Abstract: Enhancing Elastomer Seal Performance in Tailplug Applications

This presentation focuses on the validation and optimization of elastomer seals and the redesign of a conventional IPO gas lift valve tailplug, adhering to API 19G2 §6.5.3.3 standards. The scope includes identifying the root causes of O-ring extrusion under high-pressure and high-temperature conditions and evaluating the limitations of the current tailplug design. By applying the API 19G2 elastomer validation procedure, weak points in material performance and current design of a conventional IPO gas lift valve tailplug were identified. Based on that assessment, we were able to make modifications to the tailplug design to minimize the pressure forces acting on the tailplug O-ring and to help reduce O-ring extrusion when the tailplug was exposed to high pressures and temperatures.

Proposed enhancements to the tailplug design aim to minimize pressure-induced forces on O-rings. Validation testing includes pressure cycling up to 10,000 psi and temperature stabilization with precise monitoring, ensuring compliance with rigorous material traceability and certification standards. Following laboratory testing, the improved tailplug design has been installed in real-world environments to confirm its effectiveness in preventing O-ring extrusion and enhancing overall sealing reliability.

This work highlights the importance of robust testing protocols and innovative design approaches to address operational challenges, ensuring safety and reliability in critical applications.