

HST Hydro-Systemtechnik relies on robust hardware components from Beckhoff

## Wireless system ensures reliable plant communication at the Genkel Dam

The Genkel Dam, situated in the municipal area of Gummersbach and Meinerzhagen, Germany, supplies drinking water to the surrounding region. In order to automate the operation of the dam, HST Hydro-Systemtechnik GmbH was commissioned to plan, install and start up a new process control system. Robust automation components from Beckhoff ensure that the complex measuring and control tasks are performed reliably, despite long distances and a damp environment.

The Genkel Dam consists of a rock fill with a waterproof double asphalt concrete covering on the upstream face. The dam, which rises 41 metres from the bottom of the valley, is 200 meters long and almost 8 meters wide at the crown. The reservoir behind it holds approximately 8 million cubic meters of drinking water. In order to supervise the operation of the dam in accordance with state of the art technology, HST Hydro-Systemtechnik was commissioned from the Aggerverband, a regional water management association based in Gummersbach, with the installation of a modern process control system. This monitors parameters such as withdrawal of water, water level, water temperature, water evaporation and wind velocity. In addition, shifting of the dam in relation to the substrate is monitored constantly.

### PC-based control and monitoring system

HST Hydro-Systemtechnik, with head office in Meschede, Germany, employs a total of 110 people and offers complete solutions for water management, which are used in both the municipal and the commercial sector. The applications include, for example, water works, dams, storm water tanks, sewer systems and wastewater treatment plants. The company's core competencies include IT systems for automation and process control engineering. HST Hydro-Systemtechnik develops the software in-house. The hardware, conversely, is sourced externally. "Some years ago we decided to extend our HydroDat® V8 process control system using a

PC-based TeleMatic system," explains Frank Heutger, Product Manager for IT systems at HST Hydro-Systemtechnik. "To this end we looked for compatible hardware, which also had to be modular and durable. We ultimately decided to use Beckhoff components, because they are very reliable and their openness means they can be integrated simply into our process control system," says the IT expert. HST Hydro-Systemtechnik has used Beckhoff hardware almost exclusively since then.

In water management it is frequently the case that several plants distributed over a wide area have to be integrated into a process control system. The particular challenge here is to ensure reliable operation despite these conditions. Frank Heutger comments: "Communication used to take place mostly via telephone lines. Today, however, radio data transmission is being used increasingly. In addition, online connections are established via Ethernet."

### Successful integration of modern radio technology in proven Lightbus-based bus structures

The new process control system for the Genkel Dam links together a total of 12 stations, of which one – the so-called measuring raft – is located on the reservoir. In addition, the system is directly connected to the central control room of the Aggerverband, from where several dams are monitored. "The association demanded high availability where the hardware is concerned. That means the components also have to work reliably



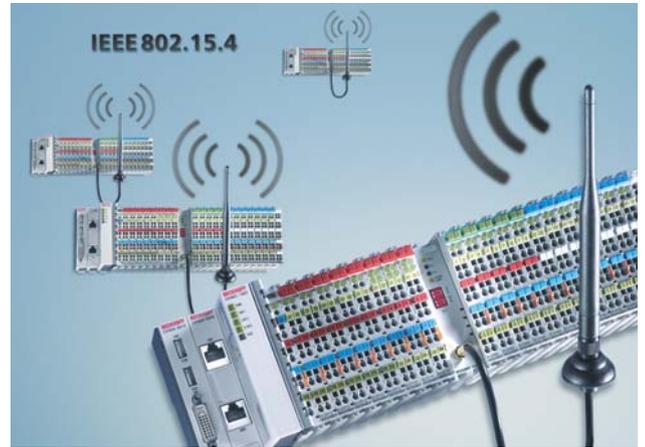
under difficult environmental conditions and have a long life span. The control system also has to guarantee secure data storage," explains the IT expert from HST.

In order to transmit the data reliably within the process control system, the Aggerverband chose – for reasons of uniformity – the Lightbus system that has already been used successfully for several years at the Wiehl Dam, which likewise belongs to this association.

A total of 11 of the 12 stations of the Genkel Dam are connected via a 1.5-kilometer long Lightbus ring. Each station consists of a BC2000 Bus Terminal Controller with integrated PLC functionality. The process data are acquired by various analog and digital measuring terminals.

#### **Beckhoff Bus Terminal system integrates wireless communication**

The 12 station, the so-called measuring raft, has almost the same hardware. However, since this raft is located out on the water 100 meters from the dam, a cable connection would have been risky. This is because a cable lying in the water body would be exposed to numerous lightning strikes during thunderstorms, since the body of water is struck by lightning much more frequently than the surrounding land. To solve this challenge, the experts from HST Hydro-Systemtechnik decided to use a solar power supply and initially a radio connection using the Beckhoff KM6551 Wireless Terminal. "These terminals, which can be integrated



Radio transmission in the Bus Terminal system: The KM6551 wireless terminal enables data transmission via radio, based on the IEEE 802.15.4 standard.

easily into the Bus Terminal system, use the 2.4 GHz band. A directional antenna ensures a stable radio link," explains Frank Heutger. The same wireless technology also exists in station one, which acts as an interface between the two Bus Terminal systems.

#### **Data transmission via ADS**

The backbone of the process control system is formed by the 12 Bus Terminal Controllers which, via ADS (TwinCAT data transport protocol), either exchange the data among one another or transmit them to the control center, from which the entire dam is then monitored and controlled. The on-site operation and monitoring of the plant take place by means of a Beckhoff CP7102 Panel PC in protection class IP 65, which is connected to the Lightbus system with an integrated FC2001 PCI interface card. All information can be visualized and the corresponding commands entered on the 15-inch touchscreen panel.

Following a planning phase lasting several months, the new process control system for the Genkel Dam was realized in approximately six months in 2010. Since then it has worked without error. The radio link with the measuring raft has also passed the acid test. "This confirms once again the good experience that we have had with Beckhoff hardware for several years," Frank Heutger declares, because in the meantime HST Hydro-Systemtechnik has installed well over 1000 CX Embedded PCs, which run reliably without exception.

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Solutions for Water Treatment

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