Meeting Room, Divan Istanbul, Turkey

**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.***



Plant modifications are an ongoing process throughout the life of any process plant. Reasons for modification include efforts to improve reliability, production capacity, quality, or productivity. Seamless incorporation is the key concern associated with the installation of any new equipment in an operating plant due to the high cost of process downtime. Several steps shall be taken to minimise the risk associated with the installation of new equipment such as hazard and operability studies, project management, development of redundancy plans, and commissioning of the new equipment.



Start-up and commissioning are essential activities in all process plant-modification projects and have significant implications for project success. Yet paradoxically they tend to be approached in an ad hoc manner. Commissioning is often included in project plans, so it is not that people are ignorant. However, there is usually a lack of systematic approaches to commissioning, so it is frequently left to tradespeople and plant operators to manage in whatever way they see fit. This is an undesirable situation since it results in unpredictable outcomes. In some cases it can even cause serious problems. Lack of experience in dealing with these problems has frequently resulted in prolonged and costly start-ups, caused by inadequate preparation for the events of start-up.

This course is designed to provide participants with an up-to-date overview of the start-up and commissioning of Process plants including troubleshooting of the start-up process. It includes the methodology for start-up and commissioning of process plants, which can be used when commissioning a new plant, or for modified equipment in an existing facility, or in a turnaround, shutdown or overhaul scenario. It takes the approach that commissioning is a series of checks and counter-checks to confirm every unit in the process plant is fit for purpose and suitable for operation.

During the course, each participant will gain enough skills to anticipate and avoid problems associated with start-up processes. Participants will gain a satisfactory understanding of the commissioning strategy, organizational issues, estimation of required resources, CPM planning, mechanical integrity, troubleshooting, start-up operations, technical inspection, instrumentation/control systems, HSE and other necessary knowledge associated with the process plant start-up and commissioning. Actual case studies from around the world will be demonstrated to highlight the topics discussed.

### **Course Objectives**

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

- Apply systematic techniques in process plant start-up, commissioning and troubleshooting
- Carryout planning and preparation as well as cost estimation
- Discuss health, safety and environment, process plant start-up management and develop process plant commissioning strategy
- Conduct mechanical integrity testing and pre-commissioning, technical inspection and dynamic hydraulic testing
- Explain construction completion and the importance of machinery commissioning
- Apply start-up operations, start-up progress monitoring and control as well as determine instrumentation and control systems in commissioning process
- Demonstrate performance trials, troubleshooting and problem solving
- Implement change management including operational techniques and post commissioning audit in process plants

### **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**.*

### **Accommodation**

Accommodation is not included in the course fees. However, any accommodation required can be arranged at the time of booking.

### **Who Should Attend**

This course provides a complete and up-to-date overview of the process plant start-up and commissioning for those involved in the start-up operations of a process plant. This includes process engineers, team leaders, project managers, refinery managers, plant managers, section heads, plant supervisors, process engineers, maintenance staff, technical staff and contractor personnel involved in project execution and plant start-up in process industry. Mechanical, electrical, instrumentation and control engineers who are involved in process plant start-up and commissioning will also benefit from this 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**

London	<b>US\$ 8,800</b> per Delegate + <b>VAT</b> . This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.
Dubai	<b>US\$ 5,500</b> per Delegate + <b>VAT</b> . This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.
Doha	<b>US\$ 6,000</b> per Delegate. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.
Istanbul	<b>US\$ 6,000</b> per Delegate + <b>VAT</b> . This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.
Cairo	<b>US\$ 5,500</b> per Delegate + <b>VAT</b> . This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

### **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:



**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.

### 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	Introduction & Welcome
0815 – 0830	<b>PRE-TEST</b>
0830 – 0930	<b>Introduction to Process Plant Commissioning</b> Terminology • Requirements • Project Details • Contracting Strategy • Organizational Structure & Responsibilities • Success Measures & Problem Avoidance
0930 – 0945	Break
0945 – 1230	<b>Planning &amp; Preparation</b> Project Planning, Critical Path (CPM/PERT) • Gantt Chart • Logic Diagrams • Planning Methods • Preparation of Checklists & Spare Parts Planning
1230 – 1245	Break
1245 – 1330	<b>Cost Estimation</b> Budget Components • Estimation Sheets • Resource Prediction • Extra Costs & Change Orders
1330 – 1420	<b>Cost Estimation (cont'd)</b> Spare Parts • Inventory • Material Ordering • MIS & Cost Control
1420 – 1430	<b>Recap</b>
1430	Lunch & End of Day One

#### **Day 2**

0730 – 0930	<b>Health, Safety &amp; Environment</b> Hazard & Operability Analysis (HAZOP) • Hazard Analysis (HAZAN) • Process Safety Management (PSM) • Root Cause Analysis & Why Trees • Risk Assessment
0930 – 0945	Break
0945 – 1230	<b>Health, Safety &amp; Environment (cont'd)</b> Hazard Identification • Safety Training • HSE Problems & contingency plans • Safety Procedures & Implementation • Safety Manual
1230 – 1245	Break
1245 – 1330	<b>Process Plant Start-Up Management</b> Responsibilities & Authorities • Organizational Structure • Manpower & Staffing • Coordination Procedures • Leadership
1330 – 1420	<b>Process Plant Commissioning Strategy</b> The Commissioning Team • Training • Commissioning Strategy • Start-Up Procedures & Logic
1420 – 1430	<b>Recap</b>
1430	Lunch & End of Day Two

#### **Day 3**

0730 – 0900	<b>Mechanical Integrity Testing &amp; Pre-commissioning</b> Hydraulic Testing • Flushing • Breaking-in Pumps • Drying Heaters
0900 – 0915	Break

0915 – 1100	<b>Technical Inspection &amp; Dynamic Hydraulic Testing</b> Vessel & Column Internals • Dynamic Loop Testing • Tightness Testing
1100 – 1230	<b>Construction Completion (The Beginning of Start-Up)</b> Construction Schedules vs. Start-Up Needs • Start-Up by Systems • Systems Definition • Punch Listing • Handover
1230 – 1245	Break
1245 – 1420	<b>Machinery Commissioning</b> Types of Process Equipment Plant Machinery • Preparation of Machines • Compressor Commissioning • Compressor Surge
1420 – 1430	<b>Recap</b>
1430	Lunch & End of Day Three

#### Day 4

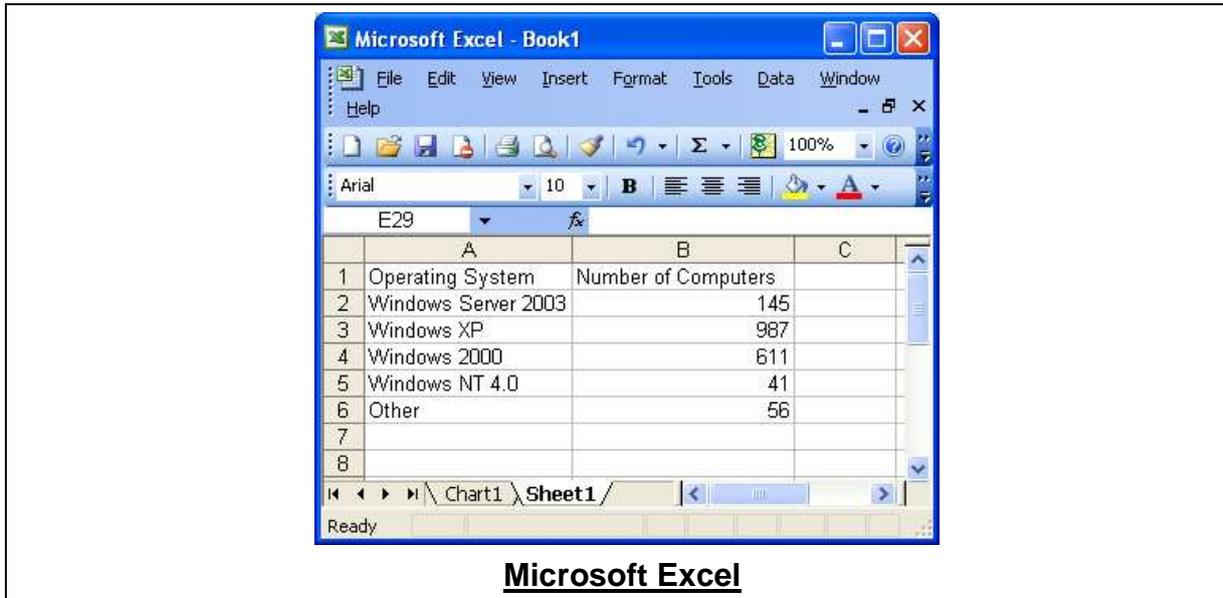
0730 – 0930	<b>Start-Up Operations</b> Isolation of Vessels & Pipes • Types of Isolation • Initial Start-Up Activities • Steaming • Fuel Gas or Nitrogen Purge • Feed-in
0930 – 0945	Break
0945 – 1100	<b>Start-Up Progress Monitoring &amp; Control</b> Planning for Success • Sequence by Units • Sequence by Systems • Recovery from False Starts
1100 – 1230	<b>Instrumentation &amp; Control Systems</b> Instrument Commissioning • Start-up Problems & Causes
1230 – 1245	Break
1245 – 1420	<b>Performance Trials</b> Performance & Acceptance Testing, Preliminary Tests • Performance Test Runs
1420 – 1430	<b>Recap</b>
1430	Lunch & End of Day Four

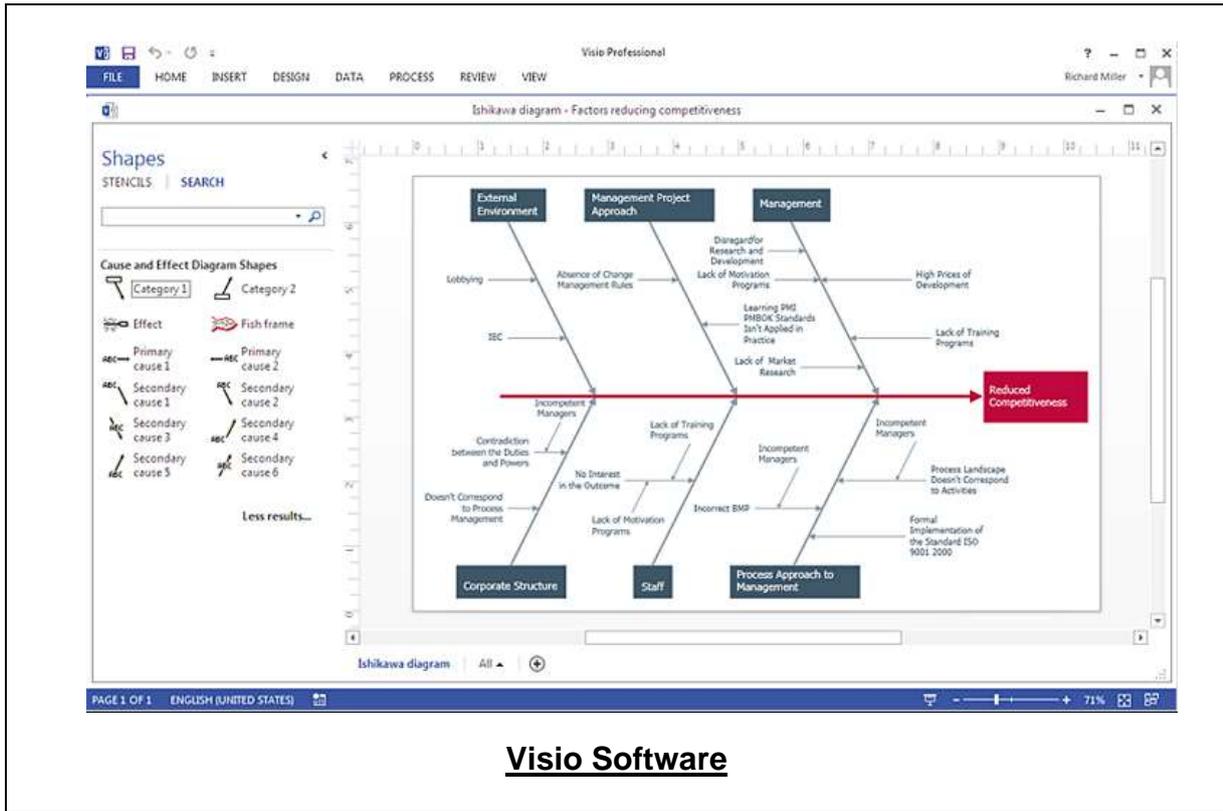
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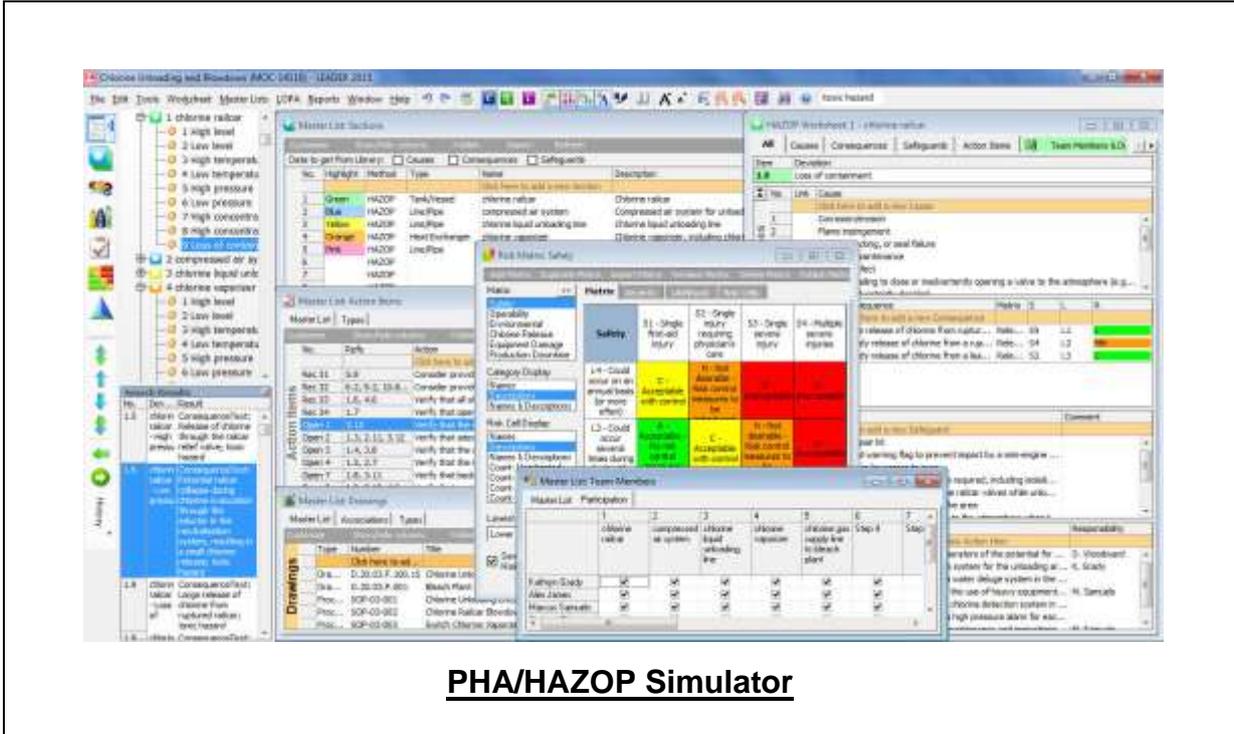
0730 – 0930	<b>Troubleshooting &amp; Problem Solving</b> Identification of Problems & Priorities • Resource Allocation & Teamwork • Data Collection & Solution Selection
0930 – 0945	Break
0945 – 1100	<b>Troubleshooting &amp; Problem Solving (cont'd)</b> Troubleshooting Techniques • RCFA & RCM • Murphy's law
1100 – 1215	<b>Change Management</b> Implementation of Change • Success Measures • Operational Techniques • Post Commissioning Audit • Close-out Certificates
1215 – 1230	Break
1230 – 1345	<b>Case Studies</b>
1345 – 1400	<b>Course Conclusion</b>
1400 – 1415	<b>POST-TEST</b>
1415 – 1430	Presentation of Course Certificates
1430	Lunch & End of Course

**Simulator (Hands-on Practical Sessions)**

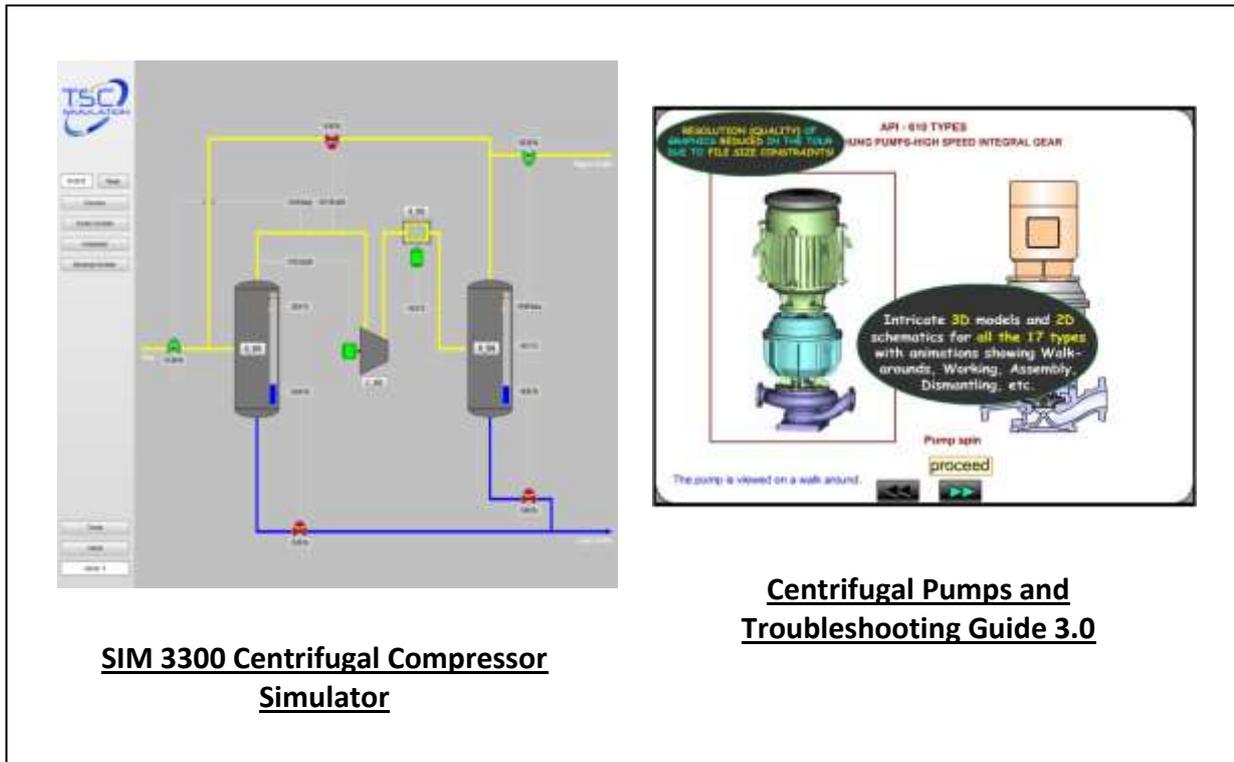
Practical sessions will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using our state-of-the-art “MS -Project”, “MS-Excel”, “Visio Software”, “Mindview Software”, “PHA/HAZOP Simulator”, “SIM 3300 Centrifugal Compressor Simulator”, “Centrifugal Pumps and Troubleshooting Guide 3.0” simulators and “ASPEN HYSYS” simulator.





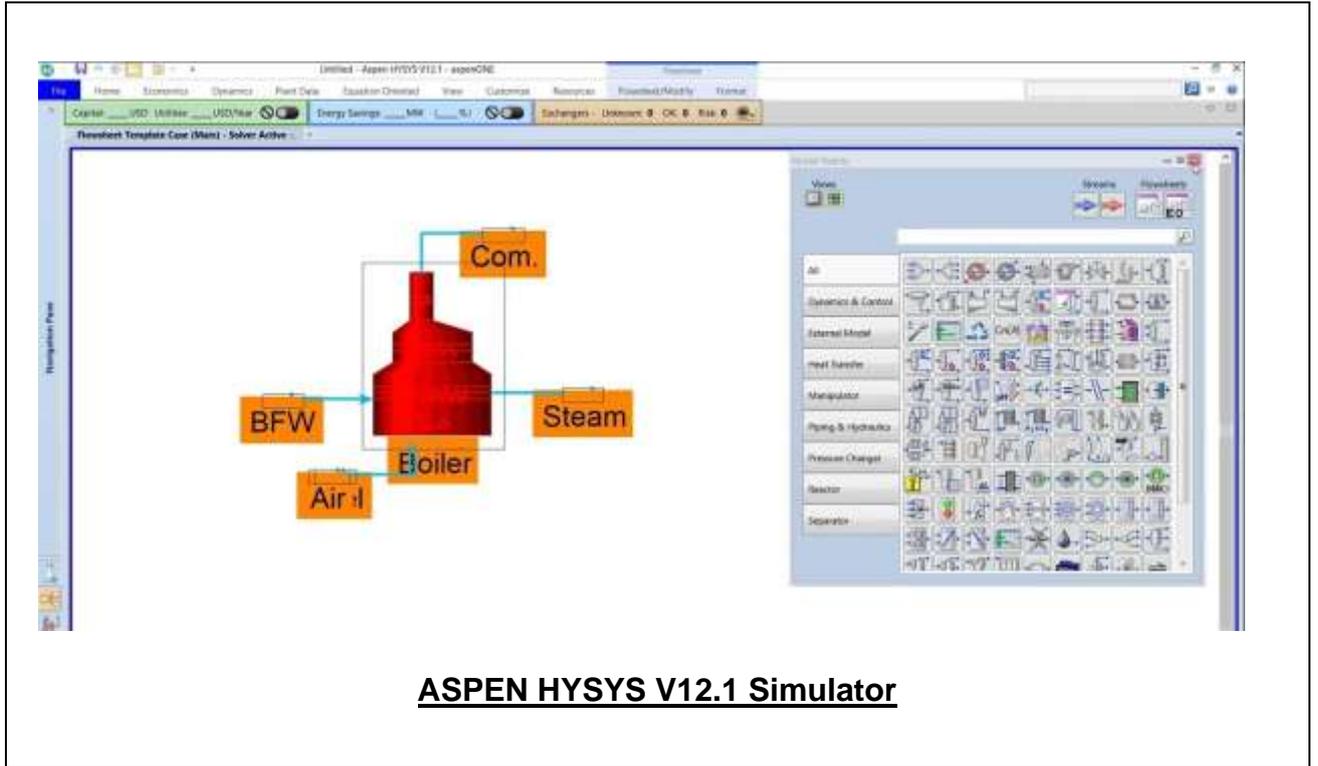


**PHA/HAZOP Simulator**



**SIM 3300 Centrifugal Compressor Simulator**

**Centrifugal Pumps and Troubleshooting Guide 3.0**



**ASPEN HYSYS V12.1 Simulator**

**Course Coordinator**

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