

CPI supplies redesigned compressor cylinder and valves to eliminate cracking at fertilizer manufacturer



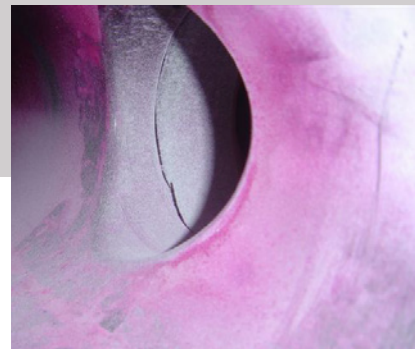
The Challenge

A fertilizer manufacturer located in Kapuni, New Zealand, began noticing ammonia synthesis gas leaking from the third-stage cylinder of its compressor. The compressor, a Cooper-Bessemer V250 natural gas engine-driven unit, is used for compressing air, compressing and recycling ammonia synthesis gas, and ammonia refrigeration.

The customer contacted CPI, part of the Howden group, to help diagnose and solve the problem. An inspection revealed that the syn-gas was leaking from cracks in the valve pockets. CPI determined that an inherent weakness in the cylinder design caused the cracks to occur.



The new cylinder (near) featured thicker and stronger valve port walls, but that required redesigned valves to fit the smaller openings.



The original valve port walls were not thick enough to withstand the pressure created by the compressor.

After 37,187 hours of operation ... the redesigned cylinder showed no signs of cracking or gas leakage and the valves were found to be in perfect working condition.

The Solution

The first step in addressing the problem was to redesign and install a new cylinder for the third stage compression. In consultation with our alliance partner a redesigned cylinder was manufactured, featuring reduced valve pocket diameter to increase strength and eliminate cracking.

The reduced valve pocket diameter in turn required redesigned compressor valves to fit the smaller pockets. CPI custom-designed, manufactured and installed a cylinder set of new inlet and discharge radiused disc (RD) valves for both the head and crank ends.

Suitable for use in a wide range of applications, including oil, gas, petrochemical, air separation and sour gas, CPI's radiused disc valves are designed to operate under discharge temperatures up to 200°C/390°F and pressures in excess of 400 bar/6,000 psi. All CPI radiused disc valves are custom designed in close consultation with the customer to meet the specific operating and dimensional needs of the compressor.



Radiused disc valve features and benefits:

- streamlined flow enabling free passage of entrained solids and liquids reducing risk of damage and improving reliability
- flow increase due to good sealing
- conformability with seat - under a wide range of operating conditions
- durable thermoplastic discs with no seat damage or wear
- simple internal design - easy to service
- soft-tempered seat and guard -sour gas (H2S) service (NACE)
- suitable for both lubricated and non-lubricated applications
- increased efficiency and savings on power consumption
- less back-flow and often lower process gas temperatures

The Result

After 37,187 hours of operation (almost five years), the customer disassembled the compressor for a routine overhaul. The redesigned cylinder showed no signs of cracking or gas leakage and the valves were found to be in perfect working condition.

Further, the radiused discs absorbed broken garter springs from a failed gas packing and continued operating without any loss in performance.

It is worth noting that tests conducted at this customer site with competitive valves in the third stage cylinders of two similar compressors (already successfully equipped with CPI valves for many years) resulted in valve failure within 293 to 1,603 hours.