Real-Time Surveillance System for Gas Lift Troubleshooting

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Abstract:

Gas lift surveillance and optimization pose significant challenges to oil and gas operations, particularly in monitoring a large number of wells. Manual efforts often result in oversight, delayed responses, and potential production losses due to suboptimal gas lift operations. Real-time systems, capable of automating routine gas lift analysis and facilitating operations by exception, hold substantial promise to enhance the practice of gas lift operations.

IPCOS has successfully implemented multiple real time gas lift surveillance platforms globally, leveraging various Digital Oilfield (DOF) technologies, including gas lift analysis software, DOF System, deployed for ConocoPhillips Alaska. The Real-Time Gas Lift Troubleshooting module, integrated into Alaska DOF Platform, supplies live data (real-time signals, well tests, gas lift design data, etc.) to a calculation engine that performs gas lift analysis using Prosper well models, enhanced by additional calculations using Valve Performance Clearinghouse (VPC) catalogue and business unit (BU)-specific requests. While precise gas lift performance calculations can be made using well test measurements, real-time calculations rely on virtual rates calculated by Prosper models tuned to the latest well test.

Emphasizing operations by exception, gas lift troubleshooting module highlights the following issues and opportunities: risk of liquid loading based on critical velocity estimate, Multipoint Injection based on valve gas throughput, top wells for oil benefit from injecting from deepest reachable mandrel. Moreover, the gas lift troubleshooting module provides tools for engineering analysis of the ongoing issues, including sensitivity curves for unloader and orifice valves, valve opening and closing pressures and, importantly, operating ranges that would keep the production within optimal region, avoiding the risk of liquid loading and multipoint injection.

Implementation of automated the gas lift troubleshooting tool in ConocoPhillips Alaska resulted in improved gas lift efficiency, reducing gas lift cycling by approximately 30 MMscf/d for each Alpine and Kuparuk asset. Real-time gas lift surveillance tools demonstrate a high potential to enhance gas lift operations, providing operational efficiency gains and minimizing production losses, as well as aid in expanding advanced gas lift troubleshooting skills to a wider engineering audience.