

Case study: Offshore Malaysia

XtremeSet cementing system pumped at 18.2-ppg in challenging HPHT well

A challenging 4½-in. liner cement job was to be executed in the production section of a high pressure/high temperature (HPHT) well in offshore Malaysia. The 9⅝-in. casing shoe was at 9,067 ft (2763 m) and the 8½-in. section was drilled to 12,405 ft (3781 m). The mud weight used to drill the 8½-in. section was 17.1-ppg. The top of the liner was planned at 600 ft (182 m) above the 9⅝-in. casing shoe, and the desired top of cement was at the top of the liner. It was important that this challenging job be flawlessly executed.

Highlights of designing and planning operation

- Simulations were run using Baker Hughes **CemFACTS™ software** to determine the precise spacer and cement slurry densities to execute the cement job without inducing losses or fracturing the formation, while considering the narrow pore and fracture pressure window.
- Extensive laboratory testing was carried out to finalize the 18.2-ppg slurry design to meet all required slurry parameters.
- Baker Hughes SR-34L high-temperature synthetic retarder was used for the first time for this customer, and gave consistent results during various HPHT sensitivity tests.
- Baker Hughes W-10 weighting agent was used to achieve the desired slurry density.

- Accurate temperature data was gathered from various logging runs, and the Baker Hughes **WellTEMP™ software** was used to best simulate the wellbore temperatures during the cement job. The blended cement silo planned for the job was kept isolated on the rig, and exacting sampling procedures were followed.

The job required 216 bbl of 18.2-ppg slurry to be pumped on the fly. 90 bbl of 14.3-ppg mixwater was prepared in the batch mixer, and another 60 bbl of the mixwater had to be prepared in Slug Pit 1. 60 bbl of the weighted spacer was mixed in Slug Pit 2. With limited pit space availability, all valves and lines had to be isolated/operated with great care in order to prevent any contamination. The mixwater was supplied to the Baker Hughes **Seahawk™ twin cement unit** from the batch mixer and Slug Pit 1, and the Seahawk unit was able to mix and pump the 18.2-ppg cement slurry with great accuracy. The liner was rotated at 20 rpm throughout the cement job. The cement slurry was then displaced with 17.1-ppg of mud as per the simulated CemFACTS displacement schedule and the plug was bumped successfully. There were no losses during the cement job, and the desired top of cement was achieved.

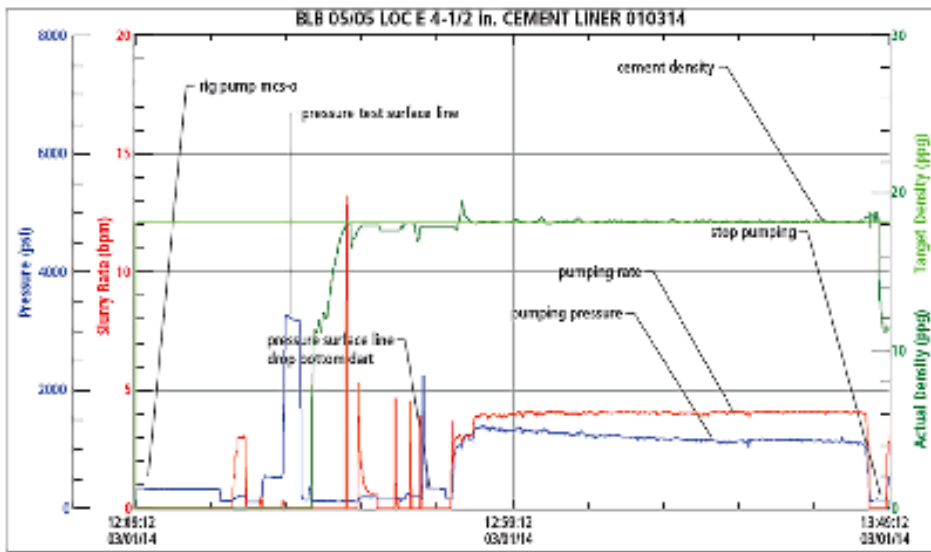
The safe and textbook-perfect performance of this critical cement job resulted in a flawless execution and earned excellent customer feedback.

Challenges

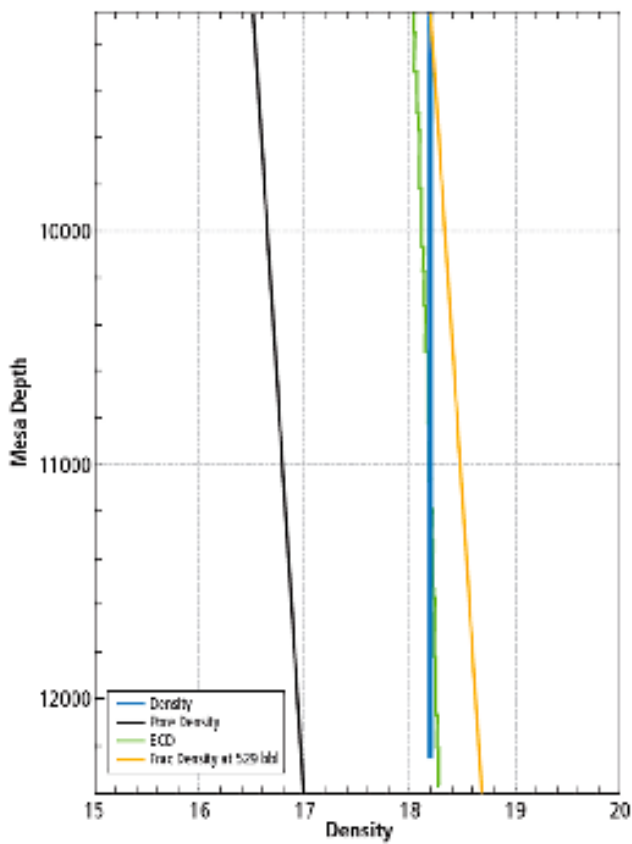
- Work with an HPHT well, where the BHST = 400°F (204°C) and the BHCT = 345°F (173°C)
- Control narrow pore/frac pressure window
- Cement a long 8½-in. section
- Mix and pump 18.2-ppg cement slurry on the fly
- Manage pit for spacers
- Operate in challenging mixwater density
- Assess logistics for huge amounts of chemical handling

Results

- Executed challenging cement job per plan with accurate density control of 18.2-ppg **XtremeSet™ cementing system**, which was mixed and pumped on the fly
- Accomplished job without any losses
- Met all technical parameters, resulting in a good slurry design
- Achieved good zonal isolation in the production section
- Earned a high level of customer satisfaction



The 182-ppg cement slurry pumped accurately on the fly



ECD management using CemFACTS