Generation Change in the Waterworks: Cooling Water Supply with SIMATIC WinCC

The Wacker-Chemicals Corporation (Munich) - one of Germany’s 100 leading industrial firms - was founded in 1914 and belongs in equal parts to the family-owned Dr. Alexander Wacker Group and the Hoechst AG. Worldwide, 16,000 employees produce over 3000 quality products including silicones, silanes, silicic acids, thermal insulating materials, pure silicon for semiconductor devices, dispersion powders, organic compounds, cyclodextrines, catalysts, basic elements for fine chemicals, silicone carbide and ceramics. In addition to eight domestic production facilities and ten outside of Germany, a sales network with offices in over 100 countries provides maximum customer proximity around the globe. With 10,000 employees, the main factory in picturesque Burghausen at the Salzach river is the most important location of the Wacker-Chemicals Corporation. In Burghausen, Wacker’s complete line of products, apart from ceramics, is produced.

Redundant Water Sources

Required for the safe, continuous operation of processes and constant product quality is filtered cooling water in guaranteed and controlled quantities. The maximum inlet temperature, for example, is 18°C throughout the year for all individual plants. To ensure this, Wacker has built a redundant cooling water system that is mainly fed by three sources.

One of these sources is the Alz River Canal - going from Hirten to Burghausen - built over 50 years ago. It is part of the Alz Works, the hydroelectric power plant of the Wacker-Chemicals Corporation. The raw water taken from the Alz Canal - up to 30,000 m³/h at peak times - is supplied to multiple waterworks, prefiltered and pumped into the cooling water network. Since it is warmed up only slightly, the water can be discharged into the canal after use.

To prevent being literally left in the dry during canal reconstructions, the Salzach pumping station was built. It utilizes six pumps and an underground canal to supply water from the Salzach river to the sedimentation basins. However, the primary use of the pumping station is during summer time, when the water in the Alz Canal (originating from the Chiemsee lake) often reaches temperatures of 24°C. The Salzach on the other hand is a cold mountain river with temperatures around 14° to 15°C - thus the permissible maximum temperature can be adhered to without problems.

Wacker also channels water from the Austrian Mühlbach river to its factory. Since this water is very clean and cold (12° to 13°C), it is used as cooling water for more sophisticated applications and for the production of completely desalinated boiler feed water. Its share of the total supply is approximately 13%.

Just as with its water sources, Wacker counts on a distributed, flexible in-house system of multiple waterworks for reliably supplying the plants.
To ensure the efficient supply of cooling water for the coming millennium, Wacker began updating and unifying the measurement and control technology of the waterworks, which had grown with the plants over the years, in 1997. This was to be accomplished within four years. Instead of using traditional control room technology with mosaic- and blind-mimic diagrams, the entire operation was to be controlled via mouse-clicks and visualized on monitors - future-proof and up-to-date.

Sections of the cooling water supply - including the Salzach pumping station - were already converted to the HMI system COROS LS-B and SIMATIC S5 PLCs as part of an earlier modernization effort. “When searching for the system most suitable for our tasks today, we once again turned to Siemens,” states the project manager and production engineer responsible for measurement and control support Hartmut Taubert in retrospect. „It had to be a continuous, open solution that was already sufficiently widespread and tested at our location. It also had to come from a reliable supplier that would guarantee future support for our continuous processes.“ These conditions were met by Europe’s leading HMI system SIMATIC WinCC (Windows Control Center) and Siemens.

The consequent continuity of the latest SIMATIC automation technology - from the management level to the field area (Totally Integrated Automation) - further simplified the decision. The acceptance by plant supervisors and shift workers - included from the start in the planning - also was a big factor in paving the way for the new technology.

Safety in any Situation
The redundancy demanded of the visualization in the control room is provided by a system of two WinCC servers running in parallel that are connected via Ethernet. Each of these servers can assume all the tasks of the other in the case of a failure. With the help of a multi-VGA card, two monitors can be operated at the servers to visualize different data (temperatures, quantities, etc.). In the final configuration (planned completion by mid-2000), two WinCC clients will be connected as well.

The decentralized peripheral devices (ET 200L/M) of the sand filters, lift pumps, data processing systems and sedimentation basins - divided in groups of six for safety reasons - are connected via PROFI-BUS to SIMATIC S7-400 PLCs. The communication of the S7-400 PLCs to the central servers in the control room is carried out via Industrial Twisted Pair cables with Optical Link Modules (OLM) and an Industrial Ethernet fiber optic cable ring.

Via star couplers, additional systems relevant for the cooling water supply are integrated, such as the Salzach pumping station (length
of the Ethernet cable is approximately 1000 m) and the condensate purifier to be followed later by the high- and low-pressure pumping station. Already implemented is the PROFIBUS connection of measurement devices at places where the cooling water is returned to the Alz Canal. This - and the integrated data interface of WinCC - has made compliance with water ordinances a lot easier.

**HMI: Unmatched Convenience**

The positive acceptance of the new technology by the control room personnel has many good reasons. One of them is reduced work: Unlike the former recording instruments housed in rows and rows of cabinets that had to be controlled manually, the same data with WinCC is now only a mouse-click away and can be displayed clearly on two monitors. Also, the recording instruments required a paper roll change every two weeks.

Just as easy and safe, for example, is the rinsing of the sand filters. „On the monitor, I can immediately recognize, whether this step is technically possible or not at the moment. In this way, even new, untrained operators can’t do anything wrong, which was not the case with the old technology,“ explains plant operator Richard Noll an error source that was eliminated by WinCC. Unauthorized access is prevented by an integrated chipcard reader.

The comprehensive visualization gives the controlled water supply operation an optimal transparence - from clear trend displays of all or individual filter values up to the expressive overviews of the most varied measurement data. In addition, the factory management as well profits from the new functionality: Using the WinCC add-on PM-OPEN PI, the connection to the plant information system (PI) introduced throughout the factory - and with it to the system-wide, continuous information processing - was no problem.

**Everything works as planned**

The project for the Wacker-Chemicals’ waterworks was configured by the Burghausen engineering office Finze & Wagner - in close cooperation with the operator and the local Siemens office - and implemented for the most part without interrupting running operations.

„From the very beginning, the requests and ideas of the plant supervisors and shift workers were included in the design of the roughly 150 screens,“ state Josef Maier and Christian Böhner, the project engineers of Finze & Wagner responsible for the smooth teamwork. „Also, following the control concept introduced by COROS LS-B helped to keep the training to a minimum.“

Based on the positive experiences of the first project phase, all participants are convinced that the tasks remaining - including the rebuilding of the measurement station - can be completed as planned to ensure the simple, safe, economical and transparent control of the cooling water supply at the Wacker-Chemicals Corporation.

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