CASE STUDY

ROP Improved 42% Using AxeBlade Ridged Diamond Element Bit in a Single Run, Oman

Six-bladed bit design successfully drills 12¼-in section through highly abrasive formation and sets new ROP benchmarks in a deep gas field, Oman

CHALLENGE
Maintain cutter sharpness to drill a historically challenging 12¼-in hole section in a single bit run while improving the benchmark ROP in a deep gas field.

SOLUTION
Introduce the AxeBlade* ridged diamond element bit to minimize damage to cutters and improve overall ROP in the section.

RESULTS
Drilled the section in a single bit run while breaking multiple field records for ROP.

Drill challenging section in a single run
An operator had undertaken an aggressive drilling campaign in a deep gas field in central Oman. One of the first challenges was finding optimal technologies to drill the 12¼-in hole section, which historically required multiple runs. The section consists of a wide range of formations, from soft limestone and shales to hard and abrasive limestone and sandstones. The interbedded hard formations had proved to be a difficult obstacle to effective drilling. The operator’s ultimate goal was to drill the entire section, which spanned 2,500 m [8,200 ft] on average, with the highest ROP possible.

Use unique AxeBlade bit to overcome wear challenges
In collaboration with the operator’s drilling team, engineers from Smith bits customized an AxeBlade bit toward the goal of meeting the objectives for the section. Extensive analysis by the two teams was completed during the technology development phase, which evaluated offset wells to pinpoint areas for improvement. A detailed study using the IDEAS* integrated dynamic design and analysis platform led to the development of an application-specific six-bladed AxeBlade bit fitted with Axe* ridged diamond elements. This bit design withstands abrasive environments, minimizing the damage that traditional bits experience without significantly reducing drilling parameters to preserve the cutting structure.

Drilled abrasive sandstone with one high-ROP run
The six-bladed AxeBlade bit design was used for a well in the deep gas field and met the objective of drilling the entire 12¼-in hole section from the Natih Limestone to the extremely abrasive Al Khalata Sandstone. The goal of drilling the section in a single run was accomplished while generating an ROP of 27.5 m/h [90.2 ft/h]. Not only did this run enable the operator to exceed the normalized ROP for the field by 42%, but the operator also outperformed the existing field-best ROP by 18%.

The AxeBlade bit drilled the section in one run at an ROP of 27.5 m/h. This represents an improvement of 42% over the normalized ROP for the field and 18% over the existing field-best ROP.

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