DATA SHEET

HALLIBURTON

Cementing Equipment

LOGIX® AUTOMATION AND REMOTE SERVICES

LOGIX® automated cementing

Remote controlled, autonomous offshore cementing for operational efficiency and consistency

FEATURES

- Enables full remote control of an offshore cement unit from onshore
- Consolidates, automates, and standardizes cement job steps

BENEFITS

- Enhanced, real-time remote oversight
- Improved operational efficiency
- Fewer required POB
- Reduced HSE exposure
- Increased Service Quality
- Contribution to carbon footprint reduction

Overview

Offshore drilling is a high cost, high exposure operation that requires expensive facilities, air or boat transportation, and high specification equipment. Offshore personnel are exposed to extreme conditions far from support facilities. A successful remote, autonomous offshore cementing solution must overcome the inherent risks involved with high pressure pumping and cementing operations.

The Halliburton journey towards autonomous cementing began decades ago with operator removal from the high-pressure, high-noise environment of the cement unit, especially during the testing of well components and BOPs, into a control room on the rig. This reduced operator exposure to noise, chemicals, and vibrations, creating a safer work environment. Since this first step, Halliburton has successfully executed thousands of jobs this way.

LOGIX® automated cementing achieves the next milestone in automated offshore cementing. This platform enables full remote control of an offshore cement unit from onshore. Two main features, remote control functionality and automation, work together to enable the delivery of an offshore cement job with increased efficiency, reduced cost, less exposure to Health, Safety, and Environment (HSE), and a reduced carbon footprint.

Improved operational efficiency through remote-control functionality

The remote-control functionality of LOGIX automated cementing ties the rig's cementing equipment together. The offshore cement unit's manual controls, valving, and ancillary equipment are fitted with automated actuators and wired to PLC (Programmable Logic Control) controllers to allow the system to be operated via a single Human Machine Interface (HMI). The HMI is replicated onshore and enables the operator in a Remote Operations Command and Control (ROCC™) center to perform the same functions onshore as offshore.

Remote capabilities permit the centralization and sharing of experienced personnel across multiple offshore rigs from onshore to provide enhanced, real-time oversight, which improves operational efficiency. Furthermore, remote

capabilities eliminate the need for offshore travel and accommodations, which reduces required POB (Personnel Onboard), cost and HSE exposure.

Increased quality and consistent delivery through automation

The main challenge with operating equipment offshore remotely is maintaining communication. Typically run through satellite-linked networks, the connections are limited in bandwidth and experience intermittent loss of connectivity. LOGIX automated cementing enables a digital connection to the cement unit's control system. The supervisor in the onshore center maintains control over the offshore job through monitoring data transmitted from the unit's controls. These transmissions include cement density, cement tub level, liquid additive rates and concentrations, flow/fluid path diagram on the unit, and video monitoring.

With remote control alone, a problem can occur when losing connectivity, which can jeopardize the execution and the success of the job and can even cause safety hazards. Automation, the second feature of LOGIX automated cementing, is the key to mitigate connectivity challenges and achieve efficiency and consistency with remote cementing operations. A conventional cement job requires hundreds of individual actions to line up and execute all the stages. LOGIX automated cementing provides remote control over all the components on the cement unit and consolidates the hundreds of actions into an automatesd sequence of less than 10 steps. Once programmed, the cement unit executes each step of the cement job automatically, while monitored by an onshore supervisor.

While the onshore supervisor and the offshore team can switch from automatic to manual mode at any time, automation frees the operator to provide closer oversight to critical job steps like cement rates and pressures to deliver improved Service Quality. Automation also improves job placement time because the computer analyzes the real time inputs to optimize slurry/mix rates faster than is humanly possible.

The automated cementing logic is held in the cementing unit offshore. The data connection is secure and requires manual authorization from offshore. If LOGIX automated cementing loses communication to the onshore supervisor, the cement job continues as programmed, while the platform flags the issue to the onshore supervisor and rig personnel. If the automated program cannot continue, the unit starts an automated wash-up sequence and moves to a safe state. Decades of Halliburton experience and best practices are programmed into the platform and are applied to every job, to ensure a consistent and quality job execution every time.

Carbon footprint reduction

Automated, remote cementing technology has changed the way we can execute and deliver cementing services offshore. In an offshore environment LOGIX automated cementing reduces HSE exposure and cost by moving personnel off the rig and away from the red zone. Remote operations provide a carbon footprint and cost reduction through minimized travel to and from the rig and the ability to enable oversight on multiple rigs from one remote location.

For more information, contact your local Halliburton representative or visit us on the web at www.halliburton.com