

Petrel Well Construction

Integrated relief well dynamic simulation for well contingency planning

APPLICATIONS

- Evaluate relief well geometries
- Predict requirements to kill the well

BENEFITS

- Early identification of potential relief well problems
- Perform relief well contingency during the well design stage
- Collaborate directly with the G&G team using the integrated geological model
- Shorten well planning iterations
- Perform uncertainty on input parameters

FEATURES

- Interfaced with the full OLGA* dynamic multiphase flow simulator and Drillbench* dynamic drilling simulation software advanced blowout control capabilities
- Accurate dynamic multiphase simulation
- Multiple scenarios through the Petrel* E&P software platform workflow manager

Today, we design longer, more complex and challenging well paths in increasingly challenging environments with deeper water, higher pressures and temperatures, and in reservoirs which have mixed high-pressures and depleted zones. Contingency planning and evaluation of the relief well has not only become an important safety requirement but also an integral part of the local drilling and production workflow regulations.

The key challenge is to have sufficient planning time. Relief well contingency plans are often performed late in the well planning phase. When simulation of the planned well determines that it does not meet the relief well requirements, a redesign of the planned well is required.

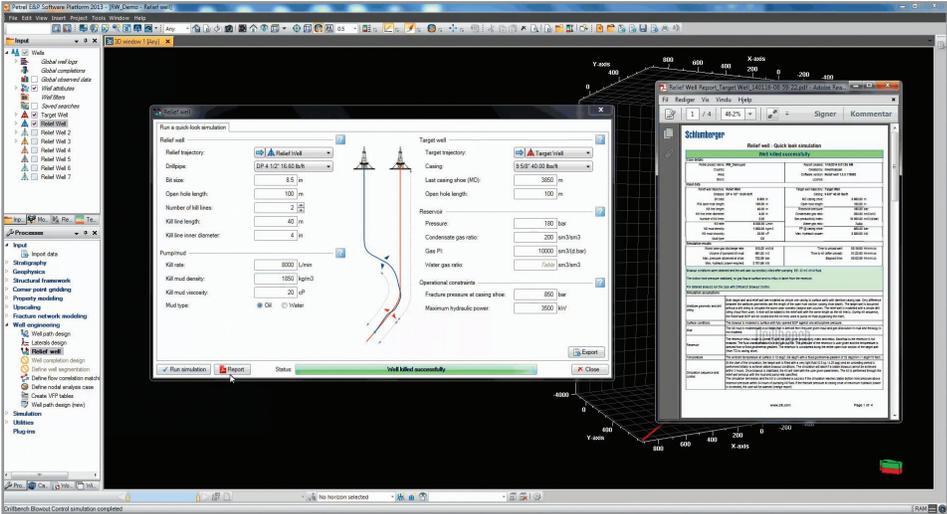
With this solution, technology for validating relief well plans will be accessible right at the well design stage, by the well design planner. This shortens the iteration process, enabling early iterations of the planned well and testing it under the full range of parameter uncertainty.

The Petrel platform's well planning module provides key workflows for designing and planning new wells, and the relief well dynamic simulation provides a simple and fast workflow that gives a qualified and conservative validation of a relief well without the need of specialized training or an expert in relief well planning.

Integrated Simulation in Petrel

This simple-to-use process is based on the OLGA dynamic multiphase flow simulator capability. It delivers the only integrated well design and relief well simulation software in the industry.

Integrated within the Petrel software platform, the simulation requires only the designed target and relief well trajectories that are stored in the project data file, thereby eliminating data transfer errors often introduced when working between separate and isolated applications.



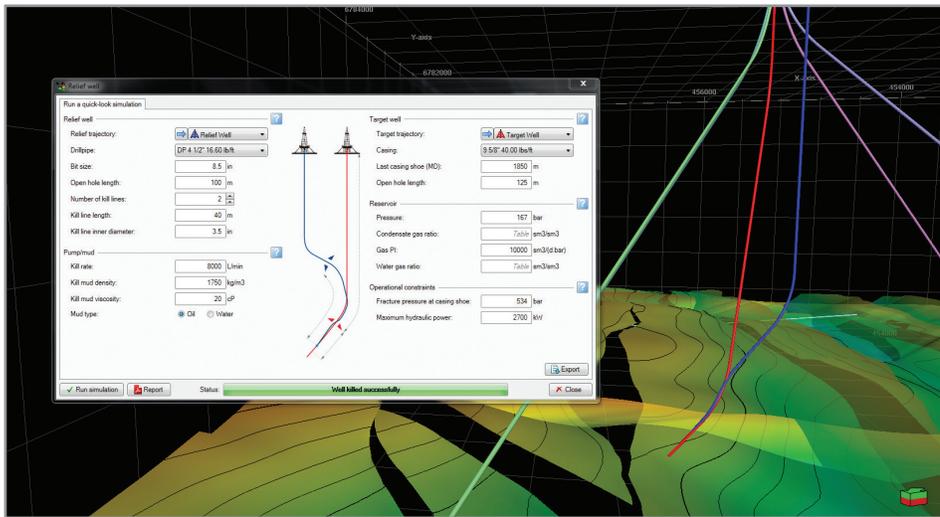
Relief well dynamic simulation interface with a simulation PDF report.



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With the input of just a few key parameters, a full Drillbench blowout control simulation is performed. Results highlight whether the target well can be killed according to the reservoir conditions, relief well profile, and available hydraulic power. The entire process is performed in a few minutes and the results are presented in a clear and precise report.

Relief well dynamic simulation supports rapid evaluation of key uncertainty parameters enabling uncertainty scenarios early in the well planning process. As parameters are confirmed, or new data arrives, the simulations can be quickly updated within the unified Petrel environment.



Relief well simulation interface with contextual geological information.

Only key parameters which have a critical impact on the analysis are required for a simulation which considerably speeds up the data collection and entry process. Conservative assumptions are used for all the remaining parameters so that a “successful kill” obtained through the Petrel relief well simulation will remain so, even when subsequent detailed studies are performed.

Accurate Dynamic Simulation

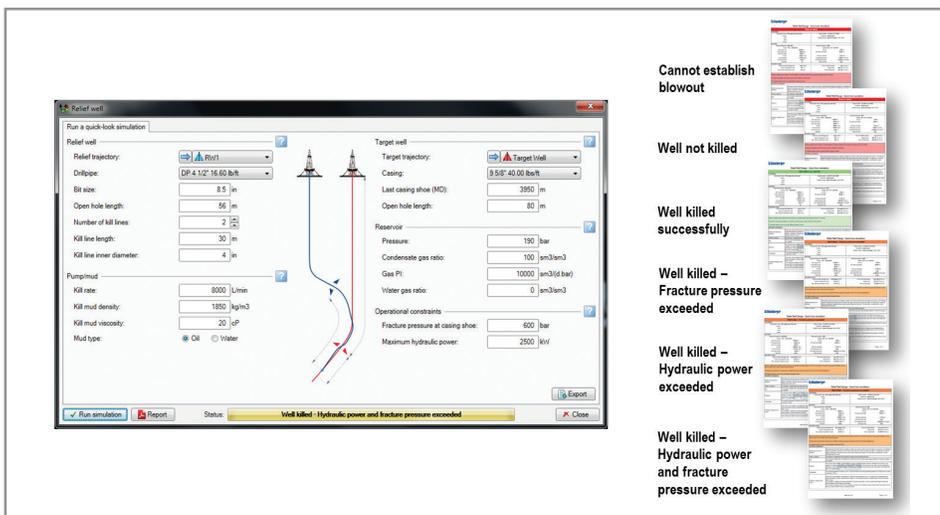
Flow dynamics during a kill operation are complex and dynamic; an accurate and powerful dynamic multiphase model is required to simulate this process. The industry-reference Drillbench blowout control software has been integrated within the Petrel Well Construction module to provide you with proven technology for well planning and relief well planning.

The scenario is to pump kill mud down the relief well and into the blowing well fast enough to establish sufficient pressure to stop the reservoir influx.

The results from the relief well dynamic simulation provides

- worst-case gas discharge rate
- volume of kill mud required
- time required to kill the well
- an assessment of whether the maximum fracture pressure or hydraulic horse power is exceeded in the kill process.

Backed by significant research and powered by the OLGA simulator, the Petrel platform’s relief well tool provides accurate results using industry-reference technology.



Resulting reports from a relief well simulation.

- Cannot establish blowout
- Well not killed
- Well killed successfully
- Well killed – Fracture pressure exceeded
- Well killed – Hydraulic power exceeded
- Well killed – Hydraulic power and fracture pressure exceeded



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