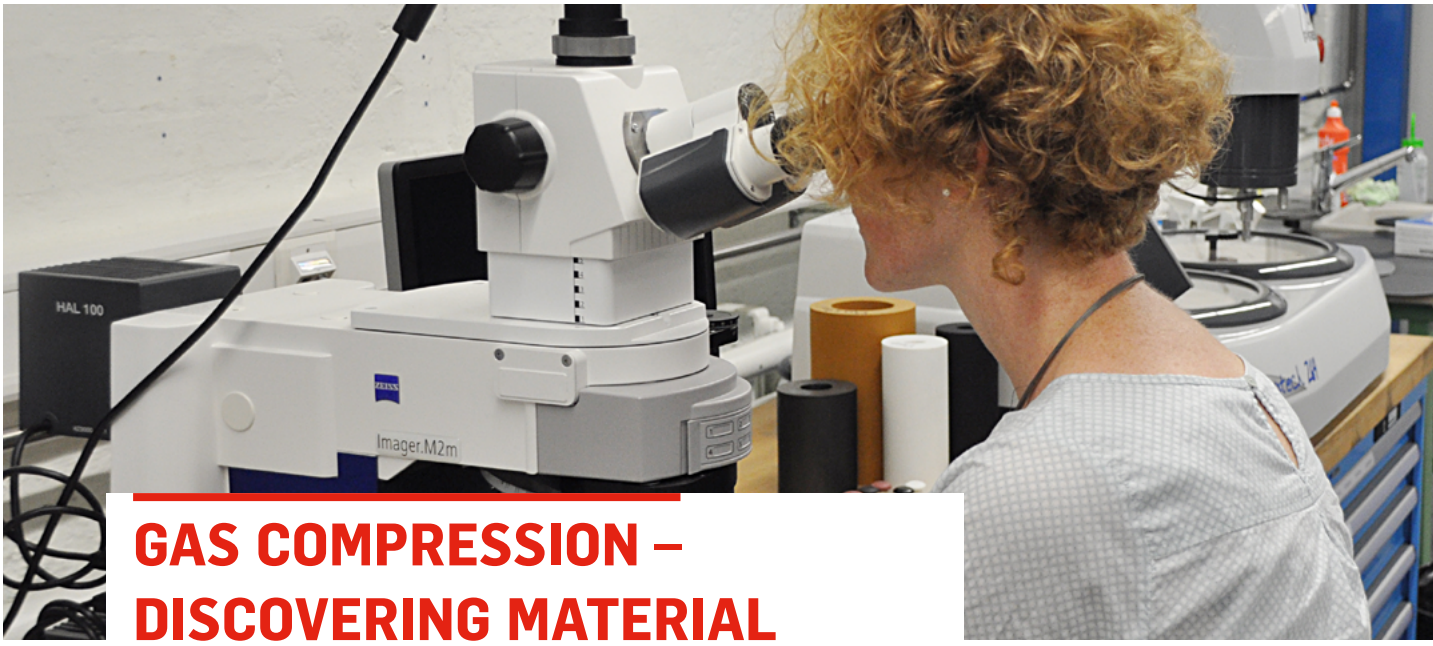
Burckhardt Compression



GAS COMPRESSION – DISCOVERING MATERIAL BENEFITS

Reciprocating compressors are used throughout modern industry for gas gathering and processing, where reliability is an essential quality. Central to their performance are the seals on pistons and packings used to ensure trouble-free operation. As maintenance items, the choice of replacement parts is extensive, so a better understanding of how they work and the materials involved is a considerable advantage.

Ralph Oertli, Design Project Manager at Burckhardt Compression, looks at the importance of expert knowledge and how it can enhance efficiency, reliability and running costs.

Many operators may not realize the importance of the designs and materials used in creating sealing elements and piston rings and how they affect the operation of compressors. Expert knowledge can support the development of new materials and designs, which can quickly be turned into cost-effective solutions, enabling more operators to appreciate the benefits.

FINDING THE RIGHT SEAL SOLUTION

Sealing solutions for compressors are at the center of machine performance. They influence efficiency and emissions as well as maintenance costs and reliability figures. Making the right choice for a seal package can extend compressor availability and enhance plant operation.

Seals should be designed for their specific application and load spectrum. So, for single, double and dual-acting piston designs, they all have different requirements. Robust sealing elements need to be able to withstand a dynamic pressure component whereas gastight seals are handling the static pressure.

On single acting pistons, the two different challenges are combined: Pressure breakers handle the dynamic pressure components (the difference between suction and discharge pressure) and the sealing elements take care of sealing the static pressure (difference from suction pressure to atmosphere).

In contrast, the sealing elements in double-acting pistons only have to deal with the dynamic pressure component varying between the suction and discharge pressures. On the other hand, dual-acting pistons alternately compress gas in both compression chambers, but not to the same final pressure. The asymmetric load on either side offers a considerable challenge for the seal arrangement.

ADVANCING MATERIAL PROPERTIES

In terms of sealing technology, polytetrafluoroethylene (PTFE) is a well-established material for low pressure applications. It has excellent chemical resistance and is much more cost-effective than more specialist materials, such as polyether ether ketone (PEEK).

However, PTFE is slightly limited in pressure range due to the lack of mechanical stability, which is why seal manufacturers often have to use more expensive, high-temperature polymers for medium and high-pressure situations. Achieving the balance between solid mechanical properties and low abrasion is necessary to deliver the expected uninterrupted service life. In several applications, a high service life of more than two years can be achieved by selecting the right materials.

By using materials science expertise, it is possible to extend the physical and chemical advantages of PTFE, using a mix of fluoropolymers and carbon fibers to improve creep behavior without using abrasive substances. For Burckhardt Compression, the complete range of materials, such as PTFE-based, PEEK and polymer blends as well as some metallic materials, are all included under the Persisto® brand.

Image 1: Burckhardt Compression develops its own Persisto® material specifically suited for reciprocating compressors

OPTIMUM COMBINATIONS

Having established the seal requirements and the most appropriate materials, the next step is to create the optimum selections for pressure breaker, sealing and support rings. Applying expert selection to achieve the optimal combinations and arrangements of the specific piston and rider rings will ensure the required sealing effect.

The knowledge and expertise to create the setup of the heterogenous piston ring arrangement comes from years of experience as an original equipment manufacturer (OEM). In this way, it is possible to achieve the best possible performance with the lowest life-cycle costs for each individual application.

The Redura® range of sealing elements from Burckhardt Compression has been developed to specifically cover all sealing applications for compressors of any brand. Using decades of experience in manufacturing and materials science, Burckhardt Compression uses materials, that have been developed in-house to create optimum sealing solutions.

PRECISION MANUFACTURING

This expertise is applied throughout the compressor and includes rod packing cases. Each application is affected by several factors such as gas type and pressure, lubricated or dry running as well as environmental conditions and connections for vent and purge pipes.

In each case, premium seal packages depend on specialist material selection together with precision machining and grinding as well as lapping of the sealing surfaces. Working to the highest quality standards, the sealing systems can be designed to meet API 618 specifications if required.

The plastic seal materials used by manufacturers for rod sealing systems are affected by temperature, altering their mechanical and tribological characteristics. As the temperature of the counter surface rises, the rate of wear of the seal element increases.

The introduction of a cooling system effectively removes the heat, improving sealing efficiency and reducing wear for extended maintenance periods. Burckhardt Compression has the expertise and facilities to introduce cooling systems as part of a sealing system to optimize the performance of the compressor and ensure long-term reliability.

THE IMPORTANCE OF RELIABILITY

For non-lubricated compressors, sealing systems are required to keep the oil separate from the process gas: Main packings shall be as tight as possible to prevent high leakage of process gas into the distance piece and/or environment. On the other side, the oil wipers must hold back the crank case oil and ensure that the oil is not getting into the distance piece. In applications such as oxygen compressors, this is of critical importance and there is no substitute for experience in designing and perfecting these systems.

The variety and complexity of sealing systems for compressors, coupled with their direct link with reliability, mean that operators should carefully consider their choice of supplier. In-house materials laboratory, design and manufacturing facilities ensure complete control over product design and quality. For the optimal solution, operators should partner with an industry expert and take advantage of decades of experience and knowledge.

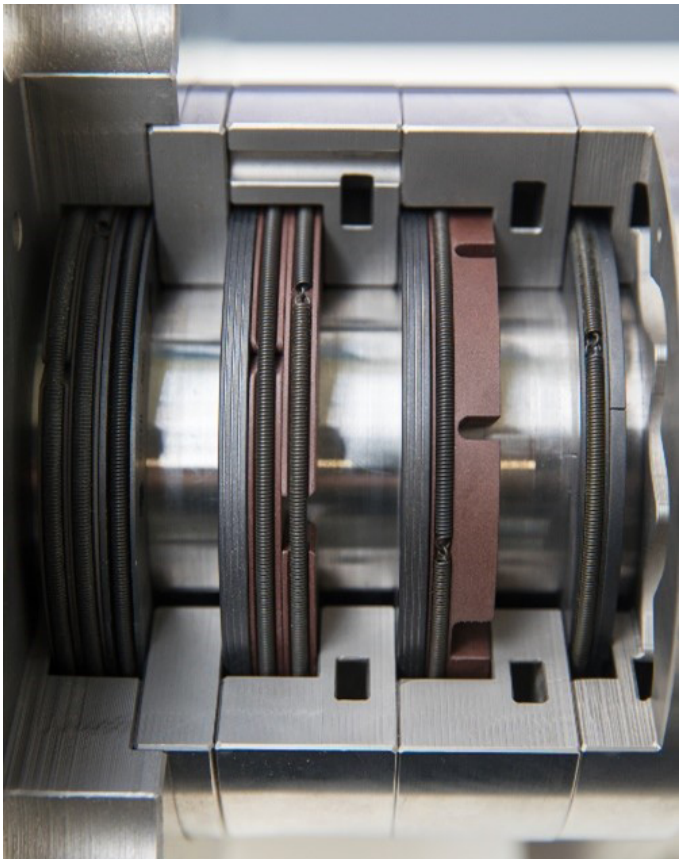


Image 2: Material, design and arrangement of rings is important to achieve highest reliability.

For more information, visit Burckhardt Compression's website:
Redura® Sealing Solutions - Burckhardt Compression

Images 3 and 4: Be it rod, piston or oil sealing, rings are of utmost importance for the efficiency of the compressor system.

Exact design and manufacturing to meet compressor requirements ensure low to zero leakage.

WE LOVE TO PROVIDE SERVICES THAT MATTER. HANDS-ON.

Personal, passionate, powerful: At Burckhardt Compression, you'll meet technical experts with an outstanding customer-first mentality who turn partnership into success.

Rooted in over 175 years of engineering competence as an OEM, we offer the full range of services for your compressors throughout the entire life cycle – regardless of brand, application or issue.

We do everything to keep your compressors running as efficiently as possible. Anywhere in the world. At any time.

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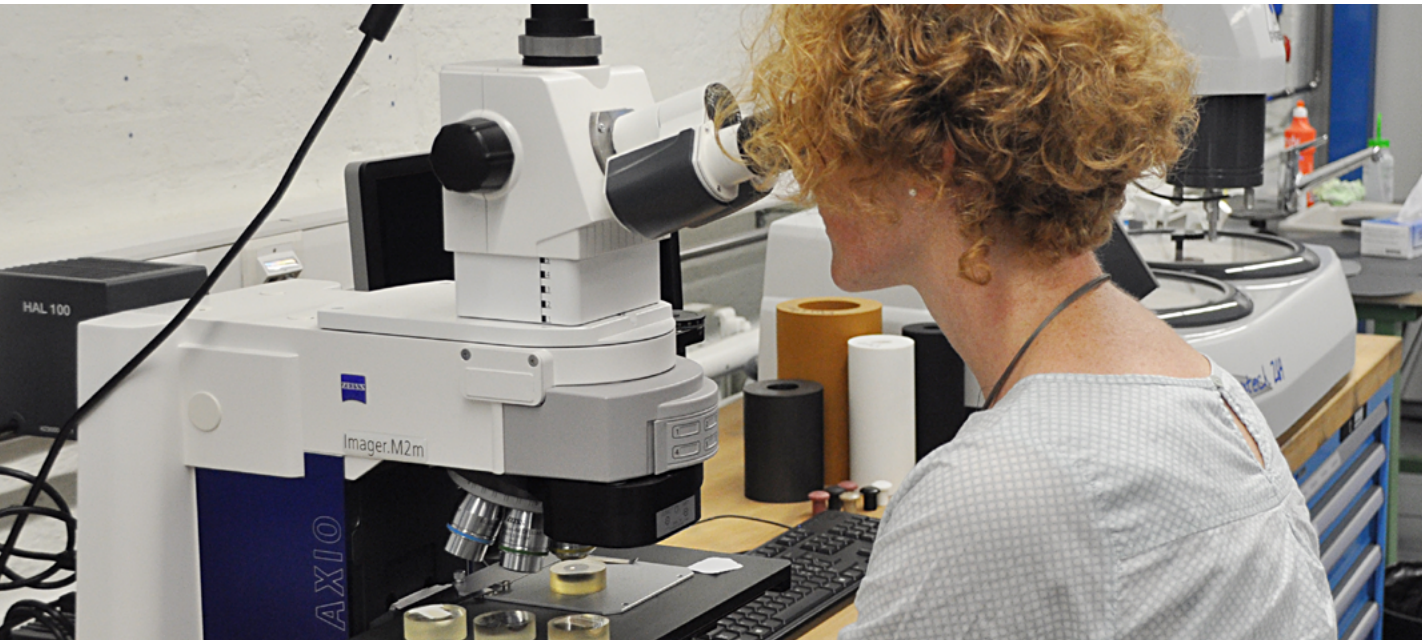

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