

FlowTimes – October 2025

*Your strategic update on flow, temperature, and pressure measurement
from Flow Research*

Executive Editor: Dr. Jesse Yoder. Volume 26, Number 1 – ISSN 1350-7204

1. Spotlight on Coriolis meters

In this issue's news from the president, we hope you will enjoy excerpts from a May 27 [article Jesse wrote for Control magazine](#) about the early days of Coriolis flowmeters (1975-2010).

The history and evolution of Coriolis flowmeters is a fascinating tale involving the contributions of 40 companies.

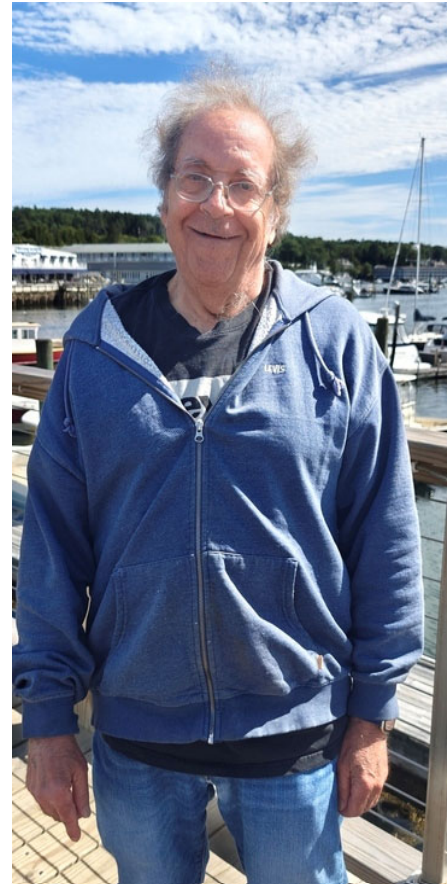
While most people associate the beginning of Coriolis flowmeters with Jim Smith and Micro Motion, there were several patents filed in the 1950s and 1960s that laid the foundation for Smith's pioneering work. A patent filed in 1958 on behalf of American Radiator & Standard Sanitary Corp. appears to be the earliest patent that mentions the "Coriolis force." In May 1960, Yao Tzu Li patented an invention called "Mass Flowmeter" that involves rotating the flow, and cites Ernest F. Fisher, who filed a patent in 1917.

In August 1972, Smith patented a "Balanced Mass-Moment Balance Beam with Electrically Conductive Pivots."

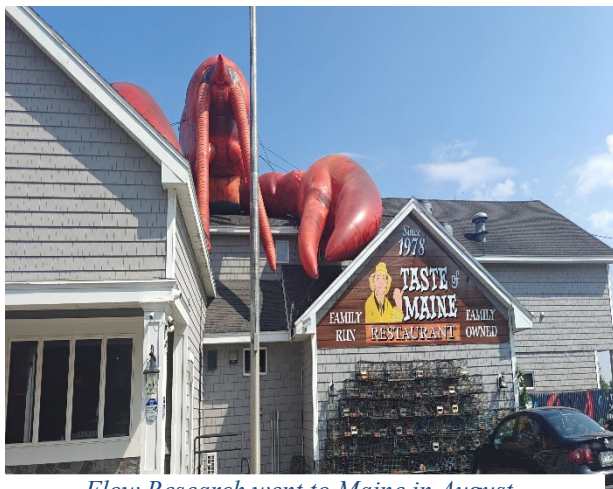
Beginning in August 1978, Smith began patenting a series of devices that became the basis for the flowmeters produced by Micro Motion, which he founded in his garage in 1977. His August 1978 patent was filed in 1975. These patents

explicitly evoke the Coriolis force. Smith's patents substituted a vibrating and oscillating tube for a rotating tube, which worked better than the earlier ones and is still used today.

Heinrichs Messtechnik GmbH says on its website that it is the first European company to offer Coriolis flowmeters. Heinrichs introduced its first Coriolis meter in 1986,



Dr. Jesse Yoder, President of Flow Research, taking a break at Boothbay Harbor, Maine



Flow Research went to Maine in August



Staffers Belinda Burum and Leslie Buchanan at a Taste of Maine lunch

which was the same year that Rheonik debuted its Omega-shaped Coriolis meter. However, that was the same year Endress + Hauser released its first Coriolis meter. This meter was a dual-tube, straight-tube meter, which evolved into the Proline Promass F.

Krohne Group followed up with a single-tube, straight-tube meter in 1994, following an earlier design from Schlumberger, now SLB, that was withdrawn from the market. One of the moving forces behind Krohne's meter was Dr. Yousif Hussain, who holds several patents on Coriolis meters.

In 1984, Rheonik's founder, Karl Küppers, began developing what was to become the company's technology base and patent portfolio, the patented Omega-shaped Coriolis flowmeter. In February 2008, GE Sensing and Inspection Technologies acquired Rheonik, but in 2015, Rheonik purchased the assets and business back from the GE unit.

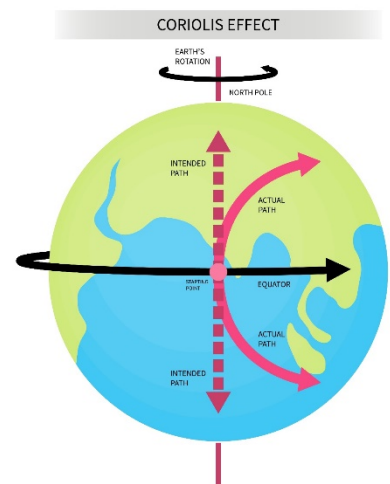
In 1992, Micro Motion introduced its Elite series of Coriolis meters, which it still carries. This line was designed for flow and density measurements of liquids, gases, and multiphase flow. During this same period, in 1993, the company Rota in Germany introduced the Rotamass, developed in Wehr, Germany. This dual-tube flowmeter featured a heavy wall to minimize the effects of vibration or pipeline stress and to provide increased reliability and output stability. In 1995, Rota became a subsidiary of Yokogawa Europe.

For more history as well as an explanation of why the dual-tube meter was invented, go to <https://www.controlglobal.com/measure/flow/article/55292715/the-evolution-of-coriolis-flowmeters-from-early-patents-to-modern-innovations>

2. Hot off the presses: our latest Coriolis study

Flow Research is excited to announce that one of our most popular studies, *The World Market for Coriolis Flowmeters, 8th Edition*, began shipping in August. The new edition, the most comprehensive study we've ever done on the market, found that Coriolis flowmeters are the leading revenue generator for the entire flowmeter market worldwide. We also found that the market is expanding rapidly and that companies are rising to meet the new challenges of measuring energy transition gases.

We don't like to brag, but we are proud to say that our August 2025 edition features extensive segmentation not found



anywhere else: fluid, mounting, and tube types; temperature; line sizes; accuracy levels by fluid type; liquid and gas applications; communication protocols; industries; average selling prices; and more.

For the first time, the study also includes research on the four different tube types (single bent, dual bent, single straight, dual straight) and their roles in industries and applications. We also discuss how changes in the Coriolis world from the 1950s to 2025 have kept the meter in the top tier of the flowmeter market. This includes new product introductions, new technologies, and mergers & acquisitions that have impacted the market. We also identify frontiers of research that will be driving research and development over the next five years.

One thing we found is that straight tube meters have become more accurate and reliable, thereby addressing some of the drawbacks of bent tube meters, including pressure drop, the inability to measure high-speed fluids, and the tendency of bent tubes to cause fluid build-up.

While bent tube meters still have advantages over many conventional meters, they do introduce pressure drop into the system. Pressure drop is an issue because in many cases the fluid has to be speeded up back to its original velocity. This costs money, as it requires the use of pumps. Another issue has to do with the tendency for build-up to occur around pipe curvatures. This can be a special problem for sanitary applications. Having a bent pipe also slows down the fluid, making it more difficult to meter high-velocity fluids.

As a follow-on to the larger study, we are considering offering a deep-dive “upgrade” module that would provide detailed segmentation of bent tube vs. straight tube Coriolis meters. Does this interest you? If so, please let us know.

For more information, or to order your copy now of *The World Market for Coriolis Flowmeters, 8th Edition*, please visit <https://www.flowresearch.com/coriolis>.



Dr. Wolfgang Drahm (left) and Dr. Alfred Rieder (center) celebrate 25 years of innovation, including the Coriolis Proline Promass Q, at Endress+Hauser's predevelopment site for flowmeters in Freising, Germany. They are joined here by Endress+Hauser Flow colleague Dr. Vivek Kumar.

3. E&H now markets SICK flowmeters worldwide

SICK and Endress+Hauser kicked off the year by officially launching their strategic partnership in process automation. Endress+Hauser now exclusively markets SICK's gas analysis and flow measurement technology worldwide, including SICK's ultrasonic flowmeters, as part of its own comprehensive instrumentation portfolio.

To support the strategic partnership, around 800 sales and service employees from SICK transferred to Endress+Hauser across 42 countries. In China, the transition took place after March 1, and in Türkiye and Saudi Arabia, sales and service transferred to Endress+Hauser in the first quarter.

The production and further development of the gas analyzers and flowmeters now take place under the umbrella of Endress+Hauser SICK GmbH+Co. KG. The venture employs around 730 people at several German sites and collaborates with Endress+Hauser's product centers to drive product innovation.

"This partnership is a perfect match," said Dr. Peter Selders, CEO of the Endress+Hauser Group, in a January 2025 press release. "It creates new opportunities for growth and development, particularly in the sustainable transformation of the process industry. By joining forces, we offer added value to our customers. Our combined efforts will make us faster and ultimately more successful than if we acted alone. In this case, one and one equals more than two."

SICK and Endress+Hauser each hold 50 percent of the joint venture. Endress+Hauser is based in Rheinach, Switzerland, close to the German border. SICK is based in Waldkirch, Germany, less than 100km from the border. SICK is one of the world's leading solutions providers for sensor-based applications in the industrial sector. The company's core business of factory and logistics automation, which accounts for more than 80 percent of sales, will not be affected by the Endress+Hauser partnership.

4. New primary elements study finds DP flowmeter market expanding

Markets for both multivariable and single variable DP flowmeters are expanding due to increased exploration and production activity in the oil & gas industry according to our new study, *The World Market for Primary Elements, 3rd Edition*, published in June 2025. End-users like the expanded functionality that these multivariable transmitters provide, and these customers are increasingly using them for gas and steam flow measurement. Growth is also occurring in new uses, including high pressure subsea applications.



Orifice plate

Primary elements are used with differential pressure (DP) flow transmitters to create DP flowmeters, and growth in the DP transmitter market is also driving growth in the primary elements market. DP flowmeters – with their primary elements – have the largest installed base of any type of flowmeter. They also remain widely used in oil and gas

production despite intrusions by new-technology flowmeters like Coriolis and ultrasonic. DP measurement is used routinely in custody transfer applications in upstream through to downstream locations. Because DP flowmeters have been used for many years in the oil & gas industry, they are being called upon now as activity ramps up.

For more information on the study, please go to <https://www.flowresearch.com/flowplate>.

5. Baker Hughes to sell Panametrics

Baker Hughes, an energy technology company based in Houston, Texas, has agreed to sell its Precision Sensors & Instrumentation (PSI) product line to Crane Company. The company, based in Stamford, Connecticut, is a leading manufacturer of highly engineered components for mission-critical applications focused on the aerospace, defense, space and process industries. The \$1.15 billion deal, announced in June, is expected to be final at the end of 2025 or the beginning of 2026.



PSI, part of Baker Hughes' Industrial & Energy Technology (IET) segment, includes the Druck, Panametrics and Reuter-Stokes brands, which manufacture instrumentation and sensor-based technologies that detect and analyze pressure, flow, gas, moisture, and radiation.

The Panametrics business, based in Billerica, Massachusetts, provides solutions for measuring and analyzing moisture, oxygen, liquid, steam, and gas flow, including ultrasonic and vortex flowmeters. Druck specializes in pressure measurement technology, including high-accuracy sensors, digital pressure gauges, and specialized products for harsh or hazardous environments. Reuter-Stokes designs and manufactures harsh environment sensors for power generation.



Waltham Watch Factory in Massachusetts, Panametrics' first home
Photo by Belinda Burum

PSI employs approximately 1,600 people across several manufacturing and service facilities globally and is expected to have 2025 sales of approximately \$390 million.

This divestiture, along with a Surface Pressure Control venture, aligns with Baker Hughes' adaptation to the energy supply it has supplied for decades dropping to 73% from ~80%.

Panametrics' 65-year history

Edmund Carnevale and David Chleck started Panametrics in 1960 in Waltham, Massachusetts. In the 1970s they introduced ultrasonic flowmeters to measure gas flow. However, since the market at the time was not yet ready to accept this technology, in the 1980s Panametrics turned its attention to measuring flare gas. Eventually, Panametrics brought out the GN868 Series for measuring the flow of natural gas.

In July 2002, General Electric (GE) purchased Panametrics for \$250 million. In 2004, the Panametrics unit was one of seven groups put together to form GE Infrastructure Sensing. In 2005, this group became GE Sensing. In 2006, GE Sensing and GE Inspection Technologies merged to become GE Sensing & Inspection Technologies. In 2009, GE Infrastructure, Sensing & Inspection Technologies and GE Optimization & Control merged to become GE Measurement & Control Solutions. In addition to the Panametrics line, the company created its instrumentation product lines through acquiring Dresser, Druck, General Eastern, Kaye, NovaSensor, Pressurements, Protimeter, Rheonik, Ruska, SI, Thermometrics, Telaire, and others.

In 2015, GE Measurement & Control became part of GE Oil & Gas. In the following year, GE Oil & Gas announced a merger with Baker Hughes, creating Baker Hughes, a GE Company (BHGE). This new company included the former GE Measurement & Control. In 2018, however, GE, with a new business focus in mind, sold off a percentage of BHGE and expressed its intention to further reduce its share. By this time BHGE was already an essentially independent operation.

In early 2019, BHGE announced plans to market its flowmeter product line, along with the original product lines from Panametrics, Inc., under the Panametrics name. On October 19, 2019, BHGE announced that it had a new name, Baker Hughes Company and would be known as Baker Hughes. Ultimately the Panametrics product line was branded as Panametrics, a Baker Hughes business.

6. New vortex study to focus on multivariable meters

Vortex flowmeters' versatility, reliability, and accuracy at an economical cost continue to drive steady market growth. This is especially true in the expanding oil & gas market, which is demanding gas and renewables as a cleaner alternative to oil and coal. Multivariable vortex flowmeters in particular are especially attractive for steam and gas because they can measure mass flow. They provide a viable alternative to Coriolis meters, which measure mass flow directly, and ultrasonic meters, which measure it indirectly. While multivariable flowmeters are somewhat more expensive than their single-variable counterparts, they offer significantly more information about the process than a single-variable volumetric meter. We believe this additional information can result in increased efficiencies that more than make up for the additional cost of the multivariable flowmeter.



The World Market for Vortex Flowmeters, 8th Edition due out in November, will focus on multivariable vortex meters and the extent to which they integrate internal sensors to measure temperature and pressure. <https://www.flowresearch.com/vortex>

7. It's time to pick your favorite studies

It's now officially autumn in the northern hemisphere, and that means apple picking here in Massachusetts. It may also mean it's time to plan your budget and pick your favorite studies. To help your planning, here's what we are delivering this year:



- *The World Market for Mass Flow Controllers, 4th Edition* (January 2025) shows that the competitive mass flow controller (MFC) market is one of the most rapidly developing markets in the flowmeter world today. <https://www.flowresearch.com/mfc>
- *The World Market for Primary Elements, 3rd Edition* (June 2025), our first complete overview of primary elements in six years, finds that the market is riding a wave of growth in the oil & gas industry. <https://www.flowresearch.com/flowplate>
- *The World Market for Coriolis Flowmeters, 8th Edition* (August 2025) reports on one of the most popular and fastest growing flowmeters. This edition is the most comprehensive study we have ever done on this market, featuring new and extensive segmentation not found anywhere else. <https://www.flowresearch.com/coriolis> We are also considering creating a *Coriolis "deep dive" supplement* on bent tube and straight tube meters. (TBD)
- *The World Market for Vortex Flowmeters, 8th Edition* (November 2025) based on 2025 data, focuses on multivariable vortex meters and the extent to which they integrate pressure and temperature sensors in calculating mass flow. <https://www.flowresearch.com/vortex>

Upcoming in 2026:

- *The World Market for Magnetic Flowmeters, 8th Edition* (January 2026) based on 2025 data, covers one of the most revenue-generating flowmeters on the market. <https://www.flowresearch.com/mag>
- *Volume X: The World Market for Flowmeters, 10th Edition* and *Module A: Strategies, Industries, and Applications* (Q2 2026), our flagship study, covers market share, market size, growth factors, industries, and more for all 10 flowmeter technologies. <https://www.flowresearch.com/volumex>
- *The World Market for Ultrasonic Flowmeters, 8th Edition: Core Study: The World Market for Ultrasonic Flowmeters; Module A: The World Market for Inline Ultrasonic Flowmeters; Module B: The World Market for Clamp-on and Insertion Ultrasonic Flowmeters.* (Q3 2026) <https://www.flowresearch.com/ultrasonic>
- *The World Market for Gas Flow Measurement, 5th Edition* covers the fast-growing gas flow market, including conventional gas, industrial gas, hydrogen, CCUS, and renewable natural gas. (Q4 2026) <https://www.flowresearch.com/gasflow>

Join us on LinkedIn!

We're excited to announce that Flow Research has created LinkedIn groups for the main flowmeter technologies. We hope to provide a forum for manufacturers, end-users, distributors, salespeople, and others involved with flowmeters. So far, the groups have discussed history, principles of operation, applications, frontiers of research, and more. Please join the discussion! We'd love to hear from you.

Coriolis Flowmeters: [linkedin.com/groups/13199258/](https://www.linkedin.com/groups/13199258/)

Ultrasonic Flowmeters: [linkedin.com/groups/13193564/](https://www.linkedin.com/groups/13193564/)

Magnetic Flowmeters: [linkedin.com/groups/13197555/](https://www.linkedin.com/groups/13197555/)

Mass Flow Controllers: [linkedin.com/groups/13191782/](https://www.linkedin.com/groups/13191782/)

Vortex Flowmeters: [linkedin.com/groups/13191600/](https://www.linkedin.com/groups/13191600/)

Thermal Flowmeters: [linkedin.com/groups/13198707/](https://www.linkedin.com/groups/13198707/)

Primary Flow Elements: [linkedin.com/groups/13194640/](https://www.linkedin.com/groups/13194640/)

Turbine Flowmeters: [linkedin.com/groups/13192681/](https://www.linkedin.com/groups/13192681/)

Variable Area: [linkedin.com/groups/13216007/](https://www.linkedin.com/groups/13216007/)

Flow Research: [linkedin.com/groups/4173627/](https://www.linkedin.com/groups/4173627/)

Help us help you

What are your market research needs for the rest of 2025 and into 2026? We are already beginning to set up our study schedule for 2026, and we are also open to custom work. Whatever your market research needs for flow and instrumentation, we are here to help. Tell us what you need to know and if we don't already have the data, we'll find it for you!



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Flow Research has new study web addresses for easier access and navigation.

Please note the new formats as they appear in this newsletter.

For example: www.flowcoriolis.com is now <https://www.flowresearch.com/coriolis>.

As we complete this process, our study pages will be part of the home [flowresearch.com](http://www.flowresearch.com) website.