

Flow measurement on a 4 m pipe

Power Plants

„Only FLEXIM's non-invasive flow measurement technology offered us the possibility to sustainably increase the operational safety of the plant with comparatively little effort. The measurements have been working perfectly since they were installed in 2009.“

Thomas Allgeyer

Head of E-Technology at the Leitzach plants, Stadtwerke München GmbH.

Measuring Task

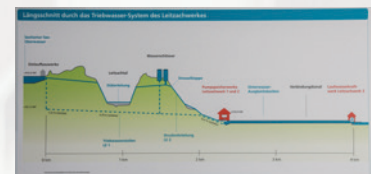
Flow measurements on the penstock pipeline of the Leitzach plants for monitoring of leakages and burst pipes.

The Leitzach plants have been generating environmentally-friendly electricity from hydropower since 1913. The expansion to pumped storage power plant took place in 1929 with the construction of an underwater reservoir and the installation of pumps.

Pumped storage power plants effectively store electrical energy with high efficiency. If electricity generation exceeds demand, the surplus electricity can be used to pump water from a reservoir to a high-level storage basin. Conversely, the potential energy of the stored water can then be temporarily converted back into electricity as needed by the turbines of the power plant.

In addition to environmentally-friendly electricity generation and the possibility to store energy which is ever more important in the wake of an energy revolution and the resulting strongly fluctuating supply of electricity generated from light and wind, the Leitzach plants are playing an increasingly important role for their operator, Stadtwerke München. The plant is capable of providing a black start, i.e., in the event of a power failure, it can start up independently and also initiate a restart of other power plants in the network with the electricity thus generated.

The Seehamer Lake serves as a storage tank for the Leitzach plants. The penstock pipeline which connects the lake with the power plant, crosses the Leitzach valley as a culvert pipeline. In order to protect the valley from possible flooding in the event of damage to the pipeline, the operators looked for a way to retrofit the penstock pipeline with measuring equipment for flow measurement as part of a modernisation of the measurement and control technology in 2009.



The flow measurements serve to protect the Leitzach valley, which the penstock pipeline traverses as a culvert pipeline.



For further information, please contact FLEXIM:
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Solution



All the information is brought together in the control room of the Leitzach plants.



The stationary FLUXUS® ADM 7407 is used as transmitter.

Non-invasive flow measurement with two stationary clamp-on ultrasonic FLUXUS® ADM 7407 flowmeters has proven since then to be the best solution for this challenging measuring task.

Given the enormous pipe dimension with a diameter of four meters, the installation of wetted measuring technology such as orifice plates or magnetic-inductive flowmeters was practically eliminated. This type of flowmeter would have been extremely expensive to purchase. Installation would have cost even more and would also have inevitably meant a longer interruption of operation. Non-invasive acoustic measurement from the outside of the pipe also has the advantage that it in no way affects the integrity of the pipeline.

A particularly favourable feature of non-invasive flow measurement for users is that they don't end up buying a pig in a poke. They can thoroughly test the measuring technology for its suitability before making the final purchase decision. The responsible field service engineer proved the basic suitability of FLEXIM's clamp-on measuring technology by a successful test measurement with his portable FLUXUS® F601. The best possible instrumentation and the most suitable configuration of the measuring points were determined in various test installations on the penstock pipeline. It was possible to identify the transducers that proved to be most suitable were those that stimulate the pipewall with Lamb waves thereby bringing a strong measuring signal into the medium flowing in the pipe as well as to reliably record high flow velocities which can occur in such hydropower applications. Due to the safety function and the associated requirement for the unconditional reliability of the flow measurements, both measuring points are dual-channel in design.

Due to the impressive long-term experience, another pipeline in the inlet to the plant was fitted with a FLUXUS® F721.

Advantages:

- Effective increase in plant safety at low cost and with very little effort compared to the installation of wetted measuring technology.
- No mechanical weakening of the pipeline, as the clamp-on ultrasonic transducers are simply mounted on the outside and do not require any separation of the pipe or holes for the introduction of wetted sensors.
- Permanently stable measurement without any wear and tear and without any maintenance.

Measuring points and instrumentation:

Pipelines: steel, external diameter 4000 mm, wall thickness 13.5 mm
Medium: water
Measuring equipment: 2 stationary clamp-on ultrasonic FLUXUS® ADM 7407 flowmeters,
4 pairs of CRG1N52 clamp-on ultrasonic transducers

Customer:

**Stadtwerke München GmbH,
Leitzach Plants, Feldkirchen/Westerham, Germany**



As a municipal supply and service company in the Bavarian state capital of Munich and its region, SWM is one of the largest energy and infrastructure companies in Germany. Over one million private households, commercial and business customers receive electricity, district heating, water and natural gas from SWM.

With over 9,000 employees, SWM is one of the largest employers in Munich.