

PetroChina Improves ROP 200% and Reduces Drilling Time by 17.6 Days

PowerDrive Archer RSS and DynaForce DTX motor improve drilling performance in high-pressure, highly laminated shale formation, China

PetroChina combined PowerDrive Archer* high build rate rotary steerable system with DynaForce DTX* thin-wall motor to drill a complex well and significantly improve ROP and reduce drill time.

Efficiently drill a high-pressure, highly laminated shale gas formation

The shale gas formation in China's Weiyuan block has brittle layers that are highly laminated with an average of 120-m thickness. The formation's compressive strength of 8,000 to 12,000 psi and pore pressure of 10,150 to 11,600 psi results in high mud weight ranging from 1.8 to 2.2 sg. The mud weight produces large amounts of solids and creates excessive viscosity while inducing high friction, which causes slow ROP in slide drilling when using a conventional BHA motor in curve and lateral sections. Penetration typically requires multiple bit runs.

PetroChina wanted to improve performance and reduce the amount of time and number of BHA trips required to drill curve and lateral sections. The average drilling cycle from spud to TD using conventional BHAs was approximately 60 to 100 days, with the curve and lateral section taking approximately 35 days.

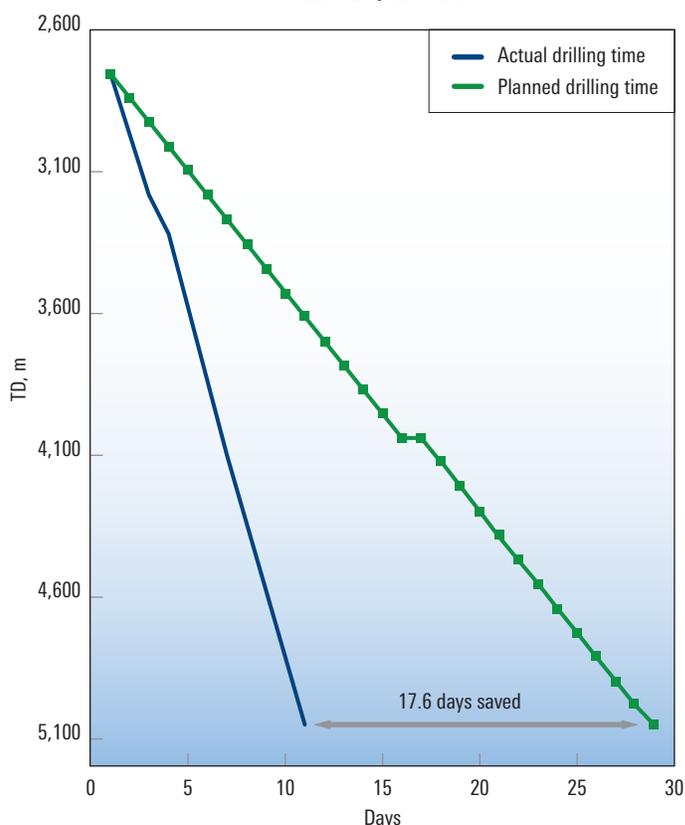
Deploy thin-wall motor with high build rate rotary steerable system

Schlumberger recommended drilling curves and laterals using the PowerDrive Archer RSS to eliminate slide drilling and DynaForce DTX motor to further enhance performance and deliver better wellbore quality. PowerDrive Archer RSS produces smooth, high-quality wellbores by reducing stick-slip, torque, and drag, making it easier to run casing and wireline logs for trouble-free well completions. DynaForce DTX motor improves drilling performance in harsh environments with its innovative high-torque transmission and driveshaft design.

Improved ROP and reduced drilling time

The combined drilling approach resulted in 200% improved ROP compared with drilling using conventional BHAs. The operator drilled a total of 2,310 m in one run from the kickoff to well TD compared with an average 700 to 1,000-m single run using conventional tools. It took 10.7 days to drill the 8.5-in section with a complicated 3D trajectory profile. The curve and lateral were completed 17.6 days ahead of the originally planned drilling time, with a very smooth wellbore achieved. Additionally, given the dramatic reduction of stick-slip, the RSS system experienced minimal internal wear and tear, resulting in longer life.

Time-Depth Curve



By combining PowerDrive Archer RSS and DynaForce DTX motor, the operator significantly improved ROP and reduced expected drilling time by 17.6 days in the Weiyuan shale gas block.