COURSE OVERVIEW PE0263
Operation of Process Equipment
Fired Heaters, Air Coolers, Heat Exchangers, Pumps, Compressors, Pressure Vessels & Valves

Course Title
Operation of Process Equipment: *Fired Heaters, Air Coolers, Heat Exchangers, Pumps, Compressors, Pressure Vessels & Valves*

Course Reference
PE0263

Course Duration/Credits
Five days/3.0 CEUs/30 PDHs

Course Date/Venue

Session(s)	Course Date	Venue
1	August 17-21, 2025	Tamra Meeting Room, Al Bandar Rotana Creek, Dubai, UAE
2	September 28-October 02, 2025	Olivine Meeting Room, Fairmont Nile City, Cairo, Egypt
3	December 07-11, 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.

This course is designed to provide delegates with a detailed and up-to-date overview of fired heaters, air coolers, heat exchangers, pumps, compressors, crude desalter, pressure vessels & valves operations. It covers the objective and equipment layout of process equipment; developing of static and dynamic head in the operating volume of pumps for efficiency and control operation; the affinity laws as tools for efficient operation, pump auxiliaries, wear components, canned motor and magnetic drive pumps, flow pumps, servicing and condition monitoring; the main features of various types of compressors; the compressors classification based on design and application; the types, styles and configurations of centrifugal and axial compressors; and the main elements of centrifugal compressor construction and efficiency.

During this interactive course, participants will learn the compressor operation; the fin fan cooler including its types, operational efficiency and capacity control; the operation and troubleshooting of cooler; the heaters and their types, construction and operating parameters and inspection/testing requirements; the types and basic parts of furnaces; the fuel gas system of burners, gas burners, oil burners, flame impingement, draft and observations during normal operation; the heat exchangers, process vessels and valves; and the troubleshooting of different equipment and processes.

Course Objectives

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

- Apply and gain an in-depth knowledge on fired heaters, air coolers, heat exchangers, pumps, compressors, crude desalter, pressure vessels & valves operations
- Discuss process equipment including its objective and equipment layout
- Develop static and dynamic head in the operating volume of pumps for efficiency and control operation
- Discuss the affinity laws as tools for efficient operation, pump auxiliaries, wear components, canned motor and magnetic drive pumps, flow pumps, servicing and condition monitoring
- Explain the main features of various types of compressors, classify compressors based on design and application including world standards and codes related to compressor
- Identify the types, styles and configurations of centrifugal compressors and axial compressors
- Explain the main elements of centrifugal compressor construction and analyze centrifugal compressor efficiency
- Employ guidelines for trouble-free centrifugal compressor operation including troubleshooting, inspection and maintenance
- Operate compressor by analysing curves for surge, stall and choke as well as define appropriate equipment for safe operation
- Recognize fin fan cooler including its types, operational efficiency and capacity control
- Operate and troubleshoot cooler through key operational considerations and proper troubleshooting
- Discuss heaters and their types, construction and operating parameters, inspection/testing requirements
- Identify the types and basic parts of furnaces including their efficient operation and air control
- Analyze the fuel gas system of burners, gas burners, oil burners, flame impingement, draft and observations during normal operation
- Differentiate heat exchangers, process vessels and valves
- Troubleshoot different equipment and processes in a professional manner

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 an overview of an overview of all significant aspects and considerations of operation of process equipment for engineers, design engineers, maintenance staff and other technical staff.

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

Dubai	**US$ 5,500** per Delegate + **VAT**. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.
Cairo	**US$ 5,500** per Delegate + **VAT**. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.
Istanbul	**US$ 6,000** per Delegate + **VAT**. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.
In addition to the Course Manual, participants will receive an e-book "*Operator's Guide to Rotating Equipment: An Introduction to Rotating Equipment Construction, Operating Principles, Troubleshooting and Best Practices*", published by AuthorHouse.	

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: -

- 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. 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's degree** in **Industrial Chemistry** from **The City University** in **London**. Further, he is a **Certified Instructor/Trainer**, a **Approved Internal Verifier/Trainer/Assessor** by the **Institute of Leadership & Management** (**ILM**) and has delivered numerous trainings, courses, workshops, conferences and seminars 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	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0930	***Introduction to Process Equipment*** *Process Equipment Objective ● Types of Process Plants ●Process Equipment Layout ● Rotating Equipment ● Stationery Equipment*
0930 – 0945	*Break*
0945 – 1100	***Pumps*** *Development of Static and Dynamic Head in the Operating Volume of Pumps for Efficiency and Control Operation ● The Affinity Laws as Tools for Efficient Operation ● Pump Auxiliaries*
1100 – 1230	***Pumps (cont'd)*** *Wear Components ● Canned Motor and Magnetic Drive Pumps ● High Speed/Low Flow Pumps ● Servicing and Condition Monitoring*
1230 – 1245	*Break*
1245 – 1420	***Compressor Overview*** *Overview of the Main Features of Various Types of Compressors ● Classification of Compressors Based on Design and Application ● World Standards and Codes Related to Compressor Design*
1420 – 1430	***Recap***
1430	*Lunch & End of Day One*

Day 2

0730 – 0930	***Types of Compressors*** *Types, Styles and Configurations of Centrifugal and Axial Compressors ● Construction Features ● Mode of Operation ● Compressor Auxiliaries and Support Systems*
0930 – 0945	*Break*
0945 – 1100	***Centrifugal Compressor*** *Main Elements of Centrifugal Compressor Construction ● Analysis of Centrifugal Compressor Effeciency ● Guidelines for Trouble-free Centrifugal Compressor Operation*
1100 – 1230	***Centrifugal Compressor (cont'd)*** *Troubleshooting Inspection and Maintenance ● Centrifugal Compressors Anti Surge System and Surge Protection ● Case Studies About Centrifugal Compressors*
1230 – 1245	*Break*
1245 – 1420	***Compressor Operation*** *Analyse Operating Curves for Surge, Stall and Choke ● Define Appropriate Equipment for Safe Operation*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Two*

Day 3

0730 – 0930	***Fin Fan Cooler*** *Types ● Operational Efficiency ●Capacity Control*
0930 – 0945	*Break*
0945 – 1100	***Cooler Operating & Troubleshooting*** *Key Operational Considerations ● Air vs Water Cooling ● Troubleshooting*
1100 – 1230	***Heater*** *Heaters and their Types ● Construction & Operating Parameters ● Inspection/Testing Requirements*
1230 – 1245	*Break*
1245 – 1420	***Furnaces*** *Types of Furnaces ● Furnace Basic Parts ● Efficient Operation, Air Control etc*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Three*

Day 4

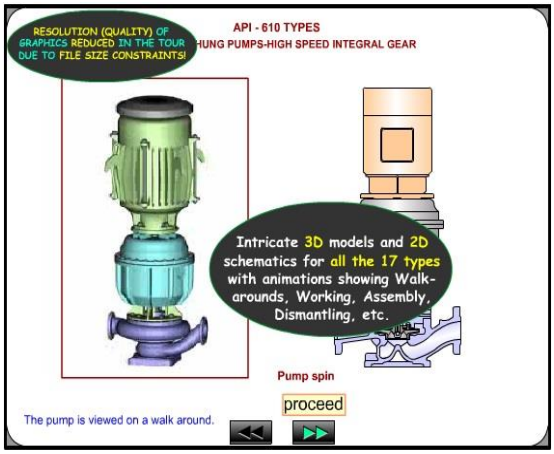
0730 – 0930	***Fuel Gas System*** *Burners ● Gas Burners ● Oil Burners*
0930 – 0945	*Break*
0945 – 1100	***Fuel Gas System (cont'd)*** *Flame Impingement ● Draft ● Observations During Normal Operation*
1100 – 1230	***Heat Exchangers*** *Types ● Shell-and-Tube*
1230 – 1245	*Break*
1245 – 1420	***Heat Exchangers (cont'd)*** *Heat Transfer Relation*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Four*

Day 5

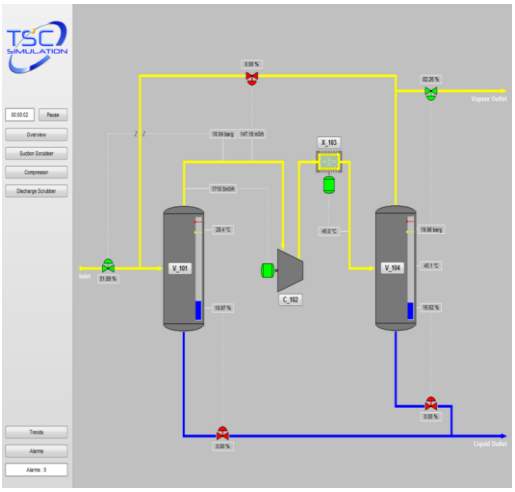
0730 – 0930	***Process Vessels*** *Types and Functions ● Safety Aspects*
0930 – 0945	*Break*
0945 – 1215	***Valves*** *Valve Theory ● Valve Types ● Applications*
1215 – 1230	*Break*
1230 – 1245	***Valves (cont'd)*** *Function ● Operation ● Troubleshooting*
1245 – 1345	***Troubleshooting of Different Equipment & Processes***
1345 – 1400	***Course Conclusion***
1400 – 1415	***POST-TEST***
1415 – 1430	*Presentation of Course Certificates*
1430	*Lunch & End of Course*

Simulator (Hands-on Practical Sessions)

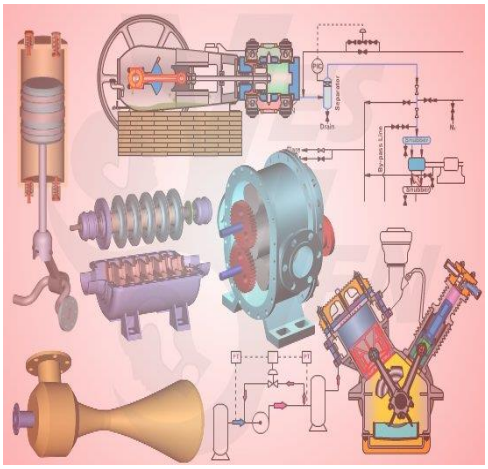
Practical sessions will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using our state-of-the-art simulators "Centrifugal Pumps and Troubleshooting Guide 3.0", "SIM 3300 Centrifugal Compressor", "CBT on Compressors", "Heat Exchanger Tube Layout", "Valve Sizing Simulator", "Valve Simulator 3.0", "Valvestar 7.2 Simulator", "PRV^{2}SIZE Simulator", and "ASPEN HYSYS V12.1" simulator.



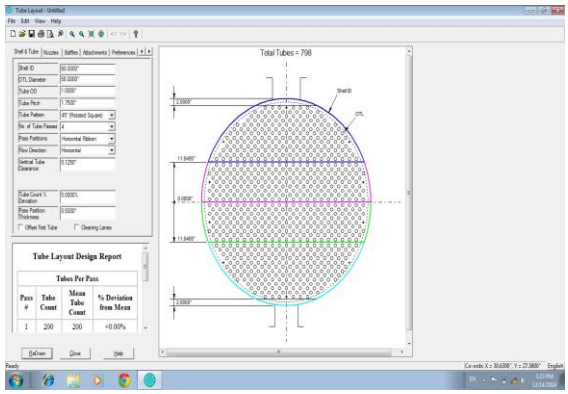
Centrifugal Pumps and Troubleshooting Guide



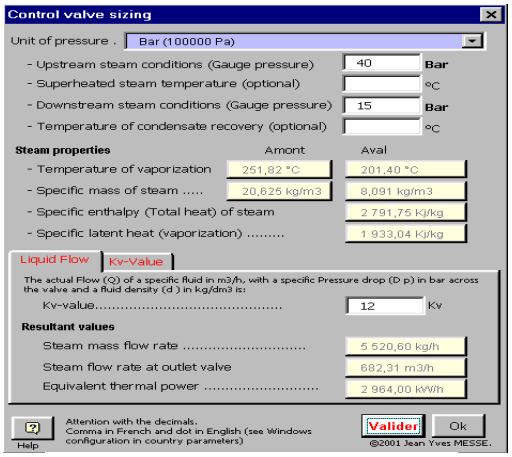
SIM 3300 Centrifugal Compressor Simulator



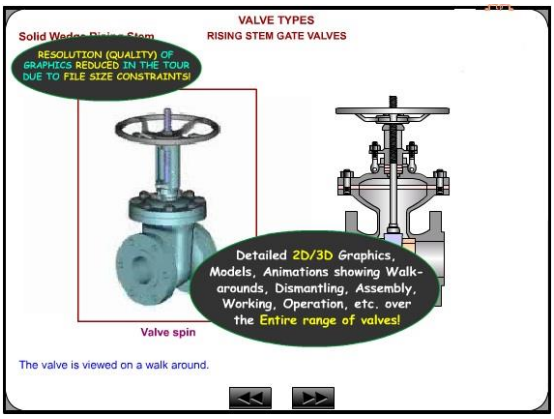
CBT on Compressors



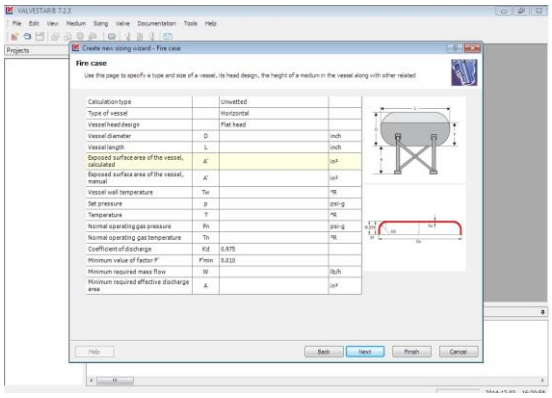
Heat Exchanger Tube Layout Simulator



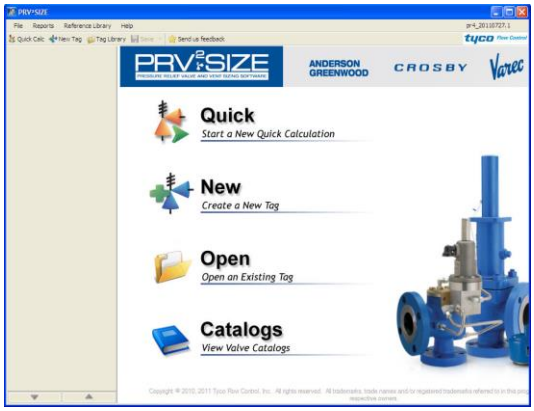
Valve Sizing Simulator



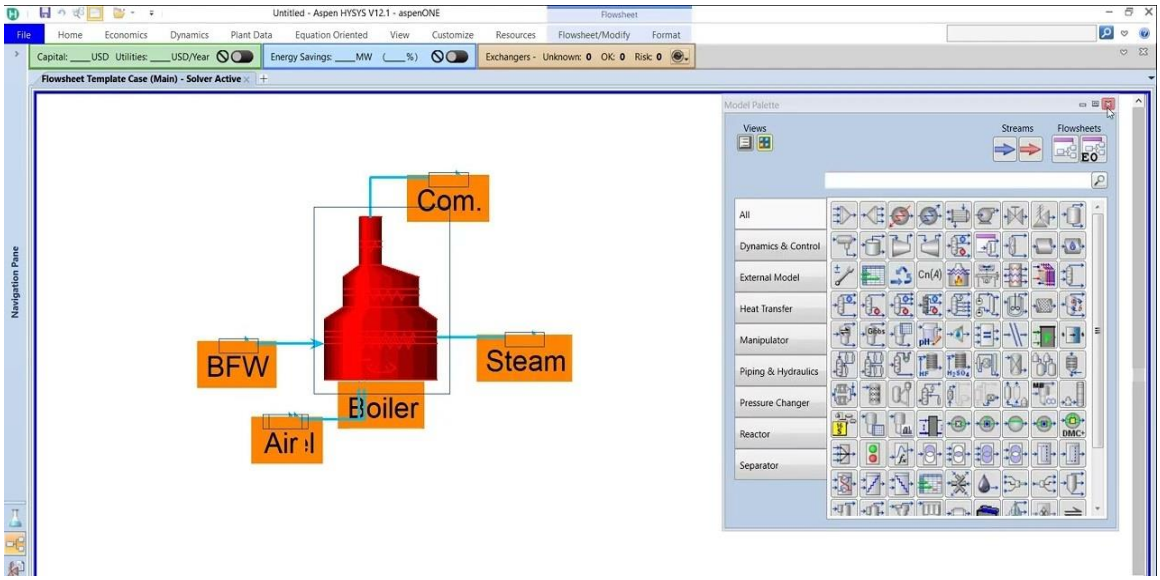
Valve Simulator 3.0



Valvestar 7.2 Simulator



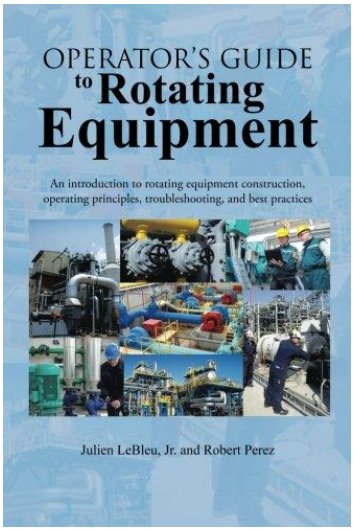
PRV²SIZE Simulator



ASPEN HYSYS V12.1 Simulator

Book(s)

As part of the course kit, the following e-book will be given to all participants:



Title : Operator's Guide to Rotating Equipment: An Introduction to Rotating Equipment Construction, Operating Principles, Troubleshooting and Best Practices
ISBN : 978-1-49690-868-1
Authors : Julien LeBleu
Robert Perez
Publisher : AuthorHouse

Course Coordinator

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