



COURSE OVERVIEW PE0221 **Operation of Process Equipment**

Fired Heaters, Air Coolers, Heat Exchangers,
Pumps, Compressors, Crude Desalter, Pressure Vessels & Valves

Course Title

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

Course Date/Venue

Please see page 2

Course Reference

PE0221

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 course is designed to provide delegates with a detailed and up-to-date overview on the operation of the hydrocarbon process equipment that includes fired heaters, air coolers, heat exchangers, pumps, compressors, crude desalter, pressure vessels and valves.



It covers the characteristics of crude oil and function of chemicals used in the process such as composition of petroleum, hydrocarbon properties, salt concentration and emulsions.



At the completion of the course, participants will be able to apply oil treating; dehydration and desalting; process and equipment operations; and employ the sequence of desalter plant start-up.

The course will also cover the different types and function of direct fired heaters; safety aspects; air coolers; heat exchangers; pumps; compressors; process vessels; valves; and troubleshooting of different equipment and processes.

Course Objectives

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

- Apply proper techniques and procedures on the operation of the hydrocarbon process equipment such as fired heaters, air coolers, heat exchangers, pumps, compressors, crude desalter, pressure vessels and valves
- Enumerate the characteristics of crude oil and identify the function of chemicals used in the process such as composition of petroleum, hydrocarbon properties, salt concentration and emulsions
- Discuss oil treating, dehydration and desalting including the process and equipment operations
- Employ the sequence of desalter plant start-up and identify the different types and function of direct fired heaters including the safety aspects
- Differentiate the various types of air coolers, heat exchangers, pumps and compressors
- Describe the types and functions of process vessels and valves including the troubleshooting of different equipment and processes

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 all operational aspects of the hydrocarbon process equipment for engineers and other technical staff who are involved in the operation and troubleshooting of various process equipment including fired heaters, air coolers, heat exchangers, pumps, compressors, crude desalter, pressure vessels and valves. The course is also beneficial for design engineers and maintenance staff.

Course Date/Venue

Session(s)	Date	Venue
1	July 20-24, 2025	Olivine Meeting Room, Fairmont Nile City, Cairo, Egypt
2	October 05-09, 2025	Tamra Meeting Room, Al Bandar Rotana Creek, Dubai UAE
3	November 30-December 04, 2025	Safir Meeting Room, Divan Istanbul, Turkey

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. Karl Thanasis, PEng, MSc, MBA, BSc, is a **Senior Engineer** with over **30 years** of practical experience within the **Oil, Gas, Refinery** and **Petrochemical** industries. His wide expertise includes **Process Plant Optimization Technology & Continuous Improvement, Process Engineering Calculations, Process Plant Start Up & Commissioning, Applied Process Engineering Elements, Coke Cooler, Process Plant Start-up & Commissioning, Process Plant Troubleshooting, Operations Abnormalities & Plant Upset, Process Equipment**

Applications & Troubleshooting, Process Plant Performance & Efficiency, Gas Sweetening & Sulphur Recovery, Distillation-Column Control & Troubleshooting, Oil Movement & Troubleshooting, Process Plant Operations & Control, Process Equipment Operation, Fired Heaters & Air Coolers Maintenance, Heat Exchangers, Pumps & Compressors, Crude Desalter, Pressure Vessels & Valves, Steam Trapping & Control, Pumps & Valve Maintenance & Troubleshooting, Turbomachinery, Mechanical Alignment, Rotating Equipments, Diesel Generators, Lubrication Technology, Bearing, Predictive & Preventive Maintenance, Root Cause Analysis, Boilers, Oil Field Operation, Production Operation, Plant Operation & Commissioning, Crude Oil De Salting Process, Gas Conditioning, NGL Recovery & NGL Fractionation, Flare System, Storage Tanks, Oil Recovery System and Chemical Injection.

Mr. Thanasis has acquired his thorough and practical experience as the **Project Manager, Plant Manager, Area Manager - Equipment Construction, Construction Superintendent, Project Engineer** and **Design Engineer**. His duties covered **Plant Preliminary Design, Plant Operation, Write-up of Capital Proposal, Investment Approval, Bid Evaluation, Technical Contract Write-up, Construction and Sub-contractor Follow up, Lab Analysis, Sludge Drying and Management of Sludge Odor and Removal**. He has worked in various companies worldwide in the **USA, Germany, England and Greece**.

Mr. Thanasis is a **Registered Professional Engineer** in the **USA** and **Greece** and has a **Master** and **Bachelor** degrees in **Mechanical Engineering** with **Honours** from the **Purdue University** and **SIU** in **USA** respectively as well as an **MBA** from the **University of Phoenix** in **USA**. Further, he is a **Certified Internal Verifier/Trainer/Assessor** by the **Institute of Leadership & Management (ILM)** and a **Certified Instructor/Trainer**.

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

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.
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.
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 “ <i>Operator’s Guide to Rotating Equipment: An Introduction to Rotating Equipment Construction, Operating Principles, Troubleshooting and Best Practices</i> ”, published by AuthorHouse.	

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	<i>Registration & Coffee</i>
0800 – 0815	<i>Welcome & Introduction</i>
0815 – 0830	PRE-TEST
0830 – 0930	Characteristics of Crude Oil <i>Composition of Petroleum • Hydrocarbon Gases Properties</i>
0930 – 0945	<i>Break</i>
0945 – 1100	Characteristics of Crude Oil (cont’d) <i>Salts Concentration • Emulsions • Function of Chemicals Used in the Process</i>
1100 – 1230	Oil Treating, Dehydration & Desalting <i>Emulsion Formation & Breaking • Vertical & Horizontal Theater Operation • Electrostatic Theatre Design/Operation • The Desalting Process/Equipment • Emulsion Treating</i>
1230 – 1245	<i>Break</i>
1245 – 1420	Oil Treating, Dehydration & Desalting (cont’d) <i>Separators – Free Water Knockout • Hetear Theatres – Other Treating Methods • Chemical – Electrical – Crude Oil Coolers (Heat Exchangers) • Control Valves Principles • Pumps Operation • Air Compressor Operation</i>
1420 – 1430	Recap
1430	<i>Lunch & End of Day One</i>

Day 2

0730 – 0930	Sequence of Desalter Plant Start-up
0930 – 0945	<i>Break</i>
0945 – 1100	Sequence of Desalter Plant Start-up (cont’d)
1100 – 1230	Direct-Fired Heaters <i>Design Considerations – Process & Combustion</i>
1230 – 1245	<i>Break</i>
1245 – 1420	Direct-Fired Heaters (cont’d) <i>Control System</i>
1420 – 1430	Recap
1430	<i>Lunch & End of Day Two</i>

Day 3

0730 – 0930	Air Coolers <i>Types – Forced and Induced Air • Key Operational Considerations</i>
0930 – 0945	Break
0945 – 1100	Air Coolers (cont'd) <i>Air vs Water Cooling • Troubleshooting</i>
1100 – 1230	Heat Exchangers <i>Types • Shell-and-Tube</i>
1230 – 1245	Break
1245 – 1420	Heat Exchangers (cont'd) <i>Heat Transfer Relation</i>
1420 – 1430	Recap
1430	Lunch & End of Day Three

Day 4

0730 – 0930	Pumps <i>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</i>
0930 – 0945	Break
0945 – 1100	Pumps (cont'd) <i>Wear Components • Canned Motor and Magnetic Drive Pumps • High Speed/Low Flow Pumps • Servicing and Condition Monitoring</i>
1100 – 1230	Compressors <i>Types, Styles and Configurations of Centrifugal and Axial Compressors • Construction Features • Mode of Operation</i>
1230 – 1245	Break
1245 – 1420	Compressors (cont'd) <i>Compressor Auxiliaries and Support Systems • Analyse Operating Curves for Surge, Stall and Choke • Define Appropriate Equipment for Safe Operation</i>
1420 – 1430	Recap
1430	Lunch & End of Day Four

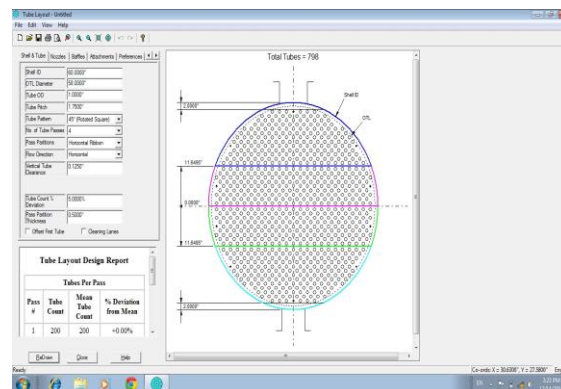
Day 5

0730 – 0930	Process Vessels <i>Types and Functions • Safety Aspects</i>
0930 – 0945	Break
0945 – 1100	Valves <i>Valve Theory • Valve Types • Applications • Function • Operation • Troubleshooting</i>
1100 – 1230	Troubleshooting of Different Equipment & Processes
1230 – 1245	Break
1245 – 1345	Troubleshooting of Different Equipment & Processes (cont'd)
1345 – 1400	Course Conclusion
1400 – 1415	POST-TEST
1415 – 1430	Presentation of Course Certificates
1430	Lunch & End of Course

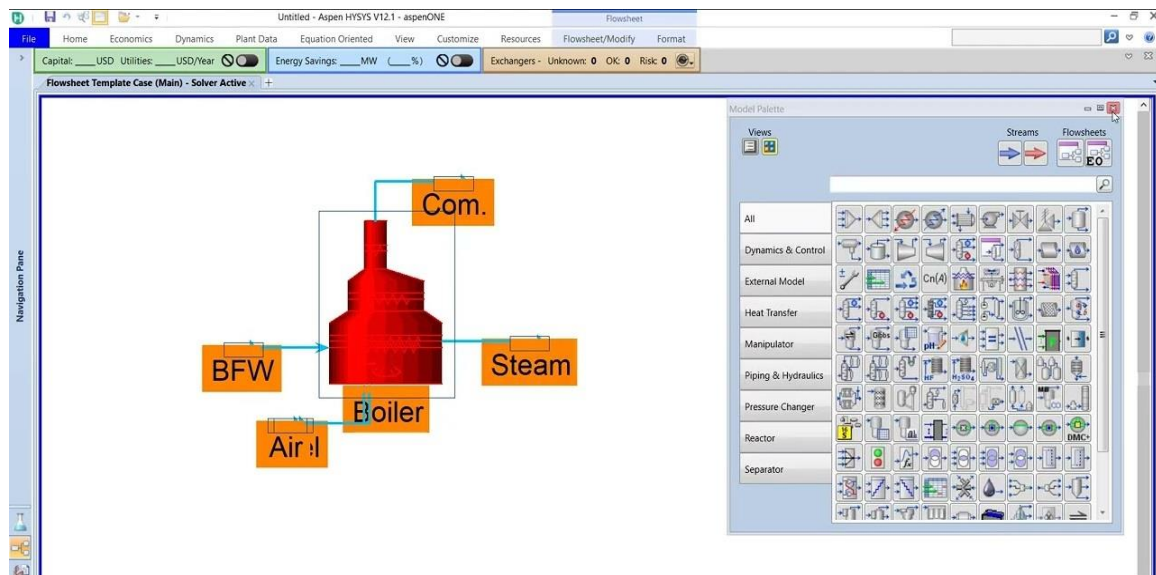


Simulator (Hands-on Practical Sessions)

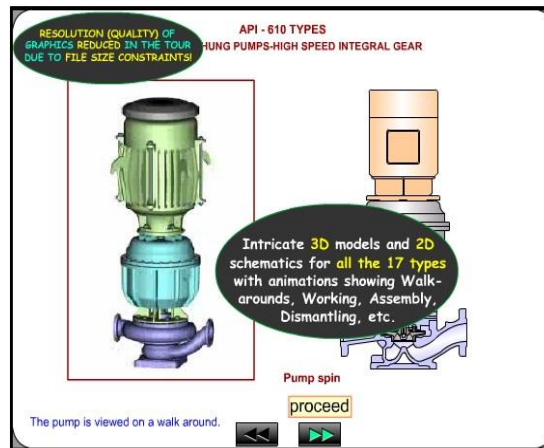
Practical sessions will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using our state-of-the-art simulators “Heat Exchanger Tube Layout”, “ASPEN HYSYS V12.1”, “Centrifugal Pumps and Troubleshooting Guide 3.0”, “SIM 3300 Centrifugal Compressor”, “CBT on Compressors”, “Valve Sizing Simulator”, “Valve Simulator 3.0”, “Valvestar 7.2 Simulator” and “PRV²SIZE Simulator”.



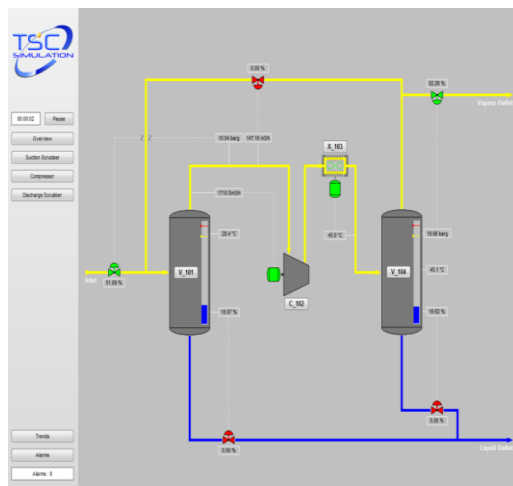
Heat Exchanger Tube Layout Simulator



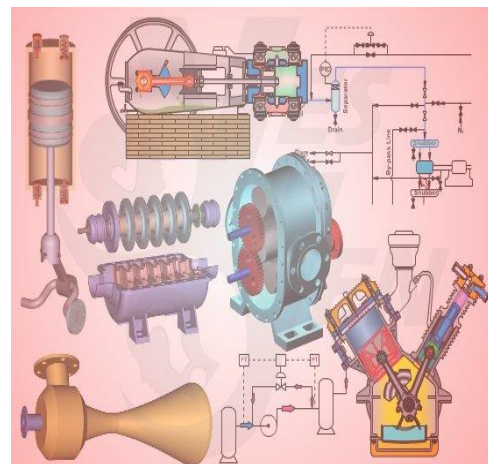
ASPEN HYSYS V12.1 Simulator



Centrifugal Pumps and Troubleshooting Guide



SIM 3300 Centrifugal Compressor Simulator



CBT on Compressors



Control valve sizing

Unit of pressure : Bar (100000 Pa)

- Upstream steam conditions (Gauge pressure) : 40 Bar
- Superheated steam temperature (optional) : °C
- Downstream steam conditions (Gauge pressure) : 15 Bar
- Temperature of condensate recovery (optional) : °C

Steam properties

Amount	Avail
- Temperature of vaporization	251,82 °C / 201,40 °C
- Specific mass of steam	20,625 kg/m ³ / 8,091 kg/m ³
- Specific enthalpy (Total heat) of steam	2 791,75 kJ/kg / 1 933,04 kJ/kg
- Specific latent heat (vaporization)	

Liquid Flow | **Kv-Value**

The actual Flow (Q) of a specific fluid in m³/h, with a specific Pressure drop (D p) in bar across the valve and a fluid density (d) in kg/dm³ is:

Kv-value : 12 Kv

Resultant values

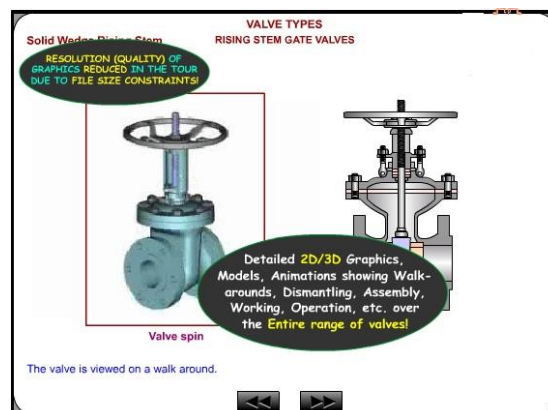
Steam mass flow rate	5 520,60 kg/h
Steam flow rate at outlet valve	682,31 m ³ /h
Equivalent thermal power	2 964,00 kW/h

Attention with the decimals: Comma in French and dot in English (see Windows configuration in country parameters)

Validater Ok

©2001 Jean Yves MESSE

Valve Sizing Simulator



Valve Simulator 3.0

Valvestar 7.2.3

File Edit View Medium Sizing Value Documentation Tools Help

Projects

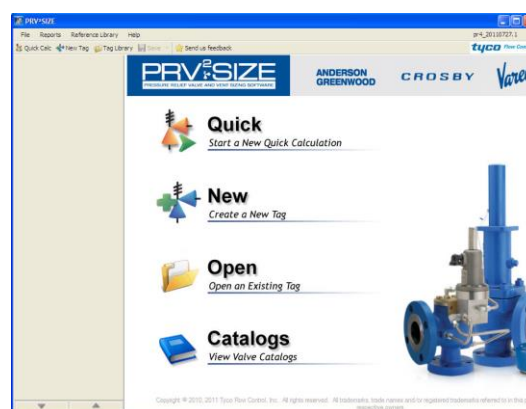
File case

Use this page to specify a type and size of a vessel, its head design, the height of a medium in the vessel along with other related

Calculation type	Unsettled
Type of vessel	Horizontal
Vessel head design	Flat head
Vessel diameter	D
Vessel length	L
Required surface area of the vessel, calculated	A _c
Required surface area of the vessel, manual	A _m
Vessel wall temperature	T _w
Set pressure	P
Temperature	T
Normal operating gas pressure	P _n
Normal operating gas temperature	T _n
Coefficient of discharge	K _d
Minimum value of factor F	F _{min}
Minimum required mass flow	W
Minimum required effective discharge area	A

Help Back Next Finish Cancel

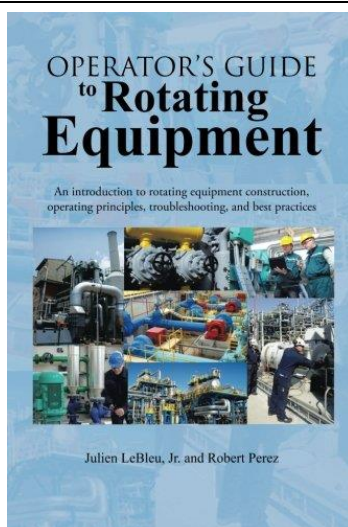
Valvestar 7.2 Simulator



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

Mari Nakintu, Tel: +971 2 30 91 714, Email: mari@haward.org