

Fortum Power, Wroclaw, Poland

SMARTBALL® TECHNOLOGY USED TO SUCCESSFULLY IDENTIFY LEAKS ON VACUUM-INSULATED HOT WATER PIPELINE, GUIDING REPAIR DECISIONS AND IMPROVING SERVICE RELIABILITY

Fortum's core business in Poland is high-efficiency combined heat and power production, heat distribution, as well as gas and electricity retail. The company aims to develop sustainable solutions for cleaner cities, meeting the needs of local communities.

District heating pipelines make sense from an environmental perspective. Throughout Northern Europe, many municipalities operate closed-loop systems of vacuum-insulated pipelines that circulate hot water for heating businesses, homes, roads, sidewalks, and more. The water is commonly heated at a power plant and transported by insulated pipes to customers for heating their spaces with radiators and heat exchangers. The water never leaves the system. It is circulated within a loop of outbound hot water and inbound cool water. This efficient method of heating structures boasts a 98 percent heat retention rate during transmission.

Challenge

Fortum wanted to understand the true condition of a suspect section of its district heating pipeline in Wroclaw, a historic city of 630,000.

The return pipeline is comprised of 900-millimeter steel pipe within 1000-millimeter steel pipe; a vacuum created in the annular space between these two pipes insulates the hot water. The line was suspected of having a leak, as water was observed in the annular space. The lines incorporate numerous 90-degree bends and u-shapes to allow for expansion and contraction as the product temperature changes. A pipeline with these challenging configurations precludes the deployment of many traditional condition assessment solutions.

Additionally, the pipeline carries very hot water, which limits inline inspection tools that may succumb to such high temperatures. The same insulation that prevents heat loss also makes the pipeline well insulated against sound transfer. This makes it difficult or impossible to hear acoustic leaks from the pipe exterior. Additionally, Fortum was understandably averse to compromising the integrity of the line's vacuum seal, and therefore, did not wish to expose the 900-millimeter pipe to mount sensors.



PROGRAM HIGHLIGHTS

- SmartBall inline leak detection inspection identified six leaks over 11 kilometers
- Inspection identified 90-degree bends and u-shapes in pipeline
- Inspection results guided repair decisions to improve service reliability and Wroclaw's resilience to water-related disaster

SERVICES PROVIDED

- SmartBall® leak and gas pocket detection

PIPE MATERIAL: Steel

INSPECTION LENGTH: 11 kilometers

DIAMETER: 900-millimeter pipe within
1000-millimeter pipe

Solution

In 2018, Heat Polska, at the request of Fortum, retained Pure Technologies, a Xylem brand to provide a pilot inspection of an older section of the Wroclaw district heating line. To meet the challenges outlined above, Pure Technologies deployed its [SmartBall® platform](#), an inline, free-swimming technology that detects acoustic anomalies associated with leaks and gas pockets in pressurized pipelines.

Because the SmartBall platform could not be tracked externally in this case, other reference points in the data were critical for accurately locating anomalies within the pipeline. SmartBall technology contains gyroscopes that can display directional changes as the tool traverses the pipeline. The many 90-degree bends in the district heating line were identifiable in the data, providing great geospatial reference points that enabled Pure Technologies to locate anomalies with confidence.

As this was a pilot inspection - the first of its kind in Poland - Fortum intentionally simulated two leaks to verify the SmartBall platform's ability to locate leaks along an 11-kilometer span.

"This was the first time in the country using the innovative SmartBall tool to inspect for leaks, and the electronic device passed the exam perfectly, detecting weak points at risk in the network..."

Thomas Adamiok, Supervising Manger, Fortum Power

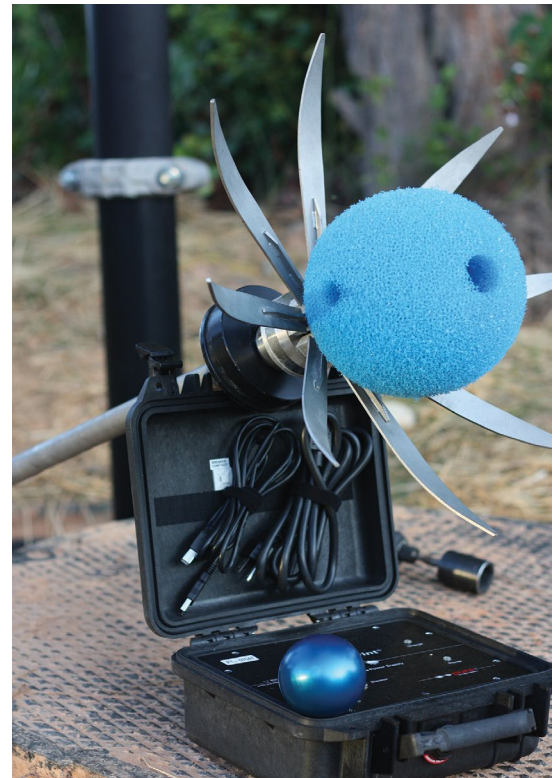
Outcome

The inspections took place over two days - one day for the supply line and another for the return line - without any negative impact on operations. In the end, Xylem's analysis team provided Fortum with the actionable information they needed to proactively manage their district heating line and improve Wroclaw's resilience to water-related disaster.

Acoustic data recorded by the SmartBall platform was analyzed and cross-referenced with position data to precisely locate the detected anomalies. The SmartBall inspection identified six leaks clearly visible in the data, including two on the supply line (one simulated) and four on the return line (one simulated). No gas pockets were detected.

Fortum now has rich and valuable data on the overall condition of this high-priority pipeline. With the data and recommendations provided by Pure Technologies, the utility is now better equipped to make the best possible remediation decisions to aid in future capital planning.

That's the power of decision intelligence.



Because district heating pipelines carry very hot water, they often pose challenges for some leak detection technologies that can succumb to such high temperatures. The SmartBall leak detection technology has been tested in district heating pipelines with temperatures up to 105 °C.

"Thanks to our leak detection inspection and the innovative SmartBall device, the citizens of Wroclaw can look forward to the heating season in peace..."

Thomas Adamiok, Supervising Manger, Fortum Power