


 An offshore oil and gas platform is shown at sunset, with the sun low on the horizon over the ocean. The platform's complex structure of pipes and steel beams is silhouetted against the bright sky.

> Solution Brief

Business Impact

For the oil and gas industry, production forecasting is a highly complex task, and as such requires an advanced analytical engine to achieve robust forecasts.

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Challenges

- **Data size and complexity.** Given large yet inconsistent data, it can be tedious to select a statistically correct sample.
- **Over-reliance on deterministic approaches.** Many people rely on empirical, interpretive approaches and are reluctant to adopt statistical methods.
- **Difficulty analyzing future production.** Unconventional oil and gas wells lack historical data, making future production extremely hard to forecast.
- **Outdated platforms.** Existing systems provide data that requires interpretation by engineers rather than a platform for advanced analysis.

Improve Oilfield Production Forecasting With Predictive Analytics

The Issue

Estimating reserves and predicting production in reservoirs has always been a challenge. The complexity of data, combined with limited analytical insights, means some upstream companies do not fully understand the integrity of wells under management. In addition, it can take weeks or months to establish and model alternative scenarios, potentially resulting in missed opportunities to capitalize on market conditions.

Performing accurate analysis and interpretation of reservoir behavior is fundamental to assessing extant reserves and potential forecasts for production. Decline curve analysis is traditionally used to provide deterministic estimates for future performance and remaining reserves. But unfortunately, deterministic estimates contain significant uncertainty. As a result, the deterministic prediction of future decline is often far from the actual future production trend - making the single deterministic value of reserves nowhere close to reality. Probabilistic approaches, on the other hand, quantify the uncertainty and improve estimated ultimate recovery (EUR).

Our Approach

Predictive analytics, combined with decline curve methodologies, provides more informative forecasting results of future production. SAS delivers software and services to help you:

- **Access well and reservoir data quickly and easily** with automated data profiling and time-series selection.
- **Apply analytical functions consistently** using a forecasting solution that automatically selects the best model but allows human intervention and benchmarking for repeatability.
- **Perform decline analysis quickly** with a robust analytical engine that provides what-if scenarios to model EUR based on a pre-defined range of easy-to-adjust, industry-standard default values.
- **Estimate unconventional sources of well production more accurately** using best-fit prediction that uses smaller data sets when large volumes of historical data are not available.

SAS gives upstream oil and gas companies a deeper understanding of future production under current and simulated conditions.

The SAS® Difference: More informed development planning and robust production forecasts

Rigorous, automated analytical techniques improve confidence in reserves estimation. These techniques also generate results your company can rely on for financial reporting. Only SAS provides:

- **Robust data management.** Unlike any other decline curve analysis solution, SAS' analytical techniques define the most statistically significant data set for the production forecast. SAS solutions normalize data distributions and minimize rogue values to ensure compatibility of data sets with curve type selection.
- **What-if analyses.** Better predictions result from evaluating performance of wells and reservoirs under simulated business and environmental conditions.
- **Advanced data visualization.** With SAS, you can rapidly identify and visualize problematic wells or reservoirs. There are no restrictions on data size, and results can be delivered via desktop or mobile devices.
- **Probabilistic forecasts.** Advanced analytical approaches go beyond business as usual to quantify measures of uncertainty, increase forecast robustness and deepen understanding of oilfield performance.

SAS delivers reliable forecasts using a rich compendium of techniques, all accessed through user-friendly Web interfaces.

Case Study: A national oil and gas company

Situation

Reservoir engineers analyzed thousands of wells to estimate oil reserves. But due to high volumes of data on each well and the capabilities of existing systems, only a limited number of wells could be included in the analysis. To compensate, engineers used a deterministic sampling process that increased forecast uncertainty. Data errors, or outliers, had to be flagged manually, which was time-intensive. When the company mandated reviews of field redevelopment plans every three months, it was time to find a new system that would reduce resource constraints.

Solution

A targeted, Web-based solution from SAS helped the company to:

- Aggregate, analyze and forecast well and reservoir production.
- Automatically detect and cleanse bad data.
- Publish and share results of analysis throughout the company.

Results

- Increased reliance on analysis due to better availability and confidence in results.
- Fewer data exceptions and more frequent, consistent reports.
- More time for strategic planning because less time is spent cleansing data and comparing forecasting models.
- Senior engineers can evaluate multiple what-if scenarios and make better reservoir forecasts.

What if you could ...

Quickly assemble and clean up oilfield performance data

What if engineers had fast, easy access to well and reservoir data?

Make all analyses based on the same assumptions

What if your forecasting solution could automatically select the best models, but still allow manual adjustments and benchmarking for repeatability?

Confidently estimate new well or unconventional reserve sources

What if you could use best-fit prediction based on smaller data sets when large volumes of historical data aren't available?

Make faster, more accurate decline analysis

What if you could more accurately quantify the impact of permeability and porosity on predicted flow rates?

You can. SAS gives you THE POWER TO KNOW®.

SAS Facts

- SAS helps customers at more than 70,000 sites improve performance and deliver value by making better decisions faster.
- SAS has more than 90 customers worldwide in the oil and gas industry.
- SAS is a Leader in "The Forrester Wave™: Big Data Predictive Analytics Solutions, Q1 2013."

Learn more about SAS software and services for oil and gas at: sas.com/oilgas