

# Improve drilling efficiency with predictive analytics on contextualized data



## Business Impact

"For an average offshore O&G operator, drilling and completion (D&C) accounts for about 40% to 50% of total capital expenditure; for many onshore operators, D&C expenditures can be as high as 65%."<sup>1</sup>

## Challenges

- **Disparate data.** Multiple vendor solutions on a well site create inconsistencies in surface and subsurface data, as well as time and depth indexes.
- **Insufficient data quality and governance.** With multiple disciplines working on data sets at the same time, and new data from embedded sensors, maintaining a single source of the truth can be complex.
- **Relevant metrics.** Performance can no longer be measured based on time spent to drill. The competitive reality of low prices demands new performance metrics for drilling and wellbore quality.
- **Unstructured data.** Most analytical systems cannot integrate unstructured text from reports and log comments, which could improve the speed and insight into drilling performance issues.

## The Issue

Drilling is one of the most critical, dangerous, complex and costly operations in the oil and gas industry. As such, there's a pressing need not only to improve drilling efficiency but also to predict and prescribe against future problems, such as equipment failures or stuck pipes.<sup>1</sup>

Embedded sensors, connected to the industrial internet of things (IIoT), have increased the granularity and frequency of data collected during the drilling process – but the data is often siloed and underutilized. This lack of integration can lead to expensive, time-consuming problems during the drilling process. Inefficient drilling programs can have an even greater aggregate financial impact, causing cost over-runs, delays in well completions and production on-stream dates, unexpected shutdowns and accidents.

## Our Approach

SAS provides insight into parameters that can improve drilling efficiency from planning through execution and completion. We approach this problem with software and services to help you:

- **Uncover hidden patterns in data.** SAS links data from the formation (variables such as rock properties) and drilling operational parameters (weight on bit and rate of penetration) with drilling system designs (well plans) to identify optimal conditions for every stage of drilling.
- **Deploy analytics on the edge.** Once patterns are identified, a predictive model can be deployed within the IIoT infrastructure to analyze data in motion and deliver new insights to drilling engineers.
- **Quantify drilling success.** Data mining techniques applied to a comprehensive data set identify potential correlations between drilling activity and process inefficiencies that lead to invisible lost time.
- **Rely on root-cause analysis to guide decisions.** SAS enables you to predict both surface and down-hole equipment failures and immediately determine which operational parameters to adjust to avoid costly nonproductive time (NPT).

<sup>1</sup> *How to Achieve 50% Reduction in Offshore Drilling Costs.* McKinsey & Company, May 2015.

Advanced analytical methodologies from SAS develop a predictive model that provides early warnings about events that could adversely affect drilling time, cost and safety.

## Enhanced drilling decisions based on data-driven insights

SAS improves drilling efficiency through its broad expertise in data integration, data quality and advanced analytics, including optimization, data mining and predictive modeling.

- **Identify KPIs behind efficient drilling operations.** SAS analyzes the statistical relationship between data on relevant drilling incidents (e.g., equipment failures, well control issues, losses, stuck pipes) and key performance indicators (e.g., wellbore tortuosity, ROP, cost per foot and foot per day).
- **Reduce nonproductive time and invisible lost time** with powerful data integration and data management tools. SAS collects and analyzes key data from the entire drilling operation, validates it with proven quality control processes, then integrates it with an easy-to-use analytical data mart.
- **Visualize and analyze drilling performance in near-real time.** Visualization software from SAS makes it quick and easy to view, analyze and communicate the latest information on current and potential drilling performance - both at the office and on the rig site.

SAS provides an integrated platform and a complete predictive analytics solution so you can take advantage of data-driven predictive models in near-real time.

## Large national oil and gas company

### Situation

The company wanted to identify in real time the optimal values for drilling process operational parameters so it could maximize drilling efficiency, increase the ROP and decrease costs. To succeed, it had to manage the ROP in the context of other performance metrics such as cost per foot, foot per day and mechanical specific energy.

### Solution

To optimize the drilling program, SAS Analytics identified the factors that most influenced ROP, enabling the customer to understand the optimum range of values for controllable factors in real time. The controllable or operational parameters available for analysis were revolutions per minute, weight on bit, slow pump pressure, drill bit selection, bottom hole assembly, rig type, logging while drilling, measurements while drilling, driller profiles and experience.

### Result

The first wells in the pilot program exhibited a significantly improved rate of penetration, increasing the foot per day by 12 percent. In addition, nonproductive time was reduced by 18 percent during the drilling phase.

## Optimize operational performance

What if you could accurately predict and manage all the variables or situations that affect performance or safety?

## Improve ROI and reduce nonproductive time

What if you could aggregate all drilling ecosystem data, including IIoT sensor data, and compare operational performance across all of your rigs?

## Monitor events and manage KPIs in real time

What if you could visualize your risks and predict the best actions to help you avoid excessive cost, dangerous situations and inefficiency?

## Accurately determine feasibility

What if you could evaluate multiple drilling scenarios to model economic feasibility?

## SAS Facts

- SAS software is used by more than 560 energy firms worldwide, including 9 of the top 10 oil producers and all six supermajors.
- SAS Analytics consistently receives top awards from industry analysts.
- SAS customers at more than 80,000 sites use our software to improve performance and deliver value by making better decisions faster.

Learn more about SAS software and services for oil and gas:

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