



PUMPS, VALVES AND SEALS

Ceramic Solutions for
Fluid Management

**Advanced Ceramics
for Fluid Handling
Applications**

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CeramTec
THE CERAMIC EXPERTS

Pumps, Valves and Seals
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A large industrial facility, likely a water treatment plant, featuring rows of large, grey, cylindrical machinery (pumps or filters) mounted on metal frames. In the background, there are stacks of white pipes and various valves and control systems. The ceiling is high with a complex steel truss structure and bright lighting.

Unique applications require unique partnerships

With extensive material expertise, unique technology capabilities and comprehensive application know-how we design, develop and implement highly-customized innovative ceramic solutions to help our customers achieve significant competitive advantages.

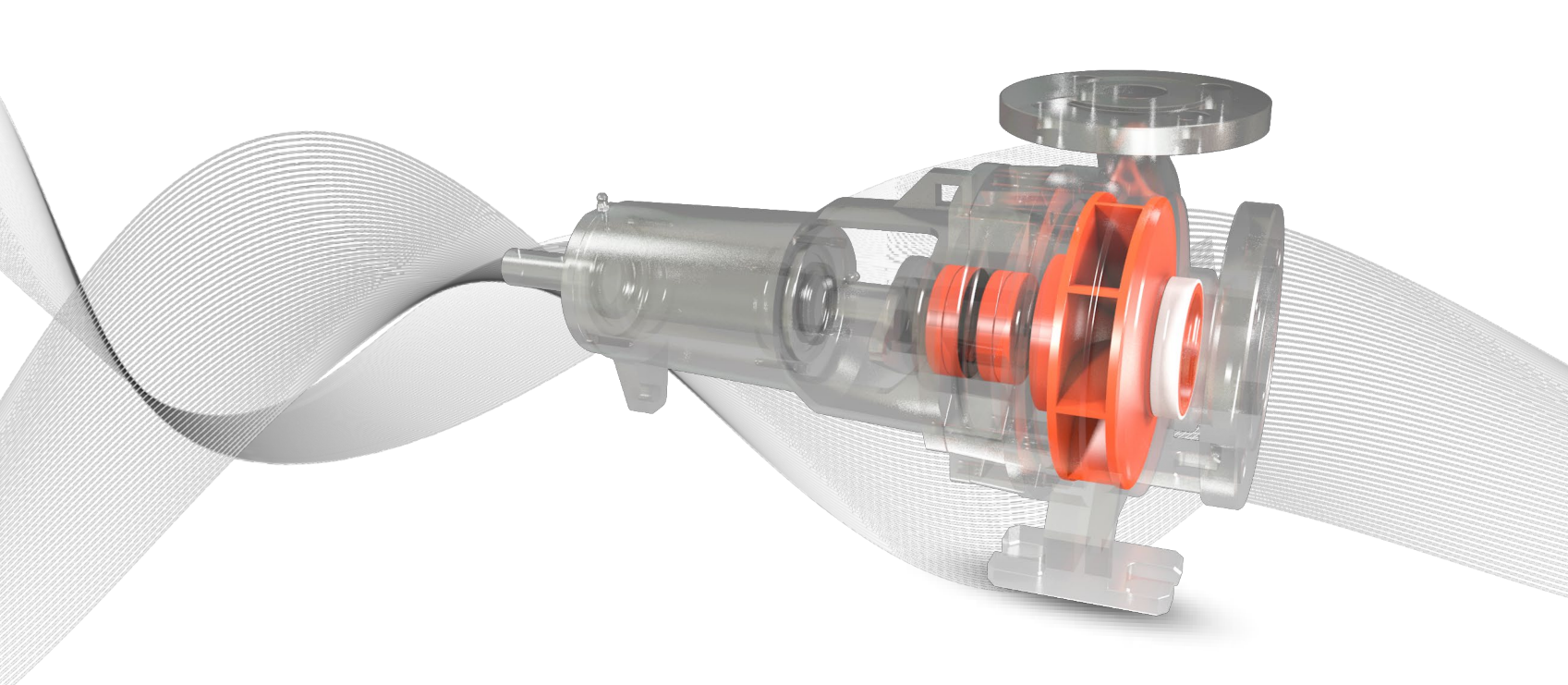
*Exciting
ceramics!*



Why ceramics in your application?

Wear is one of the main reasons why pumps can be impaired in their function. Depending on the extent, the impairment can lead to the complete failure of the process line and cause immense economic damage. During fluid transport in industrial and hygienic environment both the pump unit as well as handling components, such as pipes and valves can also be exposed to high stress and are therefore subject to wear and corrosion.

Due to their specific properties such as hardness, toughness, chemical or temperature resistance, depending on the application, ceramic solutions can significantly contribute to reducing or even neutralizing wear effects. Thus, compared to other materials such as metal or plastic, ceramics opens up enormous performance potentials and can help achieving application specific competitive advantages.



Your benefits with ceramic solutions from CeramTec

- + Wide range of high-performance ceramic materials
- + Dedicated R & D teams and application development
- + Variety of ceramic forming capabilities – from die casting and dry pressing, over isostatic pressing and extrusion to 3D printing technology
- + Higher operational safety and longer service life for your industry pump application
- + Increased process reliability and better economic efficiency
- + Excellent wear and corrosion resistance through unique tribological properties

Customized ceramic solutions for demanding applications

With over 100 years of production and development experience, CeramTec is one of the leading providers of advanced ceramic solutions worldwide. Based on our extensive material expertise and application know-how, we offer our customers unique globally networked engineering and solution competence.

From automotive, chemicals and mechanical engineering to plant engineering and medical technology – leading global customers rely on our unique competence and capabilities to develop highly customized solutions for demanding industry application needs.

Sustainable lead-free alternative for many parts in process components

According to The Restriction of Hazardous Substances Directive 2002/95/EC (ROHS) using the lead-containing metals (like brass, lead-based bearing alloys, lead-tin alloys, etc.) is to be limited. Ceramic, as non-lead high performance material is a perfect alternative to many applications, where amount of lead must be reduced.



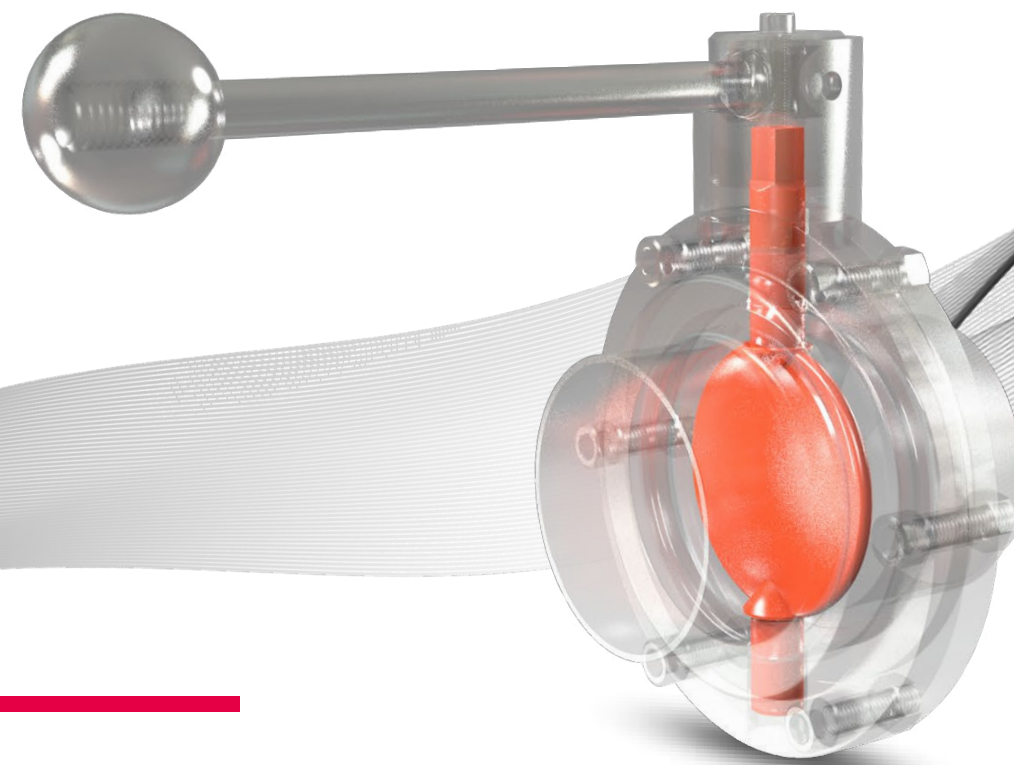
Less wear, more efficiency: ceramic solutions for industry pumps

In demanding industry environment, advanced ceramic solutions from CeramTec set standards for process reliability and performance. We have developed gliding, bearing, sealing and control technology with high-performance ceramics – with outstanding tribological, chemical and physical properties. This allows highly strained components in pumps, valves, machines and

systems to run reliably, with high economic efficiency and low wear, even under extreme operating conditions. For each application and each requirements profile – from micro-dosing pumps in medical technology to large power plant pumps – together with you we develop individual solutions based on optimum selection and material setup as well as customized component design.

Material Properties	Aluminium Oxide (Al2O3)	Zirconium Oxide (ZrO2)	Silicon Carbide (SiC)	Silicon Nitride (Si3N4)
	different grades with Alumina content 95 - 99,7 available	available with MgO or Y stabilisation	available as SiSiC, SSiC or graphite loaded SSiC	
Density	3,7 - 3,92 g/cm³	5,74 - 6,05 g/cm³	2,95 - 3,16 g/cm³	3,2 g/cm³
Bending Strength	300 - 400 MPa	500 - 1000 MPa	220 - 430 MPa	800 MPa
Hardness (HV1)	1100 - 1500	1080 - 1270	1200 - >2500	1500
Young's Modulus	310 - 380 GPa	210 GPa	310 - 430 GPa	320 GPa
Thermal Conductivity	24 - 30 W/mK	3 W/mK	120 - 170 W/mK	30 W/mK
Thermal Extension Coefficient 30 - 400 °C	7,1 - 7,5 10 ⁻⁶ /K	10 - 10,5 10 ⁻⁶ /K	3,7 - 4,2 10 ⁻⁶ /K	3,2 10 ⁻⁶ /K

Indicative values only. For detailed parameters and material information please contact CeramTec Team



Exemplary products for industry pump applications



Sealing components



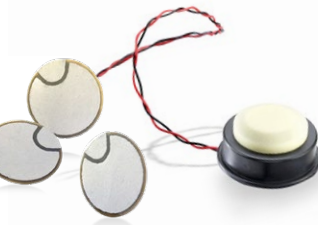
Customized and standardized valve parts



High-performance ceramics for bushings



Ceramic pump impellers



Piezoceramic solutions

FDA, Food and Drinking water certification for many material grades available. For those and other certificates please ask us for details.

Ready for your ceramic solution? Get in touch with us. We are looking forward to discuss your individual application requirements.