



A497 and A498 Material Blend Solve Tough Packing Problem On Non-Lube, Bone-Dry Ethylene Transfer Compressors

PROBLEM IDENTIFIED

Application: Ethylene Transfer Compressors in Texas Chemical Facility

Issue: Facility was experiencing significant problems stemming from packing ring leakage resulting in costly maintenance

Solution: Specially blended material for extreme compressor applications in critical non-lube service application resulted in dramatic improvements

INDUSTRY INSIGHTS

Compressors constitute an essential part of the mechanical equipment in oil refineries and petrochemical plants. Compressors are used for different applications in the main and the auxiliary process cycles. Transfer compressors are designed to transfer a wide range of process gases such as ethylene, butadiene, hydrogen, helium, methyl chloride, sulfur dioxide, chlorine, HCFCs, and hydrocarbon gases. When a plant relies heavily on one piece of equipment like a critical service reciprocating compressor, continued reliability is essential and must be ensured by means of routine maintenance.

The condensation of ethylene involves cooling and pressurization stages due to the extremely high discharge pressures. Ethylene transfer compressors are critical to production and must perform with minimal downtime. Regular inspection and maintenance of the compressors help companies to ensure reliability in their production and meet industry demand.

THE CHALLENGE

A chemical facility in Texas was experiencing significant problems with their leaking packing rings on three of their major reciprocating compressor units. The packing failures led to frequent replacement on the packing rings as the products were lasting as little as a few months on all three compressors. The resulting operational interruptions were costing time and money, but also the unreliable packing rings were becoming a continuous concern.

PROCESS CONDITIONS

- Non-Lube, Bone-Dry Ethylene Transfer Compressor
- Discharge Pressure: 1,800 psi
- Temperature 80F – 140F
- Speed – 713 RPM
- Stroke: 5.00"
- Run conditions – start/stop

CASE STUDY – AUGUST 2021

TECHNICAL SOLUTION

When evaluating a technical solution for a critical issue, it is essential to look at all aspects of the application and how those parts work together. CDI Energy Products, working exclusively with the compressor OEM, scrutinized not only the leaking packing rings but examined the ring design, piston rod material, and surface finish to ensure that the entire system was analyzed. Proactive communication, knowledge sharing, and cross-company teamwork were paramount to facilitate prompt action on the project. CDI's engineering, manufacturing and material science teams worked in tandem with the compressor OEM to ensure rapid response and deployment for the solution.

The solution included a combination of design changes and the selection of two high-performance blended materials to best suit the application and to help the maintenance team limit their service interruptions. CDI's material science team recommended a combination of two specialized material blends, A497 and A498, which could be machined for extremely tight tolerances. CDI recommended these materials because of their critical performance features running in non-lubricated conditions in challenging operating conditions. The custom blends provided the properties, tensile strength, and thermal resistance necessary and could be custom engineered to meet the demands of the application at hand.

RESULTS

After 12 months, the first compressor was stopped for the components to be measured and analyzed. While the parts showed limited wear, these were the longest "runs" achieved meeting the customers' expectations with minimum leakage. As a result of this project, the plant was able to reduce the frequency of regular maintenance on its transfer compressors and increase the volume of production and overall equipment reliability. This is a multi-phase project with continued cross-company collaboration. Additional improvements are underway to extend run time even further.

FURTHER INFORMATION

CDI is focused on forging strategic partnerships with its customers. With strategic partnerships with OEMs and Service Providers, CDI's team can continue to develop products and materials that help companies mitigate costs, drive operational efficiency, and ensure production safety across the multiple industries it serves. To learn how CDI Energy Products can improve performance in your operations, please visit: cdiproducts.com.

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BETTER SCIENCE. BETTER SERVICE. BETTER SOLUTIONS.

- In pursuit of Better Science, the CDI team replaced the original packings with a blend of its A497 and A498 materials, which were specifically developed to run in these difficult types of operating conditions.
- In pursuit of Better Service, the CDI team worked hand-in-hand with the OEM to provide the technical design, engineering, and manufacturing support specifically for the active ethylene transfer compressors.
- In pursuit of Better Solutions, the CDI team looked for ways to improve the compressor operation with materials and design in the application. The CDI team considered how piston rod and packing materials work together to meet performance expectations while also mitigating maintenance needs and reducing costly service.