HIGH PERFORMANCE **CERAMICS**

High precision parts in advanced ceramics

MATERIAL DEVELOPMENT
HIGH PRESSURE INJECTION MOLDING
CNC MACHINING IN THE GREEN STATE
3D CAD / CAM
3D CERAMIC PRINTING
PROTOTYPING
HARD CNC MACHINING
QUALITY MANAGEMENT

ceramaret

SMALL COMPONENTS FOR **GRANDIOSE SOLUTIONS**

The company, **Ceramaret GmbH**, is based in Meissen and acts as an innovative and flexible manufacturer on the growth market of technical ceramics. Our material range includes oxide ceramics such as **alumina** and **zirconia**, and non-oxide ceramics, such as **silicon carbide** and **silicon nitride**.

The **development of appropriate material for individualized applications** as well as designs particularly suitable for ceramics are among our services just like rapid **prototyping, small and medium scale production** and efficient **large-scale manufacturing.**

Components for medical technology

In medical technology ceramics are characterized by a high biocompatibility. Ceramics are also resistant against body fluids.

Zirconia blanks for dental milling

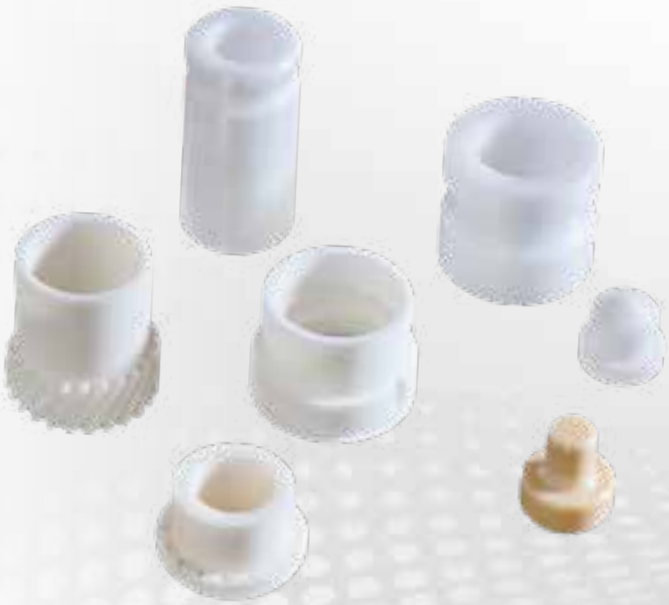
Dental zirconia blanks made by Ceramaret are used to produce copings, bridges and abutments.

Watch industry and jewelry

A luxurious look and an extremely high scratch resistance as they are provided by technical ceramics are qualities being strongly in demand for watch components as well as for chain links, bezels, rings and pendants.

Components for dental technology

The great advantage of the use of ceramics in the dental field is what we call biocompatibility. Thus, for example the risks of allergy are completely excluded.



INNOVATIVE **CERAMIC** SOLUTIONS

A wide range of processing techniques ensures optimum accuracy of our high-performance ceramic components for application fields such as electronics, chemistry, sensor- and analysis technology, medical technology, any technology requiring high temperature- and wear resistance and research.

Our range includes the following ceramics:

- Alumina and zirconia
- Silicon carbide
- Silicon nitride
- Special materials with special compositions

HIGH PERFORMANCE **CERAMICS** MADE IN MEISSEN

Technical ceramics possess properties that are needed especially for many devices, machines and production plants. They meet specific mechanical, chemical and electrical requirements which make them more appropriate to use than conventional materials.

Components for analytical technology

Excellent thermal resistance and resistance against aggressive media are the advantageous properties of ceramics.

Components for injector technology

In injector technology, ceramics play a major role thanks to their excellent properties in terms of wear resistance, hardness, toughness and heat resistance.

Sensor technology

Good electrical insulation, high strength and chemical resistance throughout the entire pH range are the advantages of ceramic materials in the field of sensor technology.

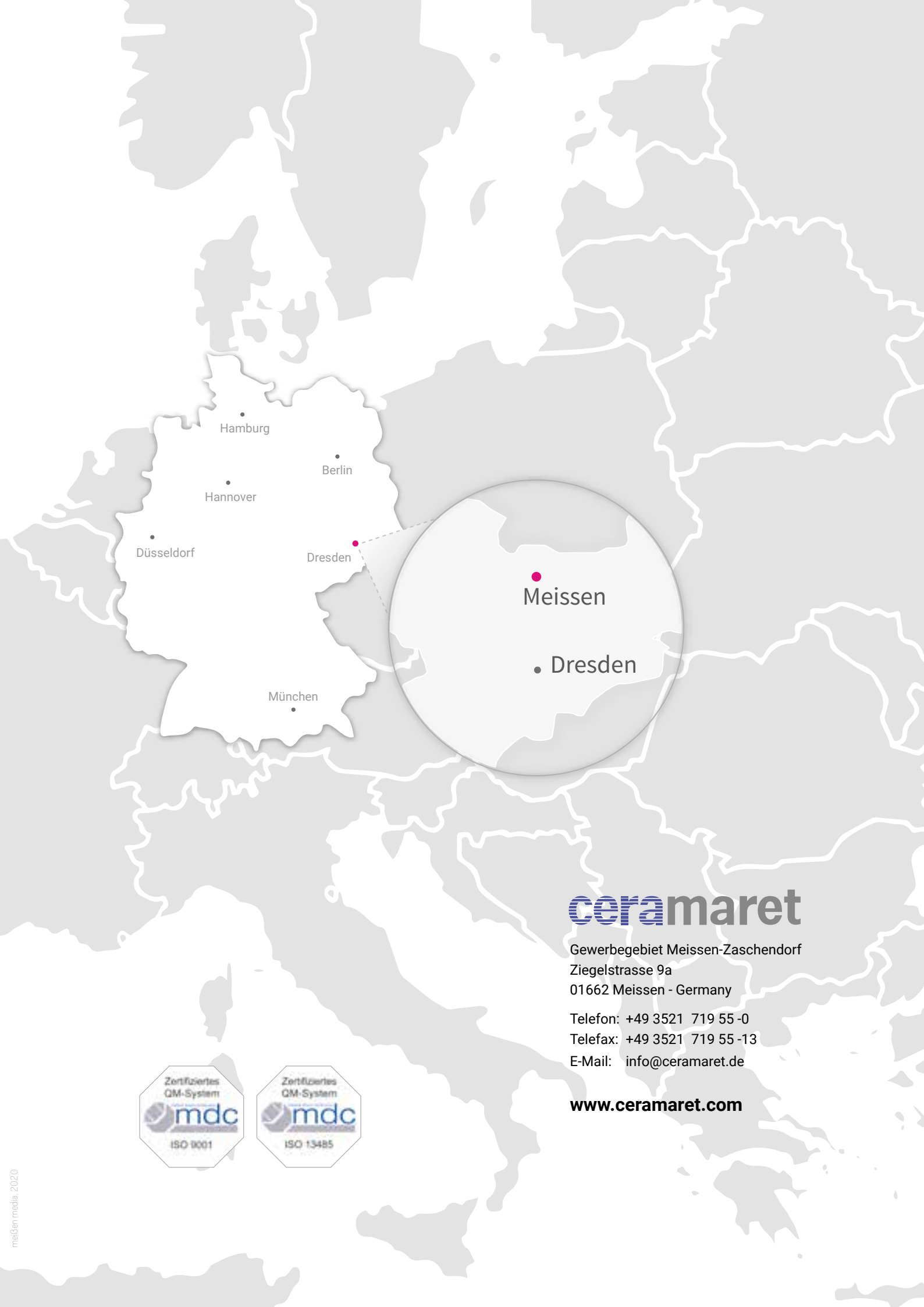
Laser technology

Its high dielectric rigidity and its high resistance against optical radiation make ceramic a material which is very well suited for laser technology.

Material Properties

Material		Alumina Al_2O_3 99,7%	Zirconia Y-TZP 3mol% Y_2O_3	ATZ 80% ZrO_2 / 20% Al_2O_3	ZTA 86 % Al_2O_3 / 14% ZrO_2	Silicon carbide sintered in liquid phase LPSSiC	Silicon nitride / Titanium nitride Si_3N_4-TiN
Color		white, slightly yellow	white (slightly translucent)	white (opaque)	white (opaque)	dark gray	golden
Structural Properties							
Density	g/cm³	> 3,9	> 6,0	5,5	4,1	3,22	3,9
Open porosities	%	0	0	0	0	0	0
Average crystallite size	µm	4	0,4	0,7	0,5	2	5
Mechanical properties							
Vickers hardness (HV_{10})	GPa	19	12	14	17	20	15
Compressive strength	MPa	3000	2200	2100	2600	3000	3000
Flexural strength (4 points)	MPa	350	1200	1395	600	500	700
Toughness	$MPam^{1/2}$	4,3	10	5	7	5	8,5
Modulus of elasticity	GPa	370	210	220	360	400	330
Weibull modulus	-	10	10	10	10	15	>15
Poisson's ratio	-	0,22	0,3	0,27	0,24	0,19	
Thermal properties							
max. operating temperature under protective inert gas	°C	1650	1200	1200	1000	1500	1000
max. operating temperature in air	°C	1650	1200	1200	1000	1500	900
Specific heat (20 °C)	J/kgK	900	400	600	700		
Thermal conductivity (100° C)	W/mK	30	2,5	6	25	80	45
Coefficient of expansion	$10^{-6}K^{-1}$	7,6	10,5	9	9	4,9	6
Thermal fatigue resistance	K	180	300	300	250	200	600
Electrical properties							
Specific resistance (20 °C)	Ohm*cm	10^{14}	10	10	10		1*10-4
Specific resistance (1000 °C)	Ohm*cm	10	10^3	10^2	10		
Dielectric strength	kV/mm	25					
Relative permittivity / Dielectric constant (20 °C / 1 GHz)	-	9	>20	>20			
Dissipation Factor (20 °C / 1 GHz)	-	$2*10^{-4}$					
Dissipation Factor (20 °C / 10 kHz)	-	10^{-4}					

Permissible dimensional deviations according to DIN 40680. Technical values according to IEC 672 and DIN VDE 0335.



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Zertifiziertes QM-System mdc ISO 9001

Zertifiziertes QM-System mdc ISO 13485