

Vibration effects during conventional rotary drilling

Talha Bin Riaz

Data Analyst Field Engineer at Petrolink, Kingdom of Saudi Arabia

Conventional Rotary Drilling is most widely used method to Drill through formation to reach the Potential Oil and Gas Reservoir. During this Conventional Drilling, Different Process are going on while drilling an Oil and Gas Well and as a corollary of utilizing this method different effects are produced while drilling. One of the most important is Vibration Effects resulted during rotation of Drill String. Rotation can be provided either by TDS (Top Drive System) or Rotary Table in case of Kelly System depending upon the type of Drilling Technique being used.

Most of the time Vibration Effects being produced as a result of Rotary Drilling are not taken under consideration. But these Vibration Effects produced are not only perilous for our Drill string specifically BHA (Bottom Hole Assembly) but also has drastic Effects on the formation of Interest.

Vibrations are in general detrimental to the Drilling Process. They may induce premature damage and wear to Drilling Equipment, which may even results in Premature Failure. Multiple Vibration effects are simultaneously produced while the drilling is carried out via Conventional Rotary Drilling system. This can results in Bit-Bounce, Stick-Slip, Forward and Back-word whirl together with linear and parametric coupling between Axial, Torsional and Lateral Vibrations.

BHA is most prone to Vibration Effects as compared to other Components of Drill String. The Drill String vibration is induced either by Drill Bit – Formation and as well as Drill String – Well Bore interactions. This Vibration has harmful effects on Drilling Process as a hole. It can results in Drop of ROP (Rate of Penetration) and also can result in the Fatigue of Drill String which can lead to damaging of MWD (Measurement While Drilling) Tool and results can be significantly altered by this Vibration Effect.

Results would be disastrous if coupled vibrations occur, this could lead to significant complexities related to Drill String Dynamics. As mentioned previously three types of Vibrations can occur and their coupling means combination of Axial with Torsional, Axial with Lateral and Torsional with Lateral Vibrations. E.g Drill Bit plays an important Role in Coupling Axial and Torsional Vibration in terms of WOB (Weight on Bit) and TOB (Torque of Bit) if the Bit bouncing occurs this indicates Torsional Vibrations have suppressed the Axial Vibrations.

So in this paper as discussed earlier with little demonstration the Vibration origin will be discussed, types of Vibration and most Important the Coupling of Vibrations which is the Core part of this paper would be discussed in Detail and also the different problems that most probably arise from these Vibration Couplings and last but not the least emerging techniques of analysis for optimization of these vibrations would be discussed.

Biography:

Talha Bin Riaz is presently working as Data Analyst Field Engineer at Petrolink, KSA (Kingdom of Saudi Arabia). He is a Petroleum Engineer did graduation from UET (University of Engineering and Technology) Lahore. His major focus was to locate the Invisible lost time or Non Productive time during Drilling Activities and he was appointed as Data Analyst Field Engineer of one of the best and Multinational Oil and Gas Services Company, named Petrolink. And the major focus of this Company was as per his interest and motto; so it was not difficult for me to match up with the Company Demands.

He presented different Research papers at SPE Annual Conferences and was awarded as one of the best presenters in this regard. This paper is also linked to my area of interest to find out the different reasons causing different problems at Drilling Site with greater depth and with more focus with what naked eye is not visible to see, but can only be observed keen focusing.