Performance Analogy by Torque Reduction, Casing Wear and Drilling Performance of Non-rotating Drill Pipe Protectors Made of Steel and Material of Low Friction Coefficient in Multilateral Wells

Author Block: M. Ans, D&WO, Saudi Aramco; R. R. Cisneros, P. I. Cantos, Drilltech Group, Quito; A. H. Salty, Drilltech Group.

Abstract

The reduction of rotary torque while drilling complex wells is essential to promote efficient drilling operations. This paper outlines the additional benefits of torque reduction to minimize casing wear by installation of non-rotating sleeve type drill pipe protectors. A comparative analysis between torque reduction, drilling parameters behavior and casing wear assessment will be analyzed for drill pipe protectors made of steel with low coefficient friction chromium alloy on sleeve and mandrel stress area.

Over the buildup and horizontal stages of wells, high side-loading forces are common, which will also have an impact on surface torque and casing wear. To reduce the effect of high side-loading forces on torque increase and casing wear during drilling on a multilateral well, non-rotating sleeve-type drill pipe protectors were used and compared the outcome with the drill pipe protectors made of steel and of rotating types. Although all drill pipe protectors are designed to provide a standoff between the drill string and the internal surface of the casing. However, Torque reduction and casing wear reduction efficacy of sleeve type non-rotating tools for a multilateral well will be analyzed using pre-deployment torque & drag (T&D) simulation, buckling, weight transfer, friction factors and actual outcome when using conventional steel made tools in similar drilling environment.

Torque usually increases with inclination, depth and friction of drill string across casing. Actual rotary torque readings obtained from the rig were compared with T&D simulation including the low-coefficient-friction drill pipe protectors. Simulated values of torque with drill pipe protectors were calibrated with actual readings and then it was compared calibrated torque values of the multilateral well without the drill pipe protectors which will have same impact as protectors with steel as external surface and rotating types. After these steps, it is possible to evaluate the efficiency of the non-rotating sleeve-type drill pipe protectors according to the actual drilling parameters of the well and then verify the outcome using corrosion logs or actual number of cleanout trips and junk recovery.

High torque values and casing wear has a consequence and cost. In some cases, the industry considers for drilling operations just the limit of drill pipe and rig capacity in terms of torque. This common practice will bring drillpipe to the limit in torque capacity without considering unexpected issues that could change expected torque values. With the implementation of non-rotating sleeve type drill pipe protectors, we will see the benefits in torque reduction, buckling efficiency, drag reduction, weight transfer which will optimize drilling operation.