**Wastewater treatment plants, such as the Upper Blackstone Water Pollution Abatement District, remove harmful contaminants from wastewater before it is discharged into the environment.**

PC-based control as an open and flexible automation platform in water treatment

# PC-based control platform optimizes water treatment product dosing

Clean water is vital in both consumer and commercial areas, including numerous industrial applications, such as mining, petroleum refining and groundwater remediation, in addition to residential applications. Environmental Operating Solutions (EOSi), a provider of products and services used in water treatment, evolved its business model to include the Nitrack® control system, which creates value to plant operators by optimizing the dosage of carbon supplements. The first PC-based control system used in this area is ideal to support functions such as remote access to the processes in conventional plants.

Bourne, Massachusetts-based Environmental Operating Solutions Inc. has provided sustainable solutions and technical services for biological contaminant removal in water and wastewater treatment systems in the U.S. and Canada since 2003. President Samuel Ledwell describes the core business of the company as follows: "We currently provide over 550 wastewater treatment plants with safe, effective and environmentally-sustainable solutions."

The MicroC® line of supplemental carbon sources forms the basis of the EOSi portfolio and represents a non-hazardous and environmentally sustainable option to remove contaminants such as nitrogen, phosphorus, selenium and perchlorate, among others, from wastewater. The MicroC® products contain various carbohydrate, alcohol and glycerin-based supplemental carbon sources,

which serve as nutrients for the microorganisms in the sewage sludge used for biological wastewater treatment. These products are subjected to the most rigorous quality control processes.

**PC-based control offers alternatives to traditional sales models**

"Maintaining regulatory compliance at the lowest cost is a common goal for our customers," says Samuel Ledwell. About five years ago, EOSi began a new initiative to help customers further optimize their use of MicroC® products. This evolved into providing and later developing their own product dispensing monitoring and control equipment. In addition, EOSi process engineers develop customized control strategies for the specific process configurations of clients and offer services to help monitor plant performance.

Nitrack® is the first PC-based control system used to monitor and control bio-logical nutrient removal in wastewater treatment. It collects sensor data from a multitude of inputs and uses this data to control and optimize an unlimited number of treatment processes. The Nitrack® system will dose the appropriate amount of MicroC® based on, for example, the amount of nutrients present in the wastewater system compared to the end-of-pipe target concentration. The Nitrack® systems feature a wide variety of PC-based control solutions from Beckhoff, facilitating simple integration into customer facilities along with im-provements in both processing power and remote connectivity options. Remote connectivity functionality enables location-independent plant monitoring by the experts of EOSi or by the operators themselves. However, it also entails special connectivity requirements that conventional process control systems usually cannot meet.

## PC-based control finds the right price-to-performance ratio

When designing the Nitrack system, EOSi wanted the ability to minimize the amount of hardware required to remotely control certain aspects of the treat-ment process. The PC-based systems provided by Beckhoff offered the right ratio of price to performance for their needs and were equipped with the required communication interfaces. Randy Pulsifer, Automation & Instrumentation Man-ager, explains: "The main driver here was to develop the Nitrack® technology on a cost-effective platform that would allow our team of engineers to openly communicate with customer control systems, while at the same time having the added benefit of standard PC software rather than being restricted to software that can only run on industrial PLC systems."

The core of the Beckhoff control system is a CP2216 multi-touch Panel PC, offer-ing a 2.2 GHz Intel® Celeron® dual-core processor in a compact form factor and custom branding for EOSi. Pulsifer notes: "We gain much greater HMI visibility than before with the 15.6-inch widescreen format, and the device seamlessly integrates with our HMI software." The Panel PC also runs TwinCAT automation software to handle controller outputs used for important process functions, such as pump speeds. EtherCAT Terminals transmit process variables and other plant information to the C6920 control cabinet IPC, which then passes it along to the plant scada, enabling the necessary processing for continuous optimization of the treatment processes.

"Flexibility is key to the success of the Nitrack® initiative. Considering the long lifecycle of water treatment systems, the ability to simply integrate EOSi systems into plants of all types is vital to enhance product value for customers," explains Randy Pulsifer. "With the EtherCAT system, we have the ability to essentially keep our control platform static and change the dis-tributed I/O equipment as the needs of the customer facility dictate." Further enhancing connectivity and data availability, the TwinCAT TCP/IP server plays an important role in the implementation process, given the varied nature of equipment used throughout the plants of EOSi customers. Another important factor in the area of public utilities is security: The system integrates directly into existing plant scada systems while remaining on an independent and secure network.

## Controller flexibility flows from retrofits to future plant designs

EOSi has been pleased with the Nitrack® system. "The design used in our old system could only control one element of the treatment process. In our first Nitrack installation at a municipal water treatment plant, we control four

elements, as well as the HMI, without taxing the CPU of the Industrial PC. We can easily add more control elements if necessary. This robust performance of PC-based control is a huge enabler for our plans to expand the scope of Nitrack installations," concludes Samuel Ledwell.



The CP2216 multi-touch Panel PC from Beckhoff runs the HMI software
from EOSi and the TwinCAT PLC software.



Nitrack® from EOSi integrates the first PC-based controller that is used
for monitoring biological nutrient removal in wastewater treatment.

Further information:
www.microc.com
www.beckhoffautomation.com