EXEBENUS
SPOTTER™

STUCK PIPE AGENT

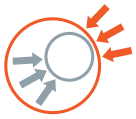
Predictive ML insights helps avoid stuck pipe by guiding real-time rig actions

To improve operational efficiency and reduce costly risks like stuck pipe, this operation focused on strengthening the communication process between Real-Time Operation Center (RTOC) engineers and rig teams—often strained by the speed and complexity of modern drilling.

Exebenus Spotter's machine learning (ML) agents were deployed to detect stuck pipe risks early, explain contributing factors, and integrate predictive insights with real-time data. This allowed engineers to deliver more trusted, actionable guidance—helping engineers cut through noise and enable faster, more confident proactive rig response. The result: improved mitigation, faster decisions, and the successful avoidance of stuck pipe incidents.

LOCATION

Gulf of Mexico, USA



CHALLENGE

In complex drilling environments, engineers must spot stuck pipe risks early and guide rig crews clearly—yet pressure, data overload, and unclear signals often cause delays. Without trusted insight, crews hesitate, and costly incidents like stuck pipe become harder to avoid.

SOLUTION

To support engineers under pressure, **Exebenus Spotter**'s ML agents delivered clear, early warnings with explanations of contributing factors. This helped RTOC staff turn complex data into trusted, actionable guidance, accelerating rig response and reducing guesswork.

RESULTS

Engineers used **Exebenus Spotter** to guide proactive action across the well—translating real-time ML insights into clear, timely decisions the rig could trust. This improved collaboration, enabled faster response, and helped avoid stuck pipe through every drilling stage.

THE STUCK PIPE AGENT'S PREDICTIVE INSIGHTS ENABLED TARGETED ACTION—PREVENTING A HIGH-COST STUCK PIPE EVENT.

ENGINEERS NEED EARLY WARNING THEY CAN TURN INTO TRUSTED RIG ACTION

Stuck pipe is one of the most costly and disruptive drilling events—often leading to days of nonproductive time (NPT) and hundreds of thousands in unplanned costs. Early detection is critical, but acting on predictive insights depends on more than data alone.

In this operation, the focus was on improving how predictive insights—specifically for stuck pipe risk—could be delivered in a way that rig crews could quickly understand, trust, and act on. Office-based monitoring engineers were equipped with **Exebenus Spotter Stuck Pipe Agents** to help identify developing risks earlier. The challenge was ensuring that these predictive warnings and alarms translated into timely, confident action at the rig, especially in the fast-paced, high-pressure environment of deepwater drilling.

ML AGENTS HELP ENGINEERS DELIVER FASTER, CLEARER GUIDANCE TO RIG

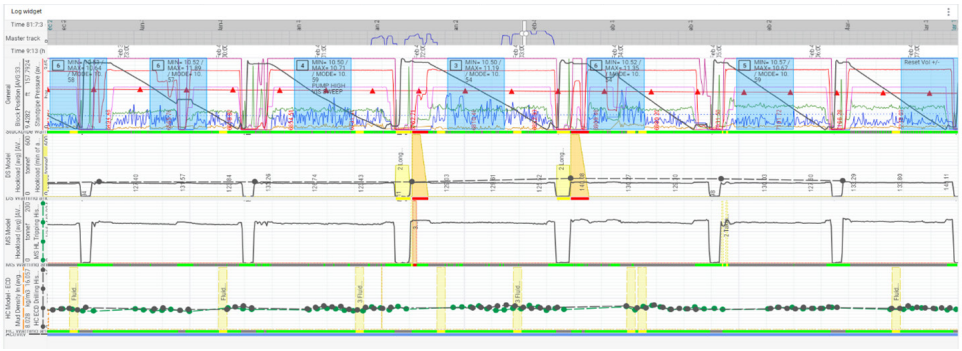
To support early detection of stuck pipe risks and improve drilling performance, Exebenus Spotter **Stuck Pipe Agent's—Hole Cleaning, Differential Sticking, and Mechanical Sticking Models**—were deployed in the RTOC. Engineers were trained to interpret predictive warnings and alarms, and integrate them with conventional real-time data for a more complete view of developing risks.

Unlike traditional monitoring tools, **Exebenus Spotter**'s ML agents not only flagged potential problems—they also explained contributing factors. Engineers were quickly trained to integrate **Exebenus Spotter** insight into daily workflows. This made it easier for engineers to prioritize, communicate data-backed guidance, and reduce the cognitive load associated with high-volume monitoring. The result was faster, clearer decision support that built rig crew trust and enabled proactive action.

RIG CREW RESPONDED WITH GREATER TRUST AND PRECISION, AVOIDING STUCK PIPE THROUGH TIMELY MITIGATION.

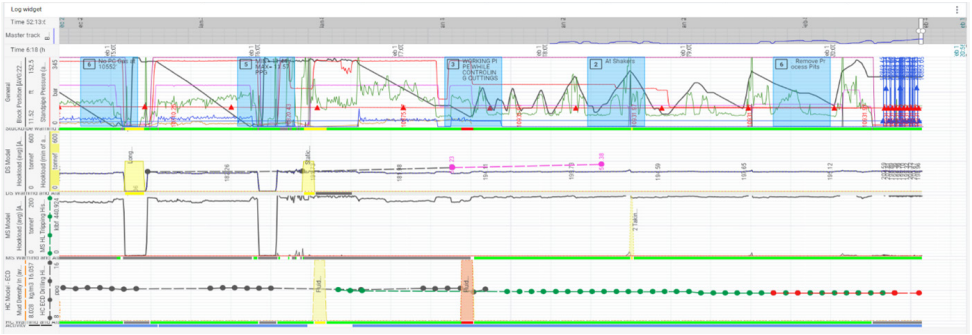
EXEBENUS SPOTTER'S REAL-TIME GUIDANCE HELPS AVOID STUCK PIPE ACROSS MULTIPLE SECTIONS

With real-time predictive guidance from **Exebenus Spotter**, engineers and rig crews worked in sync to prevent stuck pipe incidents across multiple sections of the well.



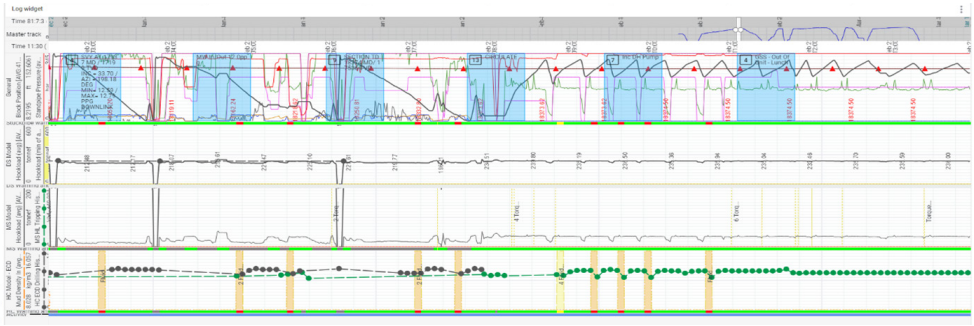
Observation: *Due to a narrow drilling window and small margins between the mud weight and the formation's fracture gradient (pore pressure), the operation required low mud weight and low flow rate. This compromised hole cleaning efficiency, increased drag and torque, raised static friction warnings, and heightened the risk of pipe sticking, as indicated by the Hole Cleaning and Differential Sticking Models.*

Action: *The RTOC informed the rig about the observed risk zone while working within this restricted pressure window. As a result, the rig spent considerable time circulating on bottom and back-reaming out of hole. The risk zone was observed again at the same depth while running the final casing in the 18 1/8" section, but the casing was run to TD without issues.*



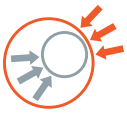
Observation: *The Differential Sticking and Hole Cleaning Models issued warning indicating there was poor cuttings transport.*

Action: *The rig confirmed the issue and took appropriate action by working the pipe while circulating out the cuttings.*



Observation: *While drilling the RTOC observed Exebenus Spotter issuing infrequent but numerous low-severity hole leaning warnings throughout the final quarter of the 12 ¼ x 14 3/4" sections.*

Action: *The rig was informed and responded by circulating—extensively and increasing the mud weight to ensure all debris and cuttings were circulated out of the hole.*



THE ML WARNINGS GAVE THE RIG TEAM TIME TO ACT — AVOIDING STUCK PIPE AND MAINTAINING DRILLING PROGRESS.

WHAT WORKS: ML WARNINGS, ENGINEERING-LED GUIDANCE, AND TEAM REPONSE

- **Predictive warnings simplify complexity:** ML-generated warnings and alarms helped engineers communicate timely, critical insights without overwhelming the rig team.
- **Feedback builds trust:** Ongoing confirmation of predictions built mutual confidence between RTOC and rig crew.
- **Proactive mitigation works:** Early detection and guidance enabled corrective actions before fully developed.
- **Integration depends on collaboration:** Success depends on strong teamwork between office-based engineers and rig personnel—sharing data, refining guidance, and delivering better results.
- **Usability accelerates adoption:** With minimal training, engineers were able to incorporate predictive ML into everyday desicion-making.

BY SHARING INSIGHTS, ALIGNING RESPONSES, AND WORKING AS ONE TEAM, ENGINEERS AND RIG CREWS AVOIDED STUCK PIPE AND IMPROVED DRILLING PERFORMANCE.

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