CemCADE

## Cementing design and evaluation software

APPLICATIONS

- U-tube simulation for primary cement jobs
- Mud removal optimization using WELLCLEAN II* technology
- Postjob evaluation using execution data
- Cement bond log (CBL) response prediction
- Cement plug job design
- Casing centralization
- Temperature simulation

BENEFITS

- Increased cement job success rate, reducing costs
- Safer operations by predicting well security before the job
- Optimized future improvements with postjob analysis using actual job data

FEATURES

- Simulation of all job aspects
- Caliper and directional survey data for casing centralization
- Improved fluid design and placement
- Temperature simulation for reducing cement wait time while avoiding premature setting risk
- Mud circulation efficiency module for assessing pipe movement influence on flow in the annulus
- Playback simulation
- Postplacement analysis module for predicting gas migration risk
- SynCBL module to predict CBL response
- Comparison of actual CBL and SynCBL to evaluate zonal isolation and avoid remedial repair
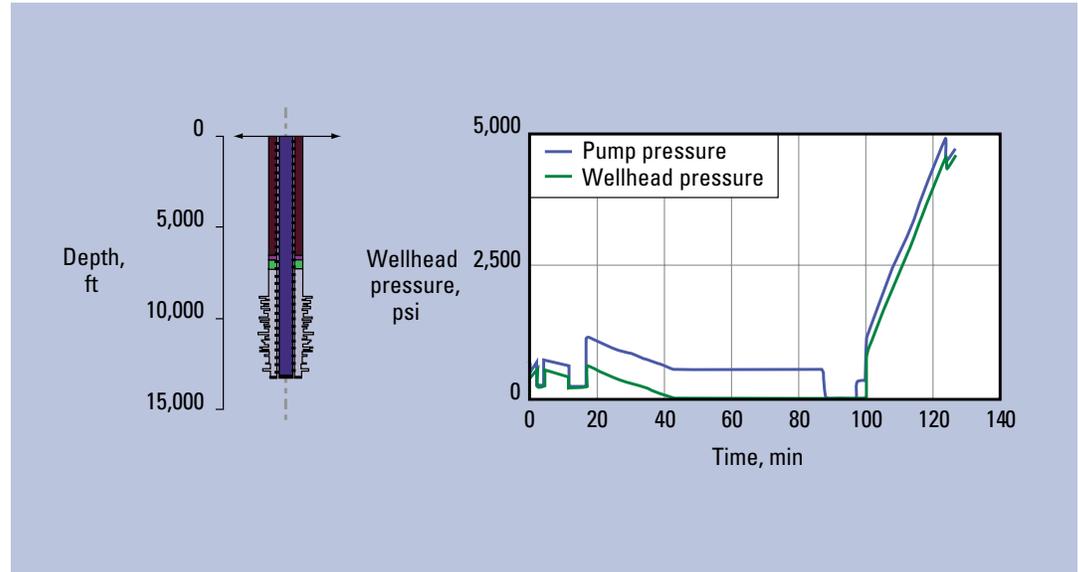
CemCADE U-tube simulation optimizes fluid placement during a cement job.

A successful cement job results in complete zonal isolation while saving time and money. To achieve this, various factors such as well security, good centralization, efficient mud removal, and gas migration control must be taken into account. Temperature must be accurately predicted to properly design the fluid and eliminate excessive waiting on cement. In addition, a postjob analysis is necessary to ascertain zonal isolation and avoid any unnecessary remedial work.

The Schlumberger CemCADE* cementing design and evaluation software is integrated to help the user design and optimize various cementing job parameters.

COMPETENT CEMENT JOB DESIGN AND SIMULATION

Schlumberger engineers use CemCADE software to design, simulate, and optimize primary and plug cementing jobs. CemCADE software can design all primary land or offshore cementing operations, from large-diameter surface casing to the deepest liners.

CemCADE software ensures well security at all times during the cementing job. The application optimizes pipe standoff and helps to calculate an optimum displacement of mud and preflushes (mud removal and cement placement) to reduce the risks of channeling and microannulus (zonal isolation). A field-validated temperature simulator predicts downhole temperatures, and fluid properties can be designed based on the predicted temperatures. The SynCBL module can be used to predict CBL response based on the fluid placement.

Actual job execution data can be imported into CemCADE software to compare design with actual results to verify the success of the operation. SynCBL can also be used to simulate the CBL response based on execution job data. This response is compared with the actual CBL data, and interpretation of the cement logs is performed.

Plug placement can be optimized using CemCADE software. The CemCADE plug placement module can predict and minimize fluid interface movement, thus reducing slurry contamination. This ability increases the success rates of cement plugs.

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CASE STUDY

An 8½-in hole was drilled, and a 7-in casing was to be run to 6,950-ft TD. The job was designed using CemCADE software. Fluid properties such as density and rheology were optimized for proper placement of the cement. Single-arm caliper data was imported, and the number of centralizers and their placement were optimized to have a minimum standoff of 75%. WELLCLEAN II technology was used to ensure good mud removal for complete zonal isolation. The volumes of the cement slurry were calculated based on caliper data and 15% excess to ensure that the top of the cement reached the desired depth.

The cement job was executed without incident. The actual job data was imported into CemCADE software and simulated in playback mode. It was found that the actual job pressure was lower than the simulated pressure. In addition, the CBL indicated that the actual top of cement was lower by nearly 1,500 ft. This explained the difference in the actual and simulated placement pressures in the CemCADE playback mode. Simulations were performed to match the actual job pressures, and the analysis showed that the actual hole diameter was larger than expected. This was also corroborated with the SynCBL results that matched the actual CBL response. The hole volume was found to be 50% greater than determined by the single arm caliper logs.

The diagnosis using the postjob evaluation tools generated improvement recommendations for future jobs.
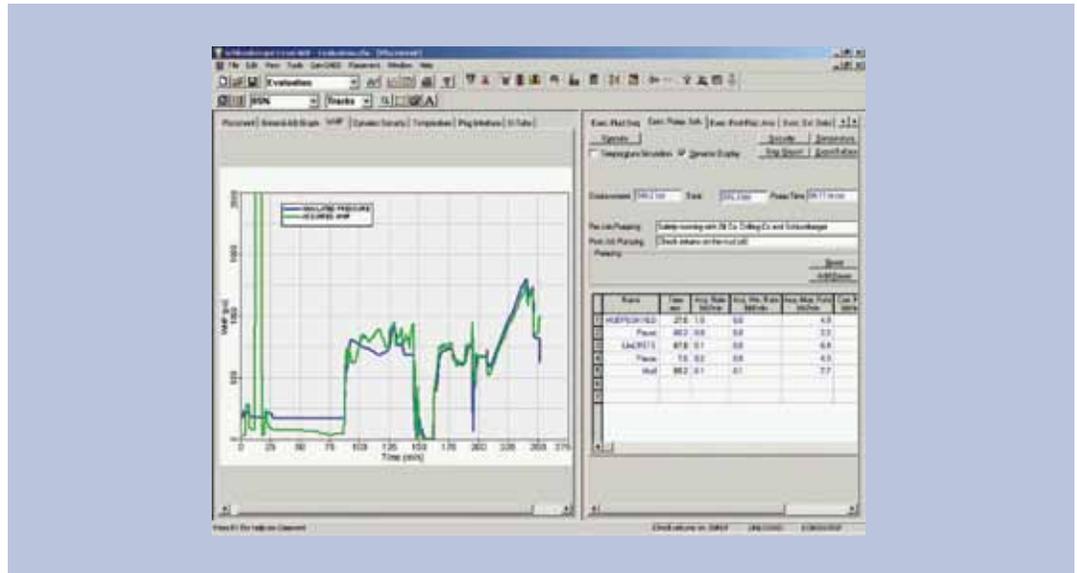
Postjob evaluation in CemCADE software uses actual job data (wellhead pressure [WHP] versus time) to evaluate the cement job and identify future improvements.
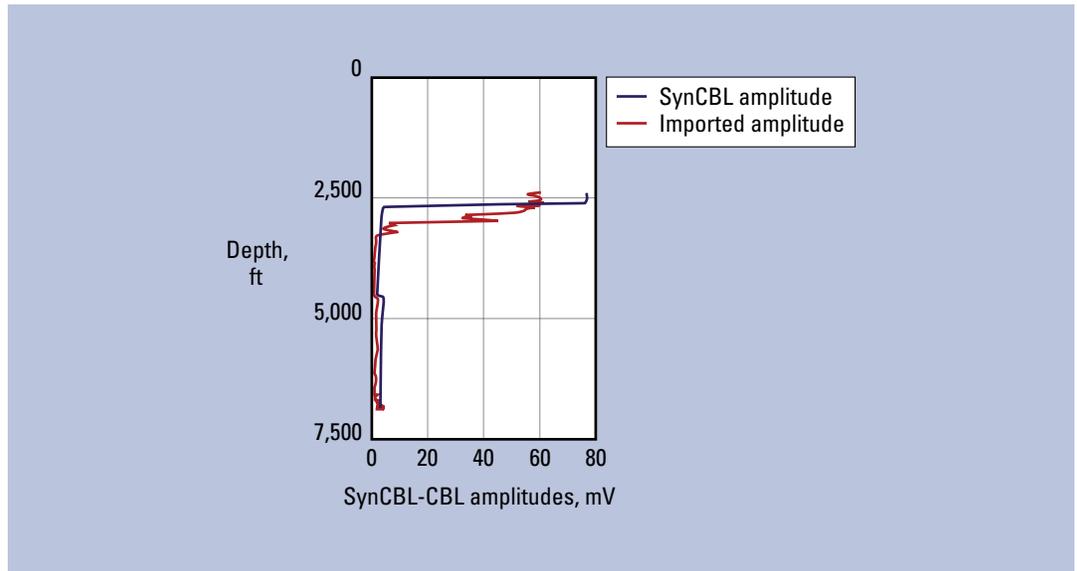
SynCBL is compared with actual CBL data for proper interpretation of a cement log.

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