

Geopro

Success Story

**7" Casing RIH with GeoGLIDER Xtreme Lite
Centralizers and Geopro HYDRA Reamer Shoe**

Geopro Technology



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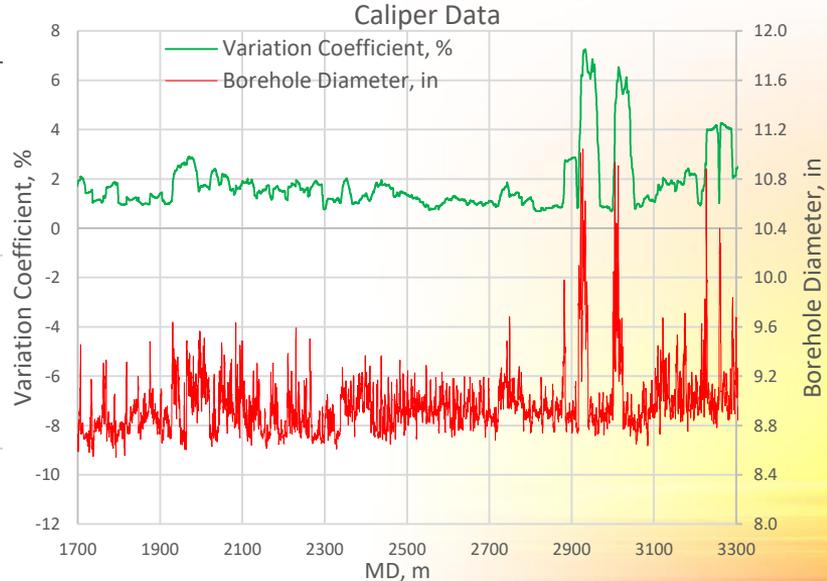
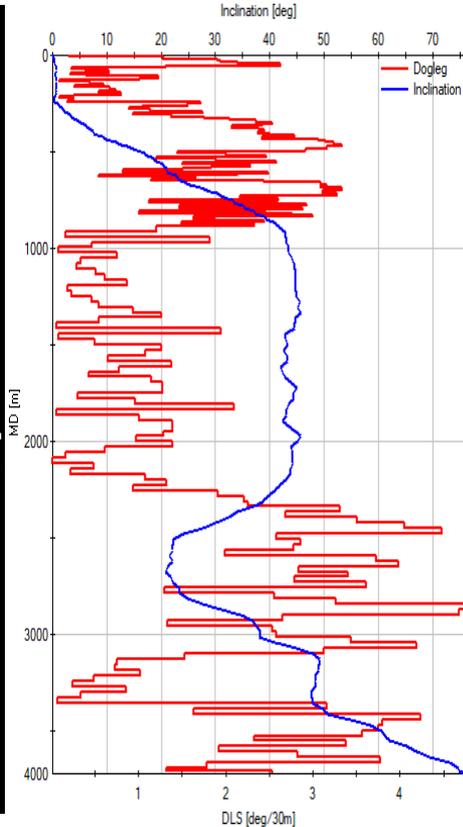
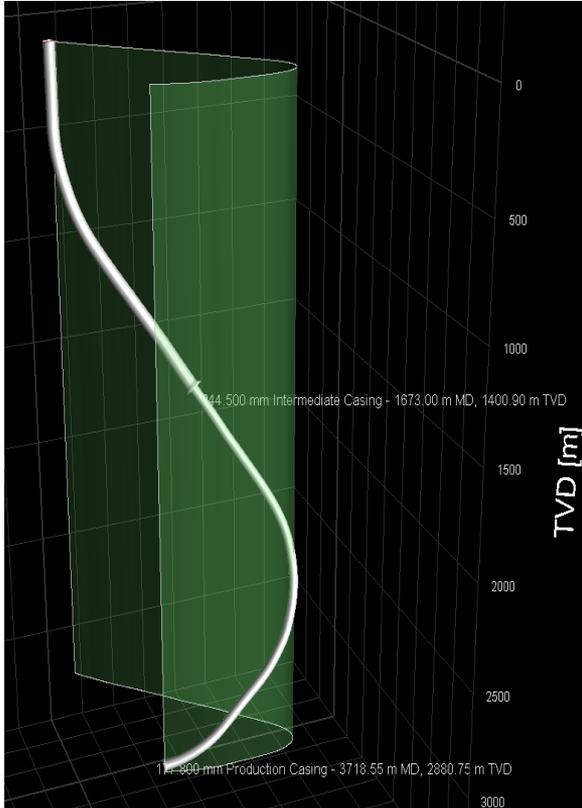


Preface

The client Rosneft had difficulties with 8 11/16” section drilling at new project. Boreholes there tend to collapse causing pack off, poor hole cleaning, ledges and high rugosity of the well. That problems are caused by difficult geology formations such as unstable shales and coals. Neither Geomechanics nor Mud Companies could suggest effective solution.

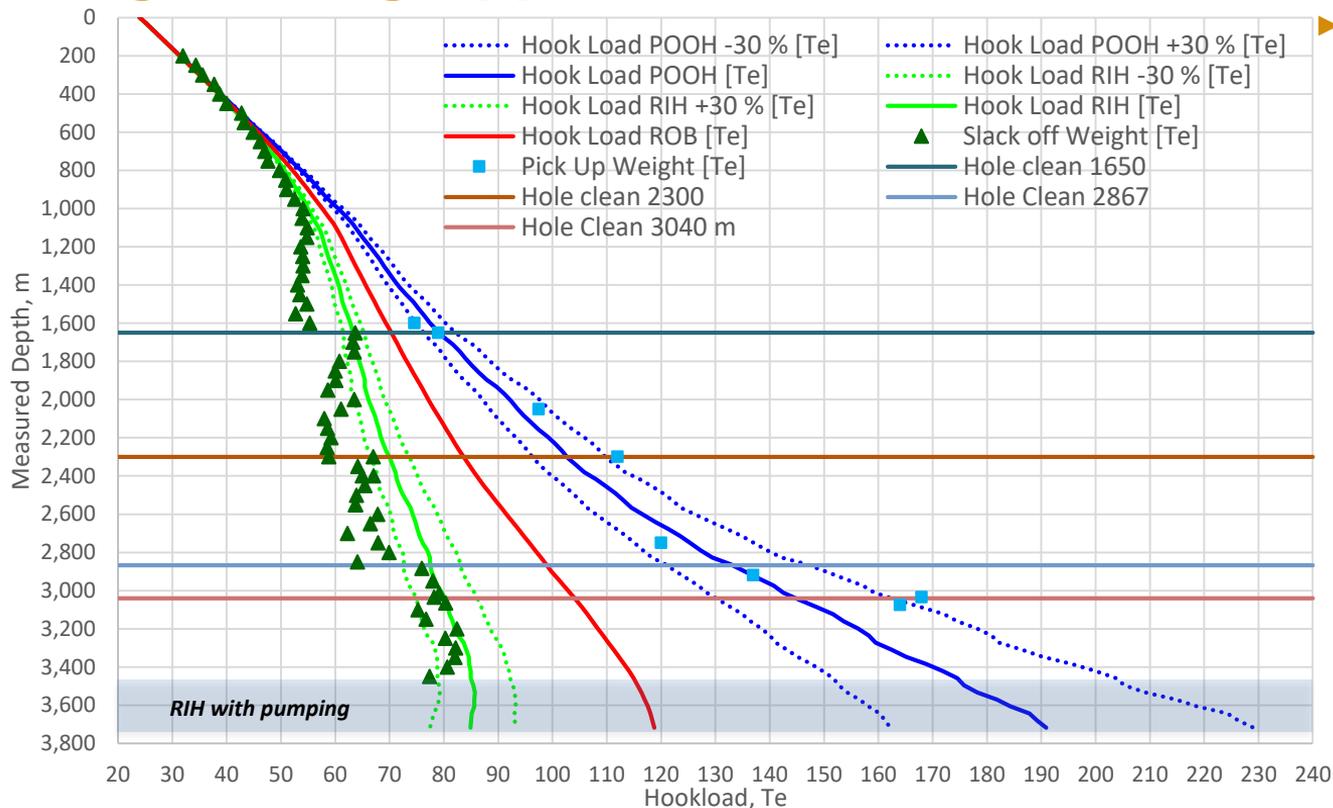
- ▶ The first well was drilled to TD but 7” casing wasn’t able to get planned depth due to pack off and stuck. As the result, kick-off and drilling a new borehole.
- ▶ The second well couldn’t be drilled to TD due to BHA pack off. As the result, kick off and re-drilling of the well must’ve been performed.
- ▶ Another borehole was hardly drilled to TD. Casing took 4 days to get TD and RIH was accompanied by hard slacks and drags, temporary loss of circulation and differential sticking. Also Spring Centralizer breakage was noticed.
- ▶ For the next well the client decided to use **Geopro Hydra reamer shoe** with Low-Friction **Centralizers GeoGLIDER Xtreme Lite (GGXL)**. As the result, Casing reached planned depth successfully. RIH took 2 days. For more details look at the following slides...

Well Geometry



- ▶ 3D Profile with intensive kick off from vertical well, causing large side forces and friction while drilling and casing RIH
- ▶ The trajectory has many drop and tangent intervals postponing it away from catenary profile conception
- ▶ High Micro- and MacroTortuosity in 6,600 feet long open hole section
- ▶ Caliper data is highly variative. Stochastic Analysis shows Variation Coefficient of diameter *c.var* increase up to 7%~30m which certainly requires to take Hi-Tech measures to RIH casing

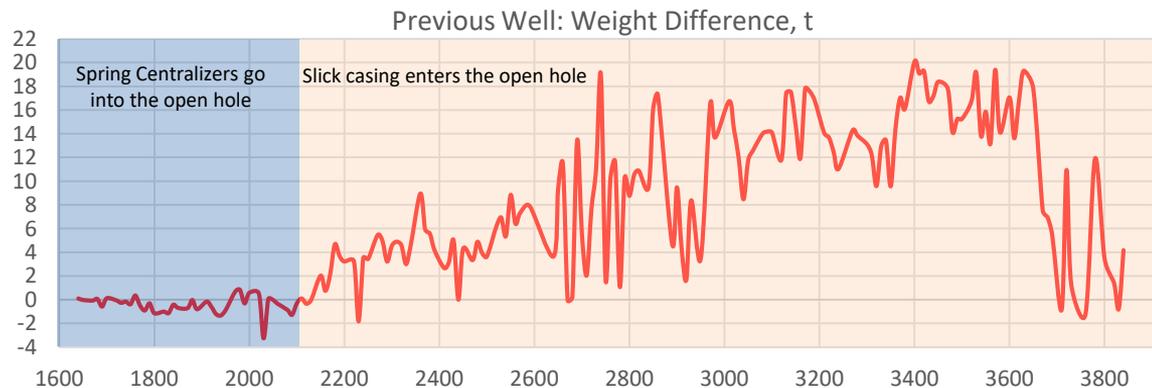
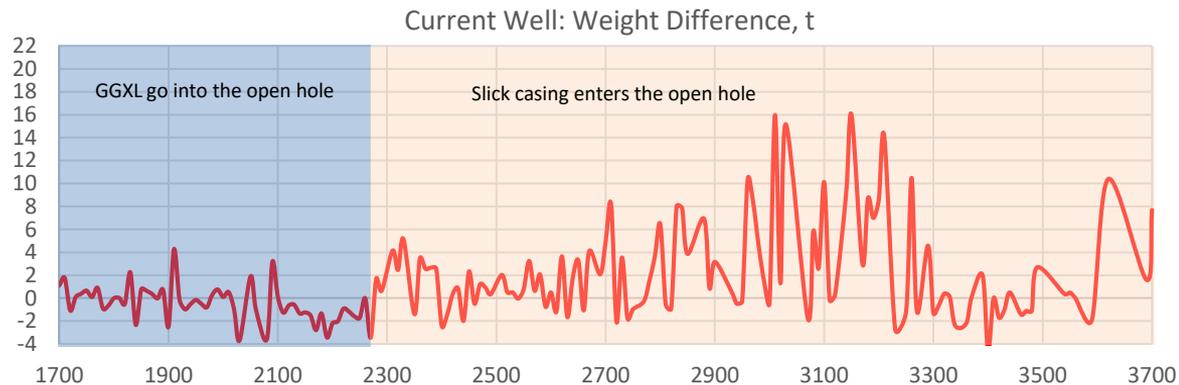
Engineering Application



Geopro Technology Engineering Department:

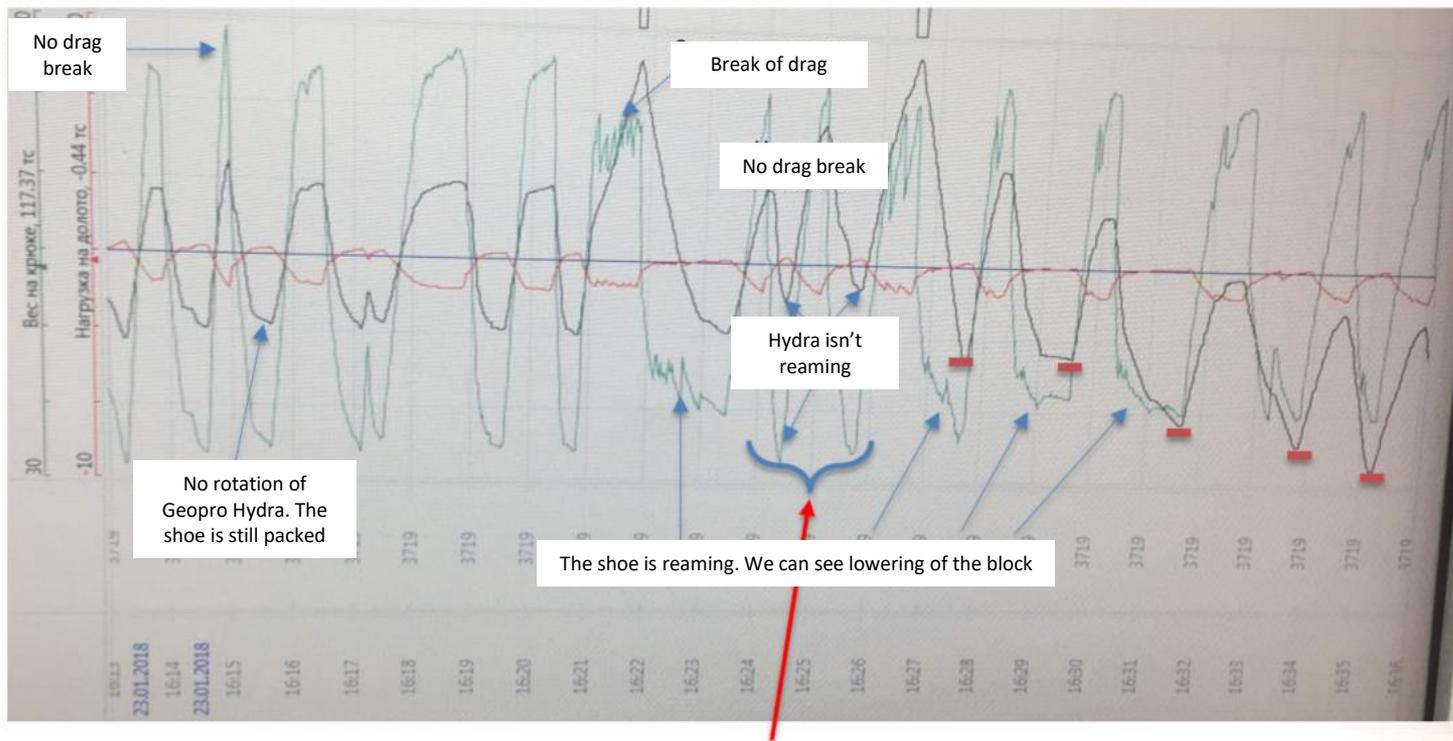
- ▶ PreRun Calculations and Analysis include but not limited to:
 - ▶ T&D Calculations including road map calibration with data from previous wells on a project
 - ▶ Wide range equipment application analysis, including innovative Hi-Tech equipment
 - ▶ Casing Standoff and Centralizers placement
 - ▶ Hydraulics Analysis and RIH velocity
 - ▶ Stuck pipe mechanism, location and avoidance
- ▶ 24/7 Real Time support as a minimum:
 - ▶ Calculations update based on actual data during run
 - ▶ Full responsibility for operations with Geopro Equipment
 - ▶ Recommendations on RIH parameters: slack and drag, velocity, flowrate, pressures, circulation timing and necessity
- ▶ PostRun Analysis
 - ▶ EOWR based on RIH results with presentation and discussion at client's office
 - ▶ Decisions and Recommendations for Continuous Improvement
 - ▶ Value for Client rationale

Differential Stuck Risks



- ▶ Here on the graphs difference between RIH weight and Stick BreakDown weight after connection is shown.
- ▶ At the bottom graph it's shown how casing with 40 spring centralizers stuck, at the top graph it's shown RIH of casing with 50 GGXLs.
- ▶ Rigid Centralizers give unquestionable reduction of differential sticking
- ▶ Spring Centralizers get ineffective when high side forces start acting on them.
- ▶ GGXLs also provided such advantages as:
 - ▶ Friction Reduction
 - ▶ Ability to reciprocate casing
 - ▶ More effective axial load at the shoe
 - ▶ No surge effect while circulation
 - ▶ Uniform reliable casing standoff

Geopro HYDRA functioning

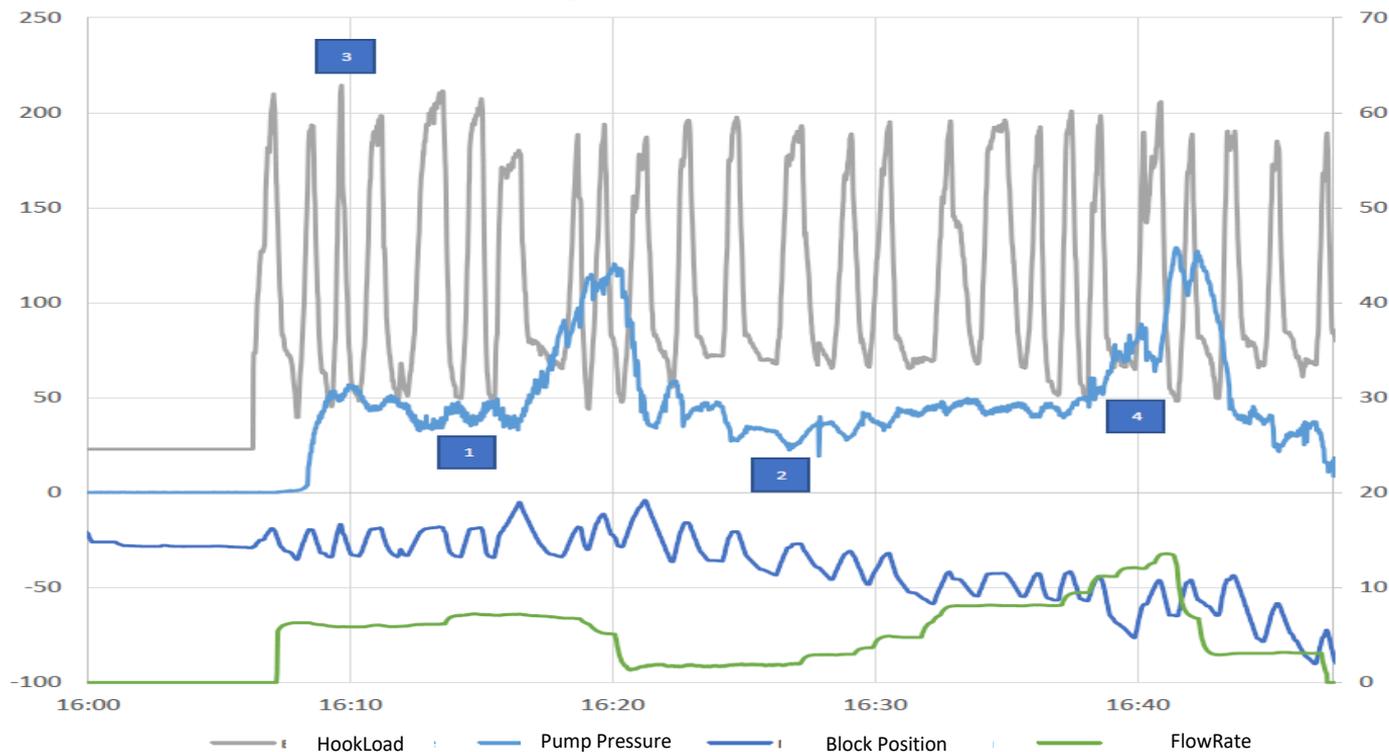


- ▶ Geopro HYDRA was successfully ShallowHole-Tested:
 - 5 l/s – Δ pressure: 5 atm
 - 20 l/s – Δ pressure: 25 atm
- ▶ The shoe reaming activity could be noted by surface acquisition data
- ▶ HYDRA could be rotated easily when got free from stuck
- ▶ If no drag break observed the shoe is still stuck and it's harder to start reaming
- ▶ At low flowrate (below 7 l/s) HYDRA works due to turning ability of nose and strong side jetting properties
- ▶ It took 1 hour to drill out the shoe with RSS BHA+PDC bit

That is how casing would be run without reamer shoe

Geopro HYDRA functioning

Running into Hole. MD 3520-3530 m



- ▶ **1** Increase in the amplitude of pressure fluctuations during slack. Reaming is in progress.
- ▶ **2** At low flowrate the shoe works in turning mode due to eccentric design of the nose. Geopro Hydra overcomes caves and ledges.
- ▶ **3** If drag is not broken the shoe is still packed. Reaming hardly can be started. Due to jetting effect and low-speed rotation the shoe loosens the pack of cuttings, that makes easier breaking of drag at while reciprocation and BHA release.
- ▶ **4** At sufficient flowrate Hydra reams the borehole. We can notice pressure and hookload fluctuations, depth increase, and slack reduction.

Conclusion

- ▶ That was the most successful casing run in the project history:
 - ▶ Casing was run without preliminary wiper trip, reaming or clean-out run. It saved at least 1.5 days of rig time for the client
 - ▶ Casing run took 2 days of rig time, that is 2 days less than RIH without Geopro HYDRA. The shoe saved additional 2 rig days
 - ▶ There was no any problem with cementing and drilling out operations
 - ▶ Using of GeoGLIDER Xtreme Lite centralizers improved casing moving abilities in terms of friction, axial load, tension and differential sticking
 - ▶ Geopro HYDRA shoe functioned during the run and reaming was noticed and monitored by surface acquisition data
 - ▶ Engineering Department demonstrated proactive and invaluable support before during and after casing run. Rosneft persists on extension of active collaboration during critical operations at the project
 - ▶ The client is willing to run Geopro HYDRA with each 7" casing at the project and also it was agreed to equip the entire open hole interval of casing with centralizers GGXL.