

IPS 2024



IPS 24-7.1

**Automated Plug-and-Perf
Decreases Operational Risk and
Improves Conveyance Efficiency**

**Presented by:
Luis Padilla, Halliburton**

AUTHORS: Joel Walden, Halliburton

PnP Challenges

High PnP activity levels demand undivided attention

Common risks

- Excessive fluid bypass
- Drift Changes
- Sudden rate/speed/tension changes
- Fatigue, Distraction

Outcomes

- Pump-offs
- Pre-set plugs
- LIH, Fishing
- NPT/COPQ

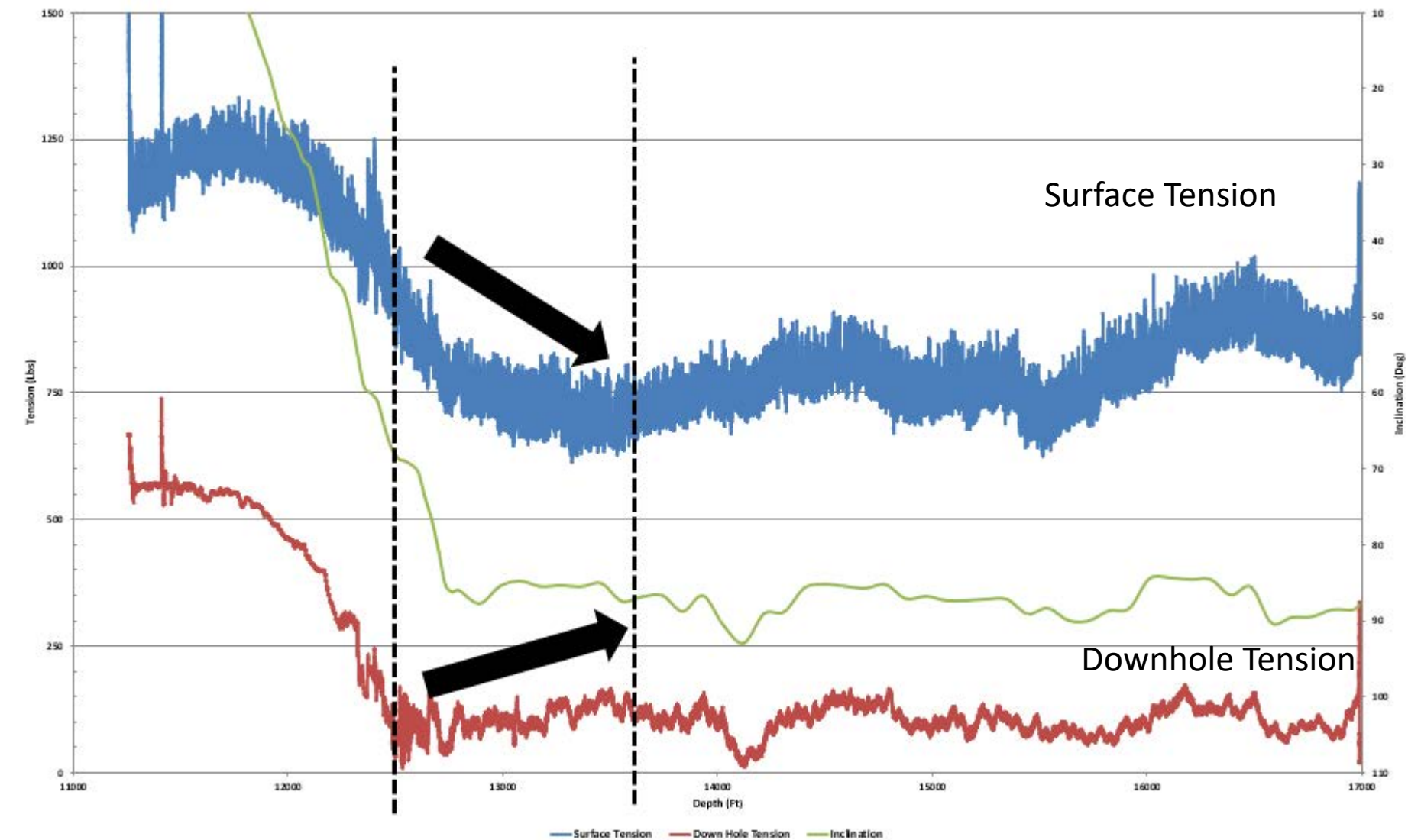
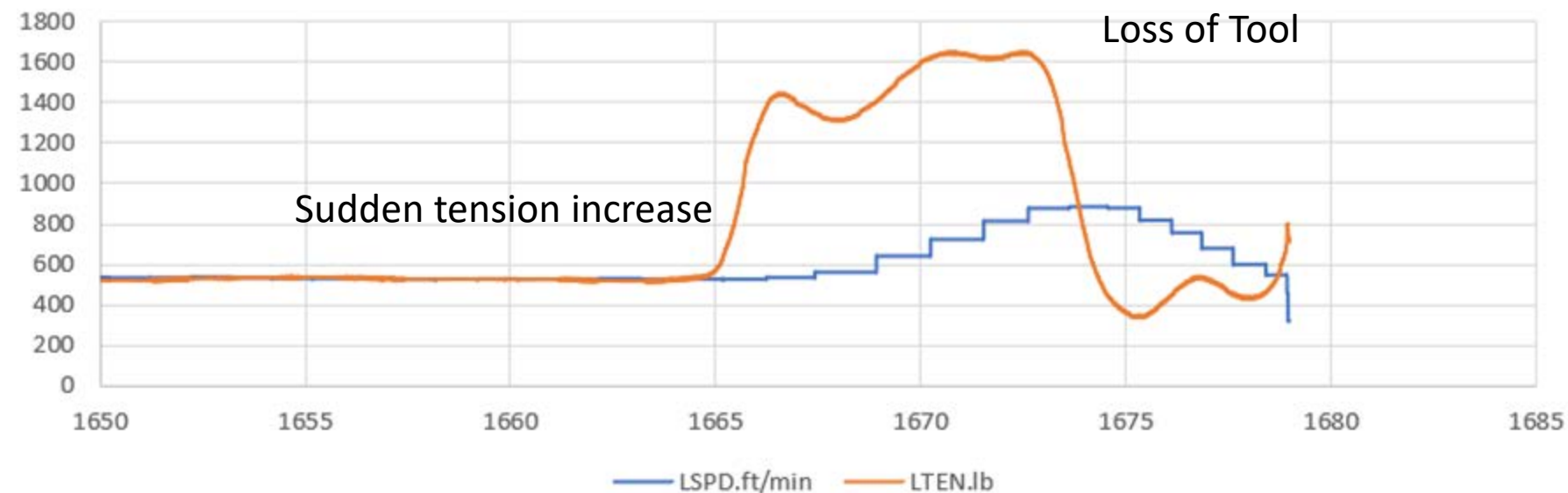


Tension Scenarios

Recognition & Response

Winch operator must be diligent

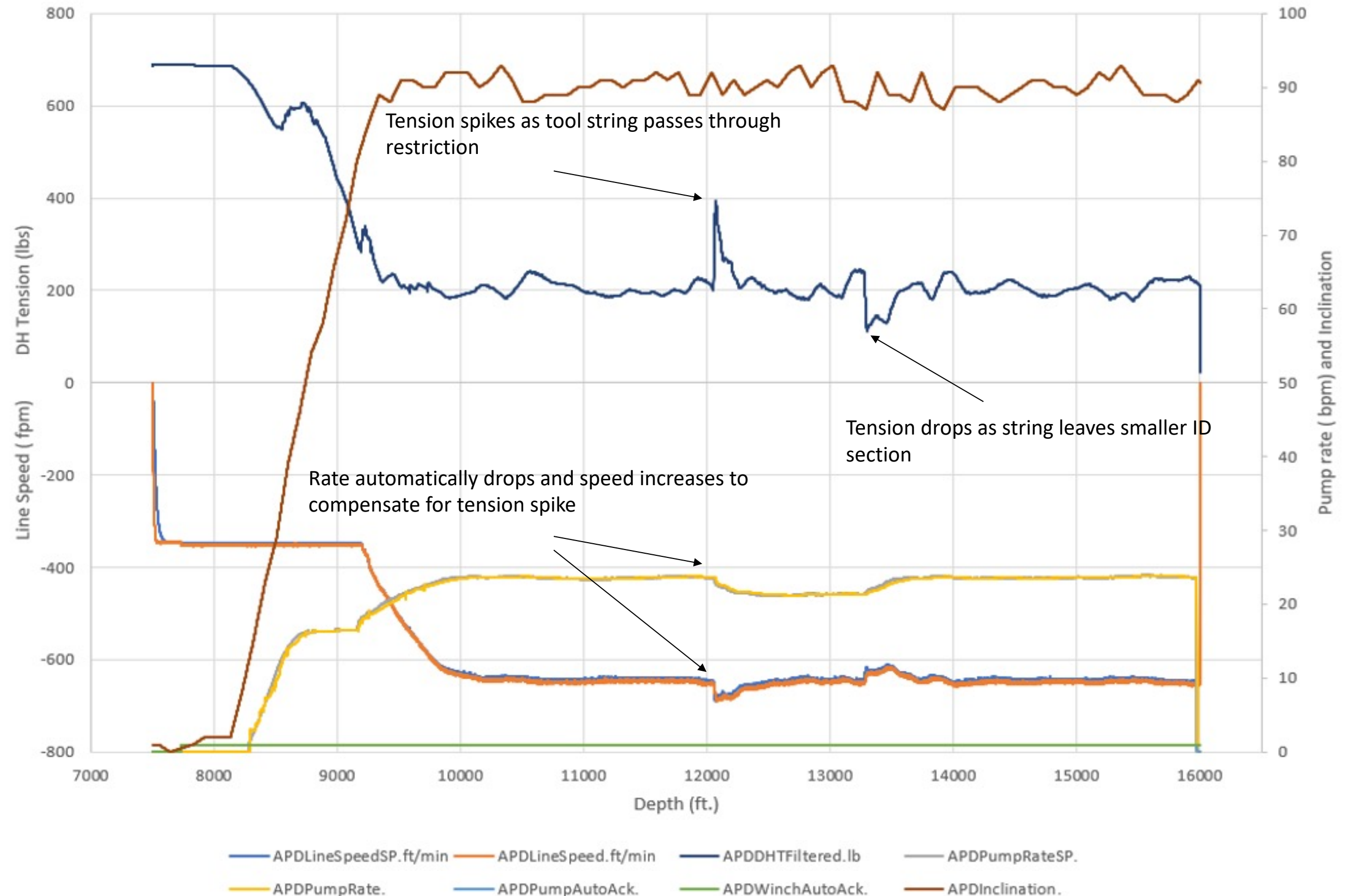
- Identify and respond to changes
- Increase speed
- Call for rate change
- Latency in operation
- Surface tension lacks fidelity



Automation Response

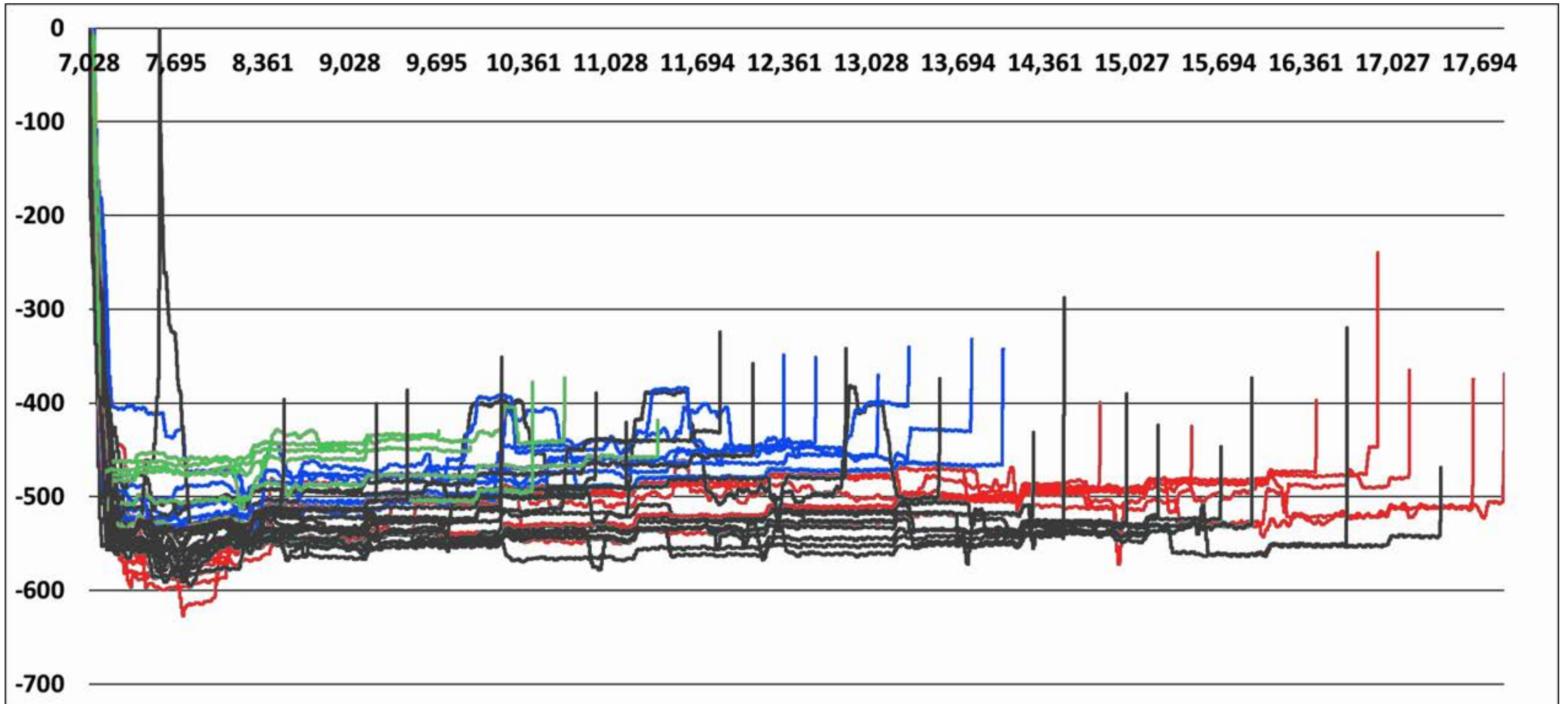
Casing Sleeve

- Pre-set plug mill-outs, fishing jobs, lost-in-hole strings easily get into the \$300k+ range, including additional spread cost during downtime
- Automation rapid response to:
 - Downhole stack-outs
 - Restriction-induced tool acceleration (shown here)
 - Surface pump failures
 - Wireline stuck in packoff
 - Surface equipment comms failures



PnP Consistency

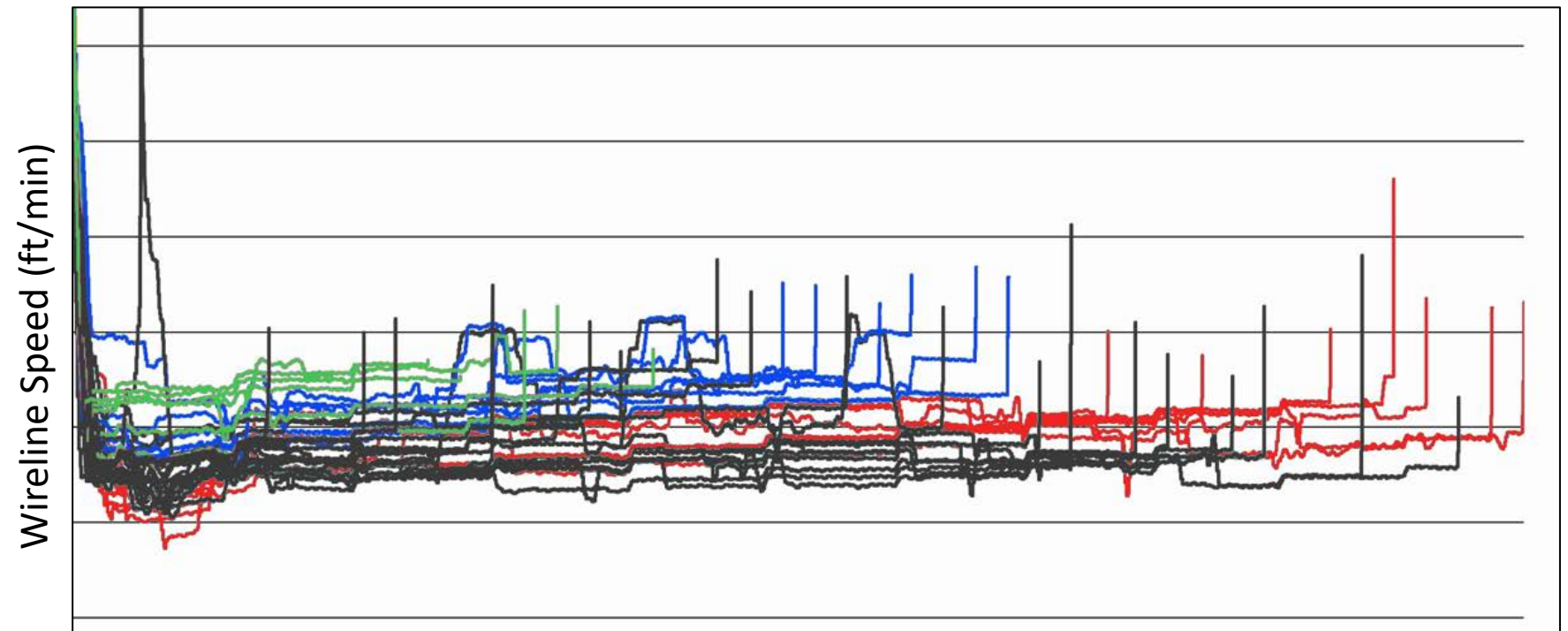
Current State



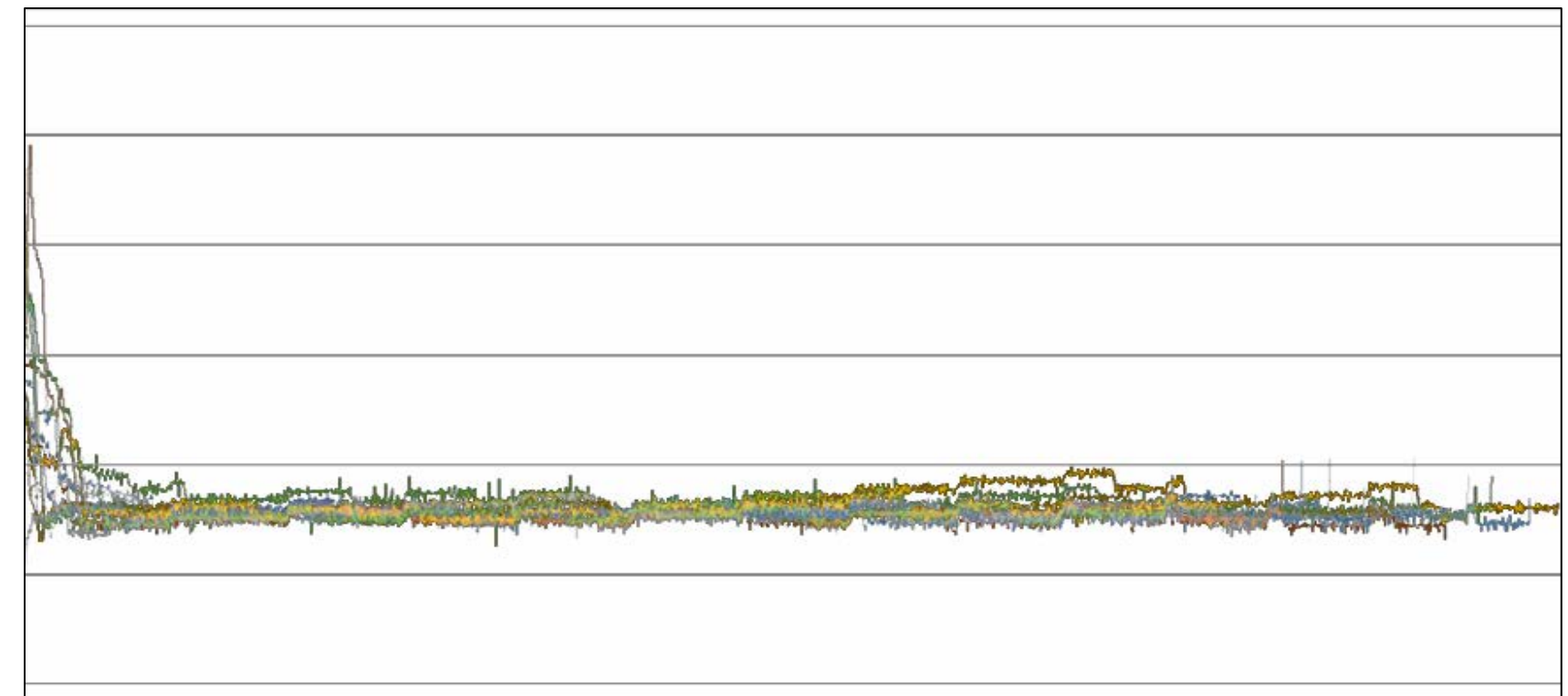
Applying Automation

Repeatable Efficiency

- **Goal of automation:**
 - Safely convey the perforating BHA while operating the winch as efficiently as possible and simultaneously using the minimum amount of pumpdown fluid
- **...while responding to**
 - Deviation and dogleg changes
 - Restrictions, debris, stackouts
 - Pressure breaks, pressure outs
- **Technical Components of Effective Automation:**
 - Closed-loop, real-time algorithm, simultaneously controlling both winch and pumpdown units
 - Incorporation of downhole sensors for real-time event detection & handling
 - Physics-based digital twin continuously updating current conditions



Depth (ft)



Depth (ft)

Field Results

Automation Benefits Realized

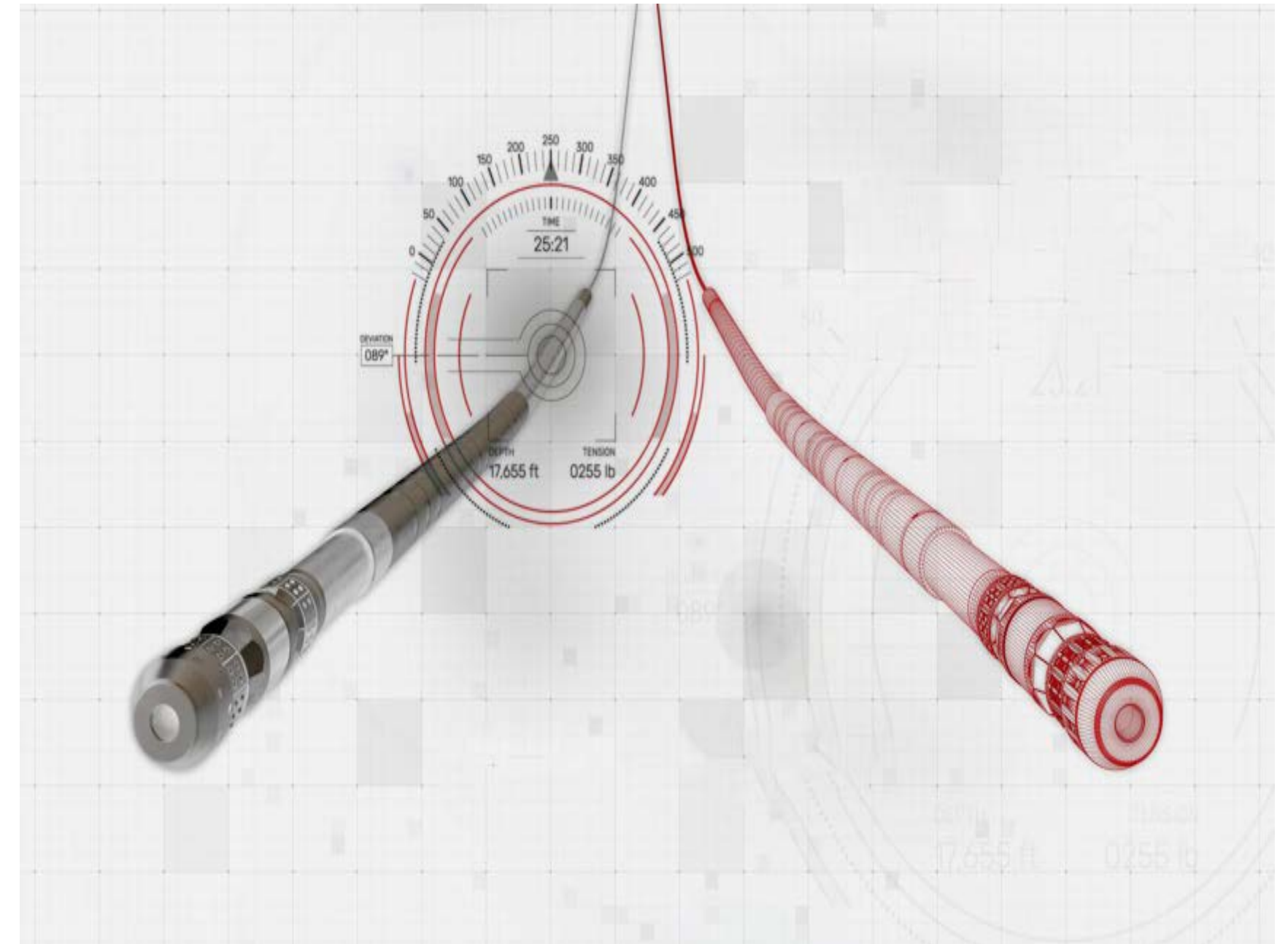
- Operator restricted running speeds due to frequent stuck guns/pre-set plugs
 - With automation, operator allowed the wireline vendor to increase running speed
 - Resulted in **12%** faster stage times
 - Critical path NPT decreased **by 48%**, approx **\$75k** in spread cost reduction per month
- Operator historically began pumping tools down from surface at up to 30 BBL/min
 - By automating the pumpdown and reducing rate, average fluid volume was reduced by **27%**
 - Dynamic rate adjustments rather than “set it and forget it” allowed smoother, more predictable conveyance of BHA



Conclusion

Summary

- Manual operations are more prone to unforeseen, costly well interventions
- Automating plug-and-perf provides more rapid response to variable, adverse downhole conditions
- Faster response times decrease the risk of fishing, milling, and lost-in-hole situations
- Typically, automation also improves operations efficiency and decreases pumpdown fluids requirements



QUESTIONS?

MAY 13-15



IPS 2024

Automated Plug-and-Perf Decreases Operational Risk and Improves Conveyance Efficiency

AUTHORS: Joel Walden