

Case study: North Caspian Sea, Astrakhan, Russia

MultiNode intelligent well system saved \$1.2 million in rig time, early production, displaced competitor

A customer in the North Caspian region operated an offshore well with long horizontal sections and extremely small tolerances between the lower completions inside diameter (ID) and the upper completions outside diameter (OD). The upper completion string extended 5,485 ft (1672 m) inside the lower completion. Additionally, because of the specific reservoir properties, the customer needed to prevent premature breakthrough of water or gas into the well.

Baker Hughes offered a unique solution: the **MultiNode™ all-electric intelligent well system** which actively controls and optimizes production performance in a large number of zones remotely without well interventions. The system allows segmentation of a horizontal wellbore into numerous individually controlled zones. An electric flow control valve (eFCV) is placed in each zone to remotely control production performance. Upon water ingestion, these water-producing zones can be identified and isolated or choked with a touch of a button from the surface control unit. The surface control system also allows for production optimization when multiple wells are completed and connected to a central location. Wells can be controlled and monitored remotely from virtually anywhere in the world without having to perform costly and risky intervention operations.

Complicating the typical offshore delivery challenges and the confined space on the rig deck, this operation was conducted during the Covid-19

pandemic which closed the border of the region. As such, the field personnel on site were required to remain on the rig and conduct all operations.

After some modifications to the equipment necessary to meet existing circumstances, Baker Hughes field personnel ran the lower completions to the bottom of the well, with a measured depth (MD) of 16,240 ft (4950 m), 7,762 ft (2366 m) of which was open hole. The team fitted the inner string with special alignment centralizers to ensure passage through the openhole section. The upper completions with the MultiNode valves was also successfully deployed into the wellbore, with 5,484 ft (1672 m) inside the lower completions. To overcome the pandemic issues, new remote methods of communication were used, such as smart helmets in the workshop and explosion-proof mobile phones at the rig floor.

The flawless Baker Hughes solution saved the customer 2 days of offshore rig time, an estimated \$1 million USD. The production rate returned as expected, with additional revenue from early well production. Most importantly, this first deployment of the MultiNode system proved successful enough to displace a competitor who charged the customer twice as much as Baker Hughes. The customer preferred the efficiency and economy of the MultiNode system, and the customer evaluated the potential for additional candidate wells in the same field to have the MultiNode system installed.

Challenges

- Evaluate intelligent completion with MultiNode to equalize the flow along the extended production horizon
- Regulate flow remotely by operating with electric flow control valves

Results

- Saved operator 2 days of rig time, an estimated \$1.2 million USD
- Returned expected production rate with additional \$50,000 in revenue from early well startup 2 days early
- Displaced competitor solution which cost the customer twice as much
- Experienced no health, safety and environmental (HSE) issues or nonproductive time (NPT)