

REFERENCE POWER PLANT OPERATOR TRAINING SIMULATOR

The UNISIM Reference Power Plant Simulator consists of a comprehensive Model of a fossil-fired (coal, oil, gas) power plant. The simulator can be operated in the full, dynamic range, including start-up from cold condition, load maneuvering, and shutdown. The fully integrated simulator includes an Instructor Console, and Operator Stations. The Operator display software can be selected from a list of DCS emulations. The description of the power plant and the training features are summarized below.

CAPACITY:
210MW

FUELS:
Coal; Oil; Natural Gas

STEAM GENERATOR:
Drum type; Natural Circulation

FURNACE AIR AND GAS SYSTEMS:
2 Forced Draft Fans, 2 Included Draft Fans, 1 Igniter Fan, 1 Scanner Fan, Windbox, 1 Steam Air Preheater, 1 Regenerative Ljungstrom Air Heater, Soot blowers, Electro-static precipitator.

FUEL AND BURNER SYSTEMS:
4 Coal Feeders, 4 Pulverizers, 4 Exhauster Fans, 2 Ignition Oil pumps, 2 Fuel Oil Pumps, Fuel Gas Supply Line, Coal, Oil, and Gas Burners at 4 Levels.

BOILER WATER AND STEAM SYSTEMS :
Economizer, Steam Drum, Downcomer, Waterwalls, Primary Superheater, Secondary Superheater, Reheater, Turbine by-pass line, Attemperators for Superheater, Reheater, and Turbine bypass, Auxiliary Steam Header.

TURBINE AND GENERATOR SYSTEMS :
HP/IP/LP Turbines, EHC, Main Stop Valve with Bypass, 4 Turbine Control Valves, Reheat Stop/ Intercept Valve, Turbine Turning Gear, Turning Gear Oil Pump, 2 Turbine Lube Oil Pumps, Turbine Lube Oil Cooler, Turbine Lube Oil Collong Water Pump, Bearing vibration monitors, Rotor eccentricity monitor, Diff exp monitor, Generator w/ Exciter and Automatic Voltage Regulator, Syncroscope, Hydrogen Cooler, Hydrogen Seal Oil Pump, Stator Cooling water Pump.

CONDENSATE AND FEEDWATER SYSTEM EQUIPMENT :
Condenser, Air Ejector, 2 Circulating Water Pumps, 2 Condensate Pumps, Condensate Storage Tank, 1 Make-up Pump, Air Ejector Steam Condenser, Gland Seal Steam Condenser with Exhaust Fan, 1 Condensate Polisher Bed, 3 Low Pressure Heaters, Deaerator w/ Storage Tank, 2 High Pressure Heaters, 3 Boilers Feed pumps (motor driven).

INSTRUMENTATION :
42 Controllers, 17 Auto-Manual Control Stations, 16 Manual Stations, 123 Indicators, 130 Switches, 92 Alarms, Trips and Alarm Logic / Interlocks

GRAPHICS
Steam Generator Overview
Turbine/Generator & Condensate/Feedwater Overview
Pulverizers
Fuel Oil, Fuel Gas, and Burner Systems
Steam Generator Top
Air and Flue Gas system
HP/IP Turbine Details
LP Turbine details
LP Turbine and Generator Details
Feedwater Section
Condensate Section

HEAT RATE MONITOR
8 Key parameters are displayed on a page, including costs due to inefficiency.

INSTRUCTOR FUNCTIONS :
Pump trips
Fan trips
Turbine trip
Generator trip
Fuel trip
Tube Leaks
Valve malfunctions
Instrument malfunctions
Soot accumulation
False alarms
Air temperature
Circ water temperature
Low grade fuel
External load demand

REFERENCE PLANT PROGRAM MANUAL

Introduction
Process Description
Control System
Plant Operations
Plant Initial Conditions
Instructor Functions
Process Report

INSTRUCTOR STATION

ESIM Instructor station from ESDOTCOM enables the instructor to control and direct the training sessions. To improve the ease of instructor actions, a graphical user interface with multiple windows, scroll windows, pull down menus, icons, 3d push buttons and dialog boxes are provided. All actions can be enabled using a mouse pointer.

The PC Windows XP / 2000 based ESIM Instructor station combines the power, compatibility and simplicity with reduced learning time and greatly improved productivity.

Features

LOGIN

- User login
- Change password
- Model status display
- Customer information

MODE

- Startup mode
- Screenshot / backtrack
- Simulation speed
- Run/Hold

MALFUNCTIONS

- Failures
- Disturbances
- Instrument faults

FIELD DEVICES

- Block Valves
- Globe Valves

ADVANCED TRAINING

- Exercise
- Monitor

LOGGIN

- PV Logging
- Event Logging
- Alarm Logging
- Summary Report
- Message

TOOLS

- Model view for model developer
- Backup/Restore
- Training Database

HELP

- Instructor station user guide
- Operator station user guide
- Process model user guide.

OPERATOR STATION

ESIM (from ESDOTCOM) provides emulation for several standard DCS interfaces, including Yokogawa Centum XL, Yokogawa CS 3000 and Honeywell TDC3000.

All Functions and features that are essential for training are included. With ESIM, operators learn dynamic process interactions with the same in-depth understanding of your process as with full function direct connect operator-training stations.

ESIM operator station contains many standard features of the real DCS console. Using either the PC keyboard or simulated keyboard (on-screen keyboard) or ESIM emulated keyboard and touch screen /mouse, the trainee can operate the simulated plant.

The features of DCS that are available :

- Group and detailed displays
- Overviews
- Trends
- Schematics
- Alarms

UNISIM MODEL DEVELOPMENT

PACKAGE

Process modelling is implemented by using the UNISIM software development package. It has open architecture and offers complete flexibility to simulate the process dynamically and in real-time. It can be applied for a wide spectrum of applications, ranging from process operator training to complex control system studies.

The UNISIM Model Development Package consists of :

"UNISIM_ALGOBLIB" which has process building Algorithms for configuring the model.

"UNISIM_CALCLIB" which has coefficient calculation Algorithms corresponding to each algorithm in the ALGLIB.

"UNISIM_PROCESS_MONITOR" which allows the engineer to tune and time the model on-line.

- "ESIM-INST" for Instructor station to define failures, disturbances, etc.

- "ESIM-OPR" for Operator station to define tag details, grouping, etc.

UNISIM TECHNOLOGY, INC. is a USA based company with over thirty years of experience in the developing Dynamic Simulation Software for power plants. The UNISIM Model Development Package has been significantly enhanced by utilizing the experience gained over the years in configuration of various plant simulation custom models. This technology is used in the development of rigorous, hi-fidelity, dynamic simulation model for the Reference Power Plant. The Operator Training Simulator is being offered in association with ESDOTCOM of India, by integrating the UNISIM Plant Model with the Instructor and DCS emulation software developed by ESDOTCOM.

ESDOTCOM engineers have extensive experience in developing custom simulation models for various power plant configurations, utilizing the UNISIM Model Development package.

We will work with you to define the scope and cost for custom simulation model of your plants. We will need extensive data to develop such custom model:

- PFD, P&IDs
- Operating procedures (including startup and shutdown procedures)
- Instrument specifications (including trip logic)
- Equipment specifications (including pump/fan curves).
- Heat and material balance for the entire plant
- Training objectives for defining failures & disturbances to be simulated.

CUSTOMIZED VARIATIONS OF THE REFERENCE PLANT

- Higher/Lower Plant Capacity
- Forced Circulation with Boiler Water Circulation Pumps
- Supercritical Once-through Steam Generator
- Coal Mills w/o Exhausters : Add PA Fans
- Gas Recirculation Fan
- Completely custom process

TRAINING COURSES:

- Instructor course using the reference plant simulator to train operators (2 weeks)
- Power plant operation course for entry level operators (3 weeks)

ESDOTCOM
Support and Software Services pvt. Ltd.
#36, Kamaraj Avenue II Street,
Ph : 91-44-4456167, 4423418, 4404336
Fax : 91-44-4423942
Email : esdotcom@eth.net

UNISIM Technology, Inc.