KICK TOLERANCE AND DYNAMIC WELL CONTROL MODELING

Kick modeling and analysis provides value in safety and cost savings. This is especially true for deep water wells where the overburden is reduced and the margin between mud weight and fracture gradient is miniscule. Kick modeling also provides benefit in reductions of insurance premiums for wells both onshore and offshore.

Industry common kick models consider single gas bubbles with simplifications regarding friction pressure loss, gas migration and gas solubility. The assumptions are made conservatively because of the uncertainty involved. Also, the single gas bubble model does not represent actual downhole behavior of wellbore fluids during a kick scenario. With the conservative assumptions combined, answers can introduce unnecessary risk analysis. Conservative designs may increase costs or prohibit drilling due to safety concerns.

Boots & Coots engineers utilize the commercially available Drillbench Dynamic Well Control, dynamic multiphase modeling software, to perform kick modeling for a variety of scenarios. Drillbench Dynamic Well Control provides more detailed insight into drilling and well control conditions where conventional methods fall short. More detailed analysis and modeling, results in a better understanding of well control scenarios.

An advantage of Drillbench Dynamic Well Control is the ability for well control modeling of non-Aqueous fluids (NADF) and HPHT wells. The combination of modeling and field expertise of Boots & Coots engineers provides a unique service for supporting projects during planning and execution.
Features

Assesses the following particulars not commonly assessed by the single bubble model:

- Gas solubility of synthetic-based mud
- Gas migration in water-based mud
- Frictional pressure in the annulus
- Mud compressibility

The model also has the following additional features:

- Can model kick tolerance for multiple weak points in the well such as the casing shoe, base of salt or other zone of interest
- Adjustable choke margin
- The model is adjustable while the simulation is running, which is useful for actual well control situations and consequence analysis

Benefits

- More accurate kick tolerance values results in more precise well designs which increases safety and potentially saves money through fewer casing strings
- Insurance companies may lower insurance premiums if kick modeling is performed
- Monitor the effect on kick tolerance by adjusting mud weights, casing setting depths, formation types, etc.
- Live graphics provide intuitive results that can be quickly referred to during emergency situations
- Track the solubility of the gas kick in NADF which results in more detailed insight to the kick tolerance dynamics and during well control situation

For more information, please contact Prevention Services Manager at 281-931-8884.