

New downhole method and technology to open well for production in a Multi Station Frac Completion through Light Well Intervention

Havtil Conference

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Agenda



Background



Solution



Pre-job qualification



Operational execution



Results



Conclusions

Introduction

Intervention scope

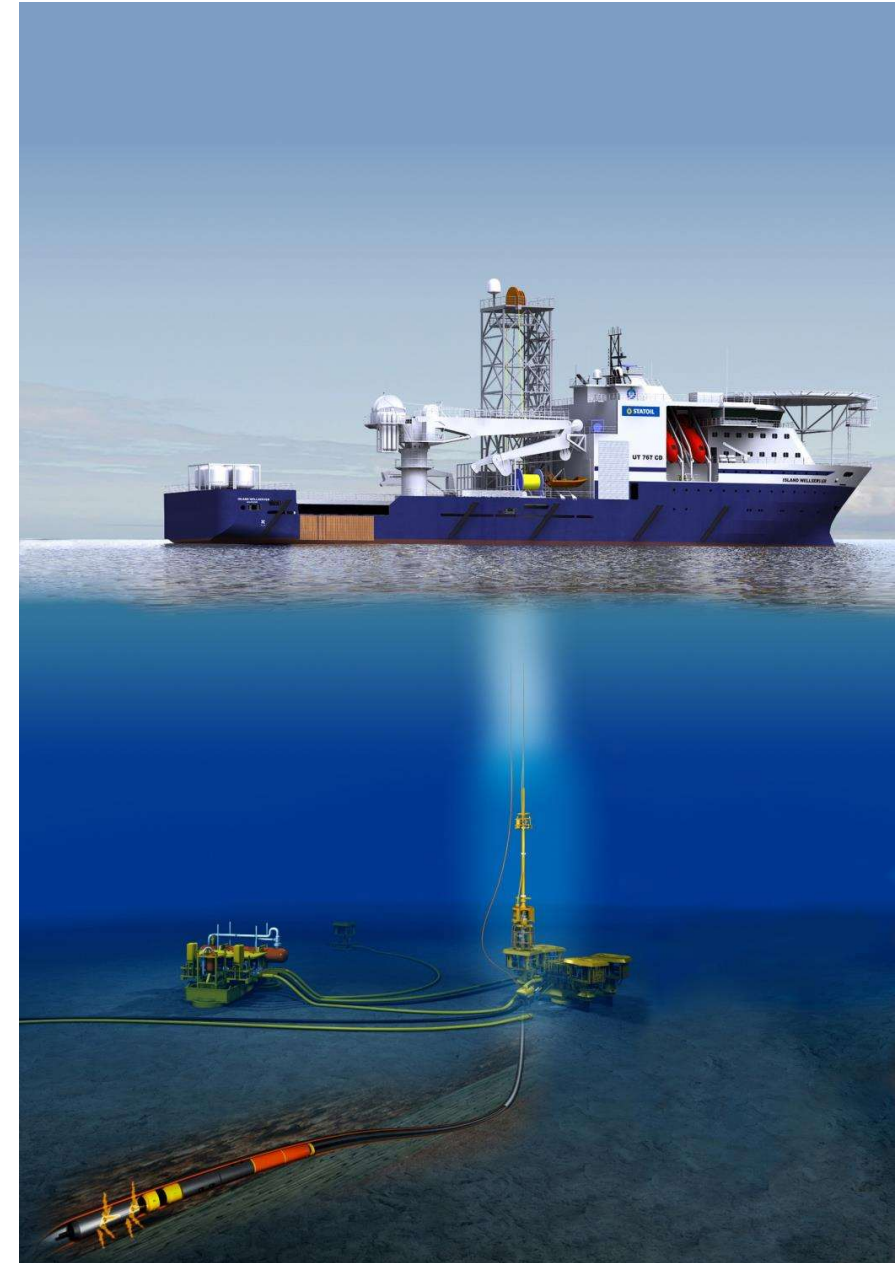
- Open **10 FRAC sleeves** to bring well on production
 - Perforation not economical on this field
- Deployed from LWI

Well status

- Multi-station completion with FRAC sleeves
- Pumped 2.16 million kg of proppants
- Drilling cleaned up

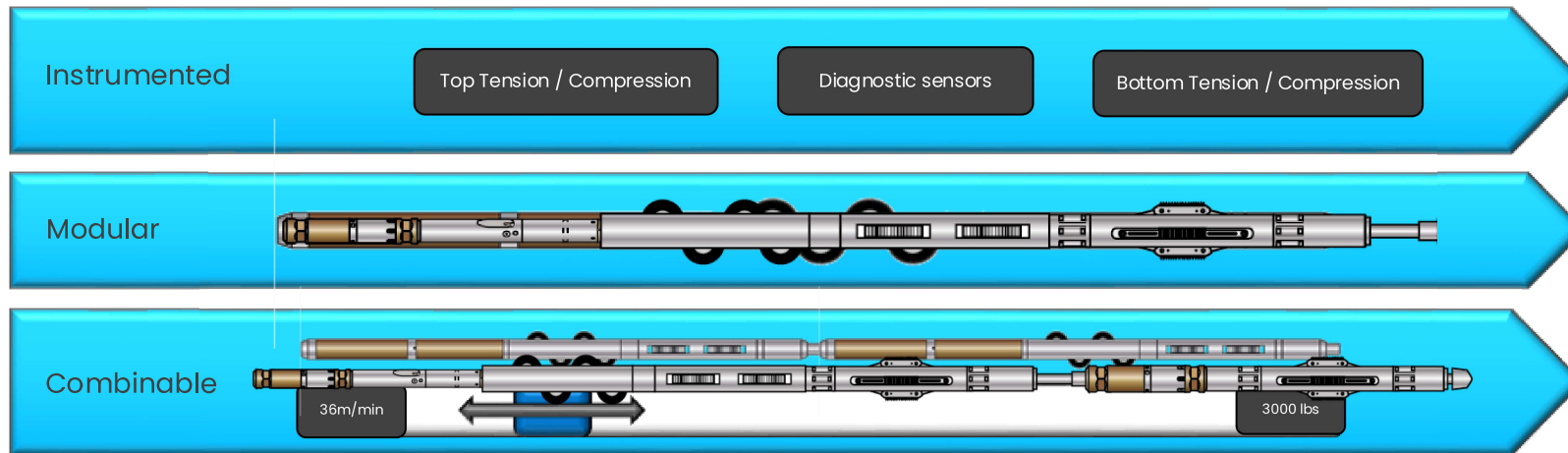
Challenges

- More **efficient** and **reliable** solution
- No profile in sleeves
- Hardness: titanium nitride coating
- Minimum 11ton of force available when anchored in the sleeve
- Proppants could cause risk not able to enter or stuck
- Stuck sleeve contingency



Background

Extending the use of the **PRIME Platform**



PRIME Compact Tractor & Stroker / Tractor

- 3.38 in. OD architecture
- Compact by design
- Modular
- Configurable as short as 7.25 m
- Bi-directional force of 16T
- Stroke length 10 in. and 20 in

33% shorter

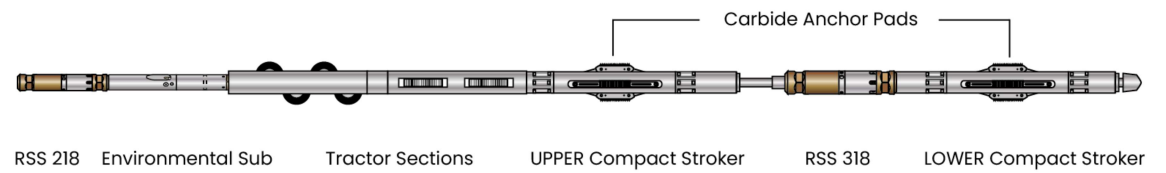
40% shorter



Solution

Dual stoker & tractor technology

- Integrated conveyance
 - Upper stoker included 2 tractor drive-sections
- Simultaneous functionality
 - Dual stokers communicating
 - real time control and data read-out
- Dual stoker purpose:
 - Upper stoker: anchor in tubing
 - Lower stoker: shift the sleeve
- Rapid response engineering
 - New anchor pad with carbide inserts

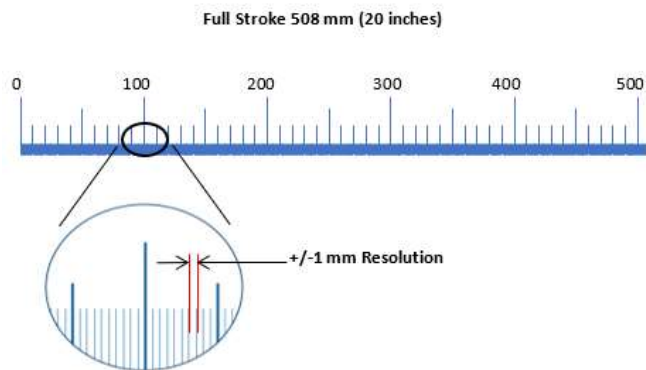


Solution

Sensor validation of downhole mechanical action

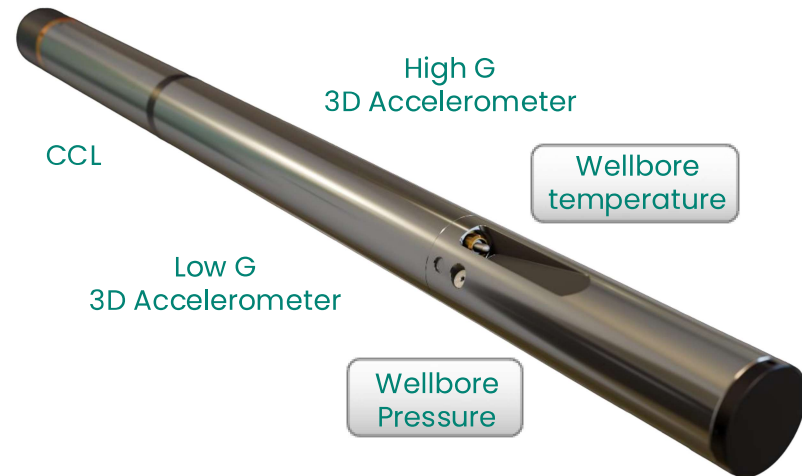
PRIME Shifting

- Knowing the expected shifting length 145 mm (5,69in).
- Monitoring the stroke force:
 - Reduction - movement
 - Increase - end position
- Additional mm, expected due to toolstring length



PRIME Environmental

- Benefits
 - Wellbore environment and tool shock measurement data providing additional real-time in-situ task verification
 - Enhancing sleeve shifting diagnostics



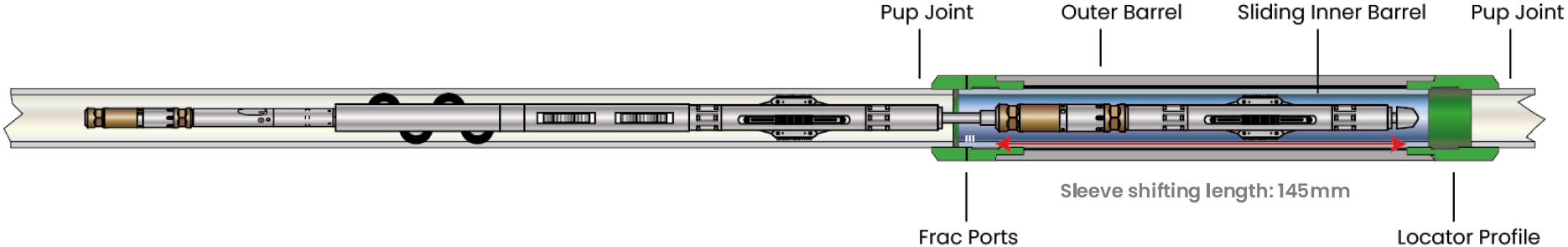
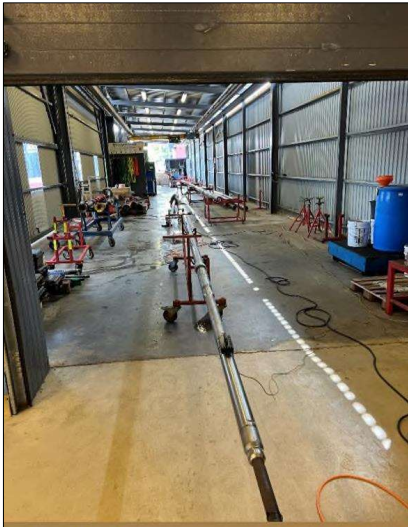
Pre-job qualification

First test – standard

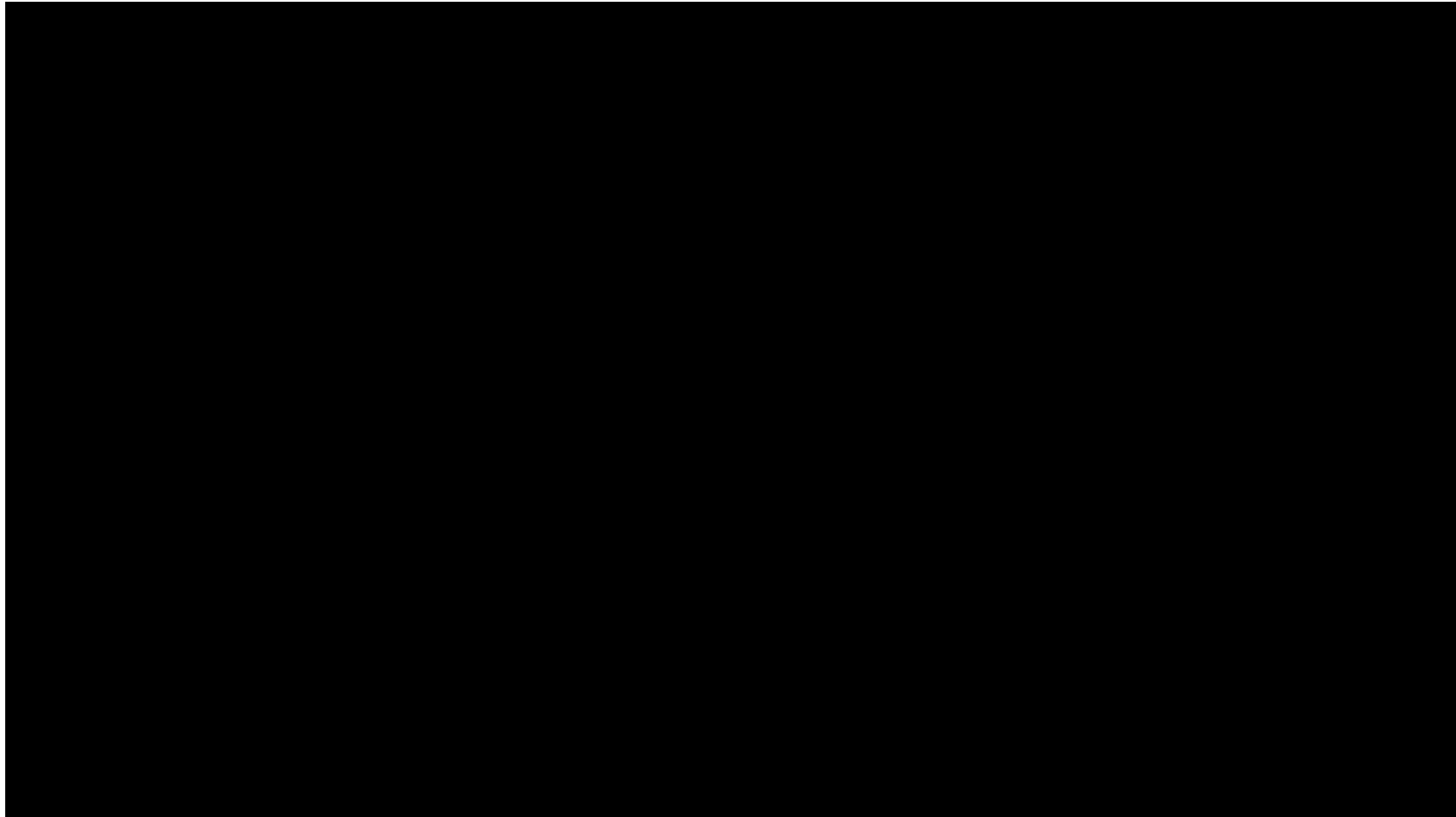
Anchors slipped inside the sleeve

Final test - carbide

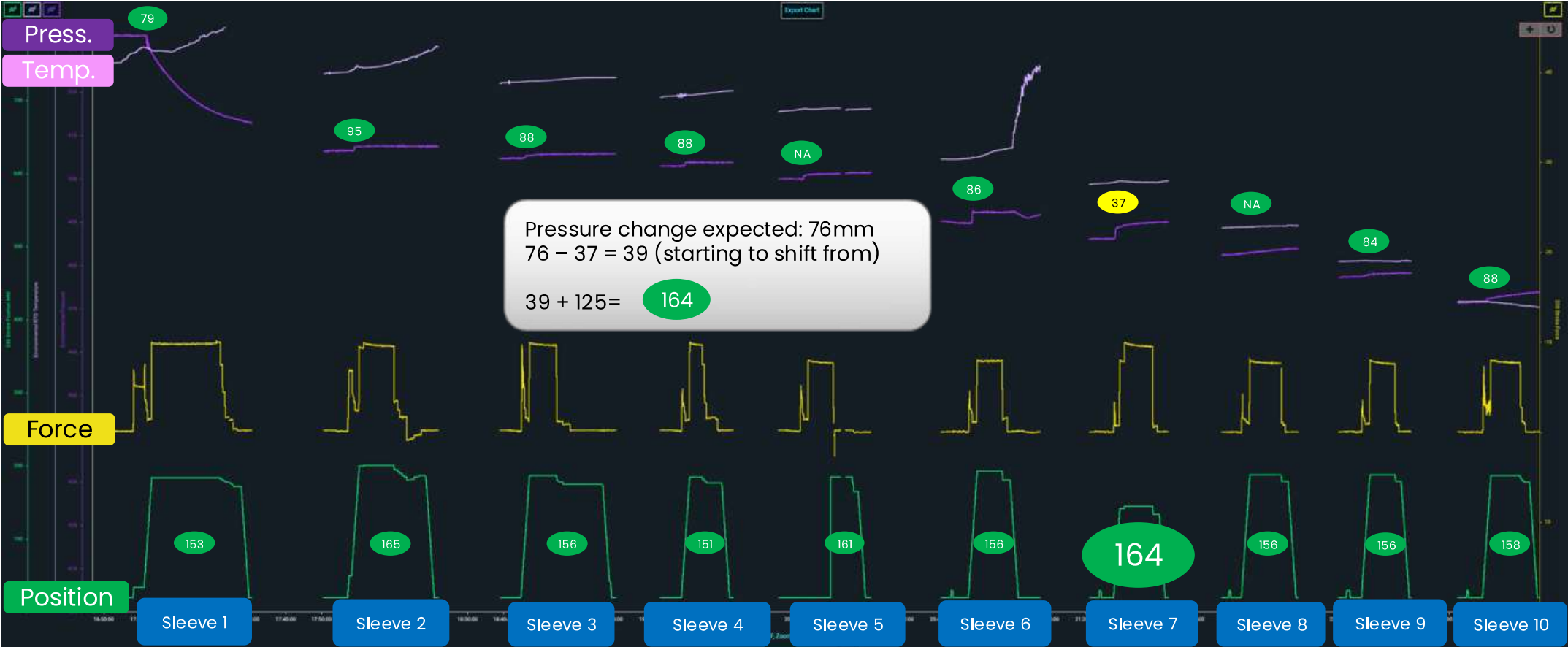
- ✓ **S**tokers running simultaneously
- ✓ **C**arbide anchors
- ✓ **S**leeve can be operated
- ✓ **S**hifting length and signature
- ✓ **P**ull 11 ton 10 times
- ✓ **P**ull 14 ton once



Operational execution

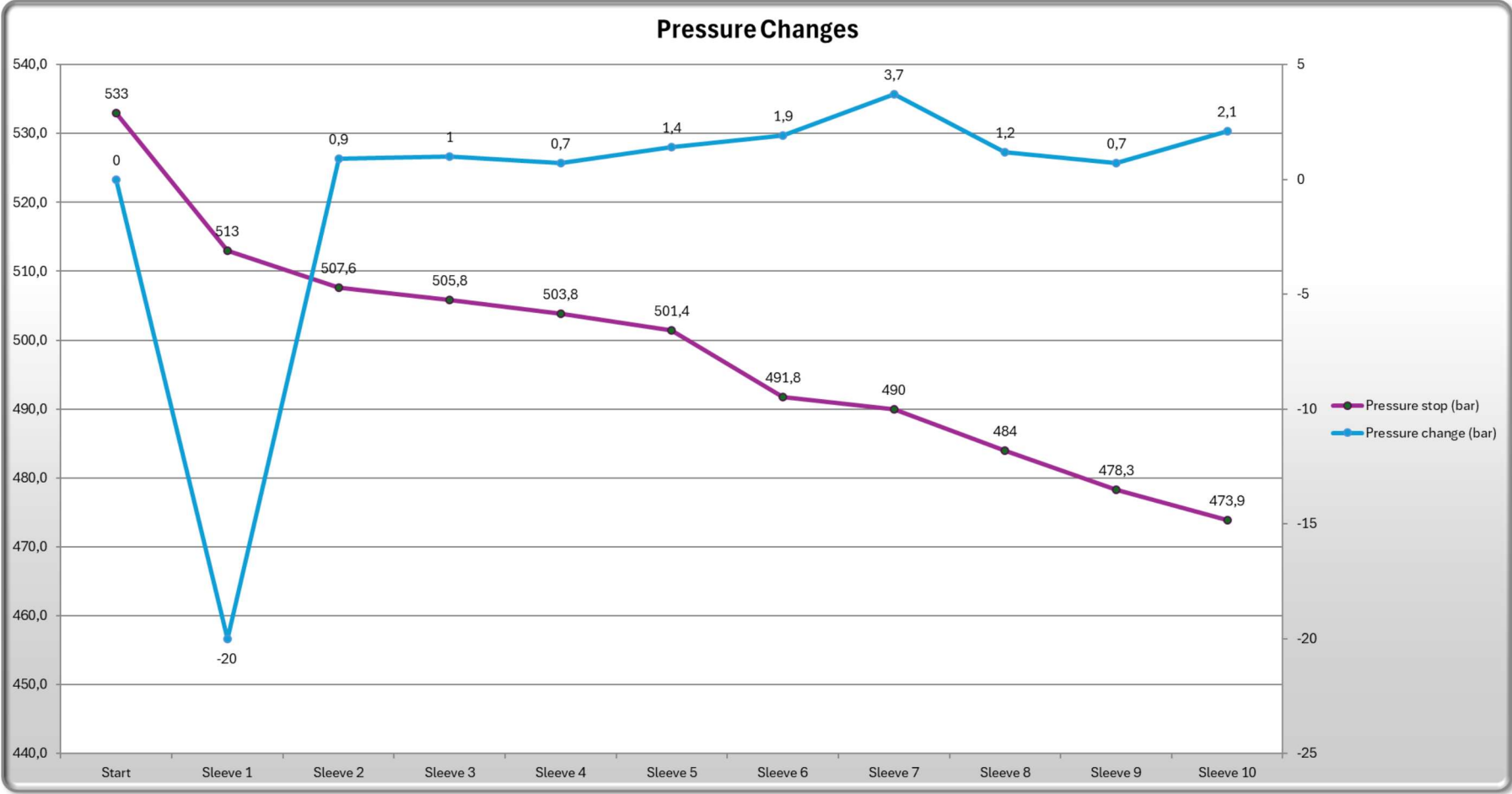


Operational execution





Results



Conclusions

- ✓ **Solution** successfully leveraged PRIME platform and COMPACT series capabilities to run dual COMPACT Stokers
- ✓ **New method** to verify sleeve fully shifted has been enabled
- ✓ **Collaborative procedure** – co-developed with customer for operational success
- ✓ **First time** COMPACT stokers have been used in a dual stoker set-up.
- ✓ **First time** environmental sub has been used to provide live pressure and temperature data from shifting
- ✓ **First time** we have used anchors to grip in slick sleeves.
- ✓ **Carbide anchor pads** proven to enable solid grip in titanium nitride coating.
- ✓ **10 FRAC sleeves** shifted in one run – 6 hrs. 30 min, averaging 39min pr sleeve.
- ✓ **Very efficient new method** –Saved **16,8mill NOK** due to less rig time in addition to days earlier start-up of production.
- ✓ **Value** in the pressure and temperature changes from a reservoir understanding perspective?

Results



New service capability unlocked

Enabled new vendor competition and expanded service offering



High production outcome

Well delivered strong production—validating intervention success.

Baker Hughes 