

WELL ABANDONMENT

# ENDURA<sup>®</sup> DUAL-STRING SECTION MILL

Set a rock-to-rock barrier and  
know that it's done right.

DRILLING & FORMATION EVALUATION

■ WELL CONSTRUCTION

COMPLETION

PRODUCTION



Weatherford<sup>®</sup>

# MILL ADJACENT STRINGS AND ACHIEVE **VERIFIABLE** **WELL INTEGRITY**

Our Endura® technology delivers a rock-to-rock barrier that cuts conventional plug-and-abandonment time in half.

Hydrocarbon migration after plug and abandonment (P&A) operations negates well integrity and threatens the environment. A P&A procedure that achieves a rock-to-rock, cement-to-formation bond eliminates the risk of releasing fluids and gases.

The Weatherford Endura dual-string section mill creates your preferred abandonment environment—a stable, permanent, and verifiable rock-to-rock barrier—and halves the P&A rig time average. The barrier seals across the borehole by milling both inner and outer strings and mimics natural bedding.

The mill features specially designed blades and stabilizers that enable through-casing milling of the adjacent string of casing to access the borehole quickly and efficiently. Separate milling and stabilizer blades provide two points of stabilization while creating finer, more manageable cuttings.

## **CUTTING-EDGE BLADES**

- Separate milling blades and stabilizer blades provide two points of stabilization for more precise targeting and cutting.
- The 4.5- to 13-in.-long carbide cutting structure enables milling long casing sections.
- The inserts cut out radially and axially downward to improve milling.
- The burrs on the blades fully retract to ease tripping out of the hole.



13 in. of milling structure on our milling blade

# HOW IT WORKS

Our Endura dual-string section mill efficiently exposes the wellbore to the bedrock for a better cement-to-formation bond. Once the cuttings are removed, the slim 8 1/4-in. (210-mm) OD enables the mill to return through this inner casing to the open section. The hydraulic stabilizers expand inside the 13 3/8-in. outer casing string centralizing the tool. The full-gauge cut-out blades with built-in stabilizer cut a window in the casing. On a second trip, milling blades are deployed to mill the remainder of the section needed to prepare the rock-to-rock area for cementing. The negative rake on the insert cutting structures aligns to the tool center for high rates of penetration and creates fine, manageable cuttings. This procedure improves swarf handling, reduces bird nesting, and saves trips.



# STAGES OF MILLING AND PLUGGING



# ROCK-SOLID BARRIERS

When you need a better alternative to perforating, washing, and squeezing, no solution performs better than the Endura dual-string section mill. The benefits that the mill provides make it the smart choice.



ROCK-TO-ROCK BARRIER

PERF, WASH, AND SQUEEZE

**> REAL RESULT**

**SAVED**  
**5 DAYS**  
**AND REDUCED**  
**OVERALL RISK**

In an offshore gas well, top-up cement in the annulus between the 9 5/8- and 13 3/8-in. casings prevented the operator from cutting and pulling 9 5/8-in. casing. The Weatherford team used a conventional section mill to mill a window of the 9 5/8-in. casing in one trip. Then the team passed the Endura section mill through the 9 5/8-in. casing, milled a window in the 13 3/8-in. casing, and exposed a 98-ft (30-m) section of open hole for abandonment. The operation took 147 hours, which saved 118 hours—or 4.9 days—compared to the conventional approach.



# WORLDWIDE CAPABILITIES

Part of our comprehensive P&A solutions, the Endura dual-string section mill helps you to meet the most stringent restrictions in the world and protect your well, the environment, and your reputation. We provide proven reliable—yet innovative—technologies and processes based on a successful global track record for safe and permanent abandonment.



Our Endura dual-string section mill creates a rock-to-rock hydraulic barrier—for the tightest seal possible in the industry. To learn more about how our P&A services and technologies can save time and reduce risk, visit us at [www.weatherford.com/endura](http://www.weatherford.com/endura) or contact your authorized Weatherford representative.



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