



MEASUREMENT & SENSORS

Advanced Ceramics and Ultrasonic
Technology for Measurement
and Sensor Applications

CeramTec
Your Partner of Choice



CeramTec – customised solutions for measurement and sensor applications

CeramTec is a world-leading manufacturer of technical ceramics and is specialised in the development and manufacturing of components made from ceramic materials. With over 100 years of experience in technical ceramics and more than 60 years of expert know-how in ultrasonic technology, we offer our customers unique globally networked engineering and solution competence.

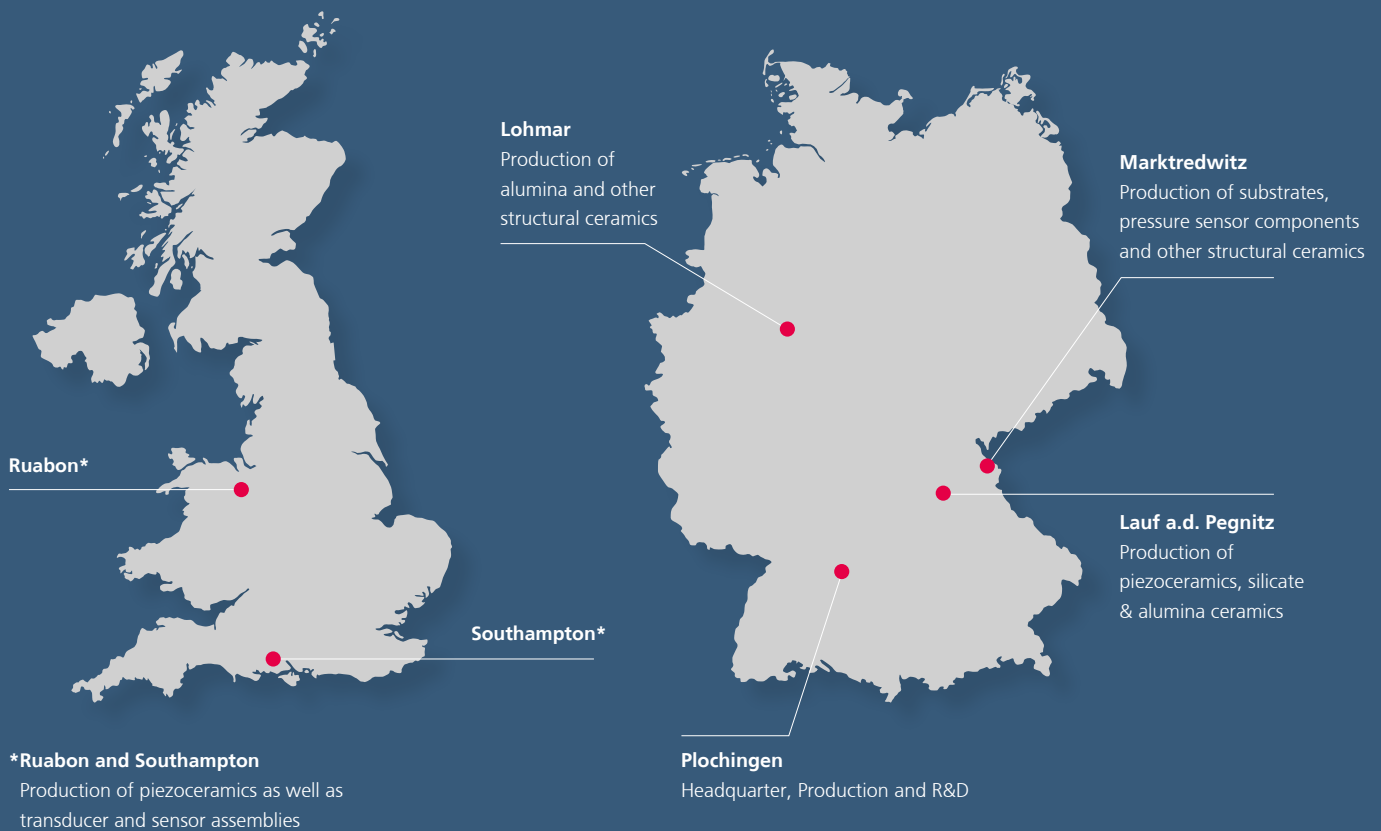
Our comprehensive solution portfolio covers ultrasonic technology and structural ceramics to ensure more precision, reliability and efficiency in a wide range of industrial applications.

As an established engineering partner, CeramTec provides individual complete solutions and assemblies that are precisely tailored to meet customer requirements in their particular application.

Our unique competencies

- Global experts in advanced ceramic materials and ultrasonic components
- Material expertise and development
- Modelling, simulation and product testing capabilities
- Variety of designs, shapes, sizes, functions and complete assemblies
- Vertical integration of the production process from powder production to sensor assembly
- Advanced solutions for high volume production
- High performance and safety requirements
- All production sites are at least certified according to ISO 9001 up to DIN EN ISO 13485 and IATF 16949 to ensure process reliability

Combined performance of six locations for millions of applications worldwide



Industry leading ultrasonic solutions

Our advanced sensors can be found in products across the globe and are the technical basis for various applications. From smart cities solutions such as flow meters and leak detectors to industrial process control and automation – piezoceramics are the heartbeat of modern-day acoustic and ultrasonic sensing technology. They are critical to a multitude of applications, enabling engineers and system designers around the world to break boundaries by delivering high accuracy sensing solutions.

Best-in-class structural ceramics

When it comes to sensor and measurement technology, the highest precision and reliability are essential. Customised high-performance ceramic components designed and manufactured by CeramTec with excellent material properties and a large design variety significantly support long-lasting functional operation and guarantee precise measurement results, even in harsh industrial environments.

The world in motion – ultrasonic measurement technology

Precise flow measurement with ultrasonic technology

CeramTec offers innovative high-performance piezoceramic solutions for reliable and precise flow measurement of liquid and gas flows using ultrasonic technology. CeramTec's ultrasonic solutions can be precisely tailored and designed to meet the respective application requirement.

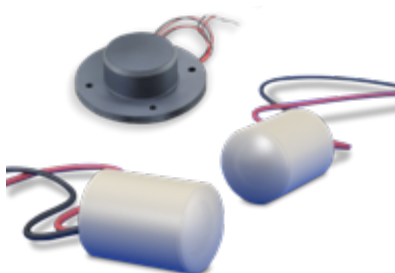
We specialise in the design and manufacture of fully assembled ultrasonic sensors for intelligent measuring devices. Using our inhouse produced piezoelectric ceramics we develop together with our customers highly customised components and off-the-shelf sensors for gas, water and heat metering.

Advantages of ultrasonic measurement

- Stable and consistent measurement results particularly at low flows, due to best in class zero flow offset over the entire operating temperature range
- Reliable operation: under high pressure, in a wide temperature range and in various environments, subject to calibration
- Best-in-class stability over temperature leading to reduced calibration times and more effective sensor linearisation
- Wide bandwidth and high sensitivity solutions for both liquids and gases
- Wear and motion-free, ultrasonic measurement reduces pressure lost and obstructions within the flow body
- Experience with drinking water approval (WRAS approval)
- Experience in testing and manufacturing sensors to MID standards, including accelerated life testing - pressure, humidity, temperature cycling, thermal shock and moisture resistance



Ultrasonic flow sensors



Ultrasonic level sensors



Ultrasonic air bubble sensors

Best-in class performance for piezoceramics, sensors & transducers

With three production sites – two in the UK and one in Germany, CeramTec is well equipped to provide excellent products for industrial measurement applications.

CeramTec can manufacture large-volume piezoceramic components (discs, rings, rectangular or square plates, focal bowls and hemispheres) according to customer requirements using dry pressing technology with SONOX® P and PZT materials. Metallisations (Ag, Ni, Ni/Au, Ni/Cr/Sn) are available for piezoceramic components. Special electrode designs (e.g. wrap-around electrodes) are also possible to realise extended functionalities and increase automation level at the customers production line.

With a selection of more than 20 different piezo material formulations, we are able to develop customer specific solutions for every application. We offer high volume, highly automated production with integrated 100 % In-Line inspection as well as craftsmanship production of special components with complex shapes in low volumes.

Applications

CeramTec wide range of piezoelectric materials and custom sensor capabilities supports applications like:

- Meteorology (anemometers and rain sensors)
- Flow metering (liquid and gaseous media)
- Level/Distance sensing
- Leak detection
- Non-destructive material testing
- Burglar alarms & property protection
- Air bubble detecting
- Wheel balancing
- Underwater object recognition
- Locating/navigating functions
- Knock sensors
- Acceleration sensors
- Energy harvesting
- Diagnostic and therapy equipment



Ultrasonic transducers



Piezoceramics in different shapes and sizes



Piezoceramic discs with wrap-around electrode

Challenging environment - structural ceramics for measurement devices



Advanced ceramic solutions for reliable measurement results

Sensitive sensor and measurement technology must function reliably in its process environment even under extreme operating conditions. Technical ceramics from CeramTec ensure durable function and precise measurement results.

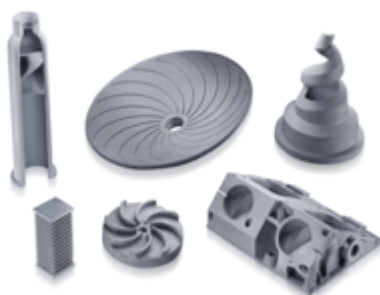
With a variety of over 40 structural ceramics materials CeramTec can manufacture ceramic components for individual customer requirements. It all begins with Silicate ceramics, which are the most traditional of all advanced ceramics. Oxide ceramics like Aluminum Oxide in various purity levels and Zirconium Oxide are manufactured in both low and high volumes.

Non-oxide ceramics like Silicon Carbide, Silicon Nitride and Aluminum Nitride are available in large scales as well. As this is only a selection of all available ceramic materials at CeramTec, in the end we can help determine a suitable material and design for most shapes and sizes together – all based on the customer's requirements.

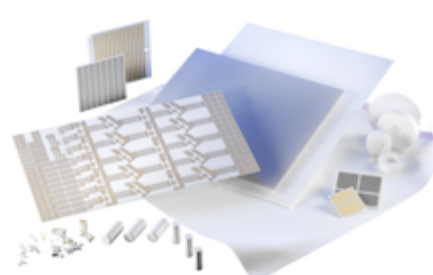
Challenges like high temperature, abrasion are easy to solve with ceramic material. The higher hardness in comparison to metal is also a real benefit. CeramTec's high variation of production capabilities include dry and isostatic pressing, extrusion, 3D printing, tape casting, injection moulding, metallisation, lasering and stamping to meet individual applications needs.



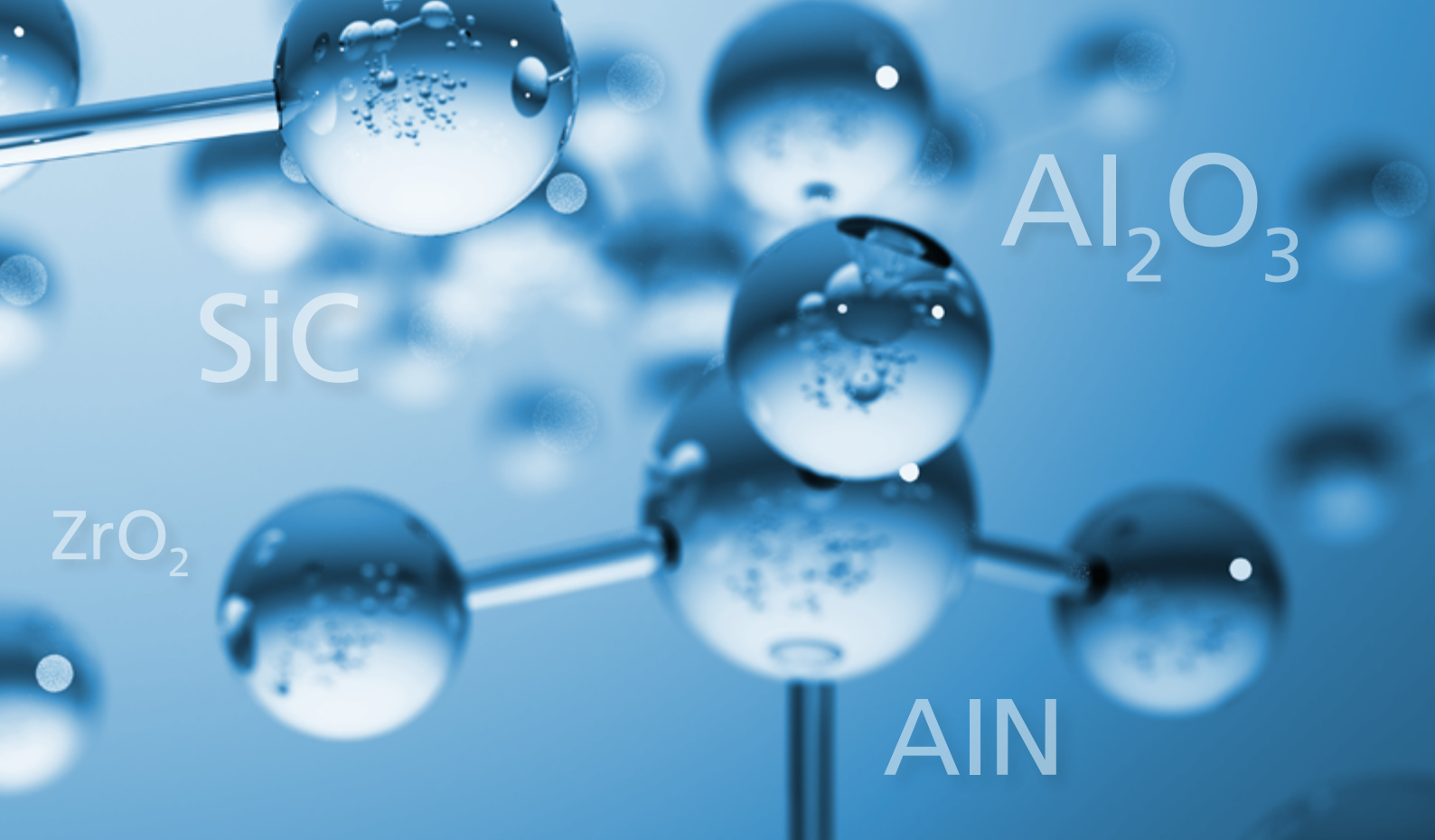
Ceramic membranes for pressure sensors



3D printed silicon carbide ceramics



*Aluminum oxide and nitride substrates
(lasered / metallized)*



ROCAR 3D printing - design freedom meets optimum material properties

CeramTec's 3D printing of silicon carbide is a real game changer in the world of advanced ceramic solutions. This new technology allows us maximum design variety combined with time and cost savings alongside optimal product quality. CeramTec's additive manufacturing specialists draw on their comprehensive expertise in ceramics to support you in the implementation of your projects. From the evaluation of data to the optimization of production – from single-batch customization to small-batch production.

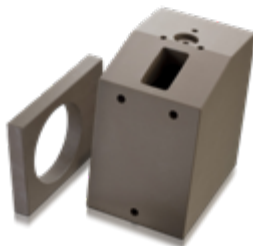
Applications

CeramTec's wide range of structural ceramics supports applications like:

- Pressure sensing
- Level sensing
- Temperature management
- Mass spectrometry
- Cooling technology
- Acceleration sensor
- Isolation from abrasive media
- Heat protection
- Metrology instruments
- Spectroscopy equipment



Protection and insulating tubes



Frequenta housing for spectroscopy



Silicate technology for heating and thermal engineering



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