SureCONNECT intelligent wet-mate system enabled fullbore multi-fiber optical monitoring in two-trip completion

Baker Hughes worked with a major operator offshore Scotland to implement a SureCONNECT™ downhole intelligent wet-mate system, to successfully link SureVIEW™ fiber-optic cable throughout the entire length of its offshore well. The operations resulted in successfully mating six optical fibers—each the size of a human hair—between the upper and lower completion, more than a mile below the earth’s surface. This was the first successful commercial deployment of SureCONNECT, which is a modular wet-mate system designed to enable downhole connection of electric and hydraulic lines, in addition to optical fiber deployed in this project.

With the SureCONNECT wet-mate system, operators can achieve real-time monitoring and control across the entire wellbore of multi-trip completions—enabling them to make data-driven decisions to optimize reservoir performance and proactively mitigate risks, such as equipment failures. Leveraging fiber-optic monitoring also enables the gathering of real-time data on multiphase inflow performance to help quantify the gas, oil, or water contribution in each producing zone. With these technologies, completions can now be designed to respond to this information, optimizing the production by shutting down or choking back zones via actuation of downhole completion tools.

The well on this project was in a field with poor matrix quality rock and large, natural fractures. Understanding of the position and long-term behavior of the fractures was inadequate. The operator was looking for a solution that would help them understand the performance of the fractures in real-time, in parallel with conventional well surveillance data. This would enable more precise well-placement decisions in future field development, as well as improved recovery through the use of complementary sliding sleeve and zonal isolation technologies.

**Flawless execution**

A project management team was set up in Aberdeen, supported by Baker Hughes Intelligent Production Systems experts and a dedicated completions supervisor to partner with the operator in coordinating all related offshore functions. The Baker Hughes XACT™ downhole acoustic telemetry service was deployed through the running string to allow real-time monitoring of run-in parameters and weight control when releasing the running tool. This novel service also aided in navigating through tight tolerance openhole sections when the operator had reached the set down limit at surface. The XACT service communicated that the full set-down weight was not actually reaching the tools down hole and allowed the operator to slack off additional weight to successfully pass the openhole restrictions. The lower completion was successfully installed without any HSE issues.

A Baker Hughes VACS™ vectored annular cleaning system was then used to effectively clean the wellbore prior to connecting the wet-mate

**Challenges**

- Harsh, offshore environment
- Large natural fractures with poor matrix quality rock
- Inadequate understanding of fracture position and long-term production behavior
- Two-trip completion design
- Deployment of continuous fiber-optic system across the full wellbore

**Results**

- Deployed the SureCONNECT system to achieve fiber-optic, real-time monitoring across the entire wellbore, for the life of the well
- Enabled operator to make data-driven decisions to optimize reservoir performance and proactively mitigate risks
- Flawlessly executed installation without any HSE incidents

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system. Once the upper completion was landed, the SureCONNECT system successfully mated to give optical continuity from the toe of the completion to the surface. Optical connectivity between the lower and upper completions on all six channels was confirmed.

Baker Hughes also installed a fiber-optic surface interrogation unit, enabling the data to be transferred to the operator’s SCADA system. This allows personnel to read pressure and temperature data from the fiber-optic gauges, as well as review distributed acoustic sensing (DAS) data and distributed temperature sensing (DTS) traces that are being recorded throughout the entire length of the upper and lower completion.

Extremely pleased with the results, the operator is making fullbore fiber optic monitoring enabled by SureCONNECT a major part of the field development strategy for the project.

SureCONNECT system subassembly with Premier™ feedthrough packer, SureVIEW CoreBright™ fiber, and pressure/temperature gauges being picked up prior to running-in-hole with the lower completion. To enable sensing and control in multi-trip completions, the SureCONNECT downhole intelligent wet-mate system deployed in this well can also carry combinations of hydraulic and electric connectors, as well as fiber.