

Permanent Magnet Motor Saves 33% Energy Costs During First-Ever Egypt/MENA Installation/Pilot Program Proves Significant Energy Savings and Operational Efficiency

Objectives

- Create a scalable pilot energy-reduction model that provides a more sustainable artificial lift solution for the Petroshahd Petroleum Company in Egypt, utilizing reciprocating and progressing cavity pump systems—many of which are powered by diesel generators.
- Demonstrate significant, quantifiable improvements in energy efficiency, emissions reductions, and system reliability. Ideally, the implemented energy-efficient, low-emission technology should also offer an added degree of simplicity and long-term reliability.
- Prove this program's viability for the oil and gas sector within the MENA region, which is facing challenges due to limited power availability and high operating costs in remote areas operating without adequate electrical infrastructures.

Our Approach

- Following a thorough review of the region and its available resources, Weatherford artificial lift specialists devised a six-week field test for measuring improvements in energy efficiency, emissions, and reliability. The team identified 10 rod-pump wells located outside the national power grid and powered by individual diesel generators, each consuming approximately 180 liters of fuel and emitting around 482 kg of CO₂ per day. Weatherford selected the permanent magnet motor (PMM) for its AC-synchronous, direct drive that provides high-torque/low-speed power that is up to 98% efficient, substantially greater than conventional AC-induction motors. By eliminating all belts and transmission drives, the PMM boosts production performance while reducing emissions and improving overall safety for virtually maintenance-free production that lasts for years.
- Representing the pilot well, a PMM-driven surface unit was installed on the well (Shahd SE-57 SR), which produces 400 barrels of fluid per day (BFPD). The study then conducted a direct comparison between the PMM system and conventional induction motors operating under identical conditions to quantify energy savings, evaluate mechanical performance, and assess environmental benefits. Additionally, the PMM's simplified design that eliminates belts and sheaves was analyzed for its impact on maintenance, OPEX requirements, and operational uptime.
- If successful, PMMs will be implemented on the remaining nine Petroshahd rod-lift wells in the area.

Value to Customer

- After the six-week observation period, the trial well demonstrated a 33% reduction in diesel consumption, decreasing daily usage from 180 liters to 120 liters per day. This improvement resulted in a corresponding reduction in CO₂ emissions of approximately 160 kg per day and a reduction in diesel consumption of up to 60 liters per day.
- Operationally, the PMM system eliminated maintenance associated with belts and alignments, enhancing reliability and reducing related downtime as well as mitigating safety risks linked to replacing motor sheaves and belts.
- The PMM's superior torque control and high efficiency further optimized pump performance and energy utilization, establishing PMM technology as a practical and sustainable solution for wells operating under power constraints.
- The efficiency of this pilot program marks the pioneering application of PMM technology integrated with a conventional surface unit in the MENA region. Its success presents a strong case for broader implementation, beginning with a planned expansion across the remaining nine Petroshahd wells. This is expected to save 219,000 liters of diesel and reduce CO₂ emissions by 587 metric tons annually. This initiative positions Petroshahd as a frontrunner in sustainable artificial lift solutions and directly contributes to Egypt's energy transition and environmental sustainability objectives.



The Weatherford Permanent Magnet Motor (PMM) demonstrated its energy-saving value over diesel-driven wells at Shahd field in Egypt. The PMM is an AC-synchronous, direct-drive system that provides high-torque/low-speed power that is up to 98% efficient. By eliminating all belts and transmission drives, PMMs boost production performance while reducing emissions and improving overall safety with virtually maintenance-free production.

LOCATION

Western Egypt

FORMATION/WELL

Bahariya/Shahd SE-57 SR

OPERATOR

Petroshahd Petroleum Company

WELL TYPE

Oil producer

PRODUCTS/SERVICES

- Permanent Magnet Motor
- Reciprocating Rod Lift

