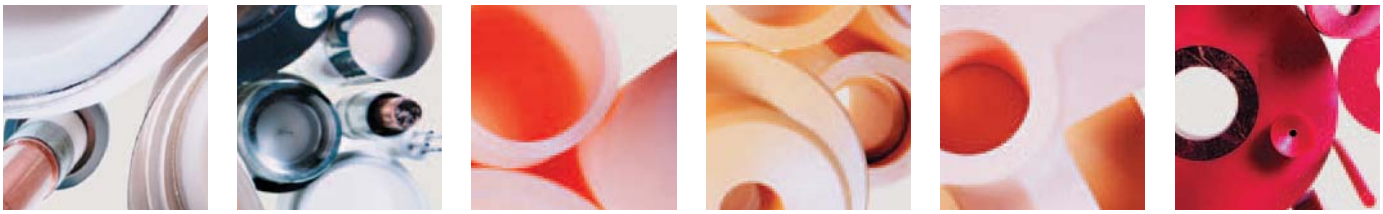
FRIALIT® -DEGUSSIT® Oxide Ceramics

Applications Spectrum



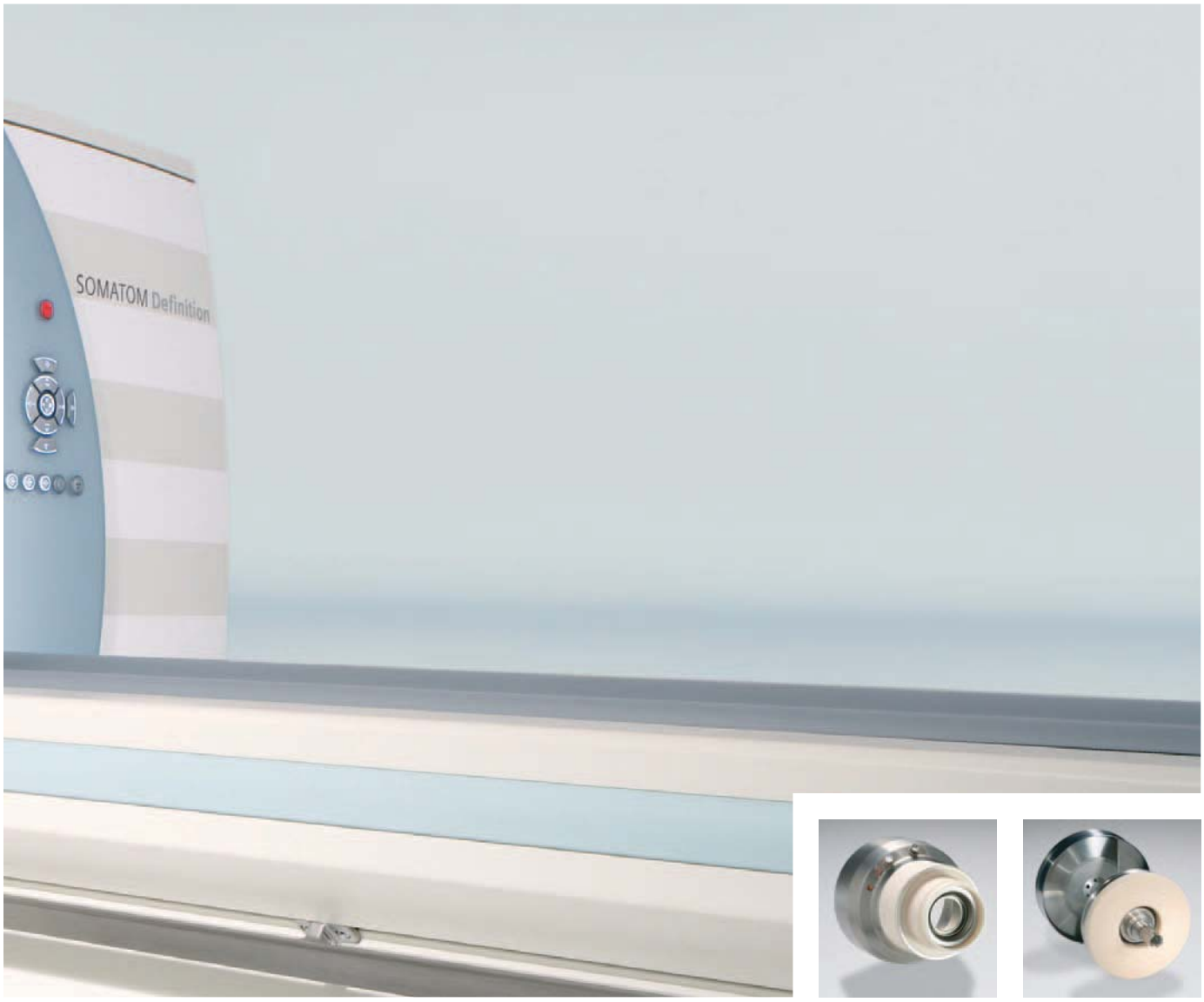
FRIATEC

FRIALIT®-DEGUSSIT® OXIDE CERAMICS FOR ELECTRONIC- AND ELECTRICAL ENGINEERING AND APPLICATIONS IN APPLIED PHYSICS. OXIDE CERAMICS ARE THE MATERIALS OF TODAY. IN THESE DEMANDING APPLICATIONS THERE IS NO WAY TO AVOID THE TOTAL CAPABILITIES OF FRIALIT®-DEGUSSIT®.

METALLISED OXIDE CERAMICS ARE THE BASIS FOR VARIOUS APPLIED PHYSICS APPLICATIONS OPERATING IN EXTREME ENVIRONMENTS. THROUGH INTENSIVE DISCUSSIONS WITH ENGINEERS OF FRIALIT®-DEGUSSIT®, OUR PARTNERS ARE ABLE TO DEVELOP THEIR PRODUCTS TO ACHIEVE MAXIMUM EFFICIENCY IN ALL FIELDS OF TECHNOLOGY. THE RESULTS ARE METAL-CERAMIC COMPONENTS WHICH SATISFY THE HIGHEST DEMANDS. INDEPENDENTLY OF THIS, IF THE PRODUCT IS USED AT HIGH TEMPERATURES AND HIGH VOLTAGES, ITS FUNCTIONALITY REMAINS THANKS TO THE PROPERTIES OF THE OXIDE CERAMICS WHICH IT CONTAINS.

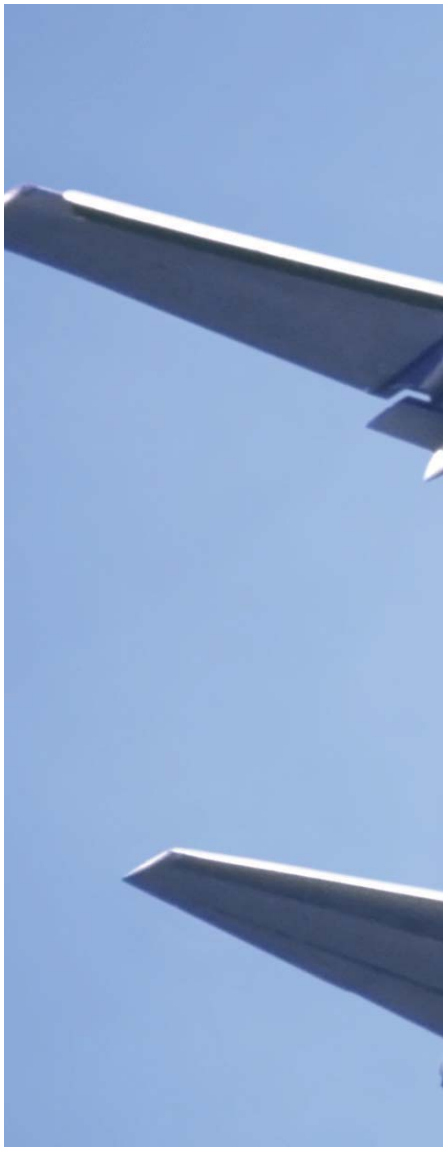
MEDICAL TECHNOLOGY IS BUILT ON OXIDE CERAMICS. THE X-RAY IMAGE INTENSIFIER: HIGHEST RESOLUTION WITH MINIMAL RADIATION DOSE.

The X-ray image intensifier is the core of computerised tomography. It enables a physician to make the safest diagnosis whilst keeping the



radiation exposure of the patient to a minimum. The key components of the X-ray image intensifier and X-ray sources are parts of oxide ceramics, developed between the application specialists of the manufacturer and the ceramic specialists of FRIALIT®-DEGUSSIT®.

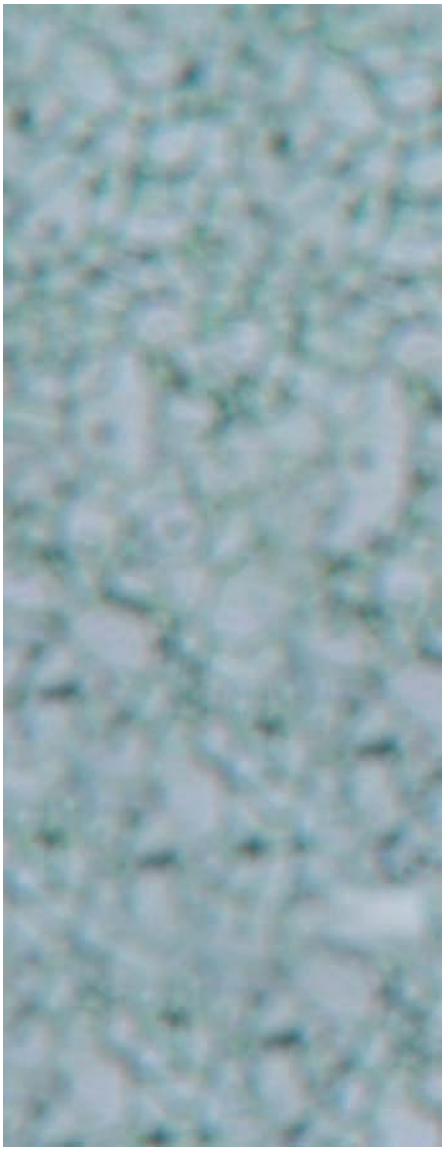
The products of oxide ceramics are the combination of decades of comprehensive know-how and intensive development work in close cooperation with a customer-orientated producer.



RELIABLE USE IN AVIATION AND SPACE-TRAVEL. PRESSURE SENSORS DELIVER CONSISTENT SAFETY-RELEVANT INFORMATION.

The bending characteristics of ceramic elements make them an indispensable measurement medium in aviation and space-travel.
Sudden pressure changes are the most testing loads placed on every flying apparatus. Sensor membranes of oxide ceramics recognise critical values, trigger alarms and so protect both crew and passengers.

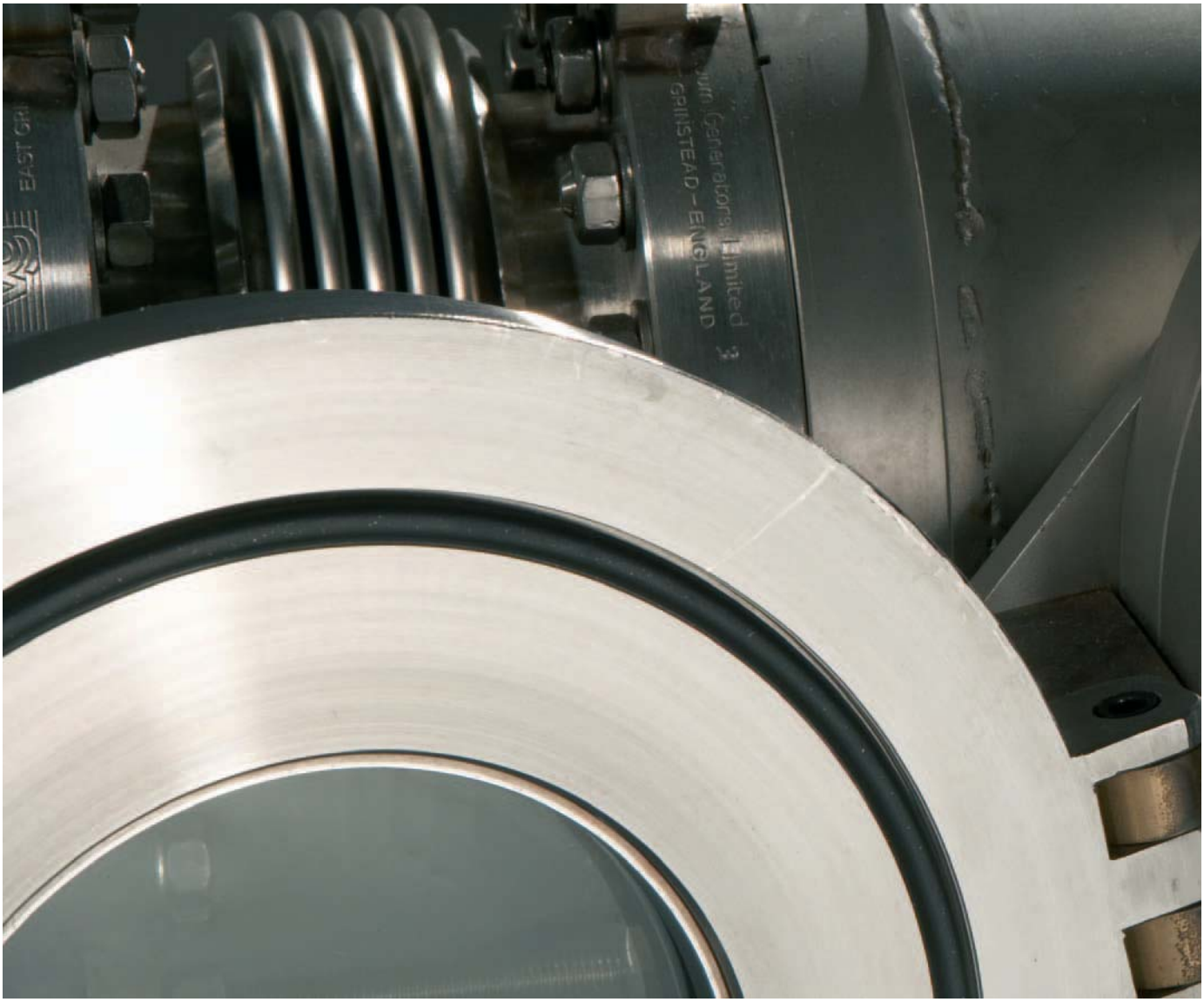
The high resolution of the measured signal is made possible by the hysteresis-free bending of the extremely thin sensor membranes. The precision of these membranes is due to FRIALIT®-DEGUSSIT®, who are responsible for the product from the initial ceramic preparation and processing up to final surface finishing.



UNIFORM ACCELERATION FOR ELECTRON MICROSCOPES GUARANTEES A HIGH RESOLUTION.

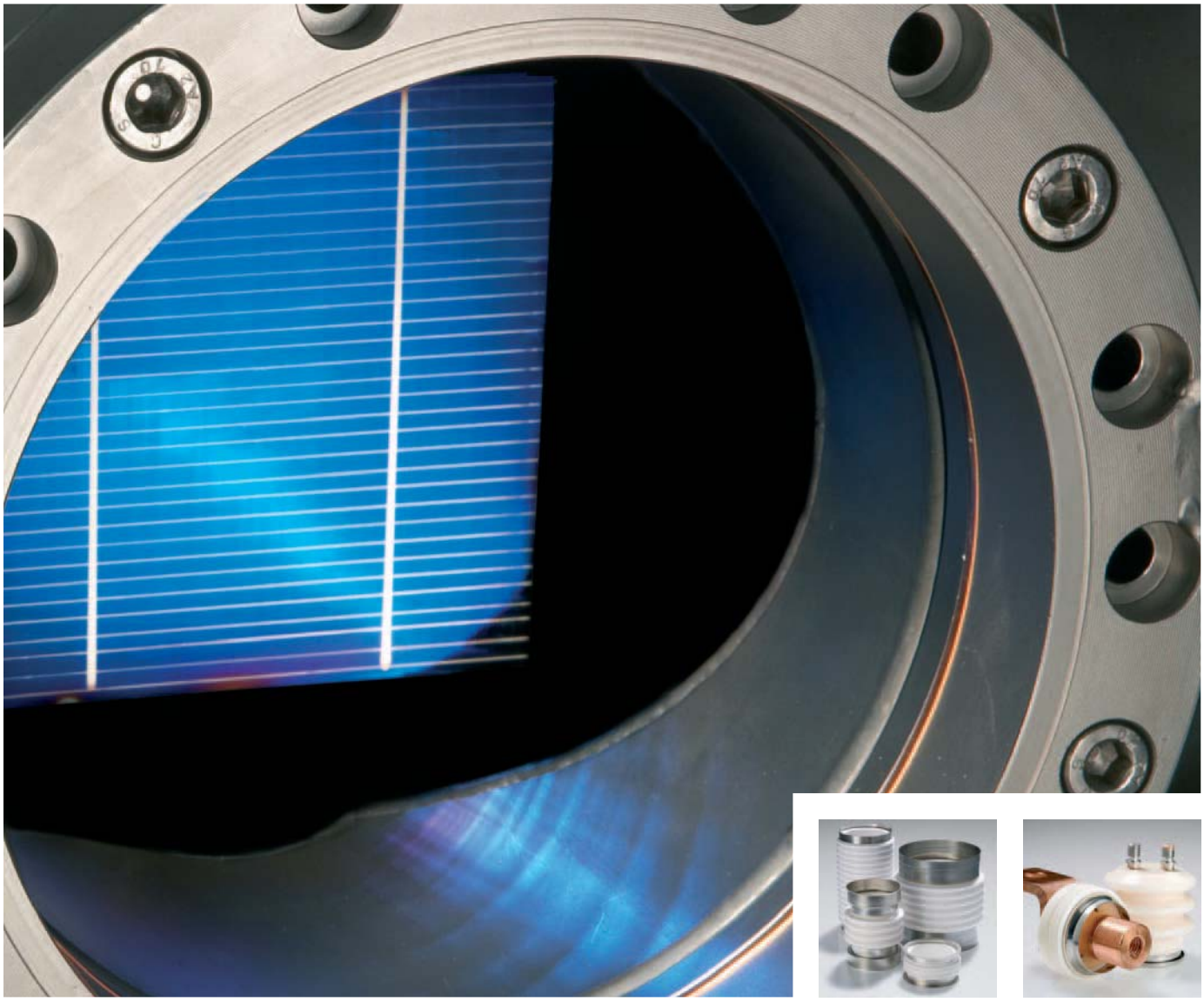
Focussing consistency in electron microscopes requires tolerances of a few microns. Only this precision allows the examination of different samples from research and technology with the highest resolution and clarity.

Vacuum chambers for charged particle accelerators made of oxide ceramics guarantee minimal tolerances due to their dimensional stability in combination with the highest electrical insulation.



NEW TECHNOLOGIES FOUNDED ON TRADITION. PRODUCTION PROCESSES UNDER HIGH VACUUM CHALLENGE MATERIALS.

Plants for the manufacture of photocells and semiconductors make use of especially high vacuum processes. Glass and porcelain materials



are pushed to their limits under these extreme conditions. Electrical feedthroughs and insulating tubes of oxide ceramics enable different high-tech applications. Ceramics of FRIALIT®-DEGUSSIT® retain the required electrical insulation properties even at high temperatures.

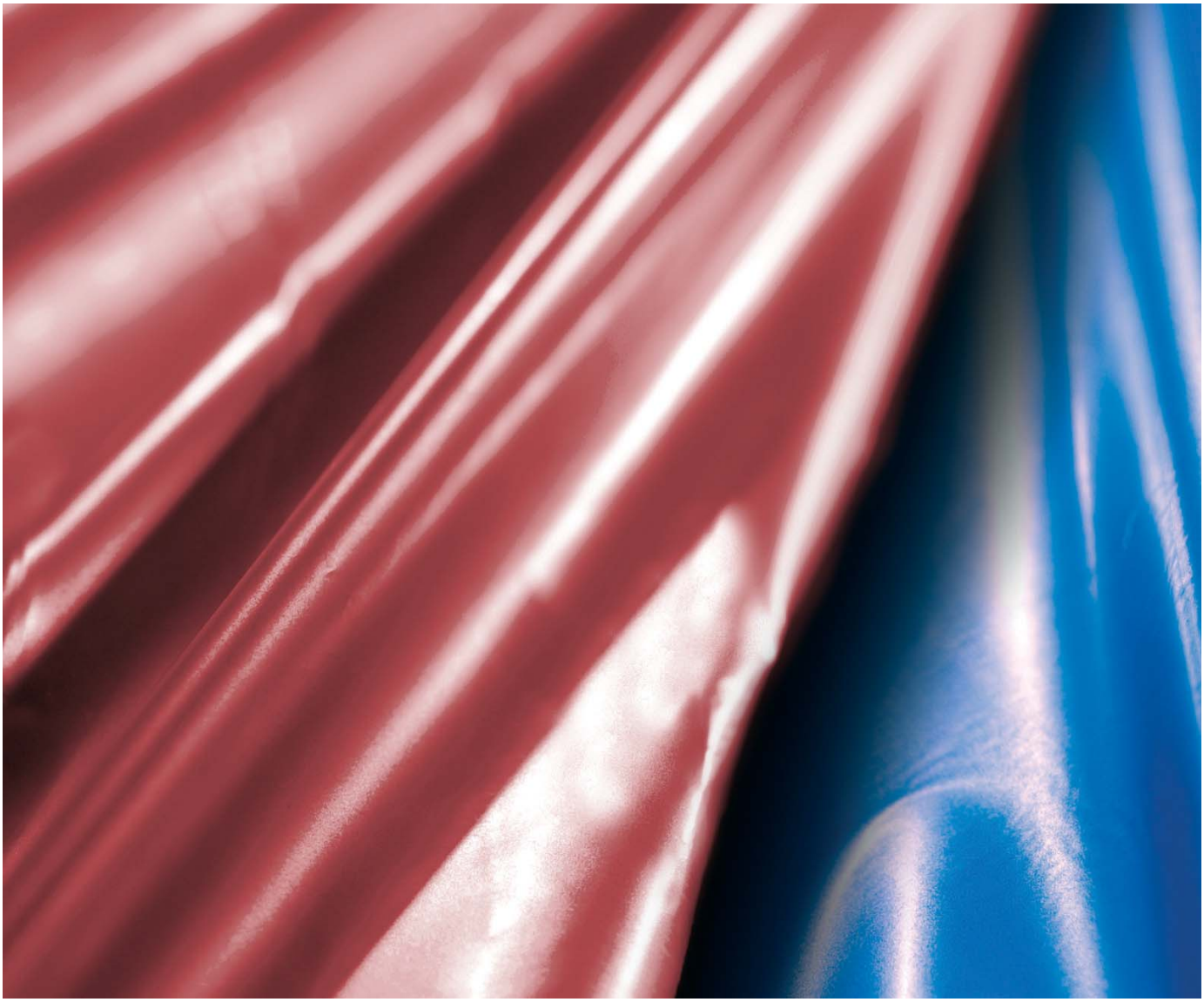
THE COMPUTER INDUSTRY IS BASED ON MICROCHIPS. THE USE OF OXIDE CERAMICS ALLOWS THIS TECHNOLOGY TO HAPPEN.

With the drive towards the development and manufacture of ever-smaller chips, there is no way that this could have happened without the products of FRIALIT®-DEGUSSIT®. In the end, computer builders must check and measure in the micron range prior to commissioning.

Material properties such as high dimensional stability under temperature turn oxide ceramics into high-precision components.

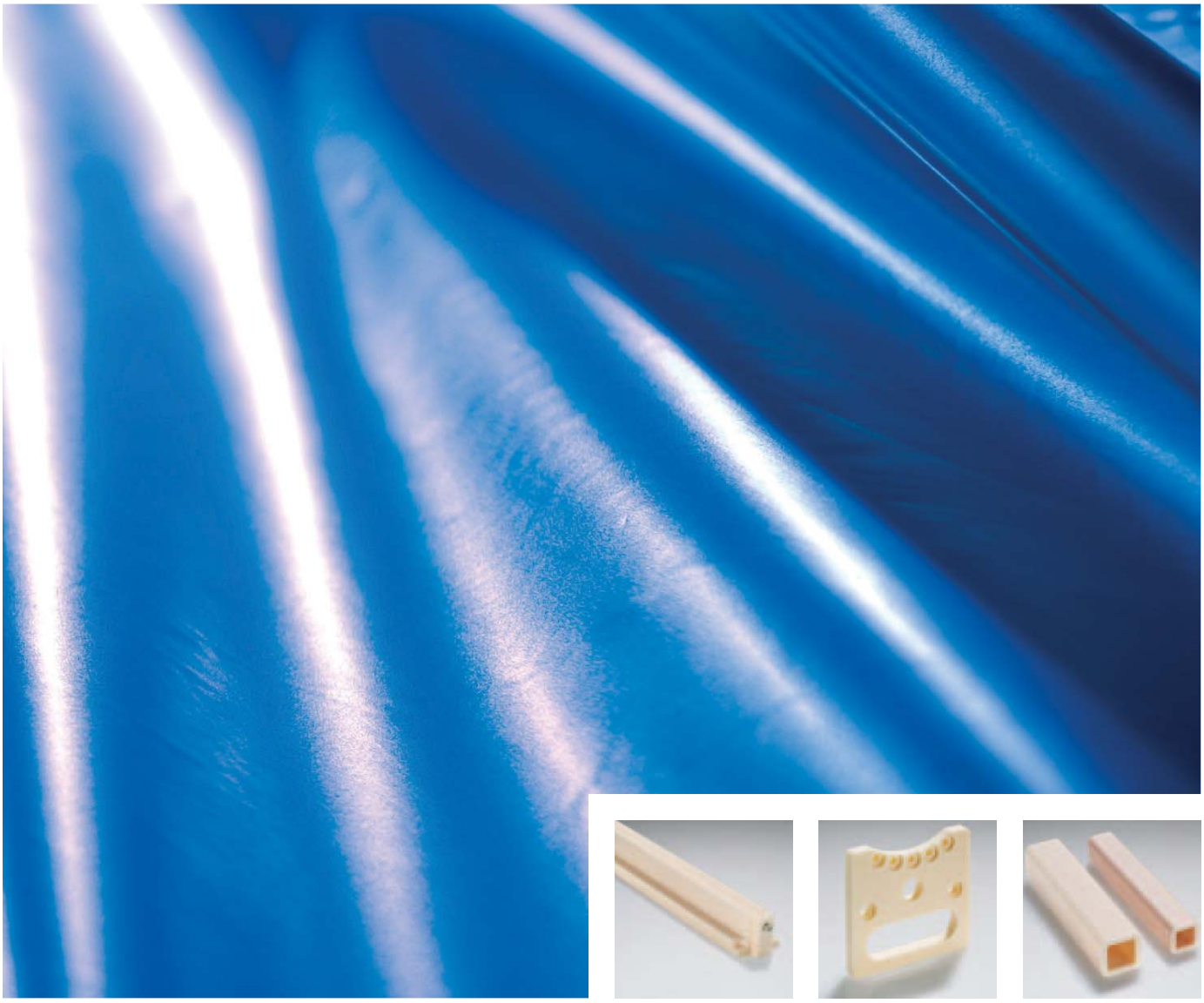
FRIALIT®-DEGUSSIT® OXIDE CERAMICS FOR HIGH TEMPERATURE TECHNOLOGIES. APPLICATIONS IN HIGH TEMPERATURES ARE A CHALLENGE FOR ANY MATERIAL; HIGH TEMPERATURE RESISTANCE UP TO 1950°C OFFERS THE SOLUTION.

RESEARCH AND DEVELOPMENT ENGINEERS, AS MUCH IN THE DEVELOPMENT OF NEW PRODUCTS AS IN BASIC GROUND-BREAKING RESEARCH, ARE INCREASINGLY USING OXIDE CERAMICS – PARTICULARLY WHEN THEY WANT TO ACHIEVE SUCCESS UNDER EXTREME CONDITIONS. FROM COLLABORATION WITH THE CERAMIC EXPERTS OF FRIALIT®-DEGUSSIT® EMERGE PRODUCTS WHICH ARE TEMPERATURE STABLE, ELECTRICALLY INSULATING AND CORROSION RESISTANT.



PRINTING ONTO PLASTIC FILM AND PAPER INVOLVES CONTACT WITH MULTIPLE COMPONENTS MADE OF OXIDE CERAMICS DURING THE VALUE-CREATION PROCESS.

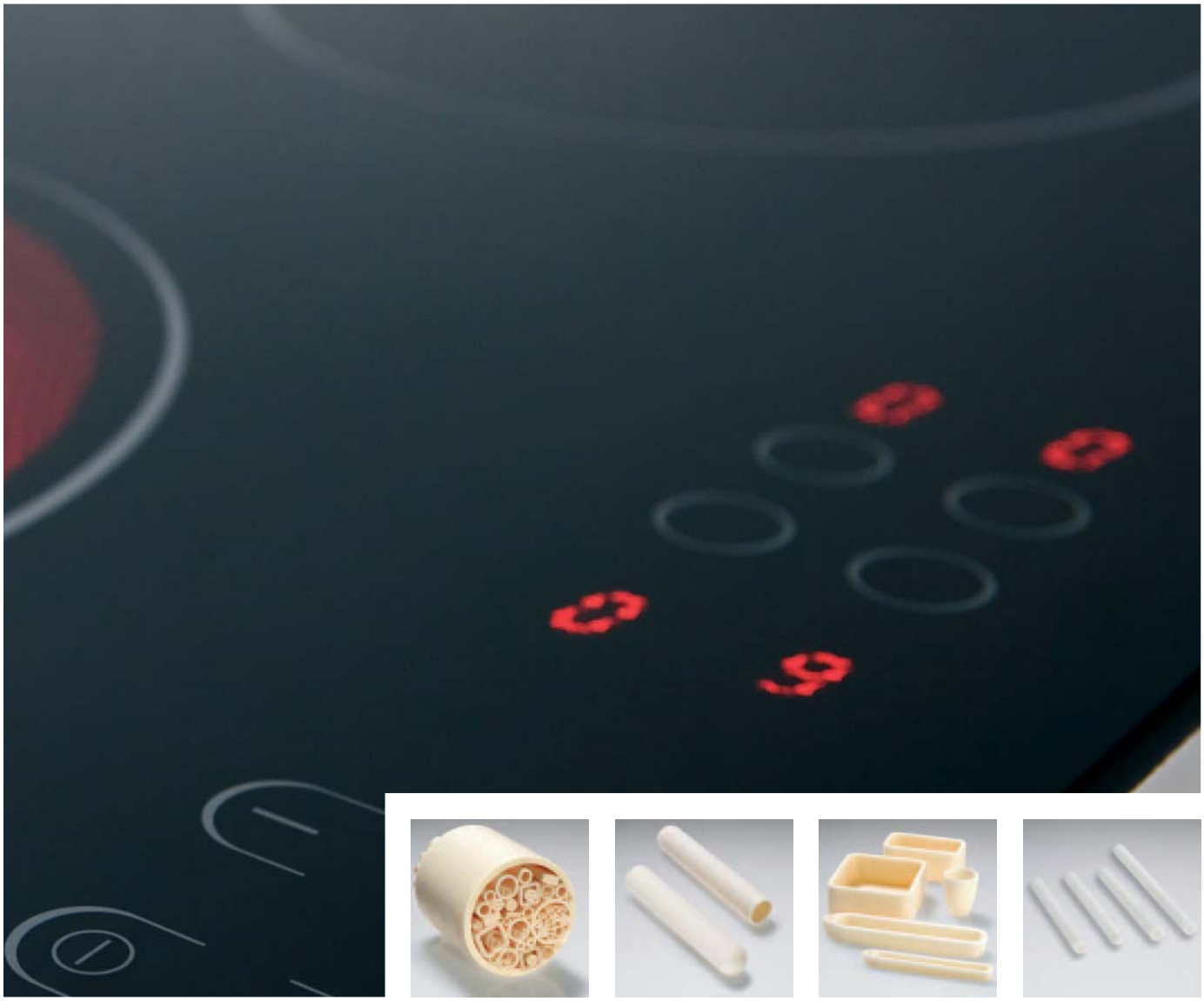
It is a guide strip of oxide ceramics, thanks to a particularly polished surface as well as a very good shape and position tolerance, which makes



enormous speeds possible. Abrasive and highly sensitive films can be carefully processed. Speed, coupled with quality, makes inserts of oxide ceramics indispensable in digital printing.

IN GLASS MANUFACTURE, THE UNMISTAKEABLE PROPERTIES OF OXIDE CERAMIC MATERIALS COME INTO FULL VALIDITY.

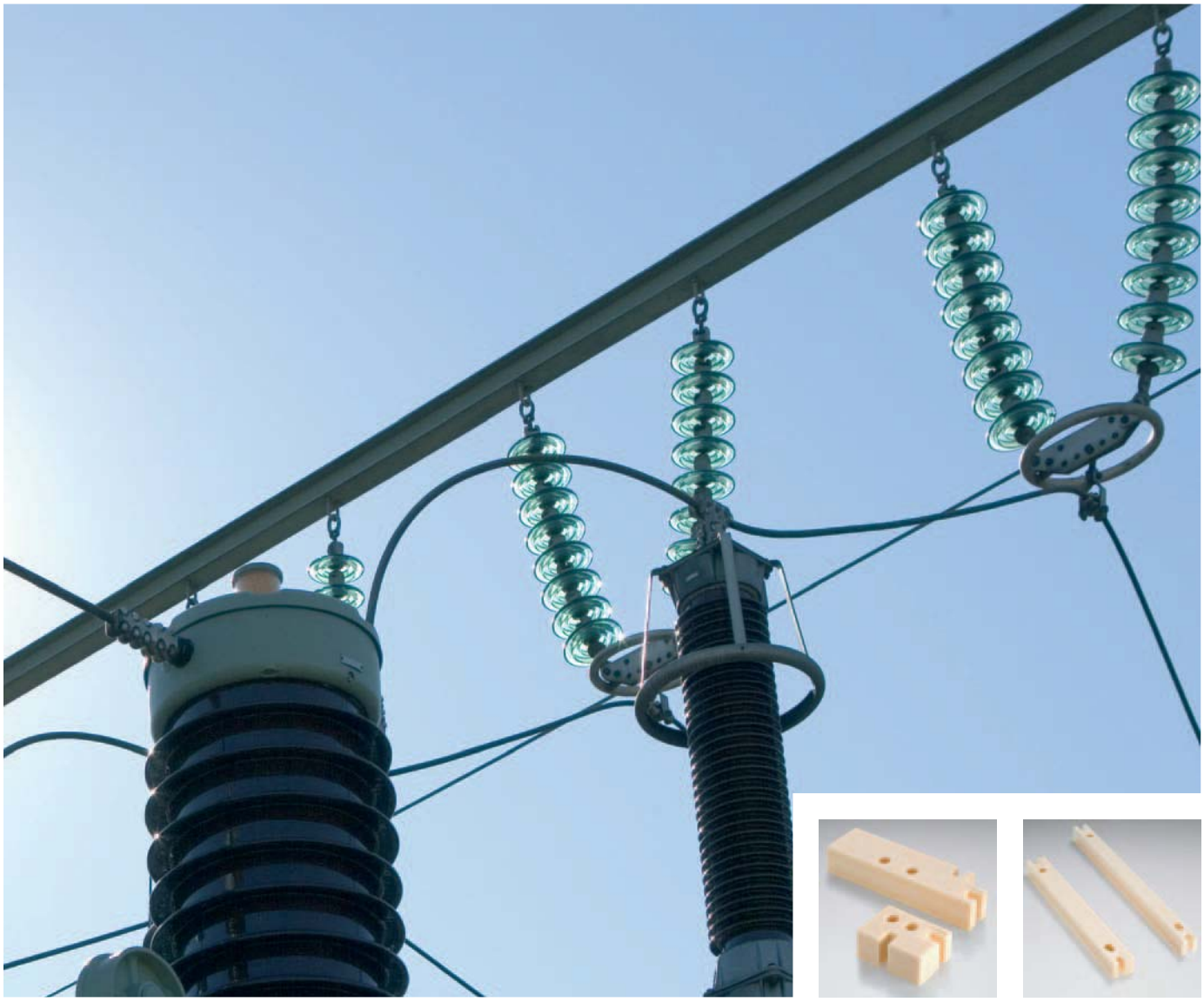
The heat resistance up to 1950 °C is the unbeatable trump-card played in the manufacture of glass products.



The high precision of temperature measurement through inserts of oxide ceramics during glass melting made the production of glass-ceramics first possible. The use of a chemically-inert oxide ceramic ensures factory and process safety during the combination and mixing of all chemical substances.

WHEN MAINS POWER FAILURES OCCUR, OR FOR INDEPENDENT SYSTEMS, POWER SUPPLIES ARE ENSURED BY FUEL CELLS.

Isolation of individual plates of a fuel cell from one another and, at the same time, provision of the required separation between them is achieved



using oxide ceramic frames. Internally, fuel cells are subjected to extreme chemical, thermal and mechanical loads. The highly-loaded rails and connecting elements were developed jointly by FRIALIT®-DEGUSSIT® and the end-users.

LIGHT IN MASS PRODUCTION. IN THE PRODUCTION OF ELECTRIC LIGHT BULBS, THERMAL RESISTANCE IS A MUST.

Glow-blocks and forming rollers of oxide ceramics use their corrosion resistance as the basis of the guaranteed consistent precision.

The long lifetimes of these machine parts ensures low down-time. Before all, in the manufacture of mass-produced items, the advantages of the material properties such as electrical insulation, thermal shock resistance and corrosion resistance are particularly valid.

FRIALIT®-DEGUSSIT® OXIDE CERAMICS FOR MECHANICAL ENGINEERING. IN THE DEVELOPMENT OF MODERN MACHINES, ENGINEERS ARE INCREASINGLY INTRODUCING COMPONENTS OF OXIDE CERAMICS. THE ADVANTAGE: THE MATERIAL PROPERTIES ALLOW THEM DIVERSE USES AND LEAD TO OPTIMUM RESULTS IN THE APPLICATION.

MACHINE COMPONENTS OF OXIDE CERAMICS GUARANTEE LONG LIFE AND ON THE BASIS OF THEIR SURFACE QUALITY ARE EASY TO CLEAN. IN COMPARISON WITH OTHER MATERIALS, PRODUCTS OF FRIALIT®-DEGUSSIT® MAKE POSSIBLE ADAPTATIONS TO RESPOND TO THE STEADY GROWTH IN DEMANDS FROM THE FOREFRONT OF TECHNOLOGY. THE CERAMIC SPECIALISTS OF FRIALIT®-DEGUSSIT® WORK TOGETHER WITH THEIR CUSTOMERS TO INVESTIGATE PERMANENT NEW INSERTS AND COMBINATION POSSIBILITIES FOR OXIDE CERAMICS. THIS IS THE ONLY WAY TO REACT TO THE RAPID MOVEMENTS IN THE MARKET.

THE CORROSION RESISTANCE OF OXIDE CERAMICS GIVES ACIDS NO CHANCE OF DESTROYING DOSING AND FILLING EQUIPMENT.

The precise portioning of components of all kinds remains a clear specialism for the use of oxide ceramics. Hygiene is the supreme requirement in

the manufacture of medicines. Pump pistons in oxide ceramics also seal without O-rings. On the basis of their surface quality they are simple to clean and sterilize. Construction of filling, processing and mixing equipment rely on the material properties of oxide ceramics and on the know-how of the ceramic experts of FRIALIT®-DEGUSSIT®.

RELIABLE AND PRECISE: MAGNETIC INDUCTION FLOW METERS.

The combination of oxide ceramics and platinum electrodes allows unrestricted flow and delivers a precise measured result.

In competition, speed and precise information counts. Food processing and chemical industries benefit from inserts of oxide ceramics with fast and exact production runs.

The demands on the material: to remain electrically insulating at high pressure and resistant to corrosive attack.

THE AUTOMOTIVE INDUSTRY RELIES ON INVESTMENT IN MACHINERY, WHICH THROUGH OXIDE CERAMICS IS ABLE TO REALLY GET GOING AT TOP SPEED.

Welding pins of oxide ceramics locate the bodywork panels for welding with pin-point precision.

Ceramic drawing dies in the metal-forming sector make many secondary operations unnecessary.

The sliding properties of ceramics allows for little or no lubrication. Through conversion to oil-free equipment, the expenditure on oxide ceramics can make it possible to totally eliminate cleaning plant.

LEAKAGE IN THE CHEMICAL INDUSTRY IS REDUCED BY THE INTRODUCTION OF OXIDE CERAMIC COMPONENTS.

Whilst the isolation shell of a chemical pump uses the magnetic coupling to allow a hermetic seal, the sliding properties of a ceramic piston in a high pressure pump are utilized for a long-life seal.

It is the material properties which have allowed oxide ceramics to become indispensible components in the development and production of modern technologies. For the user, the common goals of the engineers of FRIALIT®-DEGUSSIT® to develop mechanical components of oxide ceramics is their guarantee of a long operational life and market-leading position.

IN THE MANUFACTURING AND PROCESSING OF PAPER, CERAMIC ELEMENTS SOLVE THE WEAR PROBLEMS.

Especially with the high plant speeds in paper-making, the further processing in large printing houses and also in the packaging industry, high wear rates as well as quality issues have become major cost factors.

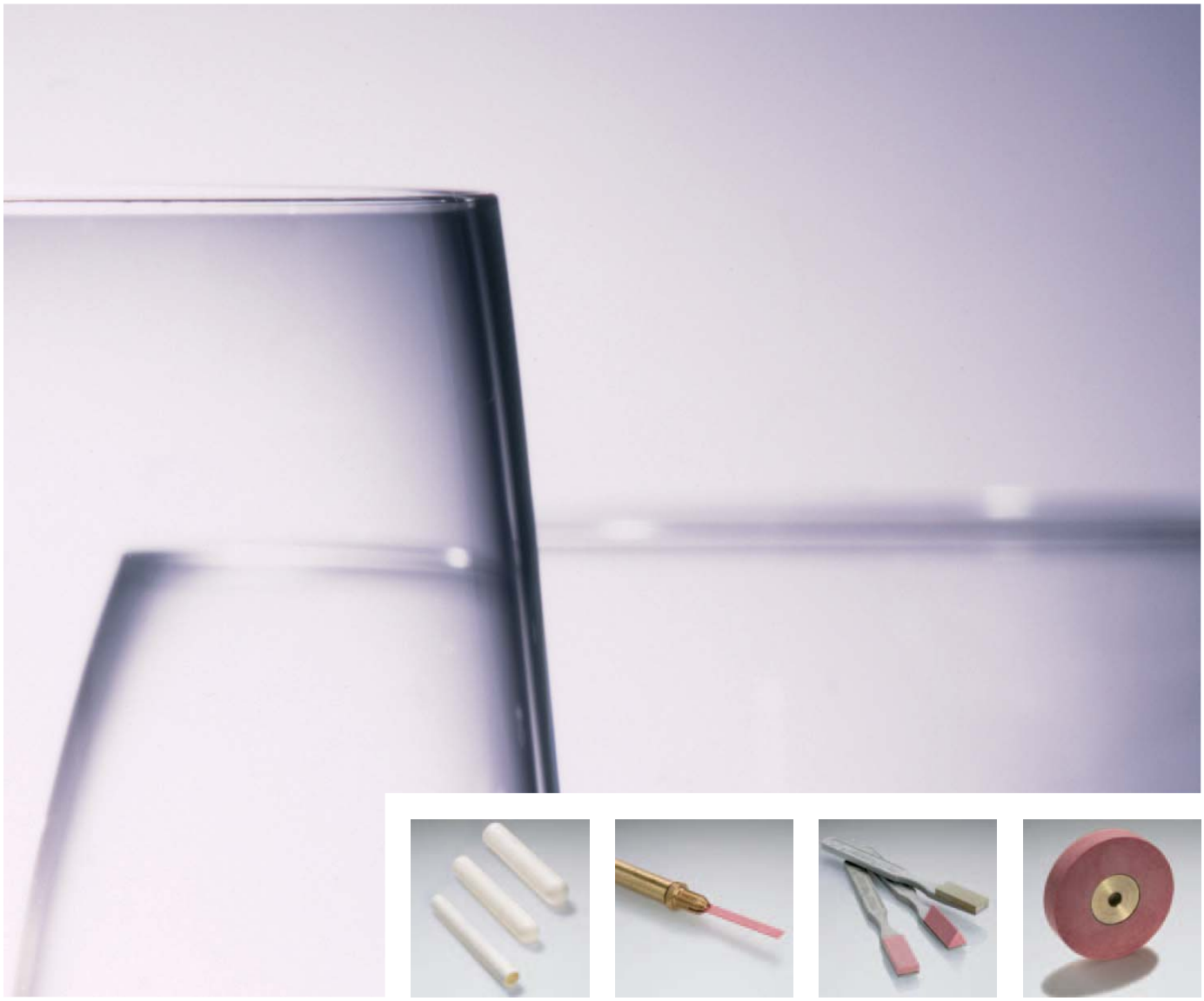
The use of oxide ceramics offers the solution. These materials draw upon their insignificant wear and high shape stability. Components from FRIALIT®-DEGUSSIT® guarantee long machine running times. Limited only by the extreme maximum resilience of the materials, significantly higher production speeds are possible.

FRIALIT®-DEGUSSIT® OXIDE CERAMICS FOR SURFACE FINISHING. THE FINAL REFINEMENT IS FREQUENTLY THE QUALITY-DECISIVE FACTOR.

THE PRODUCERS OF GLASS, PORCELAIN OR HARDENED-ALLOY COMPONENTS WHO REQUIRE THE ULTIMATE FINISH ARE INCREASINGLY RETURNING TO PRODUCTS OF FRIALIT®-DEGUSSIT®. THIS IS BECAUSE FINE WORKING TOOLS IN OXIDE CERAMICS ARE EXTRAORDINARILY HARD WEARING; VERSATILE FITTING AND CAN PROCESS THE HARDEST SURFACES.

WHEN IT COMES TO WORKING ON HARD SURFACES, TOOLS IN OXIDE CERAMICS HAVE THEIR NOSES IN FRONT.

Especially producers of delicate and precision engineering equipment, for instance the watch- and clock- and glass industries, rely upon these long-lasting high quality tools.

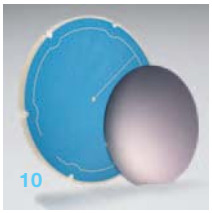


The polycrystalline sintered ruby shows diamond-like hardness and is able to surface finish varied materials.

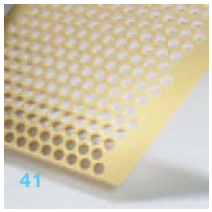
THE HARDEST SURFACES POLISHED TO MIRROR FINISHES: SINTERED RUBY REMAINS UNSURPASSED IF YOU WANT A DIAMOND SPARKLE.

To the optimum hardness of sintered ruby comes uncompromising dimensional stability. When grinding, lapping, honing and burnishing points to the advantages of sintered ruby in comparison with the rapid mechanical war and tear of older, conventional grinding tools.

The product range of FRIALIT®-DEGUSSIT® offers tools for typical applications in precision engineering and the machine tool sectors, as well as for the glass, ceramic and jewellery industries.



EXCEEDING THE LIMITS



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FRIALIT®-DEGUSSIT® Oxide Ceramics for:
Electrical Engineering
High Temperature Technology
Mechanical Engineering
Surface Finishing




COMPETENCE PLUS RESPONSIBILITY

Our customers rightly expect first-class performance with lasting value. Beside the competence to achieve this, we also undertake the responsibility for it. Ask for the evidence: FRIALIT®-DEGUSSIT® is the technological and market leader in ceramic materials for the twenty-first Century.

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