

Chesapeake Energy Increases Run Footage and Reduces NPT in Intermediate Section, Onshore Louisiana

The operator gained an additional 1,500 ft of bit life in the highly abrasive Hosston Sands and Cotton Valley Lime using EnduroBlade 360 bit with 16-mm elements

CHALLENGE

Increase run footage by 1,500 ft—to at least 9,500-ft MD—with one bit to enable running a more aggressive bit to complete the lower intermediate section for improved overall ROP.

SOLUTION

Use the IDEAS* integrated dynamic design and analysis platform to determine the optimal bit design for the application; deploy EnduroBlade 360* rolling diamond element bit with 16-mm cutting elements for improved wear and extended cutter life.

RESULTS

Increased run footage to reduce an unnecessary bit trip in the intermediate section with increased overall ROP and less rig NPT associated with tripping in and out.

“I think we have some significant opportunity to make this intermediate hole section a consistent two-bit section. Depending on what we can do with ROP, this may develop into a one-bit hole section like we aspire to in most of our other plays.”

Greg Bruton
Drilling Advisor
Chesapeake Energy



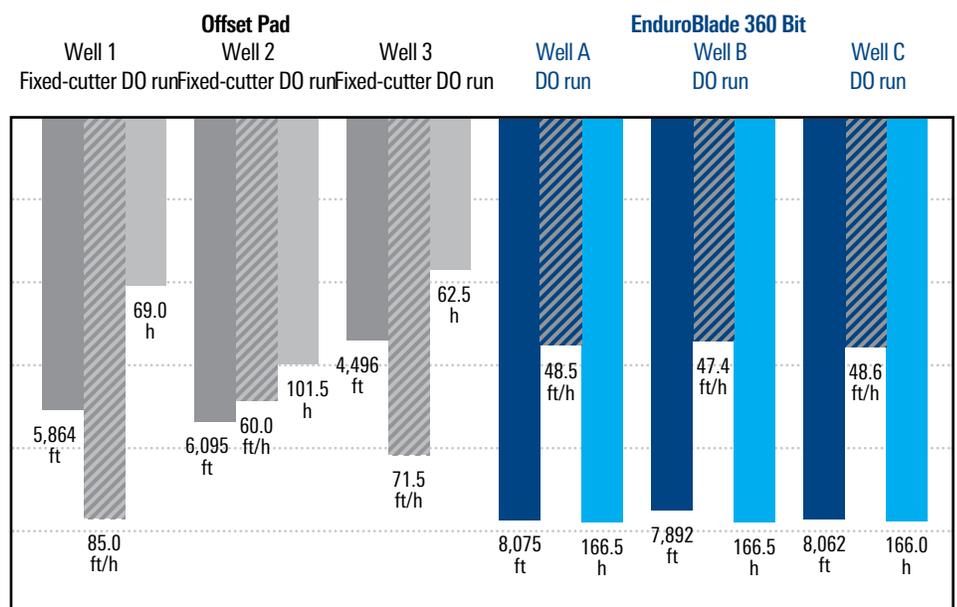
Avoid unnecessary trips in abrasive interbedded formation

On a Chesapeake Energy operation in the Haynesville Shale, the company set a goal to drill the intermediate hole section consisting of interbedded formations using fewer PDC bits at a competitive ROP to avoid unnecessary trips and potential stuck-pipe incidents. The operator wanted to reduce nondrilling hours while increasing footage on drillout (DO) runs and maintaining overall section ROP.

The DO section runs through sands, shales, and anhydrite, and the lower intermediate section includes the highly abrasive Hosston Sands and the Cotton Valley Lime. The formation varies from interbedded portions to areas that are dense and homogenous and has an unconfined compressive strength of 15,000 to 35,000 psi as confirmed by the DBOS* drillbit optimization system.

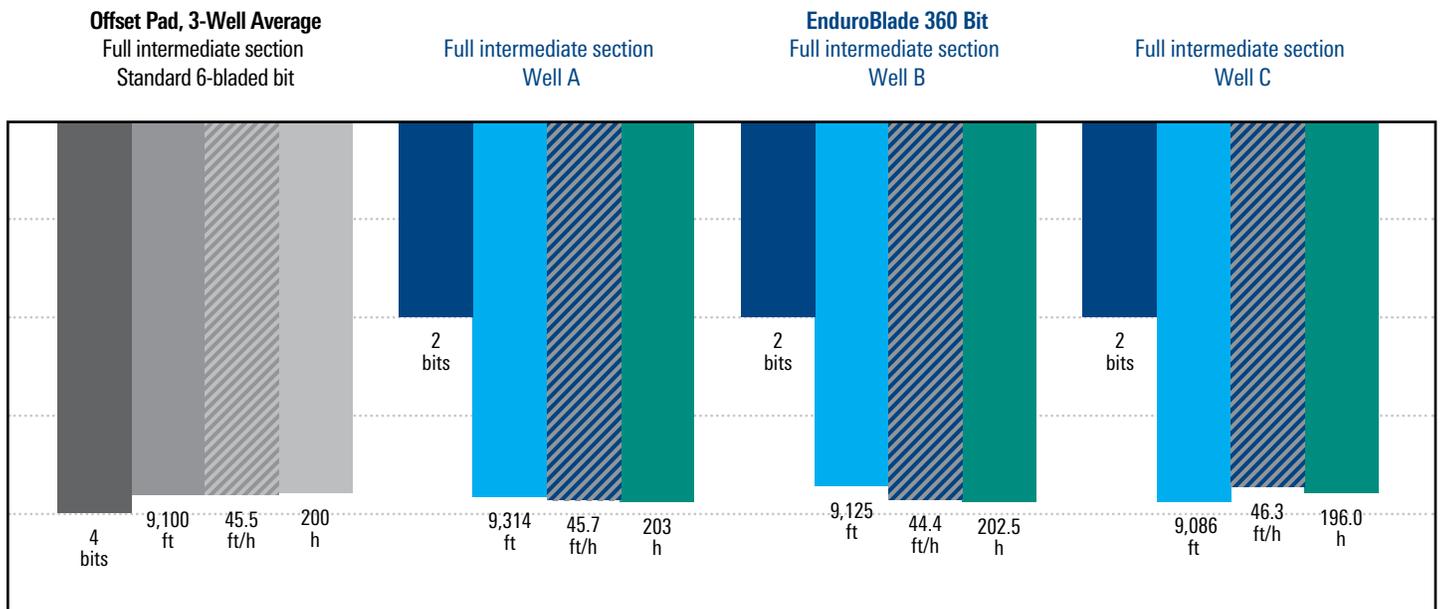
Chesapeake recognized that a DO run would need to reach beyond 9,500-ft MD, drilling past the Hosston Sands and Cotton Valley Lime so that a more aggressive bit could be run in the lower section to balance ROP. The lower intermediate section would run from 9,500 ft to 11,000-ft MD. A directional challenge is also present in the formation with a 10° to 16° nudge back to vertical or tangent to the kickoff point.

Drilling Parameters	EnduroBlade 360 Bit DO Section	Lower Intermediate Section
Depth in, ft	1,850	9,500
Depth out, ft	9,800–10,000	11,000+
Section length, ft	7,800–8,000	1,800
Drilling time, h	150–170 (on bottom)	30–40
Dull grade	2-3-BT-S-XXX-IN-WT-BHA	2-2-WT-S-XXX-IN-WT-TD
Water-base mud, lbm/galUS	9.0–10.5	9.0–10.5
ROP, ft/h	45–55	30–40



An 8 7/8-in EnduroBlade 360 bit fitted with 16-mm cutting elements outperformed conventional PDC bits with similar drilling parameters in the same formation.

CASE STUDY: Chesapeake Energy increases run footage and reduced NPT in intermediate section, onshore Louisiana



In the full intermediate section, EnduroBlade 360 bits enabled Chesapeake Energy to achieve greater footage per run for increased overall drilling efficiency.

Fit existing bit platform with rolling PDC cutters for improved wear

To mitigate abrasive sand and lime sections, an EnduroBlade 360 bit equipped with 16-mm cutting elements was chosen for its ability to constantly shear rock while rotating the cutter, allowing the diamond surface to wear evenly and stay sharp longer for increased bit life.

The 8¾-in bit was selected to surpass an 8,500-ft MD, which was the typical trip-out-of-hole point for DO bits with standard cutters. When an EnduroBlade 360 bit fitted with 16-mm cutting elements broke the 9,500-ft mark, Chesapeake would be able to run a more aggressive bit to drill the lower intermediate section at twice the ROP. One bit run would be automatically eliminated from 8,500 to 10,000 ft with a DO bit that could pass through the Cotton Valley Lime. In the same formation, drilling with standard cutters requires two bits to achieve the same objectives.

Prior to drilling, the IDEAS platform was used to determine the best MDSi616 bit design to improve the placement and workload of the EnduroBlade 360 bit with the 16-mm cutting elements. The platform was also used to design roadmaps for rig personnel as well as Chesapeake and Smith Bits engineers to optimize the performance and use of the new bit design and cutter size.

Increase run footage and limit NPT in intermediate section

On two well pads in the Haynesville Shale, Chesapeake increased run footage by deploying EnduroBlade 360 bits with 16-mm cutting elements to drill the intermediate section to 9,500-ft MD. By maintaining a sharp cutting edge for extended cutter life, the rolling cutters outperformed direct offsets with a similar BHA, motor, and well profile using the same bit design with fixed cutters.

The operator achieved equal or increased overall ROP in wells using EnduroBlade 360 bits with 16-mm cutting elements and reduced the chance of NPT associated with tripping in and out of hole to change the bit. Further, the same bit design and cutters can reduce nondrilling hours and overall rig NPT across Chesapeake's Haynesville Shale operations.

EnduroBlade 360 bits deployed on a proven, existing bit platform enabled the operator to gain an additional 1,000 to 1,500 ft of bit life. In the same lithology, with the same parameters, and following the same roadmap, the new bit design did not sacrifice ROP compared with the baseline PDC bit and standard fixed cutters.

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SMITH BITS

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