

Industrial^{IT} for Power Generation Power Plant Automation



Power Plant Automation

The Future of Power Plant Automation

Power plant control systems from ABB combine innovative technology and broad functionality with established operational reliability. Enhancement of our power plant control systems is ongoing with the aim of further improving cost effectiveness, functionality and quality. Thanks to decades of experience with all types of power plants, ABB is consistently ranked as the number one DCS supplier worldwide.

The advantages of these control solutions are:

- Future oriented platform for process control and electrical systems
- Easy-to-use and consistent user interface
- Fast analysis of disturbances
- Simple plant and enterprise-wide access to information
- High engineering efficiency and quality
- Low cost of operation and maintenance
- Simple system architecture
- State-of-the-art technology and integration of existing systems

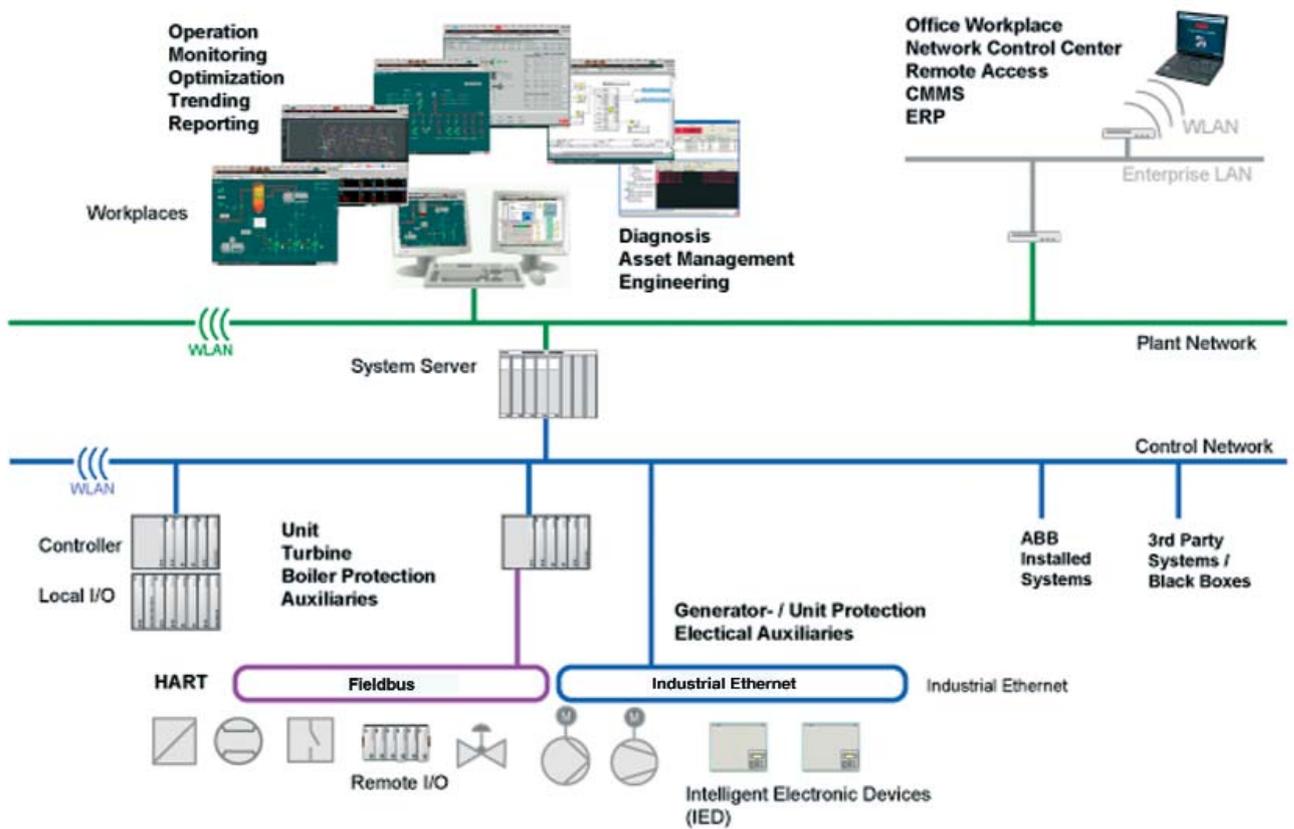


Fig. 1: Typical integration of DCS with instrumentation and electrical systems

Power Plant Automation

The Window into the Process

All functions necessary to monitor plant operation are integrated into the operator station:

- Intuitive display navigation
- Faceplate control of any device in the plant
- Integrated alarm and event management with sequence-of-events
- Trend curves displaying current as well as historic values

In addition to in-depth process monitoring capabilities, ABB operator stations allow detailed analysis of the current state of the control system itself, as a comprehensive system status display. For customer specific extensions, ABB provides state-of-the-art interfaces to its operator systems by means of OPC. Besides providing access to the system for 3rd party applications installed in the customer's enterprise, these interfaces allow the integration of 3rd party equipment typically installed in a power plant. ABB provides one common operator interface in power plants where, for example, a water treatment plant is done with the OEM's control system, while BOP and HRSG are done with an ABB DCS system.

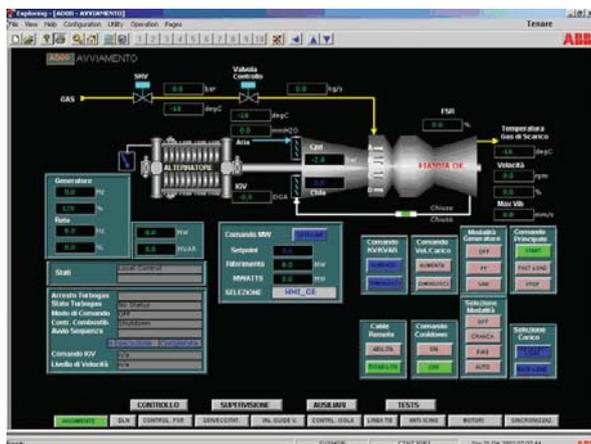


Fig. 2: Gas turbine monitoring

Power Generation Portal

Power Generation Portal (PGP) is the next generation Human System Interface (HSI). Built on field-proven Tenore technology, PGP enhances the robustness and reliability of the HSI with new and much-needed functionality.

New features include:

- An integrated historian, with native, embedded calculation and trending and Excel-based reporting
- An interface to Computerized Maintenance Management Systems (CMMS)
- A large variety of interfaces to 3rd party systems
- Available on MS Windows and Linux

These features make PGP the ideal HSI for any type of power plant, providing a scalable system from small compact installations to large client-server architectures.

SCADA Functionality

PGP supports Supervisory Control and Data Acquisition (SCADA) systems often needed in hydro and decentralized power plants by effectively communicating remotely over long distances. Various communication protocols, like IEC 60870-5-104, DNP3.0 etc. are available, and can be used to easily integrate remote systems.



Fig. 3: Spillway control of a hydro power plant

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System 800xA Operations

System 800xA Operations (formerly launched as Process Portal) provides an innovative, consistent and comprehensive information management system in power plants. It includes the functionalities of common operator consoles and information management systems that are often installed as stand-alone applications (historian functions, archiving, reporting, performance calculations). It is also capable of integrating new applications, such as, Asset Optimization.

Patented Technology

System 800xA Operations is based on the patented Aspect/Object Technology by ABB which provides access to information that is available at different locations, on computers, and in special applications. The system delivers context sensitive information that cannot be provided by traditional control technology, thus delivering information on service data maintenance instructions, engineering data, materials management, optimization and management applications. System 800xA provides an efficient means to link the process and the enterprise level of a utility.

Decision Support with Role-Based Workplaces

In order to comply with the various perspectives and information needs of users, the system offers the option to create role-based workplaces, where users only have access to the information they need for their activities. System 800xA Operations allows for a flexible and task-oriented definition of tailored workplaces for operators, management or maintenance personnel.

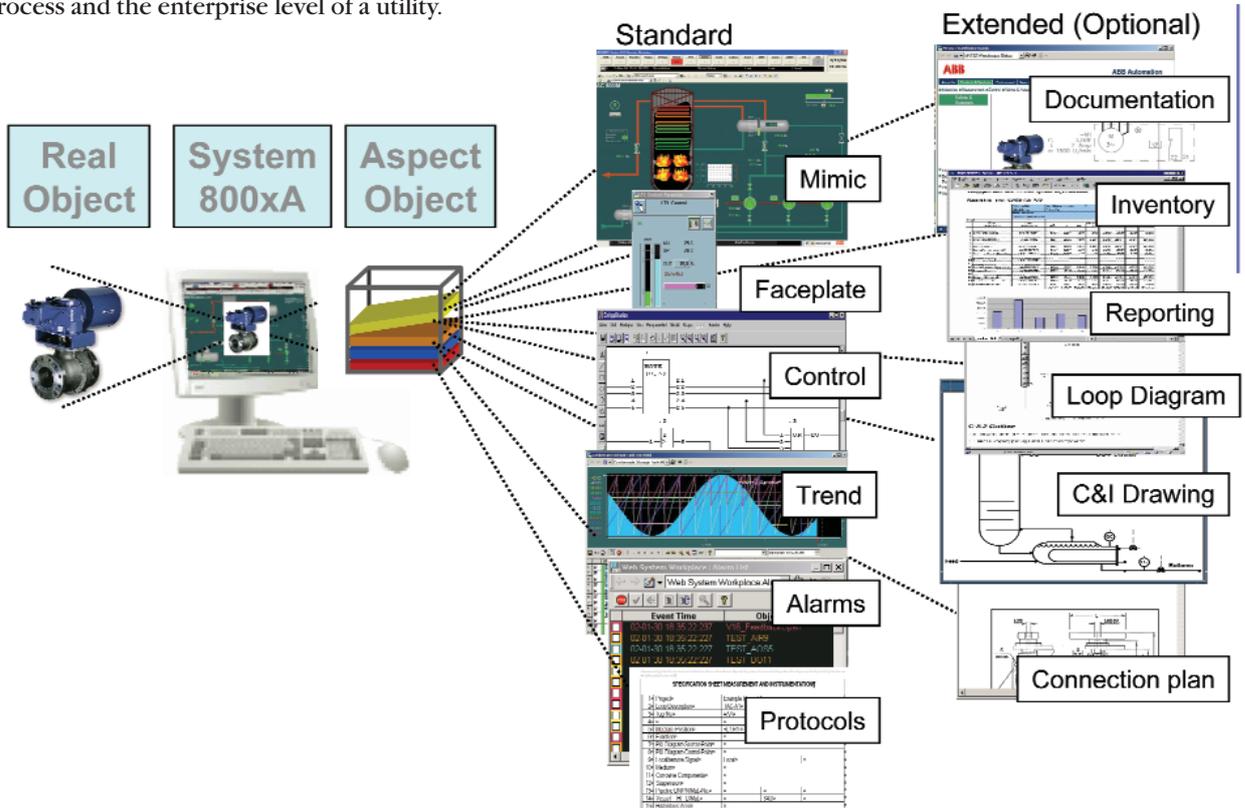


Fig. 4: Patented Aspect/Object Technology

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Information Integration

All data collected from the plant is stored in the integrated plant information management system. ABB's Power Generation Information Manager (PGIM) is the solution of choice for customers worldwide.

Business and process data from all sources throughout the plant are collected and securely stored in the data server, where they can be analyzed further. This data repository, covering the whole history of a plant in its archive, is an invaluable source of information for efficient plant operation and maintenance.

PGIM offers a wide range of analysis and presentation tools:

- Trend curves from historical data on the operator station to monitor the current process behavior
- Post production analysis in the plant engineers office environment
- Data analysis is possible through PGIMs versatile capability to present data in Microsoft EXCEL
- Regulatory reports or custom-made plant analysis worksheets with the well known functions of the commercial spreadsheet application.

Optimization Included

The information available in the PGIM server is also used by ABB's OPTIMAX[®] suite of optimization solutions. Performance monitoring, condition assessment, diagnostic tools, maintenance management systems and asset lifecycle optimization rely on the data from the automation system to provide in-depth information about the process. Information, that can otherwise only be assessed by machinery maintenance and plant shutdown. Model-based algorithms and advanced signal processing functions allow operators to quickly identify under-performing equipment and take remedial action on controllable heat rate losses.

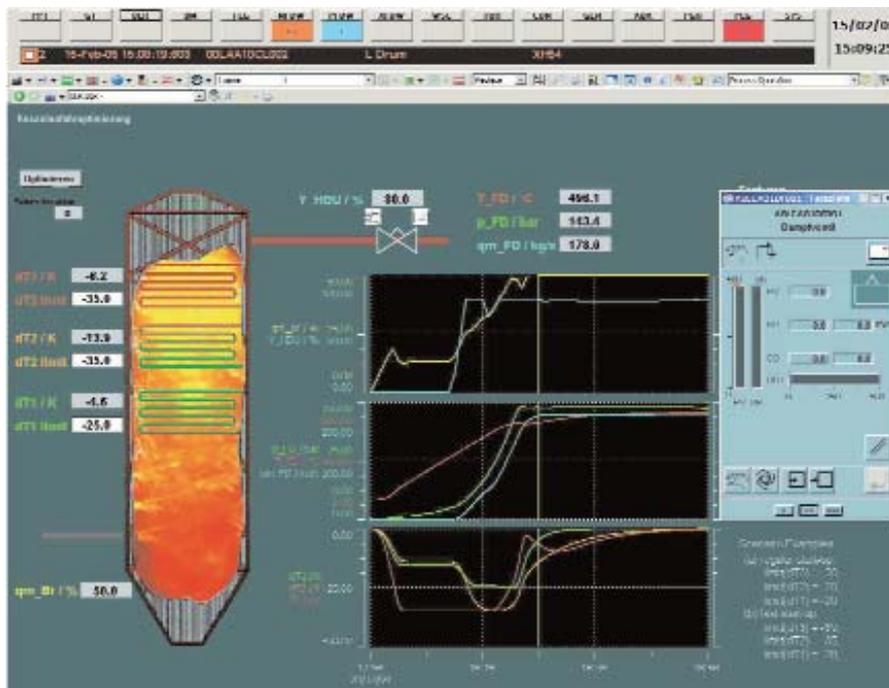


Fig. 5: Display of optimization results with OPTIMAX[®] BoilerMax

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Reliable Control

ABB designs the control architecture to guarantee the highest possible availability of the plant. Process redundancies are mirrored in the control architecture to avoid any single point of failure within the entire system. The ABB DCS provides the means to control the process either interactively by the operator, or fully automatically by the advanced control algorithms implemented. Efficient operation of the plant is the result.

Scalable and Open Systems

The ABB DCS is a fully scalable and open architecture allowing that can be applied from small hydro plants to the largest steam power plants.

All major fieldbus and industrial ethernet standards, as well as OPC connectivity, are supported to easily integrate devices and systems.

Safety First

Meeting the highest possible safety and reliability are among the most important requirements in power plant operation. Boiler protection and burner management systems are dedicated to ensure boiler furnace safety and fuel control. In the safety system, it is possible to implement all safety functions that are necessary for safe power plant operation.

ABB strictly complies with relevant industry standards.

With the same focus on safety as in the area of boiler protection, ABB can provide SIL3 certified overspeed protection systems for turbine control, or plant-wide emergency shutdown systems.

Power Plant Specific Devices

ABB provides a number of power plant specific devices that are tightly integrated into the overall system, such as:

- Servo valve position controller
- Turbine protection and speed monitoring device
- Synchronization device
- Vibration monitoring modules
- Integrated flame scanner

These devices, tailored to the needs of power generation, support the various applications within a power plant control system such as turbine or combustion control.



Fig. 6: Modules for turbine control, valve positioning and flame scanner

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System Evolution

Life Cycle Policy

In today's fast moving technology environment, investment protection is one of our customer's top priorities. ABB's life cycle policy is tailored to guard the customer's investments, while delivering state of the art technology to provide the greatest benefit to the customer.

The seamless integration between today's advanced automation systems and those systems installed 15-20 years ago is the key element of ABB's life cycle policy.

The average life span of the technology greatly varies between field installations / control level and operations / information level. Because ABB can allow these parts of the system to follow separate migration paths, our customers can benefit from the advantages of today's information technology with the reliable and proven operation of their installed control solution.

Stepwise Migration

The flexibility achieved with the consistent implementation of the life cycle policy allows ABB to offer upgrades and migration paths that match the customer's budget and maintenance schedule.

A stepwise introduction of the most advanced operator stations in parallel to the existing consoles may be one option that limits risk and expenses. Plant extensions may be implemented in today's advanced control platform, and still share a common control room with the existing control system. This allows a common HSI for both, the new and existing systems with consistent look and feel.

Any path chosen can be adapted to provide an optimal solution for a customer's long term investment strategy.



Fig. 7: Control room of "Jämschwalde 6x500 MW" plant before and after modernization

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