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Remote ESP Optimization Reduces Power Consumption by 28% and 34% in Two Iraq Wells

PCL and Lift IQ services overcome lack of well test data from remote wellsites

CHALLENGE

Optimize ESP performance and reduce power consumption in remote Iraqi wells with no well test data.

SOLUTION

Use PCL* production composite log service and Lift IQ* production life cycle management service to select, monitor, and control ESP operating parameters.

RESULTS

On two wells analyzed,

- reduced power (kVA) consumption by 28% and 34%
- lowered motor temperature by 11 degF and 6 degF [7 degC and 3 degC].

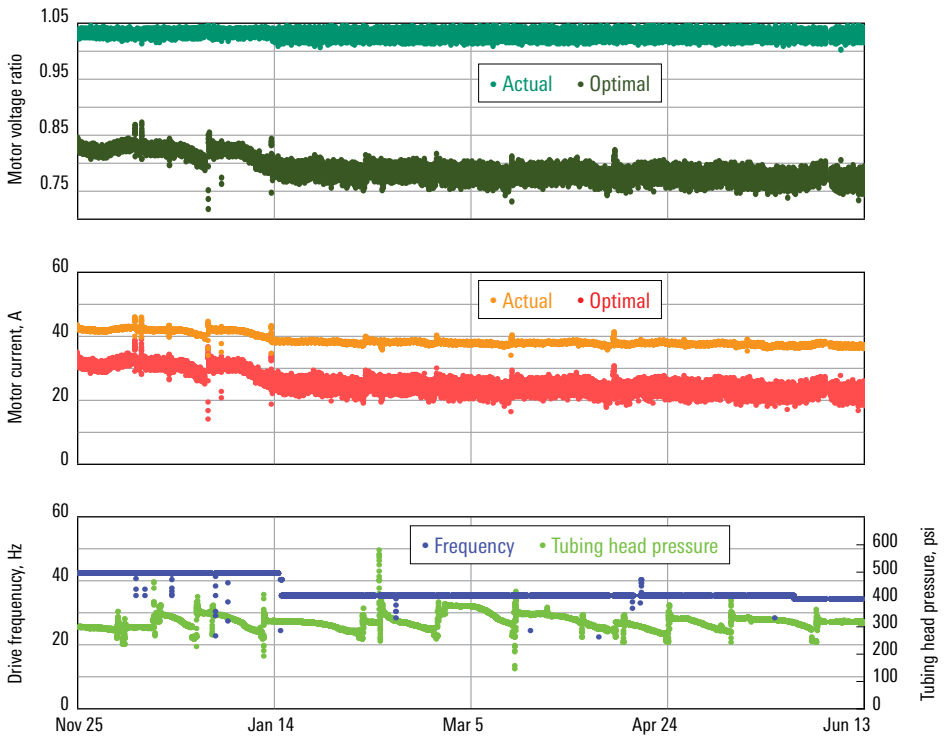
Remote wellsites made regular well tests challenging

Zubair Field in Iraq has numerous wells fitted with ESPs powered by diesel generators. The production facility for the field does not have test separators, multiphase meters, and other equipment required for frequent, periodic well tests (e.g., once per month). Instead, equipment and personnel must be mobilized to the remote desert wellsites when testing is required. Logistical constraints limit well tests to approximately once per year per well.

Lift IQ and PCL services enabled remote ESP power optimization

To address infrequent well tests and following a successful field trial (see SPE 183337) of the PCL production composite log service, the operator decided to deploy the service on all its Zubair wells equipped with Schlumberger ESPs. These wells are also under 24/7/365 surveillance with the Lift IQ production life cycle management service. PCL service provides a comprehensive method of tracking the operating stress on an ESP throughout its life by using a hydraulic and electric digital twin of the ESP system running on a computing engine accessible via the Internet. The electrical model calculates in real time the optimal motor voltage to reduce the current, thereby also minimizing power consumption. ESP run life is extended because

- reducing the voltage increases insulation life
- reducing the current lowers the motor winding temperature and therefore increases expected run life.



PCL service showed that a 25% reduction in motor voltage on Well B would reduce the current by 14 A—from 38 A to 24 A—without affecting production. Real-time trend analysis provides greater confidence when identifying power optimization opportunities compared with manual single-point analysis. Automated analysis also saves time, an important consideration in fields with large ESP populations.

PCL service's detailed models continuously compute the real-time production rate, water cut, and recommended pump power. Consequently, any impact of power optimization on well production can be evaluated. The information can be viewed in real time by both operator and Schlumberger personnel via a web portal, providing a collaborative virtual workspace. In contrast, conventional optimization methods involve lengthy analysis and modeling for every well and are impractical because of the lack of up-to-date well test data.

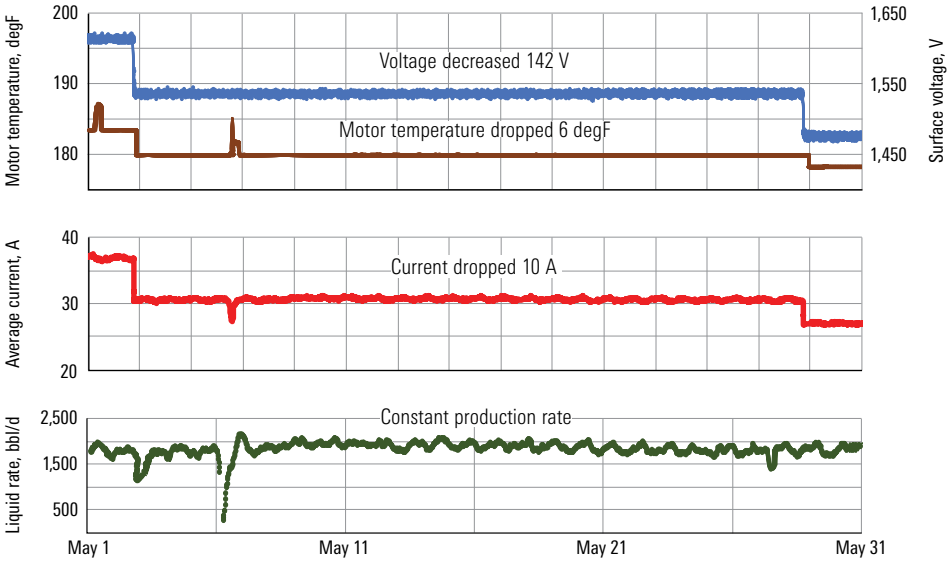
Operator reduced power consumption by 28% and 34% in two ESP wells

Schlumberger Iraq application engineers and dedicated surveillance engineers at the Artificial Lift Surveillance Centers (ALSCs) in Scotland and Egypt monitor the wells via the Lift IQ service. Using the analysis automated via the PCL service engine, they can identify potential candidates for power optimization. ESP drive settings are remotely adjusted to optimize system voltage, eliminating the need to mobilize a technician to the wellsite, interrupt production, or incur HSE risks. The changes are implemented incrementally without shutting down the ESP and the results are monitored in real time to check the effectiveness of the voltage modification and avoid tripping the ESP; changes can be reversed at any time if required.

Several wells were identified where the power supplied exceeded requirements, making them good candidates for remote optimization. In two wells, power consumption (kVA) was reduced by 28% and 34%, with no decrease in production. Motor temperature was also optimized. The reduced electrical and thermal stress is expected to prolong ESP run life, reducing total cost of ownership.

Optimization Results for Two Wells

	Before Optimization	After Optimization	Difference
Well A			
Average current	61 A	49 A	–20%
Surface voltage at wellhead	2,340 V	2,087 V	–11%
Apparent power	247 kVA	177 kVA	–28%
Motor temperature	204 degF [96 degC]	193 degF [89 degC]	–11 degF [–7 degC]
Well B			
Average current	36.4 A	26.7 A	–27%
Surface voltage at wellhead	1,600 V	1,458 V	–9%
Apparent power	101 kVA	67 kVA	–34%
Motor temperature	183 degF [84 degC]	177 degF [81 degC]	–6 degF [–3 degC]



Reduction in wellhead voltage, motor temperature, and current for Well B was achieved via ESP optimization without any loss of production. The voltage reduction was implemented in two steps—on May 3 and May 28—to manage operational uncertainties. This is enabled by Lift IQ service, which allows the surveillance engineer to make changes remotely using two-way SCADA.

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