Optimize Oil and Gas Production and Efficiency

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Big Data Analytics Increase Hydrocarbon Recovery and Improve Decision-Making

Forces such as rising energy prices, diminishing supplies of hydrocarbons and the pressure to reduce greenhouse gas emissions are leading the oil and gas industry to seek better solutions. The industry is making efforts to optimize recovery, improve drilling efficiency and streamline performance forecasts. One key to this approach is finding new ways to turn big data captured by hundreds of sensors on drilling rigs and other equipment into business knowledge that can improve productivity and efficiency.

With deep experience in both heavy machinery construction, and collection and analysis of big data from large machinery, Hitachi is uniquely positioned to support innovations in the oil and gas industry. Through our efforts with the Energy & Environmental Research Center (EERC), we are developing big data analytics solutions. Our work will help oil and gas companies turn data into prescriptive solutions to guide decisions about where and how to drill for optimal results.

Make Sense of Historical and Real-Time Data

Modern drilling rigs are equipped with hundreds of sensors that capture massive amounts of information throughout the drilling process. Today, much of that data flows to computer systems on-site or at remote monitoring facilities and is monitored by people who watch gauges and listen for alarms or other notifications. However, the data is typically passed into a historical data repository and is never looked at again.

Thanks to the power of big data analytics and rapid access to both unstructured and structured data, companies can now analyze both real-time data streams and historical data. The historical data is a particularly valuable resource because it can be used to identify trends and patterns, establish benchmarks and determine guidelines for future operations. The real-time data can then be assessed based on that deeper understanding, helping to ensure operational safety during the actual drilling process.

Most importantly, ongoing analysis of historical and real-time data can eventually drive predictions regarding expectations for new drilling ventures and how to complete new wells in the most safe, efficient and economical manner.
Apply Proven Solutions to the Oil and Gas Industry

Hitachi has developed numerous products and services that are being used in the oil and gas industry. For instance, Hitachi has developed compressors and generators with integrated sensors that provide raw data regarding temperatures and pressures. Predictive analytics can turn that data into knowledge regarding how to optimize maintenance schedules and gain insight into current operating conditions.

Another example of applicability to the oil and gas industry involves Hitachi Railway Systems. Through that subsidiary, Hitachi provides heavy manufacturing of rail stock, as well as integrated signaling systems, component monitoring, power supplies and traffic management. These capabilities can help oil and gas companies that are developing modern production facilities requiring the integration of heavy equipment manufacturing and advanced technology solutions.

Hitachi also developed a solution that made it possible to analyze a real-time data stream of stock prices in the Japanese stock exchange to support better decision-making. Hitachi now applies similar data collection and analyzing technologies, tested and proven over time, to the oil and gas industry.

Build Better Wells With Greater Insights

Hitachi is working with the EERC to develop new approaches for exploring, developing and producing oil and gas. The EERC is a unique research facility hosted by the University of North Dakota in Grand Forks. There, 250 scientists, engineers and support personnel work to develop innovative solutions to today’s pressing environmental problems.

The EERC has invited Hitachi to join the Bakken Consortium. The organization seeks to deploy the most advanced technology available to investigate opportunities to optimize drilling at horizontal Bakken formation wells in the Williston Basin in western North Dakota. With the addition of Hitachi, the consortium now benefits from a global manufacturing and IT-solutions company to provide a more comprehensive big data analytics solution.

Optimize Drilling, Completion and Production

Together, Hitachi and the EERC are developing an analytical service that will employ multivariate analysis. This analysis will evaluate complex, nonintuitive interrelationships among geology, completions, production and operations in the Bakken oilfield and help oil and gas companies achieve 3 goals:

1. Optimize Hydrocarbon Recovery
An estimated 32 billion barrels of recoverable oil exist in the Bakken oilfield today, using a recovery factor of 3.5%. Using big data analytics, the recovery rate can be increased by 0.5%, which translates to 4 billion barrels of oil and US$400 billion at today’s oil prices. Big data analytics will also be used to refine the broad estimates of the oil in place, which ranges from 10 billion to 900 billion barrels. More refined figures are needed to support the large-scale capital investments required to support the oilfield.

2. Improve Drilling Efficiency
The average cost of drilling a single well in the Bakken oilfields was US$8.5 million in 2013, down from US$11.3 million in 2012.
By applying big data analytics to drilling data, more areas can be identified to lower the cost even further. In addition, the use of predictive analytics will prepare crews for drilling new wells and help ensure that their equipment is maintained on a schedule that reduces nonproductive time.


Big data analytics will also enable oil and gas companies to streamline and improve the accuracy of their performance forecasts. Better forecasting is just one example of how big data analytics, and the prescriptive information it generates, can optimize future business decisions regarding where and how to drill.

Lead the Way to Greater Energy Security

The oil and gas industry is under greater pressure than ever to get the most resources out of available sites, using safe methods that minimally impact the environment. To do so, companies need innovative, practical solutions that combine deep knowledge and experience in both operations technology (OT) and information technology (IT). Through our strengths in both IT and OT, Hitachi is uniquely positioned to help the industry achieve its goals.

Unlike other technology vendors, Hitachi has machine data in our DNA: We build the machines and social infrastructure that are increasingly producing big data. And in the digital world, we build the IT hardware and software to capture, manage and analyze big data, and turn it into insights that generate business advantage.

Through the innovative research being conducted in our big data labs, Hitachi is building the expertise and platforms to turn big data into big value. We help oil and gas companies make better business decisions that result in greater efficiency and productivity, and more energy resources for us all.