Challenges in PCP well optimization in South Oman

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Objectives/Scope:
In a field in South Oman, with more than 600 wells producing with progressive cavity pump (PCP) systems, it was realized that monthly gains from pump parameter adjustments to changing well conditions could account for 5 to 10% net production increase, at practically no cost.
An automated approach where the Pressure Control Setup (PCS) is used to maintain a stable pump intake pressure (Pip) by changing the variable-speed controller's operating frequency (Hz). A typical Process Value is Pip.
However, it has been found that Locked-in-potential (LIP) in these wells are constantly changing but rarely disappear, i.e. wells using PCS are at optimized conditions less than 50% of the time due to surface/station trips that caused wells to restart the optimization process on a weekly basis.

Methods, Procedures, Process:
To address these concerns, an automated PCP motor controller (Kudu Well Manager) was installed in 5-wells for a period of 1-year. During this time, well optimization, uptime and resource utilization were monitored and compared to previous performance to assess impact and propose a more efficient way forward.
The same principle for optimizing pump running conditions were used, i.e. changing pump rotating speed until a target fluid level just above the pump was realized, while Casing Pressure and Fluid level were measured real-time on a well by well basis.
To increase the running time at optimized conditions, the ramp up of speed from minimum to target speed was programmed for completion within 1-day. Special consideration was given to prevent sand accumulation. This was done through an automated function which was set to work in conjunction with the controller method: *desanding*.

Results, Observations, Conclusions:
The controller algorithm had some issues adjusting pump speed after the *desanding* function was performed; the pump was driven to minimum speed instead of returning pump speed (quickly) to the value before *desanding* cycle was activated.

The PCP well controller (Kudu Well Manager) has proven to be a successful and viable well manager for PCPs, in meeting the objectives originally set forth. Overall productivity has been increased for the wells selected by increasing daily fluid production, recovering quickly from downtime, and enhancing cost and time management for operations. By eliminating the need to continuously monitor fluid levels and manually adjust pump speed, operators can concentrate on other tasks. Secondary control features such as *desanding* allows protection from overpressure, high torque, and sand plugging.