Using Big Data to Optimize Oil Well Production

Company Realizes Over $100 Million Per Year in Incremental Revenue

Challenges

A major Fortune 500 oil and natural gas exploration and production company has a large portfolio of oil and gas properties. These wells, which include thousands of wells onshore in the U.S. and Canada, provide stable, environmentally responsible production of over 500 thousand barrels of oil equivalent per day.

For years, the site managers at this company collected large volumes of granular sensor data about well depth, gamma readings, and more. They did their best to join it with information about the type of each well, the equipment used, related geospatial data, historical well performance, and more. But because well data was fragmented across site locations and spreadsheets, the company’s Enterprise Data Management & Analytics team couldn’t provide business users with an easy way to explore all of this data. Management wanted a tool to help them aggregate data, compare well designs and methods to stimulate well production, and determine which completion practices will yield the best results across different geographical areas.

To achieve this goal, the company needed a way to aggregate all of its well sensor data, historical productivity data, and geospatial data, as well as publicly available data on the productivity of competitor wells, and analyze it for insights into completions. By looking at the average production of wells at 30-, 60-, and 90-day intervals across the continental United States, business analysts could see if the company’s wells are under- or over-performing relative to competitors, as well as see what well configurations and operational practices consistently yield the best and worst results.
Solution

This oil and gas company evaluated different solutions and ultimately chose to deploy Datameer Big Data Analytics, as it provided a fast, easy way to bring together data from diverse sources and make it ready for analysis. The entire solution was fully implemented in just three days, and training of 14 users and one power user took just one day.

To collect data from internal and publicly available sources, Datameer used a number of integration methods. For example, datalinks were used to provide raw data for workbooks where nightly data refreshes were required. And direct database connections were used when refresh requirements were more frequent or required a custom SQL. Well data was then enriched with geospatial data, which identifies the geographic location and characteristics of natural or constructed features and boundaries of the land for proposed wells. Data was then exported to the company’s analytics suite – which includes Datameer software – for analysis and modeling by business users.

Now, business analysts use Datameer’s intuitive, Excel-like user interface to access complete and up-to-date data on all company’s wells – data that until now, has been unavailable for easy consumption and analysis. They can instantly:

- Identify industry trends in well stimulation faster and earlier
- Correlate stimulation parameters to well performance for each company
- Benchmark company well performance against peers
- Collect inputs for greater reservoir characterization and well engineering optimization processes

And based on this information and insights, business users can make informed decisions regarding completions and new production processes to boost production and profitability.

Benefits

With Datameer, the company’s business users can access and explore datasets that previously were not possible to create. And as a result, production engineers can arrive at better production decisions faster – decisions that will increase profitability by lowering well costs and increasing well performance.

For example, business analysts were able to identify the highest performing wells, as well as what made them perform optimally. Using these insights, the production team developed a new and enhanced well design. Already implemented across multiple wells, the new design is contributing to a 60% increase in well performance, increasing annual production by over $100M per year.

![30-Day IP Rates Chart](image-url)

**30-Day IP Rates (BOED)**

<table>
<thead>
<tr>
<th>Old Design</th>
<th>New Design</th>
</tr>
</thead>
<tbody>
<tr>
<td>575</td>
<td>&gt;60% Increase</td>
</tr>
<tr>
<td>940</td>
<td></td>
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**FIGURE 1:** The new well design – developed based on insights from Datameer, has increased well performance 60% compared to the old design.
Future Plans

Looking ahead, this oil & gas company plans to use Datameer to solve other business problems. For example, the company leases some of the land on which it drills wells from private homeowners. Land underground is typically leased for 20 to 30 years with options to extend the lease — if wells on the property are continuing to produce sufficiently. Management would like to use Datameer to accurately determine which wells near the end of their lease term are sustaining production or declining in production and which could be stimulated or modified to generate sufficient output. Based on these insights, decision makers can choose whether or not to pick up the option to extend a lease or end a lease. Production engineers can also use Datameer to identify low-performing wells that are too close to each other; by shutting down one of the wells, they may be able to lower operational spending, but gain greater overall efficiency and output.