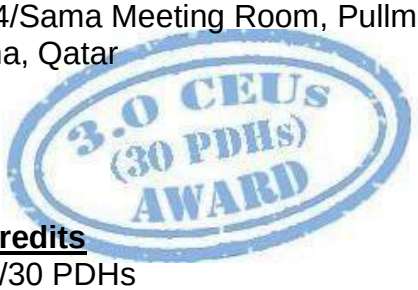
# COURSE OVERVIEW PE0230
# Process Plant Start-up, Commissioning & Troubleshooting

**Course Title**
Process Plant Start-up, Commissioning & Troubleshooting


**Course Date/Venue**
January 07-11, 2024/Sama Meeting Room, Pullman Doha Westbay, Doha, Qatar




**Course Reference**
PE0230

**Course Duration/Credits**
Five days/3.0 CEUs/30 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.***

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**.*

## 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.

## 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 **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.

- 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$ 6,000** per Delegate. 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 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. Mervyn Frampton** is a **Senior Process Engineer** with over **30 years** of industrial experience within the **Oil & Gas**, **Refinery**, **Petrochemical** and **Utilities** industries. His expertise lies extensively in the areas of **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**), **De-Sulfurization** Technology, Advanced Operational & Troubleshooting Skills, Principles of Operations Planning, **Rotating Equipment** Maintenance & Troubleshooting, **Hazardous Waste Management & Pollution Prevention**, **Heat Exchangers & Fired Heaters** Operation & Troubleshooting, **Energy Conservation** Skills, **Catalyst Technology**, **Refinery & Process Industry**, **Chemical Analysis**, **Process Plant**, **Commissioning & Start-Up**, **Alkylation**, **Hydrogenation**, **Dehydrogenation**, **Isomerization**, **Hydrocracking & De-Alkylation**, **Fluidized Catalytic Cracking**, **Catalytic Hydrodesulphuriser**, **Kerosene Hydrotreater**, **Thermal Cracker**, **Catalytic Reforming**, **Polymerization**, **Polyethylene**, **Polypropylene**, Pilot Water Treatment Plant, **Gas Cooling**, **Cooling Water Systems**, Effluent Systems, Material Handling Systems, **Gasifier**, **Gasification**, Coal Feeder System, **Sulphur Extraction Plant**, **Crude Distillation Unit**, **Acid Plant Revamp** and **Crude Pumping**. Further, he is also well-versed in HSE Leadership, Project and Programme Management, Project Coordination, Project Cost & Schedule Monitoring, Control & Analysis, Team Building, Relationship Management, Quality Management, Performance Reporting, Project Change Control, Commercial Awareness and Risk Management.

During his career life, Mr. Frampton held significant positions as the **Site Engineering Manager**, **Senior Project Manager**, **Process Engineering Manager**, **Project Engineering Manager**, **Construction Manager**, **Site Manager**, **Area Manager**, **Procurement Manager**, **Factory Manager**, **Technical Services Manager**, **Senior Project Engineer**, **Process Engineer**, **Project Engineer**, **Assistant Project Manager**, **Handover Coordinator** and **Engineering Coordinator** from various international companies such as the **Fluor Daniel**, **KBR** South Africa, **ESKOM**, MEGAWATT PARK, CHEMEPIC, PDPS, CAKASA, **Worley Parsons**, Lurgi South Africa, **Sasol**, **Foster Wheeler**, **Bosch** & **Associates**, **BCG** Engineering Contractors, Fina Refinery, Sapref Refinery, Secunda Engine Refinery just to name a few.

Mr. Frampton has a **Bachelor degree** in **Industrial Chemistry** from **The City University** in **London**. Further, he is a **Certified Instructor/Trainer**, a **Certified Internal Verifier/Trainer/Assessor** by the **Institute of Leadership & Management** (**ILM**) and has delivered numerous trainings, courses, workshops, conferences and seminars 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.

## 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: Sunday, 07th of January 2024***

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| *0730 – 0800* | *Registration & Coffee* |
| *0800 – 0815* | *Introduction & Welcome* |
| *0815 – 0830* | ***PRE-TEST*** |
| *0830 – 0930* | ***Introduction to Process Plant Commissioning***<br>*Terminology ● Requirements ● Project Details ● Contracting Strategy ● Organizational Structure & Responsibilities ● Success Measures & Problem Avoidance* |
| *0930 – 0945* | *Break* |
| *0945 – 1230* | ***Planning & Preparation***<br>*Project Planning, Critical Path (CPM/PERT) ● Gantt Chart ● Logic Diagrams ● Planning Methods ● Preparation of Checklists & Spare Parts Planning* |
| *1230 – 1245* | *Break* |
| *1245 – 1330* | ***Cost Estimation***<br>*Budget Components ● Estimation Sheets ● Resource Prediction ● Extra Costs & Change Orders* |
| *1330 – 1420* | ***Cost Estimation (cont'd)***<br>*Spare Parts ● Inventory ● Material Ordering ● MIS & Cost Control* |
| *1420 –1430* | ***Recap*** |
| *1430* | *Lunch & End of Day One* |

***Day 2: Monday 08th of January 2024***

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|---|---|
| *0730 – 0930* | ***Health, Safety & Environment***<br>*Hazard & Operability Analysis (HAZOP) ● Hazard Analysis (HAZAN) ● Process Safety Management (PSM) ● Root Cause Analysis & Why Trees ● Risk Assessment* |
| *0930 – 0945* | *Break* |
| *0945 – 1230* | ***Health, Safety & Environment (cont'd)***<br>*Hazard Identification ● Safety Training ● HSE Problems & contingency plans ● Safety Procedures & Implementation ● Safety Manual* |

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| 1230 – 1245 | Break |
| 1245 – 1330 | ***Process Plant Start-Up Management***<br>*Responsibilities & Authorities ● Organizational Structure ● Manpower & Staffing ● Coordination Procedures ● Leadership* |
| 1330 – 1420 | ***Process Plant Commissioning Strategy***<br>*The Commissioning Team ● Training ● Commissioning Strategy ● Start-Up Procedures & Logic* |
| 1420 – 1430 | ***Recap*** |
| 1430 | *Lunch & End of Day Two* |

***Day 3: Tuesday, 09th of January 2024***

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| 0730 – 0900 | ***Mechanical Integrity Testing & Pre-commissioning***<br>*Hydraulic Testing ● Flushing ● Breaking-in Pumps ● Drying Heaters* |
| 0900 – 0915 | Break |
| 0915 – 1100 | ***Technical Inspection & Dynamic Hydraulic Testing***<br>*Vessel & Column Internals ● Dynamic Loop Testing ● Tightness Testing* |
| 1100 – 1230 | ***Construction Completion (The Beginning of Start-Up)***<br>*Construction Schedules vs. Start-Up Needs ● Start-Up by Systems ● Systems Definition ● Punch Listing ● Handover* |
| 1230 – 1245 | Break |
| 1245 - 1420 | ***Machinery Commissioning***<br>*Types of Process Equipment Plant Machinery ● Preparation of Machines ● Compressor Commissioning ● Compressor Surge* |
| 1420 – 1430 | ***Recap*** |
| 1430 | *Lunch & End of Day Three* |

***Day 4: Wednesday, 10th of January 2024***

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

***Day 5:*** ***Thursday, 11th of January 2024***

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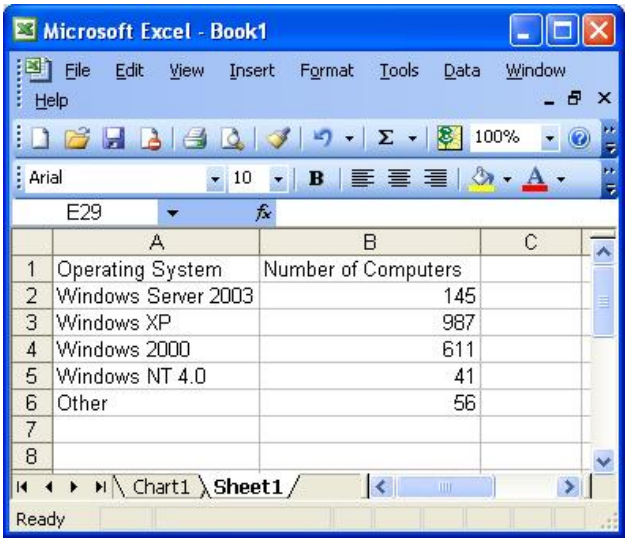
| *0730 – 0930* | ***Troubleshooting & Problem Solving***<br>*Identification of Problems & Priorities ● Resource Allocation & Teamwork ● Data Collection & Solution Selection* |
| *0930 – 0945* | *Break* |
| *0945 – 1100* | ***Troubleshooting & Problem Solving (cont'd)***<br>*Troubleshooting Techniques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

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

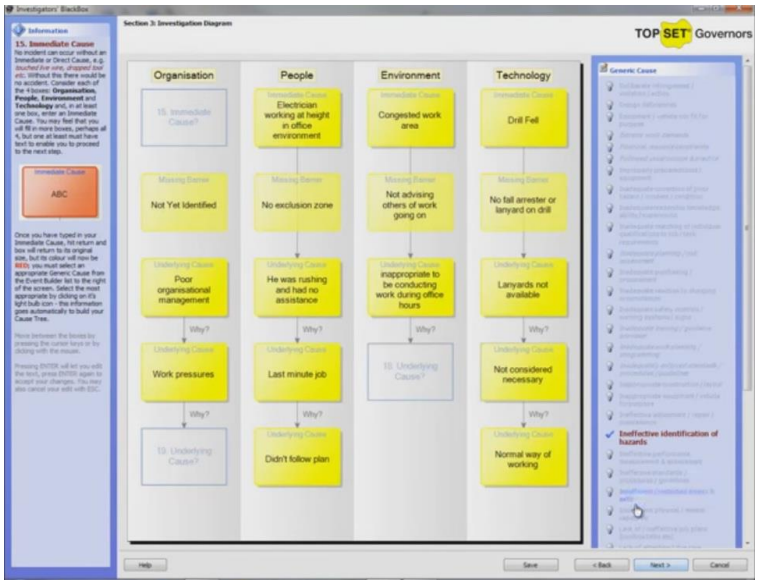
Practical sessions will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using our state-of-the-art "MS -Project", "MS-Excel", "BlackBox Software Tool", "PHA/HAZOP Simulator", "SIM 3300 Centrifugal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

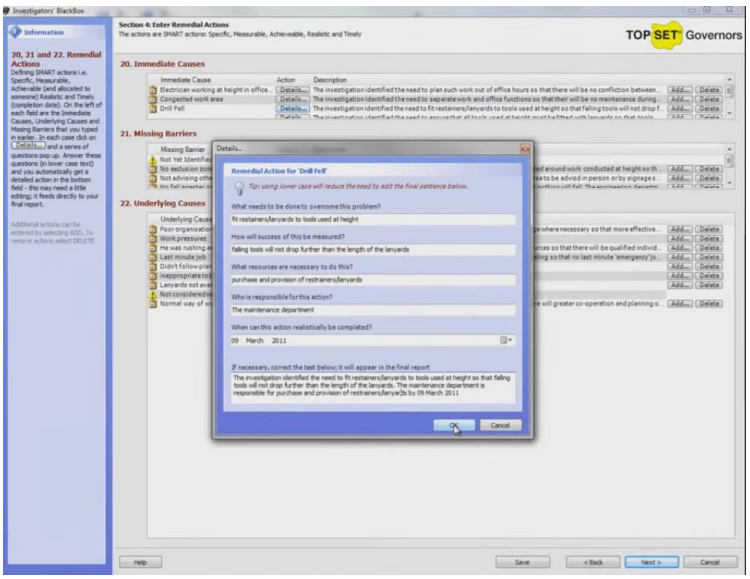
Microsoft Office Project

Enterprise Project Management Solution

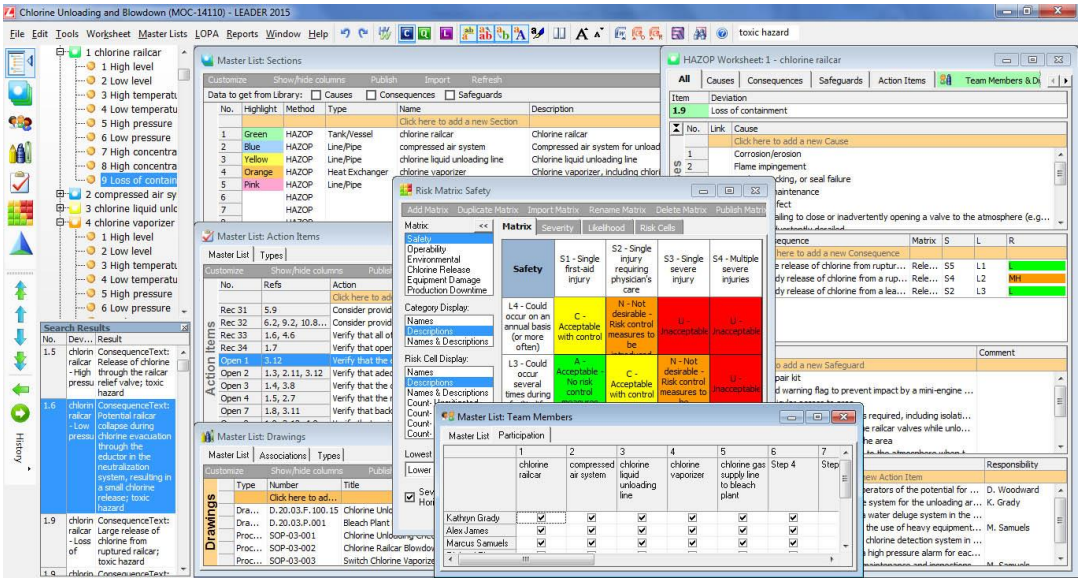



**Microsoft Excel**

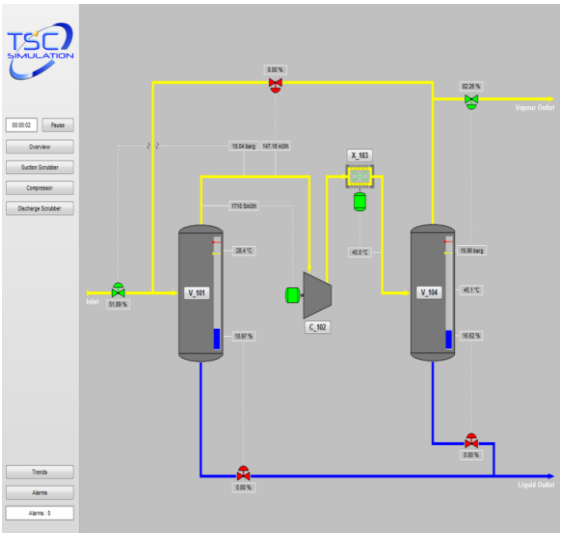


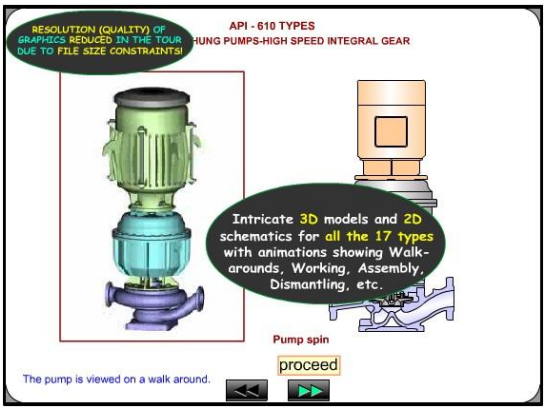

**BlackBox Software Tool**



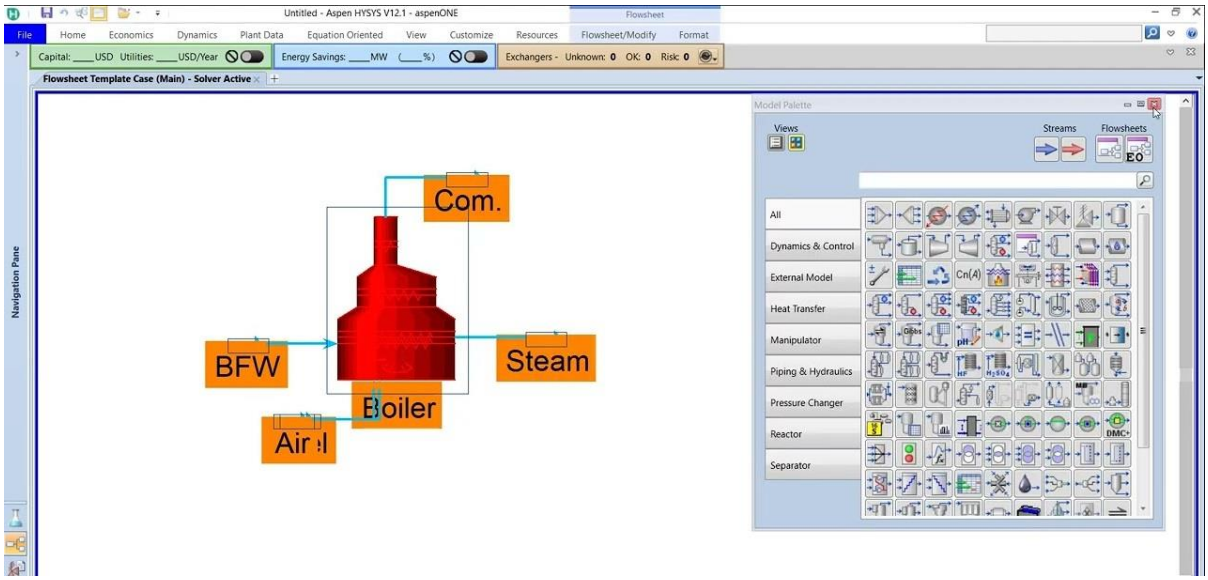
## PHA/HAZOP Simulator



## SIM 3300 Centrifugal Compressor Simulator




## Centrifugal Pumps and Troubleshooting Guide 3.0




**ASPEN HYSYS V12.1 Simulator**

**Course Coordinator**

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