TURBINE CONTROL SYSTEMS

System Overview

TTS' TMS-1000 Control System is a digital control system designed to provide enhanced control and protection features for the gas turbine train while maintaining the original system functionality. TTS utilizes Programmable Automation Controllers (PAC) such as Rockwell Automation's ControlLogix platform, Emmerson's RX3i PLC (Formerly GE) and others, which provides a high-speed, high-performance turbine control system. The controller(s) perform sequencing, fuel control and protection functions required for proper gas turbine operation. The TMS-1000 can be applied to replace the original OEM systems on all existing gas and steam turbines.

The hardware voting technology has major benefits, including:

- High test coverage of potential faults
- Tolerance to multiple failures
- No restrictions on time-to-repair
- Accurate fault identification
- Reduced operating system size and complexity

Controller Configurations

The base TMS-1000 simplex system is equipped with a single PAC/PLC

Dual and even triple redundant TMS-1000 systems are also available. These systems are equipped with redundant PAC/PLCs and redundancy modules configured for bumpless transfer to ensure even higher availability than the robust simplex system.

The redundancy modules monitor events that occur in each redundant chassis and initiate the system response to events that require it. One chassis is configured as Primary, responsible for controlling the redundant systems; the other chassis is configured as Secondary, ready to assume control if needed.

PAC/PLC features:

- TUV SIL2 Certification
- Processor and I/O Redundancy Options Multiple Communication Modules
- Memory Sizes Ranging from 750KB to 32 MB
- RIUP (Removal and Installation of Modules Under Power) Built-in Floating-Point Math Co-Processor

Network Configuration

An Ethernet/IP network is utilized for HMI communications. Ethernet modules are placed in each available PAC/PLC chassis allowing for data communication between individual controllers and the operator interface(s).

The I/O communications network implements a redundant network configuration. Redundant modules placed in each available PAC/PLC and in all I/O nodes. The modules are connected with redundant co-axial cables that extend the I/O communications bus from the I/O module level back to the PAC/PLCs.

I/O Configuration

The PAC/PLC product line provides a wide range of input and output modules to span many applications, from high-speed digital to process control. All I/O modules are industrial quality and are designed to withstand vibration, temperature and electrical noise common to gas turbine environments.