CASE STUDY

HALLIBURTON

Brunei

Specialized grout slurry aids lightweight platform installation

Microblock™ cement additive provides compressive strength for jacket installation

CHALLENGE

- Slurry tailored to achieve sufficient compressive strength

SOLUTION

- Deploy tailored 17-lbm/gal slurry with Microblock™ cement additive to meet strength and performance requirements
- Conduct onshore and offshore trials to validate mix design

RESULT

- Met all design and operational objectives
- Achieved zero downtime
- Executed jacket installation successfully

Overview

Lightweight jacket installations using rig-installed platforms rely on tailored slurry mixes for sufficient compressive strength. However, achieving uniform curing and sample strength is often a challenge, especially offshore.

Challenge

An operator in Brunei planned to use a rig-installed platform to develop marginal fields in shallow water. The operation required a grout solution to reach 50 MPa compressive strength in 28 days, validated with cured samples, and tested per ASTM C 109-90. Limited supply vessels and fast-paced operations required meticulous bulk and chemical logistics planning. The slurry design demanded precise formulation and tight control of curing conditions to achieve rapid strength at low surface temperatures.

Solution

Halliburton designed a 17-lbm/gal slurry with Microblock™ cement additive, a liquid cement additive made from a finely divided, high-surface-area silica, in combination with a compressive-strength enhancer for a low-temperature slurry. A full crew, which included laboratory technicians and operators, collected, cured, and crushed multiple samples at set intervals. A press machine was mobilized from outside the country to perform the 12- and 24-hour crush tests.

The slurry was mixed on-the-fly and Halliburton performed the grouting in two stages because the wiper seals at each jacket leg could not support a 77-m grout column. During the first stage, a 2.3-m-high plug was created to seal and support the column to the top of the jacket. Each leg had two inlets. The lower inlet (above the wiper seal) injected the plug, while the upper inlet was flushed with low-pressure seawater for approximately 12 hours to clear the annulus. Displaced water exited through an overflow port 1.8 m above sea level. Overflow was continuously monitored. Any stoppage signaled a lost plug that would require immediate remediation.

Result

The grout met and exceeded strength requirements at 12, 24, and 28 days. The 12-hour average achieved 21.2 MPa (required 5 MPa), the 24-hour average achieved 29 MPa (required 20.6 MPa), and the 28-day average achieved 52.5 MPa (required 50 MPa).

The first stage plug set within the planned time, which allowed the second stage to proceed without downtime. Because of slurry losses, the team repeated two first-stage plugs and one second-stage grouting operation. The operation was successful, the jacket was installed as planned, and the three-well development campaign was drilled and completed.