Case study: Caspian Sea, Azerbaijan

CemMaster software eliminated cement bond log runs, saved three days, $900,000 USD in Caspian well

An operator working in the Caspian Sea, Azerbaijan was experiencing deep permeable gas zones and potential shallow water flow zones, which caused a potential for losses during drilling and cementing operations. They were also experiencing centralization and mud removal challenges in deep, deviated sections. Due to well design complexity and multi-string well construction, the operator required zonal isolation verification for each section of casing string, which required running expensive cement bond logs after each job. In addition, each cement log required at least three days of downtime for mobilization and rig up/rig down of logging equipment and operations.

The operator was looking for a more economical way to evaluate the casing strings without running expensive bond logs, and reached out to Baker Hughes for a solution. Baker Hughes suggested the CemMaster™ zonal isolation cementing software. CemMaster software reduces risk, improves efficiency, and ensures quality performance during cementing operations to deliver a reliable and cost-effective cement job—from initial design through final evaluation. The CemMaster software suite includes several modules designed to help design, plan, execute, and evaluate the perfect well. Trained Baker Hughes personnel use the CemMaster software and best practices, to understand and predict performance throughout the life of the well.

The Baker Hughes cementing team spent more than a year collaborating with the customer to prove cement coverage prediction of its more than 30 wells and 80 cement jobs through the use of the CemMaster precision displacement module. This module predicts likely circumferential top-of-cement (TOC), evaluates intermixing of cementing fluids, quantifies decay of cementing fluids, improves run time and fine-grained output, identifies velocities and flow regimes, and depicts expected fluid dynamic.

The simulator predictions trended and aligned with cased hole logs for a wide range of annular configurations including conventional, horizontal, high-pressure/high-temperature (HP/HT), and deep-water applications. The software predicted the position of the fluid, integrity after cement placement, and TOC based on actual well conditions (hole size, centralization, and deviation). More than 86% of the customer's cement bond logs were correlated using this module across the 16-in., 13-3/8-in. and 7-5/8-in. liners, and 9-5/8 casing sections on various offshore rigs in the 30 well study.

The customer was extremely pleased that the job was executed as planned, and was able to realize immediate savings of $900,000 USD, and eliminate the need for future expensive cement bond logs.

Challenges
- Offshore mobilization of logging equipment, limited boat availability
- Logging equipment rig up/down time
- Limited rig side deck space

Results
- Saved three days of rig time by eliminating rig up/rig down of logging equipment and logging operations, saving $900,000 USD
- Eliminated the need for future cement bond logs, saving $50–100,000 USD per job
- Provided successful, reliable alternative circumferential cement coverage prediction through software deployment
- Determined accurate TOC using pressure matching methodology