

WWTP Aeration Basin Flow Control

Uddevalla, Sweden
Case Study



Expertise in Flow

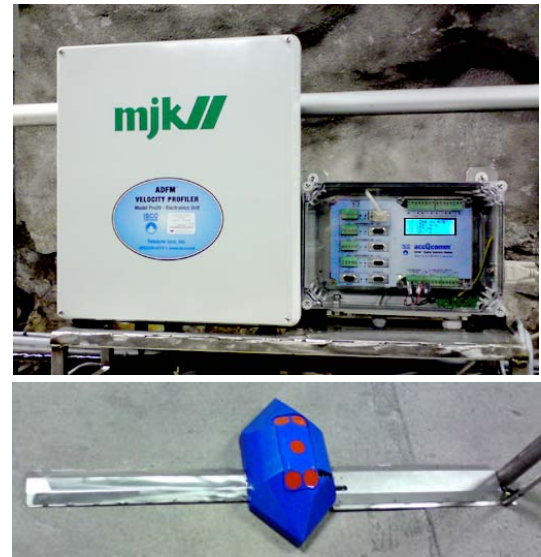
ADFM Pro20 Benefits:

- 2% flow rate measurement accuracy
- Accurate velocity measurement in difficult hydraulic conditions
 - Turbulence
 - Near zero/ zero velocity
 - Peak velocity shifting from side to side in channel
- Large flow measuring span (0.2 - 6 m level)
- 4 Piezoelectric ceramics measuring velocity in multiple points (bins) and pointing in different directions of the flow
- Measures velocity even if 1 or 2 sensors are covered
- Generates a true flow profile
- Calibration-free technology with zero drift of ultrasonic level

The ADFM Pro20 Pulsed Doppler flow meter from Teledyne Isco, Inc. is used for flow regulation and protection of the biological treatment step in a WWTP, Uddevalla, Sweden.



Aeration basin inlet channel with control hatch (red arrow)



ADFM Pro20 electronics (above) and sensor installation (below)

System Options:

- Stationary or portable
- Communication:
 - Data logging
 - Analog (4-20mA)
 - Digital (MODBUS/Ethernet)
 - Relay Alarms
 - GSM/GPRS
 - CDMA/1xRTT
- Flowlink 5.1 software:
 - Data Analysis
 - Diagnostics
 - Graphs/Tables
 - Editing
 - Reports

Uddevalla Municipality, Skansverket WWTP

Skansverket WWTP, constructed inside a mountain in 1946, uses an activated sludge process and was modernized to an aerobic/ anaerobic process in 1995. Currently it is treating 7 million m³ wastewater per year. The plant has experienced an increasing volume of wastewater due to larger impermeable surface areas and a reduction in numbers of smaller treatment plants nearby.

During rain events when surface water inflow and infiltration (I & I) is increasing, Skansverket WWTP can operate close to its capacity limit. High incoming flows can potentially cause a flushing of the active sludge in the aeration basins, taking days to recover. It is therefore crucial to have control of the volume introduced to the biological step in the treatment process. The plant's internal flow is regulated with a manually operated hatch placed in a channel between the primary settlement tanks and the aeration basins. This hatch needs to be automatically controlled based on real-time flow measurement.

Site Challenges

The channel leading into the aeration basin has a width of 1.3 m and a minimum water level of 0.8 m, even in zero flow conditions. Level varies little with changing flow rates. The average velocity is slow (0.2 m/s), and suspended solids concentrations are in the range 100-150 mg/l. Due to the flow conditions in the application, it is expected that the lower part of the flow profile can experience almost stagnant water and possibly sedimentation. Several flow meters had been tested previously with no success.

*The Future of Flow!*TM

ADFM Pro20 Sensor



Ultrasonic level sensing ceramic pointing straight up, and four velocity sensing ceramics pointing in different directions

ADFM Pro20 Solution

Teledyne Iscos's dealers in Sweden, MJK Sweden, recommended the ADFM Pro20 for flow measurement in large channels with difficult hydraulic conditions. The ADFM Pro20 system accurately measures flow rate in depths up to 6 meters. Four (4) pulsed acoustic beams pointing in different directions in the flow measure velocity at multiple level points (bins). This creates a true velocity profile of the channel. Advanced algorithms automatically adapt to changing hydraulic conditions. It removes the need for in-situ calibration and ensures accurate flow rate measurement even in flow conditions near zero velocities.



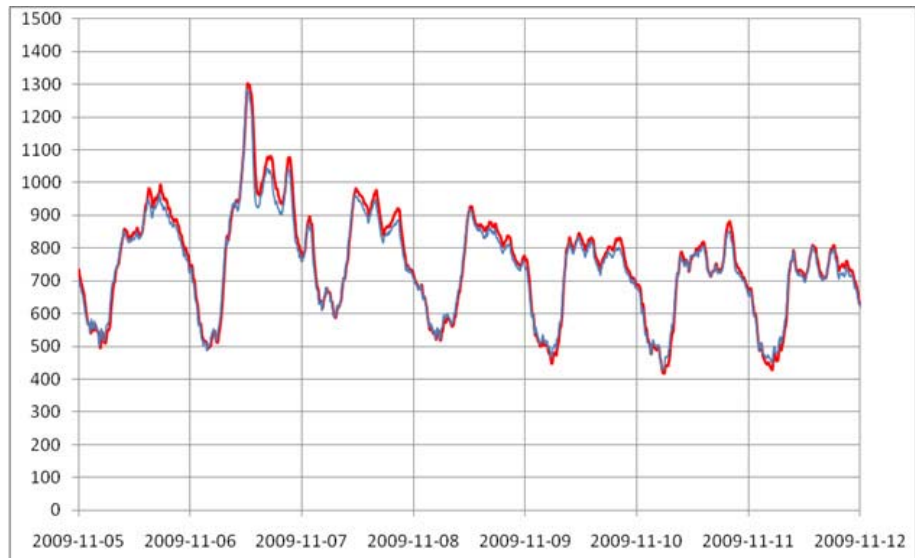
With 4 independent velocity sensors, a redundant flow measurement is ensured, with velocity measured even if 1 or 2 sensors are covered.

Measuring Results

The initial installation, programming and testing of the ADFM Pro20 were easy to perform and done in a short time. The unit is connected to an accQcomm Analog/ Digital Interface Module and a 4-20 mA signal is integrated into the plant's SCADA system. During dry periods (unlike rainy periods), the inlet flow measured by electro-magnetic flow meters is equal to the flow into the aeration basins. The ADFM Pro20 results are therefore easily compared. Results show great accuracy and correlation compared to inlet flow meters. Based on proven accuracy during high and low flow conditions, the ADFM Pro20 is directly operating and controlling the aeration basin inlet hatch.



accQcomm Interface Module



The graph above shows 7 days of measurement during dry weather. Red line is ADFM Pro 20. Blue line is comparison flow meter. Average difference is 3% during the whole period.

Feedback from Skansverket WWTP

Krister Gustafsson, Head of Section, is impressed by the great performance and the easy installation of the ADFM Pro20 flow meter. "ADFM Pro20 is competitive when compared to electromagnetic flow meters in the same flow range. The flow meter has proven its capacity to measure flow rates accurately in a large channel application with difficult flow conditions. Installation costs are low, since there is no need for channel re-construction in order to fit a new flow meter."

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