

Case study: Gulf of Mexico, United States

XACT service enabled openhole screen running in tight margin wells

Deepwater wells drilled into shallow reservoirs continue to be a particularly challenging pressure environment. By necessity, these wells are high angle to achieve reservoir contact, with high build-up rates due to the shallow depth below the seafloor. In addition, these wells have challenging mud-weight windows, typically less than 1 ppg. Due to these challenges, operators are increasingly using managed pressure drilling (MPD) systems to drill and complete shallow, deepwater reservoirs.

The difference between effectively developing a field and failure comes down to safely and effectively managing these wells in real time. Recent examples demonstrate that the correct use of real-time downhole data can significantly aid the success rate of these wells.

Yet, to acquire and transmit downhole data in these environments requires a system that is full through bore and allows the transmission of data irrespective of fluid levels or flow and can send data even while tripping in and out of the well.

A customer in deepwater Gulf of Mexico needed to effectively manage the downhole conditions by monitoring both pressures and weights downhole and along the string while running the screens and setting the packer. Swab and surge while running the screens and full pressure management during displacement operations were critical due to the narrow mud weight window. Additionally, weights at the packer and back along the string were also important in high-angle and high

build-up wells to avoid damaging the screens and to ensure safe and efficient operations.

After setting the screens, the customer needed to monitor displacement and subsequent acid treatment in terms of downhole equivalent circulating densities. Contingencies were also in place to monitor the top of fluid as a safe barrier in case of losses during the operation.

To collect the downhole data, Baker Hughes deployed the **XACT™ downhole acoustic telemetry service** as part of the completion string with tools positioned directly above the setting packer. Two further tools were distributed along the string, both in the build-up section and in the vertical section of the well, above the blowout preventer. Downhole pressures and weights were sent back to the surface in real time and used to aid in the real-time decision-making process.

Real-time transmission of downhole data through the XACT service clearly demonstrated that what was actually occurring downhole was not always represented by the surface measurements. For example, the weight of the string affected the pressures downhole as the screens started moving. The equivalent mud weight (EMW) projected to the shoe was used and contrasted with surface-measured pressure fluctuations over the connections used by the MPD system. EMWs downhole were constantly monitored and when they rose higher than expected during the displacement, the downhole pressures were

Challenges

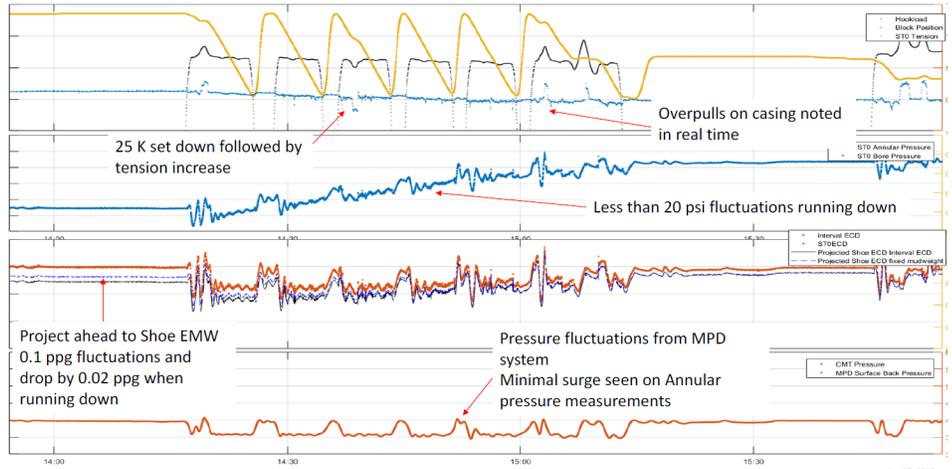
- Monitor downhole pressure and weight downhole and along the string in real time
- Run screens in openhole with high-angle reservoirs, tight mud weight

Results

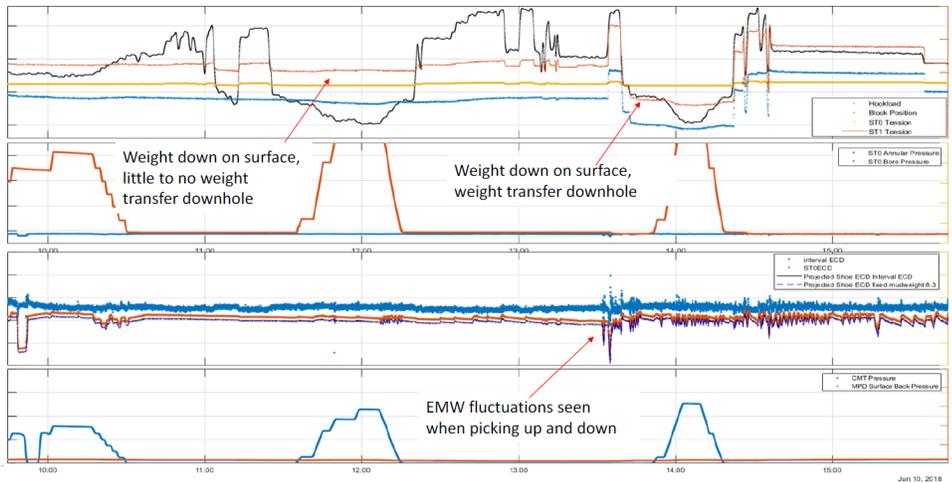
- Transmitted data gave precise downhole activity
- Delivered 99% uptime transmission
- Installed openhole screens safely and efficiently in a well considered by many to uncompleteable

managed by dropping the choke pressure to compensate. This combination of downhole data and control of the MPD system allowed the displacement to be safely and efficiently completed.

The XACT telemetry service was deployed throughout the openhole screen running operation for a total of approximately 150 hours with a network uptime just under 99%. This included tripping, displacement, packer setting, breaker monitoring, and casing displacement. Downhole pressures and weights were used to run the screens safely to the bottom without damage while maintaining the EMW within the mud weight window. The real-time data enabled a safe and efficient installation of openhole screens in a challenging well with a narrow mud weight window.



Detailed view of running the screens in the openhole section. Real-time monitoring of the set-down weights directly above the screens showed the initial inertia of the string as weight was transferred down followed by the actual movement of the screens downhole.



The first attempt to set the openhole screens was made with weight set down at the surface, but with minimum to no weight transferred down to the packer. The packer was not set, as confirmed by the bore and annulus pressures. A subsequent set down showed the weight transfer occurring and a successful setting of the packer.