Benefits
- Improved overall ROP by 36% compared to the best offset
- Reduced vibration in salt interval allowing for increased ROP

Background and Challenges
- Deepwater GoM appraisal well
- Operator needed to
  - Set 22-in. casing 1,500 ft into salt
  - Keep hole vertical (<1° inclination)
  - Reduce high torque and vibration, which can damage BHA components
  - Minimize torque fluctuations that can limit the bit’s ability to improve ROP in salt

Baker Hughes solution and results
- Deployed Baker Hughes Kymera hybrid drill bit and AutoTrak X-treme rotary steerable system
- Successfully jetted 36-in. conductor to 280 ft below mud line
- Drilled 1,131 ft of sediments at 123 ft/hr and 1,995 ft of salt at 57 ft/hr
- Extended casing point past the planned depth due to improved ROP

An operator drilling a deepwater appraisal well in the Gulf of Mexico (GoM) wanted to jet in, drill through sediment, and set 22-in. casing 1,500 ft (457 m) into salt. The operator also needed to maintain a vertical hole with as little inclination as possible, and to reach the 26-in. section’s total depth (TD) with minimal pump-and-dump mud volume. Finally, improved drilling performance over what had been achieved with large PDC bits in offset wells was required.

Historically, large PDC bits generated high torque and vibration, potentially damaging bottomhole assembly (BHA) components and increasing nonproductive time (NPT). Torque fluctuations also limited the achievable rate of penetration (ROP) in salt (42 ft/hr [13 m/hr]) in the subject case.

To overcome these challenges, and drill the top section of the well, Baker Hughes recommended a 26-in. Hughes Christensen Kymera™ hybrid drill bit with 19-mm cutters and premium metal-face seal; Baker Hughes drilling fluid; and the Baker Hughes 26-in. AutoTrak™ X-treme™ rotary steerable system (RSS) with CoPilot™ real-time drilling optimization and OnTrak™ integrated measurement while drilling (MWD)/logging while drilling services were recommended to drill the top section of the well.

Baker Hughes successfully jetted the 36-in. conductor to 280 ft (85 m) below the mud line, and then drilled 1,131 ft (345 m) of sediments at 123 ft/hr (37 m/hr) and 1,995 ft (608 m) of salt at 57 ft/hr (17 m/hr). TD was successfully reached in the 26-in. section and 22-in. casing was set. The 22-in. casing point was extended 450 ft (137 m) deeper than the well’s original objective due to improved overall ROP, which was 36% better versus the best offset.
By using the Kymera bit and AutoTrak drilling system, the operator was able to meet or exceed all project goals, improving drilling performance and ROP, while reducing casing time.

The Kymera hybrid bit combines fixed cutter PDC and roller cone bit technologies into a single, patented design for smoother drilling, superior torque management, and precise steerability through the most complex formations. The bit leverages the cutting superiority and continuous shearing action of PDCs along with the rock-crushing strength and stability of roller cones. The combination helps the Kymera bit achieve improved performance, excellent tool face control, higher overall ROP, and lower torque, stick/slip, and vibration for more footage than either a roller cone or PDC bit can deliver.

The AutoTrak RSS saves time and money by eliminating correction runs often required with conventional motors. The CoPilot service optimizes drilling performance in real time using a multiple-sensor downhole tool, customizable display reflecting the downhole conditions, and experienced personnel engaged in proactive processes and intervention techniques. The OnTrak service provides a better understanding of the actual well position by taking measurements close to the bit. Positional certainty is increased further when MWD measurements are combined with near-bit inclinations from the AutoTrak rotary closed-loop system, avoiding expensive remedial directional work.