



Abstract

Session 38: Valves

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Title

38-1: DEVELOPMENT OF ELASTOMERIC MATERIALS IN RECIPROCATING COMPRESSOR VALVES: AERODYNAMICS and SPRINGLESS VALVE DESIGNS

Summary

The history of valves in reciprocating gas compressors is dominated with the use of rigid materials from metal to advanced reinforced thermoplastic polymers. Research started in 1998 investigating the application of elastomeric materials has resulted in elastomeric valve designs that not only improve the sealing capabilities of the valve elements but also increase the durability and robustness of compressor valve performance. Specifically, compressor valves fail when the valve element loses its ability to form a gas tight seal. Solids entrained in the gas stream can damage the valve element-valve seat interface immediately upon contact or serve to erode the surfaces over time but in either case, once a leak path is formed local heating takes place, valve life is reduced and damage accumulates until the valve is replaced. The application of elastomeric materials is directed at improving the durability and damage tolerance of the seal at the valve element-valve seat interface.

In early elastomeric valve element designs, flexible materials were applied to rigid substrates for strength but this paper will present some of the advances in geometry and opportunities for not only reducing the pressure drop in reciprocating compressor valves but also improve the mean time between failures. In addition, some discussion will center on the how the use of elastomeric materials has resulted in valves being created and tested that operate without compressor valve springs and how this operating mode can further improve compressor valve reliability.