

FlowTimes – October 2022

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

Executive Editor: Dr. Jesse Yoder. Volume 23, Number 2 – ISSN 1350-7204

1. How to do the world a service in these interesting post-pandemic times

“May you live in interesting times” is the translation of a Chinese proverb of unknown origin. Many people today might want to add, “But not too interesting.” The COVID-19 pandemic, the Russian invasion of Ukraine, the ravages of climate change, along with supply change issues, have combined to make life very difficult for a lot of people. The phrase, “When life gives you lemons, make lemonade,” doesn’t seem to be a sufficient response to all this tragedy.



Despite all the negativity in the world today, these turbulent world situations present many opportunities for flowmeter manufacturers. Europe is suffering from a lack of natural gas now that Russia has cut off much of its oil and natural gas supplies, and both oil and gas prices are high. This presents an opportunity, especially for the larger companies, to not only provide flowmeters, but to build skids and other products that will help supply Europe and other regions with both oil and gas. In addition, there is suddenly a greatly increased demand for LNG, and Europe is looking to the United States to meet some of this supply.

Cooperation and partnerships

The rules are changed in this post-pandemic world, and companies that can meet the moment creatively and supply energy where energy is needed will benefit greatly. While renewables are a long-term solution to our energy needs, the research and the infrastructure are not sufficient to satisfy Europe’s immediate energy requirements. Instead, to get through the upcoming winter, Europe needs additional natural gas supplies. Europe also has a long-term need for natural gas, due in part to the decline in the North Sea energy fields. Natural gas relief is most likely to come in the form of LNG from the United States, Qatar, and Australia.

Flowmeter and instrumentation companies can help alleviate the immediate need for natural gas and oil in Europe. This may require taking another look at distribution networks, and also working to build integrated systems that can facilitate the transportation and shipping of natural gas internationally. It may include a reorientation away from selling individual flowmeters and towards building skids that can be used in a variety of ways.

Skids are integrated systems that include multiple types of control and instrumentation and are designed to fill specific needs. Types of instrumentation include process equipment, a piping network and electric power feed, local instrumentation and control systems including a flow computer, and a structural framework. Offshore metering skids are used for Floating Production Storage and Offloading (FPSO), Floating Liquid Natural Gas (FLNG) facilities, offshore

platform custody transfer, and many other applications. Onshore metering skids are used in oil production facilities, refineries, petrochemical plants, and terminals, among other locations. Flowmeter companies that do not have the equipment necessary for building skids may consider partnering with other companies that do have this equipment.

Oil and gas needed during transition to renewables

Apart from building skids or other integrated systems for custody transfer, companies that sell into the oil & gas industry should be in a position to benefit from higher oil and gas prices. There seems to be an ongoing debate about the extent to which renewable energy can solve our energy needs. What seems clear is that the infrastructure for electric cars, solar power, wind power, biomass, and other renewable energy sources is nowhere near being adequate today to handle the vast energy needs of the world. Instead, people who wish to advance the cause of climate change would do well to focus on reducing the use of coal and substituting natural gas for coal and oil. The timeline for the changeover to renewables is at least 5-10 years, and in the meantime, clean energy is needed for cooling and heating, transportation, and many other energy requirements.

The price of crude oil has hovered between \$80 and \$120 per barrel for most of 2022 and is currently on the upswing. The Biden administration has been calling for more domestic production, in part to reduce the price of gasoline. Whether or not flowmeter companies want to build skids, the current market presents an opportunity for any company that sells into the oil & gas industry to focus on supplying flowmeters and other instrumentation where it is needed. This includes offshore drilling, oil platforms, allocation metering, test and production separators, LACT units, custody transfer to and from refineries, and downstream fuel oil delivery. Many flowmeter companies were deemed as “essential” during the pandemic. These companies are equally essential today if we are to weather the current energy crisis that extends to all regions of the globe. Companies that see the energy situation for what it is and act positively will not only prosper, they will also be doing the world a great service.

2. A steady stream of data to help you row merrily along

Here at Flow Research, we are endeavoring to do our part in these turbulent times by supplying as much flowmeter data as possible. We are proud to say we are still the only company that gives you in-depth knowledge on every type of flowmeter. Since December 2021 we have published a steady stream of studies offering both breadth and depth:



- December 2021 (476 pages): *The World Market for Positive Displacement Flowmeters, 3rd Edition*, our first PD study in a decade, finds that despite competition from new-technology meters, positive displacement meters are holding their own, especially in the oil & gas market. PD flowmeters are the workhorses in the flowmeter world. (www.FlowPD.com)

- April 2022 (1,314 pages): *Volume X: The World Market for Flowmeters, 8th Edition* and *Module A: Strategies, Industries, and Applications* finds that the worldwide flowmeter market is now strong and trending upward following the pandemic slump as the economy regains its footing and rising oil & gas prices drive exploration and production. The two studies cover market share, market size, and more for all 11 flowmeter technologies. (www.FlowVolumeX.com)
- June 2022 (460 pages): *The World Market for Pressure Transmitters, 5th Edition* finds that pressure transmitter revenues worldwide equal more than 40% of the worldwide flowmeter market. Pressure is one of the most widely measured variables in the process industries, with an important relation to flow, level, and temperature. Differential pressure flow measurement overlaps with the worldwide flowmeter market. (www.pressureresearch.com)
- July 2022 (526 pages): *The World Market for Magnetic Flowmeters, 7th Edition* finds that magnetic flowmeters are running neck and neck with Coriolis meters as a revenue leader in the global flowmeter market. Magmeters are among the most widely used types of meters for measuring the flow of water and other liquids. (www.flowmags.com)
- September 2022 (566 pages): *The World Market for Turbine Flowmeters, 3rd Edition* reveals that new product developments are keeping the large and stable turbine meter market competitive. (www.flowturbine.com)

Coming in October 2022: *The World Market for Variable Area Flowmeters*, our first VA study ever, is due out any day now. Variable area flowmeters are useful for a variety of applications where high accuracy is not essential and power is not easily available. (www.flowva.com)

Published May 2021 (1,634 pages) *The World Market for Ultrasonic Flowmeters, 6th Edition* and its companion modules on inline and clamp-on/insertion ultrasonic meters found that ultrasonic flowmeters have been gaining acceptance over the last decade and the market is growing faster than expected. (www.FlowUltrasonic.com)

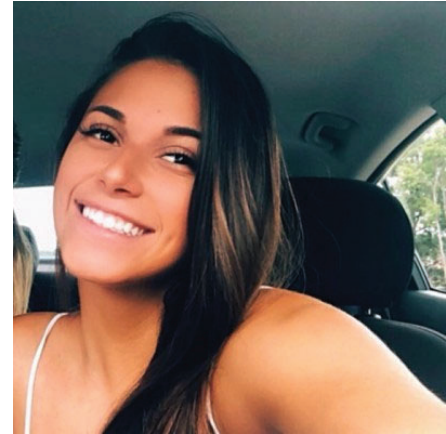
3. Did you know . . . our social media presence is exploding?

If you're a social media fan, perhaps you've noticed how active we've been lately on LinkedIn, Facebook, Twitter, and Instagram. That's because we have a new powerhouse in our corner – Kaleigh Flaherty, Flow Research's new director of marketing. Kaleigh did some media work for us starting in May 2021 before going back to school to finish her degree in marketing at Coastal Carolina University in Conway, South Carolina. However, since she rejoined us in August of this

Kaleigh Flaherty, Director of Marketing

year and really started ramping up our presence, our LinkedIn impressions alone went from 400-500 per post to over 10,000 for a popular post about larger line sizes. (See below.) We are now actively present in 22 LinkedIn groups, including Instrumentation Professionals, Flow Measurement, and our own Flow Research group.

Clearly, Kaleigh is not afraid to wade into the online waters. After graduating in December 2021, she started her own e-commerce business, KAF3 Marketing, and is now CEO. She loves data analytics and cross-checking, which she applies in her own business, as well as at Flow Research.



Her secrets for social media success? Making things relatable with a picture or other personal touch and constantly experimenting with layout, presentation, and content to find out what works best. She explains, “The focus groups are always changing, so I’ve had to learn how to adapt and react. It’s like a game; it’s fun.”

Find us on Twitter [@FlowResearch](#), Instagram [@FlowResearch](#), LinkedIn [Flow Research group](#), and Facebook [goflowresearch](#).

This post appeared 9/27/22 on LinkedIn and garnered over 10,000 impressions:

Larger line sizes – a problem waiting to be solved

Did you know?

Large line size pipes are those greater than 12 inches. There are three types of flowmeters that cannot measure above 16-inch line sizes: Coriolis, vortex, and positive displacement. The kind that can measure 20 inches and above are magnetic, ultrasonic, and turbine.

One frontier of research in flow measurement is designing Coriolis, vortex, and positive displacement flowmeters that measure larger than 16-inch line size. There are unique problems associated with making larger line sizes for each of these technologies.



For Coriolis the problem is to make a meter that is affordable but not so heavy and large that it is impractical to use. Positive displacement meters top out at 16 inches, and they are used for highly viscous petroleum liquids. Making up an even larger one would require capturing this heavily viscous material in a small compartment so it can be easily measured.

It should be possible in theory to make a vortex meter larger than 16 inches. Doing so would require a larger bluff body. This larger meter would have to be calibrated to count the number of vortices generated by the larger bluff body. Yokogawa is the only company we know of that manufactures a 16-inch vortex meter.

One path to larger flowmeters leads through lighter materials and more advanced software processing. This is a problem waiting to be solved. For more information on large line size and other types of flowmeters visit <http://flowvolumex.com/>.

This post followed on 9/29/2022:

The Sweet Sixteen

How big can a flowmeter be? What do you think?

In a recent post, I discussed measurement of flow in large pipes. I pointed out that Coriolis, vortex, and positive displacement flowmeters are not built for line sizes larger than 16 inches. I asked whether it is possible to build any of these flowmeters to fit larger line sizes. Some people pointed out that I am neglecting magnetic, ultrasonic, and turbine meters, all of which measure line sizes greater than 16 inches.



My point was not to neglect magnetic, ultrasonic, and turbine meters. Instead, I am planning a separate post on these three types of meters. But first, let's look at why Coriolis meters are limited in size to 16 inches? Coriolis may be limited because they operate on the inertia created by fluid flowing through a pipe. If the pipe is larger than 16 inches, the pipe may be too heavy and wide to cause the meter body to vibrate sufficiently to infer the mass flow. One possible solution is to build a smaller meter body and, through calibration, correlate the mass flow in the smaller tube with the flow in the larger tube. This is similar to a suggestion made by Chad Jordan of Emerson who suggests "building a meeting skid that splits the flow into multiple smaller lines." So possibly a 24-inch pipe could be measured by two 12-inch line sizes or four 6-inch line sizes.

Yokogawa makes a 16-inch vortex meter. Why can't a vortex meter exceed 16 inches? Perhaps it is because the vortices in a larger line size such as 24 inches would not be sufficiently defined to infer flowrate from them. In this context it is interesting to compare CICRA's meter, which infers flowrate from the movement of natural vortices and patterns in the flowstream without using a bluff body to create them. What is the largest meter CICRA can make? Maybe Chad Jordan's solution of splitting the flowstream into smaller line sizes would work here too.

Like Coriolis and vortex meters, positive displacement meters top out at 16 inches. One company that builds a 16-inch positive displacement meter is Brodie International. It is not obvious why a larger positive displacement meter couldn't be built. Can't a meter be built with larger compartments to capture the flow? Perhaps the question here is one of application. Positive displacement meters are widely used for downstream measurement of refined fuels. They are also used for utility gas and water measurement. The line sizes they are used on are typically small (1 to 6 inches). It may be that there would be little or no application for a 20-inch positive displacement meter, and this is why they are not built.

For more information on these flowmeters, visit <http://www.flowcoriolis.com> or <http://www.flowPD.com>.

On 10/3/2022, Kaleigh posted this graphic to Facebook with a clever news angle about *The World Market for Magnetic Flowmeters, 7th Edition*.

The Magnetic Flowmeter Study

The magmeter study has always been one of our most popular studies. With water becoming increasingly valuable – the new “liquid gold” – we expect this report to be even more popular. To kick off the release, we are offering special fall prices for orders received by October 28th. The study found that magmeters, one of the top revenue leaders in the global flowmeter market are running neck and neck with Coriolis meters. They are among the most widely used types of meters for measuring the flow of water and other liquids. More than 40 percent of their revenues are from the water & wastewater and chemical industries, and more than 15 percent of their market is in food & beverage applications. Even though they don’t measure hydrocarbons, magmeters are used in the oil & gas industry for fracking applications, including measuring water injected into oil and gas wells and water flowing from them for capture, disposal, or recycling. Find out more at www.flowmags.com.



4. Popular turbine flowmeters still showing growth

Turbine flowmeters, a mainstay in oil & gas and water and industrial liquids markets, are here to stay, according to our just-released study, *The World Market for Turbine Flowmeters, 3rd Edition* (www.flowturbine.com).

Even though turbine flowmeters are experiencing slower growth than other new-technology flowmeters – especially Coriolis, magnetic, and ultrasonic – they still remain a popular choice for clean, steady, medium to high-speed flows of low-viscosity fluids in both liquid and gas flow measurement. Turbine meters are widely used in custody transfer and non-custody transfer applications of natural gas in upstream and downstream production environments, often measuring gas flow on large gas pipelines that carry natural gas from its source to its destination – in some cases for thousands of miles. Gas turbine meters are also used as billing meters to measure the amount of gas used at commercial buildings and industrial plants. Turbine meters for liquids measure water use in commercial businesses and industrial plants, as well as in hotels, office buildings, and apartment complexes.

The study includes market size and forecasts, detailed segmentation, a technology analysis, 2019 market shares of major suppliers, average selling prices, supplier profiles, product analyses, discussions of market circumstances and growth factors, and strategies for success for companies competing in this market. Although we use 2019 as the starting base year, the market size data also includes 2020 data, and takes company input and available 2021 data into consideration in making forecasts through 2024. Segmentation includes dollars and units, worldwide and for each

region, for 11 turbine meter types – axial, single jet, multi-jet, paddlewheel, Pelton wheel, propeller, Woltman, helical, compound, fire service, and other – as well as by fluid type, mounting type, and industry.

To get your copy, click the Order link at www.flowturbine.com or contact us directly at 781-245-3200 or jesse@flowresearch.com.

5. Honeywell Elster turbine meters shine in natural gas measurement

Honeywell Elster, a leader in turbine flowmeters for measuring natural gas, has developed some very sophisticated products for handling custody transfer, including the TRZ2 turbine flowmeter. The TRZ2's robust design accurately measures gas flow in gas distribution and in industrial and commercial plants. Its patented metering cartridge provides repeatable measurements even under non-ideal inlet flow conditions. It also reduces field service time if the cartridge needs to be replaced. Because of its design, ambient changes, including temperature, have minimal impact on the correct functioning of the meter. Honeywell Elster also offers conventional diaphragm and rotary positive displacement meters and new-technology ultrasonic flowmeters, plus a range of smart differential pressure transmitters that can accommodate any primary flow element and a large number of gas meters designed for residential use.



Honeywell Elster's TRZ2

In December 2015, Honeywell International Inc. finalized its purchase of Melrose Industries plc's Elster unit for \$5.1 billion. The Germany-based Honeywell Elster Group GmbH is a worldwide market leader and specialist in flow measurement and control equipment and systems focused on the gas, water, and electricity industries in more than 130 countries. With one of the most extensive installed revenue measurement bases in the world, and more than 200 million metering modules deployed over the course of the last 10 years alone, Honeywell Elster and its product sets have gained a widespread acceptance by an array of user groups in the flowmetering world.

6. Hot off the CRC Press: *New-Technology Flowmeters*

Our own Dr. Jesse Yoder has just finished writing a two-book set for CRC Press called *Advances in Flowmeter Technology*. The first volume, *New-Technology Flowmeters*, published September 6, 2022, will be followed by a second volume, *Conventional Flowmeters*. The main purpose of the books is to provide an in-depth look at the 10 main types of flowmeters in plain English, including their origin and historical development, their principles of operation, representative companies, and advances in the theory or production of these meters. The books also discuss applications, reasons why people are buying these meters, and the leading edge – frontiers – of research for each meter type.

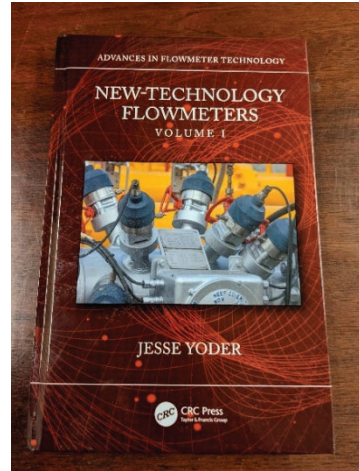
While some of these topics may seem straightforward, there is sometimes disagreement about who first invented a technology, what company first introduced a certain type of flowmeter, or even the meter's operational principle. In some cases, such as with Coriolis theory, Jesse describes his own perspective while presenting the more traditional view so that readers can make up their own minds. As many of you know, flow has been Jesse's passion for decades, and he hopes to spread the love:

“Flow is all around us. Whether it is air flow, water flow, traffic flow, or the flow of gasoline into our cars, it is difficult to escape the impact of flow in our daily lives. In fact, it is impossible for humans to live without breathing air or drinking water. Yet most of us take flow for granted, just as we take gravity and the presence of the sun and moon for granted.

“I would like to think that flow is such a fascinating topic that this book would be of interest to almost anyone. While I hope this is true, it is also true that the book is likely to be of most interest to those involved in some way with flowmeters and flow measurement, or who are working in industries in which flow measurement is important. This book could help round out knowledge for a flowmeter product manager who understands a particular flowmeter well, for instance, but doesn't really understand the other flowmeter technologies, or an end-user who is considering purchasing flowmeters. It would also be a resource for the new generation of flow professionals – a book that would get them up and running faster.

“Flow measurement is critical in so many aspects of life, from the kitchen to the oil rig.”

New-Technology Flowmeters by Jesse Yoder from CRC Press is now available on [Amazon](#).



***FlowTimes* is published by**

Flow Research, Inc.

27 Water Street, Wakefield, MA 01880, USA

Phone (+1) 781-245-3200

Fax (+1) 781-224-7552

info@flowresearch.com

www.flowresearch.com



Executive Editor: Jesse Yoder, PhD

Associate Editor: Belinda Burum

Assistant Editors: Leslie Buchanan, Victoria Tuck, and Kaleigh Flaherty