



STEAM MEASUREMENT IN A CHEMICAL PARK



Chemical Industry

“Thanks to the non-intrusive measurement technology from Flexim, we have a decisive advantage during installation and maintenance. Since there is no pipework required, we can ensure high system availability.”

*Tony Böttcher,
PPM Instruments, Dow*



Measuring Task

Flow measurement of approx. 430 °F hot steam on a 10" feed line into Dow's medium-pressure steam network at the Schkopau site

Dow has been operating a chemical site in Schkopau since the mid-1990s, where more and more companies have settled as part of the ValuePark® – a chemical park for plastics producers, plastics processing companies, and chemical-related service providers. Today, 27 national and international companies are based here, representing a balanced mix of production and logistics companies, raw material suppliers, and research and technology services.

The ValuePark® provides an optimal infrastructure. The services that Dow provides as a chemical park operator also include the secure supply of energy to the companies located there, as well as various products and services typical of the chemical industry. This also includes the supply of steam at different pressure and temperature levels.

Dow obtains the steam it needs primarily from the largest power plant in Saxony-Anhalt, the Saale-Energie power plant in Schkopau, which is in the immediate vicinity. The lignite-fired power plant, which consists of two blocks, can generate the required steam in combined heat and power and

feed it to the chemical site via pipeline systems. In addition, Dow itself has a natural gas-fired reserve power plant that could supply the chemical site with steam autonomously. There are also other steam generators in the chemical park, including one of the downstream boilers of the waste recycling plant, in which up to 38,000 t of hazardous waste can be thermally converted each year. The energy gained in this way is used to generate more than 130,000 t of steam per year, which is fed into the medium-pressure steam network at the site.

For the efficient operation of steam networks, the quantities fed in and consumed must be known in real-time, i.e. measured. A metering orifice is installed at the outlet of the waste incineration plant to account for the amount of steam generated. However, a corresponding input measurement on the part of the grid operator was missing.



Solution

Whenever a flow measuring point needs to be retrofitted with little effort and above all without any adverse effect on normal system operation, Flexim's clamp-on ultrasonic technology is the ideal solution. However, for a long time steam was considered to be the final and almost insurmountable challenge for non-intrusive measurement technology.

At Dow in Schkopau, too, measurement technology from Flexim has been trusted for decades, especially when demanding measurement tasks need to be solved as simply as possible. Therefore, the news that Flexim developers had finally succeeded in transferring clamp-on ultrasonic technology to steam applications was met with great interest among the process control specialists at Dow in Schkopau.

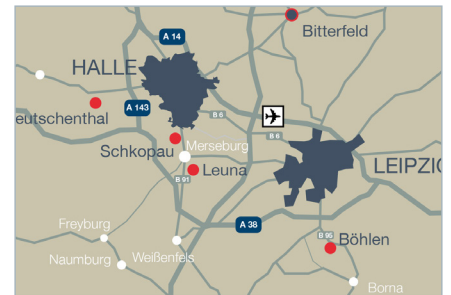
In fact, Flexim has solved the steam problem in two complementary ways: FLUXUS® ST-LT measures steam up to a temperature of 360 °F and, like the other flowmeters in the FLUXUS® series, works according to the transit time method. For higher temperatures, Flexim has developed the superheated steam flow meter FLUXUS® ST-HT. FLUXUS® ST-HT measures according to the cross-correlation method: Two pairs of ultrasonic sensors are mounted on the pipe at a defined distance from one another, thus forming two acoustic measuring barriers. The ultrasonic signals radiated into the pipe are modulated by the vortices of the turbulently flowing fluid. Since the vortices are carried along by the flow, they pass through the two measurement barriers with a time delay. By cross-correlating the modulation signals over time, FLUXUS® ST-HT determines the flow velocity of the steam and calculates the mass flow based on the geometry of the measuring point and the physical parameters.

One of the characteristic advantages of non-intrusive flow measurement with clamp-on ultrasonic technology from Flexim is that it can be checked for suitability in operation before a final investment decision is made. Dow in Schkopau was happy to try a risk-free test with the new measuring technology. So Helge Schulze, the Flexim sales and service engineer responsible for the Central German chemical plants, installed a FLUXUS® ST-HT clamp-on ultrasonic system on the 10" steam feed line.

The long-term test was absolutely convincing. Dow, therefore, decided



Aerial view of ValuePark® Schkopau
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Dow has four locations in Central Germany.
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A welcome guest in the companies of the Middle German Chemical Triangle: Flexim sales and service engineer Helge Schulze.



Measuring point with clamp-on transducers mounted on the outside of the pipe.

to purchase and permanently install this measurement system. Now the operating personnel have the real-time data they need to feed steam from the waste treatment plant into their medium-pressure steam network. Based on the positive experience with Flexim's clamp-on ultrasonic technology, the company is now thinking of having additional FLUXUS® ST-HT steam measuring points set up in the future. It is essential for the system operator that neither the installation nor any subsequent maintenance work on the measuring system requires intervention in the pipe which would mean a shutdown of the respective line.



The stationary FLUXUS® G722 ST with stainless steel housing is used as the measuring transmitter.

Measuring Points and Instrumentation

Pipelines	10", steel
Medium	saturated steam, ~ 105 °F, ~ 260 psi
1 stationary clamp-on ultrasonic FLUXUS® G722 ST-HT flowmeter for superheated steam	
2 pairs of GLM2E53 clamp-on ultrasonic transducers, mounted in Variofix C transducer mounting fixture	

Advantages

- Reliable and accurate recording of steam quantities from outside
- Easy retrofitting without interfering with the existing piping system and without interrupting the supply
- No pressure loss and therefore no energy loss
- Decades of convincing experience with Flexim's clamp-on ultrasonic measurement technology

Customer



Dow Olefinverbund GmbH, Schkopau Plant, Germany

The Dow Chemical Company was founded in 1897 by Herbert Henry Dow. Dow creates innovative solutions that improve the quality of life by combining science and technology. Using the latest in materials science, polymer science, chemistry, and biology, the company drives innovation to help solve the world's many pressing problems. Dow operates 104 production sites in 31 countries and employs around 35,700 people worldwide. The company generated a turnover of around USD 55 billion in 2021.

Dow has been active in Central Germany since 1995, making it one of the first international investors in the region. Since the extensive restructuring of the plants and systems in Schkopau, Leuna, Teutschenthal (Saxony-Anhalt), and Böhlen (Saxony) up to the end of the 1990s, Dow in Central Germany has stood for integrated production processes, innovative technologies, high productivity, and excellent results in occupational safety and environmental protection.

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AR-202211-Dow-US

