Clean and efficient fluidized bed power plant for Infraserv

One of the world’s largest fluidized bed power plants is right now under construction outside Frankfurt, Germany. Ebara Corporation, Japan, acts as general contractor for the plant and ABB will supply the total electrical and automation scope, including installation and commissioning.

The plant will produce electricity and process steam from the incineration of up to 675'000 metric tons of Refuse-Derived Fuel (RDF) per year in an internally circulating fluidized bed. It can be used in clean energy production by replacing fossil fuels. When this material is combusted, it releases around 50 to 60 percent less CO₂ than coal power plants and 20 to 30 percent less than gas power stations.

The ABB solution is a totally integrated full scope solution, offering an excellent price-performance ratio. Due to the Profibus connections the customer will receive a high degree of standardization for planning and documentation and an extremely flexible system in regards to operation and maintenance as well as for future extensions. ABB MNSiS is the first integrated system for low-voltage MCC applications and includes comprehensive motor control, monitoring, protection, and communication capabilities to higher-level control systems.

The new plant sited in Industriepark Höchst will operate in cogeneration mode and produce approximately 90 MW of power and 250 metric tons of steam per hour when entering commercial operation in 2009.
Carefree commissioning and highest availability thanks to 1:1 process simulator tests

At ABB Switzerland, all power plant products and systems are subjected to a Factory Test (FT) in the engineering and testing department before being delivered to the customers. This thorough pre-testing secures the customer a short and carefree commissioning and an optimal availability of the plant when in operation.

ABB has developed a process simulator, which tests the entire gas turbine process 100% realistically to be able to fulfill the very high demands that are placed on such systems at all times. This means that all the relevant steps from start-up, to shut-down of the gas turbines and all the required operating modes can be run through and the performance of the system can be tested without danger. This significantly increases the availability and avoids unnecessary start-ups and trips of the real gas turbine, which would reduce the lifetime. In addition, it saves time, trouble and fuel.

100% pre-tested controllers
The main components tested are:
- EGATROL (GT control system)
- TURBOTROL and TURBOTURN (ST control system)
- Distributed Control System (DCS) comprising the Boiler Control, Water Steam Cycle, Balance of Plant and Electrical System
The 800xA system is used for the Human System Interface (HSI).

The FT of one of the above mentioned components mainly comprises a hardware and software test, with a subsequent Factory Acceptance Test (FAT), where the customer is normally present.

The FT of each component comprises the following main steps:
1. Incoming inspection
2. Hardware test
3. Software test with the real application software
4. Pre-Shipment check

For complex systems such as the EGATROL, which is used for all the Alstom gas turbine types (GT8C2, GT11N2, GT13E2, GT24, and GT26) it is essential that in addition to the hardware, the entire software functionality such as the data acquisition, control, regulation, and protection, is completely tested.

1400 signals tested
The actual simulator is specifically adapted to each project. For a GT26 the exchange of signals comprises about 1400 analog and digital signals, which are processed between the simulator and the EGATROL. The simulator software completely models the gas turbine process and has the advantage that together with the 800xA HSI all the operating modes of a gas turbine can be run through without any danger. The relevant process values can subsequently be compared with the process specifications in order to adjust and optimize the control parameters if necessary to ensure the safety of the first start-up, synchronization and loading of the gas turbine is assured.

The simulator is also used to thoroughly test the modifications and updates for the EGATROL before they are finally installed in systems which are already in operation.

“Being able to take part in this thorough quality test and also to test how the plant will work in various modes make us very confident for the upcoming commissioning and future operation of the plant.”

Dirk Vogt, Group Manager Lead Engineering Gas Turbine Electrical & Controls at ALSTOM
At the beginning of 2006, an OPTIMAX Performance Monitoring System, including OPTIMAX Data Validation with PowerCycle, was installed in the Termobarranquilla combined cycle power plant in Colombia. The system monitors and ensures the accuracy of the instrumentation and will bring the customer considerable long-term savings.

Efficiency and heat rate are increasingly important to producers. To ensure efficient operation it is crucial to be able to rely absolutely on the accuracy of the installed instrumentation and equipment. To achieve this, it is necessary to monitor the accuracy of the instrumentation and to take corrective action whenever necessary. However, the measurements in a plant depend on the plant operation and external influences such as ambient conditions, fuel composition etc. Therefore, it is important to monitor not only the values, but also to use a reliable reference source for the monitoring.

The Termobarranquilla project is one of the largest and cleanest IPP projects in Colombia and is located on the Atlantic coast. The plant consists of two units with two, respectively three ALSTOM GT11N2 gas turbines connected to two steam turbines, which results in a very flexible operation of the plant. Together with the variations in the ambient conditions etc., this makes the monitoring of the instrumentation complex and time consuming. OPTIMAX Data Validation with PowerCycle is based on the online thermodynamic modelling of the plant and can therefore adapt to the current conditions of the plant and give a more accurate reference than conventional data validation. The thermodynamic modelling provides upstream/downstream redundancy comparison as well as instrumentation redundancy, with the big advantage that systematic errors are detected more easily.

Furthermore, the OPTIMAX Data Validation system stores all the results of the online monitoring in a database, which makes it possible to detect trends in the deviations through the graphical presentation of the results. This provides the customer with easy to use diagnostics and monitoring of the accuracy of the instrumentation throughout the plant and as a result saves the customer time and effort in measurement monitoring.

Higher reliability and less spare parts required after upgrade in Malacas Power Station

In close cooperation with the customer EEPSA and ALSTOM, ABB has upgraded the existing MOD300 control system in the Malacas gas power station in Peru to a digital Procontrol P13 system. The challenge was to replicate the functionality of the old Open Loop Controller (OLC) and the turbine protection in the proven Procontrol system within the short time available during normal inspection time. Malacas now has a fully integrated system.

The 96 MW Malacas power station, which first went into commercial operation in 1998, is equipped with an ALSTOM GT11N2 gas turbine and is located 1120 km north of the Peruvian capital Lima.

The decision was made for Procontrol P13 because the Closed Loop Controller (CLC) was already implemented with P13 and the customer is very satisfied with the reliability and lifetime of P13. The old ladder logic was used as the basis for the new software which was generated by using the ABB Progress 3 engineering tool.

The old operator station was replaced by a modern ABB 800xA operator station providing the customer with the usual operator displays, including alarm lists, process diagrams, faceplates and trend diagrams. Through the standardized visualization of all the information, the operators have the tools available that they need to fulfill all operational and production requirements. Additionally, the local mosaic panel was replaced by an ABB PP865 touch-screen panel for redundancy. The installed configuration is also planned to support a future remote control set-up of the plant.
Trends, efficiency and innovations discussed at the WTE Forum 2007

What should be done when the waste capacity is reached and increasing plant efficiency becomes the critical issue? What advantages can you expect from a turnkey supplier compared with a shop-around-strategy? What new innovative products and solutions are available to support the plant managers’ targets? These and other issues were addressed and discussed between 70 professionals from the WTE industry and ABB specialists at the biennial WTE Forum held by ABB in Baden, Switzerland.

One of the innovations introduced and demonstrated at the meeting was the new advanced WTE controller WACS 300, featuring modern, uniform control and visualization methods. Another novelty on display was the Extended Operator Workplace (EOW). The EOW, which is based on the ABB 800xA system, provides operators with an outstanding interactive and easy-to-use interface for optimal efficiency and ergonomics.

ABB at Power-Gen exhibitions in 2008

ABB’s dedication within the power generation industry can best be demonstrated at the upcoming Power-Gen exhibition and conferences in 2008. Please visit us at:

- Power-Gen Middle East, Manama, Bahrain, February 4–6
- Power-Gen Europe, Milan, Italy, June 3–5
- Power-Gen Asia, Kuala Lumpur, Malaysia, Oct. 21–23
- Power-Gen International, Orlando, FL, US, Dec. 2–4

PRODUCT NEWS

800xA based Condition Monitoring (MCM800)

The MCM800 modules add condition monitoring capability to 800xA control systems along with other controllers having Profibus or Modbus interfaces, or can be used as a stand-alone system. It provides a complete set of supervisory instrumentation functions for most types of rotating machinery. Critical plant equipment, such as steam turbines or water feed pumps are common examples of MCM800 condition monitoring applications.