CASE STUDY

HALLIBURTON

Indonesia

Real-time automation reduces nonproductive time on deepwater wells offshore Indonesia

First application of BaraLogix® real-time monitoring delivers automated drilling fluid measurement and digital twin hydraulics

CHALLENGE

- Complex geology in narrow pressure window environments
- Packing off from excessive rate of penetration
- Severe lost circulation events
- Nonproductive time from sidetracks

SOLUTION

- BaraLogix® real-time monitoring and automation services
- Automated drilling fluid density and rheology measurements
- Digital twin simulation of pressure and hole cleaning
- Early identification of drilling risks

RESULT

- Prevented induced downhole losses
- Reduced nonproductive time
- Optimized drilling parameters
- Reduced risk of induced downhole losses and associated NPT

Overview

A deepwater operator offshore Indonesia drills wells in environments characterized by complex geology and extremely narrow pressure windows. In several intervals, equivalent circulating density (ECD) values approached or exceeded fracture gradients, creating a high-risk drilling environment. These conditions historically led to wellbore instability, frequent pack-off events, induced losses, and challenges running casing to total depth. In some cases, these issues resulted in costly sidetracks and extended nonproductive time (NPT).

The operator sought a more reliable way to manage hydraulics and hole cleaning in real time while maintaining drilling performance. After experiencing significant losses and NPT on an offset well, the operator collaborated with Halliburton to introduce automated drilling fluid measurements and real-time predictive hydraulic modeling. This approach aimed to provide continuous, high-quality data and proactive intervention to keep operations within a narrow hydraulic window while reducing invisible lost time.

Challenge

Previous offset wells highlighted the difficulty of drilling intermediate and reservoir sections in high-inclination intervals exceeding 70°. The lithology consisted of interbedded shale, siltstone, and sandstone, which complicated hole cleaning, particularly when high rates of penetration (ROP) were pursued. Excessive ROP recommendations from another real-time hydraulics provider contributed to poor hole cleaning, pack-off incidents, and induced losses.

During one offset well, these challenges prevented the casing from being run to bottom, requiring three sidetracks to complete the target interval. Total formation losses reached approximately 9,000 bbl of nonaqueous fluid, equating to about $2 million in fluid costs alone, excluding additional rig time and sidetrack expenses. The operator needed a solution that could accurately reflect actual downhole conditions, detect early warning signs of instability, and guide drilling decisions before losses or NPT occurred.

CASE STUDY

Solution

Halliburton recommended deploying the BaraLogix® real-time monitoring service to support predictive pressure management with automated drilling fluid measurements. The service used a density and rheology unit on a semisubmersible rig to deliver fluid density data every 1 to 2 minutes and rheology profiles every 10 to 12 minutes, removing some of the delay and variability associated with manual sampling.

Continuous fluid data were integrated with real-time drilling parameters and hydraulic simulation software to create a digital twin of the wellbore. The model simulated temperature, pressure, and hole-cleaning behavior under changing conditions and defined operational boundaries to maintain the hydraulic window.

Engineers at a remote operations center applied workflow-driven processes to monitor conditions and identify risks. Advisory services issued alerts as parameters approached limits, enabling proactive adjustments. The drilling fluid system was also tailored to reduce downhole pressure fluctuations and improve stability.

This integrated approach provided a continuous view of downhole conditions and operational guidance for managing ROP, rotary speed, and other drilling parameters in real-time.

Result

The BaraLogix® real-time monitoring service and digital twin workflow were deployed on three deepwater wells across intermediate and reservoir sections. The system identified potential drilling issues early, including poor hole cleaning, excessive ECD, swab and surge pressures, and suboptimal parameters, and communicated them through a structured alert process to rig and office teams.

Nineteen alerts enabled timely parameter adjustments that prevented packing off and induced losses. For example, during a 12.25 in. interval at about 3,197 m, increasing the rotary speed by 37.5% reduced cuttings load from 6.33% to approximately 4% and stabilized hole cleaning.

The approach reduced induced losses and associated nonproductive time compared to an offset well without the service. Algorithms estimated a potential rig time reduction of about four days (93.61 hours) based on optimized ROP and proactive intervention within the hydraulic window.

> This project demonstrated drilling fluids automation combined with Baralogix® real-time monitoring significantly improves efficiency and mitigates drilling risks in ultra-deepwater applications characterized by narrow PPFG windows.
>
> – Operator Drilling Engineer

Across the three wells, the combined use of automated fluid measurements and real-time modeling was associated with improved decision-making, increased drilling efficiency, and reduced deepwater operating costs.

For more information, contact your local Halliburton representative or visit us on the web at www.halliburton.com

halliburton.com

HALLIBURTON