COURSE OVERVIEW PE0052
Chemical Engineering for Non-Chemical Engineers

Course Title
Chemical Engineering for Non-Chemical Engineers



Course Date/Venue
Session 1: January 31-February 04, 2027/Meeting Plus 9, City Centre Rotana, Doha, Qatar
Session 2: September 19-23, 2027/Meeting Plus 9, City Centre Rotana, Doha, Qatar

Course Reference
PE0052

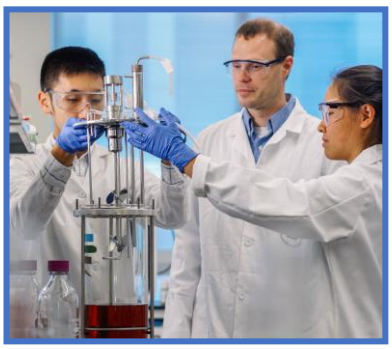


Course Duration/Credits
Five days/3.0 CEUs/30 PDHs

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.

This course is designed to provide participants with a detailed and up-to-date overview of Chemical Engineering for Non-Chemical Engineers. It covers the process flow diagrams (PFD's), piping and instrumentation diagrams (P&ID's) and process legends used in flow sheets; the stoichiometry, fluid mechanics and heat and mass transfer and its applications; the first and second law of thermodynamics, chemical reaction equilibrium, conversion of heat into work by power cycles and refrigeration and liquification; the kinetics of homogenous reactions, reactor design, single ideal reactors and petroleum processes reactions; and the hydrocracking, reforming and reactivating catalysts.

During this interactive course, participants will learn the process equipment design covering storage vessels, pressure vessels, reactors, heat exchangers and evaporators and crystallizers; the distillation and fractionation equipment and process hazards and safety measures; the process control and instrumentation, risk evaluation, risk management, HAZOP and PHA; and the accounting and cost control, manufacturing -cost estimation and fixed and capital cost estimation.

Course Objectives/Outcomes & Benefits for the Participants

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

- Apply and gain a good working knowledge on chemical engineering
- Discuss process flow diagrams (PFD's), piping and instrumentation diagrams (P& ID's) and process legends used in flow sheets
- Recognize stoichiometry, fluid mechanics and heat and mass transfer and its applications
- Explain the first and second law of thermodynamics, chemical reaction equilibrium, conversion of heat into work by power cycles and refrigeration and liquification
- Identify kinetics of homogenous reactions, reactor design, single ideal reactors and petroleum processes reactions
- Describe hydrocracking, reforming and reactivating catalysts
- Illustrate process equipment design covering storage vessels, pressure vessels, reactors, heat exchangers and evaporators and crystallizers
- Recognize distillation and fractionation equipment and process hazards and safety measures
- Apply process control and instrumentation, risk evaluation, risk management, HAZOP and PHA
- Carryout accounting and cost control, manufacturing -cost estimation and fixed and capital cost estimation

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

The course provides an overview of all significant aspects and considerations of chemical engineering for non-chemical engineers such as industrial engineers, electrical engineers, mechanical engineers, civil engineers, control & instrumentation engineers, plastics and material engineers, maintenance engineers, food scientists, environmental engineers, chemists, maintenance supervisor, shift trades people and other environmental, chemical, laboratory, operations, process and production technical staff.

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 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. 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 **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

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.

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	***Process Flow Sheet*** *Process Flow Diagrams (PFD's) • Piping and Instrumentation Diagrams (P& ID's) • Process Legends Used in Flow Sheets*
0930 - 0945	*Break*
0945 – 1200	***Stoichiometry*** *Dimensions and Units • Processes and Process Variable • Process Data Representation and Analysis • Basic Chemical Calculations Material Balance without Chemical Reactions • Material Balance with Chemical Reactions • Energy Balance • Combustion*
1200 – 1215	*Break*
1215 - 1345	***Fluid Mechanics*** *Basic Principles • Basic Equations and Fluid Flow • Fluid Head • Calculations*
1345 - 1420	***Fluid Mechanics (cont'd)*** *Piping • 2 Phase Flow • Turbomachinery*
1420 – 1430	***Recap***
1430	*Lunch & End of Day One*

Day 2

0730 – 0930	***Heat Transfer and Its Applications*** *Types of Heat Transfer • Principles of Heat Flow in Fluids*
0930 – 0945	*Break*
0945 – 1100	***Heat Transfer and Its Applications (cont'd)*** *Heat Transfer Equipment*
1100 – 1230	***Mass Transfer and Its Applications*** *Distillation • Adsorption • Leaching & Extraction*
1230 – 1245	*Break*
1245 – 1420	***Mass Transfer and Its Applications (cont'd)*** *Liquid /Liquid Extraction • Gas Absorption • Crystallization • Drying of Solids*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Two*

Day 3

0730 – 0900	***Chemical Engineering Thermodynamics*** *Fundamental Quantities • First Law of Thermodynamics • Second Law of Thermodynamics*
0900 – 0915	*Break*
0915 – 1100	***Chemical Engineering Thermodynamics (cont'd)*** *Chemical Reaction Equilibrium • Thermodynamics of Flow Processes • Conversion of Heat into Work by Power Cycles • Refrigeration & Liquification*
1100 – 1230	***Chemical Kinetics*** *Basic Definitions • Kinetics of Homogenous Reactions • Introduction to Reactor Design • Single Ideal Reactors • Petroleum Processes Reactions*
1230 – 1245	*Break*
1245 – 1420	***Chemical Kinetics (cont'd)*** *Hydrocracking • Reforming • Reactivating Catalysts*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Three*

Day 4

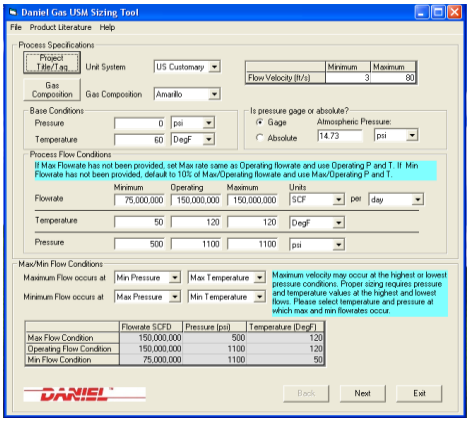
0730 – 0830	***Process Equipment Design*** *Design Considerations • Storage Vessels • Pressure Vessels*
0830 - 0930	***Process Equipment Design (cont'd)*** *Reactors • Heat Exchangers • Evaporators and Crystallizers*
0930 - 0945	*Break*
0945 – 1230	***Process Equipment Design (cont'd)*** *Distillation and Fractionation Equipment • Agitators • Filters*
1230 – 1245	*Break*
1245 - 1420	***Process Equipment Design (cont'd)*** *Dryers • Process Hazards and Safety Measures • Fundamentals of Computer Aided Design*
1420 - 1430	***Recap***
1430	*Lunch & End of Day Four*

Day 5

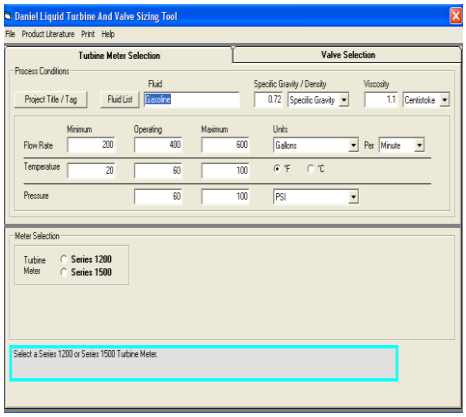
0730 – 0830	***Process Control and Instrumentation*** *Quantities of Measurement • Process Instrumentation • Temperature Pressure • Level • Flow*
0830 - 0930	***Risk Analysis*** *Risk Evaluation •Risk Management • HAZOP • PHA*
0930 - 0945	*Break*
0945 - 1230	***Process Economics*** *Investment & Profitability • Accounting & Cost Control • Manufacturing - Cost Estimation • Fixed & Capital Cost Estimation*
1230 – 1245	*Break*
1245 - 1345	***Into the Future*** *Advanced Process Control & Artificial Intelligence*
1345 – 1400	***Course Conclusion***
1400 – 1415	***POST-TEST***
1415 – 1430	*Presentation of Course Certificates*
1430	*Lunch & End of Course*

Simulator (Hands-on Practical Sessions)

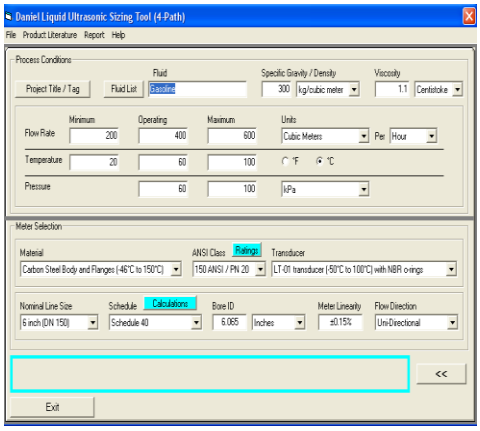
Practical sessions will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using "Gas Ultrasonic Meter (USM) Sizing Tool Software", "Liquid Turbine Meter and Control Valve Sizing Tool Software", "Liquid Ultrasonic Meter Sizing Tool Software", "Orifice Flow Calculator Software", "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", "Valve Sizing Software", "Valve Software 3.0", "Valvestar 7.2 Software", "PRV²SIZE Software", "ASPEN HYSYS" simulator and "DWSIM software".



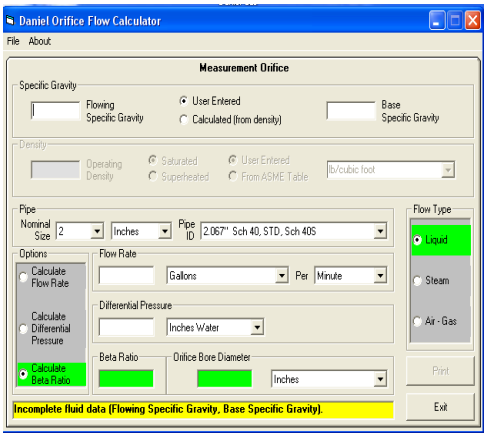
Gas Ultrasonic Meter (USM) Sizing Tool Software



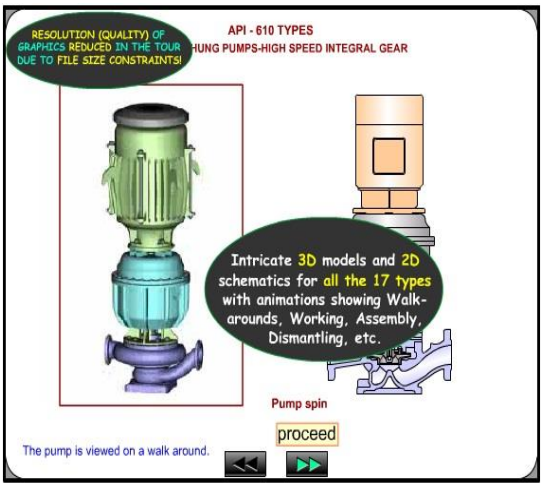
Liquid Turbine Meter and Control Valve Sizing Tool



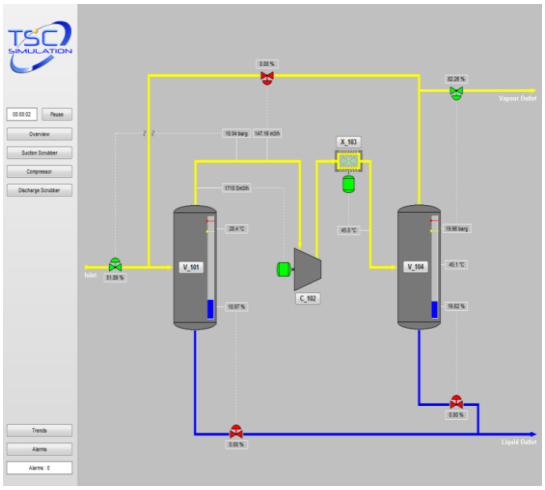
Liquid Ultrasonic Meter Sizing Tool Software



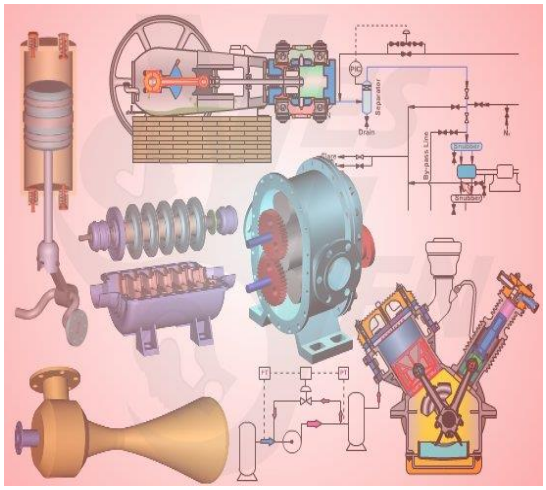
Orifice Flow Calculator Software



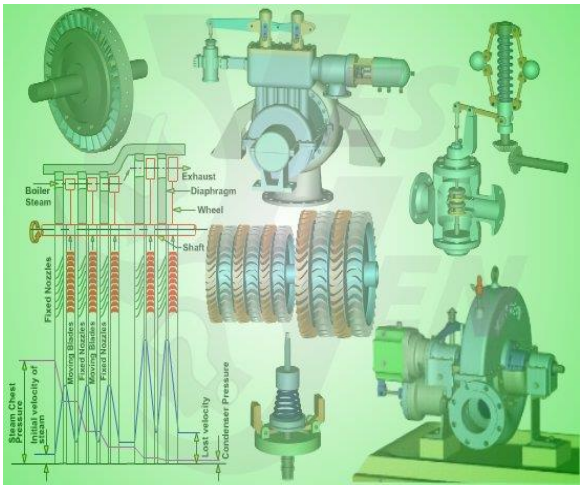
Centrifugal Pumps and Troubleshooting Guide 3.0



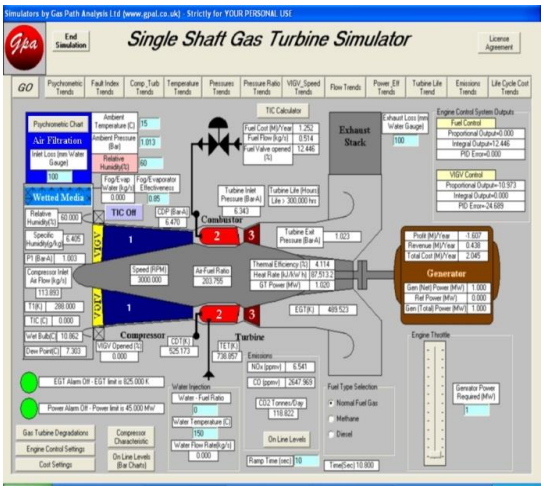
SIM 3300 Centrifugal Compressor Simulator



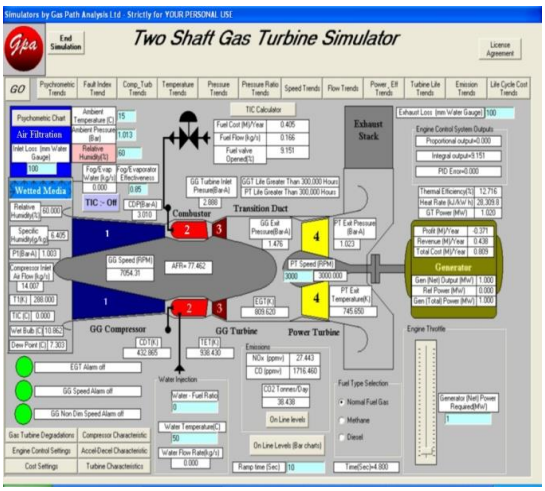
CBT on Compressors



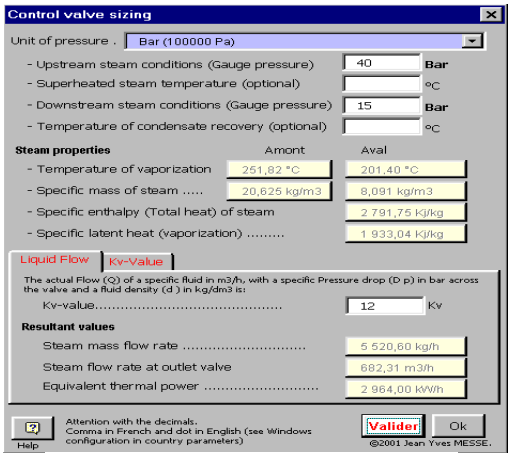
Steam Turbines & Governing System CBT



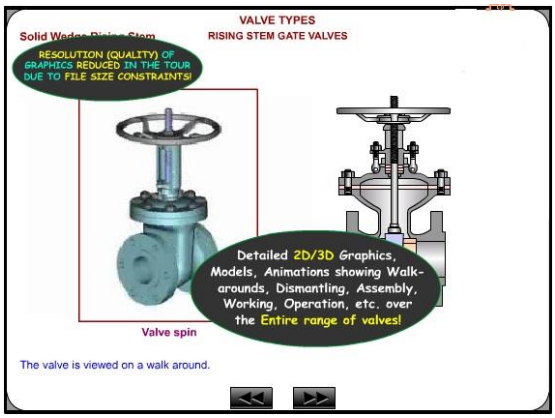
Single Shaft Gas Turbine Simulator



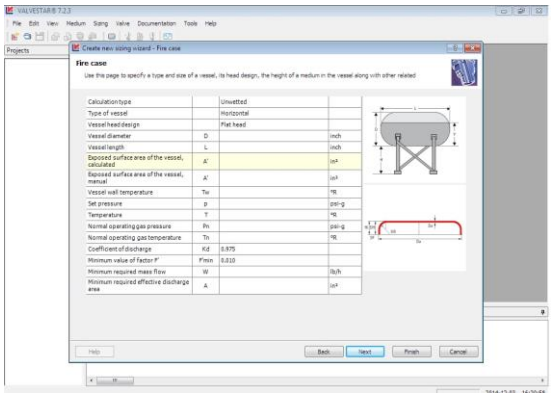
Two Shaft Gas Turbine Simulator



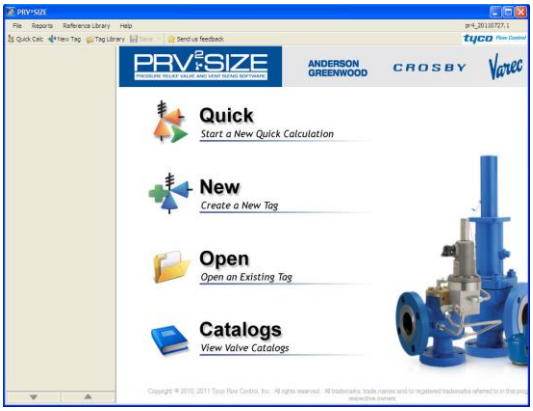
Valve Sizing Software



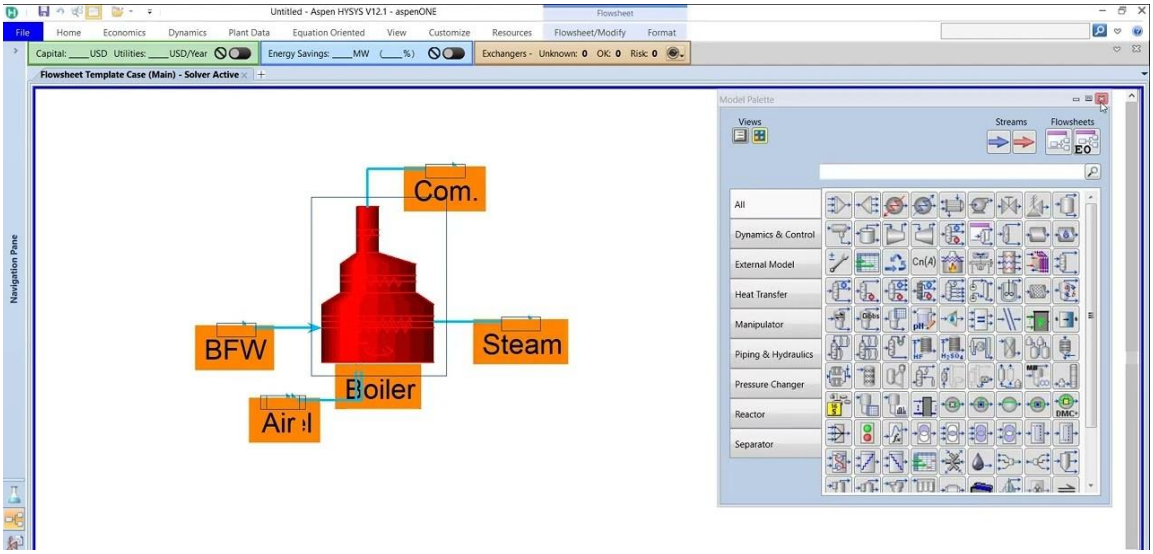
Valve Software 3.0



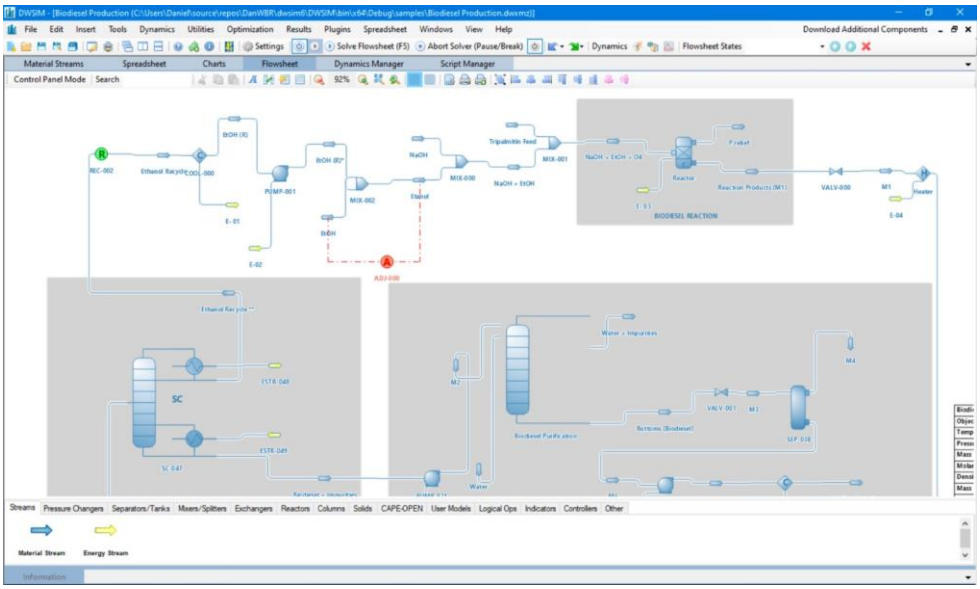
Valvestar 7.2 Software



PRV²SIZE Software



ASPEN HYSYS V14 Simulator



DWSIM software

Course Coordinator

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