AUTODRILLER PRO CONTROL SYSTEM

INDUSTRY-FIRST ADVANCED CONTROLLER TECHNOLOGY

WATCH THE VIDEO

› A CONTROL SYSTEM THAT KNOWS WHAT'S IMPORTANT, WHEN IT MATTERS MOST

AUTODRILLER PRO CONTROL SYSTEM REMOVES HUMAN VARIABILITY AND ENHANCES DRILLING PERFORMANCE

Through sequenced collaboration between H&P drilling technologies, H&P can help reduce human variability and provide game changing drilling performance solutions with an advanced autodriller control system. Traditional autodriller systems require manual gain adjustments that can cause variable results.

A related issue associated with gains that are either set too high manually, or with a semi-fixed gain system, can result in block velocity variability that negatively impacts rate of penetration (ROP), and in some cases bit life that results in additional trips with time, fuel, and emissions impacts.

H&P'S AUTODRILLER PRO SYSTEM PROVIDES STABLE DRILLING WITH DIFFERENTIAL PRESSURE, REDEFINING THE VALUE DERIVED FROM AN AUTODRILLER SYSTEM.

REDUCE TIME TO TARGET

CUT UNPLANNED TRIPS

DECREASE FUEL CONSUMPTION AND EMISSIONS

AUTODRILLER TECHNOLOGY COMPARISON

OVERSHOOT PREVENTION VS SMOOTH DRILLING

	H&P's Standard AUTODRILLER Emphasis on reducing setpoint overshoots	H&P's AUTODRILLER PRO Emphasis on smooth block velocity and improved bit engagement
Automated gain settings	●	●
Controls block velocity with weight-on-bit (WOB)	●	●
High gain controller with fast and hard responses	●	
Option to remove ROP Limit		●
Lower gain controller for smoother drilling and more consistent block velocity		●
Strong controller responses while not over-reacting to fluctuations in downhole conditions		●
Differential pressure can be used to control block velocity		●

Both the Standard H&P Autodriller control system and Autodriller Pro can be toggled to address the different challenges that can hinder performance.

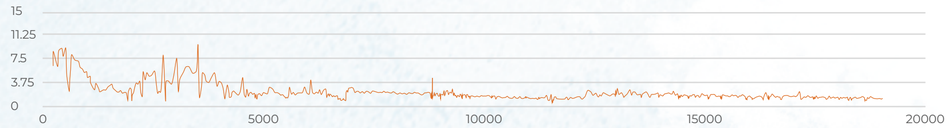
VARIABILITY OF PARAMETERS

Variability of autodriller parameters shows that though WOB and differential pressure responses are generally similar, ROP (directly associated with block velocity) is **significantly less variable with Autodriller Pro.**

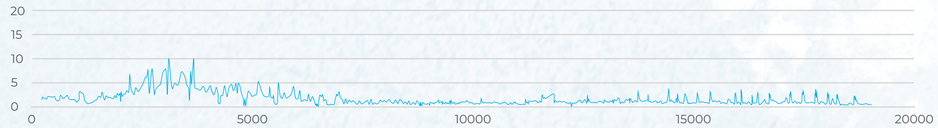
AUTODRILLER

Block Velocity

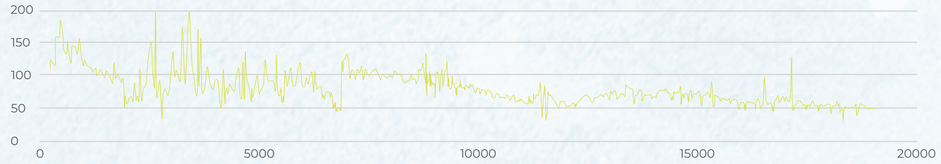
WOB



Torque



Differential Pressure

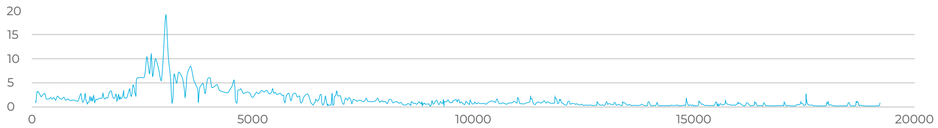


AUTODRILLER PRO

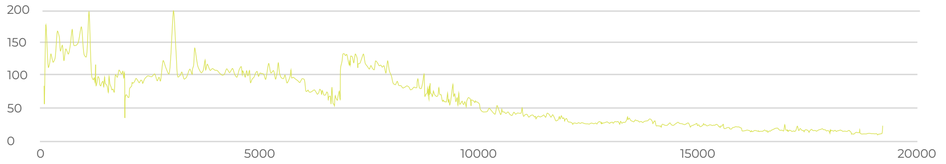
Block Velocity

WOB

Torque

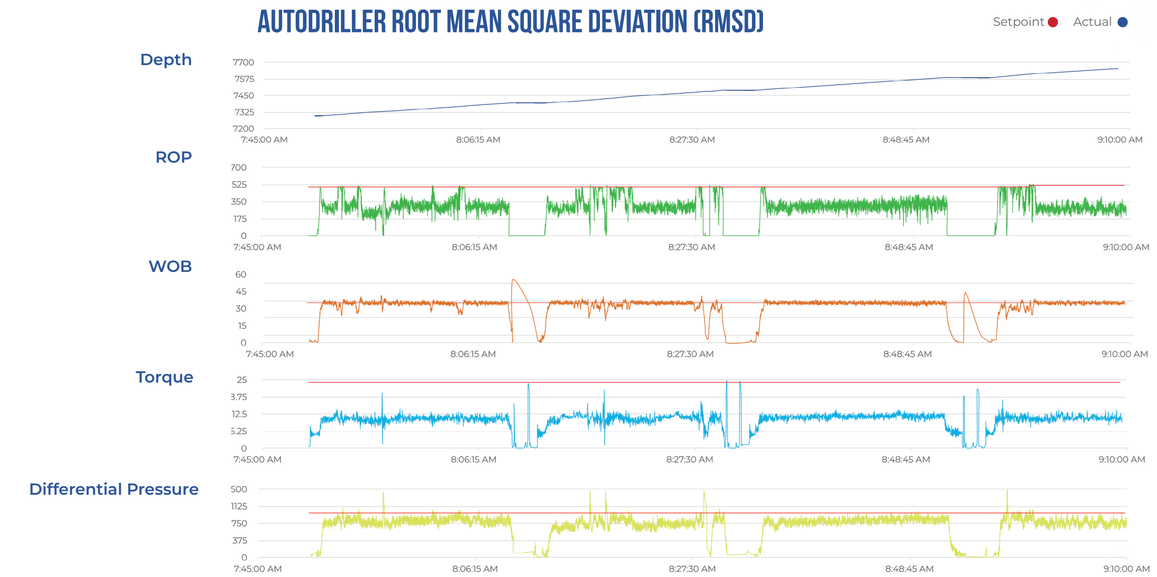


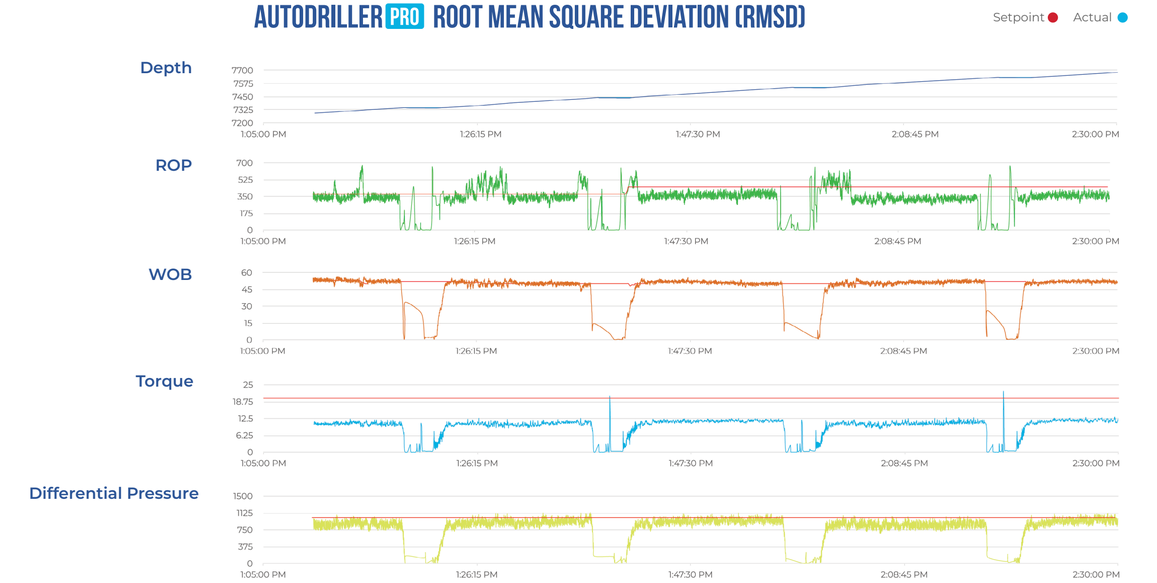
Differential Pressure



OBSERVATIONS AT SAME DEPTH INTERVAL

- **Block velocity (green) shows less variability** with Autodriller Pro
- **Higher differential pressure was achieved** with AutoDriller Pro as the system successfully switched between WOB and differential pressure while maintaining smoother block velocity
- **ROP limit is disabled** on Autodriller Pro with ROP overshoot observed on 4 of 5 stands



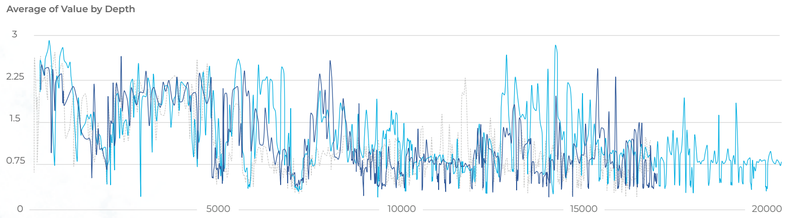


SMOOTHER BLOCK VELOCITY LEADS TO IMPROVED DRILLING PERFORMANCE

- **Average rotating ROP improved** 21%, 31% in intermediate, lateral section respectively
- **Reduced drilling time by an average of 16.6 hours per well** compared with standard autodriller systems
- Total on-bottom **time reduced by 17%**
- **Opportunity to identify roadmap intervals** with deviation measurements

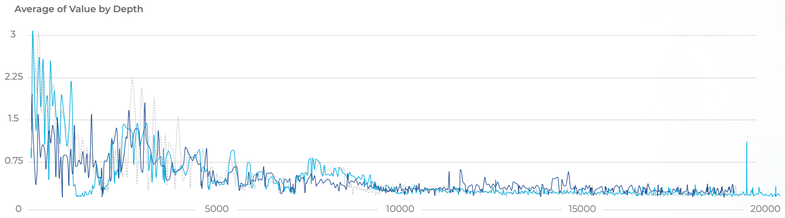
AUTODRILLER

KPI	Units	All	Intermediate	Build	Lateral
Rotary ROP	(ft/hr)		283.8	196.8	210.3
Drilling State - Rotary	(hr)	67.6	24.2	1.6	41.8
Total Time	(hr)	225.9	102.6	19.5	103.8
On-Bottom Time	(day)	4.5			



AUTODRILLER PRO

KPI	Units	All	Intermediate	Build	Lateral
Rotary ROP	(ft/hr)		343.6	290.2	275.9
Drilling State - Rotary	(hr)	51.0	17.7	0.8	32.5
Total Time	(hr)	165.4	71.1	15.3	79.0
On-Bottom Time	(day)	3.7			



IMPROVEMENT

KPI	Units	All	%	Intermediate	%	Build	%	Lateral	%
Rotary ROP	(ft/hr)			59.8	21%	93.3	47%	65.6	31%
Drilling State - Rotary	(hr)	16.6	25%	6.6	27%	0.8	48%	9.3	22%
Total Time	(hr)	60.5	27%	31.5	31%	4.2	21%	24.8	24%
On- Bottom Time	(day)	0.8	17%						
On-Bottom Time	(hr)	18.4							

› FIELD-PROVEN RESULTS

INCREASE YOUR BOTTOMLINE WITH FASTER DRILLING AND CUT TRIPS PER WELL

- **Increased ROP by 21%** in the intermediate and 31% in the lateral
- Time to Cost Savings: **~$30,000**

CUT UNPLANNED TRIPS PER WELL

- **Reduced 16 hours** in unplanned trip time
- Removing unplanned trips **saved $30,000 per well**

DECREASE FUEL CONSUMPTION AND EMISSIONS

- **26% reduction** in fuel and CO2 as a result of faster drilling and no unplanned trips
- **$18,000 per well** in fuel savings and emissions benefits

*at $2.5/gal diesel and $60/ton CO^2e

~$78K PER WELL TOTAL VALUE CREATION

CONTACT US | For more information on how our Autodriller Pro Control System can help you achieve better drilling outcomes, contact an H&P sales representative today or contact us through our website at helmerichpayne.com/contact. **It's time to follow through on your drilling performance potential.**