Kymera Reduced Seven Days Compared to Best Offset Well, Saved Operator $7.6MM USD

Location: Deepwater Gulf of Mexico, Mississippi Canyon

An operator in the Gulf of Mexico faced the unique challenge of drilling a deepwater well through salt, subsalt, hard interbedded sandstone (including Lower Tertiary formation) with an expandable reamer while, at the same time, needing to reduce risk and cut drilling costs.

The operator faced multiple drilling challenges beginning with the 16½-in section to the 8½-in section that reached total well depth. The goals for this well were to limit damaging vibrations, to kickoff and build angle in the salt formation, and to reduce overall drilling cost to reach total depth. The well was drilled next to a previous well which defined the benchmark to surpass based on its best-in-field drilling performance (Figure 1).

To address these challenges, the Baker Hughes solution included the Kymera™ hybrid drill bit, the Talon™ PDC drill bit, the GaugePro™ XPR reamer, and the AutoTrak™ G3 rotary steerable system (RSS).

The Kymera bit combines the drilling performance of the PDC shearing action coupled with the TCI crushing action. Specific hybrid bit designs stabilized drilling through multi-interbedded formations in deep water allowing more efficient drilling and minimized vibrations. The Kymera bit utilized Staysharp™ PDC cutters and a metal face sealed journal bearing within the TCI cones along with three designs to deliver the end results.

The KM633 design which has three cones and three blades with 19mm cutters was utilized for three hole sections (16½-in, 14½-in, and 12½-in). The first 16½-in Kymera bit drilled salt and subsalt, averaging a 56% faster rate of penetration for this section over the average offset. The 14½-in and 12½-in sections were drilled with minimal vibrations and improved drilling efficiencies. As the sections progressed deeper, abrasive interbedded sandstone was successfully drilled with a 10½-in. KM624 bit design which included four blades with 19mm PDC cutters and two roller cones. The final depths drilled were in the Lower Tertiary formation, so the 8 ½-in KM524 design with 16mm PDC cutters was utilized to drill this challenging formation 39% faster than the offset.

The Baker Hughes drilling solution reduced seven drilling days and included eight Kymera bits and one Talon PDC bit to complete the 16½-in, 14½-in, 12½-in, 10½-in, and 8½-in sections. All bits within these sections set ROP marks compared to the offset and saved a trip. The 41% ROP increase saved $7.6MM USD off the bottom line drilling cost.

Results
- Saved $7.6 MM USD in drilling costs
- Eliminated seven drilling days
- Drilled 41% faster than best offset well
- Eliminated a trip, minimizing risk
- Drilled 21,004 feet
- Increased ROP from 29.6 feet/hour to 41.7 feet/hour
- Reduced overall vibrations and number of LWD tool failures due to drilling dysfunctions
- Eliminated dedicated trips due to bit fatigue, excellent bit dulls
- Kicked off in 16.5-in. salt section, held 24° inclination

Challenges
- Drilling in multiple challenging formations in deep water that included five hole sections: 16½, 14½, 12½, 10½, and 8½-in.
- Slower than desired PDC penetration rates
- Challenge to achieve KOP and 24° inclination in salt
- Drilling dysfunctions with increased drilling cost

Baker Hughes Solution
- Kymera hybrid drill bits
  - 16½-in KM633 (salt, subsalt)
  - 14½-in KM633 (subsalt)
  - 12½-in KM633X (subsalt)
  - 10½-in KM624 (Lower Tertiary)
  - 8 ½-in KM524 (Lower Tertiary)
- Talon PDC bit
- GaugePro XPR reamer
- AutoTrak G3 rotary steerable system

Figure 1 – Comparison of Kymera bit performance versus best offset well performance. Kymera bits saved seven drilling days.

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