APPLICATION NOTE

Power Generation

Clamp-on flow measurement of water from a dam reservoir

- Flow monitoring of water discharge via the spillway of a hydroelectric dam
- Non-invasive flow measurement on a DN2300 carbon steel pipe
- Replacement of a faulty open channel flow measurement
- Significant increase in reliability and accuracy of measurement

1. Background

The dam at the Porsuk river in Turkey is a multipurpose concrete dam. It produces hydroelectric power as well as serves as an important reservoir of potable and irrigation water for the city of Eskişehir in northwestern Turkey.

2. Measurement requirements

To ensure a constant flow rate for potable water supply, a certain amount of water is discharged from the reservoir using the plant's spillway. This hydraulic structure also ensures the safe release of excess water in case of flooding, preventing water from spilling over the dam crest and damaging the dam. The water flow rate discharged via the spillway can reach as much as 30 m^3/s and needs continuous monitoring.

Hydroelectric dam

In the past, the dam operator tried to determine the actual flow rate and the totalised flow using an open channel flow-meter. This device, however, did not perform as desired and needed to be replaced by a more accurate and reliable flow-meter instead. It was decided to install this new flowmeter on the spillway's pressurised carbon steel pipe. The operator also demanded that the existing infrastructure remain untouched. Cutting or removing the water pipeline was thus not an option.

KROHNE

3. KROHNE solution

KROHNE recommended using the OPTISONIC 6300 W ultrasonic clamp-on flowmeter. This device is designed for permanent flow measurement in applications requiring a non-invasive installation. It was mounted on the roughly 70-year-old carbon steel pipe (line size: DN2300). There was only one small pipe section available for the installation of the flowmeter.

OPTISONIC 6300 mounted on DN2300 carbon steel pipeline

Given the large line size of the spillway pipe, flow measurement with the large sensor rails in Z-mode configuration was selected. The patented, IP68 rugged stainless-steel sensor rails were able to withhold the harsh flooding conditions in the pit. The adjustable sensor rails with metal straps also allowed for a precise mechanical installation of the transducers and a safe coupling of the transducers to the pipe surface. This will ensure an accurate and reliable measurement for years to come.

The flowmeter was provided with a wall-mounted signal converter UFC 300 W which can handle two pairs of transducers for increased accuracy. As the signal converter can be installed up to 30 m away from the rails, the readings can be conveniently checked by the operator from outside the pit. The measuring signals are also transmitted via 4...20 mA to the control room.

Clamp-on flow measurement of water in the spillway pipe

Readings displayed by the wall-mounted converter

4. Customer benefits

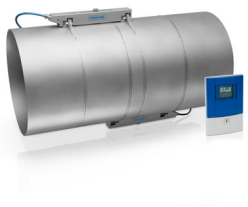
The operator benefits from improved monitoring of the actual and the total volume flow of water discharged through the spillway. Clamp-on flow measurement with the OPTISONIC 6300 W provides a much more reliable and accurate reading compared to the previous method. Due to the precise sensor mounting using the patented stainless steel rail system, the flowmeter has been stable and reliable from the beginning.

The KROHNE device turned out to be the ideal solution in terms of installation requirements and space. There was no process interruption or cutting of the carbon steel pipe; the ultrasonic clamp-on flowmeter allowed for a non-invasive and safe installation without opening or bypassing the pipeline. There was also no risk of leakage points in the old pipeline. Overall, Krohne provided a flexible, cost-effective and safe solution that the operator needed.

5. Product used

OPTISONIC 6300 W

- Ultrasonic clamp-on flowmeter for flow measurement of liquids
- Stationary device, for installation at any location without process interruption or need to cut pipes
- Robust stainless steel sensor rail for pipes DN15...4000 / ½...160"
- 4...20 mA, HART®7, Modbus, FF, Profibus-PA/DP



Contact

Would you like further information about these or other applications?
Do you require technical advice for your application?
application@krohne.com

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

www.krohne.com