Tubulars II

SPE/IADC 52882

"Hardbanding and Its Role in Deepwater Drilling

Hardbanding of drill pipe tool joints and other drilling equipment has been around since the late 1930s. Originally, hardbanding was applied primarily to protect the drill pipe and other tools from premature abrasive wear. Since that time there have been numerous changes in hardbanding, but only within the last few years has new technology been introduced that allows hardbanding to protect both the casing and the drill pipe at the same time.

The proper hardbanding:

Doubles the wear life of a drill pipe tool joint;

Reduces casing wear by 75%-85%;

Reduces downhole drag and torque up to 30%;

Reduces rig fuel consumption up to 10%;

Allows operator to use lower weight and grade of casing;

Prevents environmental catastrophes.

—J G Mobley, Arnco Technology Ltd

SPE/IADC 52848

"Low Stress Level PinUp Drillstring Optimizes Drilling of 20,000 ft Slimhole Well in Southern Oklahoma"

One size larger tubulars and bottom hole assembly (BHA) tools are used in the design a Low Stress Level PinUp drillstring. Larger tubulars are stronger, in torsional and tensile yield strengths and provide a significant hydraulic advantage while larger BHA components are also stronger and provide greater stiffness for wellbore directional control. These key drillstring improvements facilitated in the successful drilling of Marathon's Mitchell well.

Typically, when drilling a 5-7/8-in. hole section from under 7-in. casing a conventional drillstring would be comprised of 3 1/2-in. IF drill pipe, 3 1/2-in. IF heavy wall drill pipe and 41/4" 0 D drill collars. A number of limitations are imposed with this conventional drillstring design- The 3 1/2-in. IF connections are torsionally weak and prone to torsional failure (twist off) while tensile yield strength (overpull) is limited Due to the relatively small tubular bore size (2. 7-in. ID) in 3 1/2-in. IF drill pipe, mud flowrates, bit hydraulic horsepower (HSI) and wellbore cleaning are significantly handicapped The conventional 4 1/4" 0 D drill collars in the BHA have a very low moment of inertia (stiffness) which frequently leads to the creation of dog legs, keyseats and spirals during the drilling process. Overall, attempting to drill deep small diameter wellbores with conventional drillstring components can prove to be very difficult and prone to failure.

In comparison, the PinUp design allows the use of 4-in. FH drillpipe, 4-in. FH heavy wall drillpipe and 5 1/4-in. OD drill collars in a 5-7/8-in. hole size (drillstring components we run "pin up" with reduced OD pin connections for fishability). The 4-in. FH drill pipe connection is 30% stronger torsionally and with a half inch (3.3 in.) larger tube ID provides a significant hydraulic advantage. Specifically, calculations from Marathon's well with a 3 1/2-in. IF drillstring showed that at a surface pressure of 3,000 psi with I 10 lb/gal mud, a maximum flow raw of 141 gallons per minute was possible which resulted in 0.39 bit HSI The 4-in. FH Pin-Up drillstring at 3,000 psi provided 179 gal/min flow rate (+ 38 gal/min) and 0. 81 bit HSI (+ 107%). When these superior hydraulic parameters were coupled with a stiffer PinUp BHA design smoother drilling, faster penetration rates and a higher quality wellbore resulted.

Marathon plans to continue using the PinUp design on current and future wells in the Oklahoma am. Some of the first Pin-Up designed drillstrings were run offshore Norway and offshore Scotland Subsequent runs in North America am helping to define additional applications not only for the North Sea but worldwide.

—R A Dudman, Pin Tec Services Inc
—C West, Marathon Oil Co
–J Hubbard, Smith Intl Inc