Well Construction Practices Continuous Improvement

Challenge

- Connection time reduction.
- Well construction time reduction.
- Wellbore conditions real-time control and monitoring.

Solution

- Continuous real-time monitoring of drilling parameters. Dynamic control of compliance with planned parameters.
- Wellbore conditions real-time monitoring and estimation.
- Advanced data comparison analysis.

Results

- Connection time reduction
- Drilling within safe operational envelopes evaluated in real time
- NPT prevention, and ILT elimination
- Continuous Drilling hazards mitigation and real-time operational practices optimization.

CASE REVIEW

E&P company operating in Europe mature brownfields adopted the ECO System to optimize operations and improve well construction time. The Client had a long-standing plan for optimizing connection practices to reduce total well construction time. Deployed digital tools made it possible to safely improve drilled interval reaming operations sequence and duration while mitigating all risks associated with the consequent drilling and casing running activities.

Drilling connection practice improvements are associated with a balance between section time per depth KPI improvements and potential risks associated with weight transfers, accurate tool face control, and casing string running and setting at a desired depth on the other hand. The benefit of a conservative approach of implementing a comprehensive drilling connection well treatment procedures usually overweighted the goal of drilling time reduction, due to the lack of advanced drilling analysis and real-time monitoring tools to evaluate the current wellbore state and predict ahead of the potential risks associated with borehole complications and poor operations efficiency.

After a successful deployment of the ECO System digital platform on the Client facilities. Client RTOC gained access to the full set of aggregating third-party sensor data from rig contractors and other OFS companies involved. The later data and high-frequency real-time digital twin calculations performed at the edge allowed the Client to evaluate current wellbore conditions, and predict ahead of the potential technological risks. Real-time analytics digital tool enabled the Client to access the insights from multi-well comparisons between wells currently drilled and similar ones already completed. These results served as a firm ground for a new drilling connection practice. The weight-to-weight practice implementation considered – connection practices analysis and its optimization performed in real time on several wells constructed. The results achieved are:

- Improved well construction cycle time
- Record timing for intermediate and production sections drilling and completion
- Consistent results achieved across all operations

The methodology of evaluating current wellbore conditions and evaluating ahead of the potential risk of complication in the future proved to be successful and has been implemented by the Client throughout the whole rig fleet.

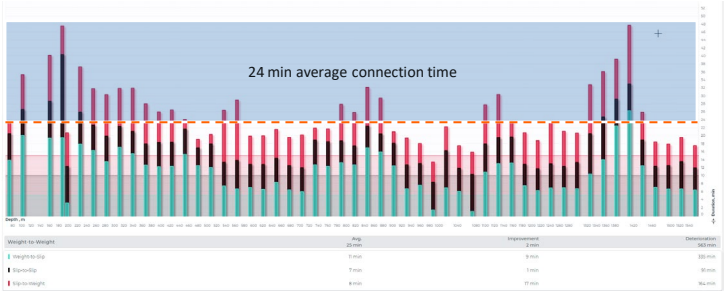
REAL-TIME PROCESS IMPROVEMENT

The current downhole state of a well is evaluated each second on the edge device and in real-time by a digital twin, and a suite of optimization build-in features serves as a firm foundation for real-time decision-making in the field and RTOC. Automated digital platform tools allowed a real-time benchmarking of currently and historically drilled comparative wells, and drilling technology applications, ensuring best and recommended practices contractors compliance, aggregated and evaluated in real time the efficiency of a current set of recommendations to continuously augment and improve the knowledge set.

The ECO System deployed on a client's premises and a dedicated edge IIOT device on each location allowed for automatically evaluating wellbore conditions in real-time and managing the effectiveness of activities performed downhole. Realtime data augmented by dynamic digital twin insights of the downhole process deliberately serves as aground for real-time decision making, advising when additional wellbore treatment procedures are necessary, hence continuously improving best practices implementation.

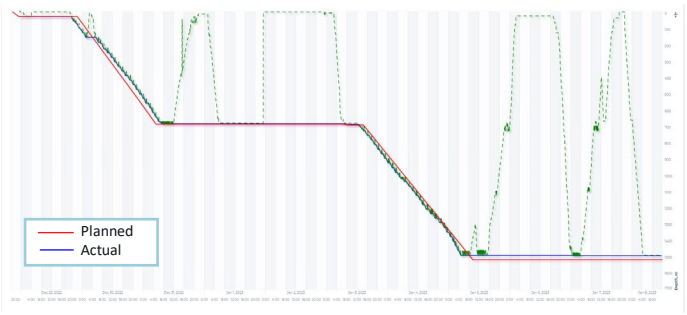
Connection practices optimization results

After new best practice implementation, average WOB-WOB time was reduced by 40% - from 42 min to 24 min.

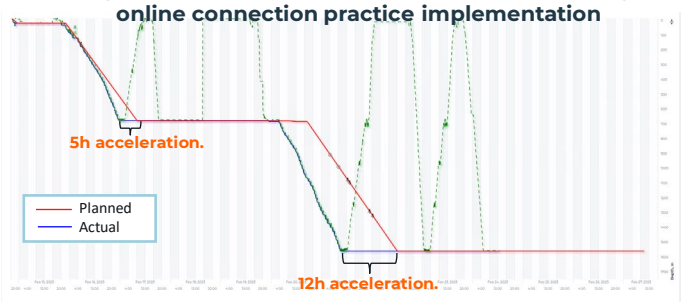


$11^{5/8}$ and 8½ inch sections drilling times were reduced by 17 hours comparing to planned schedule.

DvsD graph prior to the new practice implementation

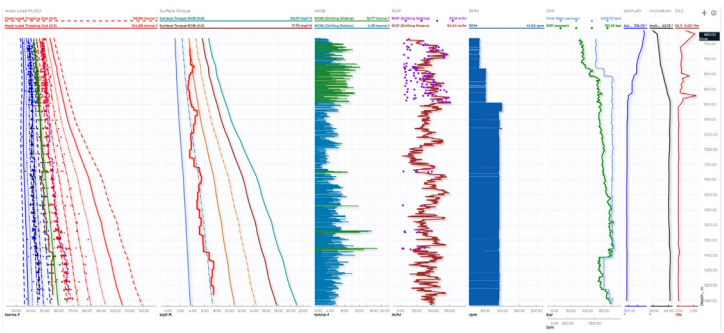


DvsD graph after real-time wellbore state monitoring and online connection practice implementation



General well construction time reduced by 10 % comparing to planned schedule.

Wellbore conditions continuous control, Friction Factors and drilling parameters real-time monitoring were conducted during $11^{5/8}$ and 8½ inch sections drilling.



ECO engineering analysis tools and multiwell comparison instrumentation paired with dynamic digital twin allowed to optimize drilling connection practices.

40%

Connection time reduction

10%

Well construction time improvement

17 h

ILT recovered deploying RT connection practices evaluation

wellsx.com

WellsX LLC
e-mail: info@wellsx.com
+1 (713) 502-6513

17002 Cypress Knee Dr.,
Cypress, Texas, 77429, USA

ECO