APPLICATION REPORT

WATER SUPPLY FOR THERMAL POWER PLANT

Power

"Thanks to Flexim's powerful measurement technology and the dedication and experience of the Flexim team, we were able to retrofit this highly difficult pipe, where all others failed, with a non-intrusive flowmeter."

He Guoqiang,
Instrument Engineer,
Huadian Fukang Power Generation Co., Ltd.

Measuring Task

Non-intrusive measurement of the water intake of Huadang Power's Fukang power plant from reservoir "500" on a 40" concrete pipe (PCCP)

The way a coal-fired power plant works is essentially based on the purchase of coal and water. Coal provides the fuel to boil the water. The steam produced is passed through turbines, which in turn drive generators to produce electricity. Water is further required in very large quantities for cooling and for flue gas cleaning processes.

Huadang Power's Fukang power plant draws its water entirely from the "500" reservoir. The reservoir invoices the consumers for the consumption. In the past, the power plant's water consumption was just calculated. The operators of the reservoir extract the water through a large pipe that is equipped with a flowmeter. Besides the Fukang power plant, there are two other customers for water from the reservoir. Their supply lines also have flowmeters.
Consequently, the water consumption of the power plant was calculated from the difference between the two measured consumptions and the total flow quantity.

There were repeated discussions about the water bill as there were doubts

about the amount of consumption determined in this way. Therefore, Huadang Power Fukang decided to retrofit its own water supply line with a flowmeter. The special challenge lies in the pipe material: The 40" line is a Prestressed Concrete Cylinder Pipe (PCCP). Installing a wetted flowmeter would be an extremely risky undertaking and could result in irreparable damage to the pipe. In addition to this risk, the installation of an inline measuring system would in any case be associated with great effort and a plant shutdown. Therefore, the plant engineers at Haudian Fukang were looking for a non-intrusive solution.

Solution

Once again, Flexim's non-intrusive flow measurement technology convinces with an all-important unique selling point: It works.

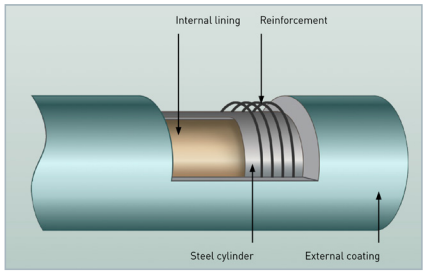
In fact, the complex structure of PCCP also poses a challenge for clamp-on ultrasonic technology. Prestressed Concrete Cylinder Pipes, sometimes referred to as Bonna pipes, are composed of several layers of different materials. The core material of these pipes is concrete, followed by a steel cylinder. The next layer consists of prestressed steel wires that create a consistent compressive pressure. These wires are embedded in a mortar coating that represents the outer material of the pipe. Flexim meets this challenge with extremely powerful transducers, the most advanced signal processing and, last but not least, the experience of its team.

Before approaching Flexim, Haudian Fukang's plant engineers had already made enquiries with other suppliers of clamp-on ultrasonic flow measurement technology, but to no avail. Only the Flexim field engineer was able to successfully carry out a flow measurement on-site with his portable FLUXUS® F601 on the challenging pipe with the very difficult pipe surface. The decisive factor was Flexim's superior technical hardware and the Flexim engineer's meticulous and patient search for the most suitable mounting position for the clamp-on ultrasonic transducers.

Convinced by the successful demo measurement, Haudian Fukang decided to install a FLUXUS® F721 stationary clamp-on ultrasonic system. The transducers chosen were of the CDG1N52 type, which proved to be the most suitable in the tests. This low-frequency and powerful transducer type has IP68 protection and can be operated permanently submerged underwater. The IP68 protection rating was confirmed and certified by an independent body in a three-month test under 20 m (~ 790") water column.

This means that Haudian Fukang now has a reliable and accurate measurement of its own for the water volumes drawn from the "500" reservoir.

The premises of Huadian Fukang Thermal Power Co. LTD., located in Xinjiang Fukang, cover an area of about 60 hectares to the south of the "500" reservoir from which the power plant draws its water. © Google



The complex structure of PCCP consists of several layers of different materials.

After the service engineer has determined the most suitable measurement location with his portable FLUXUS® F601, the clamp-on transducers are permanently installed there on the outside of the pipe with Variofix L mounting rails.

The final parameterisation of the FLUXUS® F721 stationary transmitter is a routine task for the experienced service engineer.

Measuring Points and Instrumentation

Pipeline	40” inside diameter, PCCP (steel-cement-composite), wall thickness 3.5”
Medium	raw water
Measuring Device	1 stationary FLUXUS® F721 clamp-on ultrasonic flowmeter,
	1 pair of clamp-on ultrasonic transducers type CDG1N52 (shearwave, IP68),
	mounted in reflex mode in Variofix L

Advantages

- Reliable non-intrusive flow measurement without any risk of damaging the pipe
- No process interruption for installation and commissioning, unimpaired plant availability
- Matched transducers with integrated temperature measurement and compensation according to ANSI/ASME MFC-5.1-2011 regulations guarantee for highest zero point and flow measurement stability even under changing conditions
- Excellent support from the Flexim China service team

Customer

华电国际电力股份有限公司
Huadian Power International Corporation Limited
中文版 繁体版

Huadian Fukang Power Generation Co., Ltd., Fukang City, Xinjiang Uyghur Autonomous Region, China

Huadian Power International Corporation Limited and its subsidiaries are one of the largest comprehensive energy companies in the People’s Republic of China. The Group’s power-generating assets in operation are located in 12 provinces, autonomous regions and municipalities across China. In 2022, the Group had a total of 44 controlled power generation enterprises which have commenced operations involving a total of approximately 54,754.24 MW installed capacity, primarily including approximately 43,700 MW attributable to coal-fired generating units, approximately 8,589.05 MW attributable to gas-fired generating units and approximately 2,459 MW attributable to hydropower generating units.

The two coal-fired units of the Fukang power plant started operation in 2010 and 2011. With an electrical output of 300 MW, they secure the supply with electrical power to the eastern Changji region.

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