



## APPLICATION NOTE Water & Wastewater

### Flow and concentration measurement for automated sludge thickening

- Control loop for the efficient dosing of flocculants in the secondary clarifier
- Measurement of total solid content and flow with just one instrument
- Increased process stability thanks to effective prevention of sludge washout

#### 1. Background

In biological wastewater treatment, floating sludge can form in the secondary clarifier in certain circumstances. In order to ensure that this does not get into the process and pollute the purified wastewater, the sludge must be treated quickly.

A wastewater treatment plant in eastern Switzerland relies on the targeted use of flocculants to prevent sludge washout.

#### 2. Measurement requirements

In the past the operator used a laboratory analysis of the total solid (TS) content in combination with an electromagnetic flow measurement in order to determine the flocculant requirement. This was, however, a very laborious task. Sampling for the laboratory analysis required considerable manual effort. Furthermore, there was always a delay in obtaining the results. The conventional electromagnetic flowmeter (EMF), on the other hand, was too high-maintenance for this application, because the watery sludge settled on the electrodes like a layer of fat, which meant the EMF had to be cleaned regularly.

The customer wanted to automate the sludge treatment so as to be able to use the flocculants more efficiently. This required a continuous and maintenance-free flow measurement, as well as an inline concentration measurement in real time. The measured values needed to be sent directly to the programmable logic controller (PLC) for the control loop.

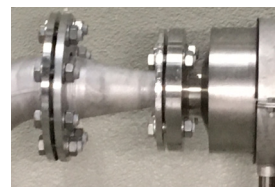
Medium:	Waste activated sludge
Flow rate:	approx. 20 m <sup>3</sup> /h / 706 ft <sup>3</sup> /h
TS content:	0.6...1.2 g/l

## 3. KROHNE solution

KROHNE recommended using the OPTIMASS 7400 C. The Coriolis mass flowmeter measures flow and density in a single instrument. The measuring device determines the TS concentration based on the density. This is done by identifying the ratio of water to sludge, i.e. the measured process density is checked against the initial density values of water and sludge that were programmed into the Coriolis meter. To compensate for changing densities of both media due to varying temperatures, the flowmeter also features an integrated temperature sensor.

A device version with titanium measuring tube was chosen to enable optimum density measurement. The measuring device was installed directly in a pipe tapered from DN80 to DN50. The size of the measuring device was DN40, which was below the flange size (DN50). The OPTIMASS 7400 sends the flow and concentration to the PLC via two current outputs.

The customer also uses the OPTIFLUX 1050 C electromagnetic flowmeter (EMF) to close the control loop. The EMF (DN15) transmits the flowrate of the flocculant to the PLC.



Installation in tapered pipe



Flocculant measurement with the OPTIFLUX 1050

## 4. Customer benefits

Thanks to the combined inline measurement of the TS content and flow, the customer can now optimally condition the sludge with flocculants. Optimal dosing means greater process stability, and sludge washout no longer occurs, which makes operation even more stable and efficient. In addition, savings can be made on the cost of flocculants as overdosing is now a thing of the past.



Measuring point with OPTIMASS 7400 C

Throughout the service life, the customer can also enjoy considerable cost savings thanks to the high process reliability and maintenance-free system. Compared to a conventional solution with two individual measuring devices for flow and TS, or one flow measurement and extra online analysis of the TS content at a laboratory, using the OPTIMASS 7400 is cost-neutral for the customer.

## 5. Products used

### OPTIMASS 7400 C

- Coriolis mass flowmeter for mass and volume flow, density and concentration of waste activated sludge
- With titanium measuring tube for stable and accurate measurements
- Single straight-tube design: self-draining and maintenance-free
- Maintains operation even with entrained gas of up to 100% (EGM™)



### OPTIFLUX 1050 C

- Electromagnetic flowmeter for simple applications
- Low-cost measurement of conductive liquids



### Contact

Would you like further information about these or other applications?  
Do you require technical advice for your application?  
[application@krohne.com](mailto:application@krohne.com)

Please visit our website for a current list of all KROHNE contacts and addresses.

