

Intro

Company

Materials

Production

Video

Applications

Quality

Environment

References

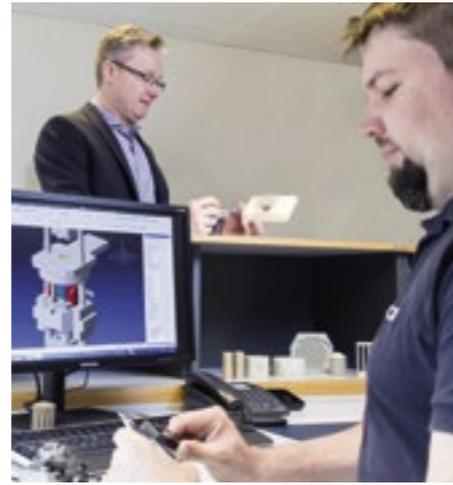
Corporate presentation

VOGT

The company at a glance

- Intro
- Company**
- Materials
- Production
- Video
- Applications
- Quality
- Environment
- References

CONSTRUCTION ◀



TOOLMAKING ▲



▶ GREEN MACHINING



The company at a glance

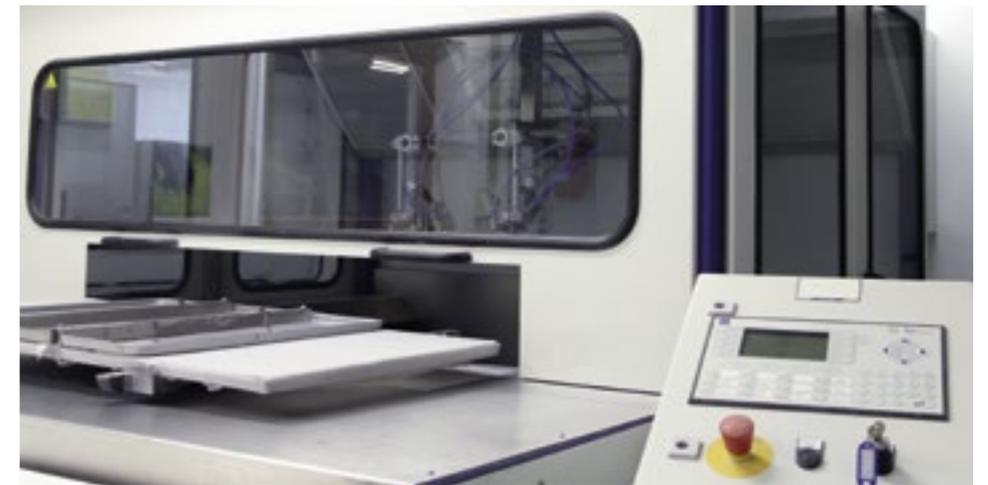
- Intro
- Company**
- Materials
- Production
- Video
- Applications
- Quality
- Environment
- References



► DRY PRESSING



SINTERING ◀



FINISHING
ASSEMBLY

QUALITY
ASSURANCE ◀



The company at a glance

Equipment of our production area of about 4.000 square metres:

Ceramic production:

- 20 powder press machines of 4 to 120 tons
- 4 vacuum extrusions presses
- 1 injection moulding machine
- 8 sintering kilns from 2 - 2500 liters of volume until Max. 1750°C

Green-part-treatment:

- 7 turning machines
- 6 drilling machines
- 2 milling machines
- 3 separation-machines

Grinding:

- CNC cylindrical grindingmachine
- Centerless grindingmachine
- Honemachine D1,0-40mm
- Double sided face grindingmachine
- Single sided polish- and lapmachine
- CNC surface grinding machine
- Centrifuge for coolant cleaning and temperature control

Tool manufacturing:

- CNC 5-axes milling machine
- CNC wire-cut EDM
- CNC die sinking EDM
- CAD/CAM program system 2D/3D
- Grinding machines
- 2 conventional milling machines
- 2 turning machines
- Drilling machine

Materials

Properties and technical values

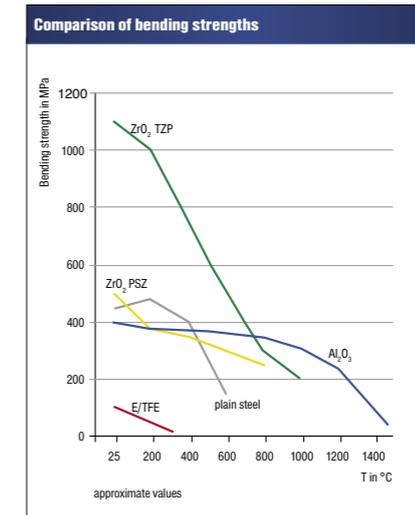
Intro
Company
Materials
Production
Video
Applications
Quality
Environment
References

Properties	Symbol	Unit	Steatite C221	Steatite porous C230	Cordierite C410	Cordierite porous C520	Mullite C620	Aluminium oxide C795	Aluminium oxide C799	Zirconium oxide Y ₂ O ₃ partially stabilized C830 / TZP	Zirconium oxide MgO partially stabilized C830 / PSZ	Aluminium titanate ATI	
Mechanical (at room temp.)													
Open porosity	P _a	% by vol.	0	35	0,5	20	0	0	0	0	0	7-16	
Min. density	ρ _a	g/cm ³	2,7	1,8	2,1	1,9	2,8	3,7	3,9	6,0	5,7	3,5	
Compressive strength	σ _{dB}	MPa	900	100	300	200	-	1800	2100	2200	1800	450	
Bending strength	σ ₉₀	MPa	140 ¹⁾	30 ¹⁾	60 ¹⁾	25 ¹⁾	150 ²⁾	280 ²⁾	300 ²⁾	1100 ¹⁾	500 ¹⁾	40 ²⁾	
Modulus of elasticity	E	GPa	110	-	-	-	150	280	300	205	205	35	
Mohs' hardness (index)	MH	Diamond=1	7	-	7	6	7	9	9	8	6,5	-	
Vickers hardness	HV ₁₀	GPa	-	-	-	-	-	12-15	17-23	12	9	5	
Thermal													
Coefficient of thermal linear expansion	20-100°C	α _t	10 ⁻⁶ K ⁻¹	6-8	8-10	1-3	3-6	5-6	5-7	5-7	8-9	8-9	0,5
	20-300°C	α _t	10 ⁻⁶ K ⁻¹	7-9	8-10	1-3	4-6	5-6	6-7,5	6-8	9-11	9-11	0,5 - 1,5
	20-600°C	α _t	10 ⁻⁶ K ⁻¹	7-9	8-10	2-4	4-6	5-7	6-8	7-8	10-12	10-12	1 - 2
	20-1000°C	α _t	10 ⁻⁶ K ⁻¹	8-9	-	2-4,5	4-6	5-7	7-9	7-9	11-13	11-13	1,5 - 2
Specific heat capacity	c _p	Jkg ⁻¹ K ⁻¹	800-900	800-900	800-1200	750-850	850-1050	850-1050	850-1050	450-500	450-550	800	
Thermal conductivity	λ	Wm ⁻¹ K ⁻¹	2-3	1,5-2	1,5-2,5	1,3-1,8	6-15	16-28	19-30	1,2-3,5	1,2-3,5	1,5-2,5	
Resistance to thermal shock	ΔT	K	100	-	250	200	150	140	150	80	80	700	
Max. application temperature	T	°C	1200	900	1200	1200	1200	1400	1500	1000	800	900	
Electrical													
Electric strength	E _d	kVmm ⁻¹	20	-	10	-	15	15	17	-	-	-	
Withstand voltage (1-min.)	U	kV	30	-	15	-	20	18	20	-	-	-	
Dielectric constant	48-62Hz	ε _r	-	6	-	5	-	8	9	9	22	22	-
	Dissipation factor 20°	48-62Hz	tanδ	10 ⁻³	1,5	-	25	-	0,5	0,2	-	-	-
		1kHz	tanδ	10 ⁻³	-	-	-	-	1	0,5	-	-	-
Volume resistivity	1MHz	tanδ	10 ⁻³	1,2	-	7	-	1	1	2	2	-	
	20°C	ρ _v	Ωcm	10 ¹³	-	10 ¹²	-	10 ¹³	10 ¹⁴	10 ¹⁴	10 ¹¹	10 ¹¹	10 ¹⁴
	200°C	ρ _v	Ωcm	10 ¹¹	10 ¹⁰	10 ⁸	10 ⁹	10 ¹¹	10 ¹²	10 ¹²	-	-	
T for volume resistivity	600°C	ρ _v	Ωcm	10 ⁷	10 ⁷	10 ⁵	10 ⁵	10 ⁶	10 ⁸	10 ⁹	10 ³ -10 ⁶	10 ³ -10 ⁶	10 ⁹
	100 MΩcm	T _{k100}	°C	500	500	200	-	300	500	500	100	100	-
	1 MΩcm	T _{k1}	°C	800	800	400	500	600	800	800	350	350	-
Tracking behaviour	KF	KC-steps	600	600	600	600	-	600	600	600	600	-	

Admissible dimensional deviations in mm								
Nominal size range	≤4	≤6	≤8	≤10	≤13	≤16	≤20	>20
Tolerance according to DIN 40680 mean	±0,15	±0,2	±0,25	±0,3	±0,35	±0,4	±0,45	±2,0%
Restricted tolerance Class I to be agreed upon	±0,1	-	±0,15	-	±0,2	-	±0,25	±1,5%
Restricted tolerance Class II to be agreed upon	-	±0,1	-	-	±0,15	-	±0,2	±1,0%
Shape and position Tolerance according to DIN 40680-2m	e.g. straightness 0,5% of the length independent according to DIN ISO 8015							
Precision finishing	Tolerances as required grinding, lapping, polishing, honing etc.							

Material comparison	C221	C230	C410	C520	C620	C795	C799	C830	ATI	Metal	Plastics
Mechanical											
Strength	0	--	-	--	0	+	+	++	-	0	--
Density	-	--	-	--	-	0	+	++	0	++	--
Hardness	0	--	0	-	0	+	++	+	-	0	--
Wear resistance	0	--	-	-	0	+	++	++	-	-	--
Thermal											
Conductivity	-	-	-	-	0	++	++	-	-	++	--
Thermal linear expansion	0	+	--	-	0	0	0	+	--	+	++
Resistance to thermal shock	0	0	+	+	0	0	0	-	++	++	-
High temperature stability	+	0	+	+	+	++	++	0	++	-	--
Electrical											
Electrical insulation	++	-	0	--	+	+	+	0	+	--	++
Dielectric constant	-	-	-	-	0	0	0	++	-	-	-
Dissipation factor	-	-	++	-	-	-	-	-	-	-	-
Chemical resistance	0	--	-	-	0	+	++	+	0	-	--

++ very high + high 0 average - low -- very low



Materials

Properties (Table 1)

Properties		Symbol	Unit	Steatite C221	Steatite porous C230	Cordierite C410	Cordierite porous C520	Mullite C620
Mechanical (at room temp.)								
Open porosity		P_a	% by vol.	0	35	0,5	20	0
Min. density		ρ_a	g/cm ³	2,7	1,8	2,1	1,9	2,8
Compressive strength		σ_{dB}	MPa	900	100	300	200	-
Bending strength		σ_{bB}	MPa	140 ¹⁾	30 ¹⁾	60 ¹⁾	25 ¹⁾	150 ²⁾
Modulus of elasticity		E	GPa	110	-	-	-	150
Mohs' hardness (index)		MH	Diamond=1	7	-	7	6	7
Vickers hardness		HV ₁₀	GPa	-	-	-	-	-
Thermal								
Coefficient of thermal linear expansion	20-100°C	α_t	10 ⁻⁶ K ⁻¹	6-8	8-10	1-3	3-6	5-6
	20-300°C	α_t	10 ⁻⁶ K ⁻¹	7-9	8-10	1-3	4-6	5-6
	20-600°C	α_t	10 ⁻⁶ K ⁻¹	7-9	8-10	2-4	4-6	5-7
	20-1000°C	α_t	10 ⁻⁶ K ⁻¹	8-9	-	2-4,5	4-6	5-7
Specific heat capacity	20-100°C	c_p	Jkg ⁻¹ K ⁻¹	800-900	800-900	800-1200	750-850	850-1050
Thermal conductivity	20-100°C	λ	Wm ⁻¹ K ⁻¹	2 - 3	1,5 - 2	1,5 - 2,5	1,3 - 1,8	6-15
Resistance to thermal shock		ΔT	K	100	-	250	200	150
Max. application temperature		T	°C	1200	900	1200	1200	1200
Electrical								
Electric strength		E_d	kVmm ⁻¹	20	-	10	-	15
Withstand voltage (1-min.)		U	kV	30	-	15	-	20
Dielectric constant	48-62Hz	ϵ_r	-	6	-	5	-	8
Dissipation factor 20°	48-62Hz	$\tan\delta$	10 ⁻³	1,5	-	25	-	-
	1kHz	$\tan\delta$	10 ⁻³	-	-	-	-	-
	1MHz	$\tan\delta$	10 ⁻³	1,2	-	7	-	-
Volume resistivity	20°C	ρ_v	Ω cm	10 ¹³	-	10 ¹²	-	10 ¹³
	200°C	ρ_v	Ω cm	10 ¹¹	10 ¹⁰	10 ⁸	10 ⁹	10 ¹¹
	600°C	ρ_v	Ω cm	10 ⁷	10 ⁷	10 ⁵	10 ⁵	10 ⁶
T for volume resistivity	100 M Ω cm	T_{k100}	°C	500	500	200	-	300
	1 M Ω cm	T_{k1}	°C	800	800	400	500	600
Tracking behaviour		KF	KC-steps	600	600	600	600	-

Materials

Properties (Table 2)

Properties		Aluminium oxide C795	Aluminium oxide C799	Zirconium oxide Y ₂ O ₃ partially stabilized C830 / TZP	Zirconium oxide MgO partially stabilized C830 / PSZ	Aluminium titanate ATI
Mechanical (at room temp.)						
Open porosity		0	0	0	0	7 - 16
Min. density		3,7	3,9	6,0	5,7	3,5
Compressive strength		1800	2100	2200	1800	450
Bending strength		280 ²⁾	300 ²⁾	1100 ¹⁾	500 ¹⁾	40 ²⁾
Modulus of elasticity		280	300	205	205	35
Mohs' hardness (index)		9	9	8	6,5	-
Vickers hardness		12-15	17-23	12	9	5
Thermal						
Coefficient of thermal linear expansion	20-100°C	5-7	5-7	8-9	8-9	0,5
	20-300°C	6-7,5	6-8	9-11	9-11	0,5 - 1,5
	20-600°C	6-8	7-8	10-12	10-12	1 - 2
	20-1000°C	7-9	7-9	11-13	11-13	1,5 - 2
Specific heat capacity	20-100°C	850-1050	850-1050	450-500	450-550	800
Thermal conductivity	20-100°C	16 - 28	19 - 30	1,2 - 3,5	1,2-3,5	1,5 - 2,5
Resistance to thermal shock		140	150	80	80	700
Max. application temperature		1400	1500	1000	800	900
Electrical						
Electric strength		15	17	-	-	-
Withstand voltage (1-min.)		18	20	-	-	-
Dielectric constant	48-62Hz	9	9	22	22	-
Dissipation factor 20°	48-62Hz	0,5	0,2	-	-	-
	1kHz	1	0,5	-	-	-
	1MHz	1	1	2	2	-
Volume resistivity	20°C	10 ¹⁴	10 ¹⁴	10 ¹¹	10 ¹¹	10 ¹⁴
	200°C	10 ¹²	10 ¹²	-	-	-
	600°C	10 ⁸	10 ⁸	10 ³ -10 ⁶	10 ³ -10 ⁶	10 ⁹
T for volume resistivity	100 MΩcm	500	500	100	100	-
	1 MΩcm	800	800	350	350	-
Tracking behaviour		600	600	600	600	-

Materials

Admissible dimensional deviations

Admissible dimensional deviations in mm								
Nominal size range	≤ 4	≤ 6	≤ 8	≤ 10	≤ 13	≤ 16	≤ 20	> 20
Tolerance according to DIN 40680 mean	± 0,15	± 0,2	± 0,25	± 0,3	± 0,35	± 0,4	± 0,45	± 2,0%
Restricted tolerance Class I to be agreed upon	± 0,1	-	± 0,15	-	± 0,2	-	± 0,25	± 1,5%
Restricted tolerance Class II to be agreed upon	-	± 0,1	-	-	± 0,15	-	± 0,2	± 1,0%
Shape and position Tolerance according to DIN 40680-2m	e.g. straightness 0,5% of the length independent according to DIN ISO 8015							
Precision finishing	Tolerances as required grinding, lapping, polishing, honing etc.							

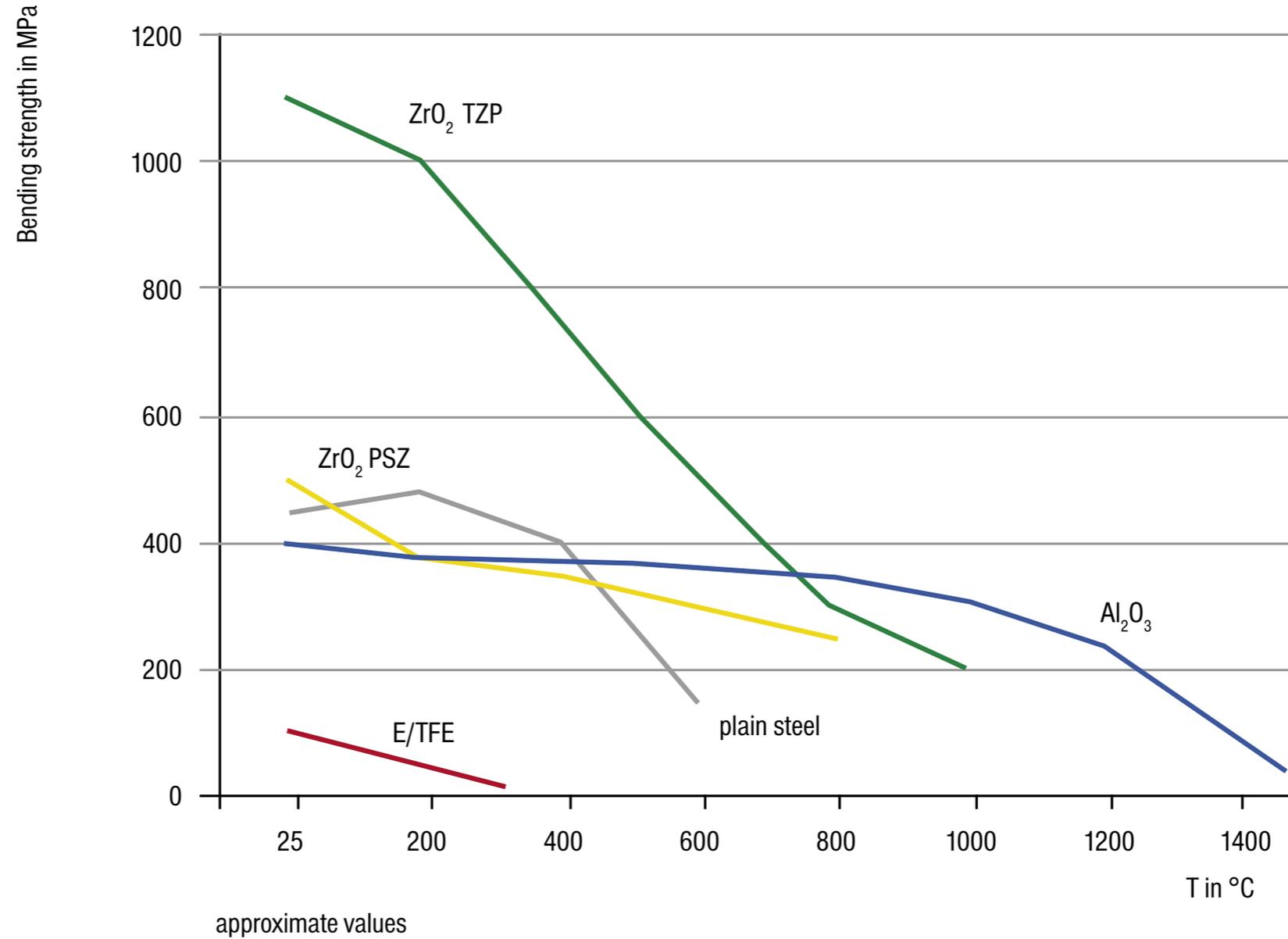
Materials

Mechanical, thermal and electrical properties

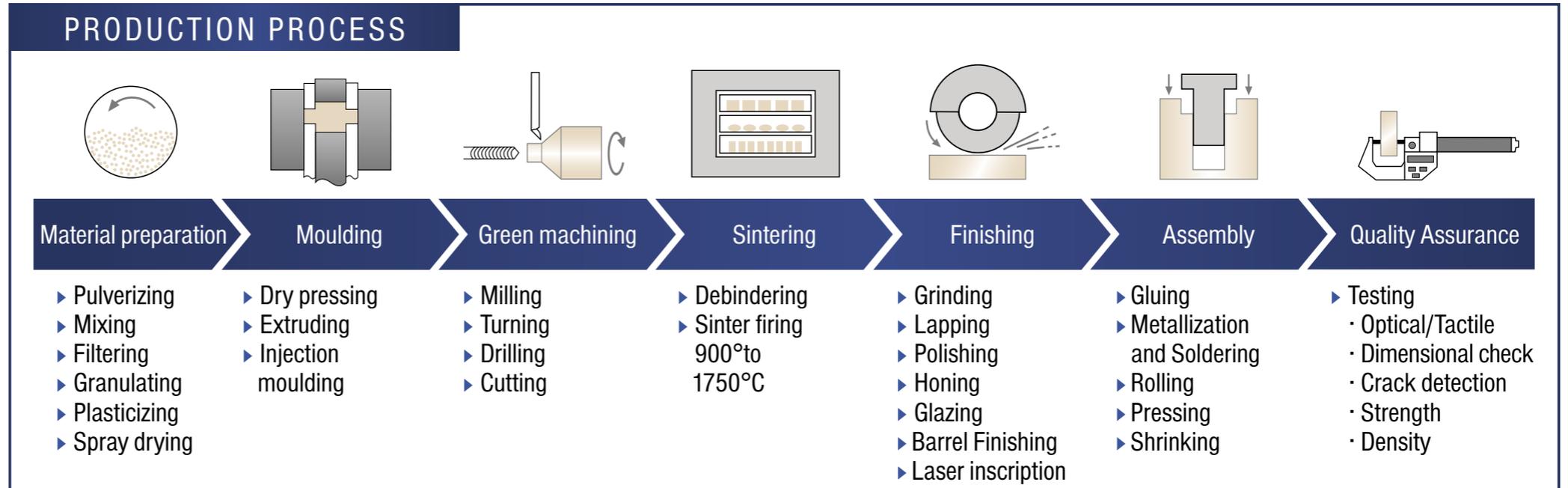
- Intro
- Company
- Materials**
- Production
- Video
- Applications
- Quality
- Environment
- References

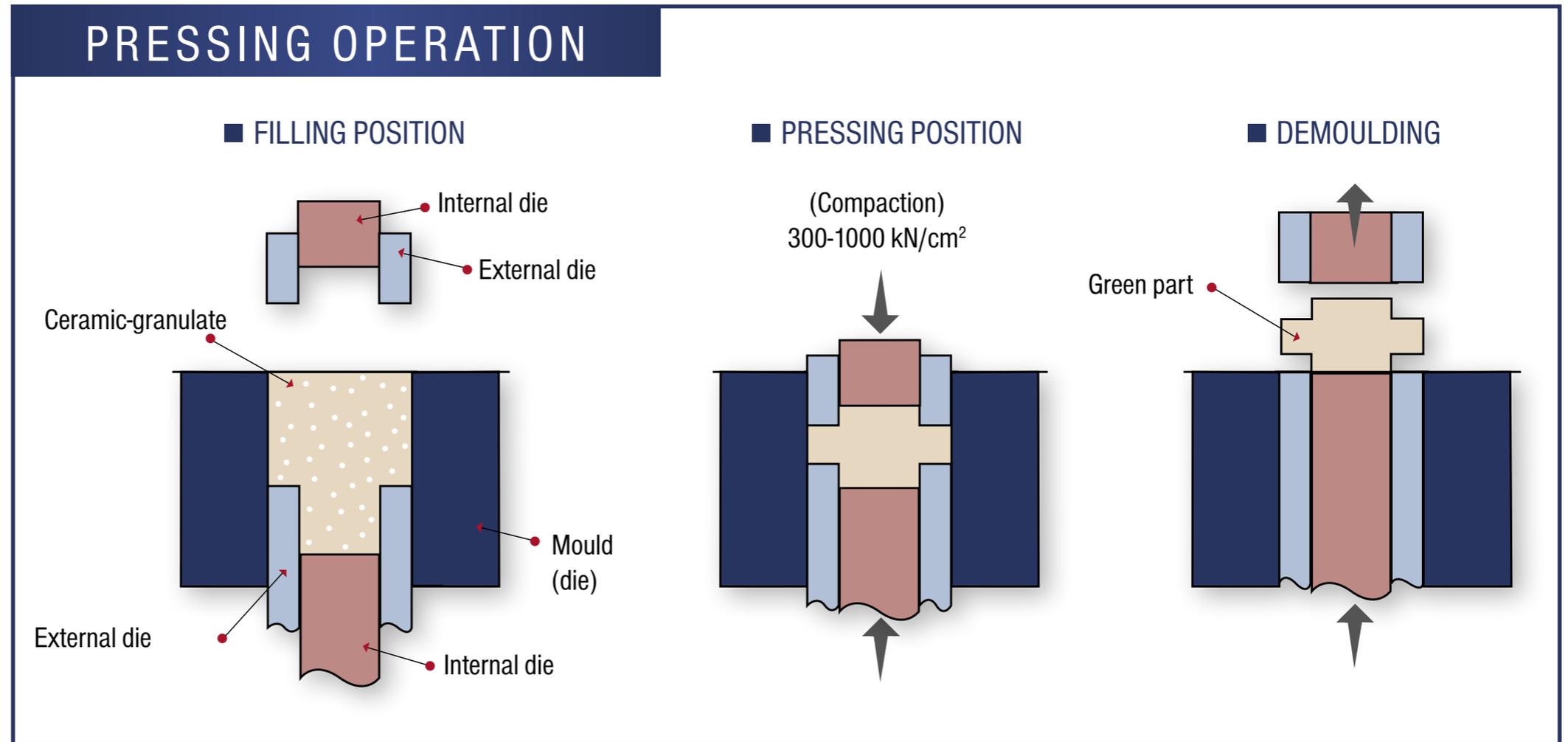
Material comparison	C221	C230	C410	C520	C620	C795	C799	C830	ATI	Metal	Plastics
Mechanical											
Strength	0	--	-	--	0	+	+	++	-	0	--
Density	-	--	-	--	-	0	+	++	0	++	--
Hardness	0	--	0	-	0	+	++	+	-	0	--
Wear resistance	0	--	-	-	0	+	++	++	-	-	--
Thermal											
Conductivity	-	-	-	-	0	++	++	-	-	++	--
Thermal linear expansion	0	+	--	-	0	0	0	+	--	+	++
Resistance to thermal shock	0	0	+	+	0	0	0	-	++	++	-
High temperature stability	+	0	+	+	+	++	++	0	++	-	--
Electrical											
Electrical insulation	++	-	0	--	+	+	+	0	+	--	++
Dielectric constant	-		-		0	0	0	++			
Dissipation factor	-		++			-	--	-			
Chemical resistance	0	--	-	-	0	+	++	+	0	-	--

Comparison of bending strengths



Manufacturing process in detail





Videos

On our YouTube channel you will find some videos about manufacturing and production.



Milling and grinding

Image

Assembly

Pressing

Tool-Making



Sealing and regulating discs
Valves
Pump components



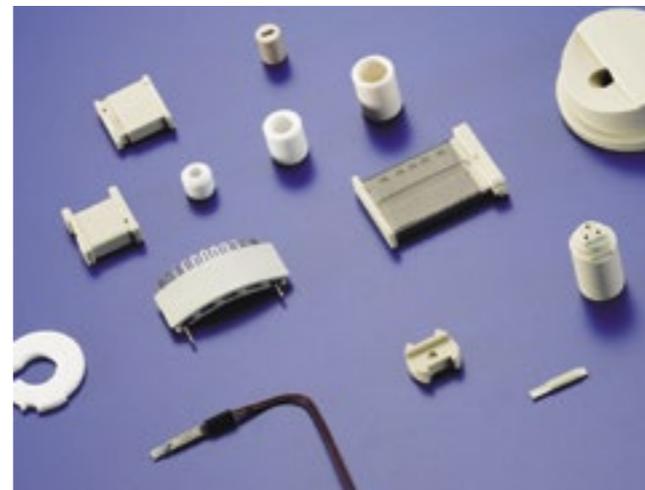
Parts for processing plant and
apparatus engineering



Pressure sensors
Sensor holder
Temperature sensors



Nozzles



Automotive components



Ceramics-metal composites



Bushes and break tubes
 Heater formers
 Structural parts



Components for household appliances
 Temperature controllers
 Thermoelement plug and -socket
 connectors



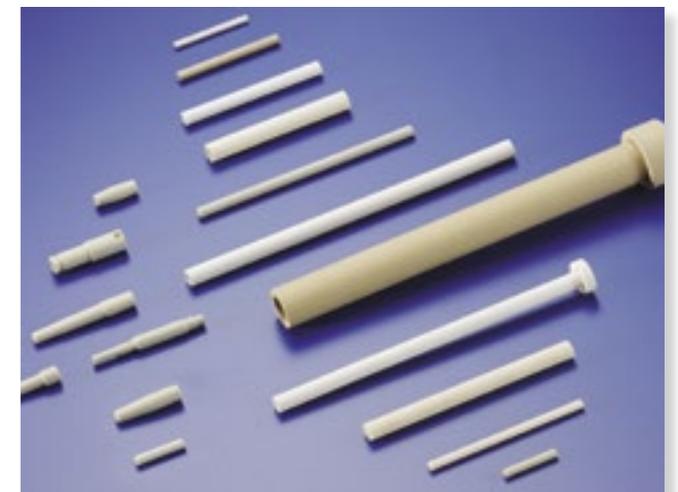
Insulators



Lamp sockets



Lamp holders



Tubes, Axes, measuring components



Sealing and regulating discs

for hydro-engineering, pneumatic, hydraulic systems

Valves

in medical technology and in household appliances

Pump components

for sliding ring bearings, pistons, seals, suitable for abrasive substances



Pressure sensors

with diaphragm thicknesses up to 0.12 mm, fluid-resistant

Temperature sensors

for thermal protection, air conditioning, thermometers

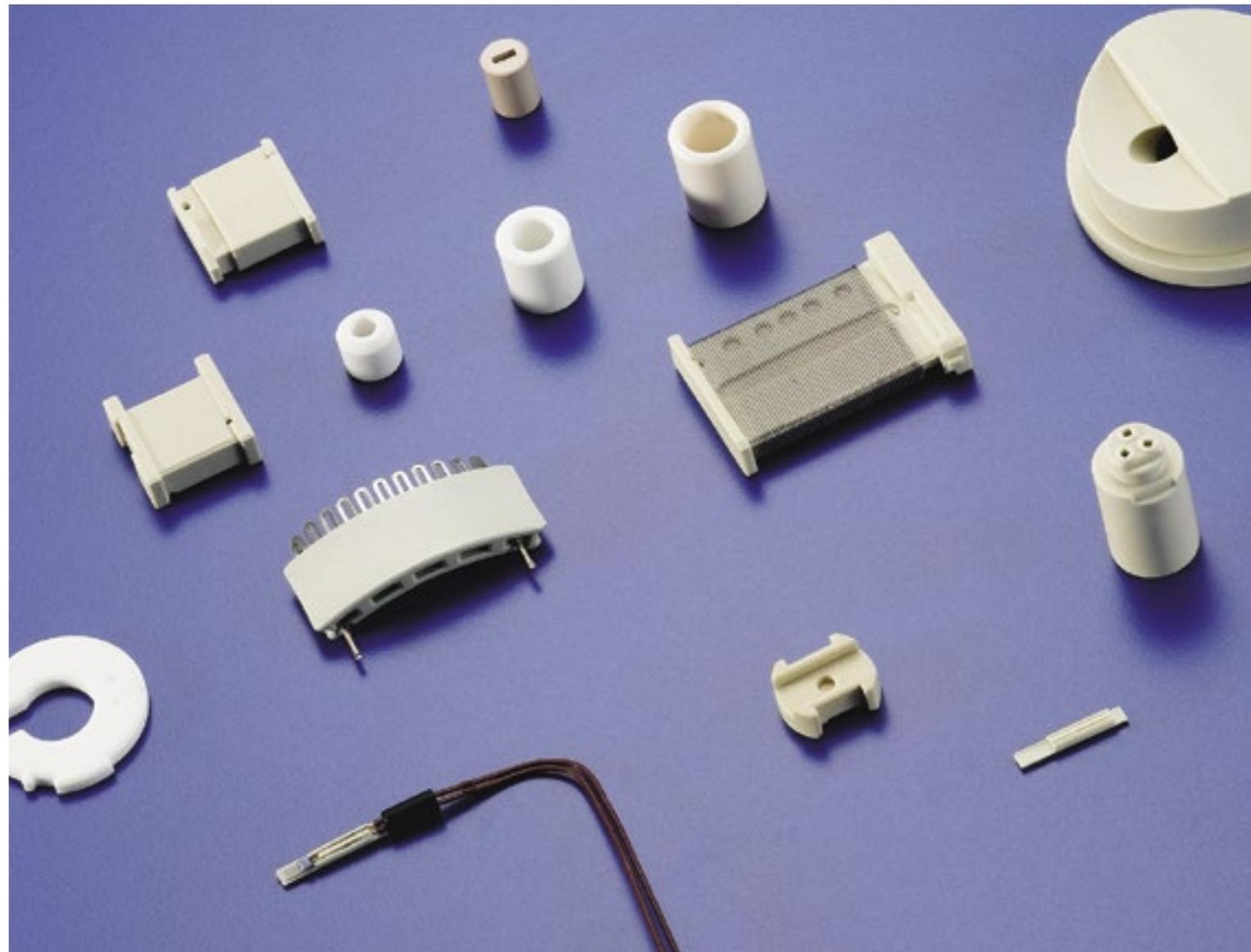
Sensor holder

for smoke detector in aircraft construction



Nozzles

featuring high abrasion-resistance, minimum wear and high corrosion-resistance for high-pressure cleaning systems up to 2,000 bar and nozzle-hole diameters up to 0.15 mm, for metal-powder atomizing, powder coating plants or glue supply systems



Automotive components

for lambda probes, diesel emission engineering, sealing discs for petrol pumps, electrical resistors for fan motors and instrument illumination, plain bearings in aggressive exhaust gas, support for temperature sensors in heating installations



Ceramics-metal composites, Assembly

all the conventional connection techniques, screw-fastening, riveting, upsetting, roller-burnishing, gluing, soldering, in industrial quantities using assembly robots



Bushes and break tubes

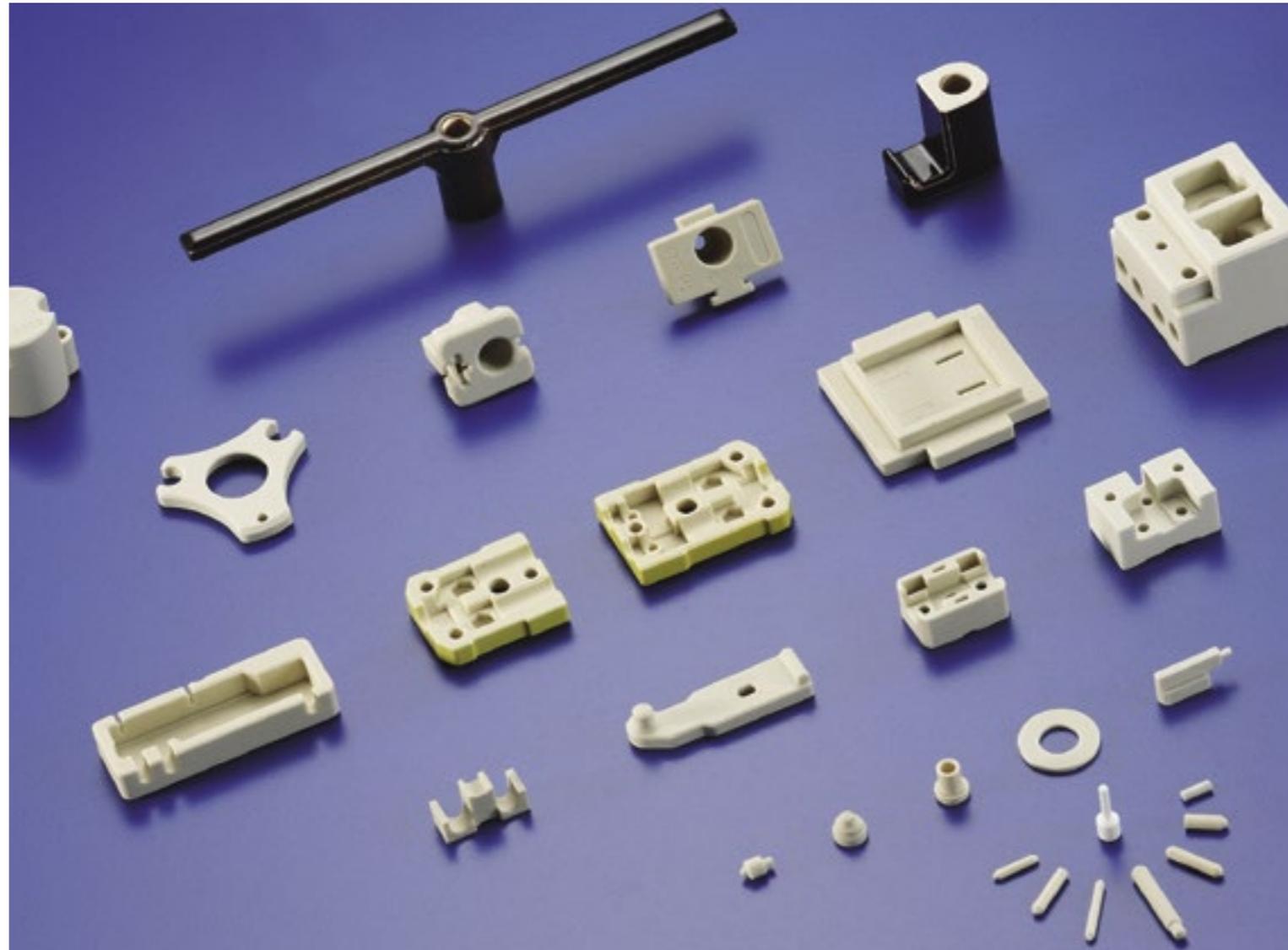
for tubular heaters and heating cartridges

Heater formers

for cylinder heating and heating/cooling combination system, fan heaters

Structural parts

for industrial furnaces, heat guns, continuous-flow heaters, heat exchangers



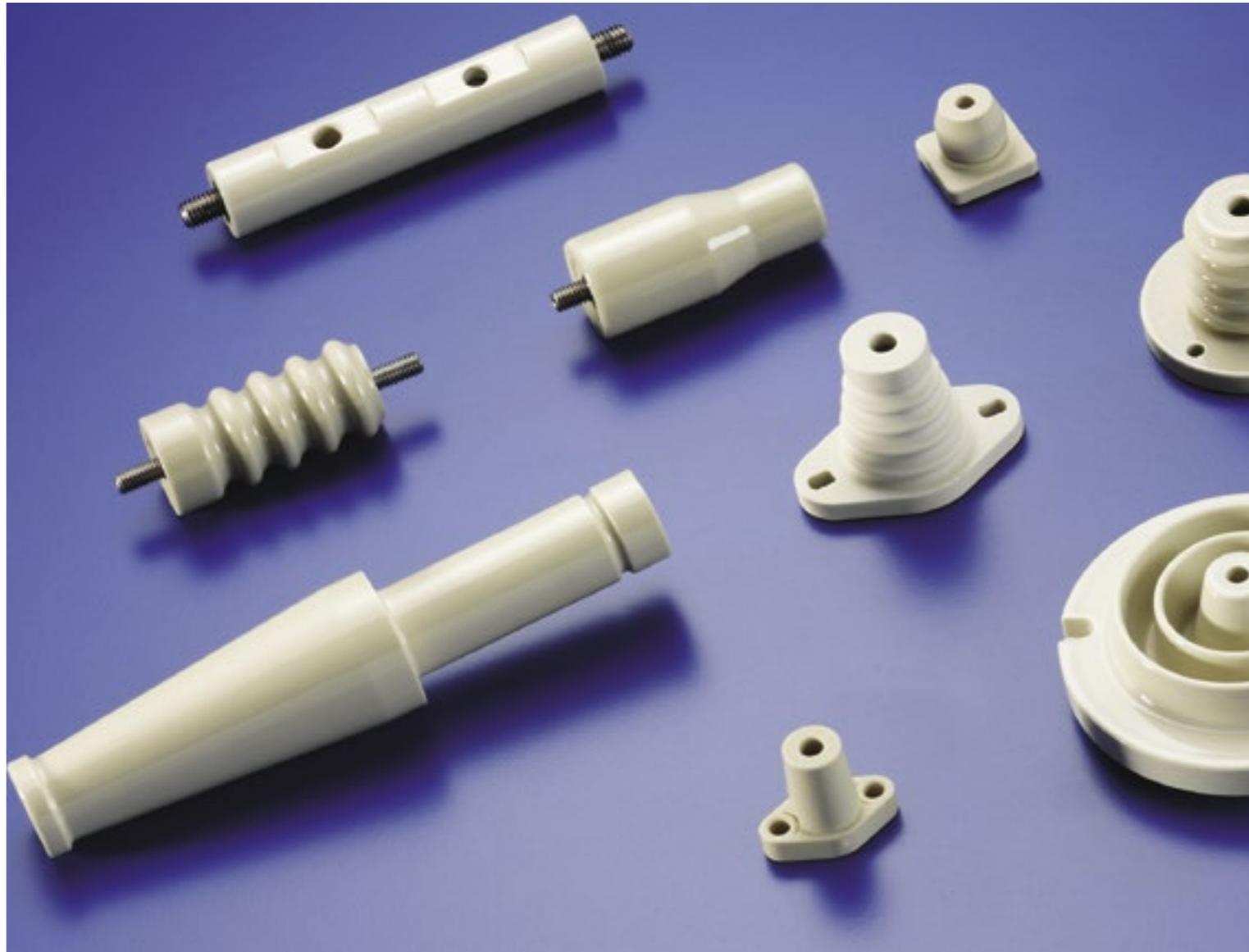
Components for household appliances

such as thermal radiators, cookers, toasters, fan heaters, microwave ovens and the components required for

Temperature controllers

such as controller housing, baseplate, actuating pins and control levers.

Thermoelement plug and -socket connectors



Insulators

for apparatus construction, electrostatic filter plants, transformer bushes, post insulators, corona surface coating plants, unglazed and glazed



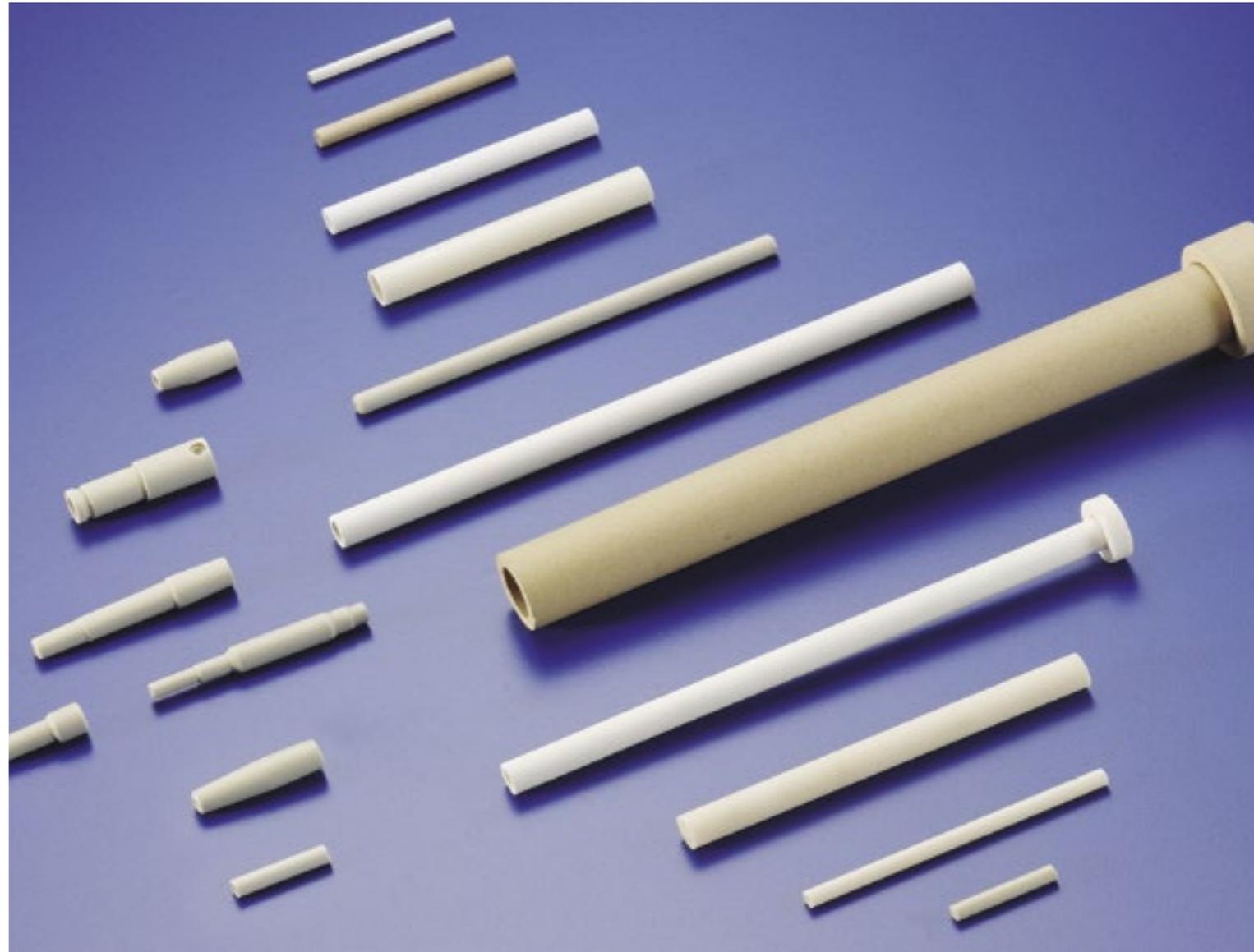
Lamp sockets

in more than 100 versions of standard and special design for UV and IR radiators, halogen metal vapor lamps with 1, 2 or 4 pins in brass, nickel, steel or with pigtail leads. On request with colored glazing or laser inscription.



Lamp holders

also in special design with coding and for multi-lamp fitting,
ex-protected holders



Tubes, Axes, measuring components

Tubes: Single- and multi-hole, collar tubes, tubes for starting electrode
axes: high-precision grinded with cross-holes or grooves



Qualitätssicherung

Introduction and implementation of a CAQ software integrated into all processes in 2016



- Quality planning, inspection and evaluation in WE-testing, Manufacturing and WA-testing
- Complaint and service management
- Gauge Management
- Initial sample inspection



Since 2011, a photovoltaic system with solar modules from SCHOTT-Solar has been installed on the roof of our company building. The system is mainly used to cover our company's electricity needs and supports us in making a sustainable contribution to environmental protection.

In 2018, the PV system was expanded to 83 kWp and now covers about 30% of our of our total electrical energy requirements.

83 kWp
Photovoltaics



We have now also switched our natural gas supply for sintering technical ceramics to CO₂ neutral ECOGAS from the regional energy supplier HEWA GmbH, thus actively contributing to the energy turnaround. The CO₂ savings amount to approx. 435 tons annually.

Since the beginning of 2017, our entire energy supply is 100 percent CO₂ neutral – TÜV certified.



Environment - Conversion to LED bulbs

VOGT GmbH has taken the next step in energy saving with the conversion to LED lights since September 2014.

In total, 200 conventional fluorescent tubes and lights were changed into high efficient LED lights of the latest generation.

The maximum required energy for lightning will be reduced by more than two-thirds (from 11,5 kW to 3,7 kW). Due to this step, we will achieve significant energy saving around 17,000 kWh each year!

Besides the high energy efficiency, LED technology convinces with its 15 times longer service life compared with conventional light sources – to save resources and avoid waste.



Savings
17.000 KWh



In March 2018, we reached a further milestone in operational environmental protection with the initial certification according to DIN EN ISO 14001:2015. The globally valid and recognized certificate attests to our systematic and sustainable protection of the environment and its natural resources. Annual monitoring audits and other internal environmental protection measures will ensure the continuous improvement of our processes in the future.



The Bavarian Environmental Pact is an agreement between the Bavarian State Government and Bavarian industry. Our voluntary measures and the assumption of personal responsibility for environmental protection form the basis for participation.

References

- Intro
- Company
- Materials
- Production
- Video
- Applications
- Quality
- Environment
- References

Automotive



Lighting



Medical Technology



Print



Electrical Engineering



Sensors



Nozzles



X-ray technology



**Thanks for your
Attention**

VOGT