

DRILLING BIT DESIGN

Challenging economics require drill bit improvements to lower break-even costs

As the industry settles into a new normal, drill bit providers once again focus their R&D efforts on developing core technologies to further increase drilling efficiency, and drive down costs in demanding formations and difficult directional/lateral applications.

■ CRAIG FLEMING, Technical Editor

The prolonged reduction in worldwide drilling activity has put a financial strain on service providers, but drill bit manufacturers continue to concentrate on refining technologies intended to increase penetration rates and overall tool durability. In spite of their relatively low cost, improvements in bit technologies have played a significant role in increasing drilling efficiency in both low- and high-cost environments. As manufacturers continue to develop and fine-tune PDC and roller cone technologies, in combination with enhanced drilling practices and application methods, operators are reaping the benefits of improved performance and lower global well costs.

formation by the PDC cutters changes in different rock types and strengths. In addition, the changes in the bottomhole pattern made by the cutting structure on

preceding rotations is analyzed, to provide more accurate interpretations of engagement of the cutters into the rock. These changes deliver a drilling model more capable of simulating real-world performance that will be encountered in an ensuing well.

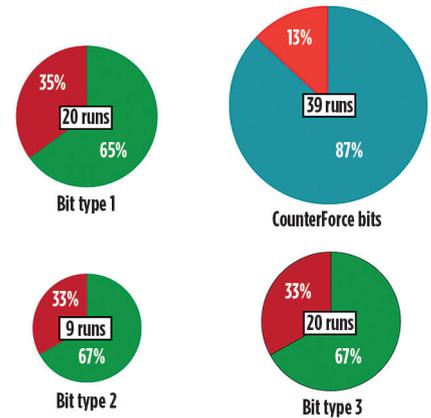
PDC BITS FOR RSS APPLICATIONS

Ulterra Drilling Technologies has updated its line of PDC bits, optimized for use with assemblies equipped with rotary steerable systems (RSS). Increasingly, the viability of these directional drilling tools have been recognized in many U.S. land plays. To extract the full potential of different RSS types, operators have sought out drill bit manufacturers, to provide designs tailored to specific parameters and BHAs.

A specific RSS, fitted with a customized PDC bit, set several new records for a service provider in the Eagle Ford shale. The BHA averaged more than 16,000 ft per run in three wells, drilling at an ROP of 87 ft/hr. In one application in Live Oak County, Texas, the bit set footage records for the type of RSS applied, drilling 16,234 ft. The extended-reach well had a TD of 22,700 ft, and achieving the lateral distance was a big challenge yet it was accomplished, using one BHA and staying on bottom for 192 hr.

Unique cutter configuration. The company has utilized its proprietary technology to develop CounterForce PDC bits, designed specifically to reduce lateral vibrations, a leading cause of downhole

Fig. 7. Percentage of RSS runs pulled for downhole tool failure. Image: Ulterra.



tool failure, Fig 7. The cutters are aligned with alternating side rakes to keep the bit from over-engaging, producing a more consistent torque response that allows drillers to be more aggressive when applying operating parameters.

In Abu Dhabi, the bit was used with another type of RSS to help solve lateral vibration issues that were causing downhole tool failures. The operator's engineering team lead said that the bit allowed the rotary steerable assembly to drill 824 ft to section TD, at an ROP of 23 ft/hr. The run was 66% faster than the average of the two previous bit runs in the mother hole. It also was 230% faster than the average of the two previous bit runs in the pilot hole. This increased performance saved the operator the expense of three trips.