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Drilling Into Operational Metrics in the Energy Industry

Using in-memory computing and analytics, Continental Resources makes better decisions to keep its oil wells pumping more efficiently.

BY JOE MULLICH

The oil and gas industry has long used analytics to determine where to drill for reserves that are generally 5,000 to 35,000 feet below the earth's surface. Relatively new, however, is that the "digital oilfield" is now expanding the use of analytics to gain fresh insight into the performance of those wells once they are producing.

Continental Resources at a Glance

- **Headquarters:** Oklahoma City, OK
- **Founded:** 1967
- **Products:** oil and natural gas
- **2012 Revenues:** $2.4 billion
- **Employees:** 900

www.contres.com

Source: Continental Resources

Few companies are as far along in realizing the operational savings from the "big data" that is collected in the field, along with its analysis, than Continental Resources, one of the top 10 independent oil producers in the United States. "The emerging trend is collecting data to provide us with better operational efficiencies," says Nik Pottala, Continental's CIO and vice president of administration.

Making better use of oil field assets and information is imperative as Continental undergoes rapid expansion. In October 2012, the company announced an aggressive five-year plan to triple production and the number of proven reserves by year-end 2017. "The exponential growth of the company is driving incredible opportunities," Pottala says, "including the opportunity to do something with all the data we are collecting."

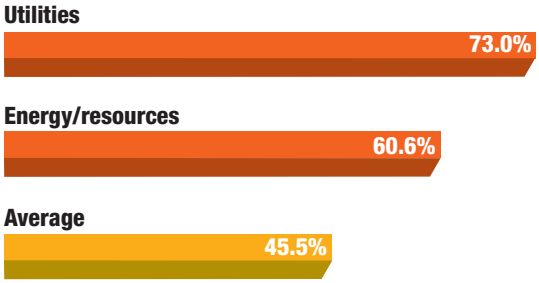
The Real-Time Edge

Since its inception, Continental Resources has been a leader in using advanced technologies to explore and produce oil and natural gas. It was one of the first companies, for example, to implement horizontal drilling to access resources that were once thought unrecoverable.

The Bakken play of North Dakota and Montana—one of the primary areas where Continental drills—is a notoriously difficult area for exploration. However, thanks to recent technology breakthroughs adding to drilling and completion efficiencies, Continental has reduced its average cost to drill a well from $9.2 million in 2012 to about $8.2 million today.[1] Applying automation and analytics to achieve operational efficiencies is the next logical step for the fast-growing energy company.

FIGURE 1 **Betting Big on Big Data**

Process companies in the utilities and energy/resources sectors lead the pack of global industries in expected big data investment returns. (mean percent of expected return in 2012)



Base: Survey of 1,200 executives in global companies in North America, Europe, Asia-Pacific and Latin America

Source: Tata Consultancy Services

Previously, much of the data produced by the wells was gathered manually. "In the past, we might have someone drive to the well once a week to collect the data," Pottala says. "After that, it might take another week to analyze the data." In early 2012, the firm required hours to consolidate operational metrics from multiple sources to generate a single key performance indicator. As a result, the reports were produced only once a month, which meant that the latest information was not always available.

1. DiLallo, Matt. "Drilling Down Into Bakken Well Costs." *The Motley Fool*, May 31, 2013. http://goo.gl/eOchcE

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Continental has recently implemented new analytics at the wellhead, enabling it to capture flow rate and other information more accurately. Now, instead of having workers physically collect the data, the information is fed into a central location in real time, where a single person can monitor and analyze several wells a day.

As a result, "We can see if the day-to-day production of a well is decreasing at a level we didn't expect," Pottala says. "By understanding the anomalies more quickly, we can make better decisions about improving or stopping production based on the economics of the decision."

Better Scientific Analysis of Big Data

Continental's initial use of analytics focused on developing data dashboards that depict information in graphical form. This approach makes it easy for executives to detect trends and take action, and it was an important step in turning information into insights more quickly.

Company Timeline

- **1967:** Founded as Shelly Dean Oil Co.
- **1990:** Renamed Continental Resources
- **1993:** Expanded into the U.S. Rocky Mountain region using 3D seismic data
- **2003:** Entered the North Dakota Bakken with a 300,000-acre purchase
- **2010:** Surpassed the 500-employee mark

Although the company's current focus remains in operations as a way to monitor progress related to growth targets, Continental is venturing into non-operational analytics—including predictive analytics. Says Pottala: "The anticipated value of the technology is to help us understand specific trends in a manner for us to save time reacting. Interpretation of data is key today in any oil and gas exploration company as it sets the direction for where to drill. The more companies can take advantage of a more objective or scientific analysis of 'big data,' the more we anticipate this leading to more efficiencies in the future."

The next stage for Continental is using in-memory computing, which can aggregate and analyze huge amounts of information quickly. The company has tested the technology for operational reports, such as financial data related to production with some budgeting assumption. Currently, Continental is in the midst of moving to a full-fledged production environment with in-memory computing. "Certain operational reports that took 10 to 12 hours to run in the past can be done in 15 to 30 minutes using in-memory computing," Pottala says. "People here are absolutely elated about that."

Continental's IT Challenges

- Speed collection of data about oil well production
- Get information to decision-makers quicker
- Reduce time needed to generate reports

Continental's Real-Time Solution

- Install analytics at oil wellheads
- Implement analytics dashboards
- Use in-memory computing to speed aggregation and analysis of data

More Savings Ahead

Pottala believes in-memory computing will help make better decisions on other key issues, such as determining when it makes economic sense to close a well. Today, when forecasting how quickly a well will be depleted, Continental uses algorithms based primarily on geography and other variables from when the well was first drilled. These details provide executives with several different scenarios.

"The in-memory computing technology will allow us to use the actual production data from a well in real time, giving us the ability to have a more precise, targeted solution," Pottala says. "By having this information, we we can tweak scenarios faster to find the best possible future outcome. When you aggregate that ability over numerous oil wells, it makes a huge difference to the company in terms of efficiency and cost savings." •

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Big Data Analytics Delivers Real-Time Insights for Energy, Process Industries

New research, qualitative interviews and the report from Bloomberg Businessweek Research Services clearly show that energy and process industries struggle to leverage big data and analytics today to improve profitability, mitigate risk and increase expectations for returns on investments in these technologies.

Many companies face inflexible legacy systems, lack of enterprise-wide analytic tools and large volumes of a wide variety of data (structured, semi-structured and unstructured). This creates what is known as the big data problem. SAP's energy and process industry team discusses how technology innovations and real-time insights can help energy and process industry companies overcome these challenges and drive business results—including better ways to reach customers, better asset maintenance and better risk mitigation.

How do technology innovations solve the challenges faced by most energy and process companies today?
A fast analytical platform that can handle large amounts of transactional and process data quickly and effectively in real time is the foundation solution. The in-memory computing platform called SAP HANA® is built to store and analyze big data from multiple systems. It helps companies achieve a more comprehensive—and instant—view of their assets, customers and business performance. The solution from SAP consists of the SAP BusinessObjects Business Intelligence platform, agile data visualization by SAP Lumira and the ability to leverage sophisticated models and algorithms to predict customer behavior with SAP Predictive Analysis.

What can energy and process companies do to derive real-time insights?
To start with, a company needs to assess its current status. For example, are you able to maximize return on capital invested? Are you able to keep up with dynamic markets, customer needs and regulations? Are you able to manage your assets efficiently? Are you able to deliver the right insight to your internal stakeholders to support decision-making and customer service? Second, define your vision for the future. For example, how will your customer needs change? How will your company's offerings need to change? How will you deliver products and services to your future customers? Finally, consider taking a gradual approach to your transformation.

The most immediate value SAP HANA and analytics can provide utility companies—independent systems operators (ISOs) that must handle large quantities of data every day—is to keep the power markets functioning, detect fraud and theft, and identify unbilled accounts. Energy and process companies are also starting to realize savings by using analytics to prioritize capital investments in equipment and to integrate sales and operations planning that support real-time what-if simulations and social collaboration. In addition, by analyzing data from smart meters, utilities can gain a better understanding of customers' consumption behavior.

Select a line of business or a region as a test bed and implement an integrated, real-time reporting and analytics solution. Using SAP HANA, energy and process companies will quickly discover how the sheer speed and flexibility of the platform provide immediate value to business users. Then adopt an enterprise-wide analytics strategy that includes big data. The SAP BusinessObjects Business Intelligence suite will support that strategy. It is a simple, one-stop solution that supports big data, real-time insights, agile visualization and predictive analytics.

For more information please visit this Web site: www.sap.com/appliedanalytics/

SAP's Recipe for Success

- **SAP HANA** platform handles your big data challenges and delivers real-time insights
- **SAP BusinessObjects** Business Intelligence suite enables every individual in the organization to make fact-based decisions via easily accessible and relevant information whenever and wherever needed
- **SAP Lumira** is an agile data visualization solution that helps decision-makers easily discover unique insights
- **SAP Predictive Analysis** empowers business users with predictive and advanced analytics
- **SAP Solutions for Social Media** is for analyzing social data and improving business customer experience
- **SAP Services** help you differentiate your company and make more profitable business decisions

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