

Next-Generation Spear Bit Drills Lateral in Eagle Ford Shale 22% Faster

Redesigned steel-body PDC increases median ROP from 64.7 ft/h to 79 ft/h on 8¾-in section

CHALLENGE

Drill an 8¾-in curve and lateral section, of at least 4,000 ft in a problematic shale formation—with maximum efficiency and toolface control—in a single run.

SOLUTION

Run 8¾-in, SDi516, five-blade, next-generation Spear* shale-optimized steel-body PDC drill bit, which has enhanced cuttings removal from the bit face, delivering improved directional control.

RESULT

Drilled the 4,308-ft, 8¾-in curve and lateral section at an average rate of 79 ft/h while maintaining good toolface control and increasing ROP over nearest offsets by 22%.



Maximum drilling efficiency required for shale applications

Drilling 8¾-in lateral sections in the Eagle Ford shale of Karnes County, Texas, an operator was experiencing the difficulties commonly associated with shale play applications: Drilling is generally conducted using low-power rigs and mud weights of 10.0 to 12.6 ppg. These factors produce a poor hydraulic environment with low flow rates. Adding to this, is a hydraulic horsepower (HSI) of 0.02 to 1.71 at the bit, which impairs cuttings evacuation, and results in poor toolface control, and low ROP.

Next-generation PDC bit for shale applications

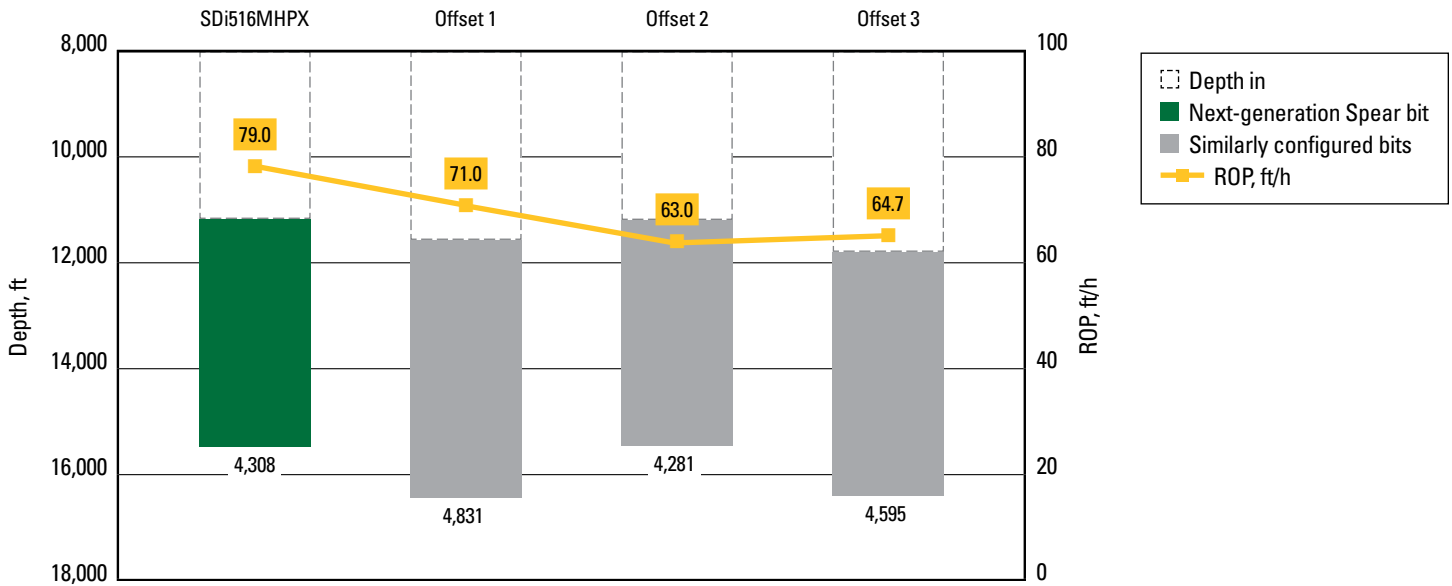
To increase the operator's drilling efficiency in shale formations, Smith Bits recommended the next-generation Spear bit. It is based on the first-generation Spear bit—characterized by its distinctive bullet-shaped steel body—which significantly reduced bit balling and cuttings packing around that afflicted matrix PDC bits.

The new generation of Spear PDC bits, developed using IDEAS* integrated drillbit design platform, features increased capabilities through design enhancements: Taller blades resulting in an increased junk-slot area, promotes cuttings migration from the bit face. A shale evacuation channel around nozzle ports and an improved hydraulic configuration directs cuttings evacuation to inhibit nozzle plugging. In addition, a reduced bit body profile improves cuttings evacuation into the annulus.



The 8¾-in, SDi516 five-blade, next-generation Spear PDC evacuates cuttings more effectively, providing the directional control necessary to drill curve and lateral sections efficiently.

CASE STUDY: Redesigned PDC increases median ROP from 64.7 ft/h to 79 ft/h on 8¾-in section



When compared with the offset drilling performances by bits from other manufacturers, within a 5 mi radius, the next-generation Spear PDC bit drilled the curve and lateral section in Eagle Ford shale with greater efficiency, increasing ROP by 22%.

Design changes deliver increased drilling performance

The next-generation Spear bit design drilled the 4,308-ft, 8¾-in curve and lateral section at an average rate of 79 ft/h while demonstrating good toolface control. Upon reaching TD, it was pulled in excellent dull condition: 0-1 with no wear on the cutting structure. Compared with the offset well median ROP of 64.7 ft/h, the new Spear PDC bit’s ROP represents an increase of 22%.

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