

High-Efficiency REDA ESP Systems Eliminate Workover Costs, Save USD 510,000 for Three Wells

ESP systems enable continued production while eliminating workover costs for nearly two years, Colombia

CHALLENGE

Mitigate the risk of premature ESP failure under changing conditions in three exploration wells in the Los Llanos field.

SOLUTION

Install high-efficiency REDA* ESP systems capable of operating with a lower-than-expected productivity index (PI) in downthrust conditions to avoid unnecessary workovers.

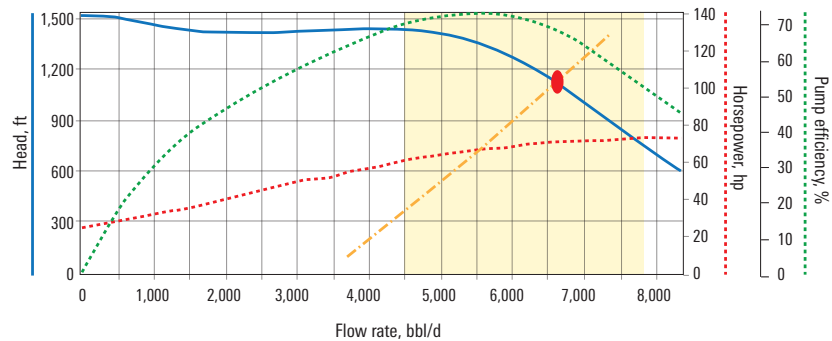
RESULTS

- Operated for more than 580 days without incident, even during changing conditions.
- Eliminated workover costs, saving the operator an estimated USD 170,000 per unit including the rig costs and ESP systems—totaling USD 510,000 for all three wells.



Exploration wells at risk of premature ESP failure with changing conditions

An operator evaluated three exploration wells in Los Llanos field for the wells' potential production performance. Based on initial data, Well 1 was expected to produce at a flow rate of more than 6,500 bbl/d. The operator was concerned about installing a potentially oversized high-efficiency ESP system with a compression pump because of the possibility of a short run life while operating the equipment in downthrust conditions outside its typical range.

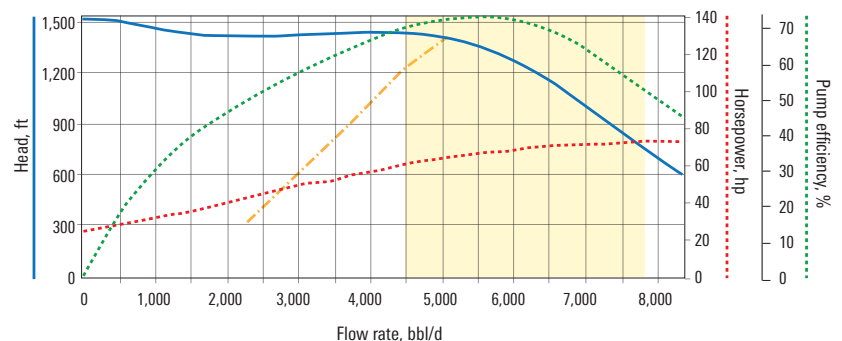


Based on initial data for Well 1, the expected flow rate was more than 6,500 bbl/d, and the ESP system was projected to perform within the operating range (yellow shaded area). The point at which the ESP system (orange line) and the head curve intersect (red oval) indicates that the pump is operating in downthrust condition.

High-efficiency REDA ESP system with tailored stage design minimizes effects of downthrust conditions

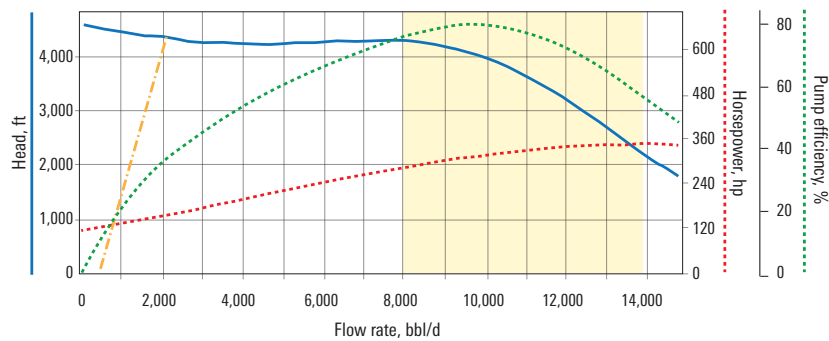
After reviewing initial data for Well 1, Schlumberger installed a high-efficiency REDA ESP system with a tailored stage design to help minimize the effects of the downthrust conditions. The high-efficiency pump features a high-flow-rate compression pump design with factory shimming, a high-strength shaft, and compliant-mounted radial bearing system.

During startup of Well 1, the PI was more than 4,500 bbl/d, approximately 1,500 bbl/d less than initially projected. However, the configuration of the compression pumps enabled the system to operate reliably, even with a lower-than-expected PI and increased water cut.



A lower-than-expected PI of more than 4,500 bbl/d was encountered during startup in Well 1, shifting the expected performance of the REDA ESP system.

CASE STUDY: High-efficiency REDA ESP systems save operator USD 170,000 per well in workover and rig costs



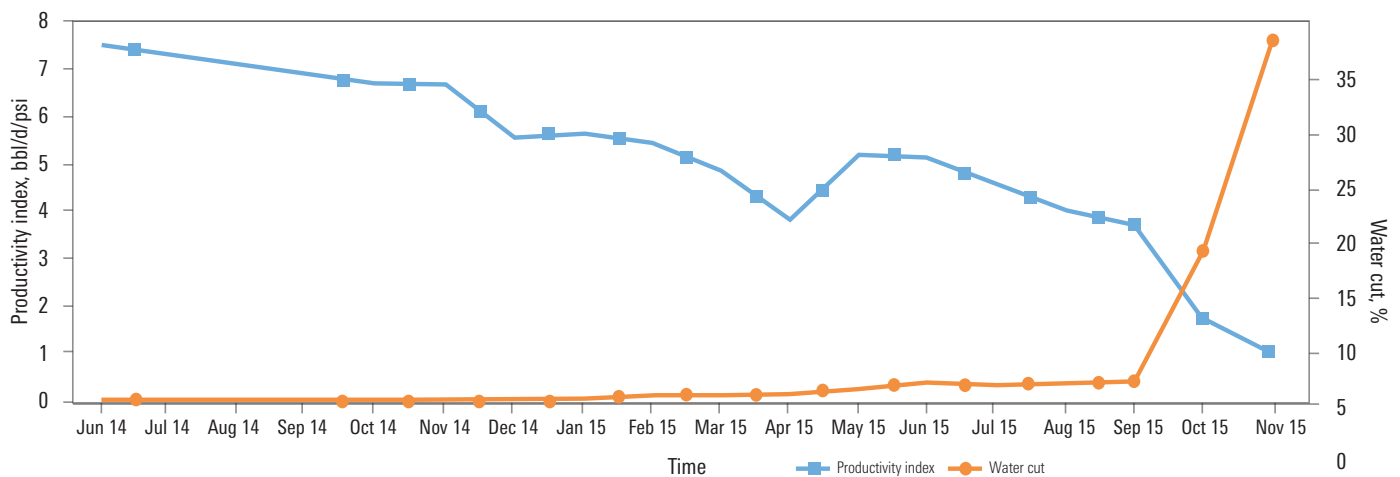
After more than 580 days of operation, the REDA ESP system continued to produce 1,978 bbl/d, even while operating in downthrust condition outside of typical operating conditions.

Reliable pump performance despite unexpected productivity decrease saves USD 170,000 per well

The pump operated within the optimal operating range for approximately eight months and then operated in downthrust conditions for four months, enabling the operator to continue producing Well 1 even when the productivity unexpectedly changed. The REDA ESP system was designed to produce approximately 6,000 bbl/d with an initial frequency of 30 Hz at a PI of 12 bbl/d/psi. After more than 580 days of operation, the well was producing 1,978 bbl/d at 50 Hz with a PI of 0.97 bbl/d/psi, and then was stopped for a planned workover, which increased the efficiency.

Due to the performance of the reliable, robust system in severe conditions, the operator installed the REDA ESP system in the two remaining exploration wells, saving a combined estimated USD 510,000 for all three wells in associated workover and rig costs. The second ESP system operated for 503 days and was stopped for a planned workover, and the third ESP system has been operating with a run life of more than 700 days as of the publish date without any issues.

Most pumps typically last between 2–3 months or fail altogether when operating outside of the optimal range. Conventional pumps also require a workover sooner—within one year—as they are unable to perform efficiently outside of the operating range.



Despite abruptly changing conditions, including a significant increase in the water cut and drop in the productivity index in Well 1, the REDA ESP system continued to operate reliably.

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