

worldwide

Treatment plant relies on PC-based telecontrol

Optimized sewer network operation through DIN rail PCs



→ As part of a complete technical overhaul, the Spaichingen waste water treatment plant has opened the door to the wide PC world, creating ideal conditions particularly for telecontrol. In the external stations, this was implemented with Embedded PCs and the automation software from Beckhoff, and at the control center with the process control system from HST.

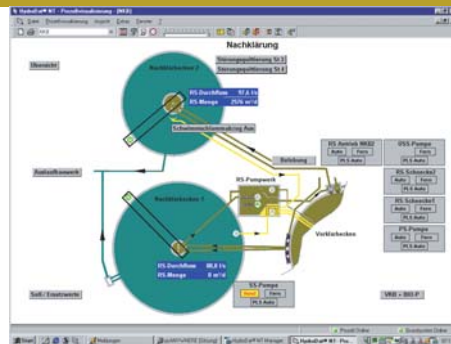
Improved cleaning performance and optimized operation were the main aims during the modernization of the waste water treatment plant at Spaichingen in Germany. To this end, the automation system was completely replaced, i.e. converted to PLC technology. Additional new features are the "HydroDat" HST process control system and the "KANiO" maintenance and operation management system. In combination with the PC-based telecontrol, they make the previous manual monitoring and recording activities largely redundant and contribute to making the whole operation significantly more efficient.

The system was implemented by a well-rehearsed team of specialists: In cooperation with the engineering consultant firm, M. Mayer from Alpirsbach, the main contractor, Hans Eisele GmbH, installed the new automation system and the switchgear. The "door opener" to the PC world was the IT systems division of the solution provider HST Systemtechnik GmbH. The company focuses on water management and was responsible for the control and telecontrol technology, with support from Beckhoff as platform supplier.

Industry know-how plus innovative PC technology

Christof Burmann, IT systems division manager at HST, sees particular advantages in the combination of know-how and innovative technology: "As a solution provider, we are able to cover the complete range from special structures within the sewer network via machine equipment to process control and operation management systems. Through high functionality and innovation our aim is to get involved in interesting projects, including PC-based telecontrol. 'TeleMatic' technology links control and telecontrol systems – offering many benefits for the user."

In the treatment plant itself, Ethernet networking and therefore the PC world are already standard today. The HydroDat 32-bit control system from HST runs under Windows, i.e. with the latest Microsoft technologies. It therefore seemed a natural step to also equip the external stations located upstream of the Spaichingen treatment plant (and connected to it via ISDN dial-up connection) with PC technology, thus, for example, making the conventional telecontrol center redundant via software.



Treatment plant with plenty of data

The sewer network at Spaichingen includes eight external stations (pumping stations, storm water basins). Two of the special water engineering structures are equipped with two substations that are connected via BK3100 Profibus Bus Coupler. A total of approximately 2,300 process variables have to be monitored and processed within the plant. In the central treatment plant, this is handled by four hardware controllers and the HydroDat process control system from HST, comprising a server and two workstations. In the external stations, the modular CX1000 top-hat rail PCs from Beckhoff are used. Since the Beckhoff TwinCAT automation software runs between the Bus Terminals and the HST TeleMatic software installed on the CX1000, the control system can not only access the Bus Terminals, but also any values that were pre-calculated in the PLC.

Given the numerous process variables and the associated multitude of data, the treatment plant operator also benefits from a special HydroDat feature: the "Delta Event" recording technique. Classic process control systems store mean values – e.g. over 15 minutes, one hour or one day – in the archives, thus gradually losing more and more detailed information. With the Delta Event technique, a value (including a time stamp) is recorded in the archive database, whenever a change from a previously specified range (e.g. 2%) has occurred. On the one hand this reduces the quantity of information, and on the other hand it ensures that, even after several years, all the detailed information is still available.



Dipl.-Ing. Christof Burmann,
IT systems division manager at HST.



Why top-hat rail PC technology?

HST has been using PC-based telecontrol for three years. Previously, a conventional industrial Windows 2000 PC was used. Spaichingen is the first project that uses the CX1000. According to Christof Burmann, the main reasons were the particular control cabinet suitability of the Beckhoff system and the simple I/O coupling: "In the past, this was realized with a S7-300 control, which is a relatively expensive solution. When trying to find a replacement, one ought to be aware that in addition to the I/O connection, the PLC frequently also deals with data pre-processing. For the hardware, we therefore required a combination of PC and PLC, and the CX1000 from Beckhoff fitted the bill. The I/Os can be connected directly, and the device is compact, can be mounted on top-hat rails and has the PLC on board. In a small pumping station, for example, space requirements are a significant factor. An additional factor is that the CX1000 reduces the commissioning time for the external stations by 50%."

Because the HST telecontrol software runs under Windows, the broad functionality of PC technology is available "by default": A webcam for monitoring a storm water basin, for example, can simply be connected to the Embedded PC via Ethernet; fault alarms can also be implemented remotely, i.e. directly from the external stations. "While PC-based telecontrol has already been used for years, it is currently experiencing the next phase through optimum hardware – naturally together with the TwinCAT software," said Christof Burmann. He identified further benefits of the PC technology in the form of simple local visualization via a panel connected to the DVI interface that displays the same process images as

the central control system, and the option to fully parameterize the external stations from the central process control system.

Technology partnership for the future

According to Christof Burmann, there were good reasons for the decision to choose Beckhoff as the platform supplier: "Beckhoff with its comprehensive product range provided the best match for HST's requirements. For example, we also use the small, non-Windows-based BC series Bus Terminal Controllers, e.g. for our discharge controllers without remote monitoring. This had the advantage that, during the conversion to remote monitoring, the complete terminal wiring could remain unchanged – only the head had to be replaced with a CX1000. An additional benefit is the modularity of the Embedded PC, which enables optimum application-specific configuration. Furthermore, Beckhoff is a pioneer for PC technology and provides an ideal match for HST, since we champion the cause of PC-based telecontrol under the collective term of TeleMatic."

Partnership also means joint developments, an example for which is the integration of the two software programs HydroDat and TwinCAT on the CX1000. Our experts have also jointly worked on the implementation of telecontrol protocols based on IEC 60870-5. On the practical side, the future has already started: Concrete orders for further HST projects with a total of 70 stations have been received and are being implemented with Beckhoff control technology.