Ultra Low Sulfur Diesel Hydrotreating Simulation and Tutorial

A self-paced MultiMedia based Tutorial/CBT and real-time dynamic simulation of an Ultra-Low Sulfur Diesel Hydrotreating Unit.

**Tutorial/CBT:**

This interactive tutorial provides an Overview, Fundamental Principles, and Control and Operating Principles for an Ultra-Low Sulfur Diesel / Gas-Oil Hydrotreater Unit using Voice, Video, Animation and Graphics.

**Overview**

- Introduction
- Importance of Hydrotreating (HDS)
- Various Hydrotreating (HDS) Processes
- Diesel-HDS Unit Overview

**Key Process Variables**

- Unit Pressure
- Reactor Temperature
- Quench Strategy
- Separator Temperatures
- Wash Water
- Treat Gas Rate and Hydrogen Purity
- Feed Vaporization
- Hydrogen Partial Pressure
- Hydrogen Consumption
- Product Stripper and Vacuum Drier

**HDS Components**

- Feed Preparation and Preheat Section
- Reactor Section
- Reactor Effluent Cooling and Separation Section
- Amine Absorber
- Recycle Gas Compressor
- Make-up Hydrogen
- Product Stripping Section

**Principles of HDS**

- Hydrotreating Reactions
- Reaction Kinetics
- Hydrotreating Catalyst
- Catalyst Deactivation and Regeneration

**Startup Operation**

**Shutdown Operation**

**Safeguard System**

- Introduction
- Unit Depressurization
- Reactor High Temperature Shutdown
- Reactor Feed Shutdown
- Feed Furnace Shutdown
- Recycle Gas Compressor Shutdown
- High Pressure Separator Safeguards
- Absorber Safeguards

**Troubleshooting**

- High Reactor Temperature
- Loss of Feed to Reactor
- Loss of Recycle Gas Compressor
- Loss of Make-up Hydrogen
- Loss of Stripping Steam
- Wet Diesel Product

• 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
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:
- Feed Surge Drum
- Feed Furnace
- Reactor with Three Beds
- High & Low Pressure Separator
- High Pressure Amine Absorber
- Recycle Gas Compressor
- Make-Up Gas Compressor
- Product Stripper with Reboiler
- Tail Gas Compressor

Key Operating Variables:
- Reactor Feed Total: 400.0 M3/H (60 MBPD)
- SR LGO: 300.0 M3/H (45 MBPD)
- Kerosene: 40.0 M3/H (6 MBPD)
- LCO: 40.0 M3/H (6 MBPD)
- Coker / Visbreaker LGO: 20.0 M3/H (3 MBPD)
- Make-up Hydrogen: 31.5 KNM3/H (1115 MSCFH)
- Diesel Product: 393.4 M3/H (59.4 MBPD)
- Wild Naphtha: 10.6 M3/H (1.6 MBPD)
- Off Gas Product: 2934 NM3/H (104 MSCFH)
- Reactor Inlet Pressure: 70 BAR (1015 PSIG)
- Reactor Inlet Temperature: 362.5 C (684.5 F)
- Reactor WABT: 394.1 C (741.5 F)
- Feed Sulfur: 0.96 Wt% S
- Feed Nitrogen: 207 PPM N
- Product Sulfur: 8.4 PPM S
- Product Nitrogen: 0.7 PPM N

- 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