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Wellbore Trajectory Quality Management: A Key Approach to Safe Casing & Completion Strings Deployment in Complex Wells

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Abstract

Wellbore trajectory quality management is a key factor while deploying casing and completion strings. Depending on the type of directional drilling driving system, formation drilled, bit steerability and operational procedures, the trajectory can be smooth or very tortuous with significant additional local doglegs. In addition, when the wellbore surveying program is not sufficiently consistent (i.e. wellbore surveys with inadequate MWD survey sampling or Stationary Gyro surveying mode with a low sampling rate), the doglegs can be hidden and become potential difficulties down the track, resulting in 'traps set open' for tubular running operations.

This paper presents a trajectory quality management methodology that enables the anticipation of stuck pipe problems or lock up situations when running casing and/or completion strings. This methodology involves different processes that permit the evaluation of:

- intermediate doglegs and wellbore tortuosity
- precise casing positioning through the wellbore accounting for centralisation program
- tubular post buckling analysis

Robust 3D directional drilling models coupled with 3D stiff string T&D calculations (enhanced tubular string mechanics analysis) and adequate field data management are the key features of this successful approach.

Introduction

Management of wellbore path is critical as well path objectives become more and more complex. This complexity may lead to situations such as stuck completions which reduce the productive capacity of the well. Mastering the actual direction of the well enables smooth completion and casing operations. The procedures used to determine the location of a wellbore have increased in complexity from single-shot inclination measurements used in the past to now whereby it is possible to determine the local doglegs between standard survey spacing numerically without a dedicated Gyro run.