

Corporate Communications

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Press Information

CeramTec Ceramics for High-Stress Components

Micro to Maxi: Pump Systems with Advanced Ceramics

***Plochingen, July 10, 2020* - From medical technology to full-scale power plants – pumps and compressors are a cornerstone of countless industrial and manufacturing operations. The individual areas of application all require components that are precisely tailored to the pump's specifications. They have to be durable and withstand extreme loads, economical and effective. A perfect fit for CeramTec's advanced ceramics.**

Pumps transport media of all kinds, from gases, liquids, solids and pastes to mixtures of liquids and solids. Depending on the application and principle of operation, a pump is made up of many individual components which have to work economically and reliably while the pump is in operation – even under heavy loads. Alongside anti-friction, bearing, seal and process control technology, protecting peripheral systems from wear is a fundamental part of operating machines and material handling equipment.

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Keep Your Systems Running: Pump Systems with Advanced Ceramics

CeramTec offers a suitable ceramic material for every application, ensuring the material properties are perfectly tailored to the requirements at hand: the precise mechanical, thermal, bio-chemical and electrical properties of advanced ceramics can be combined, optimized and developed as required. The result is ceramic materials that are perfect for their role and that are superior to alternative materials such as metal and plastic in certain applications. Whether they be oxide, non-oxide or composite ceramics – depending on the material, the ceramics can be highly wear and heat resistant, as well as biocompatible and therefore suitable for direct food contact. They are known for their temperature and thermal shock resistance. In fact, advanced ceramics are often the only viable solution for technical dilemmas which cannot be solved using conventional materials. Ceramics stand for improved operational reliability, service life, process reliability and cost efficiency – and as such also represent an increase in profitability for a given application.

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Absolute Precision in Motion: Friction Bearings and Bushings

When gases are compressed in compressors or when other media, including abrasive or aggressive substances, are conveyed using pumps, reliability and service life are key. The ceramic bearing and seal components from CeramTec open the door for economic solutions that don't just reduce friction, form a seal or convey media, they also provide reliable electrical and thermal insulation. They are used in the construction of machinery and plants as well as medical and analytical devices and can be found everywhere from automotive applications to home appliances such as coffee machines and dishwashers. The CeramTec portfolio of ceramic seal rings, bushings and sleeves for axial and radial bearings includes components measuring just a few millimeters in diameters up to 70 millimeters. The materials used are aluminum oxide, silicon carbide and silicon nitride; zirconium oxide is also suitable. Combined with carbon or reinforced plastic, this makes the components extremely lightweight while retaining high stiffness. They also feature very good emergency and dry running properties and can withstand influences through centrifugal forces.

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Precision Seal

Radial and axial shaft seals, mechanical seals, valve stem seals, flat seals and pistons rings made of advanced ceramics from CeramTec are used in pumps and pump housings in many industries across the world. They can be found in automotive, vehicle and mechanical engineering applications as well as in medical technology. The properties of aluminum oxide and silicon carbide are particularly valuable in these areas. Zirconium oxide and silicon nitride are also used. What the ceramic materials have in common is their unparalleled resistance against abrasive media as well as their chemical resistance when transporting aggressive or corrosive substances, even when they are being conveyed at high pressure and are hitting the components at high speeds and temperatures. The surface quality and macrostructure of the ceramic components can be precisely tailored to a given application, ensuring an optimal bearing couple – both as hard-on-hard and hard-on-soft variations. Mechanical seals can be manufactured up to a diameter of 1,000 millimeters.

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Reliable and Precise: Piezoceramic Applications

Precisely dosing minute amounts of fluids and gases requires utmost precision on the part of the micro membrane, dosing and medical pumps used for this purpose. Piezoceramics are perfect for this task. The piezoelectric actuators control the dosage amount with uncompromising reliability – even when dealing with minuscule quantities. Alternatively, ceramic components from CeramTec let you precisely control continuous and variable flow rates.

With their ability to convert mechanical influences such as pressure or acceleration into electrical signals, piezoceramics are also used in sensor technology. They are a tried-and-tested solution in numerous measurement processes, such as flow and level measurement, as well as in the detection of particles and air bubbles in substances. The ceramic experts at CeramTec offer first-class consultation services to tailor the piezoceramic material to a given application.

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All-Round Wear Protection with CeramTec

Also, peripheral systems such as pipes, funnels and chutes have to be well protected against mechanical and thermal stresses. This is where aluminum oxide, zirconium oxide, silicon carbide and silicon nitride come into their own. As wear protection and wear lining, these ceramic materials ensure process reliability in all applications involving the conveyance of solid, fluid or gaseous media. Advanced ceramics from CeramTec even withstand highly abrasive or corrosive substances for considerably longer periods than conventional materials. Available solutions range from individual ceramic plates to standard linings, composite systems and complete wear protection systems to highly complex, bespoke components for individual requirements.

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About CeramTec GmbH

CeramTec is a world-leading manufacturer of technical ceramics and is specialized in the development, manufacturing and sale of parts, components and products made from ceramic materials. With over a century of developmental and production experience, CeramTec is a global leader in the manufacturing of advanced ceramics and engineers these materials for use in a wide variety of applications. Advanced ceramics from CeramTec are used in a range of industries, including medical engineering, the automotive industry, electronics, energy and environmental engineering, as well as equipment and mechanical engineering. The current portfolio comprises well over 10,000 products, components and parts made from technical ceramics, along with a wide variety of ceramic materials.

With production sites and subsidiaries in Europe, America and Asia, CeramTec maintains its presence around the globe as a manufacturer and supplier. The company is headquartered in Plochingen, near Stuttgart. In 2018, CeramTec generated over €600 million in revenues. CeramTec employs more than 3,500 staff worldwide, around 2,000 of which are in Germany.

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