



Gas Turbine Power Generation

TYPE OF FACILITY

Electric Utility Provider

TYPE OF PLANT

Prime Power Generation
Utility Paralleled in Droop Base Load

PRIME MOVER

Rolls Royce Avon Gas Turbine
Inlet Fuel Pressure: 1100 psi
10.0 MW, 13.8 kV, 0.8 PF @ 60 Hz

CONTROL TECHNOLOGIES

Woodward GTC250

Gas Turbine Digital Control System for fuel control (governing), start / stop sequencing, turbine protection, and monitoring.

Woodward LQ25 / GS3

Liquid Fuel Metering Valve with Digital Driver

Wago Modules

Remote Input / Output Modules for Signal Expansion

Bently Nevada 3500

Independent Vibration Monitoring System

Woodward SPM-D

Generator Circuit Breaker Automatic Synchronizer

HMI System

Dual operator control stations communicating via Modbus TCP/IP. One touch-screen terminal in the control cabinet door and a desktop workstation in the plant control room for monitoring and control of the system.



PROJECT OVERVIEW

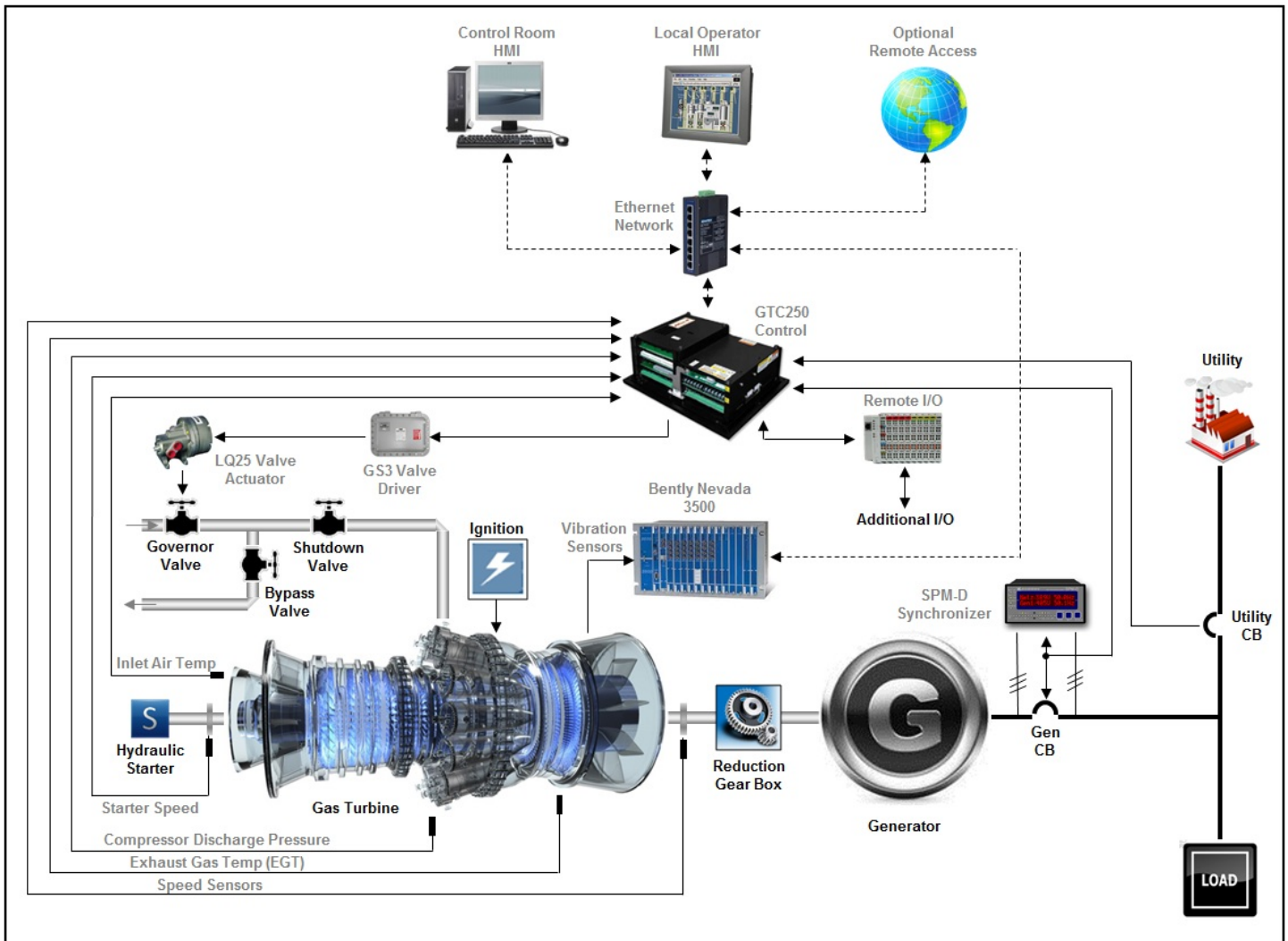
GCS supplied a gas turbine-generator control, monitoring, and fuel metering system for an electric utility provider as a retrofit package on an old outdated control system. The plant utilizes multiple turbines including this Rolls Royce Avon package rated for 10.0 MW @ 60 Hz.

The control system features the GTC250 Aero-Derivative Digital Gas Turbine Control with custom application software performing functions including automatic turbine start and stop sequencing, fuel control, and turbine protection. The GTC250 control is based on the Woodward Atlas-II hardware platform that includes PC-based technology with an industrial Pentium CPU Processor and on-board solid state hard drive.

The GTC250 interfaces to an electric LQ25 liquid fuel metering valve through a digital GS3 valve driver. The central control system includes remote I/O modules for field device expansion to include all necessary signals from the gas turbine. An SPM-D synchronizer is used to control the generator circuit breaker in order to bring the generator online. GCS has also included a complete Bently Nevada 3500 vibration monitoring system and packaged the controls in a double-sided, double-bay free-standing control cabinet.

Central monitoring and control is performed via a custom HMI system featuring an industrial grade touch-screen terminal in the control cabinet door along with a second desktop workstation in the plant control room. The HMIs provide the operator with complete system control including starting, stopping, and synchronization of the turbine.





CONTROL SYSTEM FEATURES

Control System Cabinet

- Single Freestanding Enclosure (72"Wx36"Lx84"H)
- Door Mounted Touch-Screen HMI
- Dual AC Power Supply Feeds
- Redundant DC Power Supplies
- Dedicated Hardwired Safety Trip System

Turbine Control: Woodward GTC250 System

- Fuel Control / Governing
- Automatic Start / Stop Sequencing
- Critical Speed Range Avoidance
- Protection and Alarm Handling
- Interface to Remote I/O Module Network
- Interface to GS3/LQ Driver and LQ Actuator
- Ethernet Network to HMI System

Generator Synchronization: Woodward SPM-D

- Dead Bus Control or Live Bus Synchronizing
- Operation Controlled via GTC250 System
- Interface to Automatic Voltage Regulators

Vibration Protection: Bently Nevada 3500

- Protection Independent to GTC250 System
- Low and High Speed Keyphasors
- Accelerometer and Axial Thrust Monitoring
- Dual Turbine Compressor Velocity Sensors
- Power Turbine Vibration Monitoring
- Reduction Gearbox Vibration Monitoring
- Ethernet Network to HMI System

HMI / SCADA System

- Control Room Desktop HMI Workstation
- Second HMI Mounted in Control Cabinet Door
- Industrial Grade 17" Color Touchscreen Terminal
- On-Board Solid State Hard Drive (Touchscreen)
- Ethernet Communication Network
- System Monitoring and Control
- Control System Integration
- Alarm Handling and Performance Data Trending
- Multiple User Access Levels
- Available Remote Access via the Internet



Original System On-Site



Interior of New Control Cabinet



Exterior of New Control Cabinet



New System Installed On-Site

As a part of the MSHS group of companies, GCS offers comprehensive control system support, from engine and turbine systems integration to turnkey project management for a broad range of marine, power generation and industrial projects. GCS engineers have experience with control system retrofits in all of these industries and aftermarket applications. Learn more at GOVCONSYS.COM.

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