An operator in the Gulf of Mexico needed to remove all possibility of trapped pockets of high pressure within a well prior to a plug and abandonment (P&A) operation. To ensure the well was safe for the P&A, 300 ft (91 m) of cement needed to be milled followed by the 2\(\frac{3}{8}\)-in. dual-string tubing inside the 7-in. casing. The operator decided that 2\(\frac{3}{8}\)-in. outside diameter (OD) coiled tubing would be the safest and most efficient and safest way to perform the milling operation while maintaining well control.

To provide the downhole power required for the extended milling operations, we deployed a 3\(\frac{3}{8}\)-in. Baker Hughes Navi-Drill™ VIP mud motor which would ensure reliable and consistent torque for the mills throughout the job.

First, a mill dressed with SUPERLOY™ carbide was run in on CT to mill the cement. A total of 315 ft (96 m) of cement was successfully milled in only 27 hours, and the bottomhole assembly (BHA) was pulled from the well. Next, we ran a specially designed 6.059-in. OD, six-padded, slightly concave junk mill dressed with \(\frac{1}{4}\)-in. Glyphaloy™ Advanced Milling Technology (AMT™) carbide to mill the 2\(\frac{1}{8}\)-in. dual string tubing. Glyphaloy cutters have an engineered shape that has been optimized for high performance and extreme durability.

Approximately 40 ft (12.19 m) was milled until the well showed a positive pressure test. Of the 40 ft, 15 ft (4.57 m) was determined to be the 2\(\frac{3}{8}\)-in. tubing. During the tubing-string milling operations, the

**Results**
- Saved operator 12 hours of rig time and USD 33,500
- Lowered NPT
- Increased ROP with specialized carbide cutting structures

**Background and challenges**
- Gulf of Mexico
- Operator needed to mill out 300 ft of cement and then mill 2\(\frac{3}{8}\)-in. dual-string tubing inside 7-in. casing
- Needed to remove all possibility of trapped pockets of high pressure within the well

**Baker Hughes solutions**
- Deployed 3\(\frac{3}{8}\)-in. Navi-Drill VIP workover mud motor
- Milled 315 ft of cement with a SUPERLOY-dressed mill in 27 hours
- Ran a specially designed junk mill dressed with \(\frac{1}{4}\)-in. Glyphaloy carbide
- Milled 2\(\frac{3}{8}\)-in. dual string tubing in 6.38 hours
rate of penetration (ROP) was as high as 1 ft/min (0.30 m/min). The mill and motor performance exceeded customer expectations, as did the resulting ROP. Furthermore, the cuttings generated by the Glyphaloy-dressed mill were so small they were able to pass through the shale shakers. The specialized design of our Glyphaloy carbide creates smaller cuttings that are more easily circulated to surface.

The combination of our high-power Navi-Drill motor and specialized mills saved the operator up to 12 hours of on-bottom milling time and more than USD 33,500.