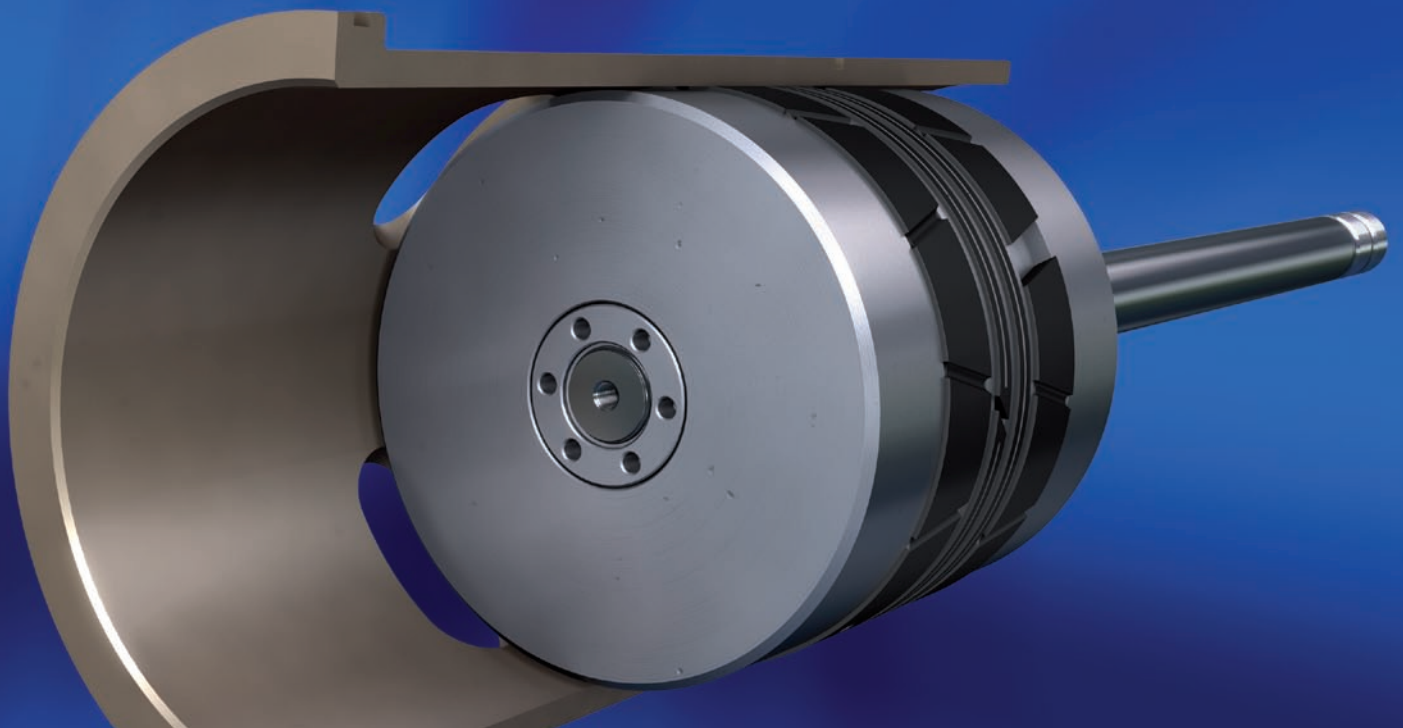


Compressor components – Pistons, rods and cylinder liners


HOERBIGER



Why HOERBIGER?

The design and manufacture of compressor components require comprehensive know-how. It is easy to underestimate the depth of engineering knowledge that lies behind seemingly straightforward components.

It takes extensive compressor design experience to be able to offer compressor users alternative solutions for spare parts, improved parts (upgrades) and services. Working together with the customer, HOERBIGER offers:

Supply of equivalent spare parts or upgrades engineered to:

- Extend part life
- Reduce maintenance costs
- Reduce machine downtimes

Functional product package selections to:

- Solve problems in critical applications
- Improve compressor performance

A cost-effective alternative to your existing supplier by:

- Optimised design and manufacturing methods
- Reduced delivery lead times

Repair or re-engineer parts based on inspection and testing:

- Dimensional check
- Surface finish
- Material properties
- Crack testing (MPI, UT & Dye Penetrant)

Product upgrades by:

- Redesigning parts to current standards and manufacturing methods
- Analysis and redesign of problematic parts and application of proven products and services

On-site monitoring and measurement to:

- Help identify problem areas on the compressor or possibly with the process.

HOERBIGER has a proven track record of complete compressor component design to API618, API 11P and NACE (MRO175, MRO103), which is supported by fully documented case histories.

Our customers can be assured that in developing solutions, we consider not just the individual component, but how it interacts with other components in order to meet the requirements placed on the whole machine.

Following inspection and assessment, and prior to starting work, HOERBIGER will agree the specification and scope of work together with the customer.

HOERBIGER can also offer applied technology to monitor, update and extend the life of your existing compressor.



Pistons

HOERBIGER's expert knowledge in the design of compressors and their operation means that we can offer the best in reliable, proven solutions for all your piston design needs. This extends to the design and manufacture of associated cylinder rings, which may also be required to ensure reliable performance.

To achieve maximum piston longevity HOERBIGER takes into account compressor operating conditions, as well as carrying out detailed stress analysis and balancing reciprocating masses for new piston designs.

A variety of piston types are manufactured for gas and air compressors using a wide range of materials including cast iron, alloy or stainless steels and aluminium alloy. State-of-the-art machining techniques are utilised to ensure the highest quality, whilst maintaining total component integrity.

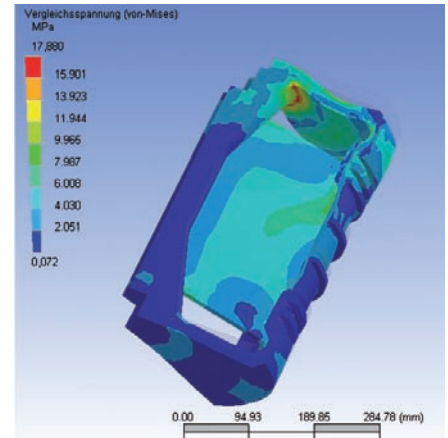
When proven possible by technical and economic review, our aluminium pistons are either machined from solid bar or produced by state-of-the-art casting technologies which avoid problems with shrinkage or other casting flaws.

To improve wear resistance, pistons manufactured in aluminium are hard-anodized in the ring groove area.

Where the requirements lead towards light-weight steel designs, HOERBIGER also offers fabricated/welded pistons.

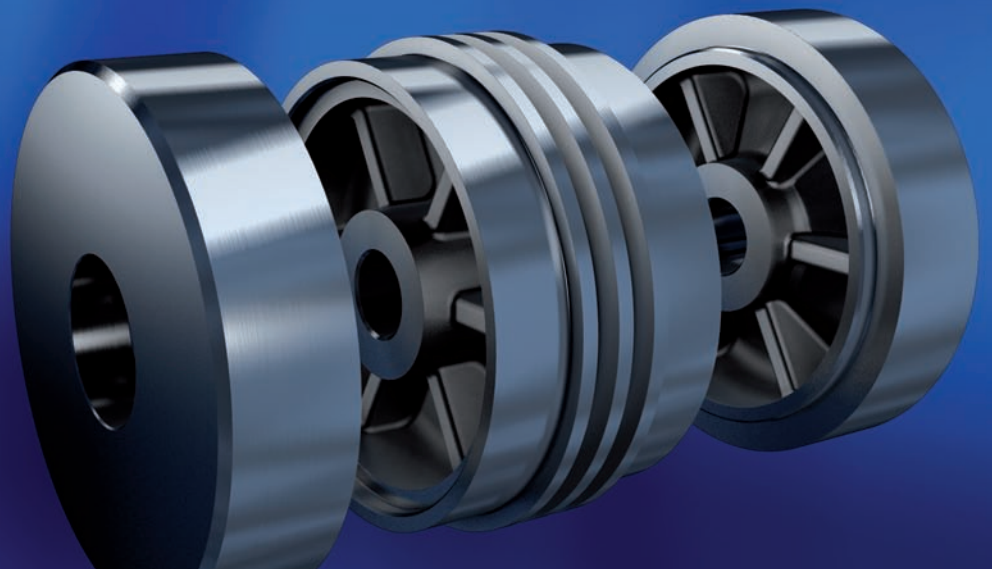
Typical upgrades include:

- Upgrade to non-metallic rings from cast iron rings
- Conversion of pistons to run non-lube from lube operation
- Installation of central steel or cast iron ring carriers to prolong groove life
- Where appropriate, upgrade to split multi-piece design for ease of solid rider band replacement



Finite element analysis model


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Liners

HOERBIGER has the knowledge and experience to supply and install a wide range of cylinder liners.

The selection of materials is based upon HOERBIGER's comprehensive knowledge of the many gas types encountered. Spun cast iron and corrosion-resistant steel are predominantly used, but other materials can also be supplied.

The liner bore is usually given a final surface finish to HOERBIGER standards, whereas the outer diameter is often supplied with a machining allowance.

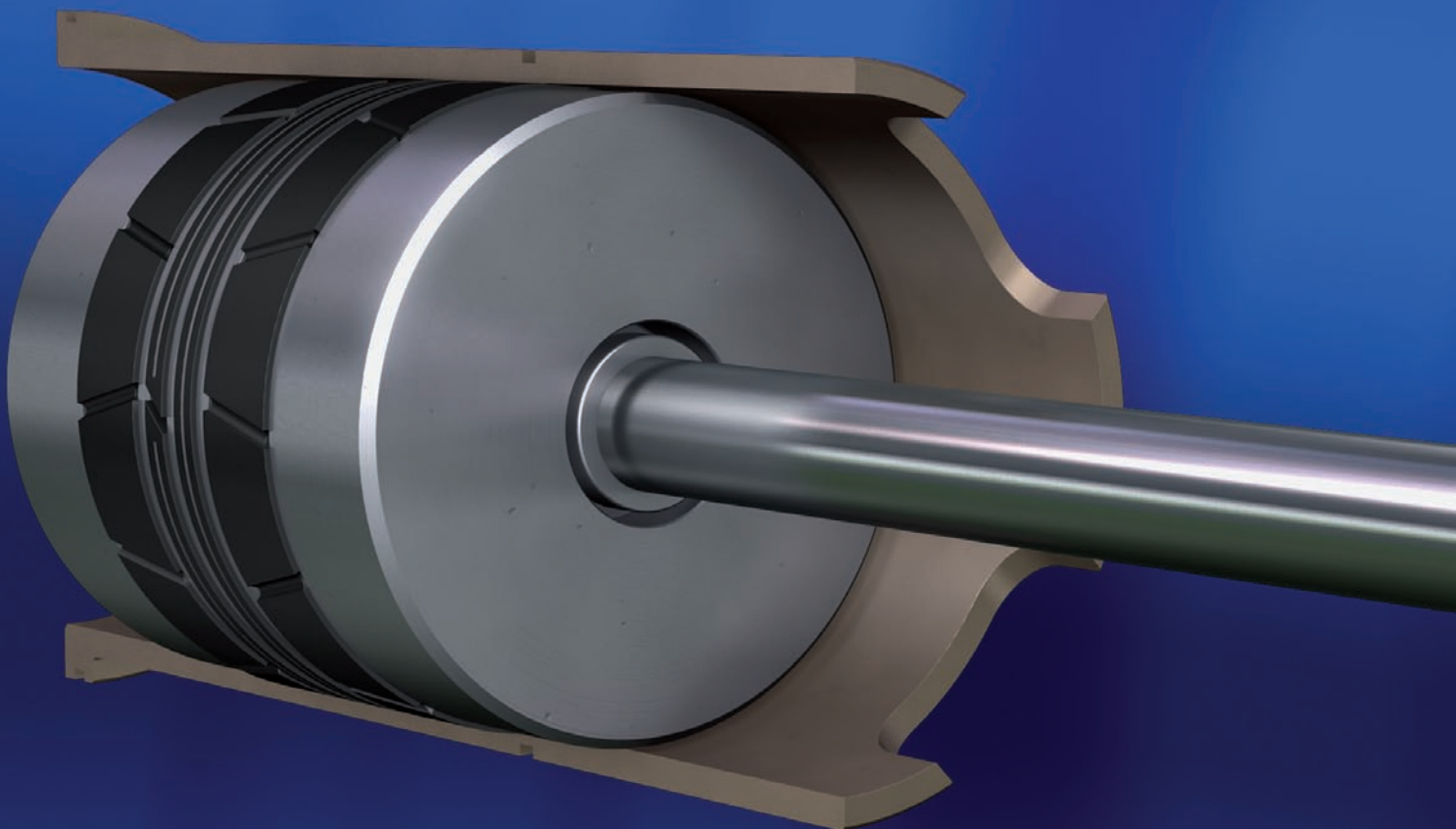
Cylinder liners are designed to be installed in various different ways. Examples include interference fit requiring either heating of the cylinder or cooling of the liner (or both), and flanged slip fit which are generally held in place by the cylinder head.

The finishing of liners often can be done only when fitted in the cylinder block. Grinding of valve ports and finish turning of diameters are very much dependent upon the findings of cylinder inspections.

HOERBIGER is able to perform liner inspections and evaluations on site, as required.



Installation of pre-shrunk liner



Piston rods

HOERBIGER's success rate with supplying superior quality piston rods for gas compressors is rooted firmly in proven design experience, together with meticulous application of manufacturing quality standards.

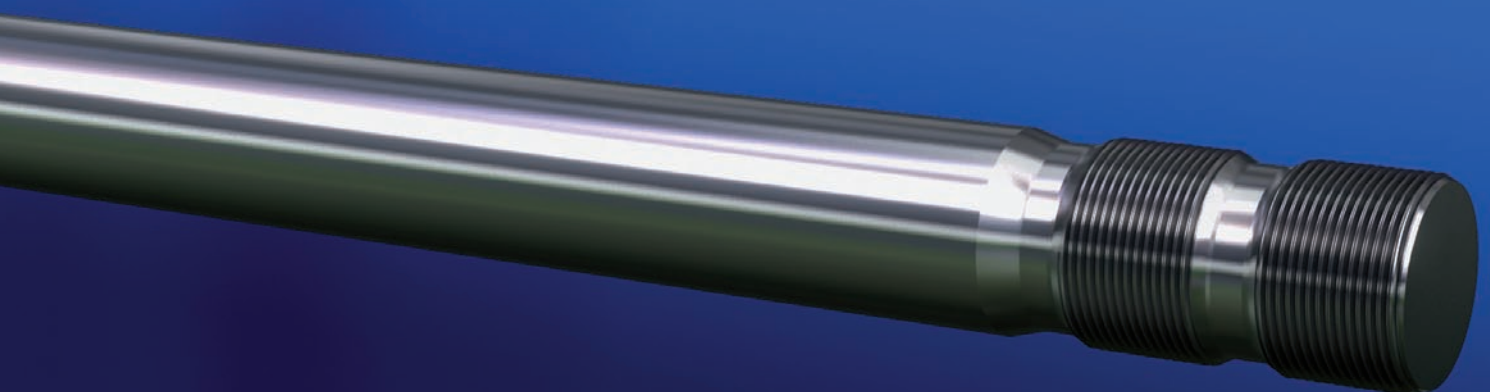
Using stainless or alloy steels, piston rods can be manufactured to accommodate the full range of gases and operating conditions.

HOERBIGER has manufacturing capabilities for rods of up to 3.6 m (142") in length and up to 400 mm (16") in diameter.

Approved to ISO 9001, the design and manufacturing process of each piston rod at HOERBIGER includes the following quality assurance steps:

- Insistence upon full traceability of raw materials by mechanical and chemical certification
- Careful ultrasonic inspection to check for internal flaws
- Application of necessary heat treatments to achieve required tensile strength and stress relief to ensure there are no residual stresses
- Nitriding, hard coating or induction hardening of packing area in accordance with compressor application
- Main external threads will be rolled and undercuts polished
- Inspection of surface hardness and finish as well as magnetic particle inspection
- 100% dimensional inspection, including straightness

Precision piston rods



Piston and rod reconditioning

HOERBIGER's comprehensive reconditioning service enables worn piston rods to be restored or upgraded by hard coating.

Where reconditioning is deemed suitable, worn areas in the packing and oil wiper regions are restored through the application of specialist hard coatings by thermal spraying.

The appropriate hard coating is selected according to the compressor application, standard options being Tungsten Carbide or Chromium Oxide.

By using thermal spraying processes to apply these high performance coatings, the piston rod's resistance to erosion, wear, heat and corrosion can be significantly improved. In fact, parts reconditioned in this way can last many times longer than the original!

The treated areas are then finish ground to the original diameter and with the appropriate HOERBIGER standard surface finish.

HOERBIGER's piston reconditioning service includes:

- Re-machining of grooves to ensure square groove sides and optimum sealing
- Evaluation of land width between grooves to ensure safe operation
- Whilst machining grooves takes the piston away from standard, HOERBIGER ensures that all pistons for one site are machined identically – thus maximising the possibility of site standardisation

Piston rod reconditioning



Piston rod assembly

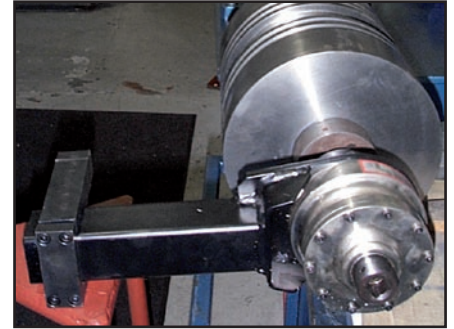
When assembling pistons and rods, HOERBIGER's bespoke torque rigs ensure precision application of torque loads to the piston rod.

The pre-stress of the rod and piston is critical, and where necessary we will carry out analysis to ensure that the correct load is applied. HOERBIGER has the facilities to carry out pre-stressing by torque multipliers to a target value or angle.

Alternatively, we can stress the rod and piston by tightening with hydraulic nuts.



Hydraulic torque wrench



Torque multiplier

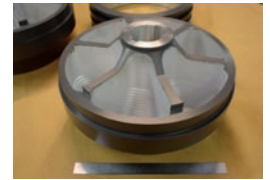
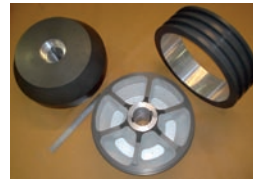
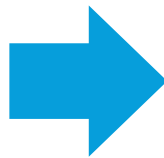
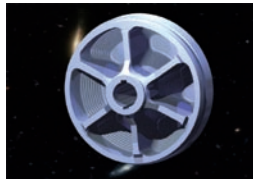
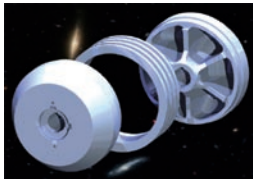

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HOERBIGER – Your partner for the complete solution

- ✓ HOERBIGER provides fully engineered solutions
- ✓ Every proposal made by Hoerbiger has been assessed for upgrade potential to ensure the optimum operational performance
- ✓ HOERBIGER's highly qualified engineering team consider the full machine dynamics, utilising knowledge not only from theoretical models, but also from practice, making full use of their many years of compressor design experience
- ✓ Product upgrades are an important part of compressor conversion projects, which are also offered by HOERBIGER. See our folder “Compressor conversion – the economical alternative” for further information

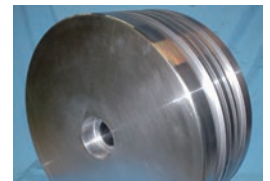
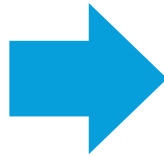
First case: machined aluminium piston



Finished design

Finished product

Second case: welded steel piston



Finished design

Finished product

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because performance counts

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