

Flow Monitoring in Cooling Water

Timelkam, Austria

Case Study

Expertise in Flow

Benefits of ADFM Pro20:

1-2% 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
 - High velocity ($\pm 9\text{m/s}$)
- Large flow measuring span (0.2 - 6m level)
- 4 Pulsed Doppler velocity sensors 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



ADFM Pro20 Sensor

Thermal power stations need cooling water for operation. The ADFM Pro20 Pulsed Doppler flow meter from Teledyne Isco is ideal for high accuracy flow monitoring in such large channel applications when sufficient particle concentrations are present. In Timelkam, Austria, the ADFM Pro20 sensor is top mounted in a cooling water channel coming from a river. This gives a great advantage since the power station is in full operation during installation and maintenance, saving time and cost.



ADFM Pro20 sensor top mounted in a cooling water channel (red arrow)

Power station site challenges

A thermal power station uses fuel combustion to convert thermal energy into rotational energy, which produces mechanical power. Water is rapidly heated to a boil, vaporizing and spinning a large turbine, which in turn propels an electrical generator. After exiting the turbine, the steam is cooled in a condenser and reused. This process requires large quantities of cooling water. The biomass thermal power station Energie AG Oberösterreich, Timelkam uses a nearby river for cooling water. The cooling water intake channel is narrow (1.95 m) and tall (3.1 m), with a relatively constant water level (2.4 m). Due to low velocities (avg. 0.3 m/s), there is a continuous deposit of silt, reaching up to 30-40 cm per year. Since the power station cannot operate without cooling water, the channel is emptied for maintenance only briefly, once a year.

"The Future of Flow!"



ADFM Pro20
Sensor Operation

System Options:

- Stationary or portable
- Communication:
 - Data logging (32MB)
 - Analog (4-20mA)
 - Digital (MODBUS/Ethernet)
 - Relay Alarms
 - GSM/GPRS
- Flowlink 5.1 software:
 - Data Analysis
 - Diagnostics
 - Graphs/Tables
 - Editing



ADFM Pro20 with
canister or box
electronics



accQcomm
Interface Module

ADFM Pro20 solution

Teledyne Isco's distributor in Austria, Logotronic GmbH, cooperated with the Timelkam power station in testing an ADFM Pro20 Velocity Profiler.

Due to the relatively constant water level, the decision was made to mount the sensor in the top position instead of the bottom position. A secondary pressure sensor was selected for level measurement.

ADFM Pro20 Pulsed-Doppler technology accurately measures flow rate in large channels and pipes with depths up to 6 meters. Four (4) piezoelectric ceramic sensors emit short pulses along narrow acoustic beams pointing in different directions into the flow. Each sensor precisely measures velocity at multiple level points (bins). The measurements are then used to determine the flow pattern over the entire flow cross-section, creating a true velocity profile. Since the flow pattern and measured velocity distribution are independent of each other, the ADFM Pro20's advanced flow algorithms automatically adapt to changing hydraulic conditions. This eliminates the need for in-situ calibration and ensures accurate flow rate measurement *despite low velocity and potentially non-uniform flow conditions found in this application.*



*ADFM Pro20 canister electronics unit (IP68)
installed with accQcomm Interface Module*

Results and feedback

Installation of the ADFM Pro20 sensor was completed in a short time. At certain operational conditions of the power station, the ADFM Pro20 measuring results could be compared with values derived from pumps in the process. The ADFM Pro20 results were in very good correlation compared with estimates (3.2% difference). Due to registration of velocity diagnostics, it is also possible to detect a changing bed level in the channel. Mr. Lugstein at Energie AG Oberösterreich Kraftwerke, was impressed with the ease of installation and the performance of the ADFM Pro20 flow meter.

“We see great benefit in a flow meter that can be installed and maintained during full operation of our plant. This is a potential cost reduction factor for us. The ADFM Pro20 has proven that it meets our requirements in terms of installation, operation and results. The possibility to use the velocity diagnostic tools to visualize the silt bed level in the channel is an additional benefit of the system.”

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