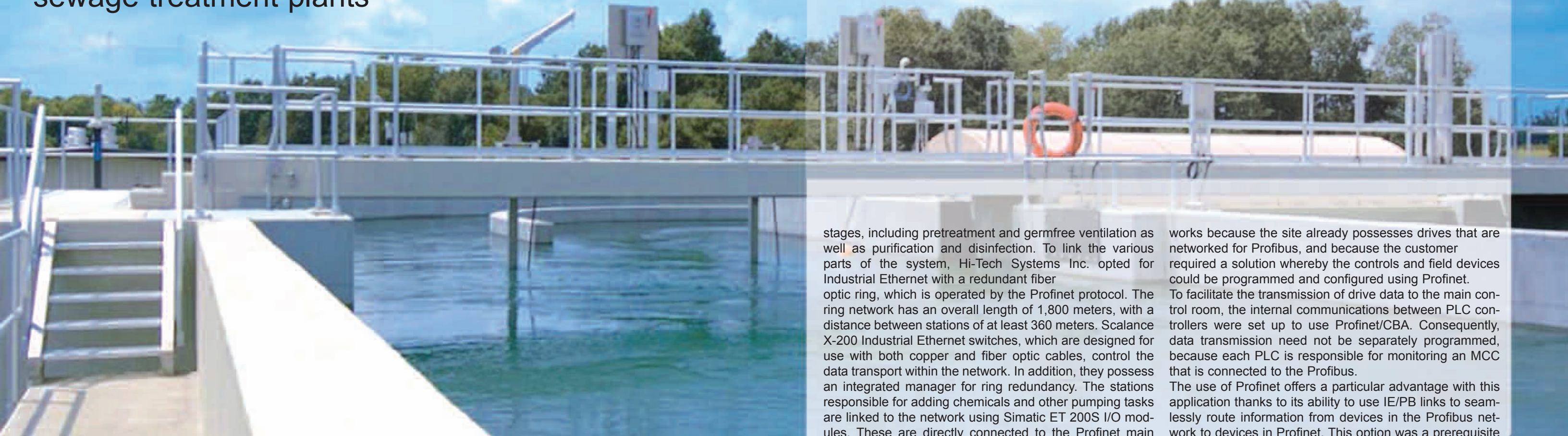


Clean Water in Abundance

Profinet CBA simplifies communication in sewage treatment plants

At the Rainsville sewage treatment plant, long distances must be overcome between individual system components.



The town of Rainsville, Alabama set itself the objective of raising the wastewater treatment capacity of its sewage treatment plant by an average of 30 percent, and to increase the peak load to improve the capability to capture run-off after heavy rainfalls. For the automation solution, the American systems company Hi-Tech Systems Inc. selected a network that uses Profinet and Component Based Automation (CBA), which combines communication between the automation components with the advantages of IT solutions with remote diagnostics functions.

Many different kinds of municipal wastewater are routed into the municipal sewage treatment plant. The largest portion is sanitary sewage from private households, but factories also discharge their wastewater into the sewage system. If this is contaminated, for example, with chemicals from a pharmaceutical operation or organic material

from a food processing plant, it must first be pretreated prior to allowing it to be discharged into the public sewage system. To protect inhabitants from pathogens, the wastewater is cleaned and disinfected in several process steps before it is fed back into the water circuit.

Bridging large distances

Rainsville/Alabama has a flourishing textile industry. The municipal sewage treatment plant serves both commercial businesses as well as private households and extends over an area of 1.6 hectares. As a result, a communications solution capable of bridging distances greater than those normally encountered in a factory was required. The sewage treatment plant comprises several different buildings, each equipped with Motion Control Centers (MCC). These handle the pumping and filtering functions of the inflowing and outflowing water through various treatment

stages, including pretreatment and germfree ventilation as well as purification and disinfection. To link the various parts of the system, Hi-Tech Systems Inc. opted for Industrial Ethernet with a redundant fiber optic ring, which is operated by the Profinet protocol. The ring network has an overall length of 1,800 meters, with a distance between stations of at least 360 meters. Scalance X-200 Industrial Ethernet switches, which are designed for use with both copper and fiber optic cables, control the data transport within the network. In addition, they possess an integrated manager for ring redundancy. The stations responsible for adding chemicals and other pumping tasks are linked to the network using Simatic ET 200S I/O modules. These are directly connected to the Profinet main cable. A suitable HMI is necessary to enable the operator to view events at all times, even those at remote stations. The Thin Client technology of WinCC, which features a central server in the control room and “thin” panels in the individual parts of the system, is the optimal solution in this case. It ensures that the operator can always view events, even if he is located at another station. Even when moving around the site, the operator is provided wireless access at all times to information on the system with the help of a Fujitsu-Siemens PC. The facility for remote diagnostics includes a DSL/VPN connection to the main control room. All connected stations are accessible from this location, even those at remote locations.

Combined communications solution

The control architecture consists of the Simatic CPUs S7-317-2 PN/DP with Profibus and Profinet interfaces, which are distributed across the entire sewage treatment plant. Hi-Tech Systems Inc. selected this combination of net-

works because the site already possesses drives that are networked for Profibus, and because the customer required a solution whereby the controls and field devices could be programmed and configured using Profinet. To facilitate the transmission of drive data to the main control room, the internal communications between PLC controllers were set up to use Profinet/CBA. Consequently, data transmission need not be separately programmed, because each PLC is responsible for monitoring an MCC that is connected to the Profibus. The use of Profinet offers a particular advantage with this application thanks to its ability to use IE/PB links to seamlessly route information from devices in the Profibus network to devices in Profinet. This option was a prerequisite for supporting the Simatic PDM Asset Management Tools, which are used for monitoring the drives. For programming and servicing purposes, technicians can also access every other device within the system from any PC that is connected to Profinet or Profibus.

All objectives achieved with CBA

The Hi-Tech Systems technicians were very satisfied with the Profinet/CBA solution. Engineering, installation and commissioning were performed smoothly without a hitch. With the easy integration of the building parts, an optimal solution for the plant extension was found, one that will also allow future remote pump stations to be integrated. The implementation of Profibus also brought with it significant time savings during installation and testing. The project succeeded in doubling the performance capacity of the sewage treatment plant and will enable future extensions to be performed without any problem. This will require only one other PLC in addition to the current three.