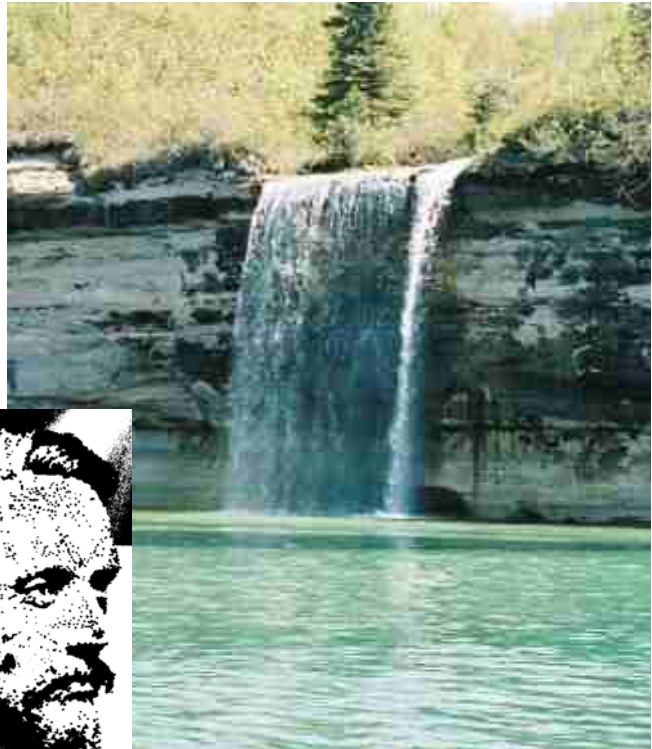


A STEADY STREAM OF DATA IS COMING YOUR WAY

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Q2 2006

Focus this Quarter: Survey of flowmeter users

A *Worldflow* publication

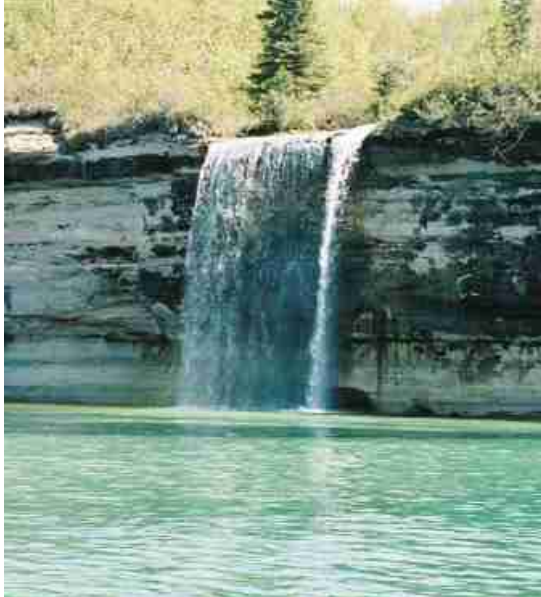


Flow Research, Inc.

The **Market Barometer** is the component of Worldflow that focuses on the flowmeter industry. Every quarter, the **Market Barometer** shines its spotlight on this industry, looking for important events to discuss or highlight.

We find the events, report them, and place them in the context of the flowmeter industry. The **Market Barometer** explains and interprets the importance of new technologies, new products, mergers, and acquisitions. We give you the information and ideas you need to generate forecasts, make budget decisions, and implement winning strategies.

Worldflow Monitoring Service



The *Worldflow Monitoring Service* is a package of resources designed to serve the information needs of flowmeter and instrumentation manufacturers, distributors, and end-users. Each component offers timely data, meaningful news, and insightful commentary on the markets it covers. Each complements and updates the studies that Flow Research regularly conducts in the same markets, and keeps readers informed of events and trends in their industry.

Worldflow, which was initiated in 2002, has four components:

Market Barometer (MB) (40–60 pages) This quarterly publication focuses on the flowmeter industry. *MB* reports on important technology introductions, mergers and acquisitions, and application trends. “State of the Industry” highlights recent industry events and their meaning. And, in every issue, we review each flowmeter technology and interpret changes, giving you the information and ideas you need to implement winning product strategies and to make more informed decisions. Your subscription includes *Flash Reports*, a PDF file of each issue, and two printed and bound hardcopy volumes.

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Flash Reports (2–6 pages each) Just as the *Worldflow Monitoring Service* informs during the interval between studies, *Flash Reports* activate as soon as important news breaks. *Flash Reports* include both the key facts and a “What it Means” section. Subjects of recent *Flash Reports* include Siemens’ purchase of Controlotron, the API’s formulation of standards for vortex flowmeters, and Nu-Flo’s acquisition of Caldon.

Living Database (LD) (24/7 access) This web-based tool is an instant library of information for anyone who wants to know everything from how to select a flowmeter to what flowmeters are available worldwide and from whom. A centralized database with subscriber access via user name and password, *LD* is the way to conveniently locate information from past reports and articles, and to keep current on new product applications. Better data = better decisions.

Market Barometer

Q2, 2006

Publisher and editor: Jesse Yoder, PhD

(jesse@flowresearch.com)

Associate editor: Belinda Burum (belinda@flowresearch.com)

Assistant editor: Norman Weeks (norm@flowresearch.com)

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Flow Research, Inc.
27 Water Street, Wakefield, MA 01880
(781) 245-3200 or (800) 245-1799
(781) 224-7552 (fax)
www.flowresearch.com



Market Barometer is part of the Worldflow Monitoring Service. Other publications in this service include the **Energy Monitor** and **Flash Reports**. The **Living Database** provides more in-depth information and analysis about the instrumentation business.

Here is the **Worldflow** publication schedule for the rest of 2006:

Q2 2006

Market Barometer—June 2006

Energy Monitor—July 2006

Q3 2006

Market Barometer—August 2006

Energy Monitor—September 2006

Q4 2006

Market Barometer—November 2006

Energy Monitor—December 2006

A look at the flowmeter market in 2005 and today

By Jesse Yoder

As part of our effort to keep updated on the flowmeter market, each year we call companies to find out how the market as a whole did the preceding year. This year we asked companies to compare their performance by product line in 2005, as compared to 2004. We found some interesting results.

Coriolis Flowmeter Market

Our estimate is that the **Coriolis** flowmeter market grew by about 9 percent in 2005, compared to 2004. The Coriolis flowmeter market is still a very active one, and the major suppliers are continuing to bring out new products. In the Coriolis section of this issue, you will find an announcement from Emerson promising even higher accuracy (0.05%) on the Micro Motion Elite Coriolis meter. With suppliers continuing to deliver technology improvements, and the need for accuracy and repeatability growing, the Coriolis flowmeter market is likely to continue to show strong growth for the foreseeable future.

Magnetic Flowmeter Market

Flow Research published a worldwide study on the **magnetic** flowmeter market in September 2005. In this study, we found a steadily growing market with a significant number of product enhancements. Magnetic flowmeters, with their variety of liners and different mounting types, lend themselves to an industry-specific or application-specific approach. We found that the magnetic flowmeter market had increased about 4.5 percent in 2005, as compared to 2004. Magnetic flowmeters are very strong in the water & wastewater industry, and for sanitary applications. With at least 50 suppliers worldwide, and a very active stream of new products and enhancements in place, this market is likely to continue to show modest but steady growth over the next several years.

Ultrasonic Flowmeter Market

The ultrasonic flowmeter market is divided into several important segments. One division is the gas market as opposed to the market for liquid applications. A second division is between transit time and Doppler meters, and there are some hybrid meters as well. A third division is between the inline, clamp-on, and insertion meter markets. It is important to be aware of these divisions when looking at the ultrasonic flowmeter market.

Much of the dramatic growth in the past has been due to the rapid growth in the multipath ultrasonic transit time inline meters that are used for the custody transfer of natural gas. Some of the impetus for this growth came from the AGA's release in 1998 of a report laying out criteria for the use of ultrasonic flowmeters in custody transfer applications. The companies that dominate this market are Instromet and Emerson Process – Daniel Division. FMC Technologies also has an offering in this market. Some of the evidence suggests that the growth in this market may have slowed down, although the market is still showing good growth, due in part to the demands of the energy sector.

There is more activity on the liquid side today than on the gas flow side. Emerson Process –

(Continued on page 8)

A look at the flowmeter market in 2005 and today (Cont.)

(Continued from page 7)

Daniel Division – has just entered the liquid side of this market with its Daniel Series 3800 meters. See the Ultrasonic technology section of this issue of the Market Barometer for more details. Faure Herman has an 18-path ultrasonic meter designed for custody transfer of petroleum liquids. And Krohne has been very active in releasing ultrasonic flowmeters for liquid applications. Krohne has allied with Sick to provide ultrasonic meters for gas applications.

A lot of activity has also occurred among the suppliers of ultrasonic flowmeters. Nu-Flo Measurement Systems acquired Caldon in January 2006. (See the **Market Barometer**, Q1 2006, page 9). While Caldon mainly sells into the nuclear industry, the company has begun to expand into the process industries. Nu-Flo was formed in 2003 as a result of the acquisition of Barton Instrument, Halliburton Measurement Systems, and PMC Global Industries. Nu-Flo is owned by Cooper-Cameron, also of Houston, Texas, and one of the world's leading suppliers of valves. Cooper Cameron acquired Nu-Flo in May 2005.

Perhaps the most noteworthy of recent acquisitions was the purchase of Controlotron by Siemens (see page 11 of this issue). Siemens is continuing to gain market share in instrumentation through acquisition, and this acquisition instantly makes Siemens one of the leading suppliers of ultrasonic flowmeters. Even though Controlotron by design remained a single-technology company, it may be that the presence of other technologies will help boost sales of Siemens' new ultrasonic meters in the long run.

Despite all the changes occurring in the **ultrasonic** flowmeter market, our estimate is that sales of ultrasonic flowmeters increased by about 8 percent in 2005, compared to 2004. This growth was due to increases in the sale of transit time flowmeters for both gas and liquid applications, especially custody transfer and fiscal metering. Doppler flowmeters have traditionally been slower growing than transit time, and do not have as active a supplier base as transit time meters.

Vortex Flowmeter Market

Like the ultrasonic market, the market for vortex flowmeters is undergoing some important changes. After several years of work, the American Petroleum Institute (API) has formulated standards for the use of vortex flowmeters in custody transfer applications. The new standard is designed for both liquid and gas applications. Although the new standard was not approved in initial balloting in March 2006, it is being reformulated and will be voted on again in the Fall of 2006.

There has also been quite a lot of merger and acquisition activity among vortex suppliers. Aalborg purchased the vortex flowmeter from Venture Measurement (February 2005). Racine Federated acquired J-Tec's industrial vortex flowmeter line in April 2005. And in June 2005, Advanced Energy Industries sold EMCO to Spirax Sarco, including its vortex flowmeter product line.

Several significant events have occurred in the past few years to help vortex flowmeter sales.

(Continued on page 9)

A look at the flowmeter market in 2005 and today (Cont.)

(Continued from page 8)

One is that a number of suppliers have addressed the problem of vibration with software. Vibration in the line can cause false readings in a vortex meter. Secondly, several suppliers have come out with reducer vortex meters that provide better results in low flow conditions. In addition, a number of suppliers have released new products, and Krohne has come out with an entirely new vortex flowmeter.

Another important change occurring with vortex flowmeters is in the end-user community. Users are becoming more familiar with vortex flowmeters, and more aware of their capabilities. Our survey of flowmeter users bears this out. While about 28 percent of users say they purchased or specified vortex flowmeters in 2004, more than 33 percent expect to do so in 2008 (see chart on the following page). Vortex flowmeters are the most versatile meter, and can measure gas, steam, liquid, and air (see chart on the following page).

Flow Research published a new study on the vortex flowmeter market in March 2006. In this study, we profiled 36 suppliers of vortex meters. We found a resurgent market, with a significant amount of new product activity among suppliers, and a renewed interest among users (see page 26 of this issue). Our estimate is that the worldwide **vortex** flowmeter market increased by about 12 percent in 2005, as compared to 2004.

Thermal Flowmeter Market

The thermal flowmeter market is still the smallest among the new-technology meters, excluding sonar and optical meters. It is dominated by Sierra Instruments, Fluid Components Int'l, and Kurz Instruments, but other companies such as Endress+Hauser and ABB are now becoming a more important part of this market. Our estimate is the revenues for **thermal** flowmeters worldwide increased by about 6 percent in 2005, as compared to 2004.

The mass flow controller market is closely related to the thermal flowmeter market, in that many mass flow controllers use a thermal measuring principle. Some of the leading suppliers of thermal flowmeters, such as Sierra Instruments and ABB, are also major suppliers of mass flow controllers. We have begun covering the mass flow controller market in the Market Barometer, along with thermal flowmeters, when there is news to report.

Other Technologies

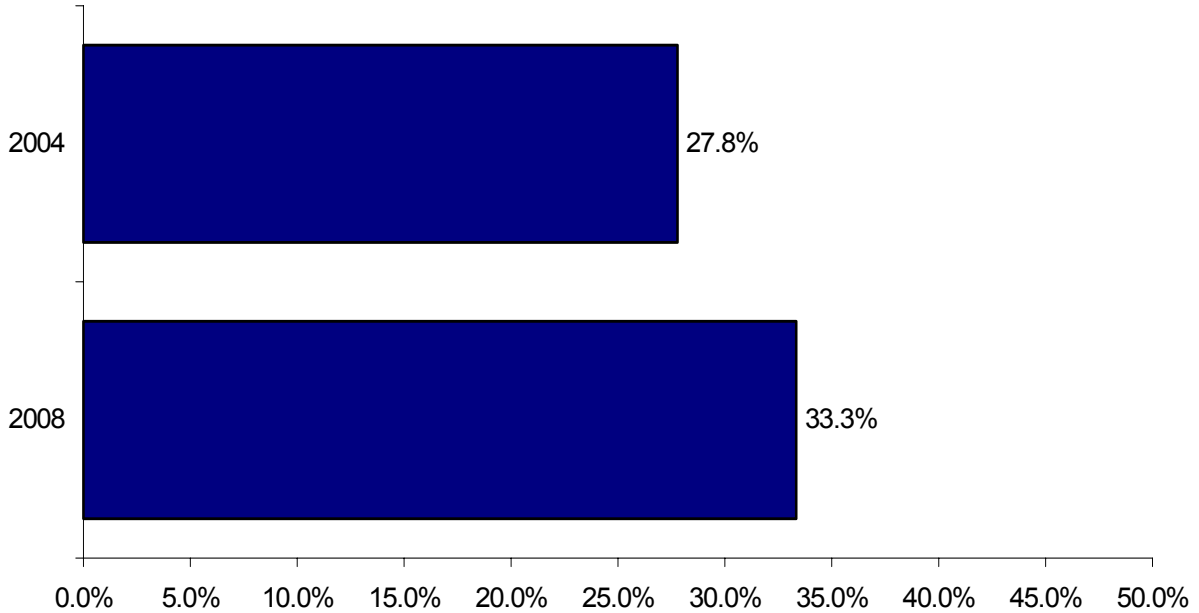
While I didn't research the comparison between 2005 and 2004 for traditional technology flowmeters, my belief is as follows. I believe that DP flowmeters are holding their own, due to the many innovations that are occurring in the pressure and DP transmitter area. I expect that the turbine and positive displacement flowmeter markets are declining, with turbine meters declining slightly faster. I believe that the variable area flowmeter market is declining, but that open channel flowmeters are showing some growth. All in all, this is a good time for flowmeter manufacturers and end-users alike.

The charts on the following page are excerpted from the Worldwide Survey of Flowmeter Users, 2nd. Edition. Both charts refer to the vortex flowmeter market.

State of the Industry Report: Second Quarter, '06

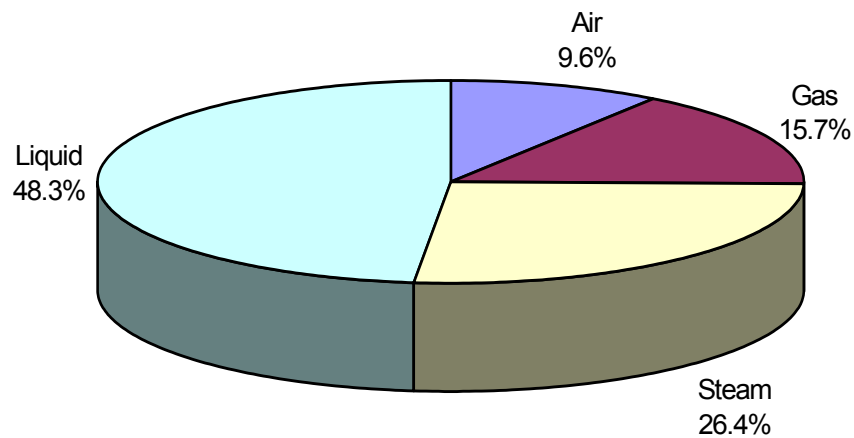
A look at the flowmeter market in 2005 and today (Cont.)

Percent of Total Respondents Who Purchased or Specified Vortex Flowmeters in 2004 and Who Expect to Purchase or Specify Vortex Flowmeters in 2008



Total Vortex respondents = 135 for 2004 and 157 for 2008

Shares of Vortex Flowmeters Used, Specified, or Purchased for the Following Types of Applications



Total respondents = 74

Worldflow Focus: Mergers & Acquisitions

In a stunning move, Siemens acquires Controlotron

Siemens and Controlotron have signed an agreement for the sale of Controlotron to Siemens. The transfer of Controlotron's business activities to Siemens was concluded in May 2006. Controlotron is a manufacturer of ultrasonic flowmeters located in Hauppauge, New York. Siemens, a worldwide manufacturer of process control and industrial automation products, is based in Germany. In the United States, Siemens' headquarters are in Alpharetta, Georgia. The sale had been the subject of the rumor mill for a number of months.

Controlotron was founded in 1962 by Joe Baumel, who still remains active in the company. In 1972, Controlotron became the first US company to introduce ultrasonic clamp-on transit time technology to the industrial market. The company also introduced the first clamp-on ultrasonic hybrid flowmeter, which combines transit time and Doppler technology. Controlotron began selling internationally in 1975. The company has 120 employees.

Controlotron is best known for its 1010 Series transit time clamp-on ultrasonic flowmeters. In addition to traditional clamp-on technology, Controlotron sells a fixed clamp-on and a clamp-on spoolpiece ultrasonic flowmeter. Other types include a group of energy meters, leak detection systems, and a variety of ultrasonic flowmeters for specific applications. Examples of these applications include natural gas flow, aerospace, and interface detection.

Siemens ranks among the largest companies in the world. Siemens reported sales of \$96 billion for fiscal 2005. In the United States, Siemens has sales of \$18.8 billion and employs 70,000 people in all 50 states and Puerto Rico. Worldwide, Siemens and its subsidiaries employ 460,000 people in 190 countries.

Siemens has grown its instrumentation business primarily through acquisition. In Febru-

ary 2000, Siemens purchased the outstanding common stock of Moore Process Automation, spending \$170 million. Later that year, in August 2000, Siemens acquired Milltronics, a manufacturer of ultrasonic level equipment, in a deal valued at \$355 million. Prior to these two acquisitions, Siemens added two other companies to its portfolio in 1999. One was Applied Automation (USA), and the other was Turbo Werk (Germany). Turbo Werk is a supplier of magnetic flowmeters. Siemens is now marketing the Turbo Werk magnetic flowmeter as the Sitrans FM magnetic flowmeter.

In September 2003, Siemens further enhanced its instrumentation portfolio by completing the purchase of the Flow Division of Danfoss. This division is a supplier of magnetic, ultrasonic, and Coriolis flowmeters, with headquarters in Denmark. In 2002, before the deal was completed, Danfoss had sales of \$73 million, with 450 employees.

Siemens' flow, pressure, and temperature products are all considered part of the Sitrans family, and they are distinguished with a letter or abbreviation that designates their technology. Siemens sells magnetic flowmeters (Sitrans FM), ultrasonic flowmeters (Sitrans FUS), differential pressure (Sitrans FO), rotary piston meters (Sitrans FR), variable area (Sitrans FVA), pressure transmitters (Sitrans P), and temperature transmitters (Sitrans T).

What it Means

This is a fascinating move by Siemens. To help understand it, it is worth looking back a few years to a quote from Helmut Gierse, president of Siemens Automation and Drives. An article in Control magazine for May 2001 quotes him as saying "We intend to move from last place in the process control industry to number three in market share in less than five years." If we take Mr. Gierse's statement liter-

(Continued on page 12)

Worldflow Focus: Mergers & Acquisitions

Siemens acquires Controlotron (Cont.)

(Continued from page 11)

ally, Siemens didn't quite make it. Siemens is ranked seventh in Control magazine's list of "Top 50" process control companies, published in December 2005. As a statement of Siemens' intent to increase its market share, largely through acquisition, the statement is more revealing. Siemens is determined to increase its market share in process control and instrumentation, and this determination is continuing to drive Siemens to make acquisitions.

The acquisition of Controlotron by Siemens will put Siemens in possession of one of the top suppliers of ultrasonic flowmeters. During the 1990s, Panametrics and Controlotron were the top two suppliers of ultrasonic flowmeters. Then came multipath ultrasonic flowmeters, and Emerson Daniel and Instromet became major players. During the past few years, Krohne has been the up-and-coming ultrasonic flowmeter company, with especially strong offerings in ultrasonic meters for liquid applications. So the market is more complex than it used to be.

For its part, Controlotron is a classic takeover candidate. It is a single technology company that is still family-owned. Furthermore, the founder, Joe Baumel, is at retirement age, even though he is still actively involved in the company. To run a company for 44 years and then sell it to a company as large as Siemens makes a lot of sense. David Chleck no doubt reached a similar conclusion when he agreed to sell Panametrics to GE Power Systems in 2002. Chleck co-founded Panametrics with Dr. Edmund Carnevale in 1960. *(See Market Barometer Flash Report #1, July 24, 2002).*

Selling at this time also makes sense because Controlotron is a single-technology company that is losing its competitive grip on the mar-

ketplace. Rather than diversifying into other flow technologies, Controlotron was convinced that clamp-on technology could solve almost any flow problem. With end-users increasingly looking for one-stop shopping, single-technology companies are finding it difficult to hold their own and compete in a global marketplace.

Other single-technology companies that have chosen to diversify into other product lines include Sierra Instruments, Fluid Components International, Racine Federated, and Liquid Controls. Of course, the leading flowmeter suppliers, including Emerson Process Management, ABB, Endress+Hauser, KROHNE, and Yokogawa, all have diverse offerings. These companies compete globally, and they have a variety of instrumentation offerings to satisfy a wide range of user needs. As noted in the recent Market Barometer (Q1 2006), KROHNE has even broadened its offerings beyond level and flow to include temperature transmitters. KROHNE acquired INOR, a Swedish manufacturer of temperature transmitters, in January 2006.

While the terms of the acquisition were not disclosed, this purchase is likely to have significant benefits to Siemens. Since Siemens now has a relatively broad range of flowmeter offerings, Siemens can position its Controlotron ultrasonic flowmeters for the applications they are best suited for, and guide end-users to other technologies where they are more appropriate. Like its purchase of Moore Process Automation, this acquisition puts Siemens squarely in charge of a US flowmeter manufacturer. Even if Siemens is not yet third in market share, they are gaining ground, and this move gives them a major place in the ultrasonic flowmeter market.

(Continued on page 13)

Worldflow Focus: Mergers & Acquisitions

Siemens acquires Controlotron (cont.)

The following is a press release issued by Siemens at the time of the agreement. The deal was completed in May 2006, and Controlotron was renamed Siemens Energy & Automation, Process Instrumentation Business Unit.

Nuremberg, Germany (April 11, 2006) - Controlotron and Siemens have signed an agreement whereby Siemens is to acquire the business activities of Controlotron, Hauppauge, New York, USA. Controlotron, a leading manufacturer of ultrasonic clamp-on flowmeters, employs a staff of around 120 and has a global sales network that is to be integrated into the Siemens organization. Take-over of the business activities is planned for May 2006.

According to Anton S. Huber, A&D Vice President, flowmeters account for around a quarter of today's requirement for process instrumentation: "The acquisition of Controlotron's flowmeter activities continues the consistent expansion of our process automation sector. Controlotron's innovative, non-intrusive flow meters are an outstanding supplement to our product portfolio in process instrumentation, consolidating our competitive position and making us an even more attractive partner

www.siemens.com

www.controlotron.com

Note: Leo Streit, formerly of the Siemens office in Karlsruhe, Germany, has moved to Controlotron in the United States to oversee the transition of the company from Controlotron to Siemens. Mr. Streit was replaced in Germany by Andre Werner.

for our customers".

The ultrasonic clamp-on devices from Controlotron calculate the flow of liquids or gases extremely accurately without intervening in the pipeline. Two sensors are clamped onto the outside of the pipe for this purpose. Key applications include the oil and gas industry, the water/wastewater sector, and energy and pipeline applications.

The Siemens Automation and Drives Group (A&D), Nuremberg, Germany, is the leading manufacturer in this field worldwide. Products supplied by A&D include standard products for the manufacturing and process industries and for the electrical installation industry as well as system solutions, for example for machine tools, and solutions for whole industries such as the automation of entire automobile factories or chemical plants. Supplementing this range of products and services, A&D also offers software for linking production and management (horizontal and vertical IT integration) and for optimizing production processes. A&D employs 60,800 people worldwide and in fiscal year 2005 (to September 30) earned a group profit of €1,210 million on sales of €9,844 million and orders of €10,190 million.

Worldflow Focus: Mergers & Acquisitions

Spirax Sarco purchases Advanced Flow Technology Co.

Spirax Sarco has acquired all the business and assets of Advanced Flow Technology Company (AFTCO) of Lakeland, Florida from AMJ Equipment Corp., also of Lakeland, Florida. The AFTCO business will be merged with EMCO Flow Systems, a US division of Spirax Sarco headquartered in Longmont, Colorado. The initial purchase price of \$2.75 million, subject to adjustment based on future sales.

AFTCO's Lakeland facility is home to both their corporate offices and manufacturing operations. AFTCO also maintains a flow laboratory that has a flow capacity of 110,999 gpm (25,000 meters³ hour). The laboratory is operated under conditions consistent with ISO 8617 standards. The company workforce is approximately 14 employees, and is led by President Al Jarrell. AFTCO was founded in 1995.

AFTCO has marketed its products through a network of more than 30 independent representatives throughout the United States, Canada, and the United Kingdom, and has conducted business worldwide.

AFTCO's primary manufactured product is the UniMag Series of electromagnetic flowmeters. This series features pulsed AC coil excitation technology for improved performance in dirty liquids such as raw sewage or dewatered sludge. Other AFTCO products include the ChannelMag, TapMag, and DemiMag models, as well as the multivariable DeltaMass line.

EMCO Flow Systems was incorporated in 1967 as the Engineering Measurements Company, and was acquired by Advanced Energy Industries (AEI) in 2001. In June 2005, EMCO Flow Systems became a division of Spirax Sarco plc. Today, EMCO is a manufacturer of flowmeters and controllers for liquid, gas, and steam applications. EMCO flowmeters are used in many industries, with con-

centrations in food, agriculture, environmental protection, and mining. EMCO sells its products through a global network of distributors, sales reps, and direct sales personnel.

EMCO's family of flowmeters includes magnetic, turbine, ultrasonic, and vortex technologies, and range in size from ¼" to 100". EMCO's magnetic line features the MAGLO™ Series. Its turbine line features the Turbo-Bar™ Series. And EMCO's ultrasonic and vortex flowmeter lines feature the Sono-Trak™ (transit time and Doppler) and the PhD™, V-Bar™, and Hydro-Flow™, respectively. Flow processors and temperature transmitters round out the product portfolio.

Spirax Sarco is a manufacturer of flowmeters, temperature and pressure controls, and steam traps for the management of steam and industrial fluids. Spirax Sarco's primary applications are within the oil refining, chemical, food, plastic and rubber, textile, and air conditioning industries. With 3,900 employees located in 39 facilities in 28 countries, the company has a significant global presence.

Worldwide, Spirax Sarco maintains 105 sales offices, with over 50 sales offices in the United States alone. There are more than 350 authorized distributors of the Spirax Sarco products in the United States. USA headquarters are located in Blythewood, South Carolina. Fiscal year 2005 worldwide sales are estimated at \$612 million.

What It Means

Spirax Sarco is a company based in the United Kingdom that has traditionally focused on steam flow measurement and on the measurement of industrial fluids. The company's Gilflo flowmeter is a variable area-based flow-

(Continued on page 15)

Worldflow Focus: Mergers & Acquisitions

Spirax Sarco purchases Advanced Flow Technology (Cont.)

(Continued from page 14)

meter that is used to measure both steam and gases. Other products supplied by Spirax Sarco include control valves, actuators, safety valves, and steam traps.

Spirax Sarco is a company that has had traditional-technology flowmeters and is seeking to broaden its product line through acquisition. Its purchase of EMCO Flow Systems from Applied Energy in June 2005 added several new types of meters to its portfolio. EMCO has a mixture of new and traditional technology meters, including vortex, magnetic, ultrasonic, and turbine. Certainly the addition of EMCO's Vortex PhD meter adds to EMCO's capabilities in steam flow measurement. The Sono-Trak Ultrasonic flowmeter comes in both transit time and Doppler flavors, although both versions are clamp-on types.

Spirax Sarco's acquisition of AFTCO gives the company a better foothold in the magnetic flowmeter market. AFTCO's flowmeter is a new-technology meter, although it is one of the more traditional types of magnetic flowmeters. The AC (alternating current) technology employed by AFTCO's magnetic flowmeters is being displaced in many applications by DC (direct current) technology, and more recently by high-strength DC technology. In 2000, AC magnetic flowmeters represented 12 percent of total magnetic flowmeter sales worldwide, while by 2004, this percentage was almost cut in half to 6.5 percent. The fastest growing coil power technology is high-strength DC magnetic flowmeter technology.

When magnetic flowmeters were first introduced, they were mainly of the AC type. Because of noise and additional voltages that may be present in the environment of the meter, these meters need to be zero-calibrated. To do

this properly, the meter needs to be full of process fluid and at a no-flow condition.

Some users had difficulty with this calibration process, and as a result, they obtained unsatisfactory results from their magnetic flowmeters. This experience was somewhat like the experience of the early users of Doppler meters, who did not completely understand this new technology, and as a result misapplied it, also achieving unsatisfactory results.

Due in part to the noise and calibration issues surrounding AC magnetic meters, suppliers introduced pulsed DC meters. Pulsed DC meters do not require zero calibration, and they handle noise better than AC meters. A number of suppliers have introduced high-strength DC magnetic flowmeters to better handle noise issues. Even though growth in the DC flowmeter market will outpace growth in AC magnetic flowmeters, there will still be a need and demand for AC magnetic flowmeters.

While AC magnetic flowmeters may seem to some like an outmoded technology, this is far from accurate. In reality, AC meters are better able to handle certain types of difficult application cases than DC meters. These include slurries, and liquids with solids content. DC meters excel with cleaner liquids.

One key to success for Spirax Sarco is positioning its new AFTCO magnetic flowmeters in those applications where they are best suited. Another is finding a way to develop a coherent message and strategy for marketing and selling flowmeters as diverse as the Gilflo, the Sono-Trak Ultrasonic, and the new AFTCO AC magnetic flowmeters. It will be interesting to see how this develops. Certainly, consolidating the EMCO and AFTCO flowmeters into a single division is a step in the right direction.

Flow Research survey of flowmeter users shows shift to new-technology flowmeters

By Jesse Yoder

Flow Research recently conducted a survey of flowmeter users to answer many of the questions already posed in this article, and many more. The Internet-based survey, which was undertaken in cooperation with Venture Development Corporation, was conducted in the second half of 2005. While the majority of respondents were from the United States, other regions such as Europe, Latin America, the Middle East, Asia Pacific, and Canada were represented. More than 500 users and specifiers of flowmeters took part in the survey. Most were from the process industries, including chemical, food processing, oil & gas, refining, and other industries.

The purpose of the survey was to answer some important questions about the flowmeter market. These include:

- Is a shift really occurring from new-technology to traditional-technology flowmeters?
- How important are differential pressure flowmeters in this market?
- With what types of flowmeters is steam flow measured, and are these types changing?

Other questions relate to the impact of communication protocols such as Foundation Fieldbus and Profibus, the penetration of smart flowmeters, and the importance of criteria such as accuracy and reliability in flowmeter selection.

One way to answer these questions is to talk to suppliers, find out what they are manufacturing, and what their projections are for the future. Another equally important way is to talk to the end-users and purchasing agents who ac-

tually make the buying decisions. The decision making of flowmeter users is one of the best barometers of the flowmeter industry.

The customers who decide which flowmeter to buy, and with what features, actually determine the fate of new flowmeter products on the market.

DP Flowmeters Still the Leading Type in Installed Base

Users were asked in the survey how many flowmeters are in use at their location, and what percentage of the total each flowmeter type represents. The results are shown in Figure 1. According to this figure, differential pressure (DP) flowmeters represent almost 45 percent of the total flowmeters in use at end-user plants. The second most popular type is magnetic, followed by Coriolis and turbine. Each of these three types represents about 10 percent of total installed base.

The difference between the installed base of flowmeters and those currently being sold is an important one. Market research studies on this subject typically focus on the number of products sold in a current or recent year. They then project future sales by looking at a variety of factors, including economic indicators, product trends, and user perspectives. The installed base, on the other hand, reflects the number of flowmeters currently in use, whether they were purchased this year, last year, or ten years ago. For this reason, installed base numbers do not show changes in flowmeter trends as quickly as current sales figures.

Why are DP flowmeters so dominant in the installed base? DP flowmeters have been used for more than 100 years, and are among the most studied type of meter. Magnetic flow-

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Survey shows shift to new-technology flowmeters (cont.)

meters were not introduced until the early 1950s, and Coriolis meters got their start in the 1970s. It takes many years for a new flowmeter technology to get established. While industry associations are now writing standards for the use of magnetic, Coriolis, and other new-technology flowmeters, many more approvals have been written for DP flowmeters. DP flowmeters also have a price advantage over magnetic, Coriolis, and ultrasonic flowmeters, which is an important factor in today's price-competitive market.

The Importance of Installed Base

Installed base is important for several reasons. When replacing flowmeters, users tend to replace like with like, unless they have a reason to change. There are good reasons for staying with a proven technology. Some facilities keep flowmeters in stock for replacement purposes. There is a learning curve associated with changing to a new technology, and additional engineering time is often required. There often is little tolerance of downtime in today's cost-conscious plants, so keeping the same type of flowmeter in place is often the most cost-effective solution.

Having a performance problem with a flowmeter is a reason for change. DP transmitters require the use of a primary element to constrict the flow. Orifice plates are the most common type of primary element, and they are subject to wear. DP flowmeters are also typically less accurate than Coriolis and magnetic flowmeters, so users who are seeking higher accuracy may make the switch. And even though they have a higher initial cost, Coriolis and magnetic flowmeters are likely to have fewer maintenance issues over time than DP flowmeters. They also have fewer maintenance issues than turbine and positive displacement flowmeters, which have moving parts that are subject to wear.

Users are Shifting to New-Technology Flowmeters

While knowing the installed base is important to understanding today's flowmeter market, Flow Research's user survey does show that an important shift is going on within the flowmeter market. Users are shifting away from traditional technology flowmeters, such as DP, positive displacement, and turbine, and towards new-technology flowmeters such as Coriolis, magnetic, ultrasonic, vortex, and thermal.

How does the survey show the presence of such a shift? Users were asked, for each type of flowmeter, whether they or their firm had purchased or specified that type in 2004. They were also asked for each flowmeter type whether they or their firm expect to purchase or specify that type of flowmeter in 2008. In the case of new-technology flowmeters, the percentage of respondents expecting to purchase or specify each of these types is greater in 2008 than it is in 2004. And for traditional-technology flowmeters, the corresponding percentage is either flat or declining between 2004 and 2008.

For Coriolis flowmeters, just over 40 percent of respondents said that Coriolis flowmeters were purchased or specified at their plant in 2004. When asked about the future, 47 percent of respondents expect that Coriolis flowmeters will be purchased or specified at their plant in 2008. (See Figure 2). The survey shows similar results for magnetic, ultrasonic, vortex, and thermal flowmeters, meaning that a greater percentage of respondents expect that these types of flowmeters will be purchased or specified at their plant in 2008 than were purchased or specified in 2004.

Traditional-technology flowmeters present a different picture. While 36 percent of respondents say that turbine flowmeters were pur-

Survey shows shift to new-technology flowmeters (cont.)

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chased or specified at their plant in 2004, less than 32 percent expect that this will be the case in 2008 (See Figure 3). The survey shows similar results for positive displacement flowmeters. The results for users of DP and variable area flowmeters are almost flat, although both show a slight decline in the percentages between 2004 and 2008.

Accuracy, Price, and Technology Drive the Shift

Users gave many different reasons for the shift in types and quantities of flowmeters purchased or specified in 2004 and anticipated for 2008. The three major reasons are as follows:

- Technology considerations
- Lower price/cost
- Accuracy and reliability

New-technology flowmeters are, in general, more accurate and reliable than traditional meters. Most magnetic, ultrasonic, and vortex flowmeters are capable of high accuracy, while Coriolis flowmeters have the highest degree of accuracy. These flowmeters intrude minimally into the pipe, and do not have moving parts that are subject to wear. This results in fewer sources of maintenance problems over the lifetime of the meter, and lower permanent pressure loss.

Some of those citing lower costs were not talking about paying the lowest price for a flowmeter. Instead, for example, they say, "The costs of Coriolis and vortex meters are coming down, and the accuracy is improving." Another says, "Coriolis technology becomes cheaper and more competitive among manufacturers." Others talk about lifecycle costs, and the ability to obtain "lower costs with good accuracy." While users are very aware of

price, they appear also to be measuring price against value, and are more willing to pay for new-technology flowmeters as their price comes down.

Technology considerations relate to specific product improvements, to new or better technology, and to the ability to measure mass flow. The major flowmeter suppliers are regularly issuing product upgrades and added features to their flowmeters. Some are adding new product lines altogether, such as reduced bore vortex meters and multivariable vortex flowmeters. Multipath ultrasonic flowmeters are another product enhancement that have had a major market impact in the past five years. End-users are aware of these technology upgrades, and are voting with their pocketbooks.

New Types of Flowmeters Emerging

In addition to the changes outlined above, new flowmeter types are emerging. Sonar and optical flowmeters have been introduced in the past several years. Both of these types are new-technology flowmeters, and the Flow Research user survey shows substantially increased demand for both flowmeter types in the future. So, not only are existing flowmeters being improved, we are seeing entirely new types of flowmeters on the market. And the result for end-users is a good one: more choices, more variety, and better products.

Figures 1 to 5 on the next pages show some of the results of the survey of flowmeter users.

Note: **The Worldwide Survey of Flowmeter Users, 2nd. Edition** was published in January 2006. The survey had 586 participants. Most participants were from the process industries. The survey includes all flow technologies. However, individual chapters are devoted to users of magnetic, vortex, and differential pressure (DP) flowmeters. For more information on the survey, please contact Flow Research.