Kymera FSR Hybrid Bit Tames Curve in One Run and Drills Twice as Fast, Saves Operator 18 Hours

In the Wolfcamp pay zone of Permian Basin, Cimarex Energy, Co., wanted to optimize drilling operations through the curve—a section that consistently proved especially challenging due to formation types and available bit technologies.

The conglomerate formations in the curve require drilling Wolfcamp shale sections and the more challenging Third Bone Spring section of sand, which has a rock strength varying between 10,000 to 20,000 psi. It’s this section that has proven to be difficult to drill in the curve, and typically requires several bits to reach total depth (TD).

When drilling the Wolfcamp field with polycrystalline diamond compact (PDC) bits, the directional drilling engineer has to increase weight on bit (WOB) to optimize penetration rate. In doing so, reactive torque increases downhole and leads to stick-slip, poor directional control, and reduced rate of penetration (ROP). The vibration from the reactive torque also creates downhole tool issues, borehole quality concerns, and subpar bit performance. Often times, the culmination of these issues result in several bit trips to complete the curve.

To overcome these drilling performance issues, Baker Hughes recommended the Kymera FSR™ directional hybrid drill bit. The hybrid design of the bit combines the best attributes of roller cone and PDC drill bit technologies. The balance of the two cutting structures provides better tool face control and cutter protection, keeping torque in check and eliminating excess energy to the drillstring.

The Kymera FSR bit drilled a consistent buildup rate in excess of 14°/100 ft on a 2.12° adjustable kickoff (AKO), more than doubled the ROP average for the field with a rate of 38.8 ft/hr (11.9 m/hr), and drilled the curve in one run. The reduction in torque and smooth directional control of the bit saved Cimarex 18 hours of drilling time, as it has done consistently in this field.

“With the Kymera solution, we’ve had consistent one-run curves with good penetration rates,” said Spencer Bryant, a drilling and completion engineer for Cimarex. “It’s rare to have a two-bit curve with the Kymera hybrid technology.”

Results
- Drilled an average ROP of 38.8 ft/hr (11.9 m/hr) compared to the offset average ROP of 18.0 ft/hr (5.5 m/hr)
- Held consistent build rates in excess of 14°/100 ft on a 2.12° AKO
- Completed the curve with one bit

Challenges
- Interbedded conglomerate formations that includes the Third Bone Spring formation, a section with rock strength varying between 10,000 to 20,000 psi
- Difficulty in drilling through the curve and achieving the right build rate in one run when using PDC bits
- Increased WOB led to high torque issues when drilling with PDC bit

Baker Hughes solution
- 8¾-in. Kymera FSR directional hybrid drill bit
Case Study: 8¾-in. Kymera (Reeves County)

Depth In/Depth Out vs. ROP

Offsets (Average)  Kymera FSR

0 5 10 15 20 25 30 35 40 45  
ROP (ft/hr)

9000 9500 10000 10500 11000 11500 12000

Depth In / Depth Out

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