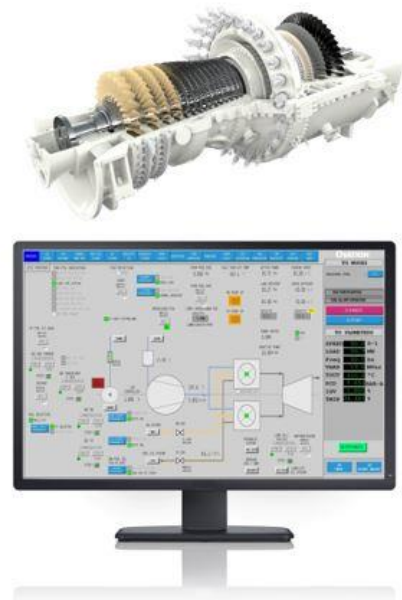


Solutions for Siemens and Ansaldo Energia Gas Turbines

Features

- Fully engineered and field-proven retrofit for Siemens V and Ansaldo AE series gas turbines equipped with Teleperm TME and TXP systems.
- Ovation-based solution with powerful redundant processors specifically designed to meet the needs of large gas turbine units.
- User-friendly tools and direct access to turbine logic facilitates in-house maintenance and reduces dependence on specialized support.
- Incorporates control enhancements that enable:
 - Better operator decision making.
 - Improved unit operation, performance and starting reliability.
 - Simplified troubleshooting and maintenance.
- Comprehensive suite of integrated products and services to support cybersecurity programs and obligations.
- Flexible architecture easily integrates turbine and balance-of-plant systems for unified plant control.
- Options available for integrated generator excitation, vibration prediction, instrumentation upgrades, wireless monitoring and simulation.



Overview

Emerson offers a fully engineered and field-proven packaged retrofit for obsolete Teleperm TME and TXP control systems on Siemens V and Ansaldo Energia AE series gas turbines.

The Ovation gas turbine control retrofit is a 'drop-in' replacement for Teleperm systems on this fleet. Emerson's comprehensive retrofit program encompasses turbine control development, application enhancements, project specific content, installation and commissioning as well as application lifecycle support and updates

To further enhance our market offering on these turbines, Emerson partners with Ansaldo Energia to provide full OEM support with comprehensive solutions covering controls, turbine uprates, operational enhancements, long term agreements, parts and outage services. The combination of Emerson's Ovation controls and Ansaldo Energia's OEM turbine technology delivers retrofit and modification solutions aimed at improving all aspects of your plant's performance.

For more than 30 years, Emerson has supplied and retrofitted hundreds of control systems on gas turbines, ranging from early 1960's vintage hydraulic governor units to the latest F class units.

Our power generation control portfolio includes system retrofits that provide reliable and efficient control of all major manufacturer's gas turbines.

Teleperm Panel Retrofit

Ovation's turbine control retrofit is a drop-in replacement for the TME or TXP control systems.

The Ovation solution covers replacement of the entire Teleperm system including sub-systems (Simadyn, Teleperm, S5-95F) and HMIs, while retaining the existing field wiring and turbine instrumentation. Eliminating all of the sub-systems ensures that no legacy control components are retained, thus mitigating potential risks due to obsolescence issues.

This solution also allows for full factory testing of the complete panel assembly, both hardware and software, which reduces commissioning risks.

Applications

The Ovation retrofit replaces the original Teleperm system while incorporating new control enhancements for reliable, flexible and safer turbine operation. The Ovation solution covers governor, sequencer and protection control functions including:

- Turbine control and sequencing
- Turbine fuel control (governor)
- Diffusion and premix control
- Turbine protection
- Fuel transfers
- Turbine monitoring
- Vibration monitoring
- Generator monitoring, control and protection
- Manual and automatic synchronizing
- Remote monitoring and communications

Native I/O modules directly interface the Ovation system to speed detectors, LVDTs, servo-valves, RTDs, thermocouples and other turbine instruments. Ovation's direct communication with turbine instruments avoids the use of external signal conditioners, provides full diagnostics down to the I/O level and ensures fully integrated control of all turbine systems including:

- Variable guide vane actuators
- Diffusion and premix fuel systems
- Wet compression system
- Water injection systems



Ovation retrofit of a TXP system on a V94 gas turbine

- Flame detection systems
- Static starter system
- Lube and hydraulic oil systems
- Overspeed protection systems
- Vibration monitoring
- Generator excitation
- Generator temperature monitoring
- Auxiliary systems

Emerson maintains a version-controlled library of turbine specific control function algorithms that were developed based on years of turbine control implementation and field-proven in hundreds of gas turbine applications.

This approach ensures a high degree of software standardization, eases software testing, improves revision control and reduces commissioning time. Ovation's turbine controls permit all modes of operation that were provided with the original OEM system.

Benefits of an Ovation Control Retrofit

Benefit	Ovation System Enhancement
Enhanced operator decision making	<ul style="list-style-type: none"> ▪ Unit operation maintenance summary automatically updates factored hours/starts ▪ Fuel controller graphics added to display the governor controllers and the fuel distribution. ▪ Side banner in each graphic shows important parameters, gas turbine sequencer steps, fuel modes and fuel controller modes ▪ Automatic turbine trip reports are provided by the Ovation Process Historian ▪ Generator capability monitor shows capability curve with automatic alarming outside of generator limits
Improved unit operation and performance	<ul style="list-style-type: none"> ▪ Unit start profile compares startup and coast-down times with a baseline to readily identify blade tip rub and other issues ▪ Gas turbine performance indicator includes megawatt capability predictions as well as real-time heat rate and efficiency calculations ▪ Manual synchronization from Ovation operator workstations ▪ Automatic droop tests and frequency response
Simplified troubleshooting and maintenance	<ul style="list-style-type: none"> ▪ Integrated governor, sequencer and protection on one Ovation platform simplifies architecture and facilitates troubleshooting ▪ Dedicated start permissives and trip displays enable fast problem identification ▪ High-speed trending to pinpoint event data ▪ Direct link to the application logic from HMI with on-line sequence step indication ▪ Overspeed testing from the HMI ▪ Fuel valve calibration from the HMI

Optional Upgrades and Enhancements

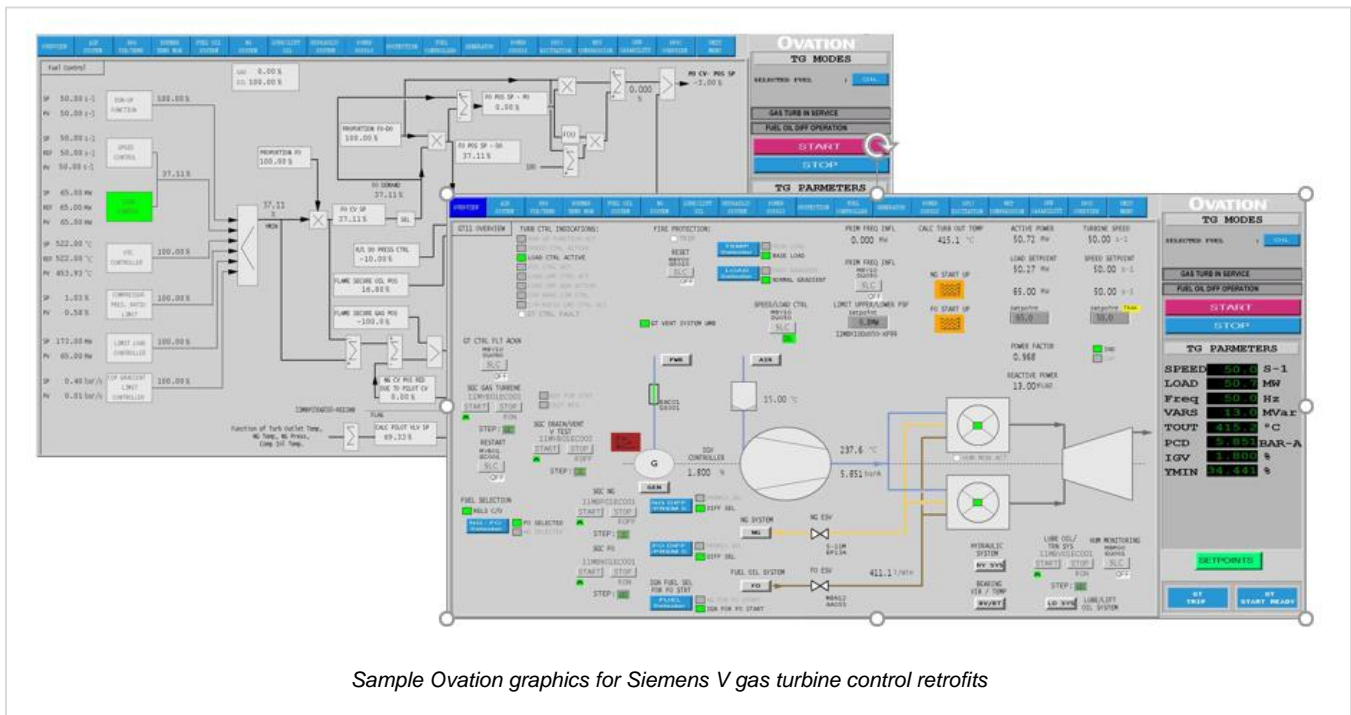
An integral part of every Ovation solution is commitment to long-term product support and cost-effective migration paths that reduce lifecycle costs while keeping pace with technological advancements. Emerson's lifecycle programs include maintenance, reliability and performance services such as:

- Installation and commissioning
- Ovation Evergreen Upgrade program
- Product Support and other Lifecycle Services.
- Educational services

Integrated Combined Cycle Control

Emerson's Ovation control system for combined cycle applications features fully coordinated HRSG-turbine control, automated startup and shutdown sequencing and enables use of Emerson's suite of proven applications for combined cycle plant optimization. The Ovation platform is perfectly suited for all combined cycle control applications, including steam turbine, heat recovery steam generator (HRSG), balance-of-plant (BOP) and auxiliary controls.

Controlling the entire power block using a single unified automation platform not only helps enhance reliability and rationalize system maintenance costs, but also provides opportunities for improving plant operating performance using Emerson's suite of plant optimization solutions.



Sample Ovation graphics for Siemens V gas turbine control retrofits

Ovation – Designed for Power

The foundation of Emerson's gas turbine control solution is Ovation technology that was designed to:

- Eliminate obsolescence concerns by using commercially available technology.
- Provide intuitive built-in diagnostics that enables quick problem identification.
- Secure operations with standard features that address cybersecurity concerns.
- Simplify configuration and maintenance with integrated user-friendly engineering tools.

Summary

Emerson understands the changing dynamics of the power industry and stands ready to apply our expansive portfolio of solutions to help increase performance and reliability of gas turbines.

The Ovation retrofit program for Siemens V and Ansaldo Energia AE gas turbines was developed by Emerson's dedicated gas turbine solutions group that includes highly specialized experts with years of experience designing, implementing and supporting turbine controls from every major OEM including GE, Westinghouse, Siemens, ABB, Pratt & Whitney, Solar, Rolls Royce and more. An integral part of the program is Emerson's commitment to long-term product support and cost-effective migration paths that reduce lifecycle costs while keeping pace with technological advancements.

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