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SIEMENS



Accurate measurement of sewage flow made possible by clamp-on technology

[siemens.com/flow](https://www.siemens.com/flow)

The customer

Welsh Water is the 6th largest regulated water and sewerage company in England and Wales. They are responsible for providing 1.2 million households and more than 110,000 businesses with a continuous, high-quality supply of drinking water, as well as for removing, treating and properly disposing of the wastewater produced by these same customers. Welsh Water supplies an average of 900 million L (nearly 198 million gal) of water every day through 27,000 km (16,777 mi) of water mains, including 532 pumping stations and 715 service reservoirs. They also collect wastewater through a 19,000 km (11,806 mi) sewer network and treat it at 832 wastewater treatment works located next to rivers and along the coast of Wales.

The challenge

Wastewater collection via sewerage systems has proven challenging for Welsh Water due to the country's mountainous topography. Many customers are situated within valleys, necessitating the use of sewage pumping stations (SPSs) that vary greatly in size and pumping capacity.

Until recently, the majority of the 1,861 SPSs belonging to Welsh Water had no system in place to measure flow. Those that did had been fitted with full-bore electromagnetic flowmeters, many of which were no longer functioning properly due to age, condition and other factors. In order to determine whether inflow was exceeding capacity within any of their pumps, the company relied on course flow data derived from calculating the rate of change in sump levels.



Answers for industry.

The case at a glance

Region: Wales

Industry: Water & wastewater

Customer: Welsh Water

Challenge: Remotely monitor flow of wastewater through sewage pumping stations to determine whether inflow is exceeding capacity and whether pumps are operating efficiently

Product: SITRANS FST020

Main benefits:

- Significantly lower cost than other flow solutions
- Time-saving installation due to non-intrusive nature
- Consistently high accuracy
- User-friendly setup and design



If a markedly high sump level was observed, an operator was required to travel to the site to investigate whether the pumps were performing correctly or a spill was genuinely occurring. This method was not operationally efficient and posed a significant environmental risk, particularly in storm conditions.

The solution

To combat this issue, a team from Welsh Water was tasked with finding a low-cost way to provide accurate and reliable flowmetering in retrofit SPS applications. Siemens was one of several process instrumentation suppliers asked to propose a potential solution. This was because Siemens had previously provided the company with numerous electromagnetic flowmeters for new installations as well as a number of clamp-on ultrasonic flowmeters for large pipes.

Welsh Water engaged their approved contractor, Celtic Process Control, to survey 80 SPSs identified as being high-risk to property or people in the event of a malfunction. These were then surveyed using a Siemens portable SITRANS FUP1010 clamp-on ultrasonic flowmeter. Parameters and diagnostics were recorded by the meter at each location, allowing the technicians to determine at a later time which sites were suitable for permanent equipment and facilitating the subsequent installation process. The SITRANS FUP1010 proved capable of providing a true picture of the flow at locations where no previous metering existed.

Survey results confirmed that another member of the Siemens flow measurement family, the SITRANS FST020, would be appropriate for installation at a number of SPSs. This clamp-on flowmeter was recommended to Welsh Water for a number of reasons, including:

- **Cost savings.** The SITRANS FST020 offers basic yet high-performance measurement functionalities at a significantly lower cost than other flow solutions, especially when overall civil, mechanical and operational costs were taken into consideration. This was particularly important to Welsh Water given the large number of sites that required metering.
- **Time savings.** Because the SITRANS FST020 is non-intrusive, no cutting of the pipe is necessary and installation can be completed in only a few hours, as compared to 2-5 days for electromagnetic meters.
- **Improved accuracy.** Calculating sump level rate of change typically results in an accuracy rate of 5-10 % but is not feasible during periods of excessive inflow and storm overflow. In con-

trast, the SITRANS FST020 uses patented transit-time sensors to demonstrate a consistently high accuracy of 1-2 %.

- **Ease of use.** The SITRANS FST020 features straightforward product configuration and a user-friendly design for simplified operation and maintenance.

Recognizing that the SITRANS FST020 was an ideal fit, Welsh Water ultimately selected Siemens as the supplier of clamp-on instrumentation for their large-scale retrofit project. SITRANS FST020 flowmeters were installed on the majority of the high-risk SPSs and are now performing accurate measurement of sewage flow. The meters have made it possible to monitor each SPS remotely, eliminating the need to send operators out into the field to verify flows. This allows operational staff to be more effectively deployed. In addition, the SITRANS FST020 provides a comprehensive and trustworthy audit trail for the governmental body that oversees spillage incidents. The clamp-on technology also makes it easier to perform routine monitoring of pump efficiency, which helps staff in more quickly identifying maintenance concerns such as worn impellers, blockages and faulty non-return valves (NRVs).

Having observed the value of the SITRANS FUP1010 during the initial site survey, Welsh Water also decided to order 10 portable units for distribution across maintenance depots. Now they are readily available to personnel whenever and wherever they may be needed for diagnostic and operational purposes. As part of the support package, Siemens delivered four onsite training sessions for more than 50 depot staff members to increase knowledge of portable meter use, which in turn has provided them with a greater understanding of the process conditions being investigated.

"Our experience with Siemens has been outstanding every step of the way," said Carle Redwood, Senior Innovation Engineer with Welsh Water. "From the very inception of the SPS retrofit project, Celtic Process Control and Siemens partnered with us to provide the best possible solutions, support and service, and with their help our operations are now becoming more efficient than ever."

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