

Case study: Norwegian Sea

Largest cement job controlled from remote onshore location successfully executed, reduced POB and NPT

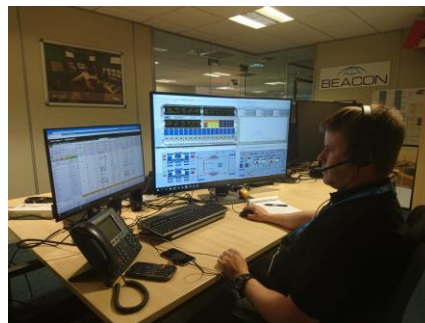
Saving rig time and performing operations more efficiently is a constant challenge for all operators, but for offshore operators, reducing the number of personnel on-board (POB) a rig also proves difficult to overcome. To help one North Sea operator, Baker Hughes introduced and implemented the integrated operations level three (IO3) model for all serviced rigs. A reimagining of traditional rig floor roles, the IO3 model halves the number of oilfield service POB with an eye to minimizing health, safety and environmental (HSE) risks, driving efficiencies, and improving overall performance quality and consistency.

The IO3 model consists of a **Total Fluids Engineer role (TFE)** with support from the Baker Hughes **Remote Onshore Operating Center**. The TFE position is a cementer and mud engineer cross-trained and multi-skilled in both fields, eliminating one POB. The Remote Operating Center supports the field personnel with additional expertise, relieving them from some tasks in order to gain more efficiency on the rig. Because cementing operations usually involve a substantial amount of planning and preparation, moving some of the work to the remote operating center saves rig time. The ability to perform cement operations from onshore was one of the tasks the operator identified as bringing value and recognition.

Complementing the IO3 model and field personnel, Baker Hughes deployed the specialized **Seahawk™ advanced offshore cementing units**.

Run by well-trained personnel and controlled from the remote operating center, this equipment includes fully automated slurry density control—a robust process that allows high-rate, heavyweight, and ultra lightweight mixing while providing ergonomic safety for the cement unit operator and critical component redundancy. The Seahawk units helped minimize the rig time while still maintaining exceptional service quality and good well integrity.

Baker Hughes also included the **EZTreat™ treatment control software application** which simplifies the management and control of pressure pumping and blending equipment, minimizing the potential for error and improving the safety and reliability of oilfield operations. The system supports remote, real-time diagnostics and monitoring from onshore, further reducing the risk of downtime and maintenance personnel trips offshore.



Baker Hughes's second Remote Control Operations Center, located in Aberdeen, Scotland, where two remote cementing jobs have been executed to date, demonstrating the system's ability to provide remote cementing services on a global level.

Challenges

- Reduce personnel on the offshore rig
- Ensure a successful remote cement job without any service delivery issues
- Achieve reliable zonal isolation

Results

- Conducted 11 flawless remote cementing operations including pressure testing, mixing operations, and casing and liner installations
- Reduced costs, risks, and nonproductive time (NPT) with fewer POB compared to conventional operations
- Experienced zero HSE incidents over all 11 jobs

With a comprehensive solution in place, Baker Hughes deployed personnel and equipment to the offshore platform and, as of October 2020, conducted a total of 11 jobs.

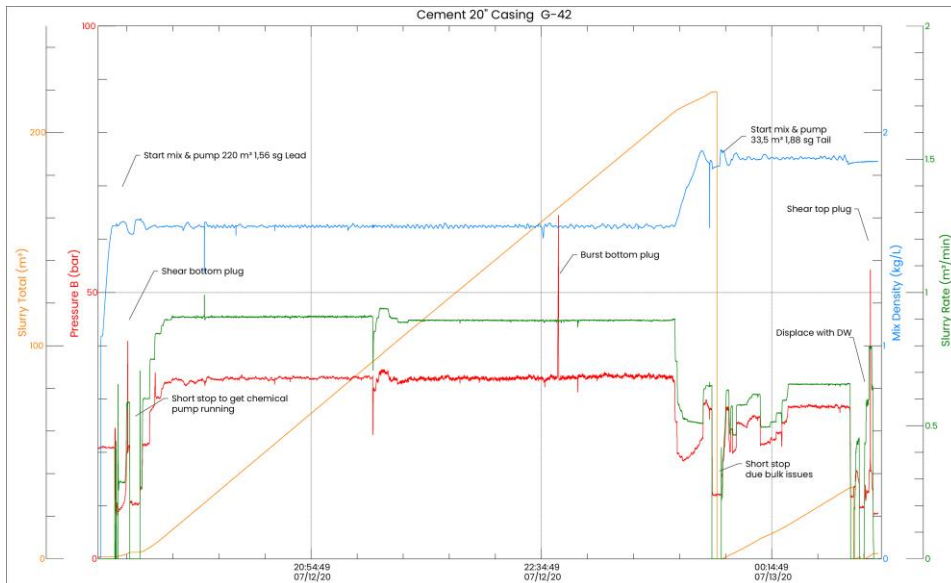
Among the highlights are pressure testing operations—one of the most labor-intensive processes executed by cement crews (sometimes lasting 12 hours)—that now can be done remotely, safely, and efficiently, without exposing the Seahawk operations personnel to long durations standing on top of the high-pressure cementing unit.

A pair of operational milestones also greatly enhanced the customer's overall goal. In July 2020, with a total job volume of 1,600 bbl of gas-tight lead and tail cement slurries, Baker Hughes performed the largest shore-based remote cementing operation

executed from onshore locations in Norway. Additionally, in August 2020, Baker Hughes and the operator performed all the cement jobs on an entire well remotely. This landmark procedure included casing sizes of 30-in., 20-in., 14-in., and 9 $\frac{5}{8}$ -in. Secure and reliable data transmission proved instrumental in the success of these cases.

Baker Hughes's technology, expertise, and innovative approach to remote operation flawlessly achieved every one of the operator's objectives. The remote cementing operations illustrated Baker Hughes's continued commitment to simplification and standardization for its customers.

The customer was so impressed by Baker Hughes's technology and expertise that it made plans to expand to other rigs.



Job log from a flawlessly performed surface casing job in the Norwegian North Sea where 1,600 bbl of gas-tight slurries were mixed for a continuous job time of over 6 hours.