

Case study: Norway

METAL MUNCHER AMT cutters pilot milled 4,200-ft casing in 4 runs in P&A campaign, saved \$4 million USD

A customer in Norway needed to remove a 7-in. cemented tubing to get access to the outside 9⁵/₈-in. casing and log the condition behind the 9⁵/₈-in. casing. The ultimate goal was to set a barrier plug as part of a plug-and-abandon (P&A) operation. The scope was to mill from a measured depth (MD) of 3,787 to 8,000 ft (1154 to 2438 m).

Drawing on its experience in North Sea milling, Baker Hughes recommended a milling operation using the **METAL MUNCHER™ pilot mill**, dressed with **Advanced Milling Technology (AMT)**. The high-performance pilot mill is used for milling washover pipe, casing, and liners. These specially designed cutting structures have strong, impact-resistant, ultra-sharp primary cutting edges. They last longer under heavy impact than other conventional tungsten-carbide inserts, and work well with the pilot mill assembly to manage rate of penetration (ROP). The blade design continuously indexes a new cutting surface during milling. The insert design produces small, uniform and easy-to-handle cuttings.

Baker Hughes delivered four 7⁷/₈-in. AMT pilot mills to remove the 7-in. cemented tubing. Highly experienced offshore fishing supervisors supported this operation to ensure success.

Field personnel milled a total of 4,200 ft (1280 m) in four runs with an average ROP of 17.16 ft/hr (5.2 m/hr). The first run milled the cemented tubing from 3,787 to 4,951 ft (1154 to 1509 m) in 110.4 hours

Run three lasted 41.5 hours to mill from 6,782 to 7,557 ft (2067 to 2303 m), averaging 18.67 ft/hr (5.7 m/hr). The final run reached a total depth (TD) of 7,950 ft (2426 m) in 21.5 hours, with an average ROP of 18.67 ft/hr (5.7 m/hr).

In total, the METAL MUNCHER pilot mill with AMT cutters milled 4,200 ft (1280 m) in four runs with an average ROP of 17.16 ft/hr (5.2 m/hr). The flawless operation lasted 261.54 hours, or nearly 11 days, experiencing no health, safety and environmental (HSE) incidents and no nonproductive time (NPT). The customer saved about eight rig days and about \$4 million USD on a jackup rig with the Baker Hughes milling performance and the Baker Hughes AMT compared to conventional milling performances.

Challenges

- Remove 7-in. cemented tubing to access the outside 9⁵/₈-in. casing
- Log the condition behind the 9⁵/₈-in. casing

Results

- Milled 4,200 ft (1280 m) in four runs with an average ROP of 17.16 ft/hr (5.2 m/hr)
- Saved 8 rig days, \$4 million USD using Baker Hughes technology
- Experienced no HSE issues or NPT