The growth in unconventional oil and gas for upstream and midstream companies is well documented. That growth has extended into service and supply companies for these operators. Flow-Cal Inc., a Houston-based software consulting company, has seen a dramatic increase in its business as its clients seek cost-effective ways to track the growing amount of oil and gas that flows through their systems.

Michael Squyres, president of Flow-Cal Inc., said its latest product was developed to address the complex needs of the midstream industry. Midstream companies did not have an effective method for tracking both gas and liquids within the same system. So about four years ago, Flow-Cal partnered with several industry heavyweights to develop an integrated application capable of managing natural gas, natural gas liquids (NGLs), chemicals, crude and refined products within a single measurement application. The resulting system has been embraced by the midstream industry for its ability to track the flow of both gas and liquids from the wellhead to the tailgate of the midstream operator.

The idea was popular, and virtually all of the company’s upstream clients wanted to upgrade to the new gas and liquids application, says Squyres. Its clients include Chesapeake Midstream Partners LP, Chevron Corp., Oneok Inc., ExxonMobil Corp., Williams Partners LP, Samson Investment Co., BP Plc, Anadarko Petroleum Corp. and others.
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— Michael Squyres, president, Flow-Cal Inc.

“Having so many clients with a common need has allowed us to develop a more comprehensive system while amortizing our costs across a broad base,” Squyres says.

Flow-Cal’s field applications for the scheduling and performance of calibration and testing requirements enables it to become the single record of source for all measurement data, satisfying the most stringent audit and SOx requirements.

One of Flow-Cal’s major clients is DCP Midstream LP, the largest NGL gathering and processing company in the U.S. DCP began looking into upgrading its data management system a few years ago. Steve Harless, director of measurement at DCP Midstream LP, says due to company growth and changes in industry standards, DCP realized that its current data management system was not allowing it to operate as efficiently as it wanted, and therefore decided to pursue improvement to its process.

“We thought that since this was going to be a significant enhancement, requiring a complete rewrite of our current system, we wanted to see what else was out there in the marketplace,” he says. DCP sent out a request for proposal (RFP) to four of its vendors asking for proposals to upgrade its system.

After analyzing proposals, DCP chose Flow-Cal to develop its revised data management system. After working with Flow-Cal on the enhancement requirements and build-out for two years, the new system was installed in August 2009. The hardware is provided by DCP’s staff and the meters, data, gas and liquid quality are also managed by DCP Midstream personnel. Flow-Cal developed the system for tracking the data from their 40,000 flow computers, accessing it, analyzing it and generating reports from the application.

The size of DCP’s operations, and the number of hourly readings from its 40,000 meters, is the largest Flow-Cal has tracked, Squyres says.

“No one else comes close to that number,” he says. DCP’s initial process utilized multiple internal applications to assist their earlier application in tracking the flow of gas and liquids through its system. The new application minimized external applications and allows DCP to manage its measurement data in a single database, thus eliminating the need for two measurement data bases, Squyres says.

Flow-Cal balances DCP’s products on both a mass and volume basis on an hourly basis and also performs component-level balancing. This complex and calculation-intensive operation identifies imbalances and ensures the accountability of its commodities.

**Ongoing relationship**

DCP’s working relationship with Flow-Cal has been an ongoing process in which it uses the product and then makes suggestions for improvement. Because DCP owns both gathering lines and processing assets, it sells the residue gas to the transmission companies at the tailgate of its plant. The new data management system allows it to track the flow of gas, liquids and condensates from wellhead to tailgate more efficiently than was previously possible.

“We not only wanted to reproduce what we were previously doing, but we had a lot of good ideas about ways to improve the process, which would enhance our day-to-day business operations,” Harless says. “Flow-Cal has been very good at receiving that input and making changes for us.”

So far, the new system has proven very reliable. “Any issues we’ve had, Flow-Cal has responded quickly and helped our folks resolve the issue and get it going.”

One of DCP’s requirements of the new system was that it was scalable. As DCP expanded, the new system needed to expand seamlessly with its growing operations. “We continue to grow and so far we have not seen any major strain on the performance of the system,” he says.

Flow-Cal’s system tracks data from DCP’s metering system, which starts at the meter itself and extends to the accounting system. “The system needs to track this data efficiently. For us, time is money,” he says.

In many cases, DCP technicians pull samples of natural gas in the field and send them to a lab for analysis. The lab then analyzes them and uploads its analysis to Flow-Cal, which calculates the gallons per 1,000 cubic feet (GPM), the heat content in Btu and the gravity of both the gas and liquids.

“Now we can do this almost instantaneously. It’s a whole new view of how we do our business,” Harless says. The ability to manage measurement data from natural gas, liquids, and condensates in the new Flow-Cal system helps balance its product from wellhead to plant tailgate.

“It makes the balancing process work seamlessly,” he says. The ability to perform daily, weekly, and monthly balancing provides DCP significant cost savings, although Harless says it is difficult to estimate precisely how much is saved. Previously, DCP managers pulled data out of the system and imported it into spreadsheets to perform balancing functions. The new system does this internally and seamlessly, he says.

In addition, Flow-Cal helps DCP Midstream stay current with evolving industry standards. Both Flow-Cal and
DCP staff are members of the American Petroleum Institute and the Gas Processors’ Association, helping them to remain abreast of impending changes and assure compliance with new standards.

Also, the new system has improved DCP’s validation process. The company’s 40,000 meters collect data on an hourly basis and send that data to Flow-Cal, which stores and processes the data and then looks for anomalies in the flow of the gas and liquids. “We have approximately one million records of data going into the system every day,” Harless says.

The system allows DCP analysts to resolve the anomalies and figure out if there is a problem with the data or the physical infrastructure that transports the gas and liquids from the wellhead. Previously, analysts sorted through the data to try to find any potential trouble. The new system flags potential anomalies for them and brings it to their attention.

“Now we have the system finding the problems and our analysts work to solve them,” he says. “The data management and data validation process is very efficient.”

The balancing process is now handled within the new system. All readings from the wellhead are reconciled with readings from different meters at the plant entrances and residue lines.

If, for example, an on-line chromatograph stopped working or a meter went to sleep, the new system would flag it and bring it to the attention of the analysts. “We have an opportunity to detect that problem much earlier,” he says. “In the past, it could be as long as 45 days before we learned of the problem. Now we can identify the problem within one to three days,” he says. “And we have our analysts fixing the problems rather than looking for them.”

Also, the new system calculates theoretical gallon balances, meaning it measures gas samples at the wellhead and calculates an estimate of the amount of liquids that the gas contains. That theoretical estimate is then compared with the actual liquids that flow out of the plant. Performing this function in Flow-Cal is more efficient than the spreadsheet approach used in the past, Harless says.

“We used to do this in spreadsheets, but in the past we only performed the GPM balancing function on a monthly basis and only on systems with a known problem because it took so long,” he says. “Now we can do it instantaneously.”

DCP settles with their customers liquid components recovered at the gas plants from the gas stream. “Utilizing a measurement management system that enables us to efficiently manage our gas and liquids to identify problems as they occur helps ensure our customers’ products are measured accurately,” he says.

The new data management system helps them to identify sampling issues and measure the efficiency of its gathering and gas processing systems.

**Other clients**

In addition to DCP, other Flow-Cal clients have found reasons to use the system. “Taking advantage of the data resolution offered by today’s flow computers is a natural evolution for the liquid industry,” states Jon Milliken, vice president and general manager of Emerson’s Daniel Product Group. “It provides assurances that substantiate the original calculated values while also facilitating more accurate recalculations when adjustments are required.”

One of Flow-Cal’s strategies is to join professional trade committees that establish industry standards. This helps it to remain at the forefront of evolving standards and provides a degree of influence, while also giving them further credibility among colleagues. One of the strongest and most recognized standard organizations is the American Petroleum Institute (API).

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“In 2007, API turned to Flow-Cal to support different software options for their Manual of Petroleum Measurement Standards (MPMS) Chapter 11.1 for volume correction factors,” says Lakshmy Mahon, manager of publications department at API.

In addition, Flow-Cal has hired a number of subject-matter experts to help it develop and support its products. “In this burgeoning midstream sector, there is a shortage of liquid measurement expertise. We work hard to attract and retain our talent,” Squyres says. “We approach this business as an industry peer.”

Flow-Cal feels fortunate to have aggressively invested in its liquid applications before others recognized the growth potential. As a result, the company is moving its corporate headquarters to a larger building to accommodate its expanding staff. To that end, it has begun an aggressive recruiting program, including off-site job fairs focused on software development, support and sales.