Two PDCs Drill over 10,000 m of Unconsolidated Sand and Heavy Oil in Venezuela’s Orinoco Belt, Save USD 115,000

Drill bits with advanced matrix material drill 10 highly abrasive sections

**CHALLENGE**
To reduce drilling costs, find a bit that is capable of drilling four or more highly abrasive lateral sections.

**SOLUTION**
Run two 8½-in PDC bits with increased abrasion resistant matrix material and optimized hydraulics.

**RESULT**
The first bit drilled four laterals: totaling 4,267 m, saving USD 38,500. The second bit drilled six laterals: totaling 6,095 m, saving USD 77,000.

**Bit with advanced durability and ROP that can transition from a soft to hard formation**
Located south of Monagas, Venezuela, the Orinoco Belt holds reservoirs composed of unconsolidated sand and heavy oil. Accessing production zones in this area required PDVSA to drill lateral sections in reservoirs 7 to 30 m thick and 4,700 to 5,200 m long. And, inclinations in these sections can reach 90° resulting in a low-annular velocity, which allows cutting beds to form. Beyond the fluid used to remove these cuttings, holes must be back reamed at least twice to clear cuttings from one of these sections.

Lateral sections are drilled with 8½-in PDC and completed with slotted liners. And, although the sandstone UCS is below 3 kpsi, the long intervals that must be drilled and back reamed by the bit, erosion from turbulent flow, grain size, geometry, and bit flow distribution were all shortening bit life. Faced with an unacceptable cost per foot, the operator reasoned that to remain economically viable a bit was needed that could endure the conditions in this application and drill at least 4 sections.

**Application-specific bit design**
To provide a cost-effective bit for the operator, a Smith Bits design team researched dull analysis from the operational area. Based on this information, they concluded that a bit for this application could be optimized by making two significant changes: First, they changed the hydraulic configuration of the drill bit by blanking off its outer nozzles, while leaving the center nozzles open. This redirected mud flow away from the bit body and to the formation, which reduced the erosive hydraulic force that was hitting the bit’s blades and compromising their durability. And to further increase durability, their second change involved altering the abrasion resistant matrix powder in the bit’s blades. To select an application-specific bit, the team used IDEAS® integrated drillbit design platform. The resulting bit model indicated that a PDC bit was needed with a more aggressive cutting structure: the 8½-in MDi619LBPX.

**Two bits drill over 10,000 m and save USD 115,000**
The optimized PDC bit proved to have much greater durability than previous bits and, as a bonus, steering response was improved. The first 8½-in MDi619LBPX PDC bit drilled four lateral sections totaling 4,267 m, saving USD 38,500. The second bit drilled six lateral sections totaling 6,095 m, saving USD 77,000.