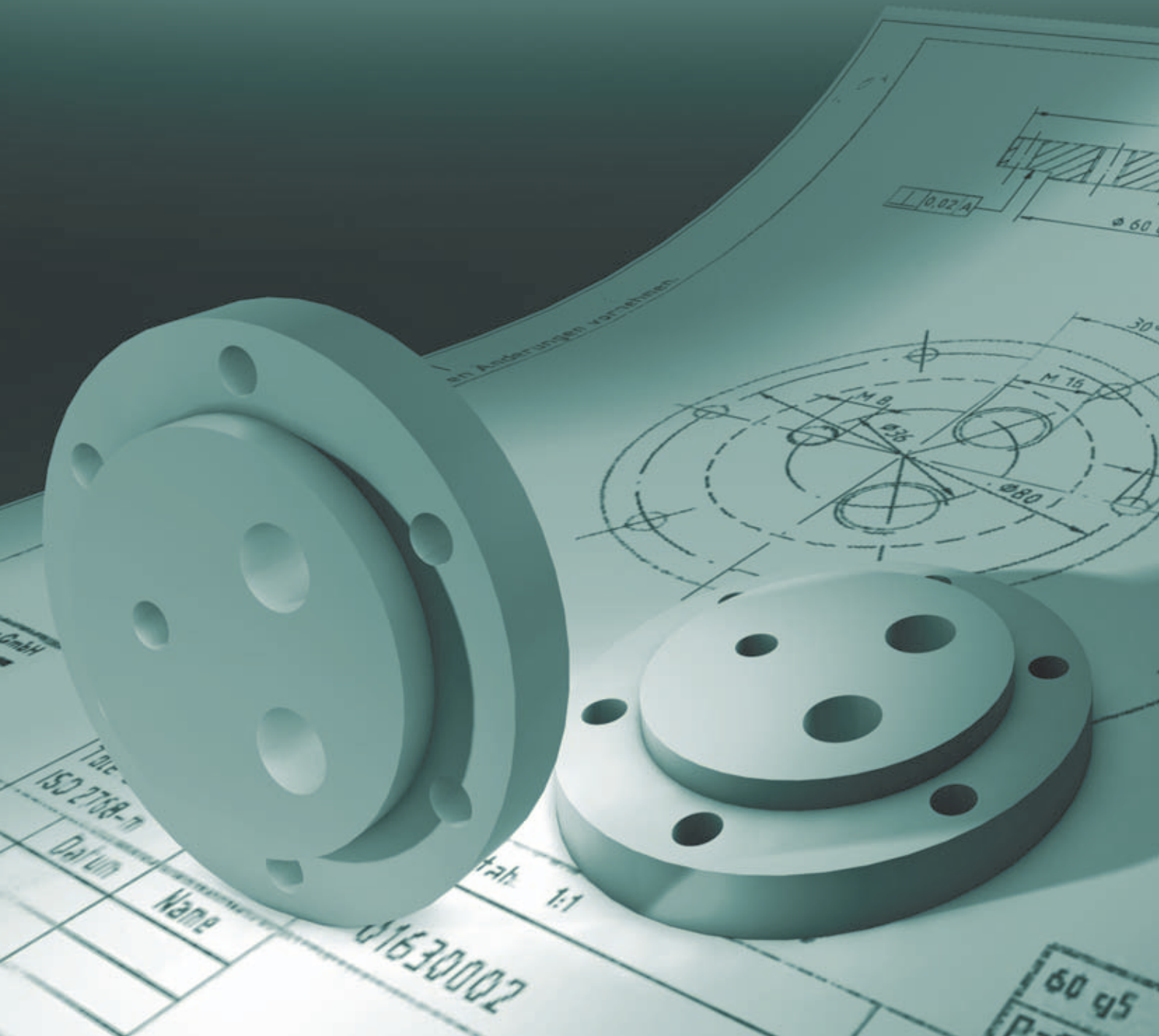


BCE[®]

Special Ceramics

COMPETENCE IN CERAMICS



MATERIALS

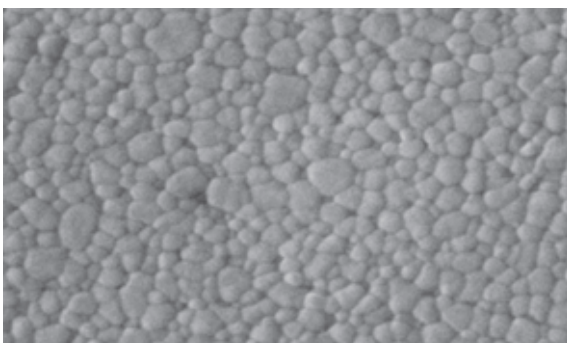
ZrO₂ – Zirconia

ZrO₂ is the candidate high-performance material among oxide ceramics. ZrO₂ shows excellent bending strength and fracture toughness behaviour and therefore is used as technical ceramic in several mechanical and apparatus engineering applications as well as prosthetic material in medical technology.

To improve the mechanical qualities of ZrO₂, stabilizing metal oxide additives such as CaO, MgO, Y₂O₃ or Ce₂O₃ are blended inducing transformation strengthening mechanism.

Al₂O₃ – Alumina

Al₂O₃ is most common ceramic material. The reason on the one hand is the nearly limitless availability and, on the other hand, the variety of material properties depending on purity, beginning with approx. 92% up to 99.99%, and the microstructure formation. Due to excellent tribological characteristics Al₂O₃ often is used as wear resistant material in different applications. Additionally Al₂O₃ offers excellent insulating properties over a wide temperature range for operation in electric devices.



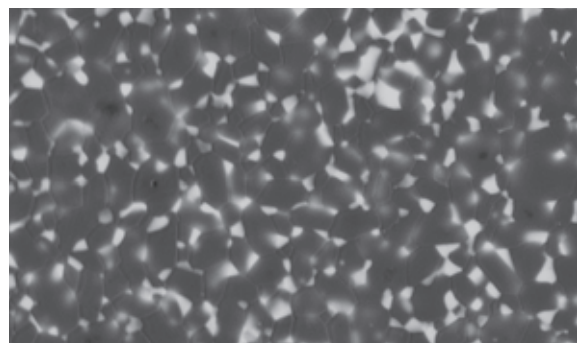
ZTA, ATZ – Mixed Oxides

The Mixed Oxides are mainly represented by the material groups ZTA (Zirconia Toughened Alumina) and ATZ (Alumina Toughened Zirconia). They are manufactured by mixing together the main components Al₂O₃ and ZrO₂ in different relations.

A strengthening of Al₂O₃ with typically volume shares up to 15% ZrO₂ causes an improvement of the material properties in comparison to pure Al₂O₃ in view of bending strength, fracture toughness and Youngs' Modulus.

Special materials

Embraced by the term special materials BCE summarizes all so called non-oxide high performance ceramics such as Silicon Nitride (Si₃N₄), Silicon Carbide (Si-infiltrated = SiSiC or Silicon-free sintered = SSiC), Boron Carbide (B₄C) and Aluminium Nitride (AlN). All mentioned candidates offer different specific properties aiming for different fields of application like excellent thermal shock behaviour, maximum wear resistance or very good thermal conductivity.





KNOW-HOW

The Company

BCE founded in 1986 in Mannheim-Friedrichs-
feld manufactures customized oxide ceramic
components made out of Alumina (Al_2O_3)
and Zirconia (ZrO_2) and mixed oxides ATZ re-
spectively ZTA and secondary out of non-oxide
ceramics starting with lot sizes from one part.

Based on more than 25 years experience in the
field of engineering ceramics BCE assists all
its customers in questions of an optimum
material choice for specific applications. Even
a prototype manufacturing can be realized
in short lead time before launching a series
production.

Use our knowledge! We are pleased to find out
your candidate appropriate material and your
optimum constructional solution.



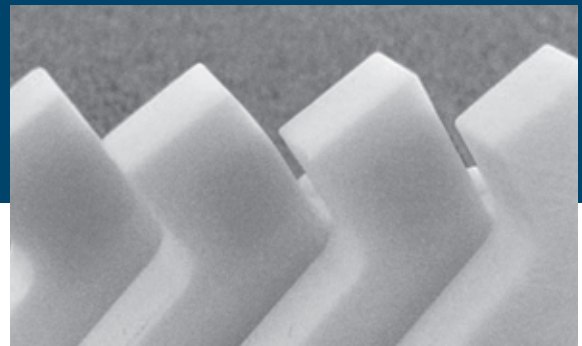


The Philosophy

BCE manufactures customized high-performance ceramic components – from our self-image we guarantee our customers same loyalty in questions of lead time and product quality for prototype production and midsize series manufacturing. We are not satisfied until our customer is fully pleased with our work!

Another success of BCE is the continuous engagement of the management board to the staff's motivation. Our highly qualified employees are skilled accordingly to their abilities by regular, intensive education and training measures. By the rotational change of our personnel on the different processing machines and equipment we prevent monotonous work routines and win, on the other hand, the greatest possible flexibility in the production planning. According to our motto: no long lasting customer relation without contented and motivated employees!

By innovative manufacturing methods we offer our customer – depending on different lot sizes and material specification – always the optimum in manufacturing efficiency and product quality.



PRODUCTS

Prototype Production

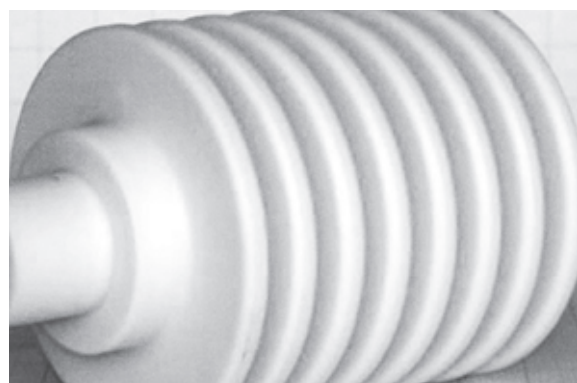
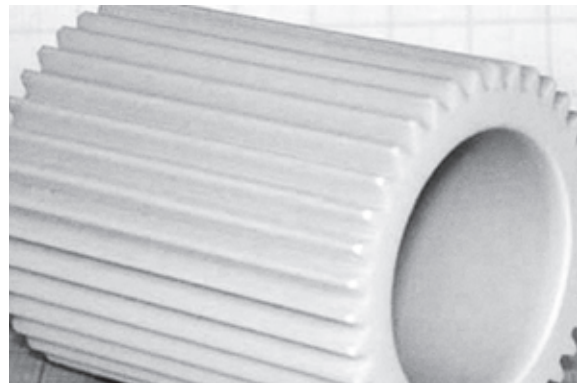
With the help of the CNC-supported green part manufacturing process BCE realizes customized components with moderate tooling costs in short lead times for an attractive price. Starting with commercially available, granulated raw materials the different powders were compacted in a cold isostatic press (CIP) with hydrostatic pressures of 600 – 2100 bar to homogeneous green bodies.

Afterwards the chalk-like blank can be treated with familiar machining procedures like drilling, turning and milling to desired geometries considering a linear or a geometry-related anisotropic shrinkage of approximately 16–25%. Complex geometries or free-form surfaces are worked out with the help of modern CAD-CAM systems on 3-axis or 5-axis milling centers.

The geometry of “as fired” parts meet generally tolerances according to DIN 2768 medium to coarse – depending on the applied material quality and respectively the component geometry. For highly exact structures in μm range BCE offers highest modern grinding and finishing machines.

Small Series and Midsize Series Manufacturing

With the optimization of special processing steps in the manufacturing process BCE is also able to offer small and midsize series in economical way. Lot sizes are dependent on component geometries and must be judged individually. By our quality management system according to DIN EN 9001:2000 we assure our customers a complete documentation of all process steps for a long lasting high quality control.



Areas of Application

BCE high-performance ceramics show high strengths, hardness, thermal and chemical resistances as well as high electric insulating properties. Therefore the manufactured components are used in several following application areas:

- Mechanical and apparatus engineering
- Wear and corrosion prevention
- Chemical and pharmaceutical technology
- Food industry
- Medicine technology
- Forming technology
- Brazing and welding technology
- Measuring technology
- Aviation and astronautics
- Research & development



PRECISION COMPONENTS IN HIGH-PERFORMANCE CERAMICS



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