DOCERAM®

MEDICAL CERAMICS

> Natural Ceramic
Naturally NACERA

Development and Design of ceramic parts for medical technologies
- > **production of ceramic parts acc. to customer's design**
- > **high precision machining**
- > **dental ceramics / abutments / implants**
- > **system provider (CAM templates, tools, speed sintering)**

Medical materials
- > **NACERA Z®: Yttrium stabilised zirconiumoxide Application Dental prosthesis, implants, tools**
- > **Aluminiumoxide Al_2O_3: Application Pumps and implants**
- > **Siliconnitride Si_3N_4: Application Stamps for pain therapy**
- > **ATZ (alumina throughend zirconia) Composite material for highest mechanical load (implants) "ceramic steel": Application Implants, high-performance tools**

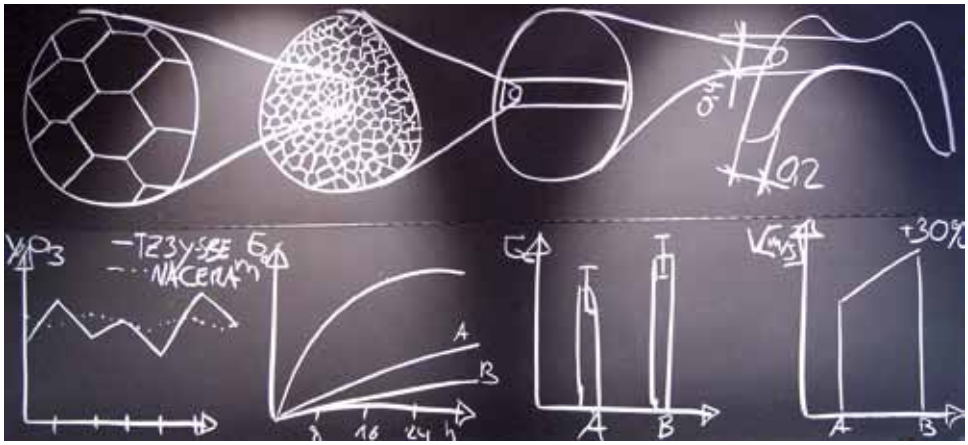
Holistic QM
> **page 14 - 15**

The Ceramic

Created by nature – tuned by DOCERAM, made for eternity
"In 4.4 billion years nature created on earth and moon a material under tremendous geological, physical and chemical environment. This material is without any doubt the best "your mouth" can get for the next 50 years!

Astonishing multi-resistant, natural aesthetics, high endurance and the feeling to have "Mother Nature" right in your body, makes this material to the last step of evolution to the perfect dental material. – NACERA®!

Pure instable ZrO_2 cannot be used technologically. For technical application it has to be stabilised by CrO, MgO and Y_2O_3. For dental applications only yttrium stabilised material is used.



Application in medical technology focussing on dental
DCOERAM is capable of delivering class 1 to class 3 products. Up-to-date production technology as 5-axis CNC-machining or ultrasonic enhanced machining gives us the possibility to produce complex geometries with utmost precision in the μ-area.

DOCERAM is capable of producing CAD/CAM blanks of all geometries for open systems, relieving our customers of all restrictions. We can tell our customer how to get from the scan to the finished dental restauration (Turn-Key-Solution).

Since 2003 DOCERAM is delivering the leading companies in the area of dental implants. Over 3.5 millions incorporated units are the hallmark of our excellent quality.

DOCERAM®
MEDICAL CERAMICS

The company
In 15 years DOCERAM evolved into a market leader for high-tech ceramics in the automotive industry, engineering, textile technology, for space and laser technology.

In all these areas, we deliver proven individual solutions and standard part, generic patented high-tech ceramics, high-temperature and wear resistant as well as electrical insulating precision parts from prototype to mass production.

The automized machining and testing was our step stone for the entry into the medical environment with remarkably similar requirements to the final product as in engineering.

> extreme wear resistance by nano-scaled and absolutely dense micro-structures
> extreme bending strength through best raw materials and optimum processes
> corrosion resistance for long-time applications
> isotropy for perfect fit

Up-to-date production technology


Structured production


Flexible sintering strategy


Automated 5-axis machining

> Secure ceramic competence

Did you know that…
… most of colouring liquids contain ironoxide? Ironoxide reduces the bending strength of your zirconia by 30%?

… translucent zirconia has little or now trace of aluminumoxide?

Aluminumoxide is used as preservator and slows down the aging process of the zirconia (phase transition to monoclinic). Negative side effect is the opacity of the zirconia.

DOCERAM uses only precoloured materials.
The competitors use individual colouring with non-acceptable dipping technology:
- **> acid containing fluids that destroy your valuable sintering furnace**
- **> different value of shading between copings and pontics**
- **> no colouring penetration of the framework**
- **> considerable time expenditure by dipping and drying**
- **> iron oxide containing colours**

The science

Raw materials, micro structure, blending, composition, sintering, machining….
Our knowledge creates the power for the final product, which will be the replacement for your original parts in your body. It does not play a role, whether it is a blank, an implant, an abutment or a tool.

Save, tested and long-time proven results guarantee for the exceptional quality and innovation designed today for your requirements of tomorrow.

The raw material is mined, chemically dissolved and cleaned in a complicated process. Finally only the desired elements are retained. After this the stabilising yttrium oxide and, in case to case the alumina oxide as well as colouring aids, are added and synthesize to a extremely fine powder < 50 nm.

Evaluated researches shown that NACERA Z has a more even distribution of the strength determining yttrium oxide as the standard TZ-3YSB-E Tosoh material.
The purity and the fine grain lead to a very fine micro-structure in the finished part.
This is desired as this enhances bending strength and hydro-thermal aging properties.
The uniform shrinkage leads to an unbeaten fitting due the fine grain.

A science of itself is our unique powder concept, the

DOCERAM Medical Ceramics focu
NACERA Z® - the sup

DOCERAM reference supplier
Flexible, long-time quality leader
Produces after our material requirements patented dental ceramics

Precise powder concept of DOCERAM Medical Ceramics
> chemical composition
> purity and homogeneity

Our actions are focus
Right from the start we aim for economi

More colours? Different finishing processes? Higher bending strengt
Define your individual requirements; we design the powder

Safety
> reference laboratories in permanent testing > own Sauer

The small but fine difference
The competitors colour their qualities with iron oxide. This lowers the bending strength and hydro-thermal aging properties.

NACERA® Z has an iron oxide free pigment that is only contained in minimal concentrations and therefore it has almost no influence on the bending strength.
We start with the details
> highly pure materials with exactly balanced, designed chemical composition
> a significantly higher evenness in the nanometre-scale is proven
> homogenous, nano-scaled micro-structure significantly better that competition

Isostatic pressure > 3.000 bar leads to complete destruction of the pressing granules. Result is a perfect micro-structure and a uniform shrinkage. For years we deliver the identical shrinkage factor irrespective of raw material batch. This requires a ceramic process technology that is the core competence of DOCERAM.

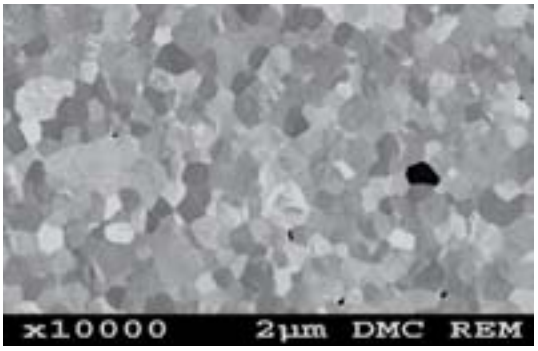
The control of all material data (incoming inspection, bending strength, granule distribution, chemical analysis, and radioactivity) and process parameter (pressing power, sintering parameters) give us the absolute control of the quality.
We are registered in Europe (93/42 EWG), USA (FDA 510(k)) and Canada (CMDCAS).

NACERA® Z: higher working speed, higher bending strength, easier finishing

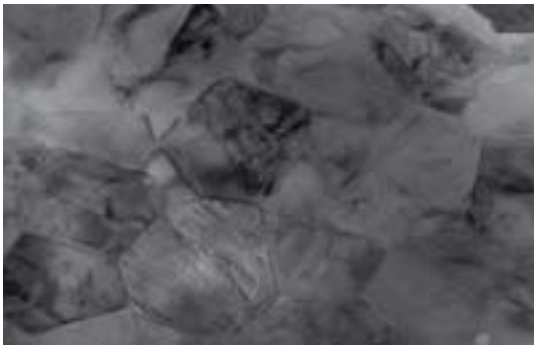
DOCERAM Medical delivers isostatic pressed blanks for dental applications with absolute isolinear shrinkage, e.g. all blanks regardless of pre-shaded, translucent or white do have always the same shrinkage 1,2500.


Powder filling in the clean-room


XRD analysis



Micro-structure tests with SEM


Nano-crystallites in TEM

purity, the micro-structure – your perfect base!

ssed on generic powder standards
erior material concept

Better raw materials lead to
> higher bending strength
> better hydro-thermal stability
> natural translucency
> aesthetic colours

Broad ceramic portfolio
> Tosoh-good-standard
> NACERA® Z
> NACERA® Z Speed
> NACERA® Z Medium/Ivory
> NACERA® ZT

sed on results.
c production and a 100% success

th? Your application determines the materials not vice versa.
quality, micro-structure and machining parameters!

5-axis milling centre > QC parallel to the production

> Premium materials for perfect final quality

A holistic material portfolio guarantees a perfect realisation of your economical and procedural requirements:

- **Tosoh quality, good standard quality**
- **Nacera® Z Speed fastest machining, secure results**
- **Nacera® Z high-end-quality, highest bending strength, perfect finishing, perfect fit**
- **NACERA® Z Medium**
- **NACERA® Z Ivory**
- **NACERA® ZT**

„Why not test this?"

Material concepts

NACERA® Z

Our implant quality for experts and toughest conditions of use: The speciality of this material is that we have developed a finer micro-structure blank than usual in the market. The chemical and physical qualities are significantly more homogenous as with comparable zirconia. The space between the single grains is smaller. This leads already physically to a more linear shrinkage. With an identical machining after sintering leads to

- perfect shrinkage,
- perfect fit,
- less adjusting.

Indication: Up to 16-unit bridges, attachment, bar- and single crown restorations, implant, telescoping crowns technology.

Nacera® Z Speed

The high-speed zirconia is for fast milling sintering the "more" in fineness. It was especially developed for users that want more than a standard material.
It is especially qualified for:

- optimised, individualised milling templates with higher feed and speed rate
- finer, filigree frameworks
- thinner cervical margins.

Of course you can work with this material in a conventional way as well. With enhanced milling templates, the milling time is 30% less than with usual materials in the market. Sintering is 90 min. or 4.3 h without loss of strength. To give you a secure production environment, we also deliver HSC-tools optimised for speed milling – of course in 'Made in Germany' industrial quality.

Ask for our speed templates for your CAD/CAM system to speed up your production process.
Indication: up to 14-unit bridges, single crowns.

NACERA® Z Medium/Ivory

The colour security by pre-coloured blanks means homogenous colour throughout the complete construction, no iron oxide, which means no reduction in bending strength and hydro-thermal stability.
NACERA® Z Ivory in the colour area Vita classic /A3/A3,5
NACERA® Z Medium in the colour area Vita classic B1/B2/A2
Indication: up to 16-unit bridges, single crowns, implants, bar and attachments, telescopic crowns technology.

NACERA® ZT

This translucent material is high-esthetical and can be used universally:

- as a translucent coping for demanding front-tooth applications for a ceramic powder build up or over-press technique.
- fully anatomic restorations, milled with or without incisal cut-back.

NACERA® ZT is a cost effective alternative to metal-free restorations.
High quality, aesthetically, milled in 10 minutes, stained, sintered and glazed.

Indication: up to 5-unit bridges, for layer and/or over pressing technology as well as for full anatomic restoration in molar area or for short span bridges.

Tosoh-quality

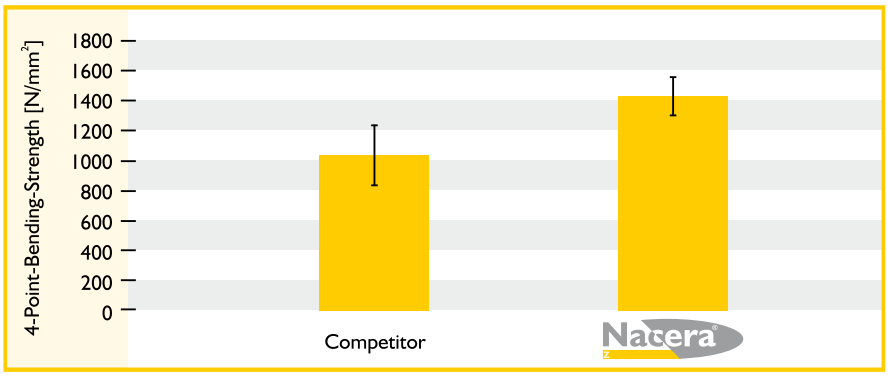
We trust this quality for 6 years with over 800.000 units. We deliver this standard quality for laboratories that are focussed on a common quality.

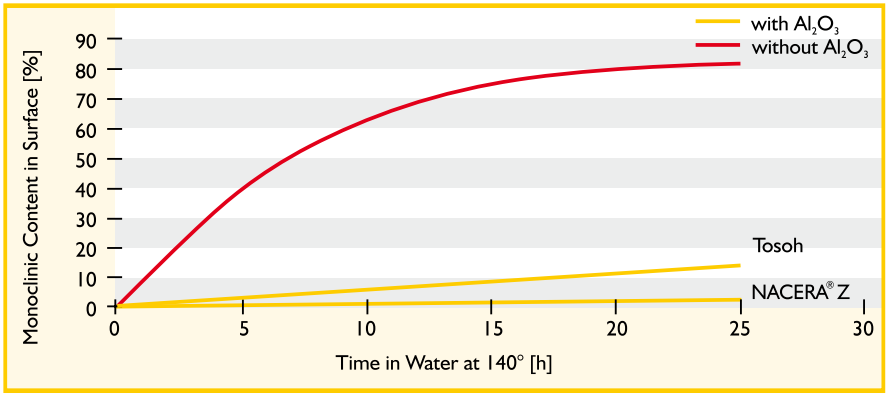
Nacera®

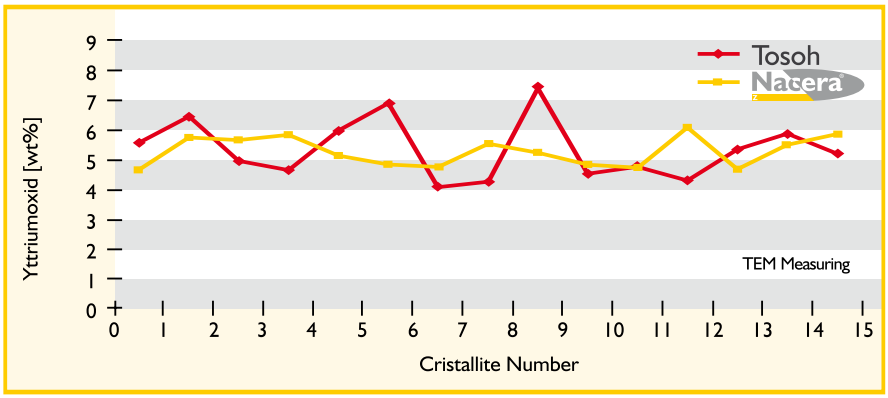
Your combatant
> immense chewing and shear forces,
> punctual contacts,
> shearing movements on inclined areas and defective position of tooth
> aggressive acids,
> thermal shocks,
> electro-galvanic currents
> nicotine, tar, caffeine, tanning agents, medicines

cause abrasion, unaesthetic and besetting plaque or even complete destruction – in short "your mouth is needs a high demanding restoration, even better than mother nature.

Our Zirconium is better than the original!
NACERA® knows no caries; NACERA® knows no discolouration, no deposits, NACERA® stands for high expectations on aesthetic, translucency, colouring and form.








Colour security

Precision machining


More time through speed templates


Production security

> Customer oriented material diversity

DOCERAM works -
The complete system
> user oriented
> open, flexible
> individual and always cutting edge

"Enjoy your new freedom – without any risk!"

Test our starter-kit consisting of:
> blank,
> template,
> burs.

We are certain that you will hook up with our quality!

Open system – most common CAM modules– all from one hand!
We deliver forward-looking complete systems with implemented process security and absolute independence.

The Turn-Key-Solution comprises the complete chain from milling template, HSC tools, blanks over sintering, e.g. all necessary components.

> CAM-software (Open Mind, etc.),
> Milling machines: tested on major linear and dental machines,
> Tools: diamond coated 3-cutters (HSC – High Speed Cutting Tools) increased life-time
> Material: Nacera Z Speed, fast processing zirconium
> Sintering furnace: We have developed Speed-sintering cycles with DEKEMA; these cycles allow to make a complete restoration in one day

Result:
Through extensive tests together with linear machine producers and CAM-module providers we develop optimized templates for our material.
The machining time is reduced by 30% per unit.

> security > freedom > compatibility > individuality

Dentist + lab
> dental impression > digitalized model > CAD > Ch

Process secure CAM-modules
Co-operative partnerships with reference suppliers (Open Mind)

Milling process on linear machines
> highly precise
> high dynamical
> faster turn around
> maximum productivity

All components, parameter and milling strategies are
NACERA® is the gold standard – the reference for sa
customers

NACERA® Z - the implant quality, perfect shrinkage, perfect fit

NACERA® Z Speed - high speed zirconia milled in < 8 min., sintered in 90 min.

Lining
> secure substructures for reliable results > fa

DOCERAM®
MEDICAL CERAMICS

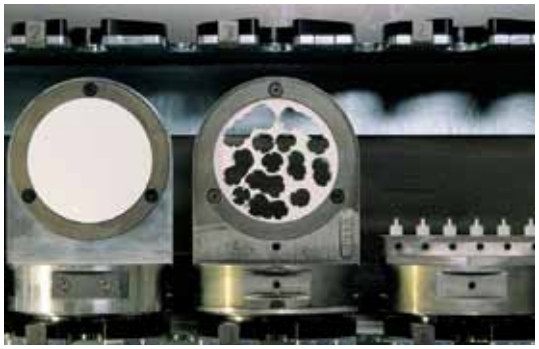
Safe service
We understand us not only as experienced producer and processor of zirconia products, furthermore we would like to share our knowledge of machining and development functioning as your service provider.

Our industry partners secure in closed co-operation the valuable processing of your products from the start to the finished products.

DOCERAM Medical Ceramics has its own development unit, engineers, and dental technicians to offer you the best solution. We can reproduce internally the complete process chain of the zirconia and are in permanent exchange with commercial reference laboratories.

Stable co-operation with the customers guarantees the successful strategy in the market help you to grow your business.


Direct realisation


Customer related production


Optimised milling strategy

Process revolution through co-operation

for perfect functionality and economical success

oratory
airside CAD/CAM systems > Dental Laboratory

NACERA® Z Speed optimised HSC-cutters
> higher endurance
> lower cutting time per unit
> higher cutting volume

Sinter furnace for highest productivity, fast sinter cycle
> process secure
> reproducible results
> fast, 90 min. for single units, 4.30 h for bridges

e optimised on the complete Nacera® Z family!
ve work, so that you can concentrate on your only!

NACERA® Z Medium/Ivory, pre-coloured without iron oxide, durable and high-strength

NACERA® ZT - the translucent type highly aesthetic

aster realisation with secure end results

> Free system choice at maximum production security

At the top alternatives become rare!
This may be intimidating for our competitors, that we are not only supplying the market leader with millions of pieces. For us on the contrary this is the sole possibility to be close to the user and his requirements to deliver real progress!

Continuous quality enhancement means
> maximum bending strength,
> constant colour,
> high demanding aesthetic,
> fast processing.

The allies
In the worldwide struggle for market share we have never forgotten that you want to take “a bite” at your competitors and to want “to feel well with us”.

This is why especially global players in the dental technology trust no only our product quality – 3,5 million units, stage end 2009 – but also value our customer focussed engineering:

> fast development cycles,
> quick decisions,
> production focussed development
> systematic networking of our partners
> competitive prices from producer

In addition to that we are working on a daily basis with traders and milling centres close to the needs and parameters of use.

We know the expectations and have learned through a lot of tests and developments to approach new goals offensively in order to secure that your final customer keeps his “bright smile”!

DOCERAM®
MEDICAL CERAMICS

The partners
We understand what you want! Now we tell you what we would like to do to keep you satisfied, furthermore we want to inspire each and every one of you!

> The industry needs innovations, creative heads, developers and material specialists for exceptional qualities and trouble-free processes – we are ready!

An absolute security of delivery and solutions for tomorrow, you will see that we have already developed for you!

> The trader needs the direct contact to the producer with safe standards and blanks of top-quality at top-conditions and support to give you security! We are there!

With our in-house training we will give you the necessary advantage and make you a competent partner for your final customer – Because real know-how is priceless!

> Milling centres and big laboratories need qualities that are made for the newest milling and finishing technologies, fast, predictable, aesthetically, economically, safe – we have the complete choice!

30% time saving processes and quality with no match at a market based price clear the way for new developments, milling technologies, tools and product developments.

> The dental technicians need save systems, high quality materials that may forgive the smallest takes of everyday work. Tell us your expectations – you have the choice!


CAD construction


Machine concepts


High precision machining production


Material choice for your individual demand

> **Co-operative complete structure**

Visions, possibilities, outlook and chances!

Ceramics in multi-optimised fields:
- **> wear**
- **> strength**
- **> bio compatibility**
- **> weight**
- **> freedom from artefact (NMR).**

Innovative use in:
- **> springs**
- **> abutments**
- **> pumps**
- **> nozzles**
- **> implants**
- **> threads down to M1,2**
- **> implants, knee implants, cup spring**

knee implant

cup spring

Visions and chances
In a historical view a novelty is only innovative until the competitors are using it, too.

100 years ago teeth were torn out, 50 years ago doctors started to drill and fill with amalgam, then we had gold alloys as restoration, the jacket-crowns, inlays, titanium abutments and then ceramic, today pre-coloured translucent zirconium, tomorrow glass ceramic for milling.

Unfortunately we are not allowed to tell you too much about the technical highlights of tomorrow. Just this:
For your ideas as well we will find the right material, the best process and most economical solutions.

The reason for this is our open way of thinking, our short and flexible structures and our motivation for a challenge!

Just think this over! No matter whether you are in our competence-centre 'Atrium', in the production or at your site "close to the problem", you will meet our engineers.

You will realise very quickly that we are solving your problem with "creative realisation power".

Tomorrow we will talk about nano-ceramic toothpaste or the "Unscrambling of the genetic code" so that tooth will grow again just as with crocodiles or sharks. See how close the future is!

Flexible ceramic drills that can take the nerve minimal-invasively, completely metal-free are already almost in use – worldwide.

For the case that you have a "no go" in your mind, we can make this work with:
- > 12 patented high-performance ceramics
- > Our fast start, open culture
- > And highly motivated engineer-team

That loves and lives high-performance ceramics.

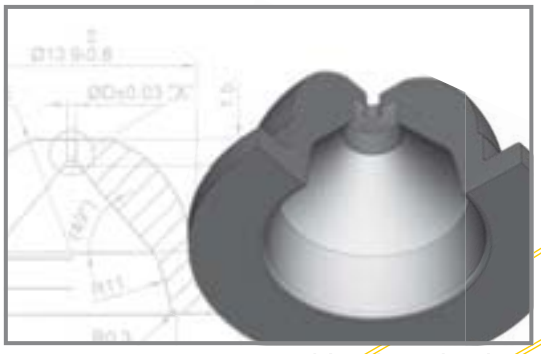
With our sister companies
- > DOTHERM Insulation Materials and
- > STS Friction

DOCERAM and the MOESCHTER GROUP create synergies that give you the decisive advantage against competition.

We welcome you in the Competence-Centre!

DOCERAM®

MEDICAL CERAMICS



Nozzle technology

Abutments

Implants

Pump technology

> Think free and design creative

Quality is no standard for us, but an active living consciousness!

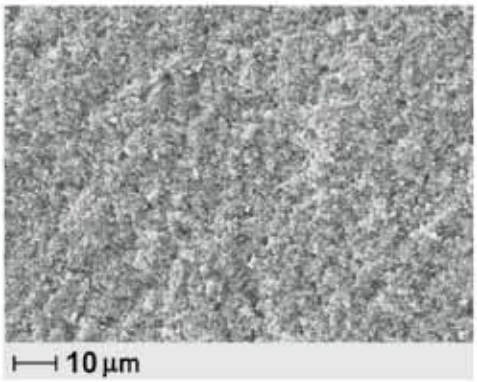
Quality management system

- **certified acc. DIN ISO 9001:2008 and**
- **certified acc. DIN ISO 13485:2003**
- **Certificate acc. 93/42 EEC Annex II Division 3 for prosthesis**
- **Certified acc. CMDCAS ISO 13485:2003 for Canada 510 (k) FDA for Nacera Z types for dental prosthesis**

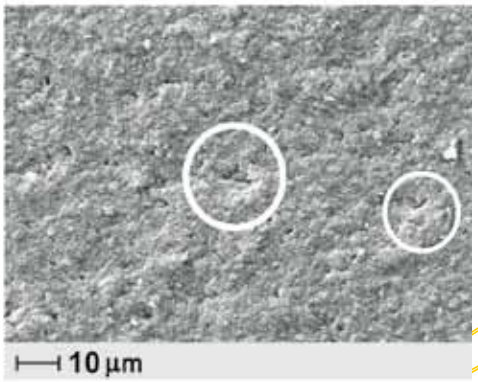
It is nice to know that our broad concept is working.

- secure components
- best materials
- proven processes
- deep rooted application competence

give you the save feeling to be well at home!

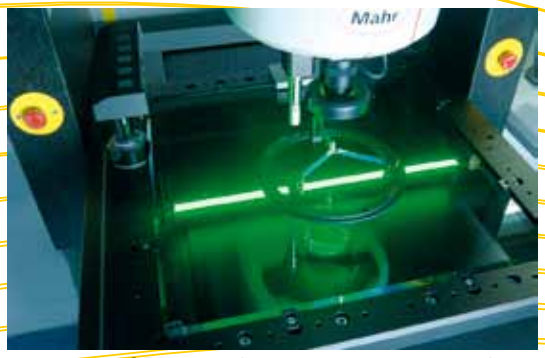


(Nacera quality without false in the structure)



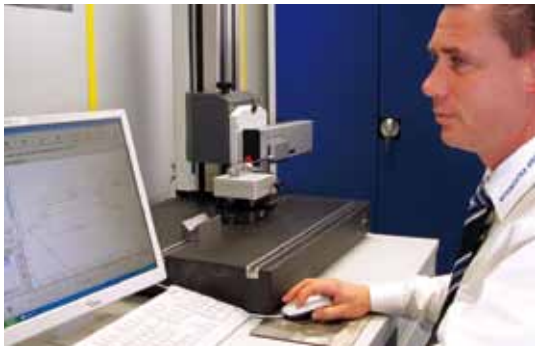
(competition with defects in blanks)

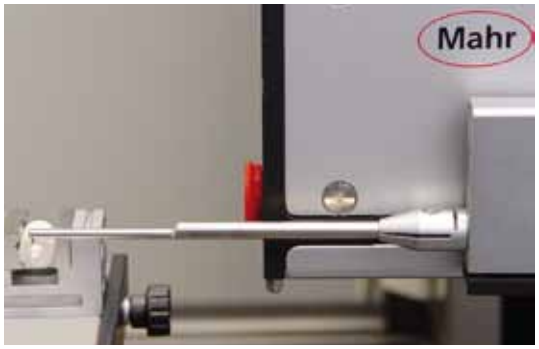
DOCERAM®
MEDICAL CERAMICS



3D-coordinate measuring machine


Material testing


2D-measuring technology



Tip probing against CAD-data


swiss TS

ZERTIFIKAT

DOCERAM MEDICAL CERAMICS

DOCERAM Medical Ceramics GmbH
Hesslingsgweg 65-67
D-44309 Dortmund

Entwicklung, Herstellung und Vertrieb von keramischen Medizinprodukten

ISO 13485:2003 Qualitätsmanagement für Medizinprodukte


swiss TS

CERTIFICATE

DOCERAM MEDICAL CERAMICS

DOCERAM Medical Ceramics GmbH
Hesslingsgweg 65-67
D-44309 Dortmund

Development, production and sales of medical devices made of ceramics

ISO 13485:2003 Quality management for medical devices

> **Extreme endurance, hardness and perfect fit**

DOCERAM
Medical Ceramics GmbH

Hesslingsweg 65 – 67
D - 44309 Dortmund

Phone: +49 (0) 231/92 56 68-0
Fax: +49 (0) 231/92 50 25-60

info@doceram-medical.com
www.doceram-medical.com

Made by nature,
optimized by DOCERAM,
created for eternity

"Realise joint visions!"

9999-Y-0005

Certified Company **DIN EN ISO 13485:2003** **MOESCHTER GROUP**