Integrated Plant Control DCS

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Why Choose GE's Integrated Plant Control DCS System?

GE's Integrated Plant Control DCS (Distributed Control System) is a solution for managing complex plant processes in an efficient, consistent, and secure way. Enhance operation of key subsystems by reacting instantly to changing load demands and continually maintaining ideal conditions at every stage of the Water/Steam Cycle. Leverage high-performance plant control logic combined with comprehensive fail-safe protection, self-testing, and fault reporting to help reduce costs, and improve safety.

Boiler Control and Protection

GE's Integrated Plant Control DCS is a coordinated control system for maintaining boiler operation at your plant. Functions include:

- **Burner management**
- **Main firing and ignition system management**
- **Boiler steam pressure monitoring and adjustment**
- **Boiler blowdown control**
- **Air and flue gas control**
- **Fly ash handling**

With efficient blowdown control that reduces corrosion and build-up of impurities in the boiler, GE's automated solution can reduce maintenance costs and increase the service life of equipment.

GE's DCS system features a comprehensive boiler protection process, including furnace purge and ignition/flame monitoring, as well as de-energization of the system and implementation of boiler trip in the event of dangerous operating conditions. By reacting faster than a human operator to make continual adjustments to the operation, the system helps to reduce the risk of boiler damage and accidents, maintaining feed water levels and managing steam pressure during fluctuations in load conditions.

Water/Steam Cycle Control and Protection

GE's Integrated Plant Control DCS takes control of subsystems and auxiliary systems involved in the Water/Steam Cycle. This solution automates and manages key processes including:

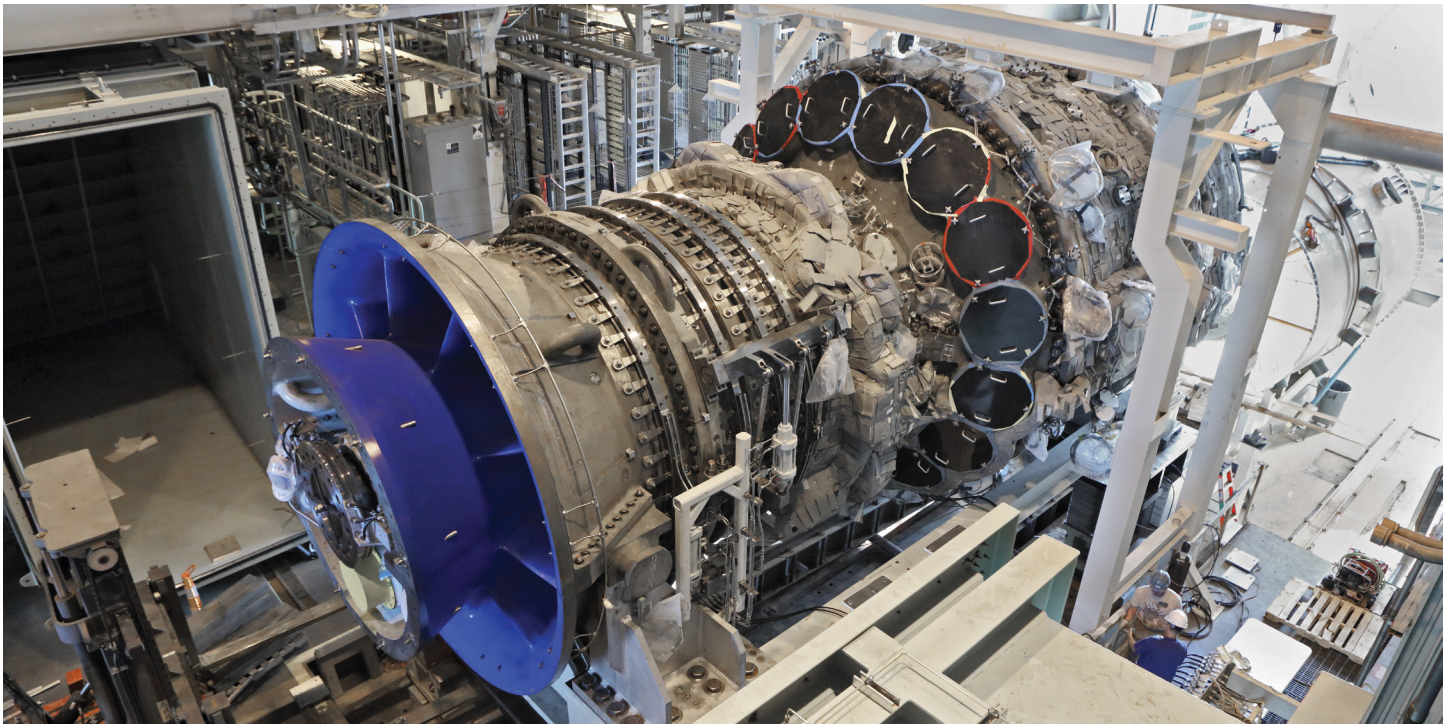
- **Main steam control**
- **Auxiliary steam system**
- **Feed water pumping system**
- **HP and LP heating system**
- **Condensing and extraction**
- **Feed water storage and de-aeration**
- **Turbine HP/LP bypass control**
- **Closed cooling water system**
- **Chemical conditioning**
- **Main condenser vacuum**
- **Condensate make-up and discharge**

By deploying GE's Integrated Plant Control DCS, you can make the most of the energy that your boiler is providing, and efficiently convert it into turbine power. At the same time, comprehensive fail-safe logic, self-testing and fault reporting helps to safeguard your turbines and other valuable equipment against dangerous operating conditions, simultaneously reducing maintenance costs and improving safety.

BOP System Control

GE's Integrated Plant Control DCS can directly control all processes which could function with PLC controllers. These include:

- **Polishing plant**
- **Condensate chemical conditioning**
- **Wastewater**
- **Demineralization water**
- **Air compressor system**
- **CEMS: Continuous Emissions Monitoring System**
- **Plant Emergency Diesel Generator monitoring**
- **ESP systems**
- **Coal conveyor**
- **Ash conveyor**
- **Stacker-Reclaimer**



- **Dust conveyor**
- **Automatic control (start-up or shut-down) of a process initiated from the central control room**

Experience the benefits and efficiency of a single-platform control solution for managing diverse plant operations by implementing GE's Integrated Plant Control DCS for all your control system needs.

Electrical Distribution Management (MV/LV switchboards)

GE's Integrated Plant Control DCS manages all aspects of power supply and electrical distribution within the plant to improve efficiency and performance, ensuring the proper sequence of operation during start-up, shut-down and interlocked processes, and maintaining safety measures. This DCS system provides power to key processes at all times, permitting both automatic and manual changeovers. When a problem occurs with the power supply, the system automatically switches to a pre-selected backup to minimize disruption and maintain normal operation of the plant.

Improve the reliability of your plant and avoid interruptions by implementing GE's DCS system to manage your plant's power supply and electrical distribution.

Turbine Auxiliary Control

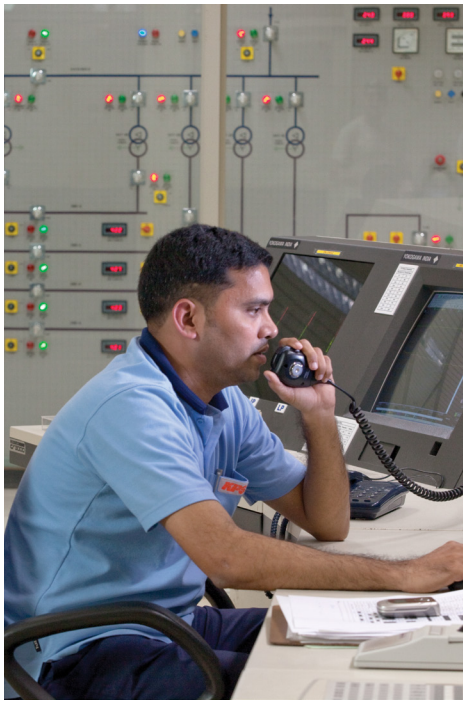
As well as managing key operations of your plant, GE's Integrated Plant Control DCS maintains the auxiliary processes that support it, including:

- **Turbine lubrication control**
- **Jacking oil control**
- **Turbine turning gear control**
- **Turbine gland steam control**
- **Turbine oil control**
- **Generator stator water cooling control**
- **Generator H2 gas cooling control**
- **Generator seal oil temperature control**

This helps to improve performance by addressing disruptions.

Flue Gas Desulphurization

GE's Integrated Plant Control DCS integrates with all types of flue gas desulphurization systems, including limestone and sea water.



Mark Vle Control

Customization and Reliability

GE provides a highly customizable solution to meet the exact requirements of your plant and operation. Mix and match controllers, I/O cards and compare performance capabilities to get the capabilities you need at a low total cost of ownership.

Ethernet Backbone Flexibility

Controller:

- **Automatic redundancy**
- **Operating temperature -30°C to 65°C (-22°F to 149°F)**
- **Suitable for hazardous locations (Class 1 Division 2)**
- **Achilles Level 1 Certified**

I/O Network Switch:

- **Wide operating temperature -30°C to 65°C (-22°F to 149°F)**
- **8-16 network ports (fiber or copper)**
- **Deterministic 100MB bandwidth, suitable for local or remote I/O**
- **Full duplex, point-to-point protocol**

I/O Packs:

- **Automatic redundancy**
- **Operating temperature -30°C to 65°C (-22°F to 149°F)**
- **Suitable for hazardous locations (Class 1 Division 2)**

If a fault occurs, controllers and I/O modules can be replaced online to enable a quick return to normal operation. Network diagnostics are reported in the alarm management system.

Flexible Controller Redundancy

Triple Modular Redundant

- **TMR (2oo3) SIL3 high / low demand for de-energization and system trip**
- **TMR (2oo3) SIL2 low demand for energization and system trip**
- **TMR degraded (1oo2) SIL3 high / low demand for de-energization and system trip**
- **TMR degradation sequence (2oo3) to (1oo2) for fail-safe protection**

Dual Redundant

- **Dual (1oo2) SIL3 high / low demand for de-energization and system trip**
- **Dual (2oo2) SIL2 low demand for energization / de-energization and system trip**

Simplex

- **Simplex (1oo1) SIL2 low demand for de-energization and system trip**

Predix* for Distributed Control Systems

Take advantage of outcome optimizing apps by leveraging centrally managed industrial infrastructure. Predix software platform supports the growing Industrial Internet of Things with cloud servers and optimization apps. Predix is a platform as a service cloud-based platform that enables industrial-scale analytics for Asset Performance Management (APM), Operations Optimization (OO), and Business Optimization (BO) by providing a standard way to connect machines, data, and people.

High-end, yet flexible, control system provides a single hardware platform, common configuration and maintenance tools, a common operator interface, and a single Ethernet network for turbine, generator, LCI, exciter, HRSG, boiler, and BOP controls.

Deep domain expertise of the main assets around the power plant allows for efficient operations and addresses instabilities during system transients. IICS can allow for a future-proof plant controls environment and seamless software upgrades over its life through the GE App Store.

Cyber security is a major concern with modern control systems that offer a range of open communication with third parties. GE's control systems are hardened. Several cyber-security options are available depending on the configuration. Furthermore, most of our controllers are Achilles certified.

Customer Success Stories

Since 2000, GE Integrated Plant Control DCS systems have maintained the operation of more than 250 projects.

Achieving Greater Reliability – PPP 10

GE provided a solution to meet the needs of this massive combined-cycle power plant encompassing 40 7EA gas turbines, 10 SC series steam turbines and generating 4,188 MW of power. GE's DCS System manages the 35,000 I/O processes involved at the site.

Achieving Profitable Growth – Duke Edwardsport

A pioneer in using Integrated Gasification Combined Cycle at scale, this plant at Duke Edwardsport looked to GE for a DCS system that would provide reliability and performance for an exceptionally innovative operation. GE's solution manages unit control, generator control, and safety systems throughout the plant, which produces 618MW and involves 25,000 I/O processes.

Achieving High Availability – Marafiq – Integrated Water and Power Plant

GE solutions control the world's largest power and desalination plant. GE's Integrated Plant Control DCS system manages the operation of 12 7FA gas turbines and 4 D11 steam turbines in a combined cycle configuration, overseeing the production of 2,750MW of electricity and 800,000 m3 of fresh water daily. The DCS system manages 35,000 I/O processes throughout the plant's operations.

Achieving Greater Profitability – EDF Bouchain

With the efficiency and precision of GE's Integrated Plant Control DCS solution, this plant set a Guinness World Record for the most efficient combined cycle power plant, at 41.5% efficiency in simple cycle mode and 62% in combined cycle mode.

Helping to achieve this exceptional result are GE's Mark Vle and Mark VleS control systems, implementing a balance of plant, turbine, and generator controllers, as well as GE's PPS Cimplicity and RX3i gas loading station control.

The operation includes a 9HA gas turbine and produces a total power output of 700MW.

Achieving Cost Reduction – Florida's FMPA Treasure Coast Energy Center

GE's Integrated Plant Control DCS solution was pivotal in making the expansion of this project as cost-effective as possible. By collecting essential data during plant start-up, the cost of tools commissioning was reduced, and remote diagnostics identified key problems.

Using a GE 7FA gas turbine and an A14 steam turbine, this plant produces 300MW of power.

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