COURSE OVERVIEW PE0102
Certified Process Plant Operator
Plant Operations, Control & Troubleshooting

Course Title
Certified Process Plant Operator: *Plant Operations, Control & Troubleshooting*



Course Date/Venue
Session 1: May 02-06, 2027/Meeting Plus 9, City Centre Rotana, Doha, Qatar
Session 2: November 07-11, 2027/Meeting Plus 9, City Centre Rotana, Doha, Qatar



Course Reference
PE0102

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.

The abnormal process situations cost the processing industry billions of dollars a year. 40% of this lost is directly attributable to human errors, with the failure to properly troubleshoot the condition being the leading contributor. The operations team is the first line of defense against process upsets and equipment problems. Failure to identify and resolve these situations quickly can lead to lost production, off-spec product, equipment loss, and even catastrophic accidents. Therefore, the ability to troubleshoot process operations is one of the most valuable skills operations personnel can possess. However, in order to troubleshoot the process or equipment, you have to understand the theory laying behind such process and equipment. This is what this course all about.

The course is designed to provide participants with the proper application, operation, maintenance and troubleshooting of the various types of process equipment such as compressors, pumps, motors, turbines, turbo-expanders, gears, heat exchangers, piping systems, distillation columns, reboilers, pressure vessels and valves.

The course will feature a unique blend of practical application experience and basic analysis methods. Its aim is to convey a thorough understanding of equipment operating principles and troubleshooting techniques.

The course covers the various process control and instrumentation methods such as pressure measurement, level measurement, temperature measurement, flow measurement, basic principles of control systems, P&ID, wiring schematics & diagrams, control valves and process considerations. It will equip participants with the basic tools and techniques for troubleshooting real-world problems. The use of the troubleshooting methodology defined in this course can greatly improve the ability of the operations team to troubleshoot effectively. With an improved understanding of troubleshooting principles, you will be better equipped to react to process upsets in order to prevent downtime and/or accidents.

The course includes a comprehensive e-book entitled "*Operator's Guide to Rotating Equipment: An Introduction to Rotating Equipment Construction, Operating Principles, Troubleshooting and Best Practices*", published by AuthorHouse, which will be given to the participants to help them appreciate the principles presented in the course.

Course Objectives/Outcomes & Benefits for the Participants

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

- Get certified as a "*Certified Process Plant Operator*"
- Apply a comprehensive knowledge and skills in process operations, process control and troubleshooting techniques
- Operate, maintain and troubleshoot process equipment such as centrifugal pumps, positive displacement & vacuum pumps, centrifugal compressors, displacement compressors, steam turbine & expanders, gas turbines & engines, fan & blowers, etc.
- Identify and differentiate various types of electric motors, gears & transmission equipment, heat exchangers, distillation columns, reboilers, condensers and explain how trays work
- Discuss the piping layout and components including the piping arrangements, specifications, fittings, etc.
- Distinguish the various measurement in process control such as pressure measurement, level measurement, temperature measurement and flow measurement and differentiate their corresponding principles
- Recognize the principles of control valves including its body types, cavitation, valve coefficient and characteristics and list the main types of actuators and accessories
- Apply systematic techniques in troubleshooting process operations and carryout successful troubleshooting activities
- Analyze the mental problem-solving process and demonstrate the use of the troubleshooter's worksheet
- Practice the rules-of-thumb techniques for troubleshooting of process equipment

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 wide understanding and deeper appreciation of process plant operations and control for technical and operational staff.

Training Methodology

Our courses employ an interactive, learner-centred methodology that integrates theoretical knowledge with practical application. The training is delivered through a suitable combination of some or all of the following methods, selected according to the course content and learning objectives:

- Instructor-led presentations and facilitated discussions
- Practical workshops and participant presentations
- Hands-on exercises and real-world case studies
- Equipment demonstrations and technical drawings
- Hardware- and software-based simulations
- Gamification & Role Play in soft-skills courses only
- Virtual Reality (VR) and Augmented Reality (AR)
- Instructional videos and other relevant training resources

This blended approach encourages active participation, strengthens practical skills and supports the effective application of acquired knowledge in the workplace.

Learning Design & Customization

This course can be customized to the exact requirements of clients. Haward Technology is so proud of our huge capabilities in tailoring our courses to the training needs of our valued clients.

Accommodation

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

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.

Course Certificate(s)

(1) Internationally recognized Competency Certificates and Plastic Wallet Cards will be issued to participants who completed a minimum of 80% of the total tuition hours and successfully passed the exam at the end of the course. Successful candidate will be certified as a "*Certified Process Plant Operator*". Certificates are valid for 5 years.

Sample of Certificates

The following are sample of the certificates that will be awarded to courses participants: -







(2) Official Transcript of Records will be provided to the successful delegates with the equivalent number of ANSI/IACET accredited Continuing Education Units (CEUs) earned during the course.



Haward Technology Middle East

Continuing Professional Development (HTME-CPD)

CEU Official Transcript of Records

TOR Issuance Date: 14-Nov-23

HTME No. 74851

Participant Name: Waleed Al Habeeb

Program Ref.	Program Title	Program Date	No. of Contact Hours	CEU's
PE0102	Certified Process Plant Operator: *Plant Operations, Control & Troubleshooting*	November 10-14, 2023	30	3.0

Total No. of CEU's Earned as of TOR Issuance Date **3.0**

TRUE COPY

Jaryl Castillo
Academic Director

Haward Technology has been approved as an Accredited Provider by the International Association for Continuing Education and Training (IACET), 2201 Cooperative Way, Suite 600, Herndon, VA 20171, USA. In obtaining this approval, Haward Technology has demonstrated that it complies with the ANSI/IACET 1-2018 Standard which is widely recognized as the standard of good practice internationally. As a result of their Authorized Provider membership status, Haward Technology is authorized to offer IACET CEUs for programs that qualify under the ANSI/IACET 1-2018 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 Association 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 is accredited by

P.O. Box 26070, Abu Dhabi, United Arab Emirates | Tel.: +971 2 3091 714 | E-mail: info@haward.org | Website: www.haward.org

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

Haward's 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**. Haward's certificates are internationally recognized and accredited by the British Accreditation Council (BAC). 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. Jamal Khaled is a **Senior Process & Petroleum Engineer** with over **25 years** of practical experience within the **Oil** & **Gas**, industry. His experience covers **Operation** of **Upstream & Midstream Process Facilities**, **Operation** of **Process Equipment** (Fired Heaters, Heat Exchangers, Air Coolers, Piping, Pumps, Compressors and Process Control & Troubles hooting), **Heat Exchanger** Design, Operation & Maintenance, **Surface Production** Operations, Advanced **Oil Wells**, Separation & Oil Treatment , Treatment of Oily Produced Water, **Gas Dehydration & Sweetening**, **Compressors & Utilities** System, **Flare & Disposal Systems** Operation & Troubleshooting, **Heat Exchangers**, **Fired Heaters**, **Process Plant Startup**, Commissioning & Troubleshooting, **Oil Movement** Storage & Troubleshooting, **Gas Compression** & Foundation, **Gas Compression Train** Operations & Maintenance, **Gas Dehydration** (**TEG**) Principles, Operations & Maintenance, **Gas Dehydration** (**Mole Sieve**) Operations & Maintenance, **Acid Gas Removal** (**AGRU**) Operations & Maintenance, **Gas Fractionation & Separation** Operations Principles & Practices, **Gas Processing** Chemical Treatment Principles, Advanced **Distillation** Operation, Control, Design & Troubleshooting, Troubleshooting **Process Operation** & Problem Solving, **Process Plant** Troubleshooting & Engineering Problem Solving, **Process Equipment** Operation, **Process Plant** Operation, **Process Plant** Optimization, **Oil & Gas Field** Operation, **Oil Movement**, Storage & Troubleshooting, **Petroleum Refinery** Process, **Process Reactor** Operation & Troubleshooting, **LNG & LPG** Plants Gas Processing, **Refinery Process** Operations Technology, **Distillation Column** Design & Operation, **Gasoline & Diesel Fuel** Technology, **Gas Sweetening & Sulfur Recovery**, **Gas Dehydration** Units, **Gas Sweetening** Units, **Fractionation Towers**, **Gas Compressors**, **Sulphur Recovery** (**SRU**) & Utilities, **Steam & Heat Recovery** Systems, **Flare & Pressure Relief Systems**, **NGL Recovery & Fractionation** and **Refrigerant & NGL Extraction**. Further, he is also well-versed in Oil & Gas **Producing Wells**, **Well Head** Design & Selection H2S, Sour Gas Compatible Material **X-Mas Tree**, **Electrical Submersible Pumping** (**ESP**) Operations, Design & Troubleshooting, **Sucker Rod Pumping System** Application, Operation, Troubleshooting & Maintenance, **Well Integrity Management** System, **X-Mass Tree & Wellhead** Operation & Testing, **Artificial Lift Systems**, Selection & Operation, **Artificial Lift Surface Equipment**, Advanced **Stuck Pipe Prevention & Fishing** Operation, **Well Completion** Design & Operations, **Casing**, **Cementing & Fluid**, **Pipeline & Pigging** Operations, **HP/IP/LP** Separation, Industrial **Water Treatment** System & Operations, **H2S**, **Confined Space Entry**, Permit To Work (**PTW**) and **Authorized Gas Tester**. He is currently the **On Job Instructor/Trainer** of Majnoon Oil Field.

During his career life, Mr. Jamal has gained his practical and field experience through his various significant positions and dedication as the **Oil & Gas Operation Instructor**, **OJT Operation Trainer**, **Operation & HSE Instructor**, **Operation & Competency Assessor/Internal Verifier**, **Operation Engineer**, **Operation Supervisor**, **Operation Section Head**, **Production Supervisor**, **Senior Operator** and **Senior Instructor/Trainer** from various international companies such as the AlFurat Petroleum Company (AFPC), ADCO, Basrah Gas Company-Iraq, North Rumaila NGL Plant, Anton Oilfield Services and Majnoon Oil Field-Iraq, just to name a few.

Mr. Jamal has a **Bachelor's** degree in **Petroleum Engineering**. Further, he is a **Certified Training of Trainer** (**ToT**), an **Authorized H2S Trainer**, a **Certified OPITO Competency Assessor**, an **Authorized Assessor/Verifier** in **Oil & Gas Operation**, a **Certified Instructor/Trainer** and has further delivered numerous trainings, courses, seminars, conferences 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	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0915	***Introduction to Process Plant*** *Process Overview ● Plant Types ● Plant Layout ● Process Equipment ● Piping System ● Control & Instrumentation ● Safety*
0915 – 1000	***Centrifugal Pumps*** *Configurations & Styles ● Application Ranges and Constraints ● Construction Features & Options ● Pump Auxiliaries ● Wear Components ● Canned Motor & Magnetic Drive Pumps ● High Speed/Low Flow Pumps ● Servicing & Condition Monitoring ● Operation ● Control ● Troubleshooting*
1000 – 1015	*Break*
1015 – 1100	***Positive Displacement & Vacuum Pumps*** *Reciprocating Steam & Power Pumps ● Diaphragm Pumps ● Plunger Pumps ● Gear Screw & Progressive Cavity Pumps ● Peristaltic Pumps ● Conventional & Special Vacuum Pumps ● Liquid Jet & Liquid Ring Pumps ● Combination & Staged Vacuum Pumps ● Operation ● Control ● Troubleshooting*
1100 – 1215	***Centrifugal Compressors*** *Types, Styles & Configurations of Centrifugal & Axial Compressors ● Construction Features ● Mode of Operation ● Compressor Auxiliaries and Support Systems ● Condition Monitoring ● Application Criteria ● Performance Capabilities & Limitations ● Operation ● Control ● Troubleshooting*
1215 – 1230	*Break*
1230 – 1330	***Displacement Compressors*** *Classification ● Reciprocating Compressors vs. Rotary Screw Compressors ● Application Ranges & Limitations ● Compression Processes ● Construction Features & Components ● Capacity Control ● Operation ● Troubleshooting*
1330 – 1420	***Steam Turbines & Expanders*** *Impulse Turbines ● Reaction Turbines ● Application Ranges ● Turbine Configurations ● Applications Constraints ● Maintenance ● Turbo-expander Construction Features ● Applications ● Operation ● Control ● Troubleshooting*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day One*

Day 2

0730 – 0900	***Gas Turbines & Engines*** *Simple Cycle ● Heat Recovery Cycles ● Type Selection ● Maintenance ● Two- & Four-Cycle Gas Engines ● Gas Engine Compressor Auxiliary Systems ● Operation ● Control ● Troubleshooting*
0900 – 1000	***Fans and Blowers*** *Types & Configurations ● Performance & System Effects ● Performance Correction ● Capacity Control Options ● Operation ● Troubleshooting*

1000 – 1015	*Break*
1015 – 1100	***Electric Motors*** *Design ● Controls ● Wiring Systems ● Standard Motors ● Special Designs ● Major Components ● The Motor as Part of a System ● Adjustable Frequency Motors ● Operation ● Control ● Troubleshooting*
1100 – 1215	***Gears & Transmission Equipment*** *Types of Gears ● Applications Constraints ● Maintenance ● Troubleshooting*
1215 – 1230	*Break*
1230 – 1330	***Heat Exchangers*** *Heat Exchangers ● Shell-&-Tube Exchangers ● Double-Pipe Exchangers ● Plate-&-Frame Exchangers ● Aerial Coolers ● Fired Heater ● Heat Recovery Units ● Heat Exchanger Example Problem ● Operation ● Control ● Troubleshooting*
1330 – 1420	***Distillation Column*** *Flash Stages ● Process Design Basic ● Reflux Ratio ● Minimum Reflux Ratio ● Minimum Number of Plates ● Optimum Reflux*
1420 - 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today & Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day Two*

Day 3

0730 – 0900	***How Trays Work*** *Down Common Backup & Flooding ● Dumping & Weeping ● Optimizing Tower Pressure*
0900 – 1000	***Reboilers*** *Reboilers Function ● The Reboiler ● Heat-Balance Calculations ● Thermosyphon, Gravity Feed, & Forced ● Thermosyphon Reboilers ● Forced Circulation Reboilers ● Kettle Reboilers ● Don't Forget Fouling*
1000 – 1015	*Break*
1015 – 1100	***Condensers*** *Flooded Condenser Control ● Subcooling, Vapor Binding, & Condensation ● Condensation and Condenser Design ● Pressure Control*
1100 – 1215	***Introduction to Piping Layout*** *P&ID's ● Piping Arrangements ● Isometrics ● B.O.M.'s ● Piping Specifications*
1215 – 1230	*Break*
1230 – 1330	***Piping Components & Valves*** *Fittings – Butt Weld ● Socket Weld ● Threaded, Valve Types and Application*
1330 – 1420	***Process & Utility Piping*** *Design & Layout of Piping Containing Liquid ● Vapour ● Steam ● Condensate ● Slurries ● Etc.*
1420 - 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today & Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day Three*

Day 4

0730 – 0900	***Valves*** *Valve Theory ● Valve Types ● Applications ● Functions ● Operation ● Maintenance ● Troubleshooting*
0900 – 1000	***Process Control*** *Control History ● Basic Measurement Concepts ● Performance Terms ● Basic Control Theory*

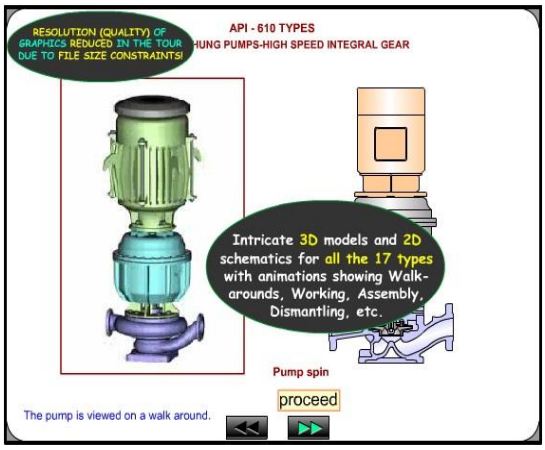
1000 – 1015	Break
1015 – 1100	***Pressure Measurement*** Basic Principles ● Pressure Transducers–Mechanical ● Pressure Transducers–Electrical ● Installation Considerations
1100 – 1215	***Level Measurement*** Main Types ● Simple Sight Glass ● Gauging Rods ● Buoyancy Tape Systems ● Hydrostatic Pressure ● Ultrasonic Measurement ● Radar Measurement ● Vibration Switches ● Radiation Measurement ● Electrical Measurement ● Installation Considerations
1215 – 1230	Break
1230 – 1330	***Temperature Measurement*** Principles ● Thermocouples ● Resistance Temperature Detectors (RTD's) ● Thermistors ● Non-Contact Types
1330 – 1420	***Flow Measurement*** Basic Flow Theory ● Differential Pressure Flow Measurement ● Oscillatory Flow Measurement ● Magnetic Flowmeters ● Ultrasonic Flow Measurement ● Mass Flow Meters ● Installation Considerations ● Impact on Overall Loop
1420 - 1430	***Recap*** Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow
1430	Lunch & End of Day Four

Day 5

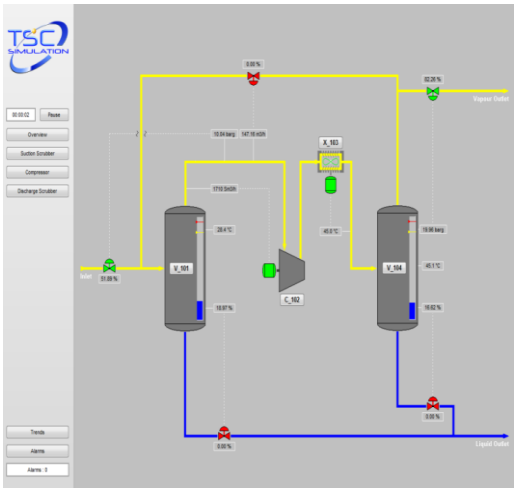
0730 – 0900	***Control Valves–Body Types*** Principles of Control Valves ● What Happens Inside a Control Valve? ● Choked Flow ● Cavitation ● Flashing ● Valve Coefficient (Cv) ● Control Valve Types ● Valve Characteristics ● Trim Characteristics ● Control Valve Selection ● Leakage Rates
0900 – 1000	***Control Valves–Actuators & Accessories*** Main Types of Actuators ● Linear Actuators ● Rotary Actuators ● Actuator Forces ● Positioners ● Fail Safe Actuators
1000 – 1015	Break
1015 – 1100	***P & ID, Wiring Schematics & Diagrams*** Block Flow Diagrams ● Process Flow Diagrams ● Mass Balance ● Piping & Installation Diagrams ● P & ID Symbols ● HAZOP ● P & ID Standards ● Valves ● Standardization of Symbols ● Schedules ● Layout Drawings
1100 – 1215	***What is Troubleshooting?*** Characteristics of a Troubleshooting Problem ● Characteristics of the Process Used to Solve Troubleshooting Problems
1215 – 1230	Break
1230 – 1245	***The Mental Problem-Solving Process*** Problem Solving ● Troubleshooting ● Overall Summary of Major Skills & a Worksheet ● Example Use of the Trouble-shooter's Worksheet
1245 – 1300	***Rules of Thumb for Troubleshooting*** Overall ● Transportation Problems ● Energy Exchange ● Homogenous Separation ● Heterogenous Separations ● Reactor Problems ● Mixing Problems ● Size-Decrease Problems ● Size Enlargement ● Vessels, Bins, Hoppers & Storage Tanks ● "Systems" Thinking ● Health, Fire & Stability
1300 - 1315	***Course Conclusion*** Using this Course Overview, the Instructor(s) will Brief Participants about the Course Topics that were Covered During the Course
1315 – 1415	***COMPETENCY EXAM***
1415 – 1430	Presentation of Course Certificates
1430	Lunch & End of Course

Simulator (Hands-on Practical Sessions)

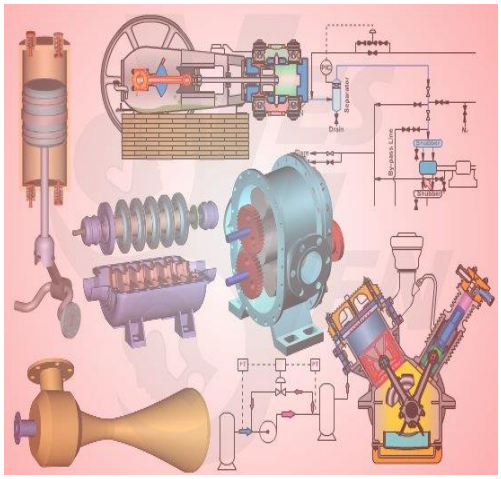
Practical session will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using the state-of-the-art simulators "Centrifugal Pumps and Troubleshooting Guide 3.0", "SIM 3300 Centrifugal Compressor Simulator", "CBT on Compressors", "Steam Turbines & Governing System CBT", "Single Shaft Gas Turbine Simulator", "Two Shaft Gas Turbine Simulator", "Two Shaft Gas Turbine Simulator", "Valve Sizing Simulator", "Valve Simulator 3.0", "Valvestar 7.2 Simulator", "PRV2SIZE Simulator".



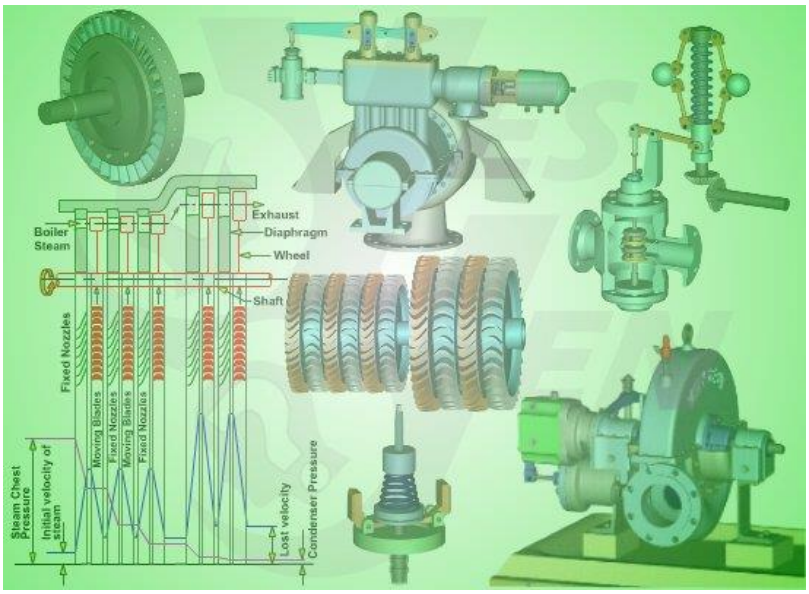
Centrifugal Pumps and Troubleshooting Guide 3.0



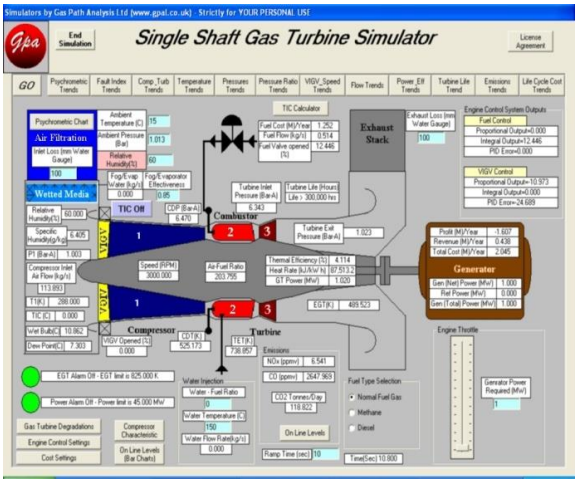
SIM 3300 Centrifugal Compressor Simulator



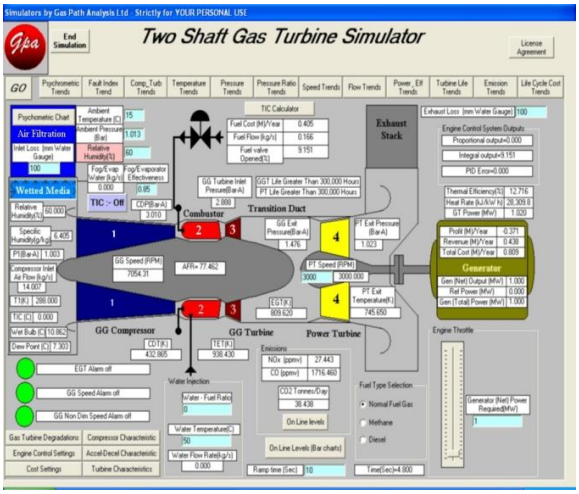
CBT on Compressors



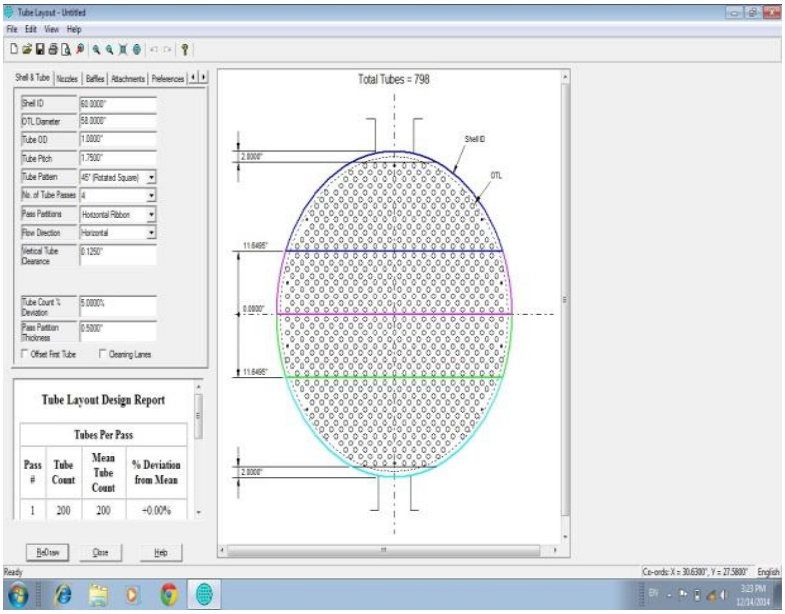
Steam Turbines & Governing System CBT



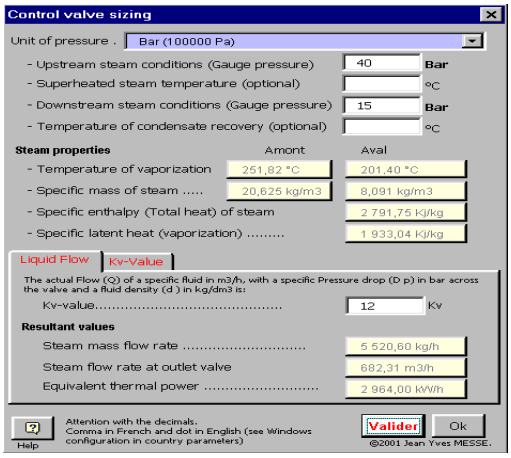
Single Shaft Gas Turbine Simulator



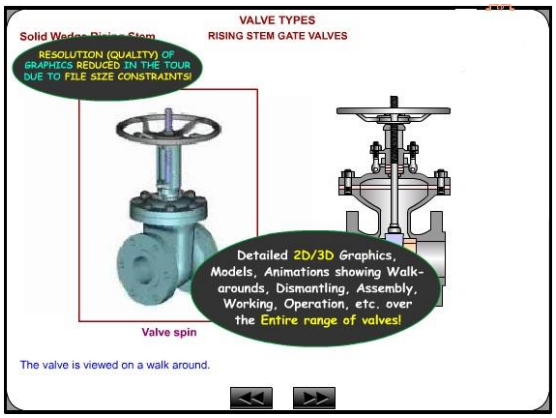
Two Shaft Gas Turbine Simulator



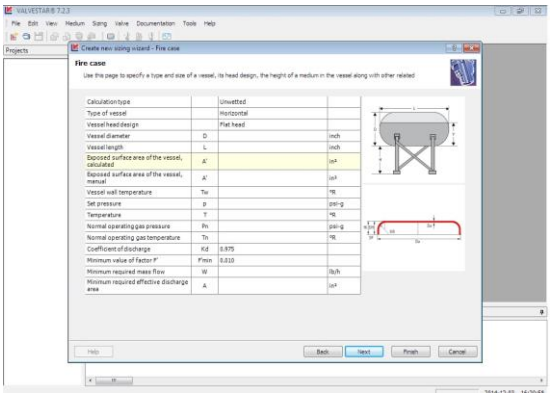
Two Shaft Gas Turbine Simulator



Valve Sizing Simulator



Valve Simulator 3.0



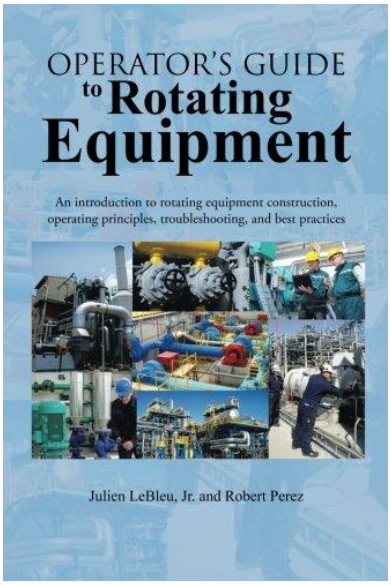
Valvestar 7.2 Simulator



PRV²SIZE 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

Jaryl Castillo, Tel: +974 6652 9196, Email: jaryl@haward.org