



MATURE FIELDS



UNCONVENTIONALS

DuraHard™ Coatings Triple Pump Run Life in Extremely Abrasive Environment

FEWER WORKOVERS SAVES ESTIMATED \$170,000 PER WELL PLUS NON-PRODUCTIVE TIME

ALBERTA, CANADA

CHALLENGES

- » Too frequent rod pump maintenance due to plugged sand screens
- » Lost production from inefficient pumping and rod pump seizing
- » Excessive abrasive wear from sand flowback

SOLUTIONS

- » SF900 DuraHard™ 15 coating to harden stages against extreme abrasion and corrosion
- » Tiger Shark® II pump designed for extreme environments, including heat and abrasion
- » Abrasion-resistant bearings and patent-pending bushing retention system for mechanical locking in high temperatures
- » Patented diffuser/impeller solids handling technology

RESULTS

- » Run life of 260+ days
- » Triple the run-time before workover compared with three rod pump wells on the same pad
- » Projected \$170,000 savings in workover costs in first 260 days
- » Additional savings from less non-productive time, estimated at \$180,000 per well in first 260 days
- » Higher production rates from ESP-based system estimated at 40m3/d added

OVERVIEW

Sand is a common and troublesome solid that interferes with production by both abrasion and accumulation. The Charlie Lake formation in Western Canada has significant sand content that forces frequent rod pump maintenance and workovers. Sand can foul rod pumps, and wear their plungers and pump barrels. Mitigating damage from produced sand reduces workover costs and non-productive time. Repair costs are substantial, leading operators to seek an alternative.

Operators need reliability and long run life from downhole pumping equipment to achieve optimal production. When pumping efficiency declines, production declines. Bearing systems and bushings, in particular, often show excessive wear and lead to shortened run life. In the Bakken region, one operator found that 90 percent of pulled pumps in extremely harsh downhole environments had significant levels of bushing migration. Improving bearing system performance could improve overall run life.

PROJECT DETAILS

An operator in the Spirit River play in the Charlie Lake formation was using rod pumps for production. The high inflow, high oil cut reservoir produced entrained sand on flowback. This solid caused sand screens to plug and pumps to seize. Multiple mitigation techniques had limited success in addressing the problems, which were causing frequent workovers and non-productive time.

Summit ESP – a Halliburton service, proposed an ESP-based system coated with SF900 DuraHard™ 15, its premium molecular bond coating. DuraHard 15 coating provides hardness comparable to carbide materials, but ductile enough to coat and bond steel components.

Summit ESP systems are designed and tested for extreme conditions, including high heat and abrasion. The Tiger Shark II pump has bearings and bushings with high heat tolerance, abrasion-resistant materials, and a patent-pending mechanical seal. The patented diffuser/impeller actively moves sand away from the pump. The new pumping system was installed in a well on the same pad as three wells using rod pumps for lift.

SUMMARY

The Summit ESP pump system has been running more than 260 days. It outperformed all three rod pumps on the same pad. Each of the rod pumps had three workovers in their first 260 days, incurring a total direct cost of \$517,000.

WITHIN **265** DAYS
FIRST

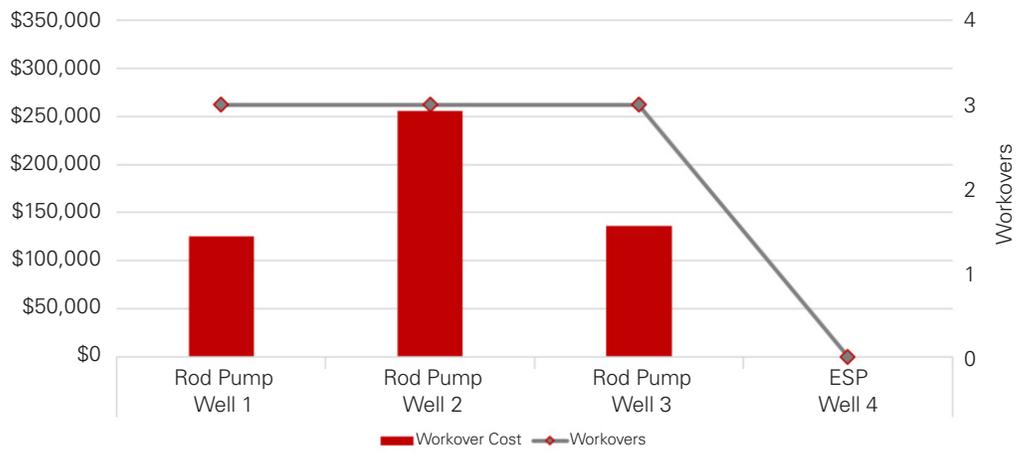
SAVED **\$170K**
WORKOVER COSTS



Run life for the ESP-based system is at least three times that of the rod pumps. This adds up to an estimated \$170,000 savings in workover costs to this point. In addition, the ESP enables maximum drawdown and higher production rates with its higher flow rates (225m3/d) versus the rod pump (80m3/d max).

Each rod pump workover also incurred an average of six days on non-productive time. At 200 BOE/d per well, each workover cost an estimated 1,200 BOE. With three workovers each during the 260 day period, the rod pump wells incurred non-productive time valued at an estimated 3,600 BOE, or \$180,000 at \$50/B oil price.

Comparison of ESP and Rod Lift System



DuraHard™ 3 Coating	DuraHard™ 7 Coating	DuraHard™ 15 Coating
Basic Reduced Friction and Corrosion Resistance	Enhanced Abrasion and Corrosion Resistance	Extreme Abrasion and Corrosion Resistance
		

Left » Slick, non-stick coating
 Middle » Nickel coating
 Right » Molecular bond coating

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