Uniform user interface for water production, waste incineration and district heating at IWB Basel

The Industrielle Werke Basel (IWB) decided to install the ABB IndustrialIT 800xA platform within the scope of upgrading, combining and standardization of the operation of the water, waste incineration and district heating utilities.

The first phase will be the replacement of the user interface for the water supply. The replacement of the user interfaces for the district heating and the waste incineration plants is planned between summer 2006 and end of 2007.

The IWB has planned the commissioning of a combined-cycle power station and a wood-fired power station for 2007 – 2008 to augment the district heating system and power generation. Both plants will be operated from the new user interface.

The standardization and the centralization of the operator’s workstations results in operating cost savings for the customer. This also includes the significant increase in the degree of automation and optimization of the water production—optimized unattended operation.
Uniform user interface
The existing automation systems are integrated via the connectivity server “ABB Connect”. In future, operations management will be concentrated in the new control room of the waste incineration plant. The local operators workstations are for commissioning and service functions. External workstations also have access via Remote Clients. The entire networking is integrated in the IWB data network.

Automation system water supply
The existing control level with its 50 control stations distributed over the entire supply network will remain. Signal transmission is made via Modbus Plus, OPC servers and ABB PLC Connect. The integration of the different sub-stations will be made step-wise without interruption to operations.

Optimized and unattended operation
This project is unique for water supply systems with its combination of the optimization of operations and unattended operation of this size and complexity.

The water consumption forecast for the next 6 days is calculated from the archived water consumption data and the daily weather forecast. Planned maintenance and cleaning etc. of water sources, pumping stations and reservoirs are entered in the system via the operations plan. The system always has the current status from the process signals. Using these inputs, the ABB Optimax® optimization system, Expert Optimizer, calculates the optimized schedule and the optimum reference values for the pumping quantities for groundwater wells, the pumping stations of the virtual reservoir (the quantity in % of all the relevant reservoirs), and the water consumption of other utilities. Deviations from the schedule are continuously monitored and the schedules are adapted if necessary.

The operation and schedule for the next 6 days is automatically recalculated every hour. For short-term events, for example the failure of a pumping station, the current schedule is immediately adapted and alternative pumps are switched on.

In addition to the first priority, which is the security of supply, the most important optimization criteria are:

- The water quality.
- Managing the reservoirs.
- Continuous use of the pumps, minimizing the number of pump switching operations and operating hours.
- Minimizing the costs for electricity.
At Aluminium Bahrain (ALBA), ABB Industrial IT operator stations were used in a new large combined cycle power station. The new power station is in commercial operation since July 2005.

Minimum Down Time
The new Power Station 4 comprises two CCPP type KA13E2-2 with a total power output of 670 MW. The scope of supply included the complete control system comprising four EGATROL gas turbine control systems including one for retrofit, two TURBOTROL steam turbine control systems, and two DCS with Operate IT. In addition, remote monitoring, and set point processing of the instruments from the Advant Engineering Tool using the HART protocol was used for the first time. ABB’s Plant Management solutions were used to support the optimization of the plant and operations.

The biggest challenge for ABB was not to exceed the contractual down time of 6 weeks for the retrofit of existing turbine control system with ADVANT control. Thanks to the exemplary local documentation and maintenance of the plant and thanks to the close cooperation with the customer’s experienced O&M personnel, the down time of the gas turbine could be limited to only 5 weeks.

Advanced Plant Monitoring and Diagnostic system
In addition to the DCS, the customer specification called for an advanced Plant Monitoring and Diagnostic system. Based on its advanced features, the following Optimax applications were installed, tested and adapted to match the site-specific equipment conditions:

- **Performance Monitoring**
- **Online Data Validation**
- **GT Gas Path Diagnosis**
- **Vibration Monitoring**
- **Process Information Management**

The Optimax GT Gas Path Diagnosis is a unique ABB application used for a quantitative analysis of the performance degradation in gas turbines and is able to detect measurement errors even if two or more faults are simultaneously present within the turbine.

Largest Smelted Aluminum Producer in the World
ALBA has expanded the production capacity to 830'000 t/a aluminum (50% exports) and is currently the largest modern smelted aluminum producer in the world. The recently installed smelting line 5 is also the longest in the world at 1.2 km.

“After close to 12 months in operation, the Alba power station shows the best performance. Due the highly critical aluminum smelting process, we depend on getting the highest reliability from the power station. This has been achieved and we are satisfied with ABB’s installation”.

Amin Sultan, Maintenance Superintendent PS3&4
Aluminium Bahrain B.S.C.
Procontrol P13 upgrade at Roosecote Power Station

At the Roosecote CCPP in the UK, ABB has upgraded the existing analog gas-turbine control system to a digital Procontrol P13 system in close cooperation with the customer Centrica Energy. The challenge was to reproduce the functionality of the old control system with the new controls within a very short delivery time.

The 229 MW Roosecote plant, in commercial operation since 1991, is based on one Alstom GT13E gas turbine and was the first privately owned CCPP to produce electricity for public use in the UK.

The customer chose Procontrol P13 as he already has P13 in other parts of the plant and is very satisfied from the point of view of reliability and lifetime. ABB only had 3 months for the engineering of the hardware and software including the manufacture of the hardware. The input requirements for the software were the analog Decontic control logic, which meant a conversion from an analog to a digital system. This challenge was easily overcome thanks to the specific performance features of the P13 control system and to the associated engineering tools. As a result of the upgrade of the control system to P13, the customer is now able to optimize his gas turbine controller to meet future challenges. Integration with other ABB systems such as Optimax® or AC800xA is now also possible. ABB will ensure the service, maintenance and all the necessary development of the P13 system for the next decade.

Modern ABB solutions for the Val Giuv Hydro Power Station

After more than 25 years in operation a number of the plant components had reached their expected lifetime and needed to be replaced. ABB received the order for the replacement of the complete electrical and control equipment through a convincing overall concept with modern technology and reliable and proven products.
Optimized Operations Management in WTE Plants

As a result of the liberalization of the utility industry, waste incineration plants are forced to optimize the operation and life cycle costs of their plants and simultaneously to reduce plant emissions. This requires powerful diagnosis and optimizing tools that allow detection of deviations from the required performance and appropriate measures to be taken early.

These tools should reduce the maintenance costs of all the plant equipment, prolong the lifetime of important components and improve the utilization of the existing assets in order to increase the availability and productivity of the entire plant.

In this area, the systems of the ABB Optimax® family offer various possibilities for improving plant operations management with respect to economic viability and expected performance.

**Optimax Performance Monitoring:**
- Continuous monitoring and timely detection of efficiency deviations.
- Calculation of the costs of deviations from reference characteristics.
- Support for preventive maintenance through monitoring of critical components.

**Optimax Lifetime Monitoring**
- Detection of faults that contribute to premature component fatigue.
- Documentation of correct operation with respect to the component suppliers or in order to fulfill the requirements of the authorities.
- Long-term maintenance planning for critical components and extending specific inspection intervals.

**Optimax Unit Commitment Optimization**
- New optimization procedures help to minimize generation costs—in the form of electricity, heat, hydro power, waste etc. The system is a decision support tool to buy or sell power or fuel, to start up or shut down a unit, to unload critical plant components or to postpone a preventive maintenance shutdown.
- In addition, Optimax is capable of applying aging models and emission costs to determine the optimum operations strategy between maintenance shutdowns.

Complete and modern electrical and control equipment

The scope of supply comprised:
- Machine controllers, turbine controls, automation
- Local operation, excitation, synchronization, generator and power system protection, low-voltage distribution, battery system
- Industrial IT 800xA operating system in the control room in the village
- Control of the water catchment, local operation, battery system, level measurement.

The control system comprises the ABB platform 800xA, which was easily adapted to the operator’s specific requirements from water-turbine modules. The control room in Sedrun supports the operator with intuitive and flexible navigation and makes decisions easier to take with integrated data. The alarm management supports fast response to exceptional situations, and the integrated messenger function allows the personnel to be quickly notified via a pager or mobile phone. Pre-configured trend curve diagrams and simple routines for reporting allow the process events to be quickly analyzed.
The integrated Power Generation Information Manager (PGIM), is a field-proven and at the same time future-proof Plant Information Management Systems (PIMS) for power generation and the water industries. It may be completely integrated into the IndustrialIT System 800xA, or run as a stand-alone application, and constitutes the archive server for long-term storage of process information and events.

The PGIM Client offers the following functionality:

- The Navigator provides a clear organization of the evaluations.
- The Signal Explorer allows you to easily configure items using drag-and-drop operations.
- Trend Analysis provides an easy and clear evaluation of signal courses.
- Process Graphics create and represent clear process and result values.
- Microsoft Office Integration for the analysis and representation of process and result values within the well-known Microsoft environment.
- Logs and Reports for a clear representation of text, tables and graphics.
- The Counter calculates counter readings for state-oriented maintenance.

PGIM evolved from the field-proven PlantConnect PIMS, with an installed base of more than 300 medium-size and large facilities in the power and heat generation sector, in industrial plants and water management facilities. The latest version’s architecture and the large number of interfaces to commonly used control systems render it particularly suitable for creating multifacility production data management systems, for upgrading existing control systems to include state-of-the-art information management, and for integrating installed plants into company-wide information systems.
The various components of a plant always have different lifetimes. This fact has a great influence on the decision as to what new products should be used when replacements are necessary. Because of the different lifetimes at the time of the replacement, there are on the one hand components that are already older but have not yet reached their technical or economical end of lifetime, and on the other hand there are components that will have admittedly soon reached the end, but for which there are neither replacement products nor is the migration path known.

This raises some questions concerning the components that are to be replaced:
- Are the new components also compatible with the existing, older components?
- What will happen if other components need to be replaced later? Is the choice then limited or is a wide range of products available?
- Does one or the other decision create a dependency on one supplier?

Guaranteed upgrade possibility
When the control system needs to be replaced, with the 800xA, ABB not only offers a system with outstanding functionality, but also the certainty that the different lifetimes of the other components will not be a problem.

The ABB 800xA control system has an open architecture. It can not only be integrated with the latest ABB controllers (A), but also with existing proven ABB controllers, with future ABB controllers (B), and also with controllers from other suppliers (C). In addition, controllers that ensure safety (D) can be operated together with the normal controllers in the same system. Therefore, the operator has a single system network with a uniform operating level available; the configuration, training and familiarization costs are kept to a minimum.

Only the controllers are proprietary hardware in an ABB System; because ABB guarantees optimum reliability and safety, only an in-house development is acceptable for this key product. However, for the other components of the control system, only commercial “off-the-shelf” components are used. At the field level, numerous bus protocols (E) and components (F) can be used to ensure that the bus exactly matches the requirements of the plant. At the network level, the most modern technology can be implemented such as wireless LAN etc. (G), and at the workstation level, all the possibilities of the PC world—wireless mice, fingerprint login etc.—can be fully used, and all with standard components (H).

Standardization to allow integration
The ABB 800xA software is based on standards. The so-called “ABB Aspect Object System”—a cornerstone of ABB 800xA—is based on the Windows operating system and allows the intelligent integration of any PC software. No matter whether it is a brought-in, older tool or software that is introduced later: everything that can run on a normal PC can also be integrated in the ABB 800xA (I). In every case, an ABB System is the right decision: keep the familiar and proven, use the modern and new.
Power-Gen Europe
May 30—June 1
Cologne, Germany

Meet with ABB and 10,000 business professionals at the Koelnmesse in Cologne - the largest power generation event in Europe. The following ABB papers will be presented at the conference:

- IT Security in Power Plant Automation Systems
- Improving overall equipment effectiveness and increasing RoA with Asset Monitors
- Combustion and emission monitoring systems for the new emission monitoring regulations
- The upgrading and optimization of the control systems helps E.ONs Scholven plant to increase the plant lifecycle and meet new market requirements
- Alarm Management in Power Plants
- Process quality monitoring: A means for improvement of plant operation

ECWATECH, May 30—June 2, Moscow, Russia

As the most important event for the water industry in the CIS states, with more than 10,000 visitors and over 500 exhibitors in 2004, this year ECWATECH will be held in the new Crocus Expo exhibition center in Moscow.

The ABB exhibits focus on turnkey solutions that allow municipalities and industry to build, rehabilitate and modernize water and wastewater facilities and systems.

Welcome to ABB, stand number K 1.5