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Lubrication Optimization in this Natural Gas Application Using CPI 192 and CPI 315 Piston/Rider and Packing Rings

The Challenge

This upgrade focused on improving sealing reliability and drastically reducing mineral oil consumption in the compressor section, thereby avoiding the need to transition to synthetic oil at elevated discharge pressures. As part of this work, the Ariel JGK-4 reciprocating compressor operating at a Natural Gas fracking location in Argentina, with a final discharge pressure of 92 bara, was converted to a CPI "mini-lube" system.

The Solution

CPI was engaged to carry out a design and improvement study on the compressor sealing components. The study recommended upgrading to piston rings, rider rings, and a main packing set manufactured from CPI 192 special polymer alloy material, together with an oil scraper set in CPI 315 polymer material. By converting all sealing elements to thermoplastic materials and eliminating metallic components, sealing reliability was significantly improved, MTBF was extended, lubrication rates were drastically reduced, and continued use of standard mineral oil was made possible.

The Result

Since the installation of the CPI replacement parts in December 2020, operating conditions have been continuously monitored. Suction and discharge pressures have remained within normal operating limits, with average flow rates between 25,000 and 29,600 Nm^3/h and discharge temperatures ranging from 80 °C to 114 °C. Throughout this period, no adverse effects on the integrity of the sealing elements in the rings and packing have been observed.

Based on this positive performance, a decision was taken in January 2022 to extend the installation of CPI replacement parts to the remaining compressors, in line with the annual maintenance schedule.

Condition-based maintenance is applied to maximize compressor availability. Following approximately 18,000 operating hours on the CPI replacement parts, an inspection of the rings, packing, and oil scrapers was carried out. The condition of the rings was such that they were reinstalled, and the compressor continued in operation.

A final inspection was performed after approximately 27,000 operating hours. Once again, the rings were found to be in very good condition and could potentially have remained in service. However, the customer elected to replace the rings, expressing a high level of satisfaction with achieving more than three years of continuous operation using the same CPI replacement rings.