

# KUDU PCP Manager Unit Extends Pump Life and Increases Gas Production 58%, Colorado

Digital automation system improves dewatering efficiency in coalbed methane wells

## CHALLENGE

Improve the run life of progressing cavity pumps (PCPs) used to dewater coalbed methane wells—without reducing methane production.

## SOLUTION

Install a KUDU PCP Manager\* well optimization unit and a real-time flowmeter in a trial well.

## RESULTS

- Extended PCP run life from weeks to years.
- Increased methane production 58%.

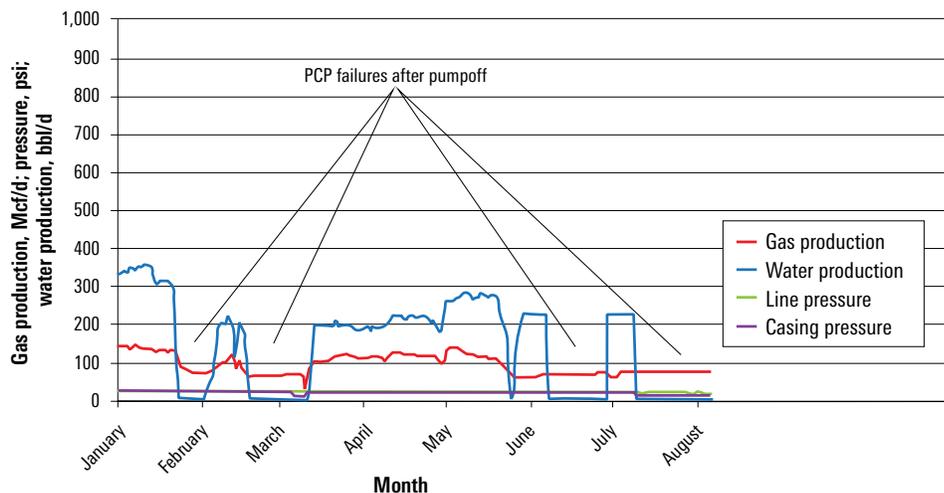


## Changes in water production damage pumps

A Colorado operator uses PCPs to lift water from about 2,000 coalbed methane wells, reducing bottomhole pressure and enabling methane production. On the basis of manual fluid-shot measurements, the operator set PCP speeds to optimize gas production by maximizing dewatering while keeping the PCP submerged to avoid a pumpoff condition. Field visits are challenging because the wellheads are dispersed across a large mountainous region. Inclement weather and landowner restrictions further limit well visits—and the frequency of fluid-shot measurements.

In one well, within the first month of operation the PCP pumped out too much water and was no longer submerged, resulting in catastrophic failure due to overheating. Three more PCPs were subsequently installed and set using fluid-shot measurements, but also failed after pumping out too much water because of variability in the well's production.

While waiting to replace the damaged pumps, the operator lost valuable methane production because water buildup prevented gas flow. A solution was required to extend PCP run life and reduce wellsite visits by automatically adjusting pump speed for fluctuations in water production.



*When PCP speeds were set based on periodic fluid-shot measurements, several PCPs failed after pumping out too much water and overheating.*

## Automated feedback loop manages variations

Schlumberger recommended a system comprising three pieces of equipment to enable closed-loop control of the PCP: a real-time flowmeter, programmable logic controller (PLC), and variable speed drive (VSD).

To determine real-time flow of water and gas at surface, engineers recommended installing a wedge meter, which measures the differential pressure across a V-shaped wedge placed in the flow stream. Volumetric flow rate is calculated from the measured differential pressure.

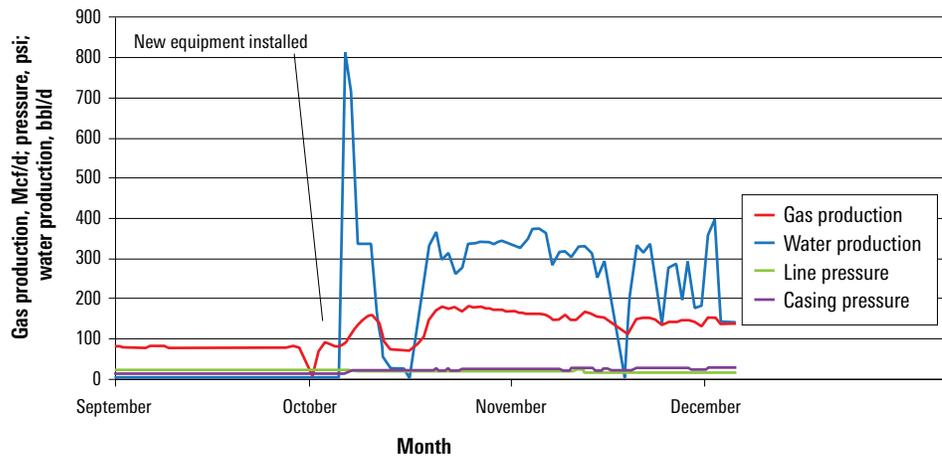
The data from the wedge meter is delivered to the KUDU PCP Manager unit, which is a PLC with a proprietary algorithm that assesses theoretical versus actual flow rates and adjusts the VSD to optimize well production.

### Water, gas production, and PCP survivability increase

After installing the digital automation equipment in the well and eliminating water buildup, the flowing bottomhole pressure stabilized at a consistent 35 psi, resulting in a 58% increase in gas production. Average daily water volume almost doubled, while maintaining sufficient water above the PCP.

Pump cavity fillage stabilized at nearly 100%, improving PCP lifetime from a few weeks or months to years; the PCP continues to operate as planned after nearly 3 years. The operator extended this solution to 80 other wells, where similar results have been achieved.

While improving production and total cost of ownership, the enhanced performance also reduced personnel requirements in the field, eliminating the need for periodic fluid-level shots and visits to verify performance. This saved the operator considerable opex and greatly decreased road mileage and safety risks.



After a KUDU PCP Manager unit, wedge meter, and VSD were installed in one well, the automation system stabilized the bottomhole flowing pressure at 35 psi, increasing gas production 58% while maintaining pump cavity fillage and extending PCP life.