



CHALLENGE

Use of automation to compensate for mechanical changes altering weight on bit while drilling

SOLUTION

Use AlphaApps™ Weight Compensator app to maintain constant downhole weight on bit

RESULTS

Average ROP increased by 5% from 86 m/hr to 90.3 m/hr when using the app

Average time savings of 1.9 hrs/well resulting in \$27K cost savings

AlphaApps™ Weight Compensator App Improves Drilling Performance

Weight Compensator App Case Study

THE NEED FOR WEIGHT COMPENSATION

Weight on bit (WOB) is an essential part of the drilling optimization process where the ability to maintain constant downhole WOB directly affects the ability to maintain a stable rate-of-penetration (ROP). However, WOB is typically measured at surface with a hook load sensor installed on the deadline and does not account for the various mechanical surface factors affecting downhole WOB.

The auto driller system seeks to maintain a set surface WOB measurement and must react to dynamic changes in tension read by the hook load sensor. Influential mechanical factors at surface impact the hook load sensor readings, thus negatively influencing the WOB calculation. The result is a slowing of the rate at which the drilling assembly is lowered, thus decreasing the actual WOB being delivered downhole and reducing the ROP (see Figure 1a).

WEIGHT COMPENSATOR APP

The weight compensator app was designed to interface with the NOVOS automation system and will adjust surface WOB to account for the various dynamic mechanical factors.

Our algorithm uses simple user inputs to automatically calculate a consistent incremental WOB increase to be applied by the auto driller while drilling down the stand (see Figure 1b).

The app has successfully been deployed on several of our Alpha™ Rigs within Canada and the US yielding ROP gains through consistent WOB.

CASE STUDY

Following extensive field testing, the first use case with the weight compensator app was for our customer in Canada. The application worked flawlessly with the automation system compensating for dynamic drilling loads resulting in improved ROP, motor differential pressure and uniform bit wear.

With an ROP increase from an average of 86.0 m/hr to 90.3 m/hr (see Figure 2), our customer realized average time savings of 1.9 hrs/well which resulted in cost savings of \$27K for the five wells that were drilled using the WOB compensator app.

CONCLUSION

Constant downhole WOB is key for maintaining a stable ROP while drilling. The weight compensator app accounts for the variables affecting surface WOB ensuring a consistent surface WOB, and by extension, stable ROP through constant downhole WOB.

FIGURE 1A

As the stand drills down the auto driller maintains a consistent surface WOB. It is evident with the consistent surface WOB there is a decreasing ROP trend.

FIGURE 1B

As the stand drills down, the Weight Compensator App applies a consistent incremental increase in surface WOB. It is evident the increase in surface WOB over the stand mitigates the decreasing ROP trend and results in an overall increase in ROP.

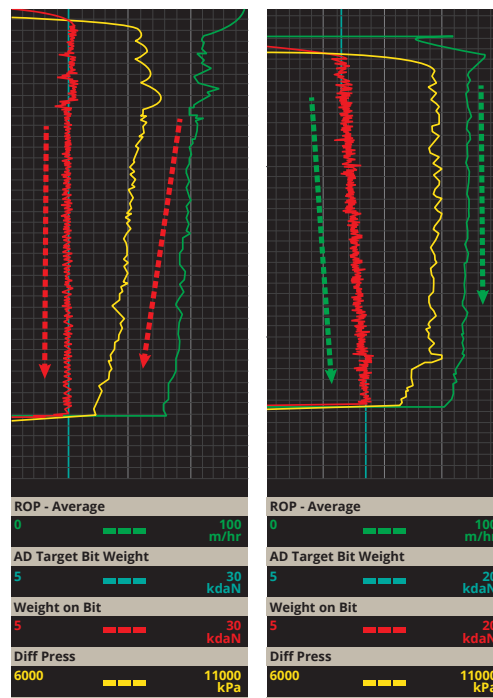
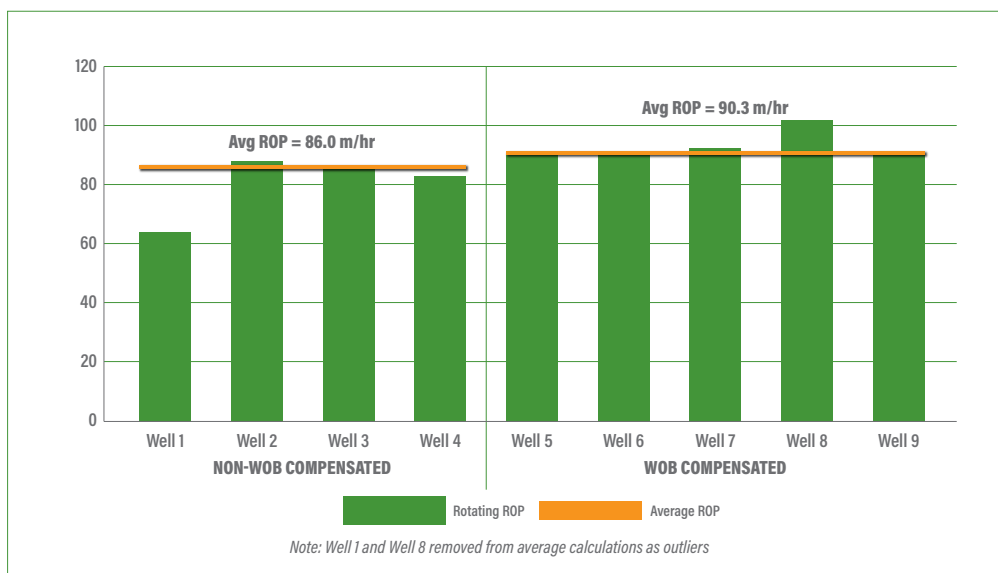


Figure 1a. Without Weight Compensator App

Figure 1b. With Weight Compensator App

FIGURE 2

The average rotating on bottom ROP using the WOB Compensator app is 4.3 m/hr faster than for wells drilled without weight compensation demonstrating that additional ROP gains can be realized once drilling is no longer limited by the surface WOB measurement.



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