Bit technology solves challenging applications

EXPANDABLE DRILL BIT

It has long been recognized within the drilling industry that the ability to drill an increased diameter bore hole, having passed through a restricted casing and/or tubing diameter, can provide significant advantage, not the least of which is the ability to incorporate novel well construction techniques using both solid and expandable tubulars.

Current techniques such as bicentered bits and under-reamers have limitations on their ability to expand while at the same time compromising the cutting structure presented to the formation.

This concept leads to the possibility that a viable solution to the task of drilling increased diameter holes could be a bit that offers substantial expansion capabilities while still presenting full cutting structure to the formation.

Expandable Drill Bit Provides New Method of Drilling Increased Diameter Hole (SPE/IADC 79793) by **A D Gledhill, Weatherford International; M D Brown, Unocal Indonesia.**

FULL THROUGH BORE DRILLING

Full through bore access is a new concept in well construction using a bit that can be opened (and pressed through) in combination with a full through-bore drillstring to perform multiple operations in a single bit trip.

The bit is based on the Shell-patented Through Bit Logging bit, which has been successfully field trialed in Australia, Cameroon, Holland and the US.

Through bore drillstring and bottom hole assembly allows conveyance of various tools, such as memory logging tools, down to the bit. It also has full functionality compared to conventional bottom hole assemblies, including MWD and steering capability.

Full Through Bore Drilling and Data Acquisition: A New Drilling Option, (SPE/IADC 79794) by **D J Runia, Shell International E&P; E A Murphy, Shell International**.

PDC BIT CLASSIFICATION

With the emergence of rotary steerable systems, the technical issue concerning the bit design for a specific directional application has reappeared.

Based on a comprehensive analysis of the directional behavior of PDC bits, a simple methodology was developed to define and evaluate the steerability and the walking tendency of PDC bits. This methodology is used to classify PDC bits defined with IADC bit profile codes.

The Disc-Bit type cutter has been in use since the mid-1950s in tunnel boring applications.

The method, based on geometrical criteria, enables quick estimates not only on PDC steerability but also the maximum dog leg potential achievable by the PDC bit coupled with the steering system.

Classification of PDC Bits According to Their Steerability (SPE/IADC 79795) by **S Menard, H Sallami**, **Ecole des Mines Paris**.

PDC DESIGN IN DIRECTIONAL WELL

A new PDC design process solved a challenging directional drilling application in Abu Dhabi onshore fields.

The operator and a service company utilized a cross functional team approach to aggressively seek a new steerable PDC technology to drill the curved section with controllable torque response and isotropic directional behavior while achieving the full penetration rate advantage potential of PDC bits.

The team analyzed the drilling from virtually every perspective using extensive numerical models, laboratory drilling tests and field testing. The key to the PDC solution, according to the authors, was the team process that identified the relevant drilling problems and performance requirements, which focused the technology development.

New PDC Design Process Solves Challenging Directional Application in Abu Dhabi Onshore Fields (SPE/IADC 79796), by **A S Al-Suwaidi**, **A Soliman, O M Abdel Shafy**, **ADCO**; **Z A Zink**, **M Isbell, M Dykstra**, **Hughes Christensen**; **C Jones**, **Baker Hughes INTEQ.**

STABLE PDC TECHNOLOGY

Combining advanced PDC bit designs with state of the art cutter technology has opened up many new applications for PDC bits were once exclusive for IADC Series 6, 7 and 8 insert drill bits. As a result of the new technology, PDC is fast becoming an alternative way to drill hard rock, providing significant reduction in cost per foot.

Key to this technology is a combination of new highly abrasion resistant PDC cutters with specific bit design characteristics that provide both low torque and dynamically stable characteristics.

New, Stable PDC Technology Significantly Reduces Hard Rock Cost Per Foot (SPE/IADC 79797 - Alternate) by **R T Fabian**, **Schlumberger Drill Bits; E J Schell, D E Phillippi, Anadarko Petroleum**.

HARD ROCK BIT

The technology of the Disc-bit is based on the single rolling disc cutter. This type of cutter was successfully used in rock for the first time on a tunnel boring machine in 1956.

By the early 1970s virtually every rock tunneling machine in the world had moved from picks, tungsten carbide cones or multi-row tapered cutters to the single row disc. By then the superior performance on tunneling machines had been demonstrated by practical experience in the field.

The Disc-Bit - A Tool for Hard Rock Drilling (SPE/IADC 79798 - Alternate) by **J C R Placido. Petrobras; J E Friant, Excavation Engineering Associates**.