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PROCESS INSTRUMENTATION

Process optimization for flow measurement

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From sewerage services to drinking water supply

The Saalfeld-Rudolfstadt Association in Germany is committed to supply around 82,000 inhabitants with clean drinking water. The resulting wastewater must be cleaned and disposed of to enable a closed water cycle. To allow for smooth processes, the customer relies on cutting-edge technologies to optimize flow measurement.

There are two different types of wastewater. On the one hand, there is water contaminated by domestic and commercial use, the so-called sewage. On the other hand there is the rainwater draining off from constructed or paved areas and being collected. To enable a sustainable water cycle, these effluents must be treated and disposed of. For the Saale region of Germany, this responsibility lies with the Saalfeld-Rudolfstadt Association. The association supplies about 82,000 people in this region with drinking water. There are 38 wastewater treatment plants that are operated in the association's area, which return cleaned waste and conditions of public drainage in the operating area.

Additionally, the association operates 59 sewage pumping stations, 24 stormwater tanks and 27 combined sewer overflows. The association's disposal concept regulates the terms and conditions of public drainage in the operating area.

Thorough wastewater treatment is mandatory

Wastewater treatment by means of a sewage plant is more thorough today than just a few years ago. After primary clarification, the wastewater treatment process comprises three stages.

The first treatment stage is mechanical. During this stage, coarse and floating solids are removed from the water.

The second purification stage takes place in the aeration tank, where substances dissolved in the water are decomposed. The activated sludge resulting from this biological treatment flows into the secondary clarifier. The sludge settles there and separates from the cleaned wastewater. Part of the separated sludge will be fed back to the aeration tank as return-activated sludge.

The third treatment stage removes phosphate and nitrogen (nitrate) from the water. After this three-stage cleaning process, the water is returned to the natural water cycle.



Siemens clamp-on sensors mounted on a 32 in steel pipe to measure the return-activated sludge.

The challenge – High-accuracy flow measurement

High-accuracy flow measurement is an absolute requirement in this cleaning process. For the volume flow measurement of the return-activated sludge, the association previously relied on a 20-year-old electromagnetic flow meter. However, this was defective and had to be replaced. The association faced several challenges for the replacement of the defective device. The first was the less-than-ideal installation situation of the measurement point. In front of the mag meter, a T-piece with the feed from the first pump is located nearby. This T-piece causes massive changes in the flow profile.

To complicate matters further, the measuring point is very low. The mag meter is at the bottom of the facility, complicating installation and removal. The orientation of the mag meter requires pumps to be installed below the measurement point, which is a particular challenge. For these reasons, the association opted for a clamp-on flow measurement solution. The high degree of particulates suspended in the flow, the very short inlet and the T-piece are generally regarded as disturbances for clamp-on technology, but the Siemens SITRANS FS230 system easily coped with all of them.

The solution – High-performance, time-saving clamp-on flow measurement

To replace the defective electromagnetic flow meter, a SITRANS FS230 clamp-on ultrasonic flow meter was installed during operation in only a few minutes. This flow meter has an accuracy of 0.5 to 1.0% of rate. With a 100 Hz data update rate, even the smallest, most rapid fluctuations in flow are detected. The SITRANS FS230 has a Digital Sensor Link that digitizes the signal at the earliest stage of measurement for a strong signal-to-noise ratio and high-precision measurement. All changes can be tracked at any time on the display with up to 6 customizable views. It can be mounted easily on the outside of the pipe, avoiding complex installation.

Using the integrated commissioning wizard, installation of the SITRANS FS230 goes quickly and easily. The difficult installation in this case was also addressed by using disturbed flow compensation. A test system was made available to the association for 4 weeks in order to give the customer the necessary security when using the clamp-on technology under the prevailing conditions. According to the customer, the measurement remained stable over the entire test period and the measured flow rate data was verifiable.

The benefit – Affordable to buy, with a very low cost of ownership

According to the association, replacing the defective mag meter would have exceeded the purchase price of a SITRANS FS230 several times over. The Siemens clamp-on solution saved the association the costs of acquiring a much more expensive electromagnetic meter. It was not necessary to remove the existing and defective magmeter, which meant additional savings of time and money. Thanks to the installation, commissioning and customer training by an experienced Siemens service technician, the cost-effective and easy-to-employ solution for this measurement point was achieved with the Siemens SITRANS FS230 clamp-on flow meter. The system has been running for many months to the complete satisfaction of the customer.



Safety under the most demanding conditions: From now on, the digital clamp-on ultrasonic flow meter ensures high-accuracy flow measurement of the return-activated sludge.

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