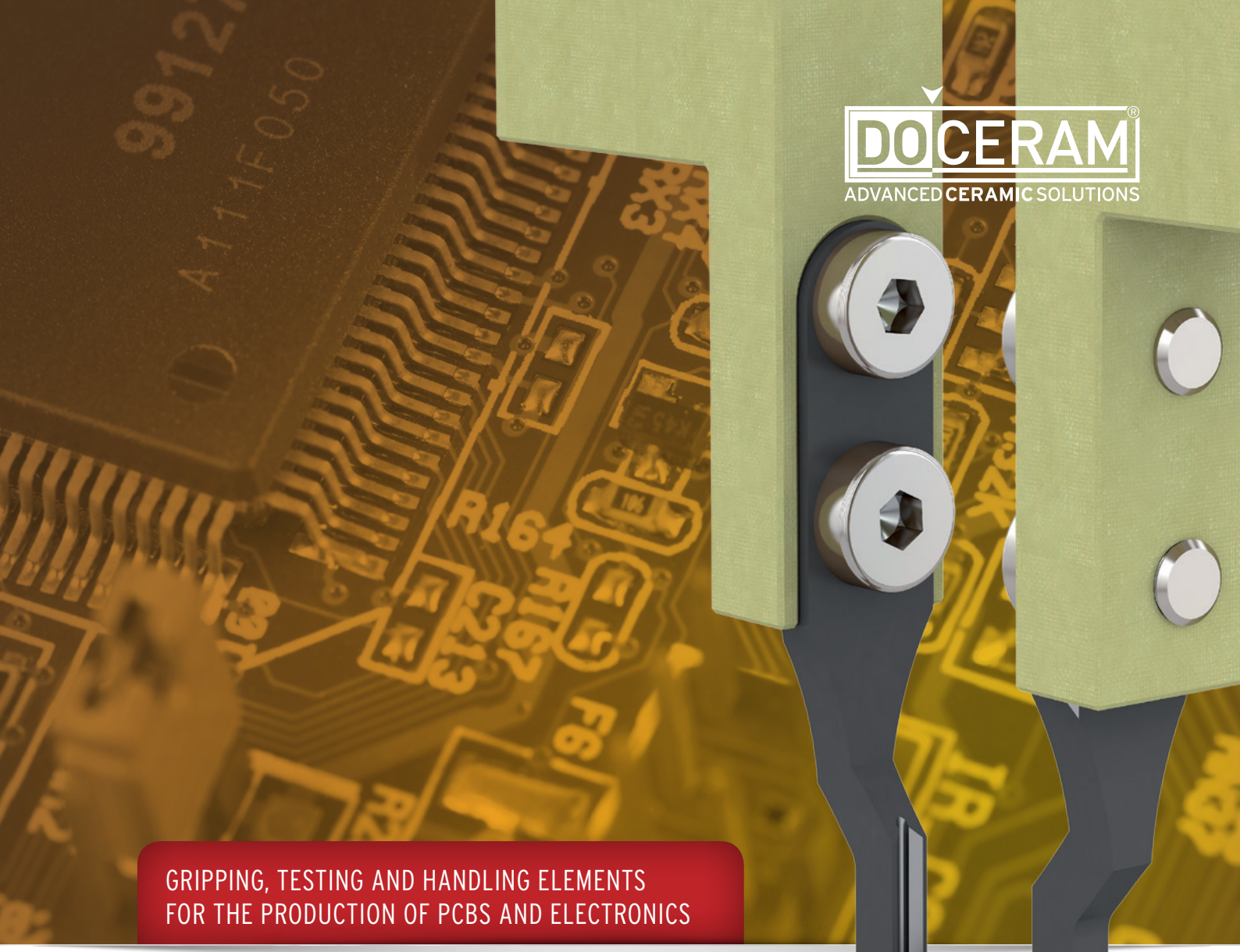

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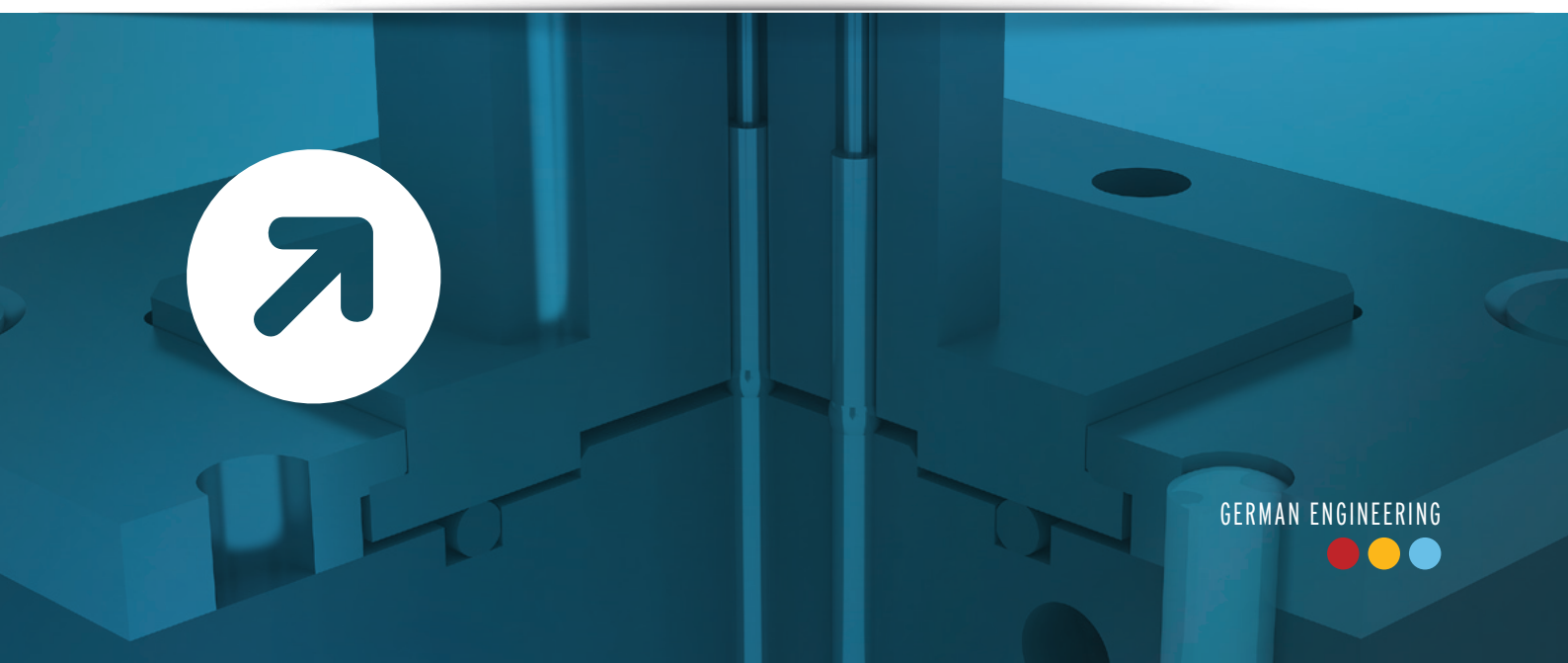
GRIPPING, TESTING AND HANDLING ELEMENTS
FOR THE PRODUCTION OF PCBS AND ELECTRONICS

MACHINE PARTS MADE OF HIGH-PERFORMANCE CERAMIC: INCREASED PRECISION, REDUCED FAILURE



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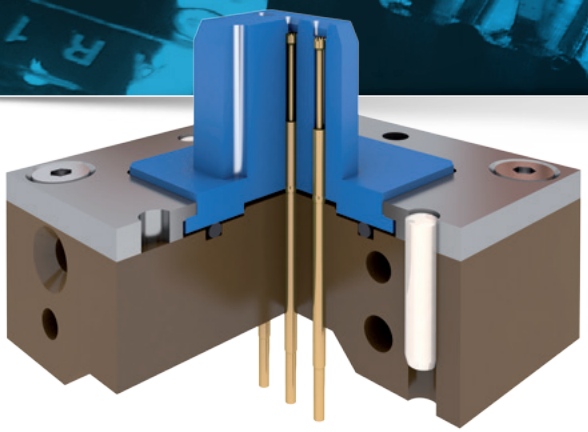
WHY IS HIGH-PERFORMANCE CERAMIC GOOD?



Example: Test plug for an automotive supplier as an assembly with components made of high-performance ceramic, plastic and metal

Examples DOCERAM high-performance ceramic components

Wear-resistant ceramic components ensure high dimensional stability Due to their function, machine parts are particularly vulnerable to mechanical, thermal and chemical stress at critical points. Ceramic precision components can withstand these stresses and surpass conventional materials in terms of stability and durability. Furthermore, ceramic has special electrical properties in terms of insulation, dielectric strength and the lack of inductive coupling properties.

Example: Gripping elements of high-performance ceramic are magnetically neutral and have no interaction with high- or low-frequency radiation

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BECAUSE THEY SIMPLY DO NOT WEAR.

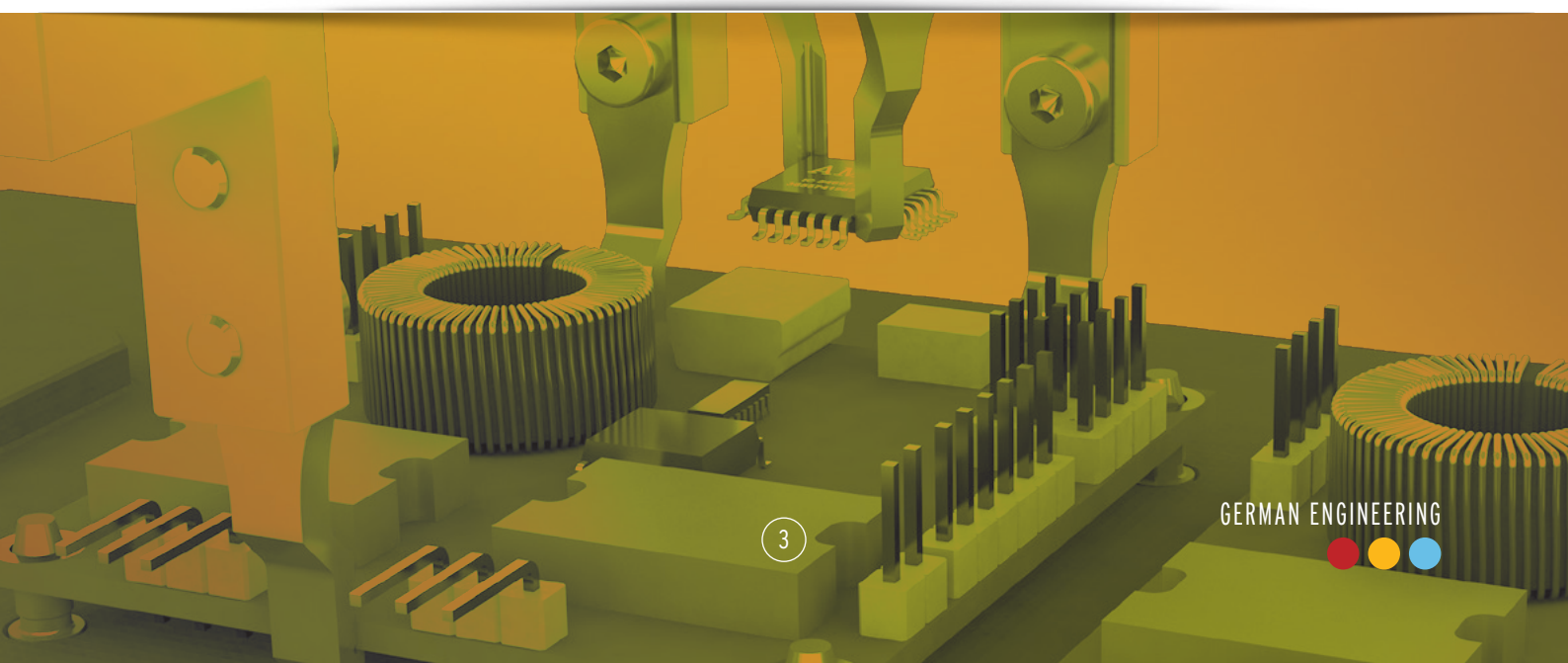
GRIPPING AND HANDLING ELEMENTS, FIXTURE CONSTRUCTION AND TESTING TECHNOLOGY: WITH CERAMIC ON THE SAFE SIDE.

Whether gripper fingers, test plugs or receptacle pins, the benefits of high-performance ceramic as a guarantor for process safety and quality are proven in all these cases. Precise guidance of components, even at the highest clock rates, and excellent mechanical, electrical and thermal properties characterise this material as an all-in-one solution for the highest demands.

High-performance ceramic is:

- extraordinarily wear-resistant: even the smallest geometries keep their dimensional accuracy permanently
- usually more durable than a series cycle
- extremely temperature-stable
- electrically and magnetically neutral
- resistant to welding spatter and repel solder
- ideal for clean rooms
- chemically inert

For technical data, please refer to the table in page 7



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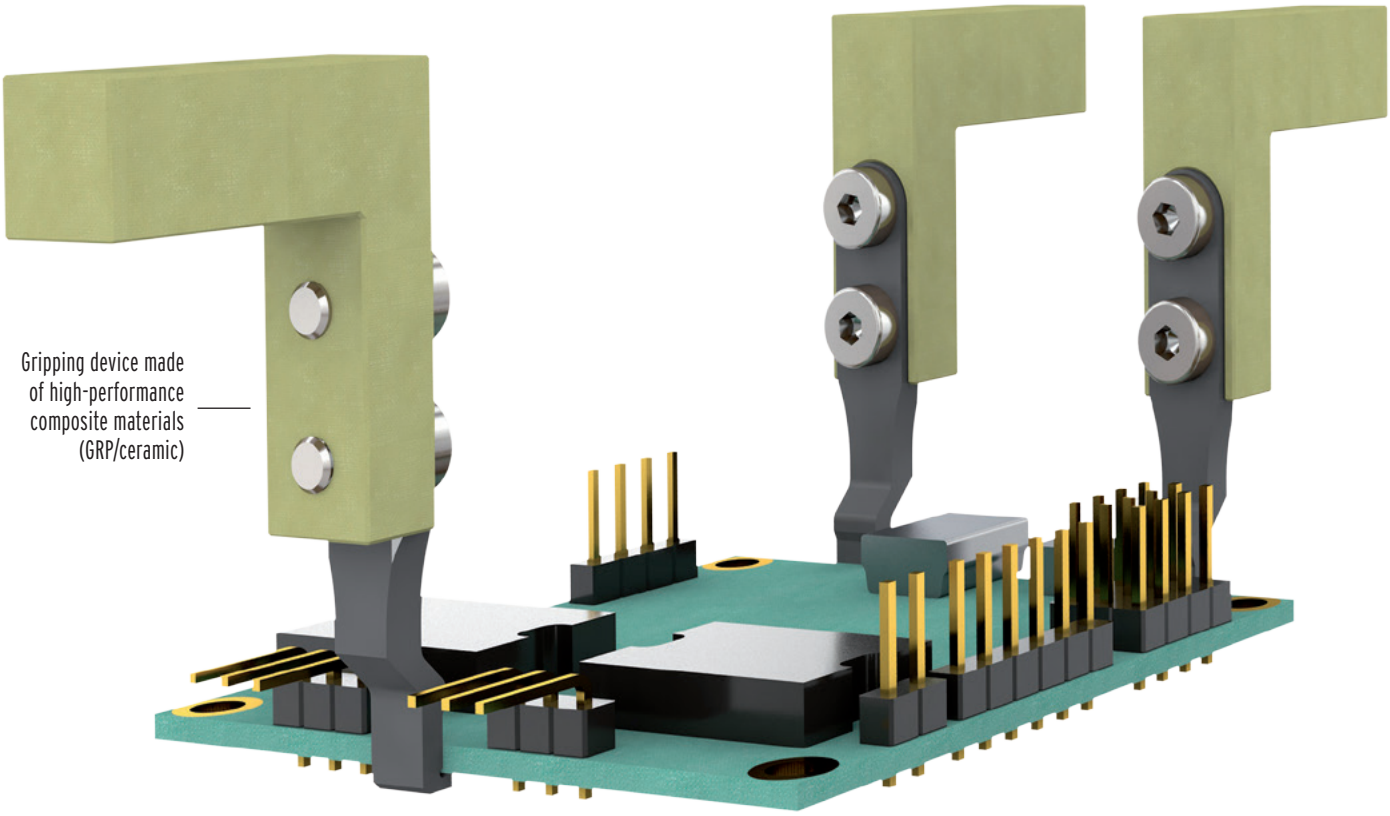
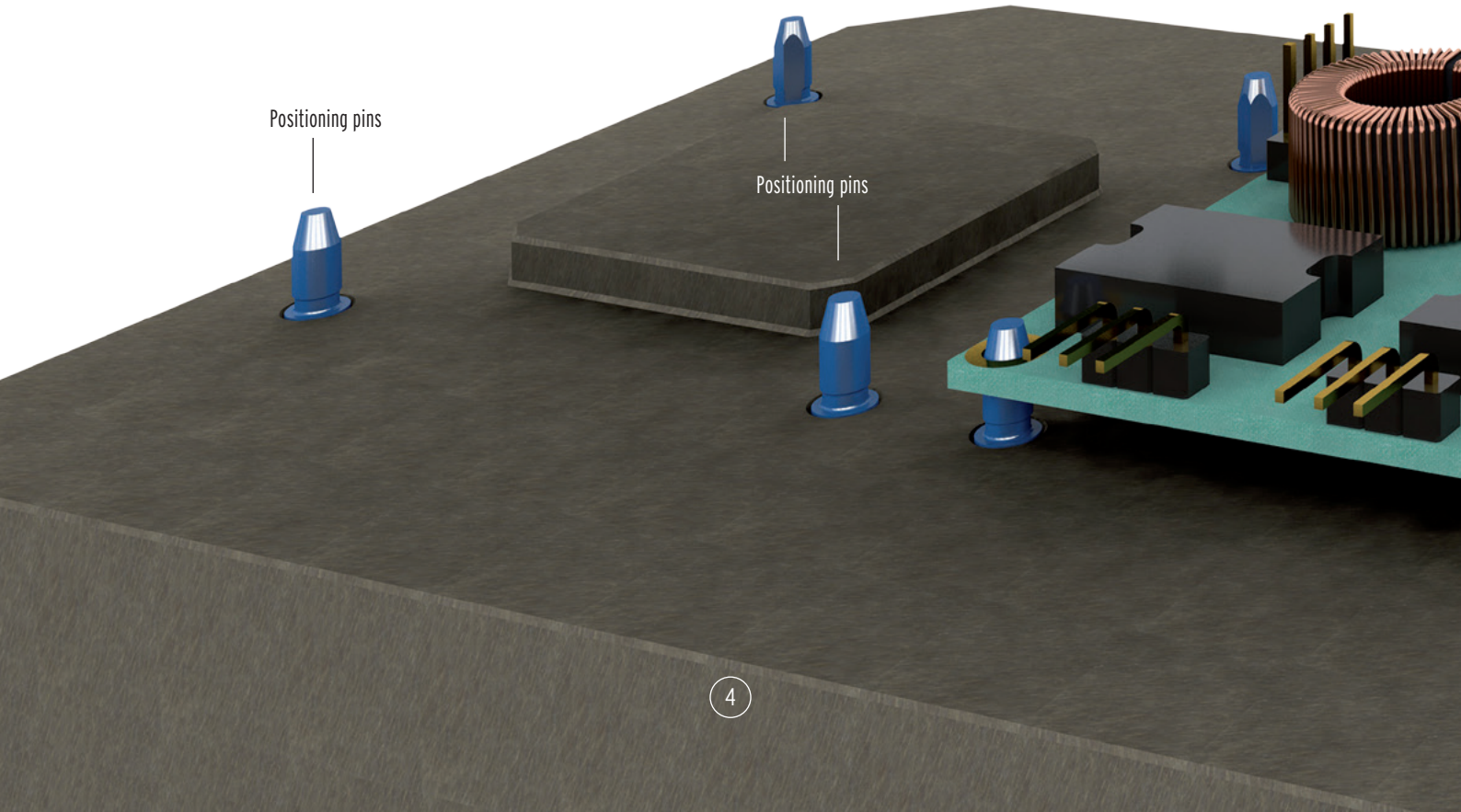
WHAT ARE THE ADVANTAGES?

SAFETY, QUALITY AND DURABILITY



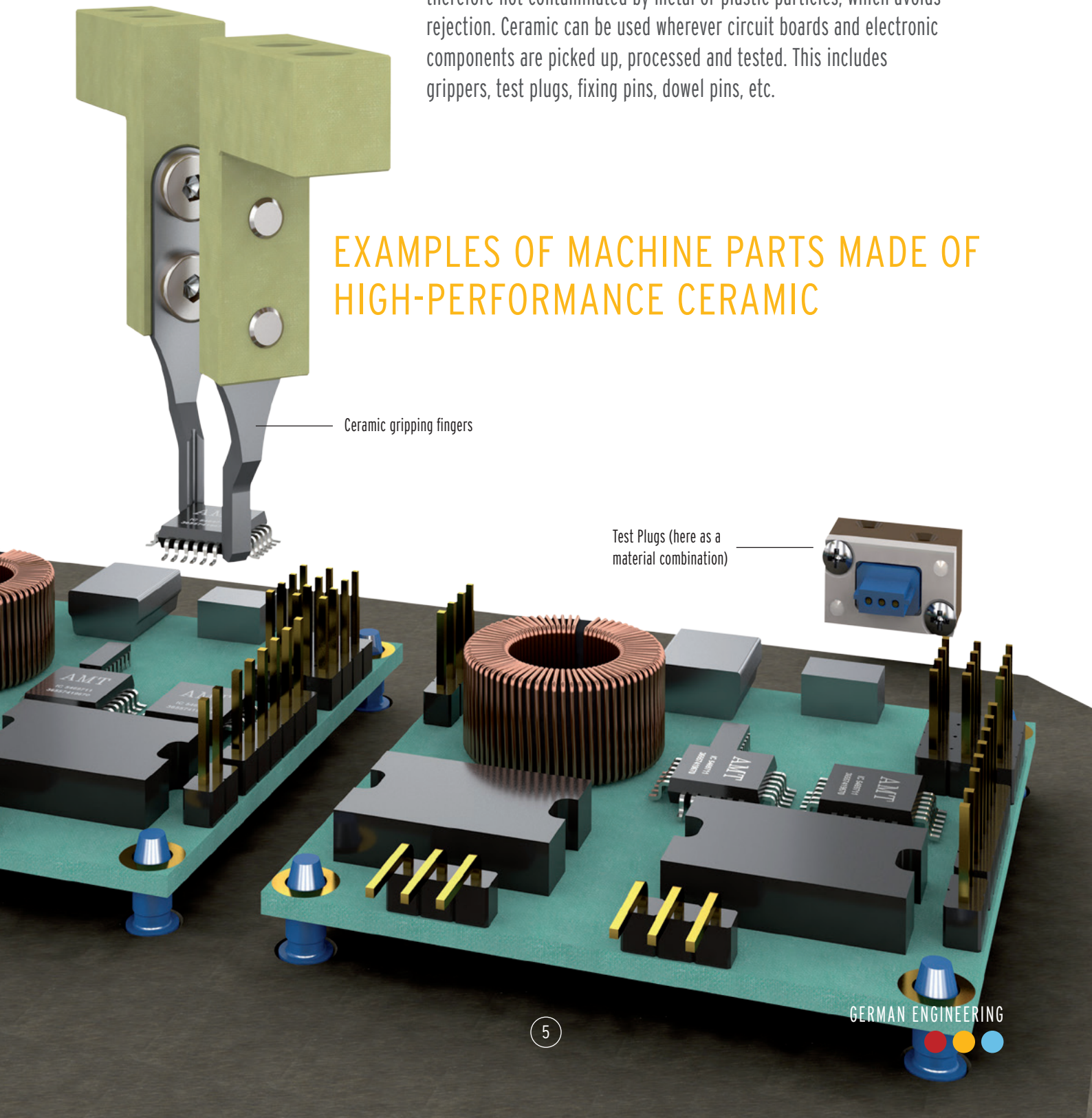


WHAT ARE THE DISADVANTAGES?

NONE!

DOCERAM high-performance ceramics combine the advantages of plastic (fixed high/low frequency, electrically insulating, non-magnetic) with those of metals (tough, precise, durable), coupled with very high resistance to wear. Ceramic is also non-abrasive. Components are therefore not contaminated by metal or plastic particles, which avoids rejection. Ceramic can be used wherever circuit boards and electronic components are picked up, processed and tested. This includes grippers, test plugs, fixing pins, dowel pins, etc.

EXAMPLES OF MACHINE PARTS MADE OF HIGH-PERFORMANCE CERAMIC



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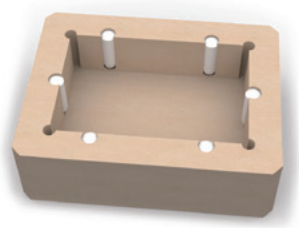
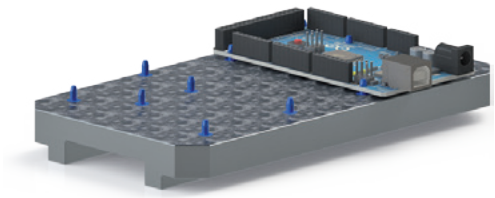
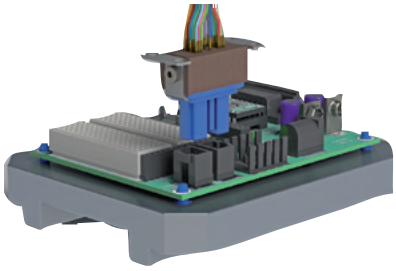
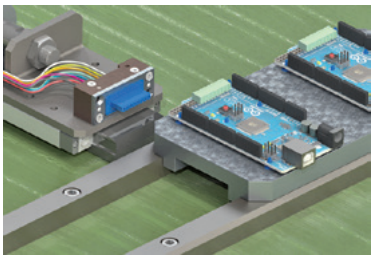
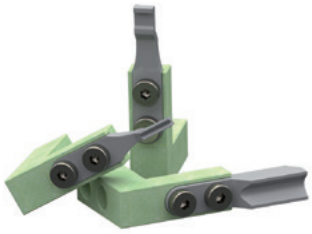
LEARN MORE ABOUT OUR SOLUTIONS FOR YOUR MANUFACTURING PLANTS



EXAMPLES OF MANUFACTURING PROCESSES

- Assembly of PCBs
- Soldering, welding and gluing of components
- Functional tests
- Mounting of PCBs inside a component such as a control unit

EXAMPLES OF CERAMIC PARTS

- Gripping elements
- Test plugs
- Fixing pins
- Dowel pins
- Component stations and grippers for high/low frequency fields

HIGH-PERFORMANCE CERAMIC COMPONENTS GENERALLY LAST LONGER THAN A SERIES CYLE. THIS LEADS TO HIGHER PROCESS SAFETY AND A BETTER PRODUCT-QUALITY WHILE REDUCING PLANT DOWNTIME AND MAINTENANCE NEEDS.

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MATERIAL PROPERTIES OF DOCERAM HIGH-PERFORMANCE CERAMICS

DOCERAM Name	Unit	A-132	A-141	M-132	M-141	Z-141	Cerazur	Volcera 131	M-121
Composition	-	Al_2O_3 >99,7%	Al_2O_3 >99,99%	$Al_2O_3 + ZrO_2$	ATZ	ZrO_2 Y-PSZ	ZrO_2 Y-PSZ	Si_3N_4	Al_2O_3 - TiO_2
Colour	-	ivory	light pink	white	off-white	white	blue	grey, black	grey
Density	(g/cm³)	3,9	3,9	4,1	5,5	>6,04	6	3,2	3,0-37
Bending strength	(MPa)	390	390	600	1600	1200	1300	750	15-100
Compressive strength	(MPa)	3900	3900	3600	3600	3000	3000	2500	-
Elastic modulus	(Gpa)	390	390	350	200	205	205	320	10-50
Impact strength	(Mpa m1/2)	5,2	5,2	7,5	8	8	12	6,7	-
Weibull modulus	-	12	12	18	12	12	25	15	10-12
Vickers hardness	(HV 0,5)	2000	2000	1600	1400	1300	1150	1650	HV10 5
Thermal expansion	($10^{-6}K^{-1}$)	5,5-8,4	5,5-8,4	6,0-8,6	9	10	10	3,4	$\alpha^{30\text{-}100°C}$ 6
Thermal conductivity	(W/mK)	28	28	18	6	<2	<2	22	$\lambda^{30\text{-}100°C}$ 1,5-3,0
Thermal shock resistance	(ΔT°C)	120	180	200	660	290	280	550	extremely good
Maximum operating temperature	(°C)	1700	1700	1000	1000	1000	1000	1000	900-1600
Special resistance at 20°C	(Ω cm)	$>10^{17}$	$>10^{15}$	$>10^{13}$	-	$>10^{10}$	$>10^{10}$	$>10^{11}$	$>10^{14}$
Dielectric strength	(kV/mm)	22	30	-	-	-	-	20	-

The values listed were determined on standard test specimens. The material properties can deviate from these values depending on the application and component geometry. Please contact us should you require a precise clarification of the material suitability. Other technical data on request. Subject to technical modifications and errors. 2014 edition.

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