

Modernization of the Ryburg-Schwörstadt hydroelectric power station

Environmentally friendly power generation



Hydraulic power has been used for the environmentally friendly generation of electric power for over 100 years. There are 11 run-of-river power stations to be found on the stretch of the upper Rhine between Lake Constance and Basel, together producing around 4,100 GWh of power per year. Numerous hydraulic power stations were built over the period from 1890 to 1930 and are still in operation today.

The Ryburg-Schwörstadt power station is the largest of these river power stations and was started up in 1931. Together, its four powerful Kaplan turbines generate 120 megawatts of power. Each year, the power station generates around 760 million kilowatt hours of CO₂-free power, which it delivers to energy suppliers both in Germany and in Switzerland. These companies then assume responsibility for transporting and distributing the power.

Efficient conversion

The power station was converted from analog technology to the Contronic P process control system of Hartmann & Braun back in 1988. Since the fall of 2003, Contronic P is being replaced by Freelance 800F, the compact process control system from ABB.

“The conversion was necessary because the power station had to be prepared for unmanned operation. The power station operates fully automatically and the control room is only manned sporadically. We therefore need a modern control system,” states Hubert Strittmatter, head of electrical engineering at the Ryburg-Schwörstadt AG power station.



Hubert Strittmatter

The conversion to modern controllers and a modern control station also made it possible to integrate remote alarm functionality. When there is no operator in the control room, messages can be forwarded to a pager or a

mobile phone. “Another advantage of replacing the legacy system with a modern control system is that it avoids problems with procuring spare parts. In fact, one particular reason why we chose Freelance 800F was that ABB offers an efficient and cost-effective means of migrating from Contronic P to Freelance 800F,” explains Mr. Strittmatter.



Requirements

- Efficient and cost-effective migration
- Short interruption times
- Parallel operation of the old and new control system
- Long-term availability
- High availability
- High degree of reliability

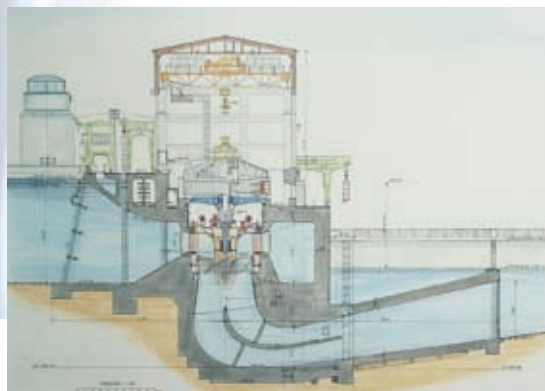
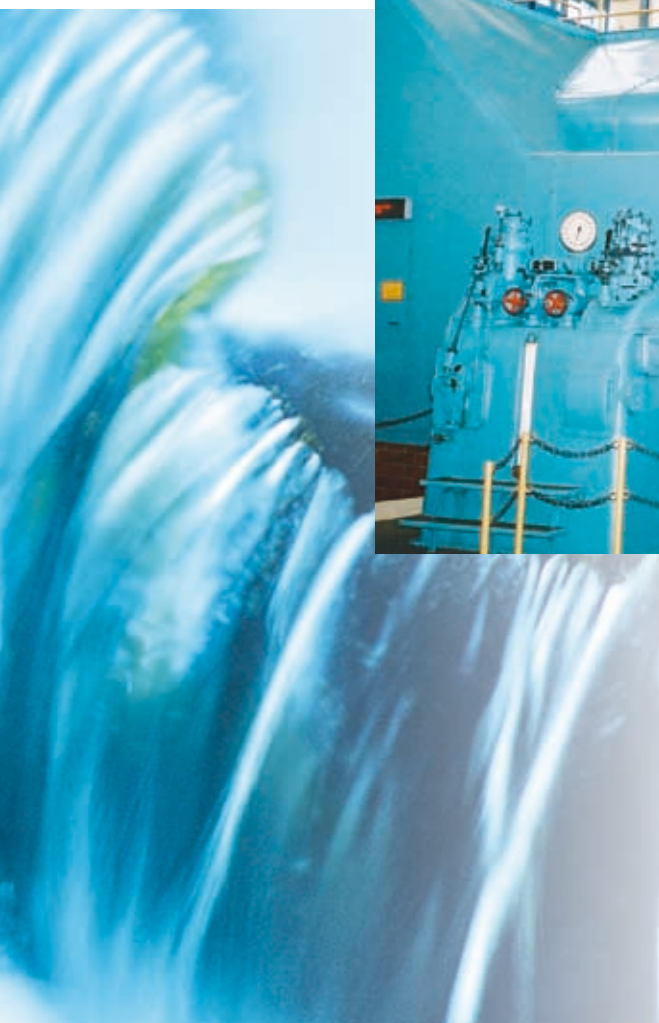


Contronic P

The Kaplan turbine:

The turbine was developed in 1913 by the Austrian engineer Viktor Kaplan. The wheels of Kaplan turbines are similar to ship propellers. In the case of large Kaplan turbines, the water flows from the top to the bottom. They are used for low heads of water of up to 60 m.

The adjustable blades allow you to regulate the turbine and increase the effectiveness. The turbines of the Ryburg-Schwörstadt power station process around 1,460 m³ of water per second.



Cross section of the power station

Multi-phase migration strategy



Rolf Bernhart

BERFA AG, the company commissioned to replace the old control technology, decided to use a multi-phase migration strategy. "This strategy facilitates our work as system integrator and reduces the interruption times experienced by the customer," states Rolf Bernhart, Managing Director and co-owner of BERFA. The first phase involved replacing the old Contronic P visualization with the modern Operate IT Process Portal process visualization.

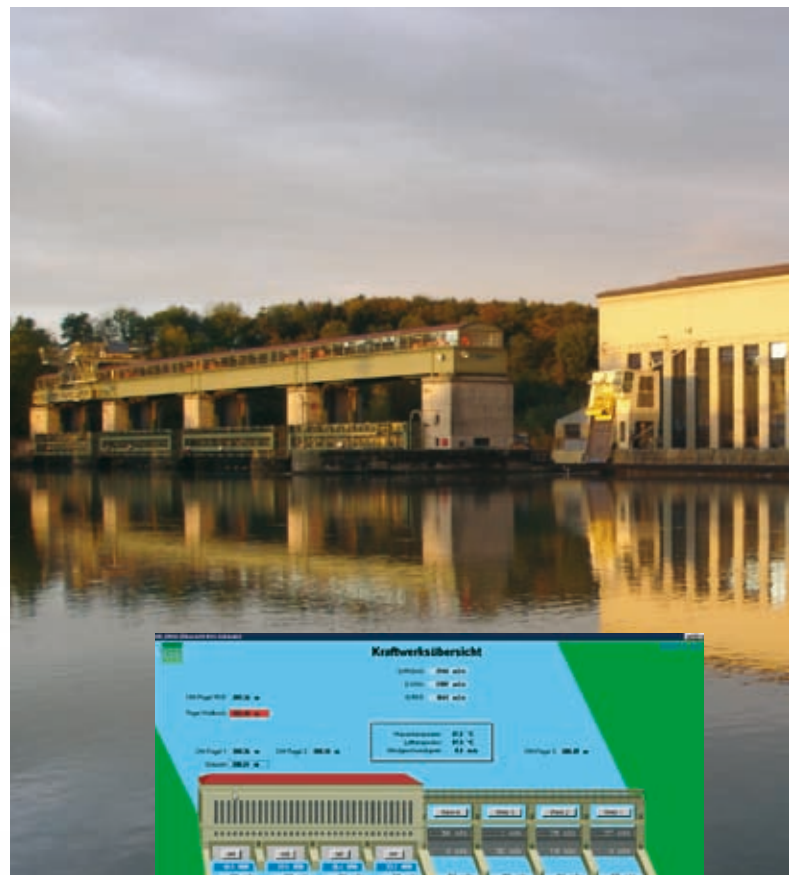
The process stations are being converted unit by unit. As the turbine for one unit is being serviced, the automation is also changed over. This, too, helps shorten the downtime.

This can be run both with Contronic P process stations and with the AC 800F controllers of Freelance 800F by using a coupling station. In the second phase, the control of the Contronic P process stations was successively transferred to the AC 800F controllers.

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Old Contronic P user interface



Modern, graphical user interface of Operate IT Process Portal for reliable operation

Simple and safe operation

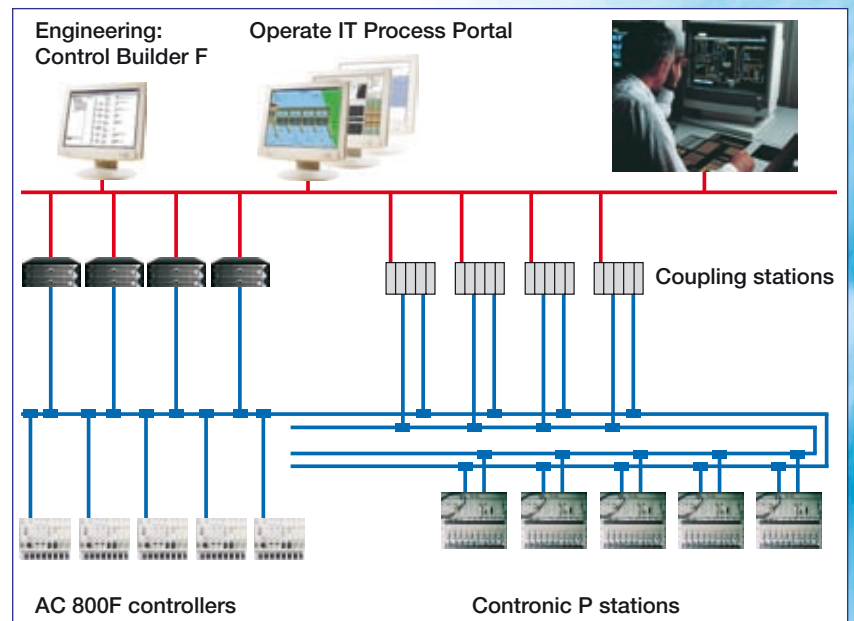
Alongside unmanned operation, another challenge involved the parallel operation of the two control systems, Contronic P and Freelance 800F. As a first step, the operator interface was converted to Operate IT Process Portal. During the transition phase the personnel work in parallel with both the familiar and the new visualization. Thus, they can get to know the new operator interface gradually. As a result, the training times are minimized, while the safety and effectiveness of the station are enhanced. In contrast to the previous Contronic P visualization, Process Portal provides the advantage of a modern graphical user interface, allowing secure operation.



Perfect functionality

As the Ryburg-Schwörstadt AG power station (KRS) delivers power to several buyers, the energy billing function must work properly. In addition, power stations located upstream of the KRS pump water into storage lakes, in which case there is less water available for KRS and the power station runs less effectively. This shortfall is also calculated by the system for energy billing.

This complex charging process is also being converted in the course of renovation. However, the existing billing system is continuing to be used in parallel to the new system for the duration of one year. This is an easy way of both checking and proving that the system is operating perfectly.



System structure with parallel operation of Contronic P and AC 800F process stations



AC 800F controllers



S800 Remote I/O



Advantages of the conversion

For the Ryburg-Schwörstadt AG power station, it was particularly important that the energy billing function could continue running without interruption during the conversion. Thanks to the two-stage concept developed by the system integrator, BERFA, the power station's staff have been able to gradually familiarize themselves with the new automation.

In this way, the plant can be run reliably. "The modern technology has put us into a position to quickly reach the right decisions," sums up Hubert Strittmatter. "We are very satisfied with both the solution from BERFA and the system from ABB. Our power station has been generating power for over 75 years and it is still a long way away from retirement. This is why the fact that ABB have promised us that the Freelance 800F system will be available for a long time is so important to us."

- No interruption to energy billing
- Straightforward training
- Reliable operation
- Modern visualization that is open to the future
- Long-term availability of Freelance 800F



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