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Worldwide Flowmeter Calibration Facilities and Markets

Gas
Flowmeter
Calibration
CORE STUDY

MODULE A
Liquid
Flowmeter
Calibration

Two new studies designed for flow calibration facilities,
flowmeter manufacturers, and end-users

Overview



Date Published: January 2016

www.FlowCalibration.org



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Worldwide Flowmeter Calibration Facilities and Markets

Flow Research has now produced a completely new set of studies on worldwide flowmeter calibration facilities. The primary goal was to determine and to describe in detail the capabilities that these facilities offer, and how and why these facilities are of importance to flowmeter instrumentation users.

The set of studies is called, **Worldwide Flowmeter Calibration Facilities and Markets**.

The research achieved multiple purposes:

- To identify independent and manufacturer flow calibration facilities worldwide and by region
- To accurately describe the capabilities of these facilities
- To identify market growth factors for calibration facilities, especially as these factors apply to gas and oil custody transfer applications
- To describe effective procedures for the recalibration of flowmeters by type
- To provide in-depth profiles of major calibration companies worldwide



Rationale for Studies

Flow Research received multiple requests for this research from the flowmeter manufacturer, calibration facility, and end-user communities. All of these interested parties asked for a comprehensive review of the subject for one primary reason: The subject directly affects the certainty that flowmeter users have in the performance of the product in the field.

We believe Flow Research has the ideal qualifications for doing this study. Our many studies have reported on worldwide and regional flowmeter technologies and markets for nearly twenty years. We provide the industry periodic updates in our *Market Barometer* and *Energy Monitor* publications (see: www.worldflow.com). And, our user interviews consistently confirm that

interest in the effective utilization of flowmeters in process control is high, and that having trust in a flowmeter's accuracy is essential.

Why These Studies Are Needed

The accurate measurement of liquid, gas, and steam in the process industries has become more exacting over time. There are several fundamental reasons for this: Users are faced with higher product quality standards, industrial process applications have become more complex, there is an increasing interdependence between measurement types within the more sophisticated process information networks, and the measured fluids themselves are more precious and should not be wasted.

Other factors that play a larger role today must also be considered. These include the current and evolving needs of personnel safety, environmental concerns, and the expansion of process controls to remote and often unattended locations. Clearly, the need for repeatable performance of flow measurement devices to high standards has never been greater.

Of course, flowmeters are calibrated to a factory accuracy standard before they are shipped for their intended purpose in the field. But it is precisely at this point in time that calibration questions first arise for operators: Was the installation actually completed per manufacturer instructions in every detail? Will the new flowmeter perform to factory specification or will the process affect its accuracy? Will sensors become coated by the process fluid? Will the lining be subject to wear and affect performance? Does our flowmeter have us in full compliance with our custody transfer contract, and how will we know when we are not?



Dr. Yoder during an inspection of a calibration laboratory.

All of these questions – and many others – lead the operator to the issues of flowmeter calibration and recalibration. Fluid flow quantification, whether it is done volumetrically or as a mass flow measurement, is one of the three primary industrial process control methodologies. And while temperature and pressure measurement certainly share the stage with flow measurement, the focus of this study is on flow.

We believe that the heightened interest in flow calibration – combined with the need for comprehensive guidance on the matter – made this an ideal time to conduct this study.

The next few pages provide an outline of the essential issues addressed by this study, and how the results of this study may benefit you and your company.



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Core Study: **Worldwide Gas Flow Calibration Facilities and Markets**

The data in the *Core Study* is primarily focused on independent gas flowmeter calibration facilities worldwide. Comprehensive numerical data describes this market in detail by identifying the sources of calibration demand from seven individual regions, and by the flowmeter technology type for each of these regions.

Gas flowmeter calibration methods are described. Profiles and specific capabilities for major calibration facilities worldwide are provided. Worldwide market shares for the largest gas flowmeter calibration facilities are included.

Study Segmentation- Independent Gas Calibration Facilities

The study segments the market by determining the region where the flowmeter being calibrated originated:

- North America (United States and Canada)
- Europe (including Central Europe, Russia, and FSU)
- Mideast/Africa
- Japan
- China
- Asia/Pacific (including India)
- Latin America (Central America and South America)



The study groups calibration facility data by the following geographic regions:

- Worldwide
- Americas (including North, Central, and South)
- Europe (including Western, Eastern, Russia, and FSU) and Mideast/Africa
- Asia (including China, Japan, India, and Asia/Pacific)

The study covers the calibration of the following gas flowmeter technologies:

- Coriolis
- Ultrasonic
- Vortex
- Thermal
- Differential Pressure
- Positive Displacement
- Turbine
- Variable Area
- Other (e.g., optical, sonar, multiphase)

**Flowmeter Calibration
is defined as:**

To check, adjust, or standardize a measuring instrument by comparing its performance with an accepted standard or a reference device.

Information is provided on gas calibration facilities by the following categories:

Business Type:

- Independent
- Manufacturer-based

Gas Fluid Type:

- Gas (including natural gas and industrial gases)
- Air
- Steam

Calibration Delivery Method:

- Fixed laboratory facility
- Portable/mobile on-site calibration

Uncertainty Levels:

- Fixed calibration laboratory
- Portable/mobile Calibration Service Unit



The study further identifies individual gas flowmeter calibration facilities by:

Gas Flowmeter Types Calibrated:

- | | | |
|--------------|-------------------------|--|
| • Coriolis | • Thermal | • Turbine |
| • Ultrasonic | • Differential Pressure | • Variable Area |
| • Vortex | • Positive Displacement | • Other (e.g., optical, sonar, multiphase) |

Methods of calibration:

- | | | |
|---------------------------|---------------|----------|
| • Master/Reference Meters | • Gas Provers | • Others |
|---------------------------|---------------|----------|

Line size capacity:

- The minimum through maximum line sizes that the facility can accommodate by gas flowmeter type

Pressure capacity:

- The upper and lower line pressure limits the facility can accommodate by gas flowmeter type

Temperature capacity:

- The minimum through maximum test temperatures that the facility can accommodate by gas flowmeter type

Gas types measured by the flowmeters being calibrated, and the gas types used to calibrate these gas flowmeters:

- Natural Gas
- Argon
- Nitrogen
- Air
- Helium
- Oxygen
- Carbon Monoxide/Carbon Dioxide
- Hydrogen
- Gas Mixtures/Specialty Gases

Does the flowmeter calibration facility have ISO/IEC 17025 certification?**The primary standard to which the calibration equipment is traceable**

- NIST
- VSL
- Other

The average turnaround time or range to complete a gas flowmeter calibration**Company Profiles**

Comprehensive profiles on the leading independent calibration companies worldwide are included. The study provides detailed information on their capabilities. The following is a partial list of the companies profiled in this study:

- Badger Meter
- CEESI (Colorado Engineering Experiment Station, Inc.)
- FORCE Technology
- Industrial Technology Research Institute
- KRISS (Korea Research Institute of Standards and Science)
- NEL (National Engineering Laboratory) - TÜV SÜD AG
- NMi Euroloop
- NIST (National Institute of Standards and Technology)
- Pigsar (Open Grid Europe)
- Southwest Research Institute
- Tektronix
- TransCanada Calibrations
- TrigasFI GmbH
- VSL Dutch Metrology Institute



Gas flow lines aligned for calibration testing

Study Segmentation – Flowmeter Manufacturers

Most flowmeter manufacturers maintain their own calibration facilities to calibrate the flowmeters they manufacture and deliver to customers. Some also recalibrate their own flowmeters and those of other companies. This study describes the calibration capabilities of selected flowmeter manufacturers of both gas and liquid flowmeters.

Capabilities of Flowmeter Manufacturers

The study provides detailed information on the calibration capabilities of some of the leading flowmeter manufacturers. The following is a partial list of the companies included in this study:

- Emerson Process Management
- Fuji Electric Co., Ltd
- Isoil Industria SpA
- Nitto Seiko Co., Ltd.
- Sierra Instruments
- Fluid Components International
- Intek, Inc.
- Max Machinery, Inc.
- Sage Machinery, Inc.
- Van Putten Instruments B. V.

This study covers the calibration of the following flowmeter technologies:

- Coriolis
- Magnetic
- Ultrasonic
- Vortex
- Thermal
- Differential Pressure
- Positive Displacement
- Turbine
- Open Channel
- Variable Area
- Other (e.g., optical, sonar, multiphase)



Information is provided on flowmeter manufacturer calibration facilities by the following categories:

Provides initial calibration for the flowmeters it manufactures

- Yes
- No

Provides recalibration services for the flowmeters it manufactures

- Yes
- No

Locations of this company's permanent flowmeter calibration facilities

Calibration delivery method:

- Fixed laboratory facility
- Portable/mobile on-site calibration

Types of fluids measured by the flowmeters calibrated or recalibrated:

- Liquid
- Gas
- Steam

Methods of liquid flowmeter calibration:

- Master/Reference Meters
- Piston Provers
- Bell Provers
- Gravimetric
- Other

Methods of gas flowmeter calibration:

- Master/Reference Meters
- Gas Provers
- Others

Types of calibration services offered:

- Initial calibration
- Recalibration

Calibration services offered for other manufacturers:

- Yes
- No

ISO/IEC 17025 certification acquired:

- Yes
- No
- In the process of acquiring

Line sizes recalibrated by flowmeter type:

- >0 to 4 inches
- >4 – 12 inches
- >12 inches

Calibration equipment is traceable to the following primary standards:

- NIST
- VSL
- Other

The average turnaround time or range to complete a gas flowmeter calibration

Chapter Structure of this Study

Chapter 1 Executive Summary of Gas and Steam Flowmeter Calibration

This chapter provides a high-level summary of the study's findings and conclusions.

Chapter 2 Scope and Method

Descriptions and discussions of the study's overall objectives, methodology, subject coverage, and segmentations are provided. A review of Flow Research's background and capabilities is included.

Chapter 3 Flowmeter Calibration Methods and Definitions

A review of the several gas calibration methods is provided. End-user choices are described.

Chapter 4 Worldwide Overview

The calibration industry is detailed in terms of major players, end-user commentary, and the flow calibration working group. Growth factors for calibration facilities are provided, including descriptions of high-growth applications.

Chapter 5 Market Growth and Forecast

This chapter provides a comprehensive data analysis - together with forecasts and growth factors - for the worldwide independent laboratory gas flow calibration market. Data by flowmeter type for seven regions is included. Totals for revenues and units calibrated are provided on both a worldwide and demand-originating regional basis.

Chapter 6 Gas Calibration Facilities in the Americas

Chapter 6 contains a comprehensive analysis for each of the major independent calibration facilities in the Americas, including detailed summaries of their gas calibration capabilities. Reviews of many other smaller and/or regional calibration laboratories are also included.

Chapter 7 Gas Calibration Laboratories in Europe

Chapter 7 contains a comprehensive analysis for each of the major independent calibration facilities in Europe, including detailed summaries of their gas calibration capabilities. Reviews of many other smaller and/or regional calibration laboratories are also included.

Chapter 8 Gas Flowmeter Calibration Facilities in Asia

Chapter 8 contains a comprehensive analysis for each of the major independent calibration facilities in Asia, including detailed summaries of their gas calibration capabilities. Reviews of many other smaller and/or regional calibration laboratories are also included.

Chapter 9 Flowmeter Manufacturers with Calibration Services

The calibration capabilities of selected major flowmeter manufacturers are described in detail.

Chapter 10 Market Shares

The worldwide revenue market shares for the leading independent gas flowmeter calibration facilities are provided.

Publication Date

This study was published in January 2016.



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Module A: **Worldwide Liquid Flow Calibration Facilities and Markets**

The data in Module A is primarily focused on independent liquid flowmeter calibration facilities worldwide. Comprehensive numerical data describes this market in detail by identifying the sources of calibration demand from seven individual regions, and by the flowmeter technology type for each of these regions.

This Module describe liquid flowmeter calibration methods. It provides profiles and specific capabilities for major calibration facilities worldwide. A separate chapter gives worldwide market shares for the largest liquid flowmeter calibration facilities.

The study segments the market by determining the region where the flowmeter being calibrated originated:

- North America (United States and Canada)
- Europe (including Central Europe, Russia, and FSU)
- Mideast/Africa
- Japan
- China
- Asia/Pacific (including India)
- Latin America (Central America and South America)



The study groups calibration facility data by the following geographic regions:

- Worldwide
- Americas (including North, Central, and South)
- Europe (including Western, Eastern, Russia, and FSU) and Mideast/Africa
- Asia (including China, Japan, India, and Asia/Pacific)

This study covers the calibration of the following liquid flowmeter technologies:

- Coriolis
- Magnetic
- Ultrasonic
- Vortex
- Thermal
- Differential Pressure
- Positive Displacement
- Turbine
- Open Channel
- Variable Area
- Other (e.g., optical, sonar, multiphase)

**Flowmeter Calibration
is defined as:**

To check, adjust, or standardize a measuring instrument by comparing its performance with an accepted standard or a reference device.

Information is provided on liquid calibration facilities by the following categories:

Business Type:

- Independent
- Manufacturer-based

Liquid Fluid Type:

- Petroleum Liquids
- Non-petroleum Liquids

Calibration Delivery Method:

- Fixed Laboratory Facility
- Portable/mobile on-site calibration

Uncertainty Levels:

- Fixed laboratory facility
- Portable/mobile calibration service unit



A portable calibration rig in use at an airport

The study further identifies individual liquid flowmeter calibration facilities by:

Liquid Flowmeter Types Calibrated:

- | | | |
|-------------------------|--|-------------------------|
| • Coriolis | • Magnetic | • Ultrasonic |
| • Vortex | • Thermal | • Differential Pressure |
| • Positive Displacement | • Turbine | • Open Channel |
| • Variable Area | • Other (e.g., optical, sonar, multiphase) | |

Methods of calibration:

- Master/Reference Meters
- Gravimetric
- Piston Provers
- Other
- Bell Provers

Line size capacity:

- The minimum through maximum line sizes that the facility can accommodate by liquid flowmeter type

Pressure capacity:

- The upper and lower line pressure limits that the facility can accommodate by liquid flowmeter type

Temperature capacity:

- The minimum through maximum test temperatures that the facility can accommodate by liquid flowmeter type

Liquid Types capacity:

- Petroleum
- Non-petroleum

Types of Liquid Measured by the Flowmeters Calibrated at this Facility:

- Water
- Crude oil
- Hydrocarbon based fuels
- Other

Types of Fluid Used in the Calibration of Flowmeters at this Facility:

- Air
- Water
- Hydrocarbon liquids
- Other

Does the flowmeter calibration facility have ISO/IEC 17025 certification?**The primary standard to which the calibration equipment is traceable:**

- NIST
- VSL
- Other

The average turnaround time or range to complete a liquid flowmeter calibration

Company Profiles

Comprehensive profiles on the leading liquid calibration companies worldwide are included. This study provides detailed information on their capabilities. The following is a partial list of the companies profiled in this study:

- Alden Research Laboratory
- Badger Meter
- C&W Meter Services
- CEESI (Colorado Engineering Experiment Station, Inc.)
- FORCE Technology
- Industrial Technology Research Institute
- KRISS
- National Engineering Laboratory (NEL) - TÜV SÜD
- NIST – National Institute of Standards and Technology
- NMi Euroloop
- ODS BV Calibration Services
- Southwest Research Institute
- Tektronix
- TrigasFI GmbH
- VSL Dutch Metrology Institute



In addition to the in-depth profiles above, these two studies review the gas and liquid calibration capabilities of the following important companies worldwide:

- | | |
|---|---|
| • Almeer Technical Services – Calibration | • Antech Calibration Services |
| • Calder Engineering Ltd. | • Cesame Exadebit SA |
| • Dick Munns Company | • e2b Calibration |
| • FLOW-TRONIC S.A./N.V. | • FlowQuip Limited |
| • G-M Services | • Gas Flow Online |
| • Graftel, LLC. | • Hydrotechnik UK Limited |
| • Indiana Standards Laboratory | • Liquid Measurement & Control, Inc. |
| • Measurement Control Systems | • Meter Maintenance & Controls, Inc. |
| • Mid America Meter | • MW Measurement Worldwide |
| • National Metrology Centre | • Phoenix Flow Measurement |
| • Polycontrols, Inc. | • Rapid Pump & Meter Service Co., Inc. |
| • RS Calibration Services, Inc. | • RSHydro |
| • RTS Services Inc. | • Stream Measurement Limited |
| • Trillium Measurement And Control | • Universal Laboratories Bahrain W.L.L. |
| • Vietnam Metrology Institute | • Voyage Marine Automation L.L.C. |
| • Young Calibration Limited | |

This study on liquid flowmeter calibration contains the following chapter structure:

Chapter 1 Executive Summary of Liquid Flowmeter Calibration

This chapter provides a high-level summary of the study's findings and conclusions.

Chapter 2 Scope and Method

Descriptions and discussions of the study's overall objectives, methodology, subject coverage, and segmentations are provided. A review of Flow Research's background and capabilities is included.

Chapter 3 Flowmeter Calibration Methods and Definitions

A review of the several liquid calibration methods is provided. End-user options are discussed.

Chapter 4 Worldwide Overview

The calibration industry is detailed in terms of major players, end-user commentary, and the flow calibration working group. Growth factors for calibration facilities are provided, including descriptions of high-growth applications.

Chapter 5 Market Growth and Forecast

This chapter provides a comprehensive data analysis - together with forecasts and growth factors - for the worldwide independent laboratory liquid flow calibration market. Data by flowmeter type for seven regions is included. Totals for revenues and units calibrated are provided on both a worldwide and demand-originating regional basis.

Chapter 6 Liquid Calibration Facilities in the Americas

Chapter 6 contains a comprehensive analysis for each of the major independent calibration facilities in the Americas, including detailed summaries of their liquid calibration capabilities. Reviews of many other smaller and/or regional calibration laboratories are also included.

Chapter 7 Liquid Calibration Laboratories in Europe

Chapter 7 contains a comprehensive analysis for each of the major independent calibration facilities in Europe, including detailed summaries of their liquid calibration capabilities. Reviews of many other smaller and/or regional calibration laboratories are also included.

Chapter 8 Gas Flowmeter Calibration Facilities in Asia

Chapter 8 contains a comprehensive analysis for each of the major independent calibration facilities in Asia, including detailed summaries of their liquid calibration capabilities. Reviews of many other smaller and/or regional calibration laboratories are also included.

Chapter 9 Flowmeter Manufacturers with Calibration Services

The calibration capabilities of selected major flowmeter manufacturers are described in detail.

Chapter 10 Market Shares

The worldwide revenue market shares for the leading independent liquid flowmeter calibration facilities are provided.

Publication Date

This study was published in January 2016.

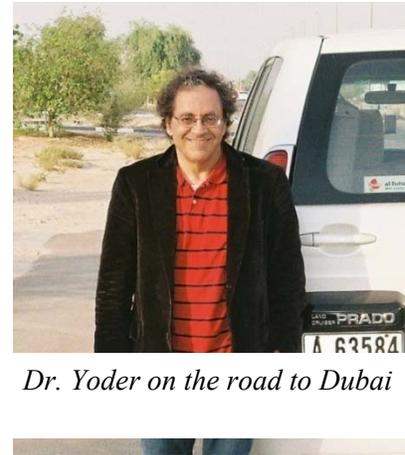
To the Mideast and back – three times – to gather detailed data on the needs and purchasing decisions of major producers

The background of this study goes back to 2009, when Flow Research made three trips to major oil and gas producers in the Mideast. During these visits, we did 15 interviews at companies in Saudi Arabia, the United Arab Emirates (UAE), Qatar, and Oman.

Many of the companies we visited have thousands of flowmeters installed, and regularly purchase many new and replacement meters. These are the large companies that supply energy to vast areas in the Mideast and to millions of people. They rely on different types of flowmeters for wellhead measurement, for custody transfer, for allocation metering, for flaring, for refining, and for many other purposes.

On each visit, we used a lengthy questionnaire, and in some cases met with as many as ten people from a single company. Our questionnaire was designed to find out:

- What types of flowmeters these companies were using and how many of each type (installed base)
- What types of flowmeters they were purchasing, and what types they would be purchasing in the future.
- Which flowmeter types were displacing other types
- What types of flowmeters are used for custody transfer
- Which flowmeter types are used for gas applications
- We also asked specifically about ongoing and future projects that would require the use of flowmeters, and what types.



Dr. Yoder on the road to Dubai



Oman Gas Company, Muscat, Oman (Photo by Flow Research)

In 2015, Visits to the Major Flow Labs in Europe Further Defined this Study

As part of our research for this study, Flow Research spent ten days in Europe visiting flowmeter calibration facilities there. Included in these were NMI Euroloop, located in Rotterdam, and the Van Swinden Laboratory (VSL), which is in Dordrecht and Delft, The Netherlands. The purpose of these day-long visits was to gain a better appreciation of flow calibration procedures in

Europe, and to better understand the differences between calibrating gas flowmeters and calibrating flowmeters for liquid applications.

NMi Euroloop was founded in 2010 through the support and cooperation of leading flowmeter manufacturers such as KROHNE, Elster, SICK, Honeywell, Emerson Daniel, Endress+Hauser, and others. These companies saw the need for a high pressure high flow gas calibration facility in Europe, and they worked together to bring it about. NMi Euroloop relies on three high pressure piston compressors to generate the high pressure gas. Seven turbine meters, which are



monitored by seven ultrasonic meters, are used as master meters. The mass conservation method is used as the gas calibration principle. NMi Euroloop calibrates gas flowmeters from all over the world. It also performs calibrations on flowmeters for liquid applications.

VSL is the National Metrology Institute (NMI) of The Netherlands. VSL makes measurement results of companies, laboratories and

institutions directly traceable to international standards. As part of its ongoing effort, VSL maintains facilities to perform both gas and liquid flowmeter calibrations. In addition, VSL participates in various International Standards Organization (ISO) standardization committees, along with numerous technical committees related to metrology.



It was after visiting NMi Euroloop and VSL that we decided to publish two separate studies: one on gas calibration and one on liquid calibration of flowmeters. The pressures necessary to calibrate many gas flowmeters are much higher than those required for liquid flowmeters. The calibration conditions for gas flowmeters are more hazardous and require more safety considerations than calibration conditions of

flowmeters for liquid applications. Some labs, such as Alden Laboratories, conduct liquid calibrations exclusively. And even labs such as NMi Euroloop and VSL that do both gas and liquid calibrations maintain separate facilities for them.

Flow Research has also visited Colorado Engineering and Experiment Station, Inc. (CEESI) multiple times, going back as far as 2003. CEESI maintains a high pressure natural gas calibration facility in Garner, Iowa. This facility taps into a natural gas pipeline operated by TransCanada Pipeline. CEESI uses this high pressure gas to calibrate turbine and ultrasonic flowmeters from 4 – 36 inches, and then returns the gas to the pipeline. This has the advantage that the high speed and high flowrates of natural gas do not have to be created with compressors because they are already there. CEESI maintains separate facilities in Nunn, Colorado for calibrating meters using liquids and air, including industrial gases. CEESI's calibrations are traceable to the National Institute of Standards and Technology (NIST) in Boulder, Colorado.

Flowmeter Recalibration a Major Issue During These Visits

One of the main topics discussed on the visits to the Middle East was the topic of recalibration of flowmeters. End-users at the large oil and gas facilities interviewed expressed confusion about the lack of guidelines for flowmeter recalibration. At that time, there was no calibration facility in the Middle East. Furthermore, there were no broadly accepted industry guidelines for when a flowmeter should be recalibrated.

Some of the companies we interviewed asked for help from Flow Research in clarifying the issues surrounding recalibration frequency. In response, we formed a Flow Recalibration Working Group (FRWG) of industry experts to address the issue of ultrasonic flowmeter recalibration. The purpose of this Working Group is to formulate procedures that will enable companies to reliably determine whether and when their ultrasonic flowmeters need to be recalibrated. The FRWG may also choose to address the same topic for other flowmeter types in the future. (For more information, go to www.flowresearch.com)



The closed high pressure test loop at FortisBC in Penticton BC, Canada

This new set of studies, *Worldwide Flowmeter Calibration Facilities and Markets*, is in part an attempt to lay the groundwork for an answer to the question of how to tell when a flowmeter needs recalibration. In addition, we catalog the capabilities of the main flowmeter calibration facilities worldwide. This includes independent, manufacturer-owned, and service bureau/mobile labs. We asked these labs about their experience and recommendations for flowmeter recalibration. We focus upon the organizations and standards that are used in flowmeter calibration, especially for custody transfer. This study will be helpful to flowmeter calibration facilities of all kinds, as well as to end-users who need to know when and where to have their flowmeters recalibrated.

Research Team Background

Dr. Jesse Yoder is President of Flow Research Inc., a company he founded in 1998. Dr. Yoder has 27 years of experience as a writer and an analyst in process control and instrumentation. Since 1990, he has written more than 180 market research studies, most of them regarding flow and instrumentation. Dr. Yoder has also written more than 240 articles on flow and instrumentation for trade journals. Links to many of these can be found at www.flowarticles.com.

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 worked on many projects including market studies, the Worldflow Energy Monitor and the Market Barometer.

Norm Weeks, Senior Market Analyst, joined Flow Research in November 2004 after a 24-year stint with Verizon. Norm also served as Director of the Urban Fellows Institute in New York. At Verizon, Norm specialized in creating innovative solutions for national and international clients, introducing new products and lifecycle management, and product marketing. At Flow Research, his contributions in development, research and writing have been significant to studies, custom projects, White Papers, the Worldflow Energy Monitor and Market Barometer.

Leslie Buchanan, Research and Publication Production Assistant, joined Flow Research in March 2010. Early on, she took on management of the contacts database, assistance with customer liaison, and developing and implementing standards for our publication formats. She has since become increasingly involved in many capacities with Flow Research studies, Worldflow and other publications.

Nicole Riordan, Administrative and Marketing Assistant, joined Flow Research in 2009. She provides valuable assistance with the handling of many administrative functions in the office, and assists with our marketing and direct outreach efforts.

Vicki Tuck, Administrative Assistant, joined Flow Research in June 2012. She has experience in both the fast-paced law firms of Boston, and in various nonprofit organizations. In addition to administrative support, she also assists with our database and collecting news for Worldflow.

Christina Glaser, Website Maintenance and Research Assistant, has worked as a software consultant, programmer and web developer since 1992. She joined Flow Research in October 2010 as an assistant, and then took on the role of refreshing and maintaining our many company websites.

Rich West, Database and Research Assistant, has work experience in computer and financial businesses. He joined Flow Research in August 2014 and has had an immediate impact with our database and outreach in customer service relations and media administration. He also provides updates and input to manufacturer databases that are maintained for a variety of research purposes.



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Blaise Pascal

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 regular 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

www.FlowCalibration.org