Application Story

Industry: Water
Products: Control Systems

Düsseldorf-Nord sewage plant

Reference project
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Düsseldorf-Nord sewage plant
Description

Düsseldorf operates the Düsseldorf-Nord sewage treatment plant on the left bank of the River Rhine. Originally built between 1962 and 1966, the plant was designed for partial (70–80%) mechanical/biological treatment. In the years 1976 to 1980, the size of the activated sludge section was increased to obtain a higher level of treatment. Because of higher inflow rates, it was necessary to increase the volumes of the activated sludge and the settling tanks in 1991.

With the aim of maintaining sewage treatment operations at a high level, and keeping up with technical developments, the plant was retrofitted and upgraded in several stages during the following years. As part of the conversion and expansion measures, also the automation & process control equipment was revamped in several separate stages to obtain modern and future-proof systems.

Düsseldorf’s municipal sewage treatment department contracted ME-Automation Projects, formerly known as KH-Automation Projects, to supply the entire process control and automation technology – including the necessary field instrumentation and the water analysis system – as well as the equipment for extending the low-voltage switchgear systems. For this purpose, the PMSX® pro process management system was selected, as it fully satisfies all the high demands for utmost availability, distributed architecture, data consistency, and the ability to process large amounts of data.

Similarly, due to the complex plant structure with widely distributed processing units, a distributed automation & control system was essential. For an optimum design, the architecture of the new process control & automation equipment had to match the sewage treatment plant’s layout. This permitted a clearly structured and hierarchical topology to be implemented. Moreover, the control system’s architecture was designed to avoid “single points of failure” that could impair the demanded high plant availability.

The required high levels of availability and reliability were achieved by means of redundant data storage and by distributing the process control tasks among 12 process servers. In this way, the contractually stipulated availability of 99.99% for the process management system was ensured. Full access to all of the plant’s process data is provided by each of the 22 operating stations. Hereby, it is particularly important that redundancies in the process technology equipment are not cancelled by the process management system. Thanks to the process management system’s distributed architecture, plant conversion was possible without interrupting normal operation.

<table>
<thead>
<tr>
<th>Customer:</th>
<th>City of Düsseldorf</th>
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<tbody>
<tr>
<td>Plant:</td>
<td>Düsseldorf-Nord sewage plant</td>
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<tr>
<td>Population equivalents:</td>
<td>800,000</td>
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<tr>
<td>Project value:</td>
<td>~ 10.0 million Euro</td>
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<td>Project duration:</td>
<td>1997–present (in discrete construction stages)</td>
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Technical requirements

Process management and sequence control of entire plant from a central location
Process management of entire plant from a central point
Operation and monitoring of entire plant from distributed operator stations
Vertical and horizontal data consistency as well as consistent linking to superordinate hierarchies
Consistent data coupling with office network
Conversion and expansion during normal operation without retroactive effects
System-wide engineering from a central engineering workplace
Archiving of all relevant measurement data in appropriate compression stages
Long-term storage of data and messages
Strict data consistency in all software tools
Availability of all process values for further processing
Standardized software tools in accordance with IEC 61131-3

Scope of delivery

- Process management system PMSX® pro
- Automation equipment
- Network using switch technology
- Expansion of the low-voltage switchgear system
- 75 drives with integrated Profibus interface
- Installation & wiring
- Target specifications / engineering / programming
- Documentation / factory testing
- Video monitoring
- Commissioning / trial operation / training

Process management characteristics

- Process management system PMSX® pro
- Topology: distributed system
- Network: optic fiber, Ethernet TCP/IP
- Automation system: Mitsubishi System Q, Siemens S7
- Data points: about 20,000
- Automation stations: 36
- Operating stations: 22
- Process servers: 12
Excerpt from our reference list

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