

Abstract

Title – Autonomous Control for Optimizing Rod Lift Pumping Speeds in Declining North American Oil Wells

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Rod Lift is a dominant lift mechanism for unconventional assets and mature assets esp. wells in their late lift and with high water cut. As assets mature the number of RRL wells increases every year. Achieving production optimization efficiently at scale has become a growing challenge for RRL operators. In the last few years, innovative new Edge solutions have emerged to address this challenge. These solutions offer an optimization option that can relieve operator's workload but require new investment at the wellsite, communication and in some cases on the cloud making the solution uneconomic for a significant portion of low production wells. We propose an alternative solution i.e. autonomous control at the Enterprise which provides a cost-effective alternative to Edge for low oil producing wells. By addressing issues like under-pumping or over-pumping, the solution optimizes production efficiency of RRL wells and eliminates the premature equipment failures.

Methods, Procedures, Process -

The Production Optimization Platform provides an embedded Autonomous Well Control capability, offering a cost-effective solution for wells that do not necessitate frequent high frequency setpoint adjustments but still require daily optimization evaluation. This autonomous control adjusts controller setpoints daily for each well or a selected group of wells, addressing over-pumping and under-pumping conditions based on the difference (delta) between current SPM (Strokes Per Minute) and the average SPM of the previous day. If the SPM delta exceeds a configurable high limit, the well is categorized as over-pumping, prompting a reduction in max SPM by a user-defined step change. Conversely, if the SPM delta falls below a low limit, the well is categorized as under-pumping, and the max SPM is increased. When optimal pumping is detected, no change is made.

Results, Observations, Conclusions –

Currently implemented on 600 RRL wells in North America's Bakken region and expanded to Eagle Ford, this solution has resulted in ~50% reduction in pumper field visits, ~15% savings in workover costs and ~2% in increased oil production. In conclusion, this autonomous process effectively reduces the workload of production engineers, operators, and pumpers, while simultaneously ensuring the optimal efficiency of the RRL system in accordance with well deliverability.