A good cement job starts with a proper understanding of the well design, the risks, and cementing best practices. These practices—including mud conditioning, optimum pump rates and densities, centralization, and many other factors that ensure effective mud removal—are critical elements for long-term zonal isolation. But, oftentimes these jobs are performed using guesswork leading to increased risks, inefficiencies, and poor performance.

A proper cement job requires simulations to accurately predict outcomes and evaluate performance. The CemMaster™ zonal isolation cementing software from Baker Hughes, a GE company (BHGE), reduces risk, improves efficiency, and ensures quality performance during cementing operations to deliver a reliable and cost-effective cement job—from initial design through final evaluation.

The CemMaster software suite includes several modules designed to help design, plan, execute, and evaluate the perfect well. Trained BHGE personnel use the CemMaster software and best practices, to understand and predict performance throughout the life of the well.

Reduced risk
CemMaster zonal isolation software reduces the likelihood of manual errors by minimizing data entry points. The software also helps BHGE engineers to accurately predict areas of possible gas migration, and design the cement job to avoid unwanted fluids and gas influx.

The CemMaster software also enables interactive data entry, graphical simulations, and enhanced reporting capabilities to provide a standardized approach to engineering design and further improve reliability. Through effective cement modeling, predicted outcomes can be evaluated based on specific values from your well. Built-in charts and standard reports are generated for each job. The combined benefits of these simulations help BHGE engineers make informed decisions.

Applications
Cementing operations

Benefits
- Eliminates the guesswork and related risks during the design, execution, and evaluation of a cement job
- Ensures optimal zonal isolation for the life of the well
decisions regarding the stage placement, slurry design, and cement system selection—minimizing risk throughout the life of the well.

Improved efficiency
A sub-optimal cement job can result in many direct and indirect costs. These could be NPT in repairing a cement job, which can be 24 hours or more in many cases, or loss of hydrocarbon production due to poor zonal isolation. Sustained casing pressure is another issue that may lead to additional workover costs.

The CemMaster software helps avoid these costs and related downtime by designing the job right the first time. Costly cement evaluation tools can also be reduced with precise displacement simulations.

Ensured quality performance
Several modules of the CemMaster suite are dedicated to the design of fit-for-purpose cement jobs, tailored to withstand changing conditions over the life of the well. These modules simulate various operational scenarios and are designed to improve the durability and effectiveness of the cement job.

With CemMaster software, operators can now assess planned versus actual performance at each critical stage of the job. CemMaster software includes various modules dedicated to accurately evaluating fluid intermixing and predicting top of cement (TOC), allowing for effective optimization on future jobs and as part of a continuous improvement process. Pump quality index analysis provides data analytics of the cement unit and personnel for evaluation and further continuous improvement in quality.

To learn more about the CemMaster zonal isolation software suite, and how it can eliminate the guesswork in your cementing jobs, contact your local BHGE representative.

HYDRAULICS AND MUD REMOVAL
Primary and remedial cement design system that provides pre-job design, real-time simulation, and post-job analysis. Predicts optimal pump rates, rheological properties, centralizer placement, and mud displacement efficiency to produce successful primary cementing jobs.

CIRCULATING TEMPERATURE MODELING
Uses finite difference modeling to accurately predict wellbore and formation transient temperature behavior during fluid circulation and placement.

PRECISION DISPLACEMENT
Predicts likely circumferential TOC, evaluates intermixing of cementing fluids, quantifies decay of cementing fluids, improves run time, fine-grained output, identifies velocities and flow regimes, and depicts expected fluid dynamic.

CEMENT STRESS ANALYSIS
Analyzes long-term stresses in the cement sheath, formulates the most appropriate slurry resilience properties, and assesses the cement’s compressive and tensile behavior due to changes in wellbore and reservoir temperatures and pressures.

PLUG CEMENTING DESIGN
Visualizes optimized plug placement and advises on cement volume to be pumped to accomplish planned top of cement.

IN-PIPE MIXING ANALYSIS
Quantifies cement contamination and other fluids (intermixing) while pumping down casing or tubing, to mitigate zonal isolation issues.

GAS/FLUID MIGRATION RISK ANALYSIS
Incorporates all well and slurry parameters, including critical static gel strength, for better slurry design and to prevent and mitigate the risks of fluid flow.

PUMP QUALITY INDEX ANALYSIS
Scores pump and operator performance within expected parameters to aid in maintaining cement slurry density during mixing.

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