

Electrical, Instrumentation and Control Equipment for the Trebinje Hydro Power Plant



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The Plant

The Trebinje Hydro Power Plant is situated in the extreme Southeast of Bosnia and Herzegovina. The plant owner and operator is Hydrosystem Trebisnjica (HET). The power plant consists of three units which were erected between 1968 and 1974 and generate an output of 2 x 60 MVA and 1 x 70 MVA. In the meantime, several sections of the power plant have been modernized.

The Task

Hydrosystem Trebisnjica placed an order with ABB for replacing the plant's conventional control system with a digital process control system, combined with a man-system-interface as a substitute for the old control room equipment, as well as for delivering the lighting, air conditioning system and furniture for the new control room. In the course of the upgrade, the UPS system had to be brought up-to-date; this included batteries, inverters, and rectifiers.

In addition, the rotary generator excitation systems had to be replaced by brushless excitation systems.

Functions	Quantity
Measurements	Approx. 300 hardware signals
Drives	Approx. 40 directly activated drives
Total signal volume	Approx. 1200 signals, incl. operation and serial interfaces
Open-loop controls	3 start/stop sequences (function group controls)
Closed-loop controls	1 joint control which distributes the power output to the 3 generators
Serial interfaces with the following systems	<ul style="list-style-type: none"> ■ ABB Unitrol excitation system ■ Siemens Siprotec generator protection system ■ Bruel&Kjaer vibration analysis system

Bill of quantities for the entire plant

The Control System Solution

The control system solution chosen for this project is System 800xA in combination with AC 800M controllers. The system includes controllers with interfaces for up to 1,500 I/O points. With System 800xA, users can work with field-proven displays, such as alarm lists, process graphics, faceplates, and trend displays. Thanks to a consistent view of the information, reliable tools are accessible to all users for performing operating tasks in the hydro power plant.

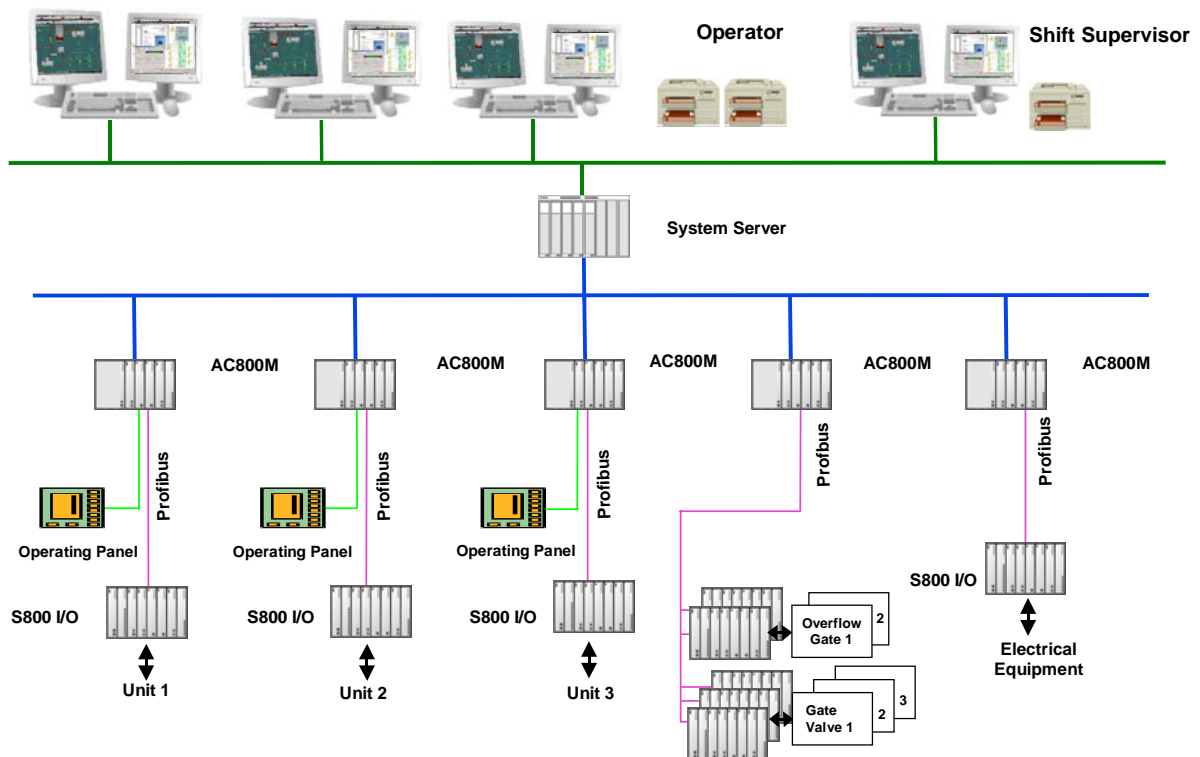
Fast, flexible and safe access to any relevant displays and information enables operators to monitor and operate the processes very efficiently and accurately.

System 800xA displays a fully detailed plant overview in a header, supporting quick access to any alarm messages and graphic displays. The operator receives information about the priority and the acknowledgement status of the individual messages.



Control room with the 800xA System

Electrical, Instrumentation and Control Equipment for the Trebinie Hvdro Power Plant



Configuration of System 800xA in combination with AC 800M

The user can directly access the associated plant displays from the header. Another important feature is that the header indicates — for each plant unit — how many messages per area are pending and which message takes the highest priority.

The alarms shown in the alarm list can be sorted according to various criteria. For instance, sorting by time, by plant designation code, or by priority can be very helpful.

The quality of the operating and monitoring activities is substantially improved with the System 800xA. With the functions available for creating system reports and issuing alarms, it is much easier to reliably schedule preventive maintenance activities. This helps prevent unexpected and costly outages before they occur. Since the staff is working in a familiar Windows environment, they can quickly and easily access all the relevant functions and efficiently perform their operating tasks. Users are already familiar with the type of menus, buttons, symbols and navigation options from other Windows applications.

This makes it easy to get to know the system and requires very little training.

Measurements

ABB replaced measuring and instrumentation equipment in the plant. Among other things, new temperature and pressure transducers, flow-rate switches, limit switches, and level switches were installed. The instruments have been designed for rough environments as are typical for hydro power plants.



New excitation system

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Excitation, Synchronization, UPS

The brushless excitation systems are ABB products from the UNITROL line designed for synchronous generators. This specialized technology has been developed and continuously advanced over a period of more than 30 years and has been applied in more than 3,300 cases.

Also, the synchronizer, the 110V DC supply and the uninterruptible power supply were replaced.

ABB installed one synchronizer which is capable of synchronizing all three generators to feed a 13.2kV busbar and, at the same time, synchronizes the 220kV voltage level of the power plant for two different three-phase current transmission systems.

The Processing of the Project

The time between the placing of the purchase order and the modification of the plant was less than half a year. The installation and commissioning activities were accomplished on a unit-by-unit basis, i.e. in three stages, during regular scheduled maintenance downtimes. At least one of the three units had to remain operable during the retrofit measures. The overall processing of the project was substantially simplified by the fact that ABB generated all the engineering documents, screen displays, alarm and status messages in the Serbian language. This way, it was possible to fully include the plant owner right from the start.

The customer especially appreciated the high level of availability of the ABB process control system, its advanced technology, and the savings potential in regard to ongoing maintenance and servicing.



Turbine hall after completion of the upgrading measures



ABB AG Power Technology Systems

P.O. Box 10 03 51
68128 Mannheim
GERMANY

Phone: +49 (0) 621 381-3000
Fax: +49 (0) 621 381-2645
E-Mail: powertech@de.abb.com
Internet: <http://www.abb.de/pt>

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