



THE LONGEST REACH



EQUIPMENT

285K Guided Rigless (Rig 9)



THE SITUATION

The coil was unable to reach the toes due to the length of well



THE SOLUTION

To mill the remaining plugs with Pistons 285K Rig 9

LONGER IS BETTER

In 2017, a major Oil & Gas producer was developing plans to drill extended horizontal wells in the high pressure Duvernay Shale formation where **the additional 1,500m would likely exceed Coil's reach.** Piston, having a reputation for its successful millout campaigns, was engaged by the producer to develop a program to millout the frac plugs to the toe with jointed pipe. Piston completed their longest well, among others, and **set a new record in Canada** the following season at 7,770m with its flagship 285K unit: Rig 9. In 2020, having proven the economics of 'longer is better,' the producer decided to extend new wells beyond 8,400m with 5,000m horizontal sections. Once again, Piston stepped up to the challenge.

THE PROCESS

1

The process began with modeling the optimum drill string for the job with Piston's pipe. Calculations showed that, without rotating, the string would helically lock up at about 6,300m.

2

A heavily tapered string was selected to maximize the slide, and manage tension and torque while rotating the string 110-120 RPM against an expected friction factor of 0.20.

3

Three pipe weights configured the string. The heavy and medium weighted joints in the top sections had high-torque PH6 pressure rated connections while the lightweight pipe for the horizontal was EUE.

4

Modeling results showed 3,000-3,500 ft-lbs of torque would be required to rotate the string at 120 RPM, which would allow the toe to be reached with 18 kdaN of surface tension. The string allowed for operational torque as high as 8,500 ft/lbs if needed.

5

In the months of preparing for the job, rig 9 readied with improved torque and pumping abilities, and all necessary BHA components were built or arranged. And after Coil was unable to reach the toe, Piston was dispatched to mill out the 12 remaining plugs with its customized drill string.

6

The crew started in the hole on the evening of Feb. 27, 2020, and during the night shift on Feb. 29, surpassed its previous record of 7,770m with all operating parameters within their expected range.

7

Approaching 8,200m on the 3rd day of operations, the rig was performing at 109 RPM with 3,513.7 ft-lbs and 17 kdaN in the slips. Plugs were being milled out in 10 minutes or less. Milling stopped at 8,255m; just short of the second last plug due to a wireline setting tool left in the well that the mill was unable to break up; and the customer's goal of 'no more than four plugs left was met with pride.

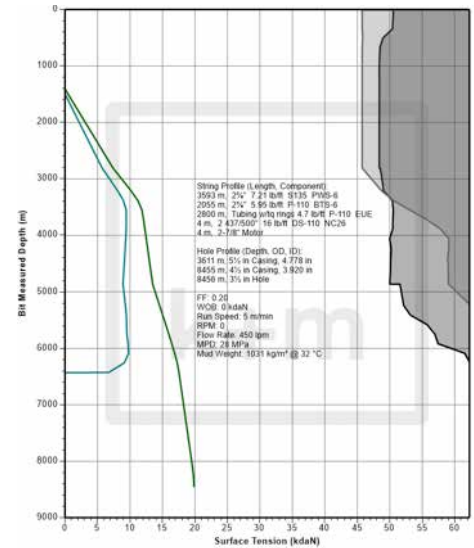


Figure 1. Surface Tension of FF = 0.2

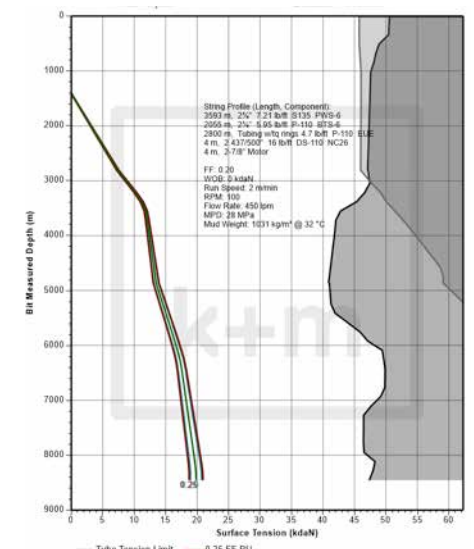


Figure 2. Tension While Rotating 120 RPM

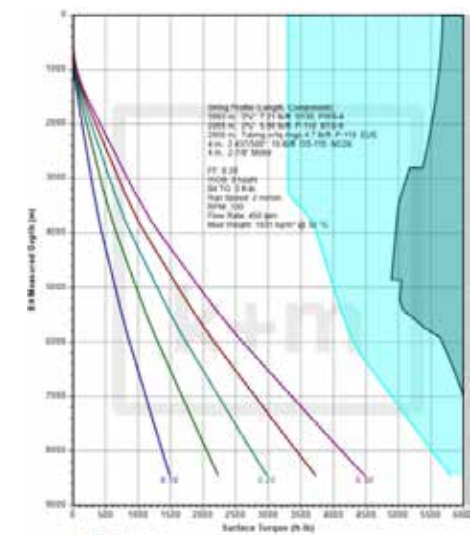


Figure 3. Torque Snapshot

THE RIG

Piston's rigs are unique and loaded with proprietary efficiencies; learnings from the company's 20+ successful years in the snubbing business. Rig 9 in particular, with a 15K BOP and 285,000lb hoist capacity (and 169,000lbs of snub force), has big-rig power but can still be rigged up with only 2 picks, swing in a single lift and trip pipe over 60 jts/hr in 2-leg mode.



FEATURES

- Fully Guided Jack
- Integrated Gin Pole up to 80' x 10,000 lbs for large BHA's or double stands
- 200 RPM, 12,000 ft-lb rotary w HALO Swivel
- Integrated Torque Track
- Dual 15K Pumps w 40m3 Mud/Mix Tank
- Multiple redundancies in well control, wellhead stability, torque and pumping abilities



THE OUTCOME

As a result of milling the 10 plugs that Coil couldn't reach, the additionally drilled, cased and frac'd sections of the horizontal were realized. The economic advantages of horizontal sections to customers in the area are reportedly estimated at \$400,000 per plug at 100m intervals.

WE HELP YOU REACH YOUR GOALS

We implement learnings from every project and will continue to break records through the development of our people, equipment and processes. Our ability to design the job, capture useable data, improve our equipment and package our offerings will continue to evolve and lead the industry's technical advances in horizontal completions.