An operator in the North Sea off the coast of Norway needed to remove a string of 9\(\frac{5}{8}\)-in. 53.5-lb/ft production casing inside 13\(\frac{3}{8}\)-in. outer casing. Baker Hughes suggested a milling operation using the METAL MUNCHER™ turbo pilot mill dressed with advanced milling technology (AMT™) G3 cutters.

The Baker Hughes METAL MUNCHER turbo pilot mill is a high-performance mill used for milling washover pipe, casing, and liners. It is designed to produce small cuttings that are easy to circulate out of hole and is incredibly efficient when dressed with AMT G3 cutters. These specially designed cutters 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).

After tripping the pilot mill to depth, we began milling at 4,707 ft (1435 m) and successfully milled 228 ft (69.5 m) of the production casing in 55 hours, averaging an ROP of 4.19 ft/hr (1.28 m/hr). Once the mill was tripped out of hole, the assembly was inspected and we found that the mill had lost only 1\(\frac{1}{2}\) in. (3.81 cm) from the initial 30-in. (76.2-cm) long blade inserts.

The same customer had to abandon a cut and pull operation on a nearby rig when they were unable to successfully retrieve a 51-ft (15.5-m) section of cut 9\(\frac{5}{8}\)-in. 53.5-lb/ft casing. They decided to mill the remaining stuck casing, but weather conditions between the rig and the transport center prevented the milling assembly from shipping. Conditions were forecasted to last several hours, meaning the customer’s operation would have to wait a day before they could receive the milling assembly.

Results
- Milled casing in two wells with the same pilot mill without redressing
- Saved a day of rig time and an estimated USD 300,000
- Managed ROP to deliver clean mill jobs on both wells

Challenges
- Two offshore wells in the North Sea
- P&A operations
- 9\(\frac{5}{8}\)-in. 53.5 lb/ft casing
- Inclement weather threatened delays

Baker Hughes solution
- Deployed METAL MUNCHER turbo pilot mill with extended 11-in. OD blades dressed with AMT G3 cutters
- Milled a total of 279 ft of casing (14,900 lb of steel) across both wells with an average ROP of 4 ft/hr
Given the circumstances, Baker Hughes quickly suggested using the METAL MUNCHER pilot mill that had just been pulled out of hole. The operator agreed and the milling assembly was flown to the second rig location the same day. As a result, we successfully milled the 51 ft of stuck casing in just under 15 hours.

After milling a total of 279 ft (85 m) in just under 70 rotating hours on two wells, the pilot mill had lost a total of only 2 in. (5 cm) from the initial 30-in. long blade inserts, which is less than 7% of total blade length. Using the same robust METAL MUNCHER pilot mill with AMT G3 cutters on both wells saved the operator roughly a day of rig time and an estimated USD 300,000.