

ASK THE EXPERT

Accurate Steam Flow Measurement in Industrial Applications – Improving the Bottom Line by Doing it Right



DAVID WRIGHT

*Global Product Manager,
Emerson*

The first industrial revolution was powered by steam energy, and while you may not see it often anymore, it is still there fulfilling many critical roles in both industrial applications and our everyday lives. Steam is one of the most commonly used utilities behind electricity and compressed air, and is used in all types of industrial applications. It possesses enormous power, yet can deliver energy in easily controllable amounts, making it useful for many applications, such as electrical power generation, distillation, process heating or drying operations.

While steam is still very common in industrial applications, it is expensive to produce and its energy content — the most critical property of a given amount of steam — is impacted by numerous factors, such as temperature, pressure, saturation and dryness. Only measuring steam flow without regard to the other parameters does not give the full picture.

Below, David Wright, part of Emerson's Global Product Management Team, discusses the challenges of measuring steam flow. In his more than five years with Emerson, he has worked with customers and sales to provide flow measurement solutions and is now responsible for portions of the differential pressure (DP) flow product portfolio.

Why is steam measurement important?

A: Steam is one of the most common ways of transporting energy in a system. The versatility of steam allows many different industries to use its heat transfer properties to power their operations. Accurate measurement of steam flow, pressure, and temperature helps optimize energy consumption, ensuring that the correct amount of steam is used for each process. This results in improved energy efficiency, saving costs by reducing wastage.

An accurate measurement in multiple locations determines the steam use of individual areas, as well as the efficiency of individual pieces of equipment. This leads to proactive scheduling of maintenance, such as heat exchanger cleaning, or improving safety by detecting dangerous leaks. Also, larger sites with steam generation allocated to customers needs to be properly measured to ensure fair usage and charges to the recipient.

Sponsored by

It is also important to understand if a process is meeting certain federal or industry-specific regulations, some compliance and reporting agencies require very accurate metering and measurement of steam if it is part of the process.



Why is measuring steam accurately so challenging?

A: The fluid properties of steam can make it a difficult application to properly measure. Steam is influenced by even the smallest changes in the temperature and pressure, with its density and phase changing substantially with these fluctuations. Typical steam piping introduces complexities to the flow profiles needing to be measured and can impede any maintenance or calibration that is required. Another issue present in steam is condensation, where the collection of water may affect the measurement and increase wear of the instrumentation.

What industries or applications is steam measurement prevalent in?

A: Steam is largely used in power generation, where it drives turbines and generators to produce electricity. It is also an important component in industrial and commercial heating systems. Through the burning of fuel, boilers convert water to steam that is then distributed through a network of pipes to heat-emitting devices, such as radiators, in a process called space heating.

Other industries such as food and beverage, pharmaceuticals, chemicals, textiles and pulp and paper rely on accurate steam measurement to help maintain efficiency and quality.



What product features are needed to achieve a successful steam measurement?

A: As mentioned previously, steam properties are heavily dependent on changing pressure and temperature. To accurately measure steam flow, a flow device

should be able to account for these changes instantly while reducing the amount of permanent pressure drop during the measurement. Permanent pressure drop is an important detail to understand, as this is pressure in the steam line that cannot be recovered. In most industries maintaining a particular steam phase is important, so any loss in pressure will reduce steam quality and thus add more energy expenditure to the process. The Rosemount Annubar™ technology excels in this area, as the patented T-shape design introduces a very low permanent pressure drop but creates enough differential pressure to measure effectively.

Will measuring steam accurately save me time, money, or both?

A: Measuring steam accurately will save facilities both time and money in various applications. Excessive steam usage results in untold energy waste, which will add up quickly if not monitored. Using a flow measurement device like the Rosemount Annubar helps facilities understand and regulate their steam, cutting down on unnecessary fuel costs and aid in identifying leak points in the system.

For industrial processes, steam measurement helps reduce variability and improve product quality, ultimately leading to increased profitability and throughput by minimizing rework. Understanding steam can also provide insight into the performance of boilers, turbines, and other equipment. With a steam measurement point, facilities can detect abnormal conditions and can proactively schedule preventative maintenance, reducing downtime and equipment failures.

A key cost saving feature of the Rosemount Annubar is that for larger steam lines, the unique insertion design becomes much more economical through eliminating the need for significant pipe modifications.

Where can I find out more information?

A: Discover more about the methods and benefits of accurately measuring steam and fluid flow from an industry leader in flow measurement technology by visiting www.emerson.com/dpflow.

Sponsored by



CONTROL