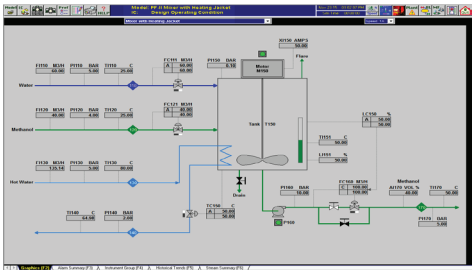
EnVision
e-Learning & Universal Simulation

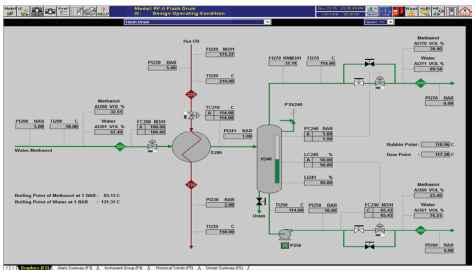
Process Fundamentals–II Simulation

The Process Fundamentals simulation is a series of rigorous and high-fidelity process equipment models that provide a realistic response for process dynamics, equipment principles, operating principles and process control.

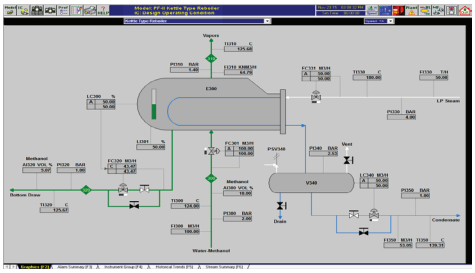
Mixer with Heating Jacket: This simulated experiment explains the principles of component mass and heat balance. The simulation model consists of a stirred tank with a heating coil. Water and methanol streams enter the tank under flow control and are well mixed. The mixture temperature is controlled via heating coil, heated by hot water. The heated mixture from the tank is pumped by a pump under tank level control



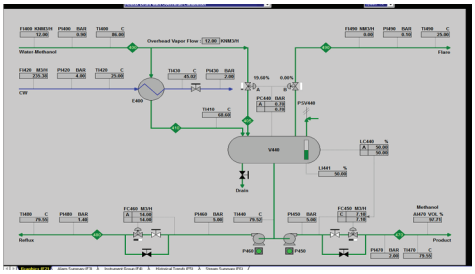
Flash Drum: This simulated experiment explains the principles of vapor-liquid equilibrium. The simulation model consists of a flash drum, heat exchanger and pump. A mixture of water and methanol is first heated in a heat exchanger under temperature control and then enters a flash drum. The mixture is flashed based upon the drum pressure, and the liquid and vapor are separated. The vapors leave the drum under drum pressure control, while the liquid leaves the bottom under drum level control.



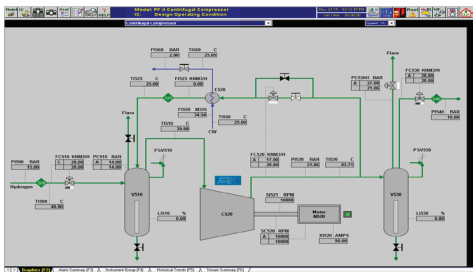
Kettle Type Reboiler: This simulated experiment explains the principles of a kettle-type reboiler. The simulation model consists of a typical kettle-type reboiler and steam condenser pot. A mixture of water and methanol enters the reboiler at the bottom on the shell side and vaporize by condensing steam on the tube side. The water-methanol liquid level in the reboiler is controlled by means of bottom draw flow control. The reboiler heat duty is controlled by steam flow control. The condensed steam enters a condenser pot, where the condensed water level is controlled by condensate draw at the bottom.



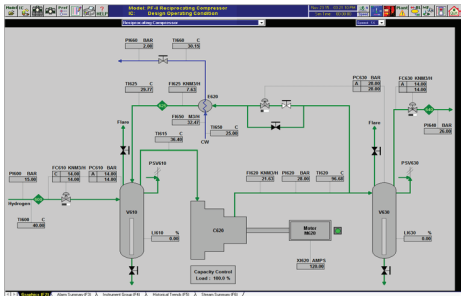
Reflux Drum with Overhead Condenser: This simulated experiment explains the principles of a typical overhead vapor condenser. The simulation model consists of an overhead condenser and reflux drum. A hot vapor mixture of water and methanol under flow control splits into two streams. One stream enters a water-cooled condenser where the vapor mixture condenses and sub-cools, while the other stream bypasses the condenser and enters the reflux drum directly. The reflux drum pressure is controlled by a split range pressure controller. The condensed liquid leaves reflux drum under level control.



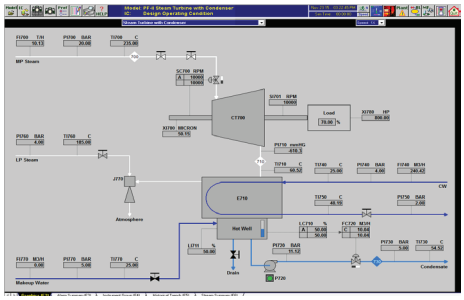
Centrifugal Compressor: This simulated experiment explains the principles of a typical centrifugal compressor. The simulation model consists of a typical centrifugal compressor with the suction and discharge tank. Hydrogen gas is compressed in single stage centrifugal compressor driven by a variable speed motor. The compressed hydrogen leaves under flow control. A spill back control strategy is used for compressor surge protection. A speed control is provided to control the speed of the compressor.



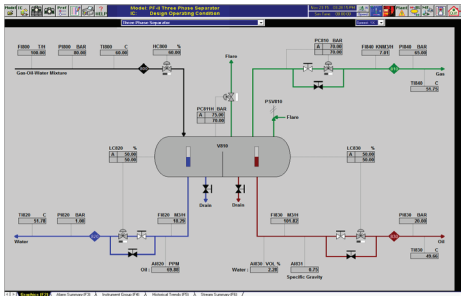
Reciprocating Compressor: This simulated experiment explains the principles of a typical reciprocating compressor. The simulation model consists of a typical reciprocating compressor with the suction and discharge tank. Hydrogen gas is compressed in single stage reciprocating compressor driven by a motor. The compressor has capacity control to vary the compression volume. The compressed hydrogen leaves under flow control. A spill back line is provided to control the discharge drum pressure.



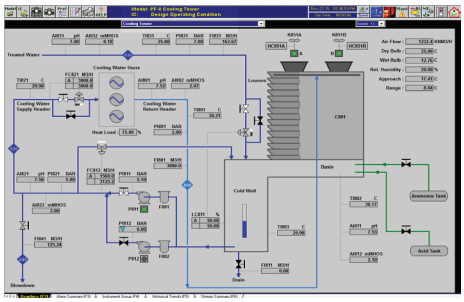
Steam Turbine with Condenser: This simulated experiment explains the principles of a typical steam turbine with a water-cooled condenser and an eductor system, using a steam ejector. The simulation model consists of a typical steam turbine, water-cooled condenser and steam ejector. The exhaust steam from the turbine is condensed in a water-cooled condenser. The condensed water accumulates at the bottom in a hot well. The condensed water leaves the hot well under level control. The steam turbine shaft is connected to a load with a user settable load control. The load could be from a compressor, generator or some other source.



Three Phase Separator: This simulated experiment explains the principles of a typical three phase separator. The simulated model consists of a typical three phase separator with associated control strategies. The feed to the separator is a three phase mixture from an oil-well containing gas, oil and water. The gas-oil-water feed enters the separator through a control valve and is separated into three phases: oil, water and gas. The oil overflows from the first compartment and leaves the separator under level control. The water settling in the first compartment also leaves the separator under level control. The separator pressure is controlled by a pressure controller that controls the flow of gas from the separator. The separator also has an over-pressure controller that vents out excess vapor to the flare, in the event of over-pressurization.



Cooling Tower: The cooling tower consists of a single cell provided with two induced draft fans at the top of the tower. The “return water” which comes from the cooling water users is at a higher temperature; it enters the cooling water return header and is sprayed downwards through the cell in a counter-current flow to the upward draft of air. The water is cooled by evaporation and by sensible heat exchange with the air. The cooled water from the cold well is then pumped to the cooling water users. To reduce the total dissolved solids (TDS) in cooling water, a blowdown line is provided at the discharge of the cooling water supply pump. The pH of the cold well water is maintained in an acceptable range by addition of acid and ammonia.



- Simulation comes with a Learning Management System (LMS) called SimAdmin that allows an instructor to register trainees and monitor their performance
- Simulation is available as Standalone (Single or Dual Monitor) and Instructor-Trainee versions

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