Revitalizing Performance - Revamp Gas Compression System Through Process Optimization & Tuning

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Abstract

Objectives/Scope: Oil and gas wells performance is changing drastically over the time and the topside facilities are unable to keep up with this significant declining trend. Modification or upgrades of topside facilities are very expensive and not economically feasible for limited life oil fields or low-cost operation. The existing gas compression package were struggling with the high variance between design condition and current operating parameters, causing both the oil & gas export were declining. A team of various discipline was formed to analyze the issue and come up with a solution with end in mind target of Revitalizing Performance. “Achieving More with Less” - stretching the equipment performance to achieve higher output through only configuration and fine tuning.

Methods, Procedures, Process: A holistic approach taken to review the entire process and identify the key requirement and optimize the equipment to meet expected deliverables. Various inhouse simulation and testing were performed at site to understand the true bottleneck and determine the best operating condition which guaranteed maximum output. There are more challenges and limitation exist when dealing with old oil & gas fields with limited remaining reservoir life, aging equipment, and short shutdown window. Performed surge margin optimization without requiring actual surge test or production interruption. Besides, controller re-configuration done to enhance the field device response towards system command and process variation. Finally, process setpoint was further optimized and limit control implemented to keep the operation within the ideal region and handle any process instability without causing major interruption.

Results, Observations, Conclusions: Successfully optimized gas compressor running philosophy from 2GTC units to 1 GTC & 1 BC, delivering the same total production output with more savings. This initiative enables us to save 2mmcfd fuel gas per day, reduced CO2 emission by 48,140 tCo2e/year and flowing more gas to export for additional cash generation of USD 3.82mil/year. Besides, achieved higher compressor throughput and zero gas recycle for both LP & HP stages and improved the gas compressor system efficiency by 20%. Reduction in maintenance for 1 GTC cut down maintenance cost by USD1.15mil/year and avoiding shutdown window which cause production deferment of USD2.97mil/year. Finally, both oil & gas process parameters were observed to be more stable than before which eliminating manual intervention to stabilize the process periodically.
**Novel/Additive Information:** The gas compressor system performance post optimization and tuning were benchmarked and will be evaluated against field behavior from time to time. The key is to understand the process challenges and explore the most efficient (Achieving More with Less) way to resolve the issue.

**Category (Complete):**
204. OPERATIONS AND CAPITAL PROJECTS: Operation Facility Management — Operational Excellence;
183. OPERATIONS AND CAPITAL PROJECTS: Facilities Discipline Engineering — Machinery and Rotating Equipment