konstruktios praxis
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Partnerships

PTFE-Gaskets – also for non-metallic mating surfaces

Applications involving the use of seals on non-metallic mating surfaces require special know-how in the field of PTFE compound development as well as a suitable design of the seal and seal lip geometry. As ElringKlinger compounds PTFE and manufactures semi-finished products in-house, the company possesses the requisite competence in these areas.

All-in-One:
Complete pump module for dialysis technology

For years, PTFE compounds have been successfully used in a wide range of different sealing and industrial applications. Particularly with chemically aggressive media, high temperatures and pressures, insufficient lubrication or dry operating conditions, as well as in low-friction applications, PTFE seals have been proving their beneficial properties. The particularly high wear resistance of the seals is achieved by carefully selected filler combinations. These fillers, like carbon, high-performance plastics, glass fibers and bronze, require a tempered or metal-plated mating surface. However, new developments in the field of PTFE compounding are increasingly enabling the successful use of PTFE seals on non-metallic mating surfaces, both as shaft seals and as piston and rod seals. The following examples provided by ElringKlinger Kunststofftechnik serve to illustrate these possibilities.

Mating Surfaces: Plastics

- **Wobble piston compressor application (Figure 1):**
  Use of EMT memory cup packings made from PTFE compound HS 21059 in injection-molded polyphenylene sulfide (PPS) housings in wobble piston compressors and vacuum pumps (e.g.ventilating air compressors). Operating conditions: p &Mac178; 3 bar or vacuum, dry operation, v = 3m/s. The PTFE compound and HS 21059 contain, among others, organic fillers, which do not attack the soft mating surface. As there are no an-organic or metallic components, there is no risk of run-in or grooving at the working surface of the PPS cylinder. The injection-molded, extremely smooth working surface of the PPS cylinder results in very good sealing performance and minimal wear of the PTFE packing.

- **Headlight wash/wipe nozzle application (Figure 2):**
  Wash/wipe systems of passenger car headlights, especially Xenon headlights, spray the lights with a mixture of water and cleaning agent. Although wash/wipe systems had originally been available only for more expensive cars, there is now an increasing trend towards offering headlight wash/wipe systems across all price and model ranges. An injection-molded polyoxymethylene (POM) cylinder is used as a cost-effective mating surface in an actuator of such an automotive wash/wipe system. A particularly suitable sealing element for this application is a Standard Memory Packing (EMS) made from PTFE-HS 21029.
  In particular, this PTFE compound excels in offering outstanding chemical resistance against water, anti-freeze and cleaning agents under pressures of up to 4 bar. Use of pure water achieves the best results, also with regard to friction. Merely the impact of outside dirt and dust cause the seal and the POM cylinder to wear down more quickly. Nevertheless, in this particular application, there is no better combination than PTFE and POM with regard to sealing performance, friction and service life.

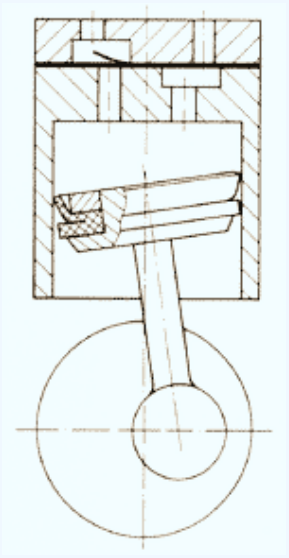

Figure 1
Assembly drawing:
Memory cup seal with integrated EMTX guide in wobble piston application

Mating Surfaces: Ceramics/Glass

- **High-pressure piston pump application (Figure 3):**
  Ceramics or ceramic coatings like Cr2O3 are used as mating surfaces in piston pumps, for example. These piston pumps are used in analytical technology and high-pressure cleaning systems working with pressures up to 350 bar and at piston speeds of up to 2 m/s. Due to frictional heat, thermal stress can be up to 120 °C. Media: water + cleaning agent; in analytical technology a wide range of different aggressive media are used. This application uses spring-energized seals with a special geometry and made from special PTFE compounds, with fillers being composed of carbon + organic fillers (PI, PPS, PEEK, etc.), among others. Excellent surface quality of the hard ceramics pistons is a prerequisite for functional stability and long service life of the seals. This requires surface finish (Ra) values £ 0.2 µm. If the surface is too rough, the hard ceramic tips of the piston surface will wear down the seal and/or the PTFE compound too quickly. Despite tough operating conditions, the seals can achieve a service life of up to 1000 hrs.

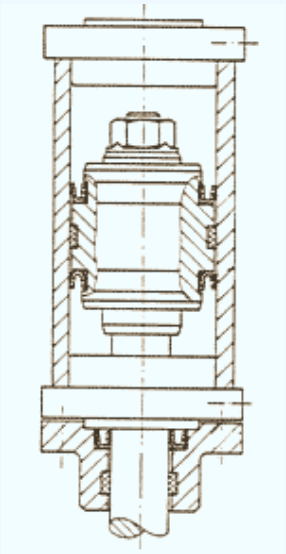

Figure 2
Assembly drawing:
EMS Standard inside the cylinder

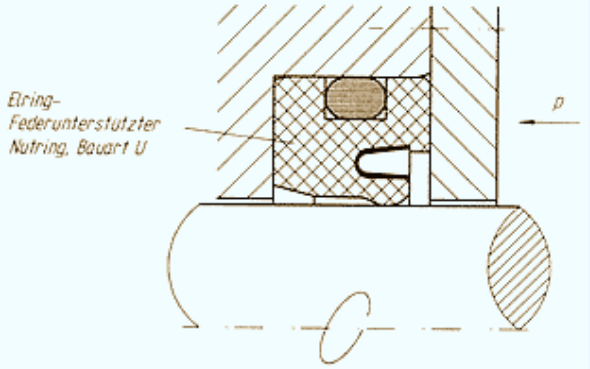

Figure 3
Assembly drawing:
EFN with O-ring for piston pump

- **Medical technology piston pump application (cover photo):**
  High-precision glass cylinders are used as mating surfaces in medical technology applications, such as dialysis piston pumps. These piston pumps pump highly critical and highly fluid media up to 2 bar. The seal consists of a complete piston with memory sealing lips made from the HS 4080 compound.
  The very smooth glass cylinder and the dual-lip piston provide excellent sealing results. This is primarily achieved through the strong memory effect of the HS 4080 compound and the resulting radial forces. Consequently, memory sealing lips can be used without an additional spring element. Permanent contact pressure is guaranteed.

The Authors:

Dipl-Ing. (FH) Klaus Hocker.
ElringKlinger Kunststofftechnik GmbH

Dipl. Wirt.-Ing. (FH) Martin Schuster,
ElringKlinger Kunststofftechnik GmbH

ElringKlinger Kunststofftechnik GmbH
Etzelstraße 10
D-74321 Bietigheim - Bissingen

Tel: +49-(0)7142-583-0
Fax: +49-(0)7142-583-200
Email: info@elringklinger-kunststoff.de