



Abstract

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Title

41-2: Advancement in Pulsation Control for Reciprocating Compressors

Summary

Current acoustic manifold designs for reciprocating compressors require a balance between pulsation control, compressor performance, and mechanical vibration. The high amplitude pulsations associated with uncontrolled nozzle resonance can cause unacceptable vibration and poor compressor performance. Pressure drop elements, which are currently used to control cylinder nozzle pulsation amplitudes in combination with surge volumes, can significantly affect compressor capacity and horsepower requirements. For modern high-speed compressors units, nozzle resonance control with the use of an orifice is common but can significantly reduce unit performance and decrease capacity. As part of an ongoing, joint Gas Machinery Research Council (GMRC) and Southwest Research Institute (SwRI) research project, a pulsation control device designed to mitigate cylinder nozzle resonant pulsations without the losses typically associated with the installation of cylinder nozzle orifices was developed and field tested. This newly developed pulsation control device was named the Virtual Orifice, since this technology was essentially developed to replace the compressor nozzle orifice. The Virtual Orifice effectively reduces the nozzle pulsations without a pressure drop and a corresponding power and capacity loss. This paper presents results from the research and field trial of the virtual orifice with respect to pulsation control performance, efficiency improvements, and vibration reduction.