PS5020: GAS TURBINE SIMULATOR

GAS TURBINE SIMULATOR

The Gas turbine simulator is a comprehensive, dynamic simulation of Gas turbine equipment. The simulator can be operated in the full dynamic range, including startup 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.

The power plant consists of a multi-stage air compressor, a multi-stage gas turbine and an electrical generator. The gas turbine uses gas/oil for fuel. The generator provides power to a 138 KV electrical grid. An Auxiliary buss of 4,160V is also provided for plant use.

Functionally, the gas turbine power plant can be divided into four main sections:

- Air section
- Fuel, Burner, and Combustion Section
- Turbine, Generator, and Electrical Section
- Plant Auxiliaries

Capacity

- 50 / 100 / 350 MW

Fuels: Natural Gas; Fuel Oil

Equipment:

Air System:

- Air intake louver, Air filter,
- Compressor for pulsation cleaning of air filter,
- Anti-icing air heater,
- Multi-Stage axial compressor with variable inlet guide vanes

Fuel Gas System:

ESD Valve, Knock-out drum, Steam heater, 2 Coalescing filters, Vent valves and Control valves for ignition and main fuel
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Fuel Oil System:
- Fuel Oil Tank, 2 Fuel Oil Pumps
- Steam Heater

Combustion Chamber:
- Main Burners
- Ignition Burners
- Flame Monitors
- Vibration Monitors

Turbine and Generator:
- Multi-Stage Gas Turbine
- Bearing vibration monitors, Rotor displacement and phase angle monitors,
- Turbine blades wash system,
- Generator w/ Exciter and Automatic Voltage Regulator, Syncroscope, Static start-up device, Main Transformer, Voltage Regulator Transformer,
- Air circulation fans and Water Coolers for air

Auxiliary Systems:
- Lube oil reservoir
- Electrical Heater
- Oil reservoir exhaust fan
- 1 Main lube oil pump, 1 Auxiliary lube oil pump, 1 Emergency lube oil pump
- Lube oil cooler
- 2 Lube oil filters
- 2 Power oil pumps
- 1 Power oil filter
- 1 Turbine gear oil pump
- 2 Oil pressure accumulators
Control system:
The following main functions are included:

- Acceleration Control
- Speed Control
- Temperature Control
- Start-up Control
- Shut-down Control
- Operating Limit

Instructor functions:

- Air temperature
- Air Humidity
- Grid Frequency
- Pump trips
- Compressor trip
- Turbine trip
- Generator trip
- Fuel trip
- Tube Leaks
- Valve malfunctions
- Instrument malfunctions
- False alarms.
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AIR SYSTEM

FUEL GAS SYSTEM
GAS TURBINE SIMULATOR BENEFITS:

- Savings in Start-up time
- Reduction in training time to bring new hires up to speed
- Increase in plant productivity – reduced energy costs, less downtime
- Trainee evaluation for job classification
- “What if” Analysis for operating procedures, control and logic modifications
- Facilitates regular rehearsal to maintain operating skills
- Validation of training skills