

**Case study:** Permian Basin, North America

# Slimline CENesis PHASE solution increased ESP system uptime to 97% in extremely gassy well

A major operator in the Permian basin's Wolfcamp formation had a problem horizontal well where two conventional electrical submersible pumping (ESP) systems had failed within eight months. The failures were related to handling gas-to-liquid ratio as high as 5,000 SCF/STB. The production rates were too high for conversion to a rod lift system and the operator wanted an alternative solution in order to operate in the high gas rate environment.

Baker Hughes Artificial Lift Systems applications engineers recommended installing the patented\* **CENesis™ PHASE multiphase encapsulated production system** designed to improve overall ESP reliability by naturally separating gas from the production stream before it enters the ESP system.

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 system primed when gas slugs displace fluid in the well and a recirculation pump keeps fluid flowing past the motor to prevent overheating.

Since the well was completed with 5-½ in. 20 lb. casing it would not accommodate the traditional CENesis PHASE system. However, with the recently developed slimline CENesis PHASE system, featuring a **300 series FLEXPump™ 6 production pump** combined with a **338 GI™ gas insurance boost pump**, Baker Hughes was able to design an ESP system to operate in this high gas rate well. The

system runs through gas locks and increases gas separation, working more efficiently with less free gas.

The wide flow range of the FLEXPump 6 pump and the 338 GI pump enabled the customer to operate the ESP system as the production rate continued to decline rapidly.

The slimline CENesis PHASE system is running in a stable operating condition since the majority of the gas is now being produced up the annulus instead of through the pump.

The system is able to consistently run in a fixed frequency mode, which puts less stress on the equipment. The ESP has logged 97% uptime since installation and only one percent of the downtime was ESP related.

Baker Hughes continues to monitor the system through its 24/7 production surveillance services to evaluate and control performance.

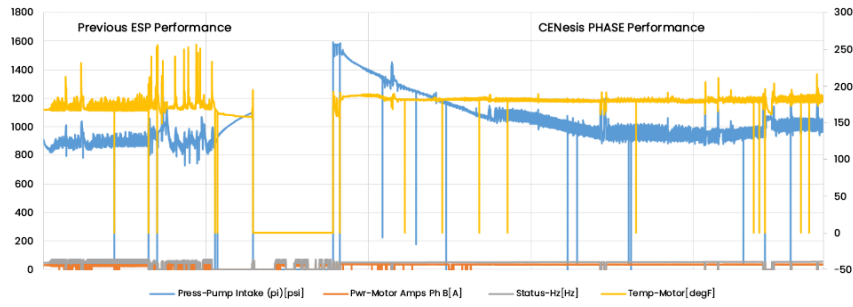
## Challenges

- Low-flowing well
- ESP failures and deferred production due to system downtime
- High gas-to-liquid ratio from 3,000 to 5,000 SCF/STB
- 5-½ in. 20 lb casing, which limited artificial lift options

## Results

- Increased ESP system uptime and drawdown
- Eliminated gas lock shutdowns due to gas slugs

### ESP vs CENesis PHASE performance



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

