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Positioners Enable Rapid Build Rates

To optimize drilling, operators must look at how the bit, motor, measurement-while-drilling tools and other BHA components interact, suggests Ed Spatz, who was one of the pioneers behind the first steerable motors. With that goal in mind, he assembled a multidisciplinary team–including Mike Reese, who has 40 years of experience in drill bits, and Jim Dudley, an MWD and downhole tool expert–to form an entity now called XR Lateral.

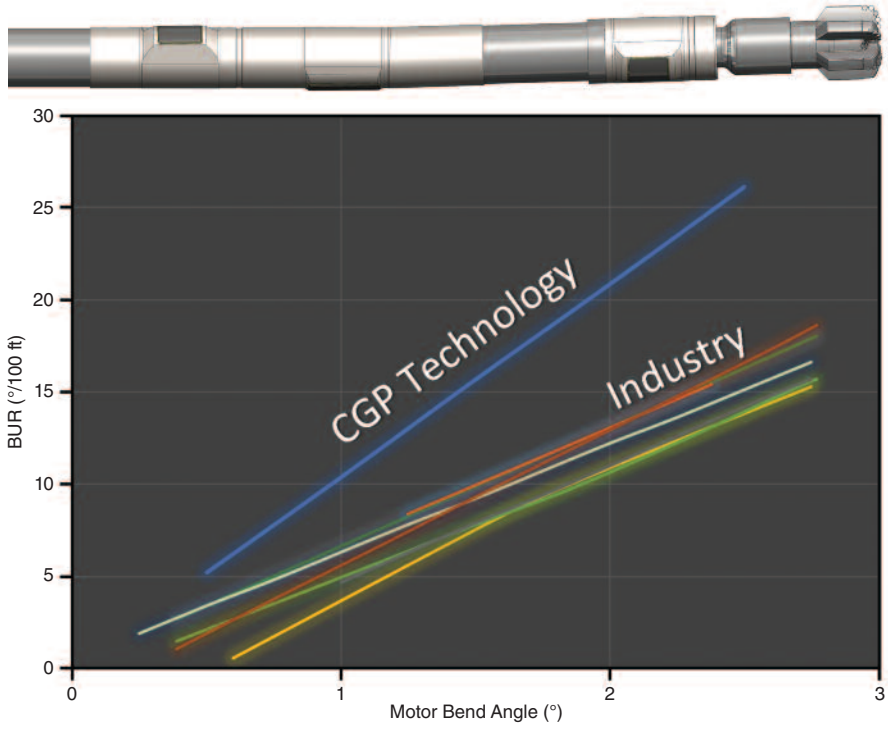
"One of the biggest issues we see is that drillers need motors with large 2¼-degree or 2⅜-degree bent housings to achieve the necessary build rates in the curve," Spatz says. "These extreme bends stress the motor and other drill string components, capping the string rotation speed, and therefore, the ROP the driller can achieve without risking tool failure.

"At the same time, the high bend angles cause the motor to rotate in an eccentric pattern that creates an oversized and tortuous wellbore," Spatz continues. "The extra hole drilled generates more cuttings that need to be evacuated while reducing the annular velocities that assist with hole cleaning."

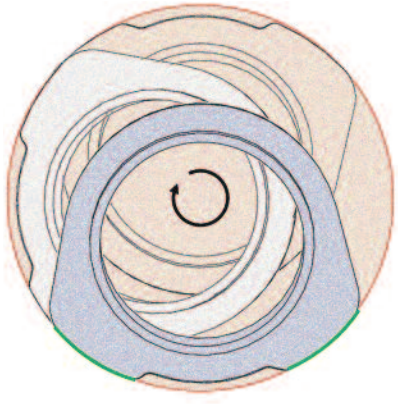
Spatz adds that eccentric rotation periodically slams the drill pipe into the side of the wellbore, causing vibration and potentially damaging BHA components.

"We can reduce bend angle by 40-50 percent," Spatz says. "These 1 to 1¼ degree bend angles allow faster and more concentric rotation, which improves penetration rates and hole quality. In addition, our technology lets drillers achieve higher build angles than are possible with standard steerable motors."

To reduce bend angles, Spatz and his team use a proprietary model to determine how well the BHA's components work together and decide where the BHA needs to be positioned within the hole to optimize its performance. Then they add Compound



Mud motors equipped with compound geometric positioners (top) can achieve high build rates with low bend angles (bottom). CGP developer XR Lateral says such angles reduce stress on the drill string, allowing it to rotate and drill more quickly.



Carefully-engineered, application-specific compound geometric positioners stabilize the mud motor and keep the BHA in the ideal position whether it is rotating or sliding, XR Lateral reports. This image shows contact points between CGPs and the borehole wall during rotation.

Geometric Positioners (CGPs) to the motor's housing to keep the BHA in the optimum position.

"No longer is the motor's housing restricted to using no stabilization or a full-wrap stabilizer that is under hole gauge and often completely ineffective, or a kick pad for directional work," Spatz declares.

The compound geometry and precise placement of the positioners lets them come into play when the BHA is sliding in the curve or rotating in the lateral, Spatz says, emphasizing that this optimizes contact and correctly positions the drill string in both drilling modes. He adds that the patent-pending technology enhances the directional driller's job, improving consistency from run to run.

In its first field test, which occurred in the Permian Basin, Spatz says the positioners exceeded expectations. "The build rate was within 10 percent of what our model predicted, and it was 10 percent higher," he details. "In addition, the tool face control was excellent. During the first 100 feet of curve, when tool face is most erratic, tool face held within one or two degrees of where the directional driller wanted it."

Spatz says the CGPs are adaptable to modern steerable motor technology and will be beneficial in any directional application, including select parts of the rotary steerable market, where they can achieve comparable build rates at a lower cost. ❐