Today, power plants are faced with aging assets, such as gas turbine control systems. As these original systems become obsolete, or approach obsolescence, they start exhibiting significant failures. The original turbine control system might even be a closed architecture, inhibiting plant operators to diagnose and correct system issues efficiently.

If this sounds like your legacy turbine control system, we are here to help. Our fully integrated gas turbine control solution is an open system that provides the freedom to take true ownership of the operation, improve starting reliability, and prolong equipment life span. Through a recent partnership, our gas turbine solution has been further enhanced with dry low NOx (DLN) control expertise. We understand the importance of technologically advanced solutions to improve unit responsiveness and performance.

Key benefits:
- Maximum reliability and availability
- Reduced maintenance costs
- Avoidance of unplanned outages
- Improved unit responsiveness and performance
- Seamless integration and unified interface
- Scalable solutions, with unparalleled evolution strategy
- Lower NOx and CO emissions
- Increase fuel efficiency
- Prolong equipment life span

A broader portfolio of industry-leading gas turbine control solutions
For several decades, ABB has been one of the world’s leading providers of gas turbine control systems that deliver cost efficient solutions. With Symphony® Plus, all this experience comes together in S+ Turbine to take ABB’s turbine control offering to a new level of unmatched functionality and performance.

In addition, ABB and Turbine Technology Services Corporation (TTS) have partnered together. TTS offers unparalleled expertise in DLN applications for gas turbine retrofits. Bundling that into the proven S+ Turbine control platform offers a complemented vast knowledge of gas turbines, experience in engineering projects, and cutting-edge engineering solutions that effectively offer the most complete set of skills, reliability, and response leadership to meet the needs of the power plant industry.

ABB and TTS gas turbine control systems are designed to provide the operator with optimum information enabling precision control of the unit via integrated turbine modules and control expertise that perform beyond industry standards.
Advanced gas turbine control solutions
Dry low NOx combustion

Proven products and integrated solutions
By utilizing a fully integrated solution, you experience the benefits of a common platform for the turbine functions including: engineering design standards, engineering tools, and operator graphics. S+ Turbine is a key part of the Symphony Plus technology family, offering a tight integration into S+ Engineering, S+ Operations and S+ Control. A common platform also minimizes the investment needed for back-up hardware, reduces training requirements and eliminates the need for serial interfaces. Additionally, our open architecture allows us to seamlessly interface to any other existing distributed control system (DCS) platform at your plant.

High-end turbine protection
S+ Turbine offers a fully integrated SIL3 rated turbine protection system that provides overspeed trip protection, acceleration protection, and anti-surge protection functionality. This system is triple redundant and can be automatically tested with the unit on-line. The on-board processing capabilities allow the protection system to operate independently from the main DCS controller, resulting in faster and more reliable protection.

Integrated generator auto-synchronization
S+ Turbine incorporates a fully integrated synchronization module that can automatically close the generator breaker through precise matching of frequency, voltage, and phase. This device provides reliable, efficient, and cost-effective solutions for generator to grid synchronization as well as bus-to-bus (switchyard) synchronization.

Industry’s most capable valve positioner
S+ Turbine includes a fast-acting valve positioner capable of interfacing with all major types of servo valves, I/H converters and position feedback devices. Its control algorithms perform separately from the main DCS controller, provide response times under 3 msec, and is complemented by numerous advanced features such as automatic calibration, built-in valve testing, I/O redundancy, module redundancy, built-in valve curves and cascaded loop control.

Advanced mechanical and electro-hydraulic applications
ABB supplies gas turbine mechanical and electro-hydraulic solutions that are reliably integrated into our DCS system. Our offering includes fuel valves, actuators, position feedback devices, speed probes and speedwheels. We have design, installation, and consulting expertise for virtually all combustion turbine systems.

Continuous condition monitoring and assessment
ABB offers a family of products that provide continuous condition monitoring and assessment along with a diagnostic vibration software application that provides specialized plots of rotating machinery data. Integrating powerful hardware with intelligent software to collect and analyze historical and waveform data for evaluation, allows you to maintain continuous surveillance of your critical assets and support proactive maintenance programs.

TTS Comprehensive DLN services
Combustion Dynamics and Emissions Tuning
For DLN combustion systems, combustion dynamics tuning is required during initial unit start-up and periodically anytime combustion or hot gas path hardware is changed out. Additionally, combustion dynamics tuning may be required to help meet your goals for operational flexibility.

Combustion dynamics tuning involves the acquisition and analysis of real-time dynamics data using locally installed
Advanced gas turbine control solutions
Dry low NOx combustion

equipment and adjustment of a gas turbine’s operating configuration. Tuning minimizes emissions and combustion hardware stress levels.

Monitoring services allow real-time analysis of combustion dynamics, identification of changes to a unit’s operating profile and recommendations for corrective tuning. Customers benefit from improved reliability, availability and regulatory emissions compliance as a result of combustion dynamics tuning.

DLN Tuning
Optimize the DLN system operation to maintain emissions compliance over the widest possible ambient temperature range, while also ensuring sufficient margin from both Lean Blow Out and unsafe dynamic levels over the entire low-NOx load range.

Auto Tuning
DLN Auto-Tuning system integrates continuous dynamic and emissions monitoring with an advanced tuning algorithm to automatically feed tuning adjustments back to the turbine controller. Auto-Tuning maintains the DLN system within operator-defined emissions and dynamics limits, and prevents Lean Blow Out as the combustor responds to changes in ambient conditions, changes in fuel conditions, and degradation of combustion hardware and control valve calibrations.

Operational Troubleshooting
Lean Blow Out and regulatory NOx excursions are common operational problems on improperly tuned DLN systems. TTS understands the impact of ambient temperature variation on inducing these problems and established tuning criteria to eliminate their future occurrence.

Sometimes a turbine comes out of a scheduled outage with significantly increased NOx, above regulatory limits. We will analyze pre- and post-outage turbine performance data to diagnose the cause of the problem and provide short and long term solutions to maintain operation within compliance.

Maximize Load Turndown
Many DLN turbines are commissioned with only 60% load turn-down. Our offering maximizes turndown while also maintaining emissions compliance. Besides increasing operational flexibility, combined cycle plants can avoid overnight shut downs, reducing start/stop cycles and extending hardware life.

Proven experience
For more than 40 years, ABB has provided control systems for turbine applications. Our main Turbine Automation Center of Competence is located in Natrona Heights, PA. We have provided control systems for all types of rotating machinery including a variety of applications for more than 3200 turbines worldwide, representing over 30 different OEMs. Our turbine control experts average 20 years of experience designing and implementing combustion turbine control systems.

TTS is proud to celebrate over 30 years of engineering excellence and industry expertise, delivering results in the gas turbine and power generation industries. TTS was the first non-OEM to develop and install gas turbine control systems on DLN equipped machines and the first non-OEM to perform DLN tuning on General Electric (GE) gas turbines. In addition, TTS engineers have extensive field experience working on GE EA and FA gas turbines with DLN combustion systems.

Partnering together, ABB and TTS, for your success.

Symphony Plus, ABB’s total plant automation for the power and water industry
With over 125 years of experience, ABB optimizes performance, improves reliability, enhances efficiency and minimizes environmental impact. Combining in-depth process knowledge with an extensive automation and electrical portfolio, this expertise has been successfully deployed in thousands of demanding applications. ABB optimizes your combustion turbine application with Symphony® Plus and our embedded application know-how.

Symphony Plus represents the new generation of the field-proven Symphony family of control systems with over 6,000 systems installed worldwide. Through ABB’s “Evolution without obsolescence” life cycle policy, we continue to provide enhancements with graceful evolution to newer technology with power and water specific products and applications.

Symphony Plus – simple, scalable, seamless, secure.
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