

PCP Run Life Increases More Than Sevenfold Despite High Well Inclination and Sand Production

Downhole permanent magnet motor with progressive cavity pump eliminates sucker rodstring and friction challenges

Replacing a conventional PCP and rodstring with the KUDU electric submersible PCP with permanent magnet motor (ESPCP PMM) in a highly deviated well with significant solids production extended run life from 90 to 663 days.

Deviated well and abrasive environment hindered PCP operation

An operator in the Middle East installed a third-party PCP in one well at a depth of 1,000 m [3,280 ft]. However, the high deviation (45° at the pump), dogleg severities greater than 5°/30 m [5°/98 ft], and significant rate of sand production caused rod failure in less than 3 months. The equipment was pulled out and a new PCP was run in using a continuous rod and rod guides, but system run life was again limited to 90 days. The cost of a workover rig, new PCP equipment, sucker rod inspection and replacement, and deferred production made the frequent changeouts unsustainable. A more durable PCP solution was required; sand production ruled out use of an ESP or sucker rod pump.

Rodless system was unaffected by well profile

The operator chose the KUDU ESPCP PMM, which enables pump installation in wells with high dogleg severity (DLS) or inclination while significantly increasing uptime. With no rodstring, torque reduces by 20%–60%, efficiency and safety increase, and power consumption and opex decrease.

The technology delivers constant and high torque across the full PCP speed range of 50 to 500 rpm. This flexibility enables accommodating a wide range of production rates without replacing the pump, which simplifies artificial lift planning and reduces capex and opex. The system is preferable to a conventional ESPCP, which uses an ESP motor with a much higher rotational speed. Because a PCP turns more slowly, the conventional ESPCP requires a gear reducer downhole, increasing the likelihood of mechanical problems due to sand production.

The PMM improves efficiency with low power loss in the rotor and enhances dynamic performance with a variable frequency drive specifically designed for PMMs. Downhole telemetry is used to prevent pumpoff conditions, monitor equipment performance, and optimize well production.

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Prior to installation, the equipment was tested under full load on surface, using a special test bench created by Schlumberger for the project. Subsequently, the KUDU ESPCP PMM was installed at a depth of 997 m [3,271 ft] and ran flawlessly for 663 days, an increase of 637%. Pleased with the outcome, the operator plans to use the system on all its high-deviation wells.



The KUDU electric submersible PCP with permanent magnet motor (ESPCP PMM) eliminated the requirement for a rodstring in the highly deviated well and provided the flexibility to handle a wide range of well production rates without intervention.