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The World Market for Coriolis Flowmeters, 4th Edition

Overview



Gustave Coriolis

Publication Date: January 2013

www.flowcoriolis.com



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The World Market for Coriolis Flowmeters, 4th Edition

Flow Research has completed a new market study on the worldwide Coriolis flowmeter market. The study was conducted by Flow Research. The primary goal was to determine the size of the Coriolis flowmeter market in 2011, and to forecast market size through 2016. The study is called *The World Market for Coriolis Flowmeters, 4th Edition*.

This study contains the following vital information:

- The 2011 market size in US dollars and unit volume for Coriolis flowmeters worldwide
- Market shares of the leading suppliers of Coriolis flowmeters worldwide
- A detailed forecast of the market for Coriolis flowmeters in dollars and unit volumes through 2016
- Segmented data both on a worldwide basis and for each of eight global regions
- A technology and product analysis for Coriolis flowmeters
- Market and product strategies for suppliers of Coriolis flowmeters worldwide
- Company profiles of the significant suppliers of Coriolis flowmeters worldwide



Rationale for Study

Flow Research published the third edition of our worldwide Coriolis flowmeter study in September 2008. We have been following the Coriolis flowmeter market regularly since then, and have been providing technical, corporate, and marketing updates in our quarterly publication *Market Barometer* (www.worldflow.com). Our end-user interviews indicate that the interest in Coriolis flowmeters remains at a very high level, and that end-user needs have become more complex and demanding. We have determined that some of the growth in this market is due to growth in the oil & gas and other energy markets, and have determined growth rates of other industries since the 2008/2009 recession. This was an optimal time to quantify this growth, and to take another in-depth look at a rapidly expanding market.

Background of Study

The French mathematician Gustave Coriolis formulated the principle that underlies Coriolis flowmeters. In 1835, Gustave Coriolis showed that an inertial force needs to be taken into account when the motion of bodies in a rotating frame of reference is described. The Earth is often used as an example of the Coriolis force. A hypothetical object thrown from the North Pole to the Equator appears to vary from its intended path, due to the Earth's rotation.

Operating Principle. Coriolis flowmeters contain one or more vibrating tubes. These tubes are usually bent, although straight-tube meters are also now available. The fluid to be measured passes through the vibrating tubes. It accelerates as it flows toward the maximum vibration point, and slows down as it leaves that point. This causes the tubes to twist. The amount of twisting is directly proportional to mass flow. Position sensors detect tube positions.



Coriolis flowmeters were introduced quite recently onto the market. In 1977, Micro Motion introduced a commercially viable Coriolis flowmeter for industrial applications. Since that time, a number of other suppliers have entered the market, including Endress+Hauser and KROHNE. Coriolis suppliers have introduced a wide variety of models and types of Coriolis flowmeters in the past 30 years. Endress+Hauser recently announced the world's first large four-tube Coriolis meter for oil, gas, and other fluids. Another important development has been the introduction of Coriolis flowmeters into multiphase flow measurement.

Coriolis suppliers differentiate themselves in a number of ways. One is by the proprietary design of the bent tubes in their Coriolis flowmeters. Another is by the different types of straight tube Coriolis flowmeters that they offer. Suppliers also compete by bringing out Coriolis flowmeters for particular industries and applications, such as water, food & beverage, and pharmaceutical. Accuracy and other performance specifications are other areas of supplier differentiation.

While Coriolis flowmeters are preferred by many end-users, price is often an issue. Coriolis flowmeters are the most expensive meters made. The average selling price of most Coriolis flowmeters remains between \$5,000 and \$8,000. Some suppliers have introduced low-cost Coriolis flowmeters in the \$3,000 range, or even less. Performance specifications for the lower-cost flowmeters are not at the same level as those of the higher-priced meters. However, these lower-cost meters help satisfy the most essential needs of users who want the benefits of Coriolis technology, but want to avoid the higher price.

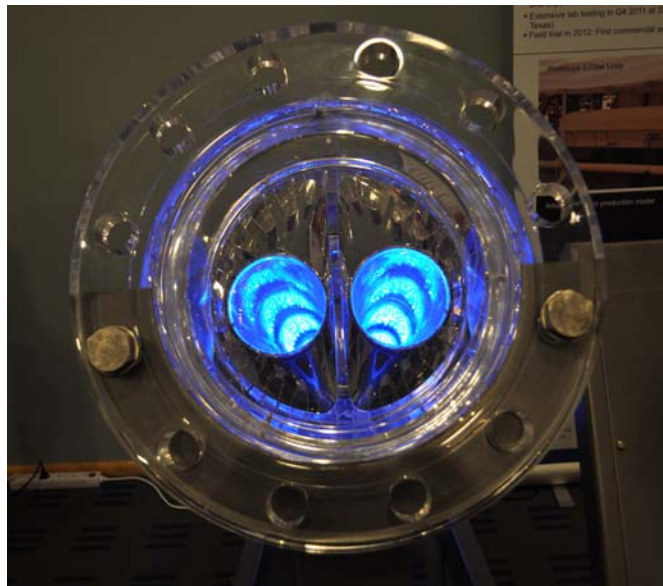


Photo by Flow Research

One important development that is closely examined in this study is the growth in large line size flowmeters. Rheonik (now part of GE Measurement) used to be the

only supplier that offered a Coriolis flowmeter in line sizes above six inches. In the past several years, three more manufacturers have jumped into the large line size Coriolis flowmeter market. Available line sizes range from 8 – 14 inches. Many of these meters are designed for custody transfer applications in the fast-growing oil and gas markets. With the price of crude oil currently above \$90 per barrel, companies are buying these large line size meters where high accuracy and reliability are required to measure high-value fluids. Large line size Coriolis meters are extending the availability of Coriolis meters to new applications not previously addressed by these meters.

Key Issues Addressed

This study addresses the key issues in the Coriolis flowmeter market, including:

- Growth in the use of smart Coriolis flowmeters
- The relative merits of straight tube vs bent tube meters
- The growing use of Coriolis flowmeters to measure gas flow
- The emerging market for Coriolis in steam flow measurement
- Growth in the market for large line size Coriolis meters
- Low cost Coriolis meters
- The use of Coriolis flowmeters for multiphase flow measurement

Segmentation

The segmentation for this study is as follows:

Geographic Segmentation:

- North America (United States and Canada)
- Western Europe
- Eastern Europe/FSU
- Mideast/Africa
- Japan
- China
- Rest of Asia
- Latin America (Mexico, Central, and South America)

Coriolis Flowmeters by Flowtube Type

This study distinguishes between flowtube types as follows:

- Single bent tube
- Dual bent tube
- Single straight tube
- Dual straight tube

What's in this for my company?

- See the emerging applications and where the growth is.
- Understand world and regional markets.
- Get to know your real competition.
- Learn what other suppliers manufacture, where, and for whom.
- The best information creates the best decisions.

Coriolis Flowmeters by Mounting Type

Coriolis flowmeters are segmented in this study according to mounting type:

- Integral
- Remote

Coriolis Flowmeters by Fluid Type

Coriolis flowmeters are segmented in this study according to fluid type:

- Petroleum Liquids
- Non-petroleum Liquids
- Gas
- Steam

Coriolis Flowmeters by Line Size

Coriolis flowmeters are segmented in this study according to line size:

- <1/2 inch
- 1/2 inch – 1 inch
- >1 inch – 2 inches
- >2 – 4 inches
- >4 – 6 inches
- >6 – 10 inches
- >10 – 16 inches

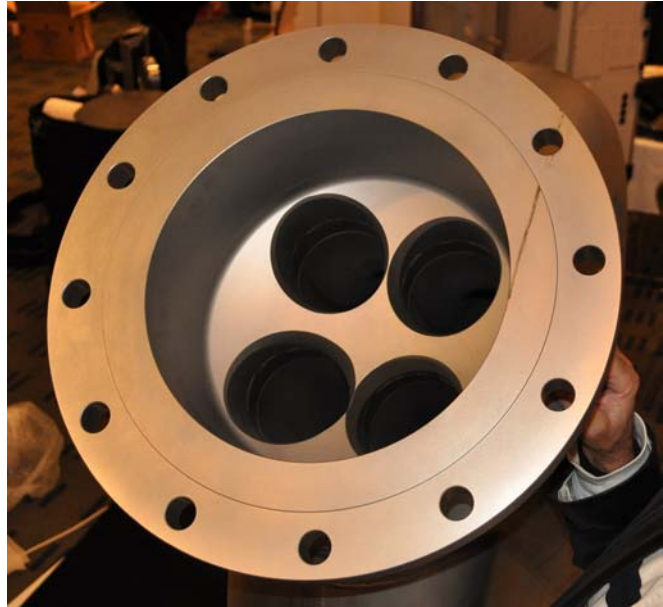


Photo by Flow Research

Coriolis Flowmeters by Intelligence Level

There are two kinds of Coriolis flowmeters:

- Smart (digital output, remotely configurable)
- Conventional (analog only)

Smart Coriolis Flowmeters by Communication Protocol

Smart Coriolis flowmeters are segmented by the following protocols:

- HART
- Foundation Fieldbus™
- Profibus®
- Proprietary digital
- Modbus®
- Other

Coriolis Flowmeters by Temperature Range

Coriolis flowmeters are segmented by the following temperature ranges:

- High temperature: $>200^{\circ}\text{C}$
- Low temperature: $<-50^{\circ}\text{C}$ (Cryogenic)
- Other: -50°C to 200°C

Coriolis Flowmeters by Tube Material Type

Coriolis flowmeters are segmented by the following tube material types:

- Stainless steel
- Hastelloy C[®]
- Titanium
- Zirconium
- Tantalum

Coriolis Flowmeters for Gas Application

Coriolis flowmeters for gas are segmented in this study by the following applications:

- Custody transfer of natural gas
- Allocation metering
- Process measurement
- Industrial gases
- Compressed natural gas (CNG)
- Batch/Filling
- Utility metering
- Other



Photo by Flow Research

Coriolis Flowmeters for Petroleum Liquid Application

Coriolis flowmeters for petroleum liquids are segmented in this study by the following applications:

- Custody transfer – Upstream/Midstream
- Custody transfer – Downstream
- Allocation metering
- Liquefied natural gas (LNG)
- Non-custody transfer
- Process measurement
- Other

Coriolis Flowmeters for Non-petroleum Liquid Application

Coriolis flowmeters for non-petroleum liquids are segmented in this study by the following applications:

- Custody transfer of non-petroleum liquids
- Non-custody transfer of non-petroleum liquids
- Process measurement
- Batch/Filling
- Other

Coriolis Flowmeters by Industry

Coriolis flowmeters are used mainly in the process industries. We segmented sales revenues by the following industries on both a worldwide and regional basis:

- Upstream Oil & Gas
- Refining
- Downstream Oil & Gas
- Chemical
- Food & Beverage
- Pharmaceutical
- Pulp & Paper
- Metals & Mining
- Power
- Water & Wastewater
- Other (including Cement, Ceramic, Rubber, Paint and other process industries)



Coriolis Flowmeters by Distribution Channel

The Coriolis flowmeter market is segmented according to the following sales channels:

- Direct sales
- Independent representatives
- Distributors
- E-Business

Coriolis flowmeters by Customer Type

The Coriolis flowmeter market is segmented according to the following customer types:

- End-Users
- Original Equipment manufacturers (OEMs)
- Systems Integrators
- Engineering Companies



Market Shares of Coriolis Flowmeter Manufacturers

- Worldwide
- For each geographic region
- Single Bent Tube Meters
- Dual Bent Tube Meters
- Single Straight Tube Meters
- Dual Straight Tube Meters

Strategies for Success

- Strategies for selling into the competitive Coriolis flowmeter market
- Emphasize the reliability of Coriolis meters
- Coriolis is at the top in accuracy
- Remember to emphasize the basics

Company Profiles

- Business profiles of the main suppliers of Coriolis flowmeters
- Histories, current organization, overall product line summaries
- Coriolis flowmeter product line descriptions
- Company strategies

The following is a partial list of the Coriolis suppliers profiled in these studies:

- | | |
|--|--|
| • ABB | • KOBOLD Instruments, Inc. –
Heinrichs Messtechnik GmbH |
| • Brooks Instrument | • KROHNE, Inc. |
| • Emerson Process Management –
Micro Motion | • OVAL Corporation |
| • Endress+Hauser | • Siemens AG |
| • General Electric | • TASI Group – KEM Küppers
Elektromechanik GmbH |
| • Invensys/Foxboro | • Yokogawa |
| • Itron | |

Publication Date

This study was published in January 2013.

Flow Research, Inc.

Volume X: The World Market for Flowmeters, 4th Edition is a publication of Flow Research, Inc. of Wakefield, Massachusetts. Flow Research is the only market research company whose primary mission is to research flowmeter and instrumentation markets.

The lead analyst for this study, **Dr. Jesse Yoder** of Flow Research, has 26 years of experience



writing about and analyzing process control and instrumentation markets, beginning as president and founder of Idea Network. He has written over 150 market research studies and published numerous articles on instrumentation in industry journals. To read some of the more than 200 published articles on instrumentation written by Dr. Yoder, visit the Flow Research article website at www.flowarticles.com.

Some of the recent and currently scheduled Flow Research studies are listed on the next page.

Flow Research specializes in instrumentation, and conducts **market research studies** in a wide variety of instrumentation areas that can be purchased by anyone interested in the topics. We create these studies through interviews with suppliers, distributors, and end-users. Topics include all of the flowmeter technologies - both new and traditional - as well as temperature sensors, temperature transmitters, level products, pressure transmitters, liquid analytical instruments, and selected API-certified valves.

Belinda Burum, Vice President and Editor, worked in journalism and advertising before entering high tech 18 years ago as a writer, marketing communications manager, and customer references consultant. She joined Flow Research in 2002, and has since then worked on many projects. In addition to her work on market studies, Belinda is editor of the *Energy Monitor* and the *Market Barometer*.

Norm Weeks, Senior Market Analyst, joined Flow Research in November 2004 after a 24-year stint with Verizon. At Verizon, Norm specialized in creating innovative customer solutions, product introduction and lifecycle management, and product marketing. He is now a fulltime market analyst for Flow Research, has completed many studies, and is an associate editor of our quarterly publications, *Market Barometer* and *Energy Monitor*.

Leslie Buchanan, Research Associate, joined Flow Research in March 2010. She serves as a customer liaison, manages the contacts database, does research and writing for some Flow Research studies and publications, and develops and implements standards for publication formats.

Vicki Tuck joined Flow Research in June, 2012. As an administrative assistant, she has experience in both the fast-paced law firms of Boston, and in various nonprofit organizations.

Christina Glaser, Research Analyst and Programmer, has worked as a software consultant, programmer, and web developer since 1992. She joined Flow Research in October 2010 and took an active role in refreshing our company website.

Flow Research studies contribute to an ongoing view of the flowmeter market

Listed below is a summary of Flow Research studies in process and studies completed during the last few years in the area of process control instrumentation. Conducting these studies has contributed to our understanding of the flowmeter technologies included in *Volume X: The World Market for Flowmeters, 4th Edition*. These studies are further described at www.flowstudies.com.



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Flow Research

- Volume I: The World Market for Coriolis Flowmeters, 4th Edition* (January 2013)
- Volume II: The World Market for Magnetic Flowmeters, 5th Edition* (Q2 2013)
- Volume III: The World Market for Ultrasonic Flowmeters, 4th Ed.* (3 vol.) (Q3 2012–Q4 2013)
- Volume IV: The World Market for Vortex Flowmeters, 4th Edition* (July 2010)
- Volume V: The World Market for DP Flowmeters and Primary Elements* (January 2007)
- Volume VI: Worldwide Survey of Flowmeter Users, 2nd Edition* (January 2006)
- Volume VII: The World Market for Positive Displacement Flowmeters, 2nd Edit.* (March 2012)
- Volume VIII: The World Market for Turbine Flowmeters, 2nd Edition* (January 2012)
- Volume IX: The World Market for Pressure Transmitters, 2nd Edition* (August 2011)
- Volume X: The World Market for Flowmeters, 4th Edit.* (includes all flow tech.) (January 2013)
- Volume XI: The World Market for Gas Flow Measurement, 2nd Edit.* (6 volumes, Q3–Q4 2011)
- Volume XII: The World Market for Steam Flow Measurement* (March 2008)
- Volume XIII: The World Market for Mass Flow Controllers, 2nd Edition* (May 2012)
- Volume IV: The World Market for Thermal Flowmeters* (October 2009)
- Volume XV: The World Market for Liquid Analytical Instruments* (February 2011)
- Volume XVI: The World Market for Oil Flow Measurement* (six volumes) (Q4 2012–Q1 2013)

The above studies are further described at www.flowstudies.com.

Besides writing and publishing studies of this type, Flow Research specializes in user surveys that include a detailed analysis of customer perceptions. In addition, Flow Research provides quarterly updates on the flow and energy industries in the **Market Barometer** and the **Energy Monitor**. Both reports are part of the Worldflow Monitoring Service; more details are available at www.worldflow.com.



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The Flow Research *Founding Sponsor Program*

To produce studies that most closely match our clients' needs, Flow Research instituted the Founding Sponsor Program. This program enables companies who wish to participate at a high level in a study's research to influence its scope and segmentation. In addition, Founding Sponsors receive regular updates from Flow Research on study progress, and receive a significant discount on the standard retail price of the study.

Procedure: Early in the planning phase of a study, Founding Sponsors receive a proposal that includes the proposed segmentation. Founding Sponsors can propose additional segmentation, and can also suggest changes to the proposed segmentation. While the decision to adopt particular segmentation ultimately lies with Flow Research, and is based on input from all contributors, we will do our best to accommodate the specific needs of each of our clients.

During the research phase of a study, Flow Research will issue regular reports that provide updates on the progress of the research. These reports will be sent to Founding Sponsors, who are then invited to provide any additional input or comments into the study.

Being a Founding Sponsor requires making an early commitment to purchase the study. However, in return, Founding Sponsors receive a significant discount off the regular price of the study. Payment can be made either in one amount at the beginning of the study, or split into two, with the second payment due upon delivery of the study.

For additional details, or to find out how the Founding Sponsor program applies to any particular study, please contact Flow Research. We look forward to working with you!

If you have any questions about the Founding Sponsor program, please contact Norm Weeks at +1 781 245-3200, or norm@flowresearch.com.

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Why Flow Research?

- We specialize in flowmeter markets and technologies.
- We have researched all flowmeter types.
- We study suppliers, distributors, *and* end-users.
- Our worldwide network of contacts provides a unique perspective.
- Our mission is to supply the data to help your business succeed.