EnVision
e-Learning & Universal Simulation

Hydrogen Unit with PSA Purification

A self-paced MultiMedia based Tutorial/CBT and real-time dynamic simulation of a Hydrogen Unit with PSA Purification.

Tutorial/CBT:

This interactive tutorial provides an Overview, Fundamental Principles, and Control and Operating Principles for a Hydrogen Unit with PSA Purification using Voice, Video, Animation and Graphics.

Overview
- Introduction
- Importance of Hydrogen
- Process Overview
- Personal Safety

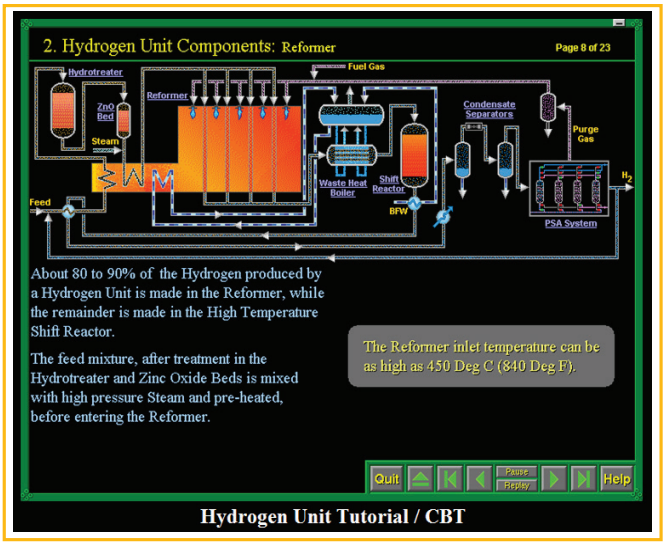
Hydrogen Unit Components
- Feed Preparation
- Hydrotreater
- ZincOxide Bed
- Reformer
- Waste Heat Boiler
- High Temperature Shift Reactor
- Pressure Swing Adsorption System

Principles of Hydrogen Unit
- Feed Treatment
- Reforming Reaction
- Shift Reaction
- PSA Purification

Key Controlled and Operating Variables
- Recycled Hydrogen Flow
- Tube Outlet Temperature
- Steam to Carbon Ratio
- HTS Reactor Temperature
- PSA System

Startup Operation
- Pre-Startup Check
- Catalyst Loading
- Warming Up
- Commissioning

Shutdown Operations
- Normal ShutdownOperation
- Emergency Shutdown



Hydrogen Unit Tutorial / CBT

Safeguard Systems
- Introduction
- Emergency Shutdown (ESD)
- Reformer Furnace Shutdown

Troubleshooting
- High Hydrocarbon in Reformer Effluent
- High Pressure Drop
- Poor Burner Operation
- Poor Quality of Boiler Feed Water and Steam
- Mechanical Failures
- PSA System

- Tutorial has a built-in Quiz and comes with a Learning Management System (LMS) called TutAdmin. The LMS allows an instructor to register trainees and monitor their performance and Quiz scores
- Tutorial is available as a Standalone or Web based application
- Available in English, Chinese, Danish, Dutch, French, German, Spanish and Swedish

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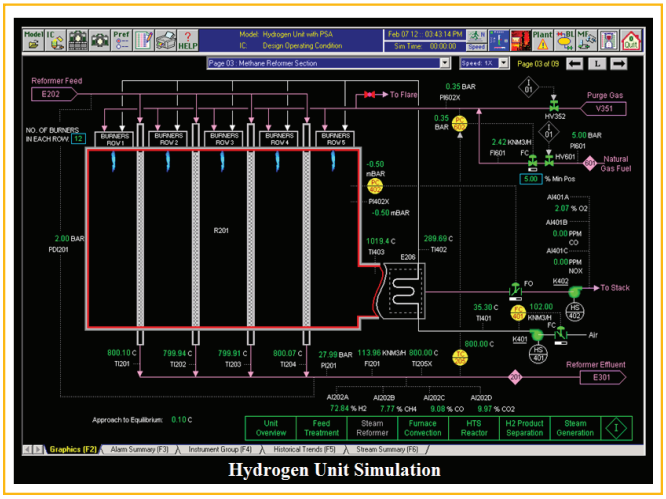
Simulation

GSE's EnVision simulation is a real-time dynamic process simulation program used for Operator Training. It is based upon a rigorous and High-Fidelity mathematical process model to provide a realistic dynamic response of a process unit.

The Simulator allows a Trainee to Practice:

- Startup and Shutdown Operations
- Normal Operations
- Emergency Shutdown Operation
- Control Exercises
- Troubleshoot and practice recovery from Equipment, Instrument, and Control Valve Malfunctions

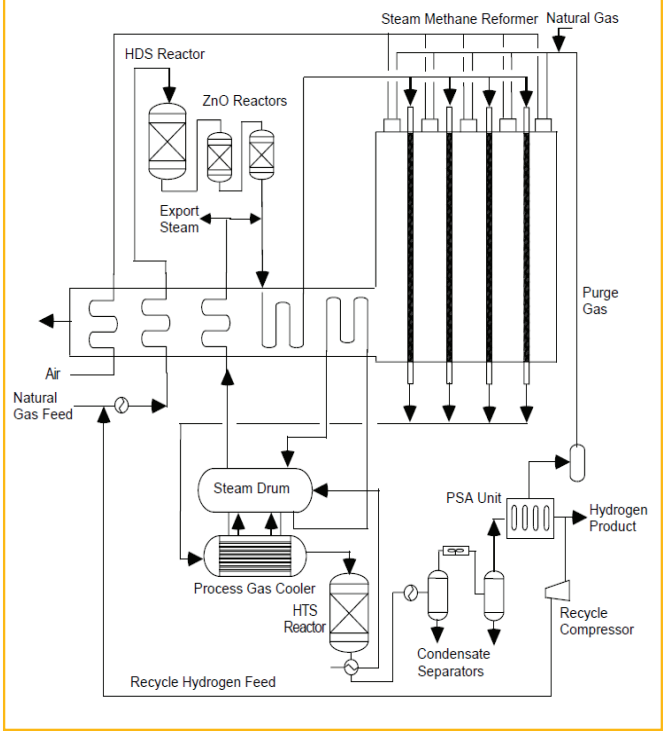


Major Equipment:

- Hydrodesulphurization (HDS) Reactor
- Zinc Oxide (ZnO) Reactors
- Top Fired Steam Methane Reformer (SMR)
- Reformer Flue Gas Heat Recovery Section
- Process Gas Cooler
- High Temperature Shift (HTS) Reactor
- Condensate Separators
- PSA Unit (Simplified)
- Steam Drum

Key Operating Variables:

- Natural Gas Feed: 17 KNM3/H (600 MSCFH)
- Recycle Hydrogen Feed: 4.5 KNM3/H (160 MSCFH)
- HDS Reactor Temperature: 350 C (660 F)
- ZnO Reactor Temperature: 350 C (660 F)
- Reformer:
  - Steam to Carbon Ratio: 3.9 Mol/Atom
  - Temperature: 800 C (1470 F)
  - Pressure: 28 BAR (405 PSIG)
- HTS Reactor Temperature: 330 C (625 F)
- Hydrogen Product:
  - Flow: 41 KNM3/H (1460 MSCFH)
  - Purity: 99.9 % Hydrogen
  - Purge Gas Flow: 25 KNM3/H (860 MSCFH)
- Steam Generation:
  - Pressure: 40 BAR (580 PSIG)
  - Total Steam Generation: 100 T/H (220 MLB/H)
  - Export Steam: 46 T/H (101 MLB/H)



- 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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