



# DELIVERING BETTER OUTCOMES



# NEW NOW &

## H&P'S CURRENT TECHNOLOGY PORTFOLIO



BIT GUIDANCE  
SYSTEM



PASO



AUTOSLIDE®  
CONTROL SYSTEM



AUTODRILLER  
PRO CONTROL  
SYSTEM



STALLASSIST™  
TECHNOLOGY



FLEXB2D®  
TECHNOLOGY



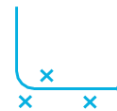
FLEXDRILL®  
TECHNOLOGY



FLEXOSCILLATOR®  
TECHNOLOGY



FLEXTORQUE®  
TECHNOLOGY



COLLISION  
AVOIDANCE



ENGINE  
MANAGEMENT



HIGHLINE  
POWER



# ENHANCE WELLBORE QUALITY WHILE MINIMIZING ECONOMIC IMPACT

Our industry-leading cognitive computing system helps you make intelligent directional decisions that are based on economics so that we can help lower your drilling costs and increase your production

## PROOF IS IN THE OUTCOME

- ▶ Reduce Drilling Time
- ▶ Consistent & Repeatable
- ▶ Accurate & Precise
- ▶ Increase Production Potential
- ▶ Decrease Human Error





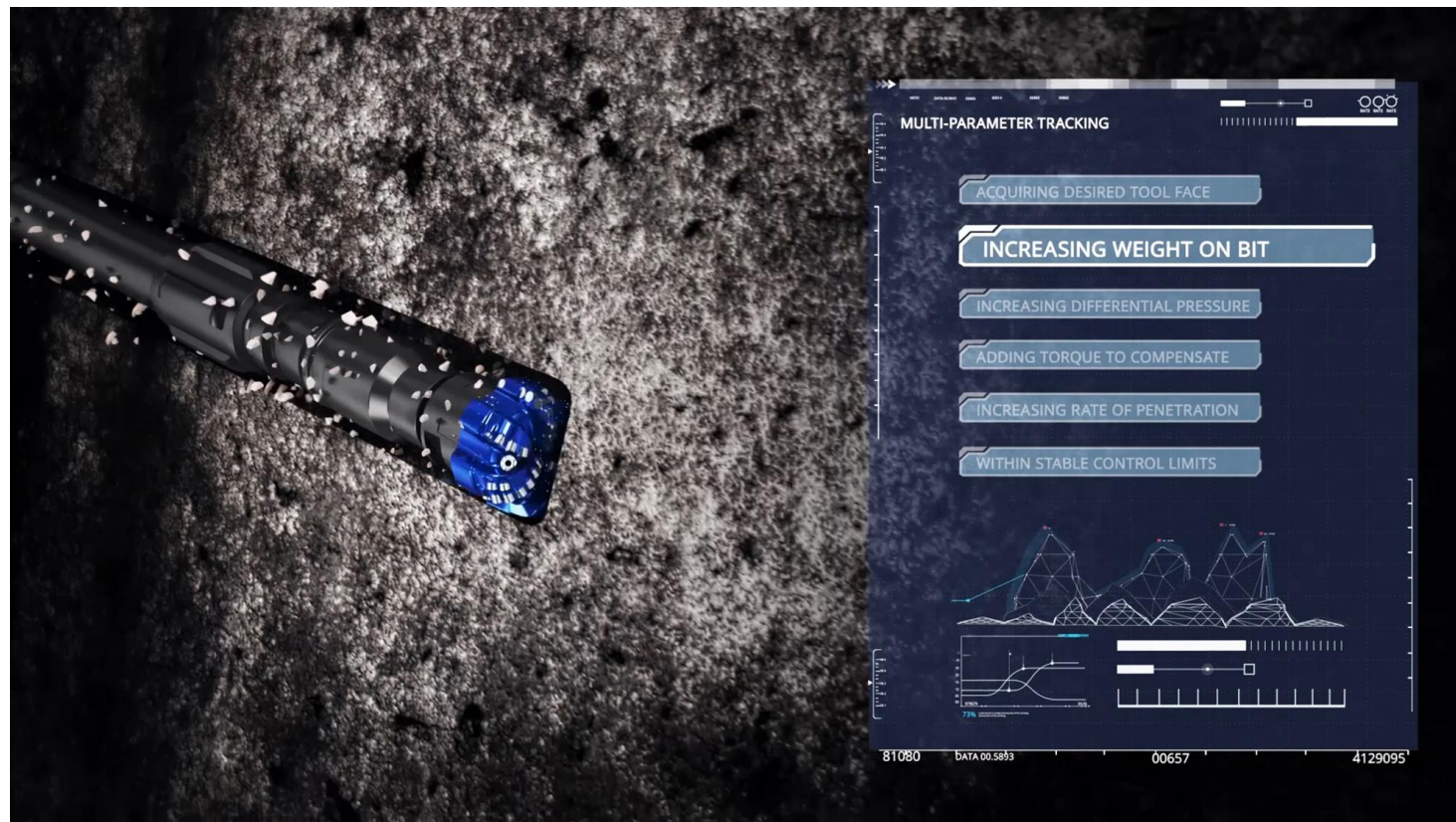


# SIMULTANEOUS, ACCURATE EXECUTION

The AutoSlide® system automatically executes the slide based on a data driven plan from the Bit Guidance System.

By automating the control of surface equipment and steerable mud motors, we optimize sliding in deviated and horizontal wells in order to improve your:

- ▶ Slide Quality Accuracy
- ▶ Wellbore Quality
- ▶ ROP Performance
- ▶ ROI

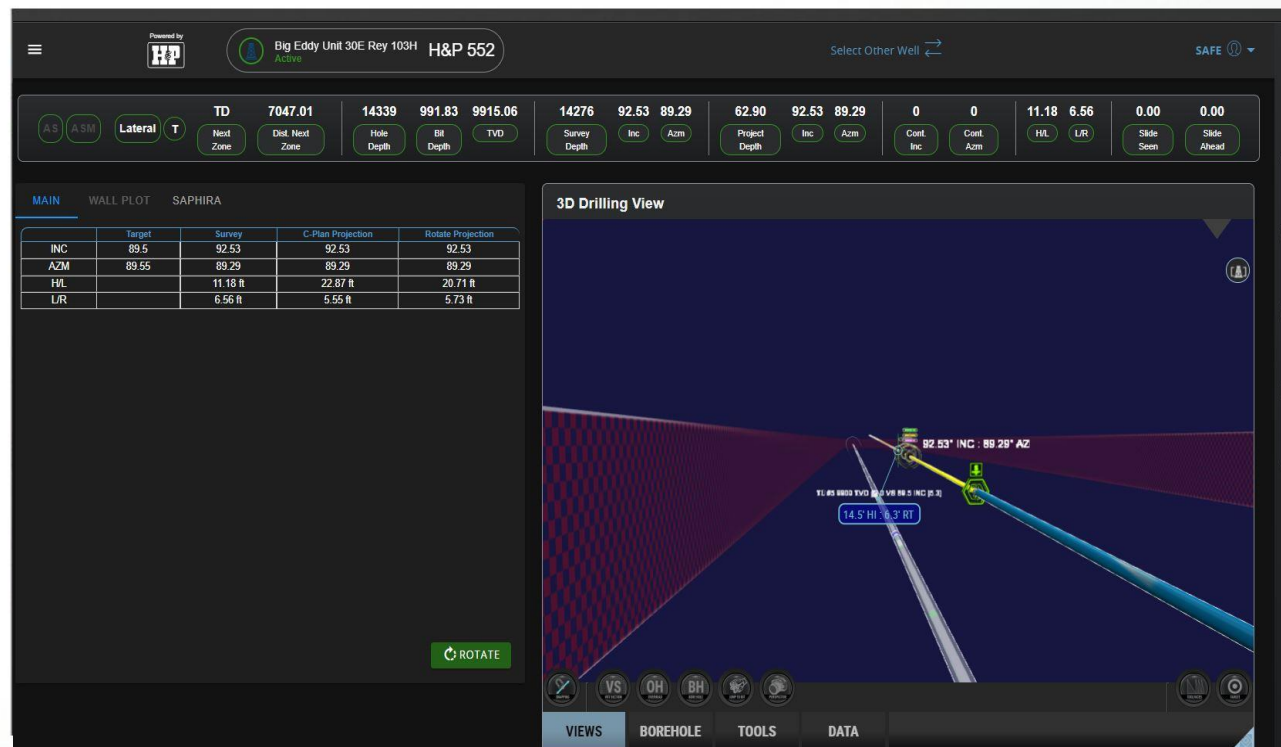




# MORE OVERSIGHT & CONTROL

PASO enables internal H&P ROCs and/or operators the ability to drill multiple wells from one UI.

- ▶ More Control
- ▶ Quick Visualization
- ▶ Reduced Overhead



## DRILLING VISUALIZATION

- ▶ 2D Drilling Positions
- ▶ 3D Visualization (MotiViz)
- ▶ PAS Config Controls (convert to chat)
- ▶ Cost Curve Controls (convert to chat)
- ▶ Real Time Chat with Dallas CC
- ▶ Display drilling plans

## DRILLING CONTROLS

- ▶ Drilling Parameter Controls
- ▶ Cost Curve Controls
- ▶ RSS Remote Downlinking
- ▶ Saphira Survey Corrections



## SMOOTHER DRILLING FOR HIGHER ROP AND IMPROVED TOOL RELIABILITY

Our advanced drawworkscontrol system smoothly controls block velocity while regulating inputs from differential pressure, torque, and/or WOB in order to maintain smooth block velocity.

- ▶ Helps to seamlessly transfer to/from WOB and differential pressure for consistent bit engagement
- ▶ Does not require changing gain settings

REMOVES HUMAN VARIABILITY BY REMOVING GAIN ADJUSTMENTS







# DETECT. MITIGATE. REDUCE DAMAGE

Fast, autonomous motor stall detection to help reduce damage and the potential of equipment being stranded downhole.

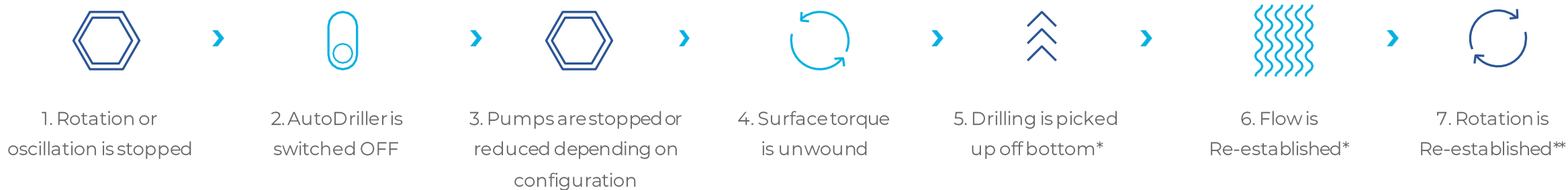
- ▶ Reduce pumps
- ▶ Reduce trapped torque
- ▶ Pick up off bottom

## INFORMATION NEEDED FOR DETECTION OF A MUD MOTOR STALL

- ▶ Driller enters maximum operating and stall differential pressure from the motor manufacturer for rotary and slide drilling
- ▶ Control system monitors the differential pressure based on the performance limits and the rate of change in differential pressure to determine when a stall has occurred.



## AUTOMATED SEQUENCE USED FOR REACTING TO & MITIGATING A STALL



\* If configured \*\* If configured & rotating at time of stall



# CONSISTENT BIT & BHA ENGAGEMENT

Our technology helps to consistently and efficiently engage the bit back to bottom to decrease drilling dysfunction and reduce Bit/BHA damage.

- ▶ Reduce torsional and lateral vibration
- ▶ Reduce bit and BHA damage
- ▶ Cut unplanned trips
- ▶ Decrease transition time from connecting to drilling
- ▶ Automated zeroing ensures accuracy and consistency
- ▶ Automated staging to 9 operator defined setpoints help ensure consistent execution



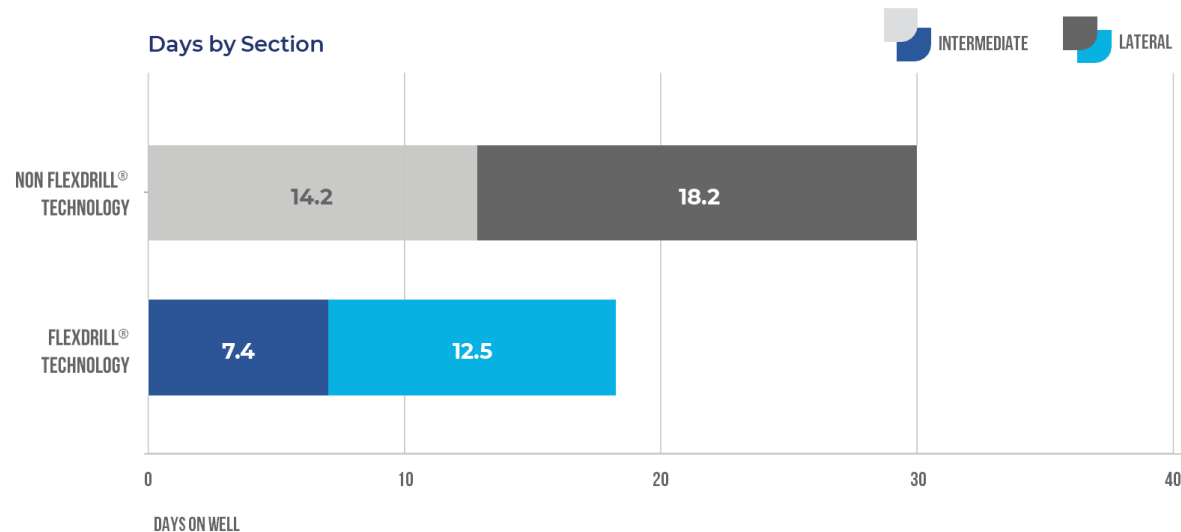
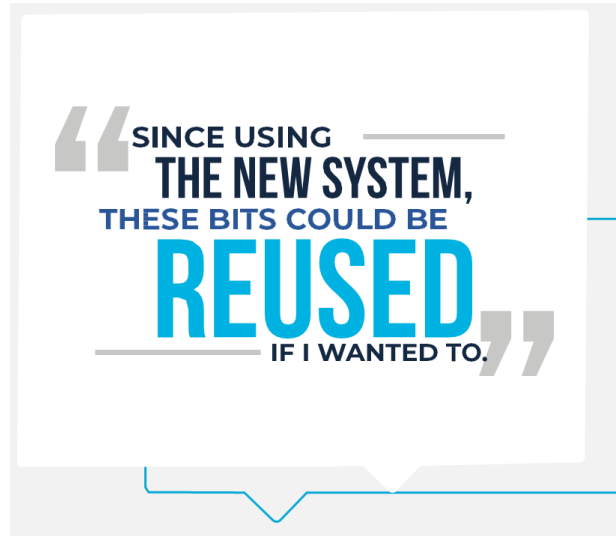




## OPTIMIZE ROTARY SETPOINTS FOR INCREASED ROP

Automatically manage and optimize setpoints at a much higher rate than manual driller setpoint changes to help increase ROP during rotation intervals.

- Stick slip indication and mitigation
- Stinger detection and response
- Automated, high-frequency adjustments to WOB & RPM
- Automated WOB & differential pressure zeroing
- Configurable limits for drilling parameters
- Automated process to go back to drilling
- MSE and ROP optimization



**41%**  
↓ FEWER  
DAYS ON WELL.



# REDUCE FRICTION FOR FASTER DRILLING

By automatically oscillating the pipe to reduce axial friction, we help improve slide execution and rate of penetration (ROP).

- Improved motor yield and dogleg consistency
- Toolface control
- Choose the number of wraps and RPM – forward and reverse
- Automatically maintain initial wraps





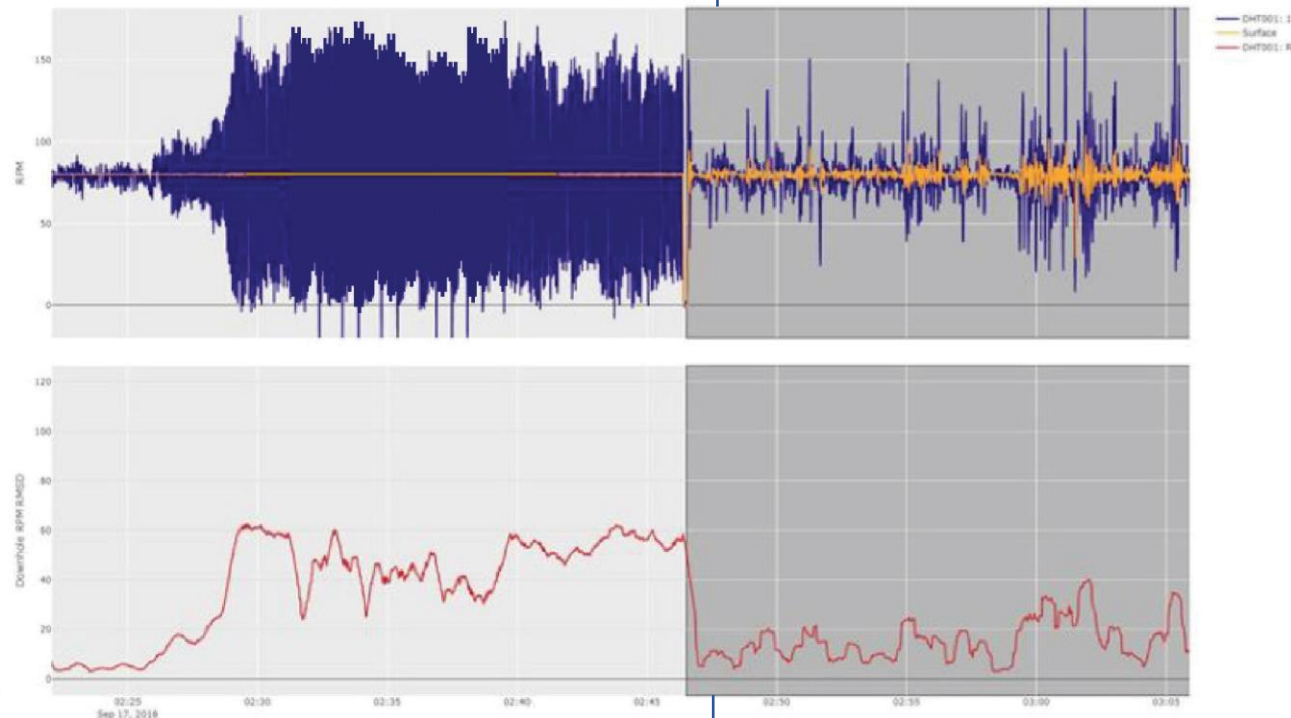
# PROACTIVE STICK SLIP MITIGATION

Our technology actively responds to torque fluctuations by adjusting top drive RPM to help mitigate stick slip.

- ▶ Mitigate drillstring vibration from stick slip that can lead to BHA damage
- ▶ Stick slip mitigation with active control technology
- ▶ Reduce wear and tear on downhole equipment
- ▶ Reduce trips for increased safety
- ▶ Decrease time to target
- ▶ Identify drilling dysfunction

## FLETORQUE® SOFTWARE TURNED ON

- ▶ Surface RPM begins to fluctuate, but downhole RPM fluctuations are reduced significantly.



## FLETORQUE® SOFTWARE TURNED OFF

- ▶ Surface RPM is steady, but downhole RPM is chaotic



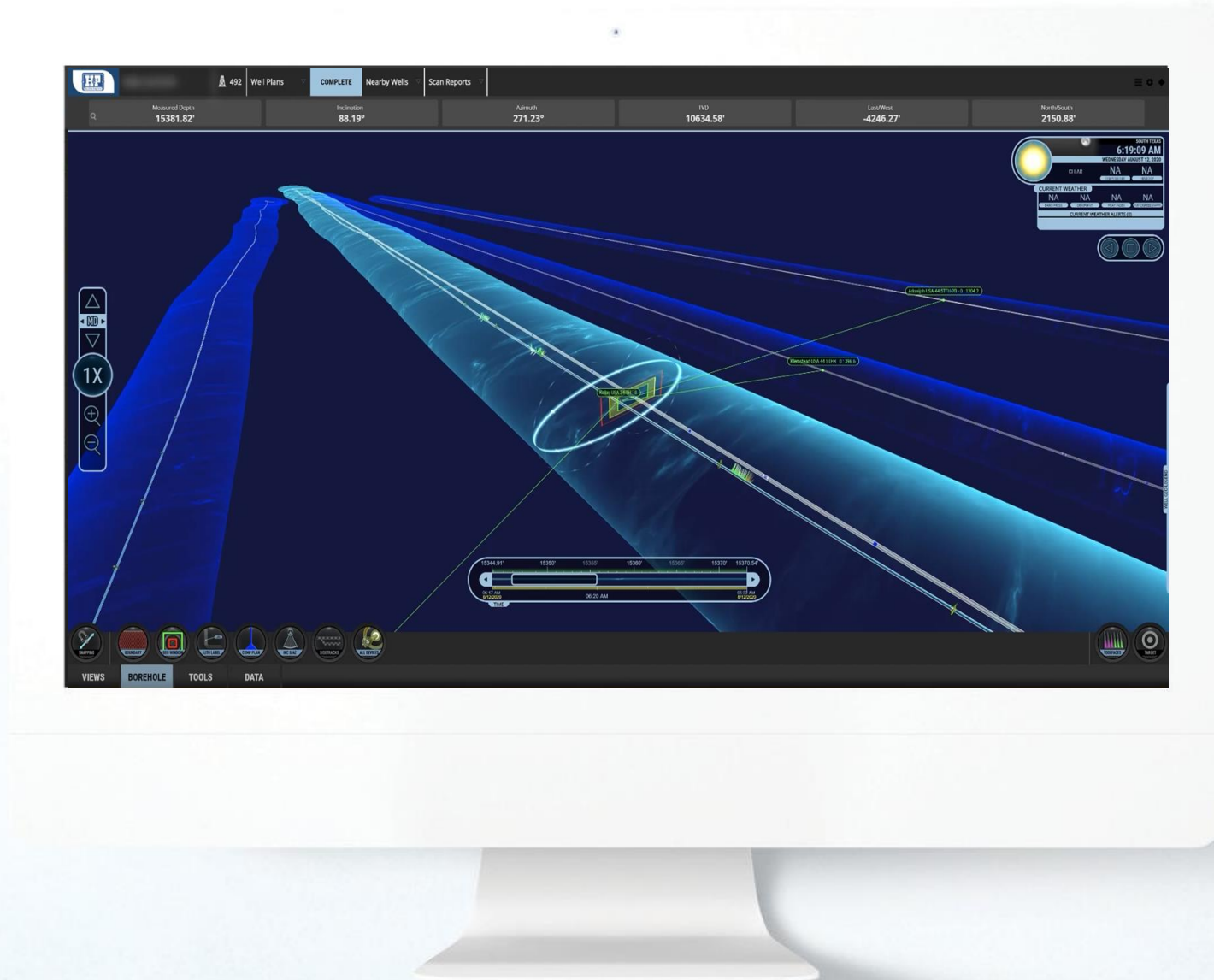


## FRUSTRATION-FREE RISK MANAGEMENT

By automating speed, quality and safety, we can help reduce your time to target as well as human variability.

### WE CAN HELP YOU REMOVE:

- ▶ Flat time with automation
- ▶ Risk of human variables with uniform implementation
- ▶ Huge financial and safety implications that collisions cause

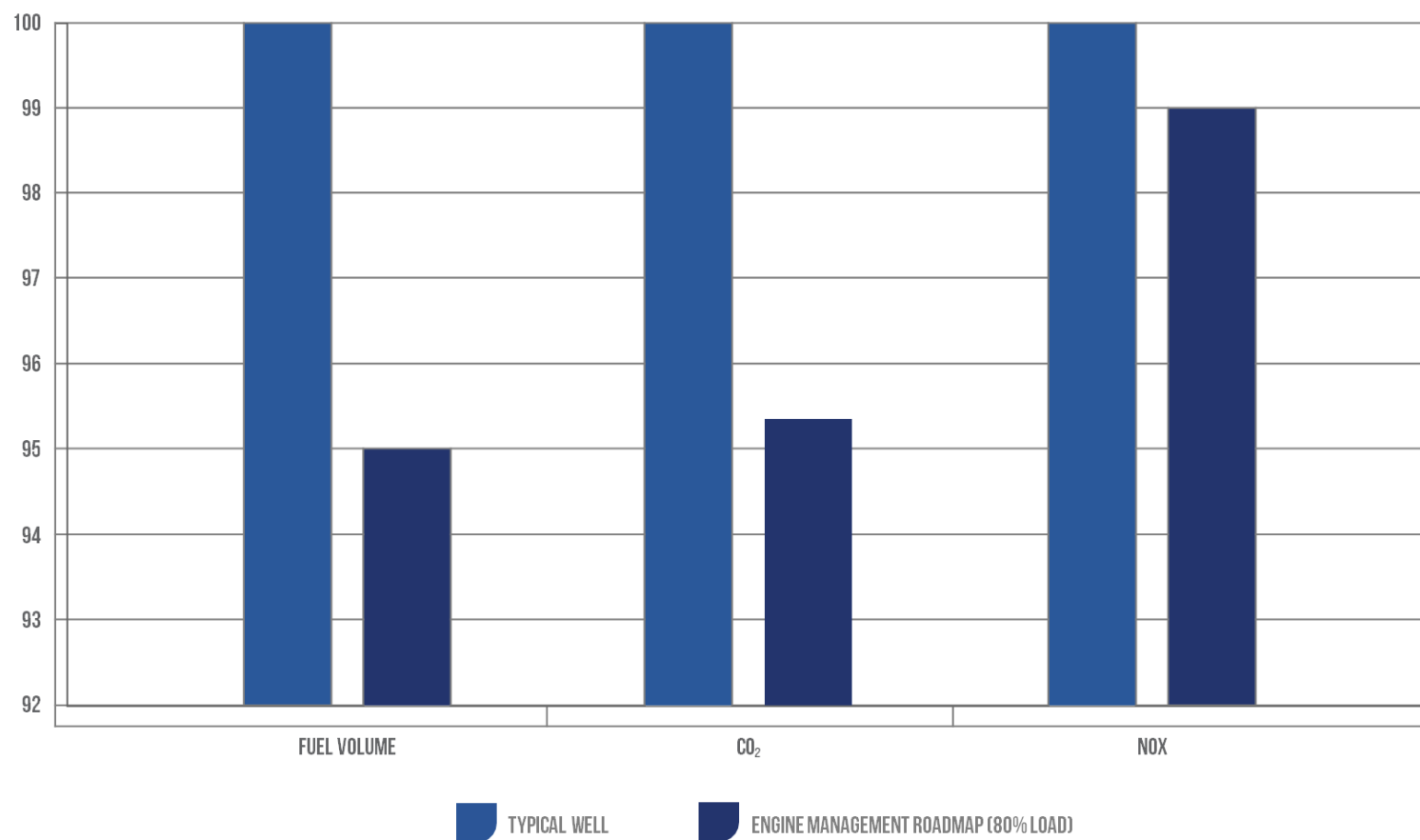




## LOWER EMISSIONS & ENHANCE SUSTAINABILITY

- ▶ Primary goal of safely optimizing engine count/engine load for well and rig operations
- ▶ Engine use roadmaps assesses historical requirements for power consumptions to drive awareness and fuel/emissions reduction

### IMPACT OF ENGINE MANAGEMENT



1. Emissions and volume data limited to rig consumed power
2. Volume and emissions impact will vary by well and well activity

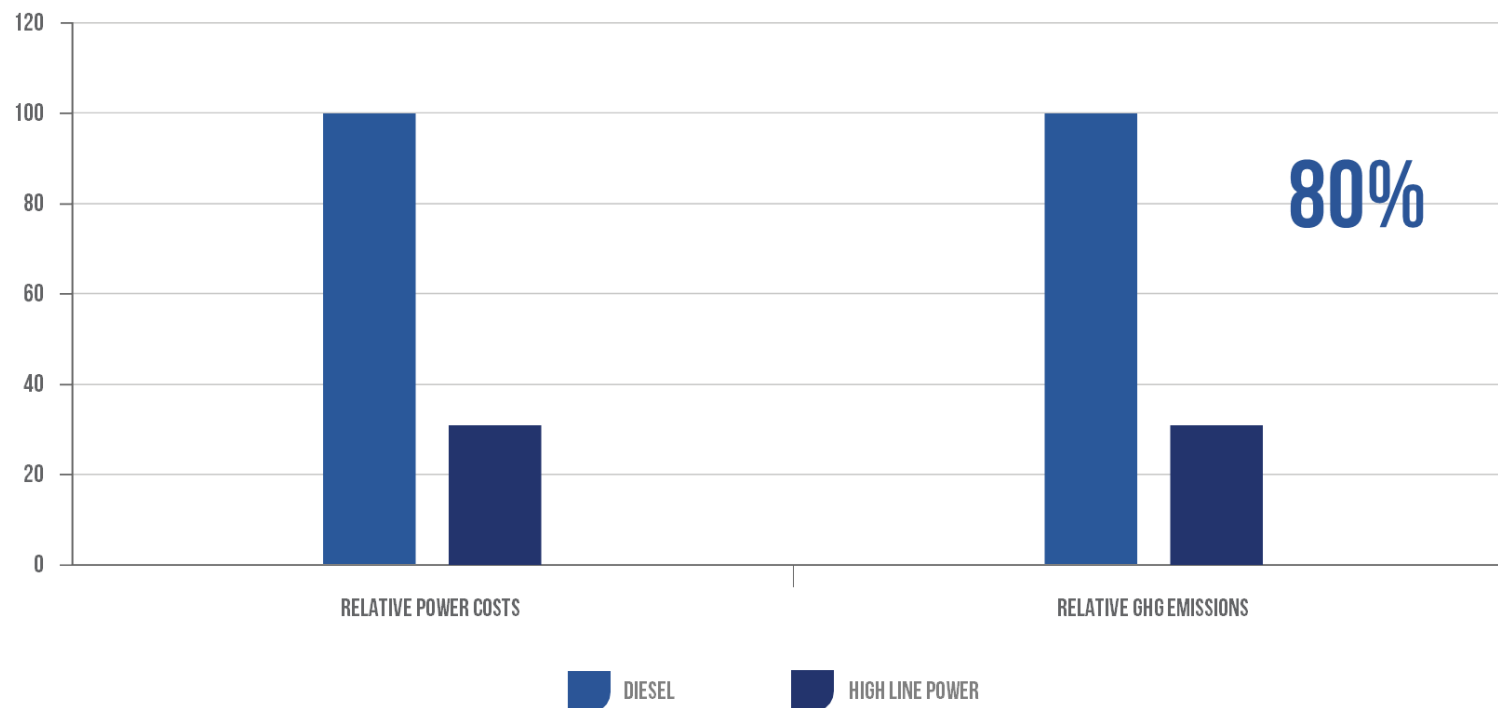


## EXPERIENCE OVERVIEW

- ▶ 10 years of experience drilling with high line power, over 1,000 executed wells
- ▶ H&P rig designs readily accept the technology
- ▶ High line design is compatible with utility voltages throughout U.S.
- ▶ High line design ensures full compliance with HSE and code requirements
- ▶ No impact on pad to pad move time

### HIGH LINE RIG SITE IMPACT ESTIMATES\*

(Neglects cost of high line equipment)



1. Emissions and cost data limited to rig consumed power and excludes infrastructure costs
2. Cost and emissions savings will vary by region and well
3. Scope 1 emissions offset by lower Scope 2 emissions



# NEW NEAR &

H&P'S FUTURE  
TECHNOLOGY  
PORTFOLIO



AUTOMATION  
SEQUENCER



AUTOMATED  
GEOSTEERING



DIGITAL  
ROADMAP



DRILLDOWN™  
PLATFORM



RSS  
DOWNLINKING



COMPUTER  
VISION



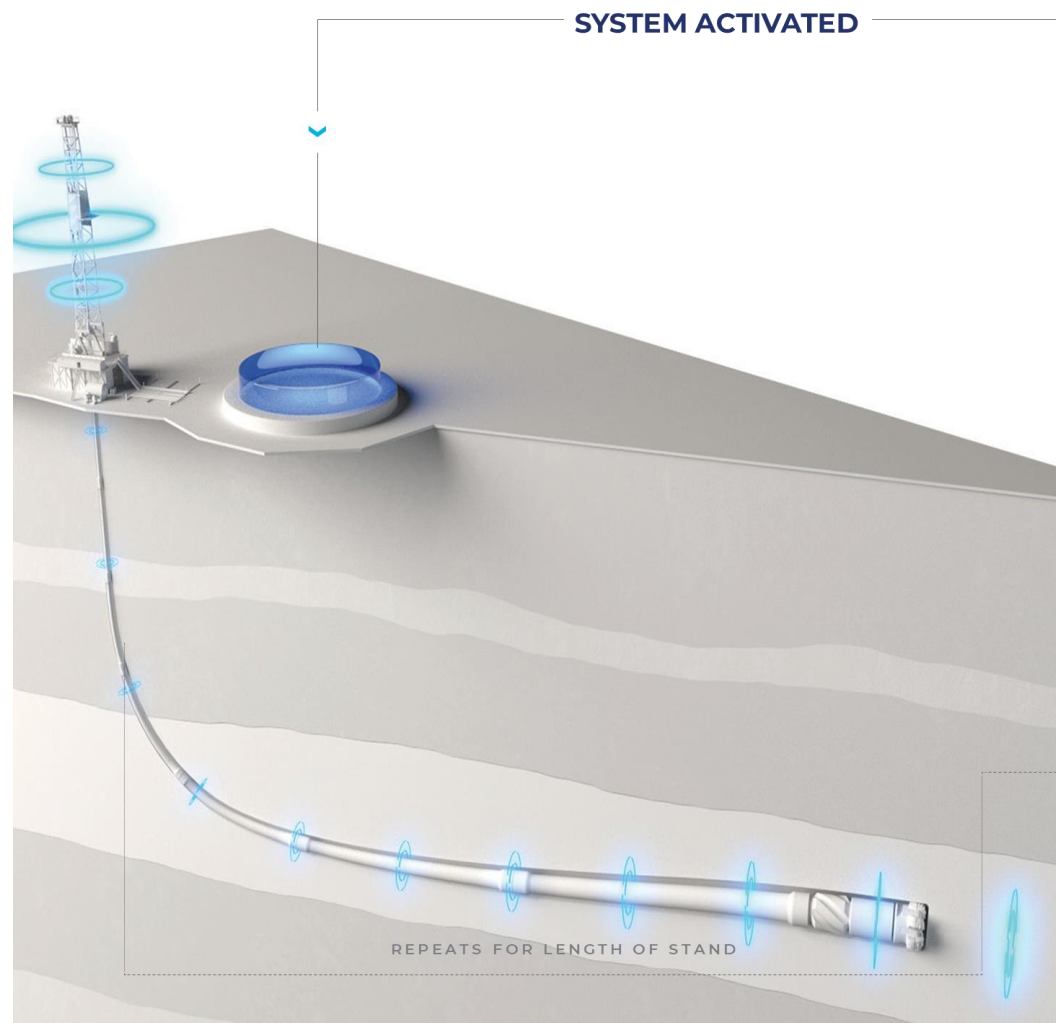
## STAY ON BUDGET

### REDUCE TIME TO TARGET

We leverage technology to reduce manual inefficiencies that delay the time to target and add additional costs.

#### DRILLER STEPS

- ▶ Drilling Connection **15. Minutes**
- ▶ Engage Pumps **Seconds**
- ▶ Engage Sequencer **1 Second**



#### BIT GUIDANCE SYSTEM

If rotation occurs, FlexB2D® Technology adjusts. If sliding occurs, AutoSlide® Technology adjusts.

##### SLIDE

#### AUTOSLIDE® TECHNOLOGY

Orients toolface, engages bottom and executes slide intervals

#### FLEXOSCILLATOR® TECHNOLOGY

Aids in transfer of weight to the bit

##### ROTATE

#### FLEXB2D® TECHNOLOGY

Once connection is made, the system will consistently engage bottom to help ensure efficient bit engagement.

#### FLEXDRILL® TECHNOLOGY

Optimizes rotation intervals

#### STALLASSIST™ TECHNOLOGY

For stall detection and mitigation  
- 1 second initiation



# EASE OF EXECUTION. OPTIMAL PERFORMANCE.

Sequenced collaboration between our advanced drilling technologies allows for more robust solutions without manual challenges.

## AUTONOMOUS COLLABORATION WITH THE PUSH OF A BUTTON



### BIT GUIDANCE SYSTEM

Intelligent directional decision  
making base on economics



### FLEXB2D® TECHNOLOGY

Automated and uniform bit  
engagement



### FLEXDRILL® TECHNOLOGY

Optimize rotary drilling



### AUTOSLIDE® CONTROL SYSTEM

Automated slide  
drilling execution



### FLEXOSCILLATOR® TECHNOLOGY

Breaks friction and transfers  
weight down to bit



### STALLASSIST™ TECHNOLOGY

Detection, mitigation, and  
recovery from downhole  
mud motor stalls



### DIGITAL ROADMAP

Automatically load  
drilling parameters

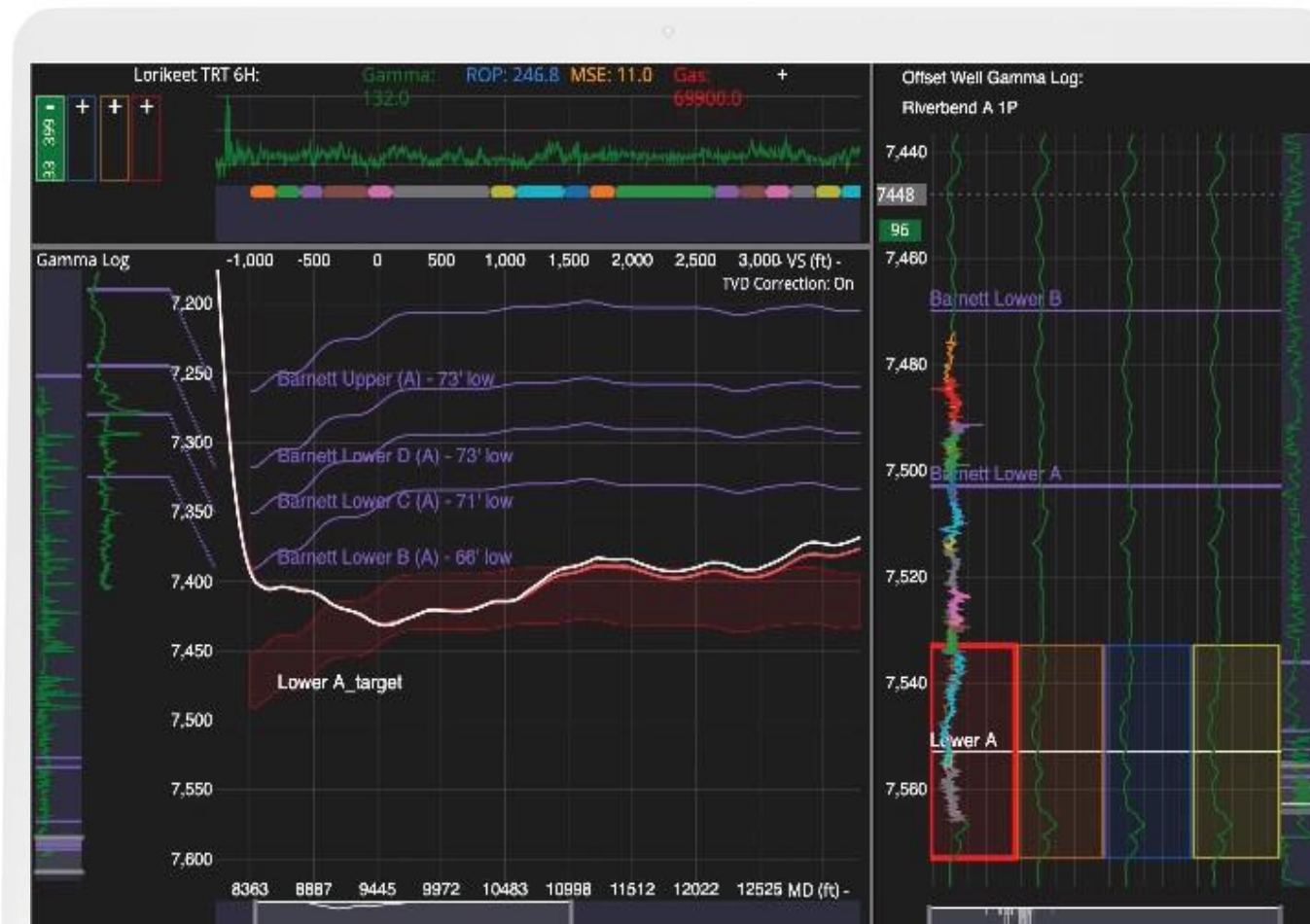




# RECONCILE UNCERTAINTY FOR ACCURATE PLACEMENT

Automated Geosteering technology continually collects and analyzes incoming logging data to make sure your well plan is guided through the target formation.

- ▶ Integrated drilling and geology platform allows you to quickly respond to unexpected geology
- ▶ Automated interpretations enable more consistent results



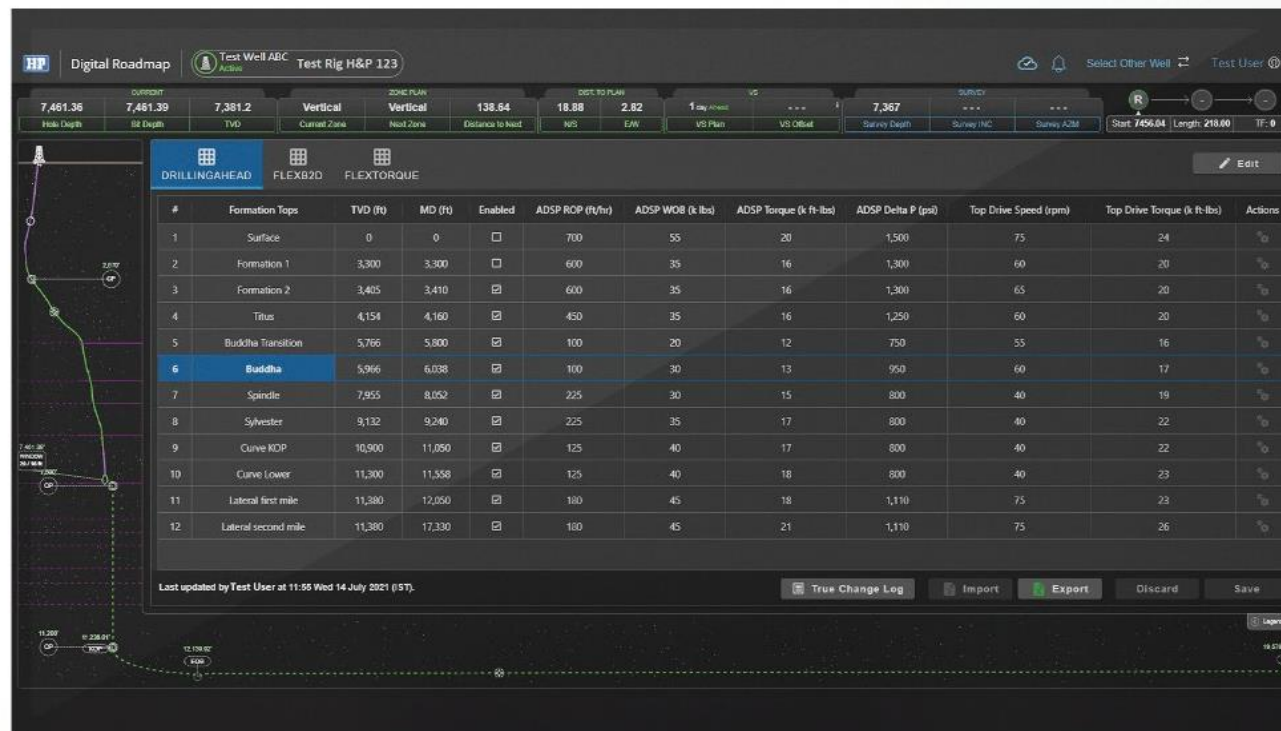


# AUTOMATIC UPLOAD & EXECUTION

Automatically load drilling parameters, even from remote locations, into the control system based on geologic formation, depth, and geometry to reduce time consuming, manual changes and potential inaccuracies.

- ▶ Increased Visibility
- ▶ Automatic Roadmap Execution
- ▶ External Control

- ▶ Drilling Ahead
- ▶ FlexB2D® Technology
- ▶ FlexTorque® Technology
- ▶ Automation Sequencer





## BIG PICTURE AT A GLANCE

Our real-time, comprehensive view of drilling activities allow you to make proactive drilling decisions in order to:

- ▶ Improve efficiency by consolidating necessary information
- ▶ Exceed performance expectations with more real-time insights and offset comparisons
- ▶ Have more certainty on timing for better logistics planning



### DESIGNED WITH YOUR SUCCESS IN MIND

- ▶ Operations Schedule
- ▶ Days vs Depth
- ▶ Drilling Performance Insights
- ▶ ROP Optimization in real-time insight
- ▶ Wellbore Schematic
- ▶ Bit Position Window
- ▶ Offset Well Comparison

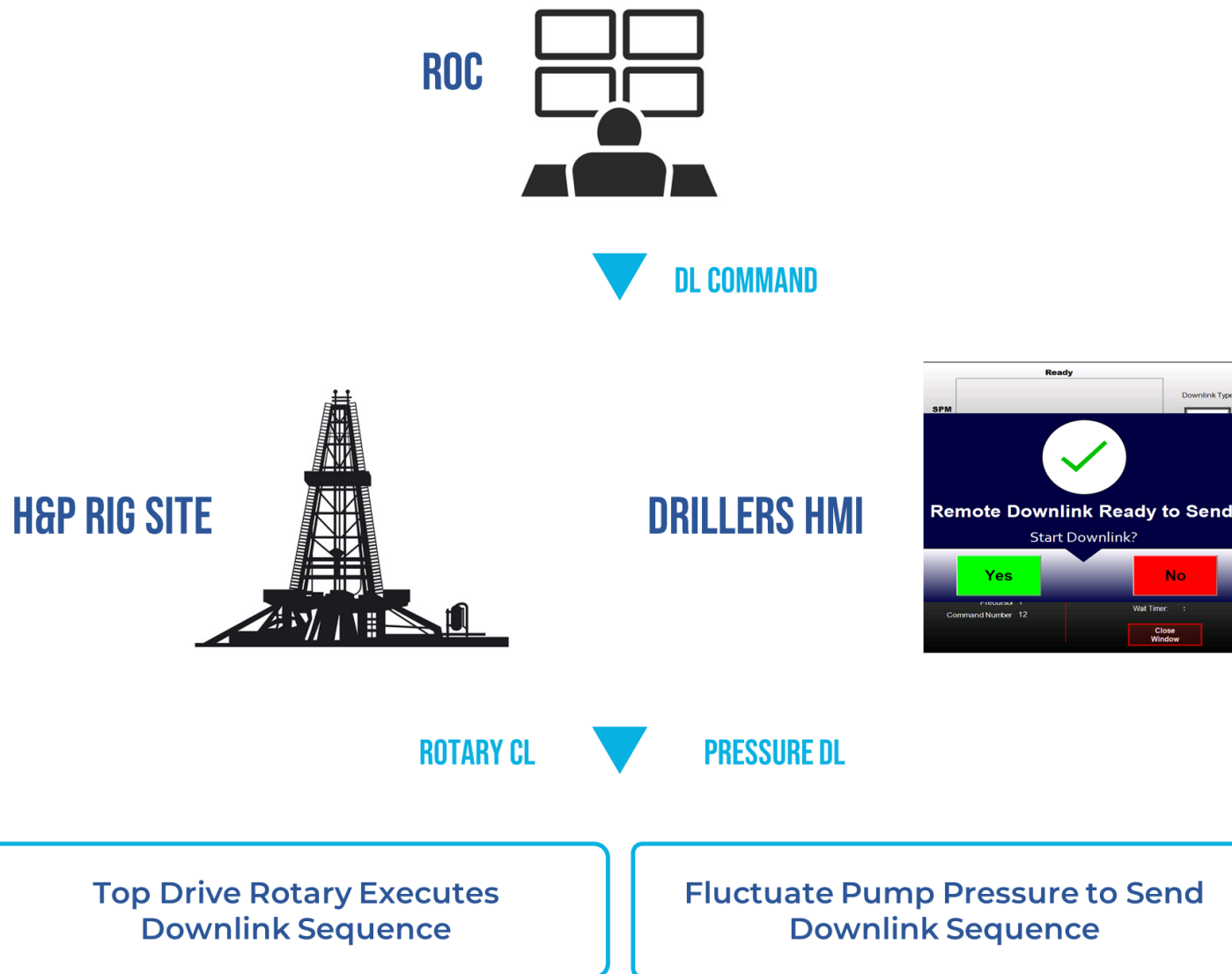




## A UNIFIED INTERFACE

This unified, web-based interface will help provide current status and offer control of downlinking, even from offsite locations.

- ▶ De-Manning– Reduce personal footprint on the rig
- ▶ Well Control– Operation can control when downlinks are executed, even from offsite locations
- ▶ Reliable & Consistent– Automation helps ensure commands are sent correctly
- ▶ Time Savings– Don't spend time downlinking again because of a missed downlink

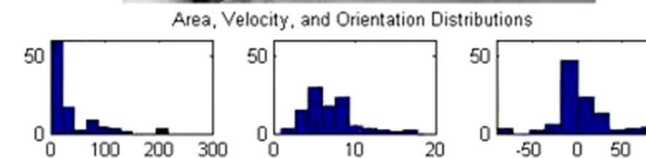
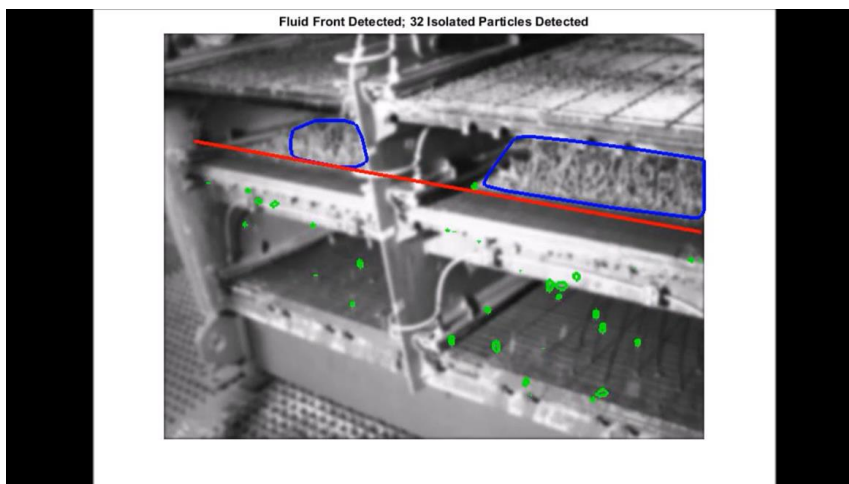
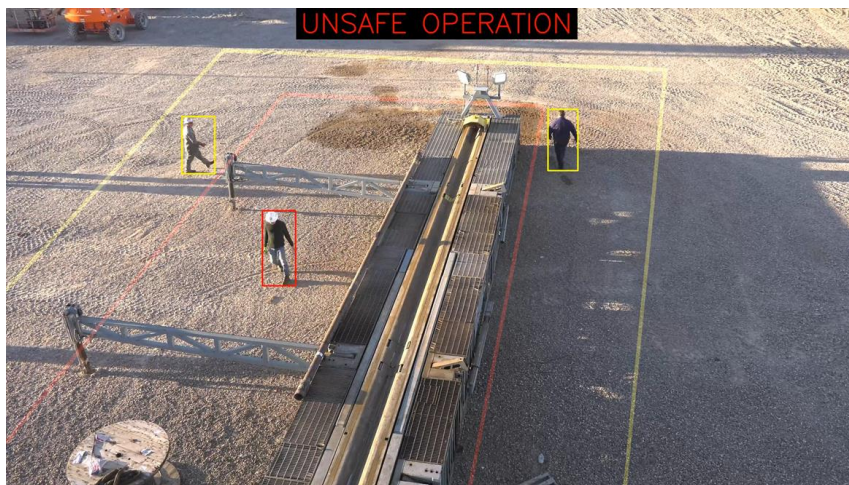




# THE NEXT-LEVEL OF SAFETY

Computer Vision will include a variety of safety focused technologies including, PDS Redzone and Shaker Vision.

- ▶ PDS Redzone uses camera vision to control “red-zones” by setting off alarms and/or initiating shutdowns for violations of established rule sets
- ▶ Shaker Vision uses Computer Vision smart detection systems to continuously monitor the shakers and detect anomalies in the cuttings (such as wellbore carings or motor rubbers), as well as monitor fluid fronts on the shakers





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