

Next-Generation Spear Bit Drills Haynesville Shale 19% Faster

Redesigned steel-body PDC increases ROP 4.1 ft/h on 6¾-in curve and lateral sections

CHALLENGE

Drill 6¾-in curve lateral sections, totaling at least 6,400 ft in a problematic shale formation—known to cause bit balling—with maximum efficiency and toolface control.

SOLUTION

Run 6¾-in, SDi611UPX six-blade, next-generation Spear* shale-optimized steel-body PDC drill bit, which has proven to combat bit balling in shale applications and drill curve and lateral sections with improved ROP and directional control.

RESULT

Drilled the 6¾-in curve and lateral sections for a total of 6,420 ft while maintaining good toolface control and increasing ROP 19%.



Shale applications challenge drilling performance

Drilling 6¾-in curve and lateral sections in Louisiana's Haynesville shale, an operator was experiencing bit balling and nozzle plugging, resulting in bits being prematurely pulled. The operator also had to deal with other difficulties commonly associated with shale play applications: Drilling is generally conducted using low-power rigs and relatively high mud weights of 16 ppg. These factors produce a poor hydraulic environment with low flow rates. Adding to this is an inadequate hydraulic horsepower (HSI) of 0.3 to 0.8 at the bit, which impairs cuttings evacuation, which results in bit balling, poor toolface control, and low ROP.

Next-generation PDC bit for shale applications

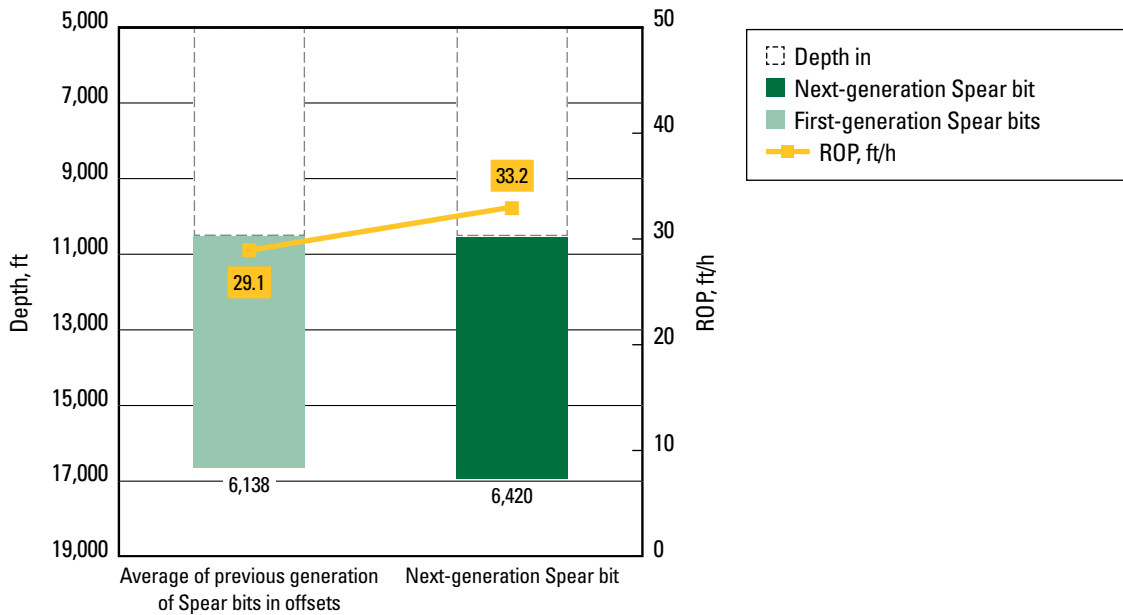
To eliminate the nozzle plugging and bit balling the operator was encountering drilling the Haynesville shale. Smith Bits recommended their next-generation Spear PDC bit: It is based on the first generation Spear bit, which was characterized by its distinctive bullet-shaped steel body and significantly reduced bit balling and cuttings packing around bit blades.

The next-generation Spear PDC bit design, developed using IDEAS* integrated drillbit design platform, features increased capabilities through design enhancements: Taller blades give it an increased junk-slot that 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. And, a reduced bit body profile improves cuttings evacuation into the annulus.



The SDi611UPX six-blade, next-generation Spear bit's improved hydraulic configuration cleans and cools cutters more effectively to extend its cutting structure's durability and maximize ROP.

CASE STUDY: Redesigned PDC increases ROP 4.1 ft/h on 6¾-in curve and lateral sections



The next-generation Spear PDC bit drilled the curve and lateral sections with no nozzle plugging or bit balling with good directional control and ROP increase of 19%.

Bit design changes increase efficiency and eliminate extra bit trips

The next-generation Spear bit drilled the 6¾-in curve and lateral sections for a total of 6,420 ft at 33.2 ft/h with no formation packing or nozzle plugging. The bit was pulled at TD in excellent dull condition: 0-1 with little wear on the cutting structure. When compared with 11 offset wells that were drilled an average of 6,138 ft, at an ROP of 29.1 ft/h, the newly designed Spear bit drilled 282 ft further and increased ROP 19%.

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