Solutions for Combined Cycle Power Plants
The huge demand for new power plant capacities can be met by high efficiency coal, oil and gas fired power plants. New technologies have been developed increasing the efficiencies of combined cycle power plants toward 60%. Efficient advanced control of the turbine and the plant must be adopted to meet these targets.

Modern combined cycle power plants (CCPP) meet emission rules by applying optimized combustion technologies. In this respect the instrumentation, control and electrical systems also play an important role in meeting the targets required by the emission authorities.

**Main Plant Components of a CCPP**

A CCPP is divided into the following main sections:
- Civil works
- Gas turbine
- HRSG
- Steam turbine
- Mechanical Balance of Plant
- Electrical Balance of Plant
- Plant Automation System

ABB focuses on the integration and optimization of plant automation and electrical balance of plant. This makes ABB an ideal partner for utilities, general contractors and plant/process equipment suppliers, thanks to our competitive and field-proven solutions for both new plants and rehabilitation projects, as well as our project services. ABB can provide instrumentation, control and electrical systems and create full-range solutions that have been optimized technically and economically – everything from a single source!

**ABB - One Reliable Partner Throughout the Plant Life Cycle**

In partnership with customers all over the world, ABB delivers what it takes so our customers can successfully run a CCPP from design to operation and from the plant floor to the enterprise level.

We combine in-depth knowledge of the process with extensive electrical and automation “know-how” to provide a best-in-class solution for your plant. ABB’s leading-edge products support our customers in the production of highly reliable and available power. We design, implement and commission our scope by integrating the parts into one single solution that fully meets the specified requirements.

Our ability to execute complex projects has been proven in more than 270 CCPP installations world-wide.
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Electrical Balance of Plant
ABB has the engineering expertise, experience and state-of-the-art technology to deliver “turnkey” system integration of electrical Balance of Plant (eBoP) applications specifically tailored to different types of CCPPs.

We offer complete engineering, procurement, installation, commissioning and testing as well as ensure the quality of the eBoP integration with the complete plant automation system of your power facility. Direct control over all engineering and project management functions enables us to pledge the best performance and quality of engineering workmanship. Through innovative electrical power applications we assist customers to build and maintain reliable combined cycle power system installations safely and efficiently, offering cost effective solutions.

Plant Automation Systems
ABB delivers all the systems required to successfully automate a combined cycle power plant: from the plant floor to the enterprise level, from system design to operation.

Our automation platform, instrumentation, valves and drives are designed for the most stringent requirements of power plant automation and are customized for CCPPs.

ABB’s control systems combine innovation and broad functionality with established operational reliability. Development of our power plant control systems is ongoing, with the aim of further improving cost-effectiveness, functionality and quality.

The advantages of these control solutions are
• Future-oriented platform for process and electrical systems
• Easy-to-use and consistent user interface
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- Fast analysis of disturbances
- Simple plant and enterprise-wide access to information
- High engineering efficiency and quality
- Low operating and maintenance costs
- Simple system architecture
- State-of-the-art technology including fieldbuses and easy integration methods of existing systems.

Years of experience in the field help ABB engineers design control systems that cover all the CCPP requirements.

One important feature of the plant automation system is total integration of all the main functional areas of the plant into one common system. The system incorporates a uniform operator interface throughout the plant. All data acquisition functions form an integral part of the system, including built-in sequence of events and extensive system diagnostics.

The ABB portfolio includes the necessary functions for the complete automation of all areas in a combined cycle power plant including:
- Gas turbine
- Steam turbine
- HRSG
- Balance of plant
- Switchyard
- Water and effluent treatment

The plant automation of plant, gas and steam turbine can be implemented in one common platform with the following benefits:
- Common look and feel in operations
- Seamless integration in hardware and software
- Common engineering and diagnostic tools
- Reduced spare parts requirement
- Simplified maintenance and training

Gas Turbine Control
ABB can supply turbine control and monitoring solutions for a full range of gas turbines, including heavy-duty machinery. Our turbine control solutions comprise the turbine governor, sequence control, drive control and turbine protection.

Operation of the gas turbine can be fully automated; the various systems of the plant are automatically controlled in a sequential manner. Minimal operator intervention is required to start a complete CCPP unit. The protection can be built as a fault-tolerant 2oo3 system and can include a SIL 3 certified over-speed protection system.

To enable customers to determine the actual state of the machine, a supervision system monitoring turbine speed, vibrations, temperatures and stresses generated can be installed.
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Steam Turbine Control
Over the last 40 years, ABB has proven its expertise in more than 1,200 turbine automation projects with most turbine OEM’s. These solutions cover control, protection and turbine supervisory equipment and are tightly integrated into the plant automation system with the advantage of seamless integration of operation, engineering and diagnostic functions.

Hydraulic Solutions
ABB can supply turbine-specific electro-hydraulic and hydraulic products and solutions as well as design expertise and consulting for gas and steam turbines. Our solutions incorporate universal products and can be integrated into nearly any type of mechanical system used today.

Electrical Generator Auxiliaries
As part of our portfolio, we have specific solutions for electrical generator auxiliaries such as:
- Excitation system
- Synchronization
- Generator and unit protection
- Static starting devices for gas turbines
They are suitable for all common types of generators.
HRSG Protection / Burner Management Systems
When required due to additional firing of the HRSG, protection and burner management systems will be installed to ensure boiler furnace safety and fuel shutdown. ABB strictly complies with major industry standards, such as

- US National Fire Protection Association (NFPA)
- German TRD/DIN
- IEC 61508, levels SIL1-3

As well as those of other governing agencies, including,
- Factory Mutual (FM),
- Industrial Risk Insurers,
- Underwriters Laboratories (UL)

and
- all appropriate governmental authorities.

The use of advanced boiler automation systems and the need to comply with the modern safety standards often means that state-of-the-art flame scanners and detectors must be used. For this purpose ABB has developed specific products that meet all the modern industry standards.

OPTIMAX® Plant Optimization

ABB’s OPTIMAX® plant optimization solutions support plant personnel in achieving higher plant efficiencies and expected performance of assets, thus improving total plant availability and productivity.

- Performance Monitoring continuously compares actual plant and equipment performance to expected performance.
- PowerCycle determines the expected plant equipment process values at current operation mode. In addition, PowerCycle can also be used for “what-if” simulations, for data validation and for developing process optimization strategies.
- GT Gas Path Diagnosis quantifies the probability of fouling, erosion, damage etc. within the engine’s gas path. This improves predictive maintenance and decision support for maximizing efficient operating time, thus reducing performance losses, and avoiding downtime.
- GT Compressor Wash Optimizer optimizes wash cycles by taking into account historical data, current compressor fouling status and future costs.
- GT Emissions Predictor predicts gas turbine emissions for various load profiles and weather conditions.
- Lifecycle Optimizer determines the optimal load profile for multiple generating units, based on total costs including ageing and emission costs.
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**ABB Project Services**

ABB’s core strength is our ability to consistently translate the process and operational requirements into a harmonized and economical automation configuration and electrical single line diagram. In doing so, we minimize and optimize the interfaces between instrumentation, control and electrical systems.

**PROJECT MANAGEMENT** – ABB’s certified project managers take care of all relevant issues during your project – a competent partner for the entire ABB contribution.

**ENGINEERING** – ABB engineers are skilled in control and process technology and use well-proven tools, which allow project-wide consistent data storage with access from our office and from the site.

**INSTALLATION** – As part of our installation supervision we prepare the schedule for delivery and installation in close cooperation with our project partners. As required, we plan and procure the site facilities and provide the complete installation.

**COMMISSIONING** – We can take care of all phases of commissioning, from I/O-check through plant start-up to acceptance testing.

**CUSTOMER TRAINING** – We offer training for operators, process engineers and maintenance staff on site as well as at ABB facilities.

**Life Cycle Commitment**

We support our customer base through global service contracts assisted by a strong localized service organization. This organization offers advanced and efficient services from a comprehensive and modular portfolio to provide: emergency remediation, preventive maintenance and remote diagnostic services. Additionally, we help our customers maintain their financial and intellectual investment in their assets through training programs, consulting services and comprehensive migration strategies for system upgrades and retrofits.

ABB is committed to being the world leader in providing total integrated automation solutions for power generation, allowing our customers to meet the complex automation challenges of today and tomorrow.

![A complete portfolio of services](image)
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