The sewage system includes 26 special facilities, consisting of pump stations, collection channels, compressor stations and rainwater retention basins.

The technical monitoring of the highly complex sewage system of Emsdetten had been done through an – by today’s standards – extremely inflexible telecontrol system from the early 90’s. Necessary upgrades to the system, effective troubleshooting and the procurement of spare parts were no longer ensured to happen within reasonable cost or time.

Official environmental guidelines also made it necessary to record and archive the rainwater deductions in the collection channels correctly from a time as well as quantity perspective. To modernize the technical equipment regarding operational reliability and availability, it became necessary to update the measuring, control and telecontrol equipment incl. the connection to a control system.

The substations were to be equipped with PLC systems to make future modifications or extensions easier. The new telecontrol technology was to supply detailed information from the substations on measures, values, alarms and messages that also have to be logged automatically. Also, from a central control room, controlling and parametrizing activities need to be possible.

In addition, an object-oriented project development was requested in order to re-use existing developing effort and to save costs regarding future extensions.

Since state-of-the-art GPRS communication technology offers the advantage of wireless data transmission, this key component was to further reduce operating costs.

Another important requirement was an enduring system architecture for the control system to permit gradual extensions and connection of additional plant sections and operator stations in the future to be made.

The need for open interfaces to external systems

Company Overview
City of Emsdetten, Stadtwerke (Municipal Works) – Emsdetten, Germany
The City of Emsdetten with approx. 35,000 inhabitants is located in the West of Germany close to the Dutch border. The operation of the wastewater treatment facility as well as the approx. 280 km long sewerage system is the responsibility of the independent wastewater works of the City of Emsdetten.

“The system allows us to quickly locate errors and other events in the sewerage system. This enables us to prepare our service activities as best as possible and to dramatically reduce the time required for maintenance on site, or even to avoid having to do work locally altogether.”

Robert Erndt, Sewage System Manager, City of Emsdetten
for plant management and evaluation also was a necessity to be considered.

Project Implementation

Central Control System
A central control system was realized with Wonderware’s Application Server on the basis of ArchestrA-technology. This software works with re-usable automation objects and thereby realizes significant time savings in terms of development as well as application upgrade time. The Wonderware Application Server collects production messages and alarms, processes this information into a user-friendly view and visualizes production via InTouch HMI (Human Machine Interface).

GPRS modems are used to establish a wireless connection to the distributed substations. At the same time, the ability to integrate special applications such as the control and monitoring of the GPRS data volume via Microsoft .Net technology into the Wonderware system proved to be a substantial advantage.

All data such as alarms, status information and production messages are continuously stored in real time in the Wonderware Historian (formerly known as IndustrialSQL Server or InSQL). Along that process, the data volume is compressed in size to save hard disk capacity.

The analysis clients of the ActiveFactory software offer a detailed display of the recorded information. This Wonderware tool effects easy-to-design display of curves and progression as well as the import to Office systems such as MS Word and MS Excel.

Communication Structure
Wireless communication via GPRS modems was implemented to connect the distributed substations. Each pumping station is equipped with a Simatic S7-300 control system and an integrated Ethernet interface.

A VPN gateway (virtual private network), which can manage up to 400 VPN connections simultaneously, was established in the control room. To ensure data security, all VPN connections are locally secured with a Firewall. The Gateway communicates with a fixed IP address via a DSL connection.

GPRS communication provides a permanent online connection across which only the data volume is transferred. Using a data protocol specially developed by Lamping & Reisig, it is possible to handle large volume of data comfortably while causing extremely little traffic. In this case, a low-cost volume based rate from Vodafone with a basic volume of 30 MB per month and per pumping station was used.

Thanks to a special volume management system (intelligent volume management with monitoring of the available data volume) it is possible to transmit production measures and other information in real time.
Benefits

Based on innovative system architecture, the control system offers an exceptionally high level of safety.

That includes that during operation of the client/server system, operator stations can be exchanged without compromising data – unlike the case during regular maintenance instances before.

The high resolution and the detail of the plant data supplied enables quick conclusions to be made regarding events in the equipment environment. As a consequence, service activities can be properly planned and repair time to be reduced – if not avoided entirely.

The users benefits from using an enduring product that is constantly developed further. A clear advantage is also the reusability and scalability through easy-to-use software interfaces.

Due to the intelligent connection management, communication expenses can also be drastically cut.

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