



# Accurate Measurement Via Eight Paths

**COOLING WATER** In the Mittelsbüren power station, an ultrasonic 8-path measurement enables the accurate measurement of the water tapping.

**>** Blast furnace gas from the neighbouring furnaces is used as a primary source of energy for the power generation at the swb power station. The required cooling water is tapped from the Weser river. Each of the two DN1600 pipes supplies the power station with 15,000 m<sup>3</sup> of cooling water per hour. For the chargeable surface water tapping, a standardised measuring method and a measuring system with a convincing measuring accuracy and reliability are required.

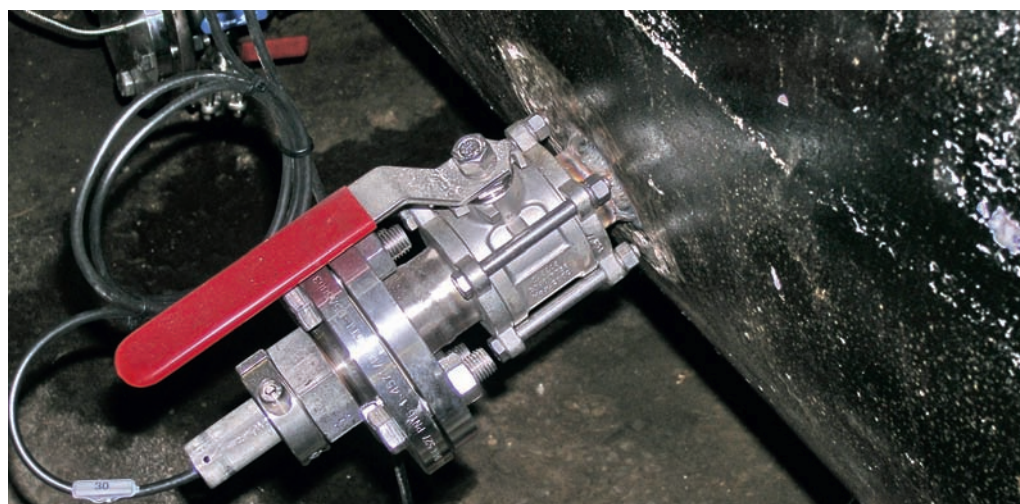
Reason enough for the power station's maintenance managers to replace the defective electromagnetic flowmeters with the deltawave flowmetering system from systec Controls. The measurement section features eight ultrasonic paths configured as two symmetrically crossed planes of four paths each as prescribed by the IEC41 standard. This arrangement can reliably cope with the hydraulic influences of a curved pipe upstream from the measuring points. Each measuring point thus disposes of eight paths. Both flow measuring points are located in block 4 of the power station of the Bremen utility company swb. The pipe-flow tapped from the Weser river is subject to natural variations. When using only one measuring path, this has a strong effect on the measured value. By using eight paths, the local flow variations are not totally applied to the measured value. During normal operation, the measuring

system also uses an intelligent damping. "In this case, the measured-value variations are reliably damped for the benefit of a high control performance", underlines the manufacturer. At the same time, the tests of high measured values, e.g during the start, are followed more rapidly than when using an ordinary damping. Standardised equations of calculation and a high time resolution of the ultrasonic transducers, when totally filled-up, ensure an accuracy of 0.5% of the measured value. "Even in a partially filled state, deltawave can measure the flow in a repeatably accurate way", claims systec Controls. Here, the

calculation fundamentals of ISO6416 are taking effect. Depending on the number of covered ultrasonic transducers, an accuracy of up to 1.5% can be reached in this case. A differential pressure transmitter measures the exact water-level in case of partial filling.

The straight inlet section at the measuring points in the Mittelsbüren power station is only five pipe diameters long. The cross flows, which are still present in this case, distort the result to a great extent with many measuring systems. As emphasised by the manufacturer, deltawave fully compensates for this effect thanks to the 8-path measurement in two crossed planes. Regarding the invoicing reliability, every cubic metre of cooling water measured in excess of the actual tapping would affect the profitability of the power station. On the other hand, a measuring error in the opposite direction would conflict with the interests of the water resources authority.

The ultrasonic transducers were introduced into the pipe using systec's quick-lock feedthrough assembly system. The Quick-lock system, equipped with a ball valve, enables an exchange of the transduc-





ers without interrupting the operation. This installation possibility without having to cut the pipelines was one of the important advantages when taking the decision.

### Maintenance-free measurement

For security reasons and in the scope of the adaptation to the measuring point, systec Controls has developed a binary interference evaluation which allows to continue the measurement in case of an incorrect water level measurement. The level is then assumed to be full instead of having to put up with a total failure of the measurement. Using the software included in the delivery, swb can change the parameterisation itself later on.

The river water carries a continuous portion of sludge and dirt, which leads to deposits on the interior tube wall and also on the measuring instruments which are in contact with the medium. "Even under these conditions, the ultrasonic transducers have been measuring reliably and stably since several years, even with turbidity values of 12 g/l or more", underlines the manufacturer.

Unlike with the use of electrodes of electromagnetic transducers, repetitive calibration works are unnecessary. The ultrasonic

**Unsophisticated:** deltawave is measuring exactly even in a partially filled state. deltawave enables installation and calibration works without interrupting operation.



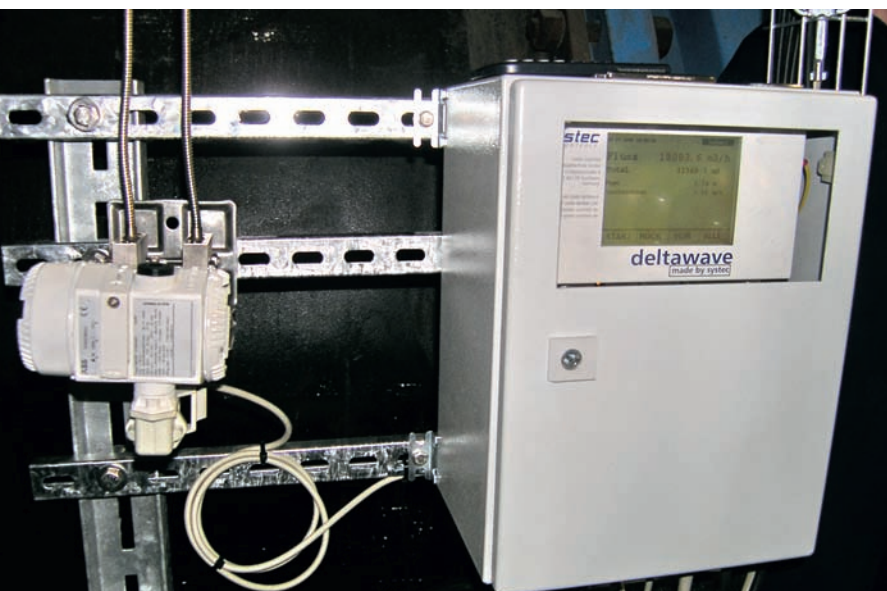
transducers contain neither electronics liable to drift nor mechanics subject to wear. According to the manufacturer, this guarantees the immensely important lasting reliability regarding the monitoring of the cooling water supply.

### Continuous data storage

The communication is via standardised 4-20mA signals and via digital pulses at the optocoupler output. For future communication ways, the system can also transmit measuring signals in digital form using the TCP/IP Internet protocol. Even during revision works or failures of the control system, the system delivers traceable measur-

ing results. The measurement data are continuously stored in an internal memory. During normal operation, the measurement data are arriving in the process control and instrumentation system in the control room of the power-station block 4. As soon as less than six measuring paths are functioning, an error message is transmitted to the control room by the process control system. For the verification of the measuring results, a comparison measurement was carried out immediately after the installation. The mean deviation during the 1-hour measurement was 1%. <

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