

AxeBlade Diamond Element Bit Achieves Record ROP in Hard Limestone Formation

Engineered drillbit increases ROP 14%, saving 21 h and USD 50,000 in West Kuwait well

CHALLENGE

- Improve ROP by 10 to 20% while drilling the 16-in vertical section through a hard limestone formation with a gas kick zone and unconfined compressive strength of up to 24,000 psi [165 MPa].

SOLUTION

- Use an AxeBlade* ridged diamond element bit to combat high torque and optimize ROP.

RESULTS

- Drilled from 11,819 ft to 14,070 ft [3,602 m to 4,289 m] in just one run.
- Set a record-high ROP speed of 35.5 ft/h [10.8 m/h].
- Increased average ROP by 14% compared with an offset well.
- Saved 12 h of on-bottom drilling time.
- Cut drilling costs by USD 50,000.



Hard formation and heavy mud restricted drilling efficiency

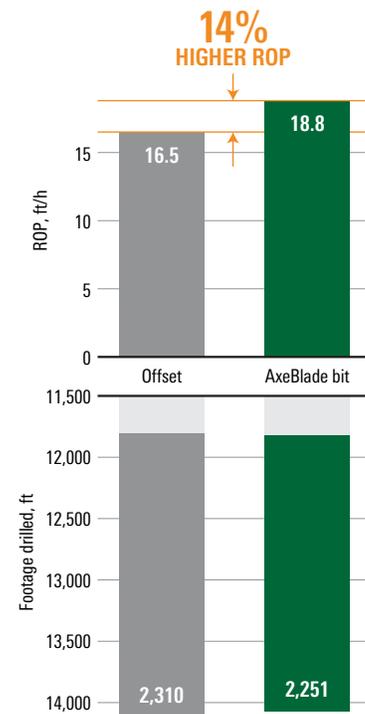
An operator was using a conventional PDC bit to drill the 16-in section of a well through a hard limestone formation with an unconfined compressive strength (UCS) between 18,000 and 24,000 psi [124 and 165 MPa]. In previous wells drilled from this location, the operator encountered high pore pressure, high torque, and gas kicks—all contributing to slow ROP. To improve drilling efficiency, the operator sought to drill the interval in one run and increase ROP by 10 to 20%.

Ridged diamond element bit reduced torque, improved ROP

After successfully using an AxeBlade bit in the 12¼-in section and simulating drilling performance with the IDEAS* integrated dynamic design and analysis platform, Smith Bits, a Schlumberger company, recommended using the AxeBlade bit to optimize ROP in the 16-in section. The AxeBlade bit features a unique ridge-shaped cutting element with a thicker diamond table. This geometry enables more efficient cutting with less overall torque, higher instantaneous ROP, and longer bit life than conventional PDC cutters.

Operator increases ROP 14%, saving 21 h and USD 50,000

The first 866 ft [263 m] of the 16-in section were drilled at an ROP of 35.5 ft/h [10.67 m/h]—the highest ROP ever achieved in this section. Gas influx required the operator to drill the remaining 1,385 ft [422 m] at a controlled ROP of 15 ft/h [4.6 m/h]. Despite this, the AxeBlade bit drilled the entire section in one run at an average ROP of 18.8 ft/h [5.73 m/h]—increasing ROP by 14% compared with an offset well drilled using a conventional PDC bit. A total of 21 h of on-bottom drilling time was saved, reducing costs by USD 50,000.



The AxeBlade bit increased average ROP from 16.5 ft/h to 18.8 ft/h.