

September 11, 2002

Go New-Tech or Stick With DP Meters?

Differential pressure flow users face the dilemma

Jesse Yoder
June 24, 2002

Many end users of differential pressure (DP) transmitters today are facing a dilemma. Should they upgrade to new-technology flowmeters, or stick with tried and true DP meters? Of course, some end users at large plants may choose to upgrade some of their DP meters, and stick with DP technology elsewhere in the plant. Instead of replacing all their DP meters, they may make this decision on a case-by-case basis.

DP flowmeters are sometimes contrasted with new-technology meters because many users today are replacing their DP and other traditional-technology meters with ultrasonic, Coriolis, and other meters of recent vintage. New-technology meters include ultrasonic, Coriolis, magnetic, vortex, and multivariable DP.

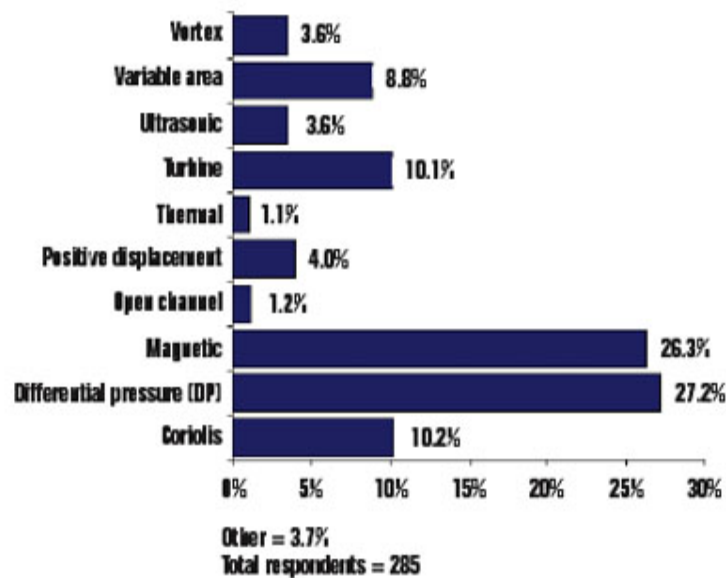
New-technology meters have four traits in common: They were introduced after 1950, they incorporate recent technological advances, they are the focus of new product development, and they perform at a higher level than traditional-technology meters.

A DP flowmeter consists of a differential pressure transmitter integrated with a primary element. In the past, pressure transmitter companies sold DP transmitters and users ordered their primary elements separately. Now companies such as Emerson Process Control are selling their DP transmitters already integrated with a primary element, such as an Annubar or an orifice plate. When a DP pressure transmitter is integrated with a primary element and has the capability of calculating flow rate based on difference in pressure, it is a DP flowmeter.

While much has been written recently about new-technology flowmeters, some important questions remain unanswered:

1. Why are end users choosing new-technology meters?
2. Which of the new-technology flowmeters are replacing DP meters?
3. What are pressure suppliers, especially suppliers of DP flow technology, doing to stem the tide of customers switching to newer technologies?

This article answers these questions by looking at the results of some research conducted over the past two years by Flow Research. This includes an extensive analysis of the worldwide new-technology and DP flowmeter markets and a worldwide survey of flowmeter users. We'll see why customers are switching to new-technology meters, and why some choose to stick with DP meters. Finally, we'll look at four new pressure transmitter products that have been released in the past year.

FIGURE 1.**POPULARITY CONTEST**

INSTALLED BASE IS AN IMPORTANT FACTOR IN NEW FLOWMETER PURCHASING, AND DIFFERENTIAL PRESSURE FLOWMETERS MAINTAIN A SLIM LEAD, BUT OTHER TYPES ARE CATCHING UP.

Installed Base Is Important

In 2001, Flow Research and Ducker Worldwide conducted a worldwide survey of flowmeter users. The survey included 100 users from each of three geographic regions, including Europe, North America, and Asia. Three hundred users were interviewed by phone in their native languages. One purpose of the survey was to find out whether users are changing their flow technologies and why.

One important question has to do with installed base. Users were asked what types of flowmeters they have at their facility, and what percentage of each type. Figure 1 shows the results, on a worldwide basis. DP flowmeters account for 27% of the installed base of flowmeters worldwide, while magnetic flowmeters account for 26%. These numbers are important because installed base is an important factor in the flowmeter decision-making process.

The geographic breakdown of this data was also very interesting. DP flowmeters have traditionally been the flowmeter of choice in North America, while magnetic flowmeters are more favored in Europe. The survey found that DP flowmeters account for 38% of the installed base in North America, while they account for only 15% in Europe. In Asia, DP flowmeters account for 26% of the installed flowmeter base. Interestingly, the survey found that magnetic flowmeters account for about the same installed base percentage (39%) in Europe as DP flowmeters do in North America (38%).

Users were asked why they use DP flowmeters. Figure 2 provides the answer, on a worldwide basis. Over one-third of end users say they choose DP flowmeters because of price, while 31% cite accuracy. Familiarity and tradition is the third strongest reason.

Price may be the strongest card that DP flowmeter suppliers have to play in competition with suppliers of new-technology flowmeters. The fact that accuracy comes in second may seem surprising, since most DP flowmeters are not as accurate as most new-technology meters. But if a meter is as accurate as required for the application, then it is sufficiently accurate, even if it isn't as accurate as some other meters.

What Meters are Replacing DP?

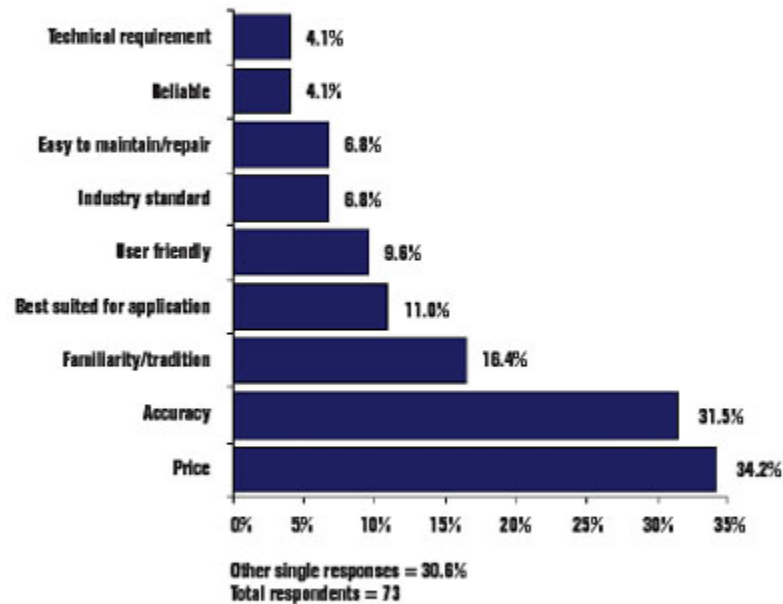
Users may be moving toward new-technology flowmeters, but they are not moving with equal speed to each of the different types of new-technology meters. In the survey, users were asked what types of flowmeters they are choosing when they replace their DP flowmeters. Figure 3 shows the results.

Users say they are switching to Coriolis, vortex, and magnetic flowmeters in that order, with almost 30% of those who switch saying they are selecting Coriolis meters. It should be noted, though, that

the number of respondents to this question (21) was substantially lower than for the other questions.

FIGURE 2.

WHY STICK WITH DP?



WHEN IT COMES TO JUSTIFYING DIFFERENTIAL PRESSURE FLOWMETERS, PRICE IS FOREMOST, AND ACCURACY IS GOOD ENOUGH FOR MANY APPLICATIONS.

The study provides some insight into what types of meters are replacing DP flowmeters. Buy how often do users make this switch? In the survey, users were asked whether they have substituted one flowmeter technology for another in the past two years. As shown in Figure 4, about 20% said yes, while 80% said no. It is among this 20% of users that are changing from DP to Coriolis, magnetic, vortex, and other types of meters.

Users are switching to new-technology flowmeters for three main reasons:

* **Accuracy.** Accuracy and reliability are the two strongest forces behind the worldwide flowmeter market. Users today are looking for flowmeters that are both accurate and reliable. In the worldwide survey of flowmeter users, 53% said they require accuracy of 0.5% or better in their flow measurements. Eighty-two percent said they require accuracy of 1.0% or better. Even though the accuracy of pressure transmitters is extremely high, the accuracy of many flow measurements using DP transmitters is likely to be less than 1% when the primary element is included in the calculation. While some users may not be fully aware of the impact of primary element accuracy on the total flow measurement, users who are looking for high accuracy are likely to look toward Coriolis, magnetic, or ultrasonic flowmeters.

* **Reliability.** Integrating the primary element with the pressure transmitter may improve the reliability of DP flowmeters. Users may also look to using a primary element other than an orifice plate to improve reliability. Orifice plates are subject to wear, and they can also be knocked out of position by impurities in the flow stream. While both of these factors will help DP flowmeters, many users are opting for the newer flowmeters because of reliability issues.

* **Low maintenance.** Users today are looking for flowmeters that do not require a great deal of maintenance. Rather than purchasing a flowmeter that needs to be checked regularly for accuracy and repeatability, they prefer to purchase meters with minimal maintenance requirements. In many cases, users will spend more for a flowmeter that has reduced maintenance requirements.

Many users today are aware of the distinction between purchase cost and cost of ownership, or life cycle cost. Even though ultrasonic and Coriolis meters may have a higher installed cost than DP flowmeters, they may cost less over the lifetime of the meter due to reduced maintenance costs. They are not subject to wear in the way that orifice plates are. With many companies reducing their engineering and maintenance staffs, having a meter that does not require a great deal of maintenance can be a major advantage.

While some end users are replacing their DP flowmeters with other types of meters, there are also some good reasons why users are choosing to stay with DP flow technology. Reasons include the following:

* **Many are reluctant to switch technologies.** There is an inherent conservatism built into the process industries. Users are reluctant to change to another technology unless there is a compelling reason to do so. Acquisition by another company can be a reason, and cost is another. In many cases, however, users choose to replace like with like when ordering flowmeters. And because DP flowmeters have the largest installed base of any meter, at least in North America, chances are good that they will be replaced with another DP flowmeter. Cost is more likely to be a reason to stay with DP technology than to change, since most new-technology meters cost more than DP meters.

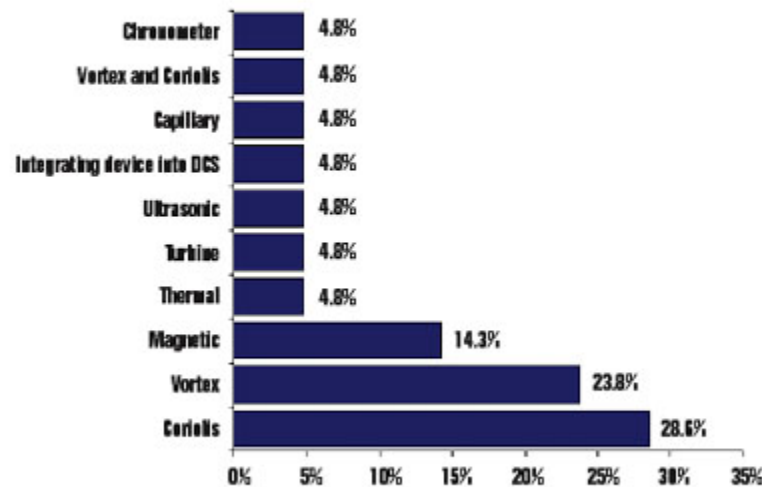
In many cases, there is good reason why users do not wish to change to another flow technology. Often companies stock spare parts or spare flowmeters to use in case one breaks down. These need to be used or disposed of in some way if the company changes to a new flow technology. Once engineers are trained and experienced on one technology, it can be expensive to retrain them. It also takes time to adjust to a new supplier. So in many cases, it makes good business sense to stick with what you have.

* **Installed base of DP flowmeters.** The Flow Research end user survey shows DP flowmeters have an edge in installed base in North America and in Asia. They also have a large installed base in Europe. Having an edge in installed base is a huge growth factor. A company that widely uses a particular flowmeter technology has a lot invested in this technology, and is not likely to change except for a compelling reason. Of course, installed base is different from current sales, but installed base gives a major advantage to DP flowmeters.

* **New DP technologies are turning the old into new.** Pressure transmitter suppliers have introduced their own new technologies as a way to keep DP flowmeters competitive. They have developed several new technologies to encourage users to stay with DP flowmeters. One is the multivariable DP transmitter. Multivariable DP transmitters provide a cost-effective way to measure mass flow by integrating three instruments together into a single device. Emerson Rosemount, Honeywell, Yamatake, Foxboro, Bristol Babcock, and ABB all offer multivariable DP transmitters. The multivariable DP transmitter, when integrated with a primary element, is a type of new-technology flowmeter.

FIGURE 3.

NEW-TECHNOLOGY REPLACEMENTS



CORIOUS AND VORTEX ARE LEADING REPLACEMENT TECHNOLOGIES FOR DP FLOWMETERS.

A second innovation is integrating a pressure transmitter with a primary element to create a single DP flowmeter, as described above. Rosemount has created two of these DP flowmeters: the ProBar and the ProPlate. The ProBar integrates a pressure transmitter with an Annubar primary element. The ProPlate integrates a pressure transmitter with an orifice plate. These devices save users both on calibration and on installation costs. They are providing an additional reason for users to stick with DP flowmeters.

Both multivariable DP transmitters and integrated DP flowmeters provide users with a way to upgrade to new technologies without having to invest in a completely new product line. Users can

often achieve higher accuracy and greater reliability while still retaining the same suppliers and knowledge base surrounding the products.

Since multivariable DP flowmeters can measure mass flow, users who need to measure mass flow may choose these meters instead of Coriolis meters. This decision will mainly be determined by the end user's accuracy and reliability requirements. Users who require very high accuracy or who are doing custody transfer may select Coriolis meters, while those whose accuracy requirements are not so high may find that multivariable DP meters do just fine.

New Product Developments

In addition to developing multivariable flowmeters and integrating them with primary elements, pressure transmitter suppliers have recently introduced other innovations that raise the performance level of pressure transmitters.

Emerson has upped the ante with its new series of 3051S pressure transmitters. The 3051S incorporates a new design platform called the 3051S SuperModule. With a stainless steel housing, the transmitter provides 200:1 turndown, 0.04% accuracy, and response time of 100 msec. The 3051S also comes with a 10-year stability guarantee.

Honeywell brought out two new inline gauge pressure transmitters designed for high-pressure applications in the oil and gas, hydrocarbon processing, and chemical industries. The STG19L and the STG99L are both members of the ST 3000 line of pressure transmitters. They are designed for applications requiring measurements from 0 to 10,000 psig.

Smar enhanced its LD301 pressure transmitter with a new chip called the HT3012. This chip provides faster computations and faster response time, making the LD301 more useful for flow control applications.

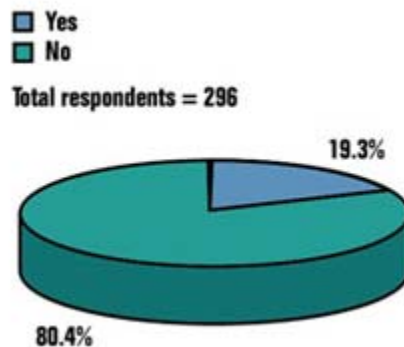


Figure 4: Change Comes Slowly

Asked if they have substituted one flowmeter technology for another in the past two years, users overwhelmingly said "no."

Kobold released the RCD differential pressure flowmeter, which can be used to measure the flow of liquids and compressed gases. The RCD incorporates a single measuring bellows that the differential pressure is applied to. It contains an orifice plate as an integrated element, making it a DP flowmeter.

What lies ahead? Several years ago, many pressure and flowmeter suppliers had their research dollars invested either in developing fieldbus products or in Y2K related issues. Now that those issues have been resolved, suppliers can focus more completely on developing technologically superior products.

The products described above are evidence of this trend. Look for suppliers to focus more on improved sensing technology in the future as opposed to communications technology.

There is no stemming the tide of users flowing to new-technology meters. However, suppliers of DP flowmeters can help themselves by incorporating new technologies into their current DP meters. Multivariable DP transmitters and DP flowmeters that incorporate a primary element are two examples of how DP suppliers can meet the new-technology challenge with new technologies of their own.

Jesse Yoder is president of Flow Research, Wakefield, Mass. He has 16 years experience as an analyst and writer in process control, specializing in flowmeters and other field devices. Prior to founding Flow Research, he served as an analyst for several market research companies. He recently completed a series of six studies on new-technology flowmeters, including DP flowmeters. He is currently working on six studies on traditional-technology flowmeters. Contact him at 781/245-3200 or jesse@flowresearch.com. Flow Research recently initiated the Worldflow Monitoring

Service, which publishes monthly reports on flow-related topics. For more information, visit www.flowresearch.com.

Control

© 2002 Putman Media