

Operator Uses Hybrid Bit Technology to Improve Drilling Efficiency in the Curve

CRUSH & SHEAR™ HYBRID BIT PROVIDES DIRECTIONAL DRILLING STABILITY THROUGH PLASTIC SHALE WHILE INCREASING PENETRATION RATE

BELARUS REPUBLIC



CHALLENGE

- Drill curve section through plastic shale formation in one run
- Maintain directional control at a higher ROP than offset runs
- Apply hybrid bit technology for the first time in the region

SOLUTION

- DatCI™ design process — to optimize bit performance
- Crush & Shear™ hybrid drill bit combined with Chisel™ plowed scribe cutter (a Geometrix™ 4D shaped cutter) — to improve drilling efficiency

RESULTS

- Set a project run length record, drilling entire section of 6,040 ft (1,841 m) at an average 77.75 ft/hr (23.7 m/hr) ROP
- Proved capability of new 8½-in. ES55RKs, surpassing customer expectations, and became the bit of choice for future wells in this field

OVERVIEW

An operator drilling in the Belarus Republic was challenged by an 8½-in. curve interval in a formation with varying rock strengths, including plastic shale. These tough transitions can cause cutting structure damage to the drill bit and make it difficult to maintain toolface control. It was a major struggle in this area to efficiently and consistently drill curve sections in one run.

The customer's objective was to drill the 4,921-ft (1,500-m) curve in just one run, while maintaining precise directional control at a higher ROP than previous offset runs.

HYBRID DRILL BIT TECHNOLOGY ADVANTAGES

In certain formations or applications, a hybrid drill bit is required to ensure that directional targets are achieved, while also allowing the operator to maintain drilling efficiencies. Hybrid drill bits have been successful in demanding applications, where steerability is critical and/or durability is required due to formation inconsistencies.

Crush & Shear™ hybrid bit technology is a specially engineered solution that takes advantage of rock failure mechanics and provides lateral stability. It can withstand high weight on bit (WOB), while reducing torque fluctuations, thus, improving toolface control and enabling smoother drilling. This innovative solution reimagines hybrid bit technology, by placing the Geometrix™4D shaped cutters – Chisel™ PDC elements in parallel with the rolling elements, instead of in series. By optimizing PDC element placement and positioning rolling cones in the center to crush the rock (where PDC shearing action is typically inefficient), the Crush & Shear hybrid bit achieves higher rates of penetration (ROPs) and minimizes torque fluctuations. This functionality increases drilling efficiency and extends the life of PDC elements.

RECORD-BREAKING RESULTS

In this challenging application, the Crush & Shear technology was utilized to design a bit (via the DatCI™ design process) that could complete a one-bit run through an 8½-in. curve section. This aggressive goal was successfully achieved, along with meeting the challenging directional control requirements given the plastic shale formation. The operator set a new ROP record for production section drilling—6,040 ft (1,841 m) at an average 77.75 ft/hr (23.7 m/hr) ROP—leading to a decision to apply the same hybrid bit technology to upcoming wells in this field.



Photo showing minimal cutting structure damage (Dull Grade: 0-0-NO-A-X-I-CT-DTF) after 1st run of the Crush & Shear hybrid drill bit.

Well	Bit Type	MD In (m)	MD Out (m)	Run Length (m)	ROP (m/hr)	Hours
Well # A	ES55RKs	770	2611	1841	23.7	77.68
Well # B	ES55RKs	1764	2500	736	17	44
Well # C	GTD55Ks	1810	2580	770	9	89
Well # D	GTD55MKs	1406	2710	1304	10	136
Well # E	Competitor A	1428	2595	1167	6	203
Well # F	Competitor B	1424	2800	1376	7	205

Chart highlighting ES55RKs bit as delivering best ROP performance and longest run length, compared to offset wells.