

Case study: Delaware, United States

CENesis PHASE production system increased oil production by 48%, drawdown by 40%

A horizontal well in the Delaware Basin's Bone Spring reservoir was experiencing continual gas slugging. The operator had been using an electrical submersible pumping (ESP) system with a tapered pump design to handle the gas into the pump, but this system configuration did not sufficiently draw down the wells. The operator wanted to improve the well's performance and increase its oil production by increasing the drawdown.

Unconventional horizontal wells present unique production challenges, particularly gas slugs that accumulate in the high side of undulations in the lateral section and then break free. These gas slugs affect the operation of ESP systems, causing gas locking conditions that shutdown the system and/or pump cycling that can lead to motor overheating. These issues shorten the life of the ESP system and limit oil production.

The Baker Hughes Permian Basin Artificial Lift Systems applications engineering team recommended the patented* **CENesis™ PHASE multiphase encapsulated production system** to handle these tough well conditions, which are common in unconventional reservoirs. This solution has proved to be successful in more than 1,000 installations in the US by mitigating gas slugs, increasing oil production, and reducing ESP motor temperature.

The CENesis PHASE solution fully encapsulates the ESP system to naturally separate gas from the fluid stream, preventing the majority of the gas from entering the ESP. The

design creates a reservoir of fluid to keep the ESP system primed when gas slugs displace fluid in the well and a recirculation pump keeps fluid flowing past the motor to prevent overheating.

This well was producing approximately 169 BOPD, 475 BWPD, and 398 Mscf. Pump intake pressure was 336 psi; motor temperature was 176°F (80°C).

After installing the CENesis PHASE system, production increased to 250 BOPD, 750 BWPD, and 849 Mscf. Pump intake pressure decreased to 200 psi. As an added benefit, motor temperature also decreased from 176°F to 168°F (75.5°C).

Following installation of the CENesis PHASE system, Baker Hughes continued to watch the well's performance through its 24/7 production surveillance services to monitor downhole conditions and to optimize system performance.

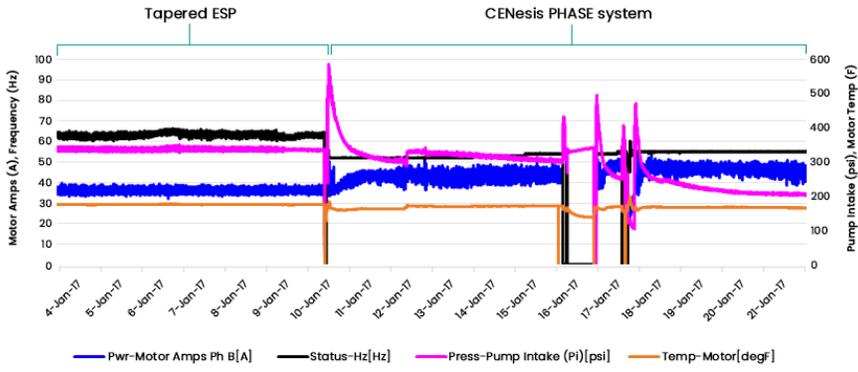
Challenges

- High gas-to-liquid ratio (>3,000 SCF/STB)
- Gas slugging

Results

- Increased oil production 48% from 169 BOPD to 250 BOPD
- Increased drawdown 40% from 336 psi to 200 psi pump intake pressure
- Reduced motor temperature from 176°F to 168°F
- Improved natural gas separation to reduce free gas in the pump

Well performance



*The CENesis PHASE multiphase encapsulated production solution design is patented under Patent 9920611

