

Case study: Offshore Norway

MASTODON system cut, pulled heavily settled casing, saved Norwegian operator \$5 million USD

A major operator with a well in the Smørbukk subsea field, Norway, needed to cut and pull a 10³/₄- x 9⁵/₈-in. casing string down to 2438 m (7,998 ft), just above the 13³/₈-in. casing shoe. Retrieving the 9⁵/₈-in. casing that close to the 13³/₈-in. casing shoe was necessary to allow for a deep sidetrack. The well, completed from a new, modern semi-submersible rig, had a long 45° angle, and the annulus was filled with old 1.80 SG oil-based mud. Conventional technology dictated certain runs would be dedicated only to cutting the casing while separate runs would execute the pulling. In between each pulling run, a cleanup would also be necessary to remove the hard settled barite. The operator was looking for a more efficient and safe solution.

During the job planning phase, the Baker Hughes Wellbore Intervention team recommended the **MASTODON™ casing retrieval system** to recover the casing. The system can harness up to 818 tons (1.8 million lb) to pull objects from the wellbore. It anchors in the casing, exerts a pulling force on the fish below, and transmits the force to the casing rather than the surface equipment, minimizing damage risk to the casing. The system facilitates multiple cut-and-pull attempts in a single trip, saving runs and reducing rig time.

After the upper part of casing was retrieved down to 2054 m (6,738 ft), Baker Hughes field engineers deployed the MASTODON system. In the first run, the system applied 590 tons (1.3 million lb) in an attempt to pull a casing length from 2054 to 2438 m (6,738 to 7,998 ft). Judging the casing stuck, the engineers cut the casing

at 2204 m (7,230 ft), jacked it free, and retrieved the cut casing to the surface. It took 335 tons (738,000 lb) and 16 strokes with the MASTODON to pull the casing with the rig itself. All of these operations were performed in a single trip.

The second run attempted to pull the casing from 2204 to 2438 m (7,230 to 7,998 ft) with the MASTODON system applying 590 tons (1.3 million lb) of force. The casing at this stage was also stuck, and it was cut at 2329 m (7,641 ft). After 355 tons (782,000 lb) was applied and 20 cycles performed, the severed casing was successfully jacked free and retrieved to the surface.

On the third and final run, the casing from 2329 to 2438 m (7,641 to 7,998 ft) was successfully pulled free using 502 tons (1.1 million lb). No additional cut was required. A total of 50 cycles was required to pull the 109 m (357 ft) of 9⁵/₈-in. casing free enough so the rig could pull the casing itself using a straight pull.

By using the MASTODON casing retrieval system, the operator cut and pulled a total of 386 m (1,266 ft) of casing in only three runs. On this job a total of 17 runs (6 dedicated cutting runs, 6 dedicated extra pulling runs, and 5 cleanup runs) were eliminated by using the combined MASTODON system. The combined cut-and-pull system enabled the customer to pull the casing free by generating 355 tons (738,000 lb), 335 tons (782,000 lb) and 502 tons (1.1 million lb) in three sections, cycling a total of 86 times.

Challenges

- Cut and pull 9⁵/₈-in. casing from semi-submersible rig
- Overcome heavily settled casing with a 45° well trajectory
- Enable deep sidetrack operations

Results

- Cut and pulled 386 m (1,266 ft) in three runs
- Saved 17 runs when compared to conventional technology
- Saved \$5.8 million USD and 210 hours compared to conventional methods
- Cycled a combined 86 times—maximum 50 times in one run
- Generated a combined 1192 tons (2.6 million lb) of force to pull casing free