



EDGE AUTOPILOT™ **TECH-POWERED PERFORMANCE**

 **ENSIGN®**



REVOLUTIONIZE YOUR DRILLING OPERATIONS WITH EDGE AUTOPILOT™ ENGINEERED FOR EXCELLENCE

EDGE AUTOPILOT™ DELIVERS A COMPREHENSIVE TECHNOLOGY SUITE FOR TODAY'S DRILLING CHALLENGES, OPTIMIZING AND DRIVING REPEATABLE RELIABLE DRILLING PERFORMANCE AND CREW SAFETY.

EDGE AUTOPILOT™ coordinates the full suite of process automation to unlock the potential of our rig intelligence, algorithms and machine learning.

1. **Applications** automate processes and drive efficient and repeatable execution.
2. **Analytics + Portal** drive data-based decision making for continual improvement.
3. **The Advance Performance Management Team** will drive optimal repeatable performance on your rigs, making for enhanced well delivery.

Performance Automation Unleashed

EDGE AUTOPILOT™ APPLICATIONS

Navigate the future with EDGE AUTOPILOT™. The trailblazing technology that coordinates full process automation. Unlocking each rig's full potential with unmatched performance through intelligence, algorithms, and machine learning.

1. AUTODRILLER

2. Z-TORQUE / SOFT TORQUE

3. QUILL OSCILLATOR®

4. AUTO REAMER

5. AUTO DOWNLINK

6. PROACTIVE ENGINE MANAGEMENT

7. RIG IQ

8. AUTOMATED DRILLING SYSTEM (ADS)

9. AUTOMATIC TOOLFACE CONTROLLER (ATC)



Accelerates wellbore delivery times

1. AutoDriller

AutoDriller uses advanced algorithms to optimize the desired control mode, ensuring the correct WOB, DP, Torque or ROP setpoints are held for the duration of the stand. The system continuously calculates and then switches to the optimum control mode to ensure smooth and consistent drilling. Drillers have sophisticated AutoDriller tuning capabilities at their fingertips.

2. Z-Torque / Soft Torque

Stick slip occurs during on-bottom rotary drilling, posing challenges for RPM stability and on-bottom time. This phenomenon can abruptly halt the bit and Bottom Hole Assembly (BHA), leading to rapid accelerations of up to five times the surface RPM. Our stick-slip mitigation software effectively addresses these challenges, widening the drilling envelope to deliver better RPM stability and increased ROP.



Improves efficiency with a wider drilling envelope



Greater supports for directional drilling

3. Quill Oscillator®

This software facilitates sliding and curve build segments of a well by rocking the drill string, reducing friction and enhancing weight transfer to the drill bit for improved directional steering and increased ROP. Continuous improvement cycles involve constant communication between rig personnel and office experts.

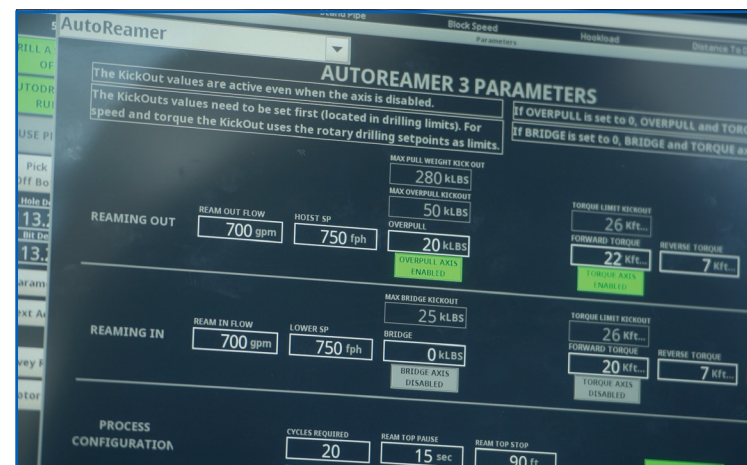
EDGE AUTOPILOT™ APPLICATIONS

include separate software modules, designed to seamlessly integrate with your rig equipment. Z-Torque / Soft Torque and Quill Oscillation work to alleviate downhole challenges that can reduce bit performance and cause deviation from the well plan. With these effects minimized, AutoDriller optimizes the rig's control mode, so drilling can follow the well plan as closely as possible.

Meanwhile, well optimization personnel are in constant contact with the rig and office experts in a cycle of continuous improvement.

EDGE AUTOPILOT™ ANALYTICS

streams rig data 24/7 and then uses machine learning algorithms to pull out meaningful insights to improve drilling performance.



Ensures consistent operations during reaming

4. Auto Reamer

Ensure consistent operations during reaming to maintain wellbore integrity and minimize common wellbore risks. This approach allows the driller to concentrate on the overall process and remain attentive to the rig. Additionally, it facilitates working in a tight hole while reducing the risk of a stuck pipe incident, making the driller's job smoother and more manageable.



Eliminates human error and personnel cost with the automation

5. Auto Downlink

Automate downlinking functionality to minimize human error and guarantee downlinking accuracy. Gain the capability to remotely steer your well, thereby reducing the expenses associated with on-site personnel requirements. This system is adaptable to rotary or flow, whether on bottom or off bottom. Elevate performance by seamlessly integrating with the Automatic Drilling System (ADS).



Reduces carbon footprints and costs by utilizing data analytics tools.

6. Proactive Engine Management

Power management schedule uses historic data to determine optimal active engine count per section and well activity. Reduce costs, excess fuel consumption, and carbon footprint by producing a power management schedule and increasing optimal load compliance.



Systems for common dysfunctions with real-time performance

7. Rig IQ

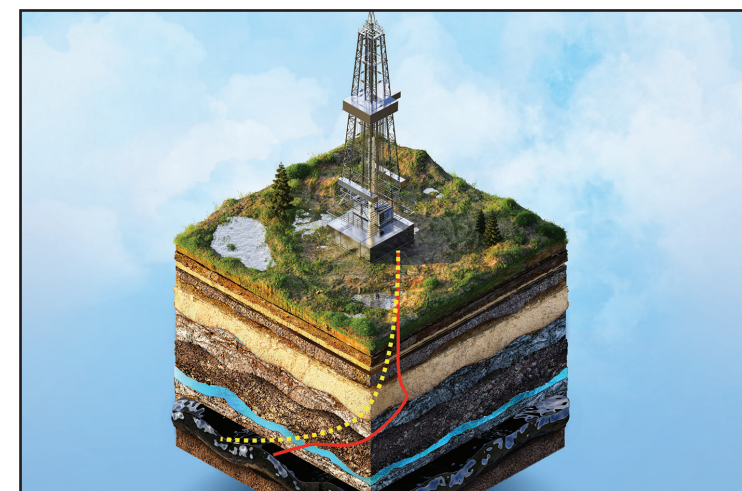
RigIQ effectively reduces costs and resource demands for "Cloud" or back-office requirements. Unlock the full potential of rig data and derived analytics to mitigate dysfunction and enhance the Rate of Penetration (ROP). Leverage the capabilities of EDGE AUTOPILOT™ applications to gain valuable insights into well construction.



Executes multiple functions and applications providing optimal wellbore delivery

8. Automated Drilling System

Improve consistency and reliability through the automation of common tasks. Ensure compliance at the rig site to meet defined goals and objectives. Streamline analytic systems, leading to significant time and cost savings.



Maintains the downhole toolface.

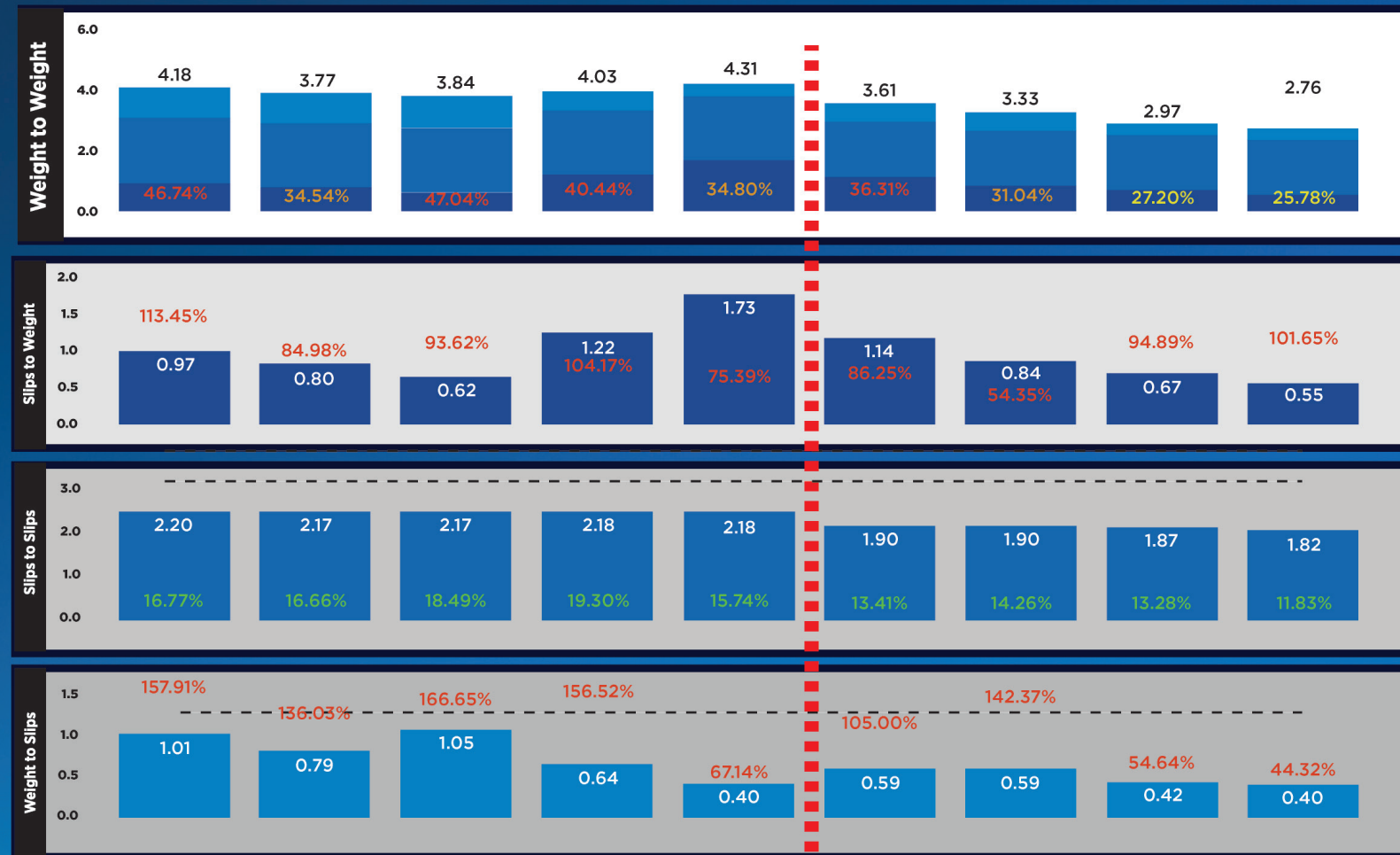
9. Automatic Toolface Controller (ATC)

The system maintains the downhole toolface by adjusting the quill position during sliding, crucial for accurate directional drilling. It automates the directional function from the driller's cabin, enhancing precision and efficiency. This allows for more effective management of drilling direction, improving speed and accuracy in complex environments.

ADS CASE STUDY

ADVANCED ANALYTICS + INNOVATIVE TECHNOLOGY
Reduce Costs, boost productivity and maximize profits as you elevate your operations with EDGE AUTOPILOT™ — unleashing unparalleled efficiency.

CONNECTION TIMES

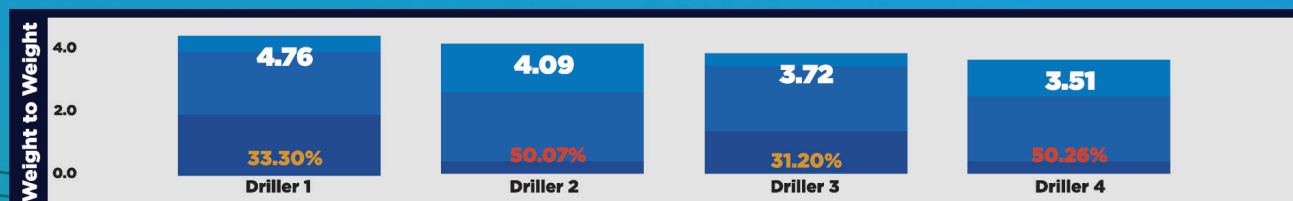


With the implementation of ADS (Hera pad), there has been a significant improvement in weight-to-weight times, notably enhancing performance with each well. This improvement is primarily attributed to a reduction of approximately 0.35 minutes in slips-to-slips time and a consistent decrease in slips-to-weight time. The percent values represent Coefficient of Variation (CV), where a lower percentage implies more consistency. This reduction not only improves efficiency but also contributes to a decrease in off-bottom whirl.

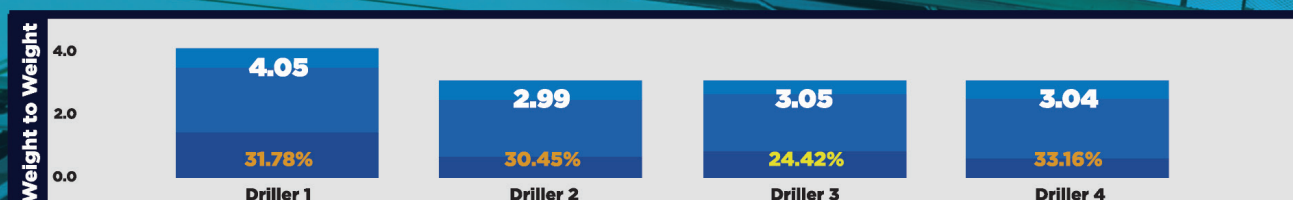
ADS Used after surface from this point

DRILLER COMPARISON

Pad #1
(before ADS)

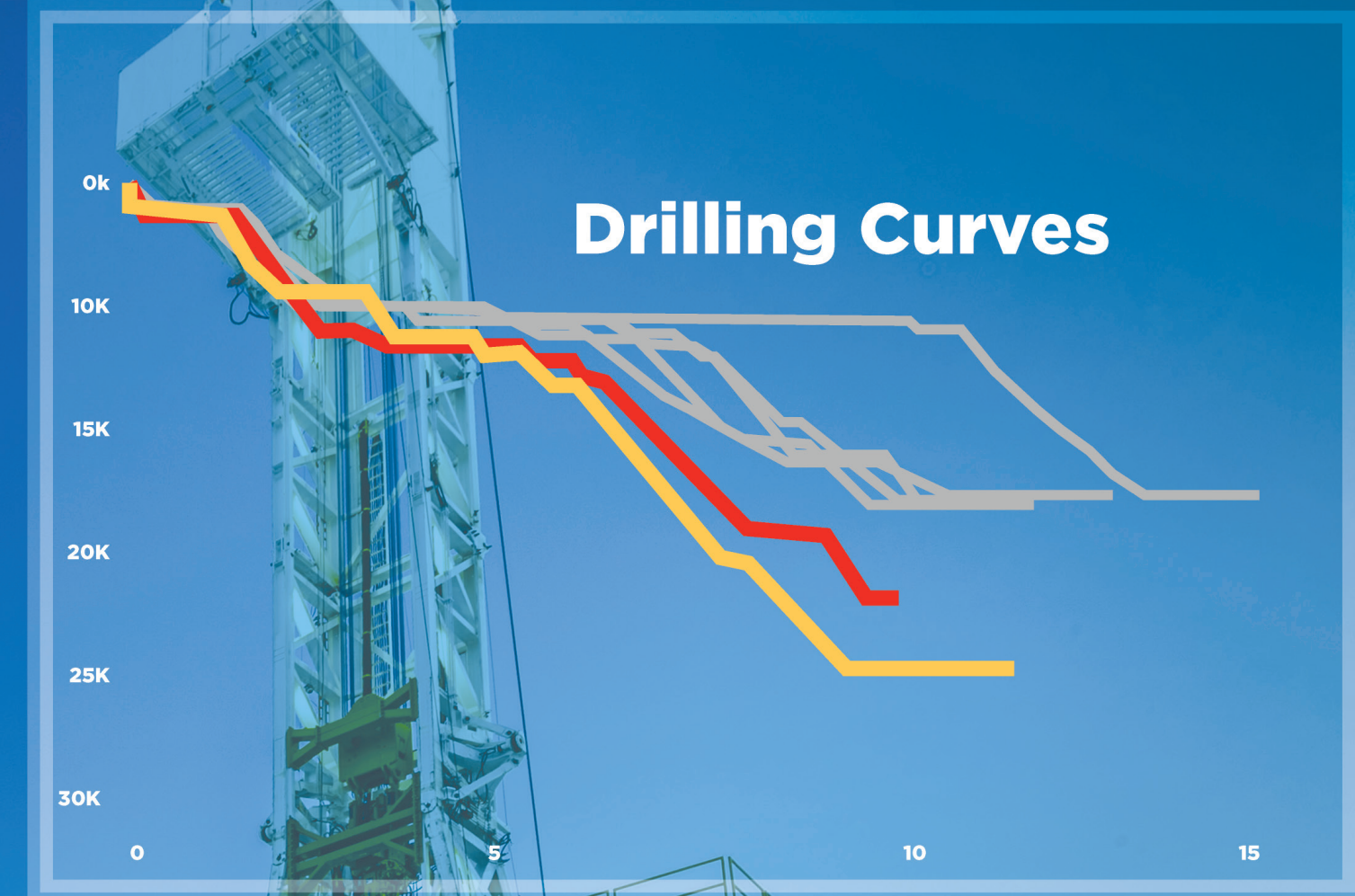


Pad #2
(with ADS)



All drillers achieved improved weight-to-weight connection times using ADS, demonstrating even greater consistency.

DAYS VS DEPTH



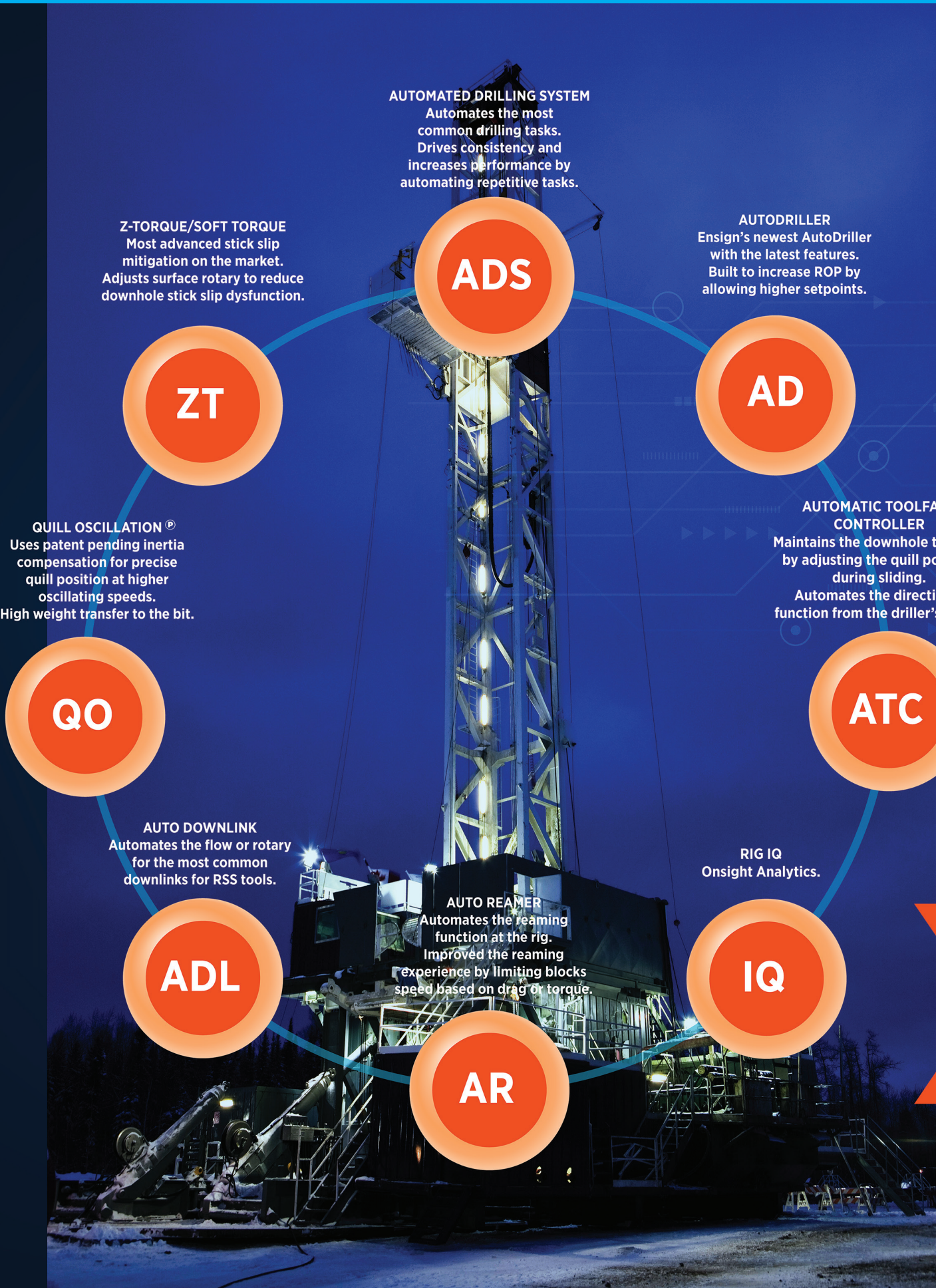
ADS wells are in bright colors and previous wells are in gray scale.

Overall performance has improved since installing ADS.

The first well (red trace) was comparable at the same depth as the non-ADS wells on the previous pad, but drilled around 5k feet deeper.

The second ADS well (yellow trace) finished the lateral in one run to 24K feet. At 19k feet, they were almost 2 days ahead of the fastest non-ADS well.

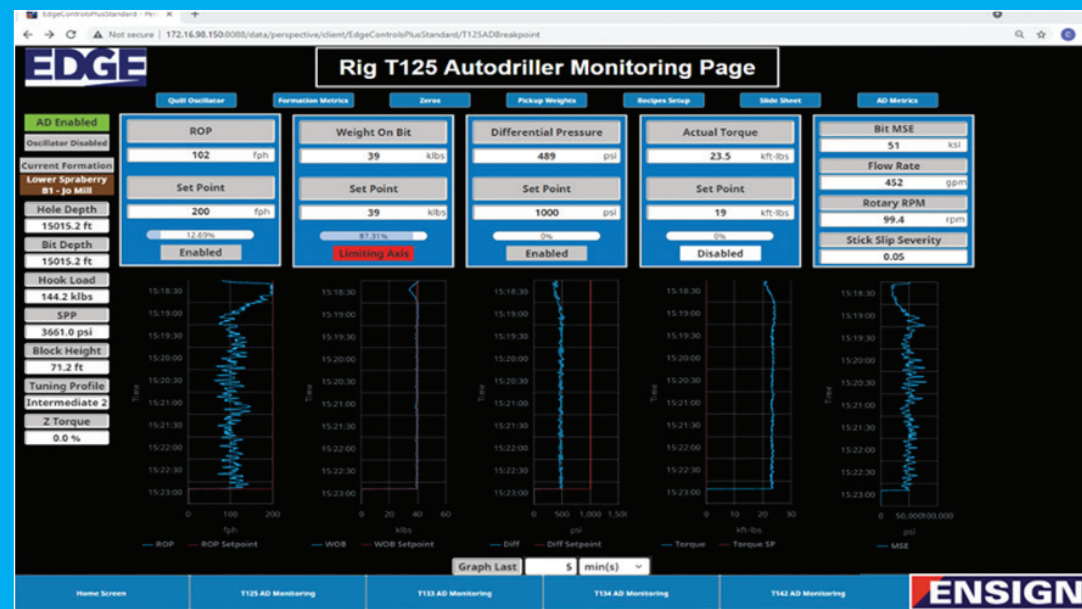
EDGE AUTOPILOT™ APPLICATIONS



EDGE AUTOPILOT™ DIGITAL APPLICATIONS



EDGE AUTOPILOT™ PORTAL



API available for integration with in-house applications or analytics packages.

Transform your drilling operations with the Enhanced Customer Portal, delivering an immersive experience akin to being in the driller's cabin. The EDGE AUTOPILOT™ Portal, a secure web-based platform, ensures on-demand access to well data precisely when and where you need it. This enables swift and informed decision-making. Harness the power of data through the EDGE AUTOPILOT™ Analytics Dashboard to enhance rig performance seamlessly. With the EDGE AUTOPILOT™ Portal, you can monitor KPIs, access real-time rig data, and streamline communication between the rig and the office, elevating your experience to a new level.



ACCESS DATA ON DEMAND

The EDGE AUTOPILOT™ portal is a secure, web-based platform to access well data. It is available when and where our customers need it, informing the critical decision-making that drives our performance and continuous improvement.

LEVERAGE DATA WITH EDGE ANALYTICS DASHBOARD

The EDGE AUTOPILOT™ Analytics generate automated reports to easily compare performance and identify areas for improvement. Relevant data is always put in context and provides a closer look at performance with the capability to dive deep into specific intervals.

ACCESS REAL-TIME OR HISTORICAL SENSOR, MACHINE OR CONTEXTUAL DATA WITH THE EDGE DRILLING DASHBOARD

Monitor rig performance with easy access to Setpoints, KPI's, and configurable targets.

STREAMLINED RIG TO OFFICE COMMUNICATION

Reduce communication hurdles between the office and the rig by uploading the Well Plan directly to the Automated Drilling System through the EDGE AUTOPILOT™ portal. Increase consistency by delivering connection parameters, scheduled tasks, and direct messages to the driller on site.

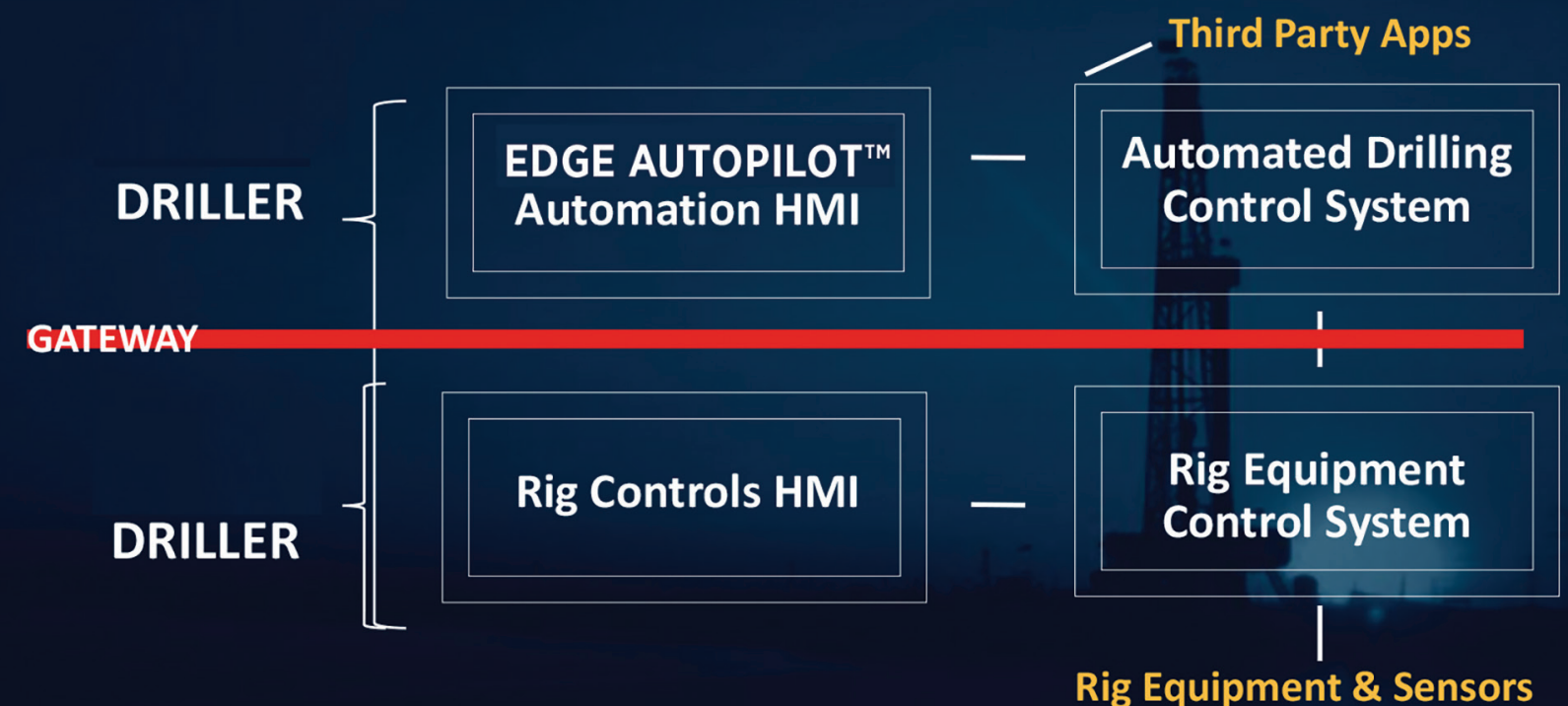
REVOLUTIONIZE RIG AUTONOMY WITH **EDGE** **AUTOPILOT™**

DISCOVER THE UNMATCHED POWER OF EDGE AUTOPILOT™ AND UNLOCK YOUR COMPETITIVE ADVANTAGE WITH THESE KEY FEATURES:

1. **UNIVERSAL VERSATILITY:** Experience the freedom to install EDGE AUTOPILOT™ on ANY rig. Unlike other systems designed for specific rigs, EDGE AUTOPILOT™ is a universal technology, setting a new standard for versatility.
2. **TAILORED TECHNOLOGY AND ANALYTICS:** Elevate your drilling operations with EDGE AUTOPILOT's fully customized suite of cutting-edge technology and analytics. We don't just meet your needs; we redefine them.
3. **EXCEPTIONAL SERVICE, EVERY STEP OF THE WAY:** Gain peace of mind with our dedicated Drilling Solutions team, ensuring that you receive exceptional service and support throughout your journey with EDGE AUTOPILOT™.
4. **PERFORMANCE EXCELLENCE:** Elevate your drilling performance with our outstanding Performance Drillers team. We are committed to ensuring your success by providing continuous follow-up and support.

THIRD-PARTY APPLICATION CAPABILITIES

UNLEASHING VERSATILITY, CUSTOMIZATION, AND EXCEPTIONAL SERVICE



Explore the future of rig autonomy with confidence—EDGE AUTOPILOT™ sets a new standard for versatility, customization, and unmatched service. Our continually expanding network of rigs, equipped with the latest EDGE AUTOPILOT™ ADS technology, ensures safe and efficient drilling with a proven track record of success.

Training

At Ensign, we're proud that our people meet rigorous skill and safety standards, providing our customers with a consistent level of service on all their projects. We know that when our crews mobilize, our people are not only capable and experienced but also ready to excel. Ensign believes that quality training for our people translates to quality service for our customers.

This approach to customer service is routed in Ensign's enterprise-wide Global Skills Standard

(GSS). GSS is an approach to training that uses a standardized curriculum to ensure and guarantee Ensign's people (specifically rig crew) around the world, meet our global criteria for skills and competency, enabling us to provide a consistently high level of service in all our operations.

Our customers deserve the assurance that Ensign meets benchmark standards of performance, regardless of the size or location of an operation.

Health, Safety and Environment (HSE)

At Ensign, we're striving for a perfect Health, Safety and Environment (HSE) record.

In our industry, there's no compromise on health and safety. Ensign is never complacent about safety performance. We believe all incidents are preventable. That's why we train our employees in a high-performance safety culture and are continuously Driving to Zero®.

Zero safety incidents. Zero injuries. Zero absences due to injury.

Training starts on the first day of employment and is continuously reinforced through rigorous job safety analysis practices, personal injury prevention training, safety coaching, pre-job safety meetings, and work observation and intervention programs.

We take responsibility for our impact on the environment and actively work with our customers to reduce, reuse, recycle and reclaim materials used in our operations.



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