

**EXPERTS FOR
CERAMIC COMPONENTS
IN PUMPS**

High-performance ceramics

Customized
technical ceramics
for pumps.

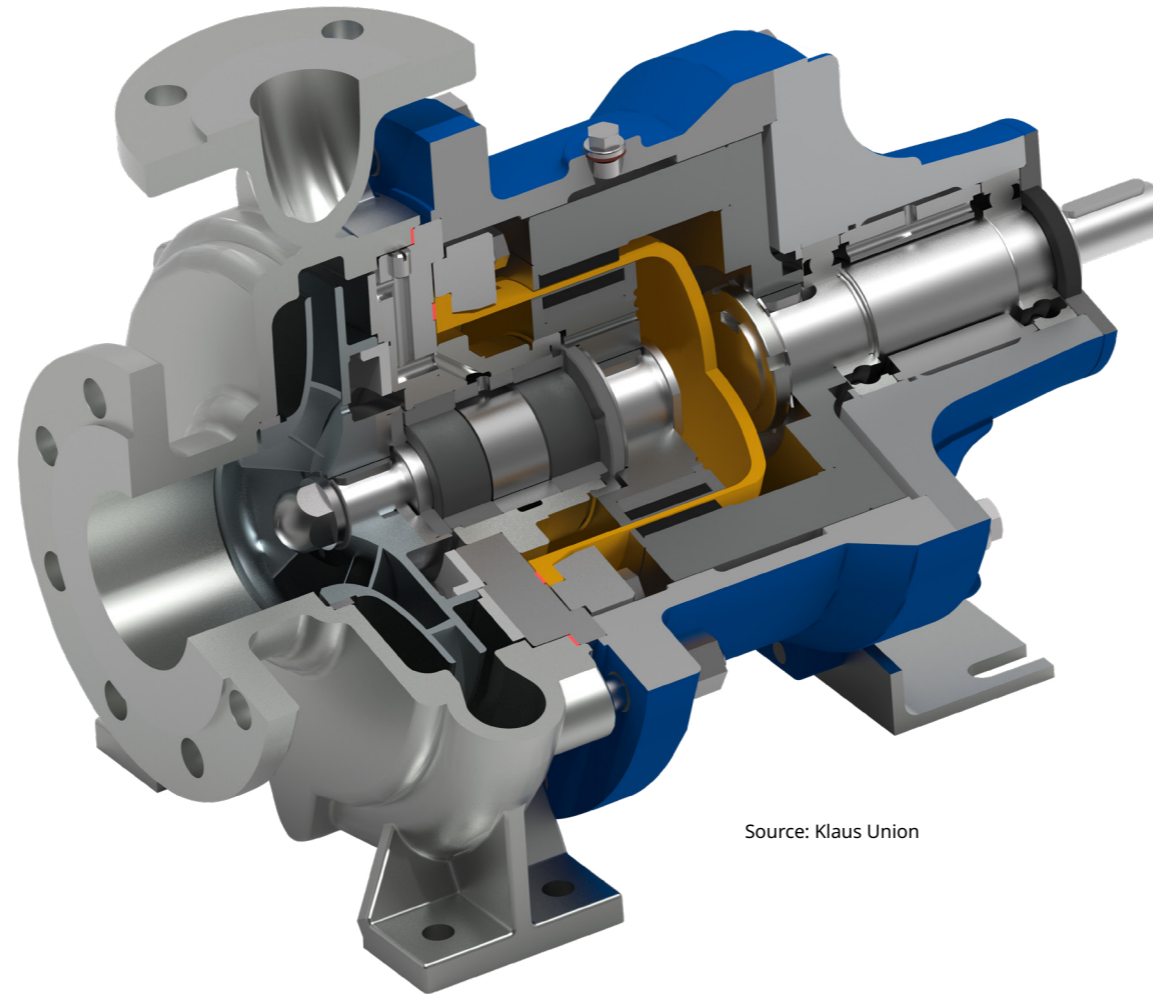
PUSHING BOUNDARIES WITH KYOCERA CERAMICS

Ceramics expand the possible use and performance of your pump systems. Service life, sealant wear, and maintenance intervals are significantly improved.

Due to their superior material properties, high-performance ceramics have an enormously diverse variety of applications. Whereas metals and plastics have their limits, or where these limits are actually exceeded, our high-performance ceramics stand out from all other materials due to their:

- ▶ Extreme hardness
- ▶ High temperature resistance
- ▶ Unsurpassed abrasion and corrosion resistance
- ▶ High dimensional stability and low weight
- ▶ Outstanding thermal shock resistance

Here is a selection from our wide range of products for your application in the pump industry. For more information about the products please contact our specialists or visit our websites.



Source: Klaus Union



Alumina ceramic piston



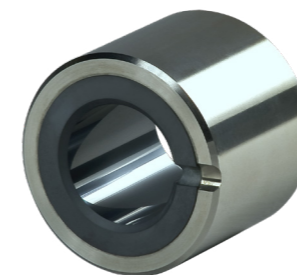
Pump impeller made of zirconia FZM



F-Molding parts made of silicon nitride (SN240) and zirconia (Z206N)



Sliding ring made of silicon carbide



Product-lubricated slide bearing made of silicon carbide



Protection sleeve made of silicon carbide



Slide bearings made of silicon carbide



Containment shells made of zirconia FZM and FZM+

HIGH PRECISION CERAMIC PUMP COMPONENTS



Containment shells made of zirconia FZM and FZM+

CONTAINMENT SHELLS

Applications:

- ▶ Sealing element in magnetic drive pumps

Materials:

- ▶ Zirconia FZM
- ▶ Zirconia FZM+

Advantages:

- ▶ Energy savings through reduced eddy current losses
- ▶ Non-magnetic material
- ▶ High specific resistivity
- ▶ High corrosion resistance
- ▶ Temperature resistance and thermal insulation (-200 °C to +450 °C)
- ▶ Wear resistance
- ▶ High mechanical strength
- ▶ High thermal shock and impact resistance



Pump impeller made of zirconia FZM, approx. diameter 300 mm

PUMP IMPELLERS

Applications:

- ▶ For special rotary pumps used under extreme conditions

Materials:

- ▶ Alumina F99.7
- ▶ Zirconia FZM

Advantages:

- ▶ High corrosion resistance
- ▶ High wear resistance
- ▶ High temperature resistance
- ▶ Complex geometries can be achieved by diffusion bonding



Alumina ceramic piston

CYLINDERS AND PISTONS

Applications:

- ▶ Reliable and accurate precision parts for constant delivery valves

Materials:

- ▶ Alumina
- ▶ Silicon carbide
- ▶ Zirconia

Advantages:

- ▶ High heat resistant
- ▶ Excellent sliding and wear properties can be obtained by applying DLC coating
- ▶ High chemical resistance
- ▶ SiC porous materials provide excellent sliding properties in a lubricated environment by retaining lubricating oil
- ▶ Low thermal expansion
- ▶ High precision clearance



High-pressure piston made of FZM with shrink-fitted metal support ring

HIGH-PRESSURE PISTONS

Applications:

- ▶ Water jet cutting systems
- ▶ High-pressure cleaning
- ▶ Cleaning of build-ups, e.g., in pipes
- ▶ Industrial cleaning
- ▶ Desalination plants
- ▶ Homogenisers

Materials:

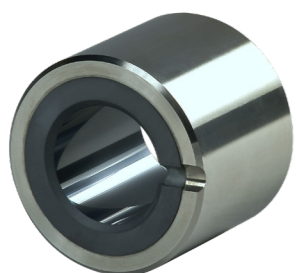
- ▶ Alumina F99.7
- ▶ Zirconia toughened alumina FZT
- ▶ Zirconia FZM and FZM+
- ▶ Y-TZP zirconia FZM/K

Advantages:

- ▶ High wear resistance
- ▶ Optimum sliding properties (Ra < 0.05 µm)
- ▶ Pressure resistance up to 10,000 bar
- ▶ Service life of up to 4,000 h at 3,000 bar
- ▶ Lower weight compared to pistons made of hard metal
- ▶ Low frictional heat generation

Our high-performance materials and extensive experience in construction and development guarantee your machine components extended operating time and high reliability.

SEALING AND BEARING ELEMENTS



Product-lubricated slide bearing made of silicon carbide



Protection sleeve made of silicon carbide

SLIDING RINGS AND SLIDE BEARINGS

Applications:

- ▶ Liquid-lubricated mechanical seals and gas seals in pumps
- ▶ Stirrers
- ▶ Mills
- ▶ Compressors
- ▶ Turbines
- ▶ Desulfurization plants
- ▶ Primary shaft seals in naval construction, shaft seals in the gas- and oil extraction

Materials:

- ▶ StarCeram® S – sintered silicon carbide
- ▶ StarCeram® Si – silicon-infiltrated silicon carbide
- ▶ StarCeram® A – alumina
- ▶ StarCeram® N – silicon nitride

BEARING BUSHES AND PROTECTION SLEEVES

Applications:

- ▶ Plant engineering
- ▶ Mainly in pumps
- ▶ Mixers
- ▶ Stirrers
- ▶ Compressors and turbines

Advantages:

- ▶ High chemical corrosion resistance
- ▶ High temperature resistance
- ▶ High thermal conductivity i.e. rapid dissipation of process heat
- ▶ Low density, i.e. small mass moment of inertia
- ▶ High wear resistance due to high strength and hardness
- ▶ Good tribological properties

ABOUT KYOCERA



The global Kyocera corporation - a strong partner.

- ▶ **Headquarters:** Kyoto, Japan
- ▶ **Foundation:** 1959
- ▶ **Employees:** over 80,000 worldwide
- ▶ **European headquarters:** Esslingen, Germany
- ▶ **European production sites:** Mannheim, Germany
Selb, Germany
(further subsidiaries in Europe)

KYOCERA = KYOTO CERAMICS

KYOCERA – it all began with ceramics

KYOCERA Fin ceramics Europe GmbH is a subsidiary of KYOCERA Europe GmbH, which has been successful in Europe for over 50 years. The Kyocera Group is one of the world's leading providers of high-performance ceramic components for the technology industry, offering over 200 different ceramic materials, as well as state-of-the-art technologies and services tailored to the specific needs of each market.

KYOCERA Fin ceramics Europe GmbH has grown steadily in recent years – and is now a leading European supplier of customised solutions made of technical ceramics. Working in partnership, we develop and manufacture products that offer our customers added value in their respective markets and secure their technological lead in the long term. We are committed to this every day.

Throughout Europe, we are represented by two production and development sites in Mannheim and Selb, as well as six sales offices –

in Mannheim, Selb, Esslingen, Neuss, Rungis (France) and Frimley (United Kingdom).

Our hearts beat completely for ceramics. Our team provides comprehensive advice on the selection of ceramic materials, product design and project execution – from the development stage to prototyping. We supply system components for high-tech applications in numerous industries. Our products are characterised by high quality, precision and durability.

Our business partners benefit from the fact that we think and work across divisions within the Kyocera Group. Because innovations and real milestones can only be achieved together – across industries and national borders.

This is what we believe.

Together with you we develop efficient solutions that optimize complex applications and enable significant performance improvements.



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