EnVision
e-Learning & Universal Simulation

Natural Draft Furnace - Gas Fired

A self-paced MultiMedia based Tutorial/CBT and real-time dynamic simulation of a Natural Draft Furnace.

Tutorial/CBT:

This interactive tutorial provides an Overview, Fundamental Principles, and Control and Operating Principles for a Heating Furnace using Voice, Video, Animation and Graphics.

Overview
- Purpose of Furnace
- Applications of Furnace
- Types of Furnaces

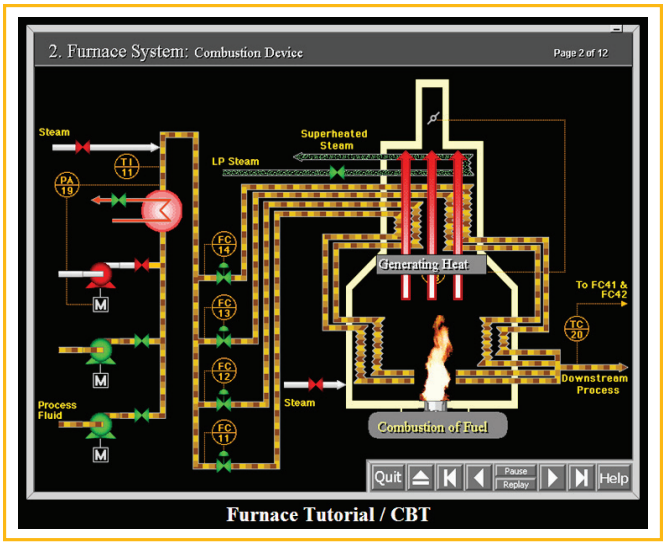
Furnace System
- Combustion Devices
- Heating Tubes
- Radiation Section
- Convective Section
- Heat Recovery Section
- Draft Devices and Stack

Furnace Performance
- Air Flow Rate & Excess Air
- Burner Characteristic
- Stack Damper
- Air Register
- Fuel Temperature
- Oil/Steam Ratio for Oil Burner
- Fuel Composition

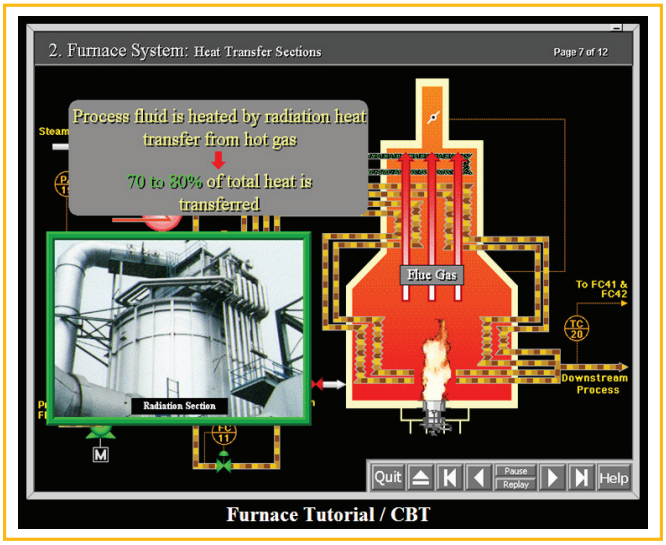
Furnace Operating Principles
- Pre-Startup Operations
- Startup Operations
- Shutdown Operations

Troubleshooting
- Leakage of Process Fluid
- Leakage of Economizer
- Flame-out

Monitoring of Key Parameters
- Flame Color and Length
- Furnace Efficiency
- Tube metal Temperatures, Hot Spots and Coking
- Excess Air
- Abnormal Combustion



Furnace Tutorial / CBT



Furnace Tutorial / CBT

- 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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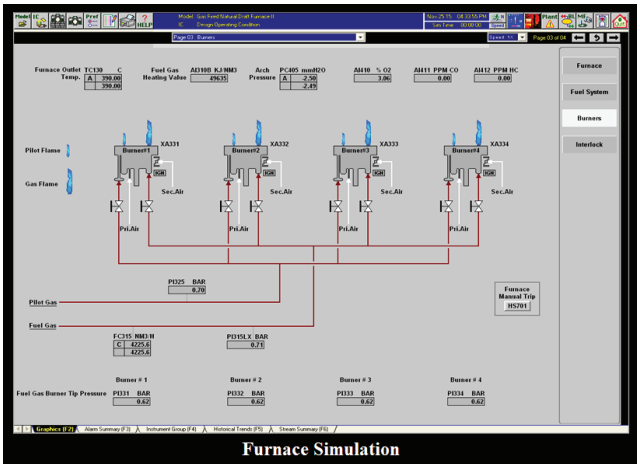
Simulation

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



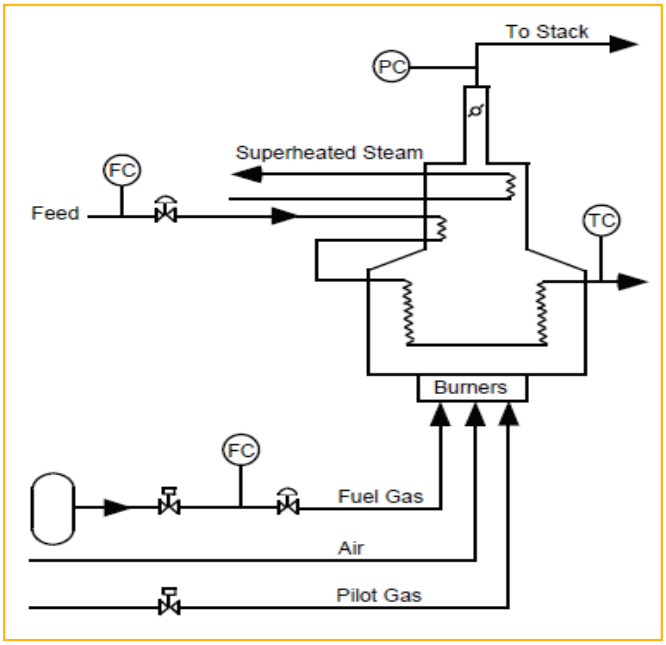
Furnace Simulation

Major Equipment:

- Box/Cabin Type with Floor Firing
- Two Passes
- Fuel Gas Firing
- 4 burners
- Air Register
- Steam Superheater
- Fuel Gas Knock-Out Drum
- Pilot Gas Line

Key Operating Variables:

- Feed: 400 M3/H (60 MBPD)
- Feed Inlet Temperature: 260 C (500 F)
- Feed outlet Tempature: 390 C (735 F)
- Vapor Fraction at the Outlet: 0.50 wt. basis
- Fuel Gas:
  - Flow: 4225.4 NM3/H (149.0 MSCFH)
  - Wobbe Index: 60.55 MJ/NM3 (1625.7 MBTU/MSCF)
- Pilot Gas Flow: 127.5 NM3/H (4.5 MSCFH)



- 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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