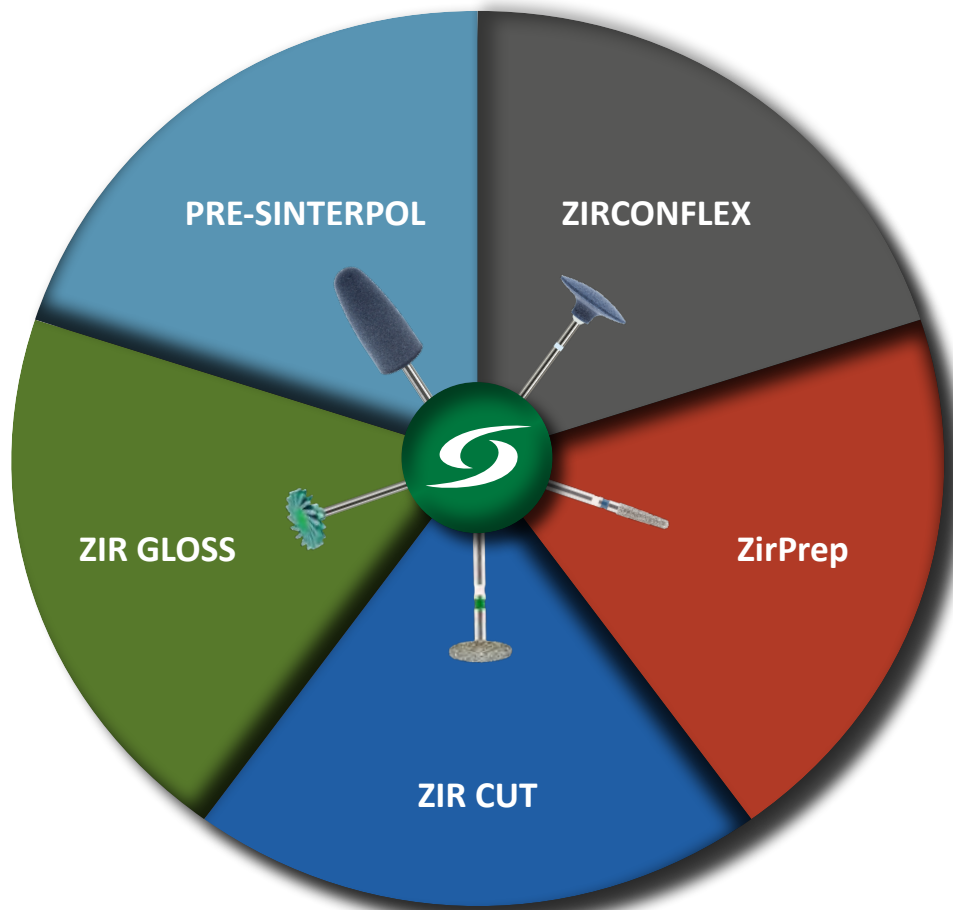




ZIRCONIA POLISHING COMPASS





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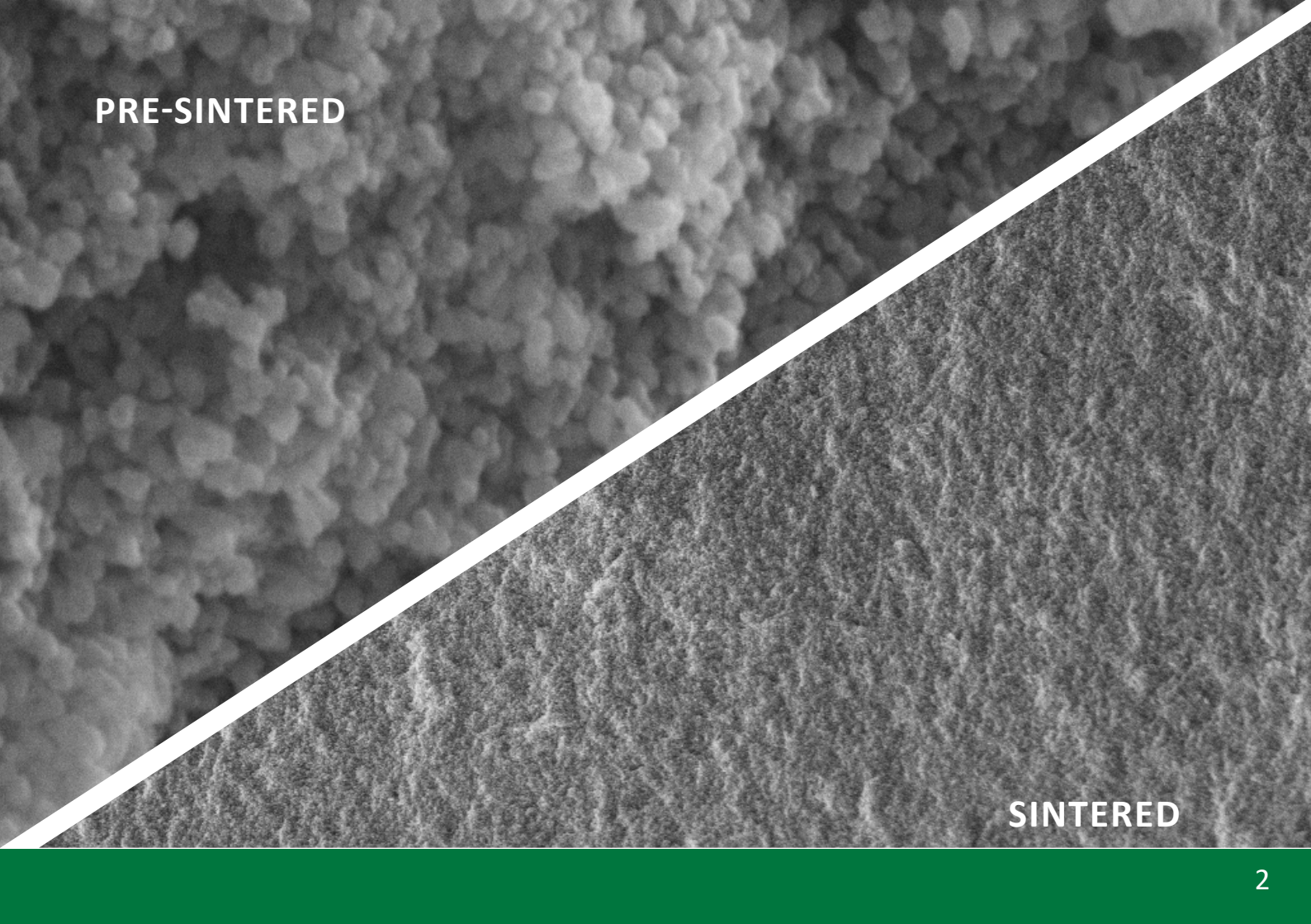
Zirconium Dioxide (Zirconia, ZrO_2)

Zirconia provides the ideal combination of **high strength**, **fracture toughness**, **aesthetics**, and **biocompatibility** for applications in dentistry. These unique properties are based on the mineralogical structure of the material. Zirconia has two states: pre- or un-sintered and sintered.

Pre-sintered zirconia has a loose structure, and sintered has a crystalline structure (see pictures on the right). Therefore, it is necessary to use instruments that are especially suited for these two states.²

To **avoid abrasion of the natural antagonist** and **reduce bacterial adhesion**, the microstructure of the zirconia surface is very important. The roughness influences the transmission, absorption, reflection, and scattering of light and therefore affects the esthetic appearance of the restorations.¹⁰ Surface smoothness can be achieved by **polishing or glazing, or both**. Some studies showed that glazing significantly decreased the flexural strength values after grinding, but polishing did not.^{4,5} Besides, the glaze layer is likely to diminish in the first 6 months after insertion of the restorations¹⁷ or by any required adjustment, resulting in increased wear of the antagonist.¹⁶ For these reasons, many **scientists prefer polishing** zirconia restorations.^{12,13} If glazing is used to create a smooth surface, all zirconia restorations on the contact and proximal surfaces should still be polished before glazing.

Moreover, **polishing improves the durability and aesthetics** of restorations by eliminating the defects caused by surface grinding.¹⁸ Another advantage of polishing is the **reduced risk of plaque accumulation and periodontal diseases**.¹⁸



PRE-SINTERED

This scanning electron micrograph (SEM) illustrates the morphological changes in a material during sintering. The image is split diagonally by a white line. The upper-left portion, labeled 'PRE-SINTERED', shows a collection of small, rounded, and somewhat isolated particles. The lower-right portion, labeled 'SINTERED', shows a more continuous and interconnected network of particles, indicating that the material has undergone sintering where the particles have fused together.

SINTERED

PRE-SINTERED ZIRCONIA PROCESSING

Separating the restoration

C31RL.HPL.010



10'000 rpm
500105143007010

932D.HP.220



10'000 rpm
806104350524220



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PRE-SINTERPOL

PRE-SINTERED ZIRCONIA STEP 1 POLISHING

Developed for the lower strength of pre-sintered zirconia

ZIR9972M.HP.100



4'000-7'000 rpm
658104275423100

ZIR9974M.HP.055



4'000-7'000 rpm
658104275423055

9160.HP.140



7'000-12'000 rpm
652104546503140



swiss laboratory



PRE-SINTERED ZIRCONIA STEP 2 POLISHING

Zirconia is not contaminated with color pigments

ZIR9972F.HP.100



4'000-7'000 rpm
658104275413100

ZIR9974F.HP.055



4'000-7'000 rpm
658104275413055

9840.HP.140



7'000-12'000 rpm
803104543503140



SCAN OR CLICK

KIT 1936 GREEN STATE REFINING

Polishing pre-sintered zirconia simplifies finishing after final sintering

Zirconia in the pre-sintered state has a **porous structure** and a **low strength**. A subsequent sintering process can not eliminate defects such as cracks and microchips developed after the manufacturing process or after shaping and structure adjusting.¹¹ Furthermore, polishing only at the zirconia sintering stage causes high material wear on the polishing tools and is very time-consuming. Therefore, **white-stage polishing** restoration is an essential step before the sintering process.

In a recent study, Pfeifferle et al. (Munich, 2020) showed that white-stage polishing **improves the optical and mechanical properties** of zirconia, and **polishing after sintering takes less time** therefore, the pre-polishing step (green polisher) can thus be skipped.¹⁵ Nevertheless, the two-steps polishing protocol increases flexural strength. Additional polishing step removes more surface defects and thus achieves a smoother surface.¹⁵ Based on new scientific research, Jota has developed polishers **PRE-SINTERPOL** that do not change the color of the green state and improve the surface quality. It is not recommended to use polishing paste for pre-sintered zirconia polishing. Because it was shown that polishing paste could incorporate into the porous pre-sintered surface and reduce translucency of restoration.¹⁵ Pre-sintered zirconia restorations should be polished **only in the dry state**.

Based on the new polishers **PRE-SINTERPOL**, a **KIT 1936 GREEN STATE REFINING** has been created, which includes a minimal set of instruments for detaching from the disc or block, grinding the connectors, texturing the surface, and white-stage polishing of the restoration.



swiss laboratory



Video about Kit 1936 on YouTube

KIT 1936



swiss **laboratory**

Separating

C31RL.HPL.010



10'000 rpm
500105143007010

Connectors grinding and crown margin thinning

ZIR9972M.HP.100



4'000-7'000 rpm
658104275423100



KIT 1936



Fissures
retightening

515L.HP.012



3'000-7'000 rpm

310104467211012



swiss laboratory

Surface texturing or fissures shaping

863.HP.012



50'000 rpm
806104250524012



KIT 1936

Straight surfaces processing

882.HP.018



50'000 rpm
806104142524018

Smoothing and polishing

9840.HP.140



7'000-12'000 rpm
803104543503140



SINTERED ZIRCONIA PROCESSING

JOTA Zirconflex

JOTA Zirconflex is the **ideal partner for the preparation of sintered zirconia**, as it was specially developed for the preparation of zirconia. No water cooling is required, yet there is only minimal heat build-up, thus avoiding phase transition, damaging the material. Material is removed rapidly using minimal grinding pressure while at the same time protecting the material properties so that the risk of microcracks is reduced to a minimum.

Right is an electron microscope image of zirconia after preparation with **JOTA Zirconflex** and a competitor's product, magnified 1000 times. The JOTA example presents a spotless, smooth surface profile without microcracks. This surface has been ideally prepared for facing with build-up material.



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Jota

WITH ZIRCONFLEX

COMPETITOR

SINTERED ZIRCONIA PROCESSING

JOTA Zirconflex

SZ722.HP.180



7'000 rpm
655104304526180

SZ715.HP.160



7'000 rpm
655104371526160



swiss laboratory

interdental regions adjusting



SINTERED ZIRCONIA PROCESSING

JOTA Zirconflex

SZ732.HP.050



10'000-15'000 rpm
655104107526050

SZ736.HP.065



10'000-15'000 rpm
655104012526065

SZ623.HP.060

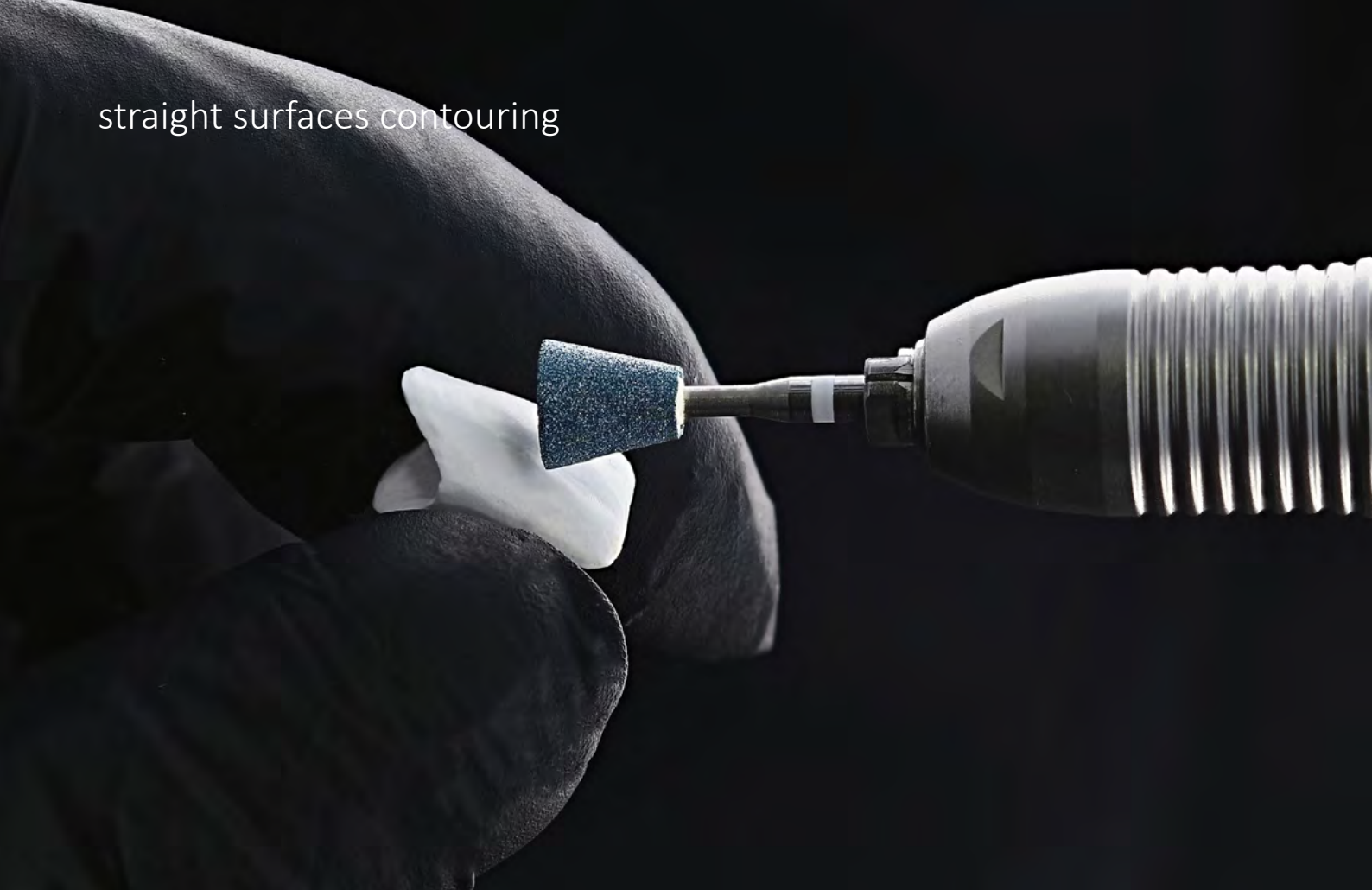


10'000-15'000 rpm
655104043526060



swiss laboratory

straight surfaces contouring



SINTERED ZIRCONIA PROCESSING

JOTA Zirconflex

SZ601.HP.035



10'000-15'000 rpm
655104001526035

SZ602.HP.040



10'000-15'000 rpm
655104001526040

SZ667.HP.035



10'000-15'000 rpm
655104257526035



swiss laboratory

palatal, lingual and occlusal
surfaces preparation



SINTERED ZIRCONIA PROCESSING

JOTA Zirconflex

SZ652R.HP.035



10'000-15'000 rpm
655104199526035

SZ660.HP.040



10'000-15'000 rpm
655104274526040

SZ638.HP.025



10'000-15'000 rpm
655104110526025



swiss laboratory

preparation of the margins and labial surfaces



SINTERED ZIRCONIA PROCESSING

JOTA Glaze Prep intraoral

GP662.RA.035



15'000-25'000 rpm

655204288526035



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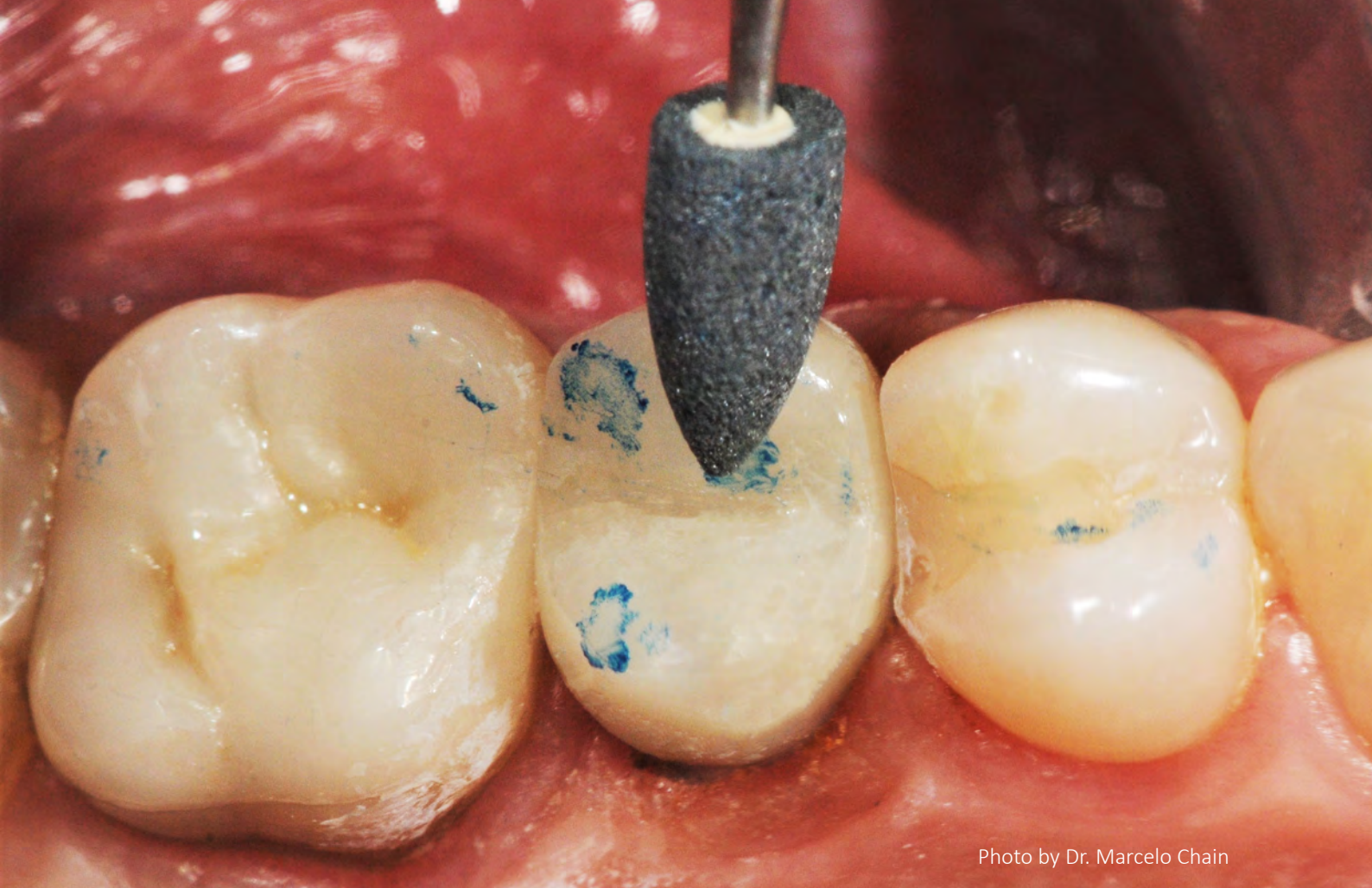


Photo by Dr. Marcelo Chain

SINTERED ZIRCONIA PROCESSING

JOTA ZirPrep

Sometimes it is necessary to adjust the early contacts after the crown has been fixed or after sintering in the laboratory. The **use of coarse diamond burs can lead to micro cracks** and subsequently increase the fragility of the restoration. Besides, coarse instruments remove the glazed layer and **increase the surface roughness**.² Kosmac et al. found that grinding with coarse-grit burs caused more **decrease in flexural strength** than grinding with fine grit.⁶ The same results became Curtis et al.⁷

Grinding dental zirconia with **tungsten carbide burs causes a significant reduction of the biaxial flexural strength** and observed microstructural surface and subsurface damage. Tungsten carbide burs are not recommended for grinding dental zirconia.⁸

To fix these problems, Jota specifically developed **JOTA ZirPrep** diamonds with **unique diamond grains** and optimized bonding for sensitive zirconia surface preparation. ZirPrep diamonds provide **less aggressive** zirconia removal at moderate surface temperatures and no risk for micro cracks. Moreover, **durability** is outstanding thanks to specifically selected diamond grains. The additional white stripe can easily distinguish ZirPrep instruments.

Besides dental technicians can use these instruments with the laboratory turbine to correct zirconium oxide restorations or abutments, dentists may also perform reworks or fitting restorations.

JOTA ZirPrep diamonds should be used with **water cooling** only.



ZirPrep Kit 1460



All ZirPrep instruments in one Kit

ZirPrep

Z801L.FG.014



300'000 rpm
806314697324014

Z801LF.FG.014



300'000 rpm
806314697314014





Z833.FG.023

Z833F.FG.023



190'000 rpm
806314277324023

190'000 rpm
806314277314023



swiss laboratory

ZirPrep

Z863.FG.012



300'000 rpm
806314250324012

Z863F.FG.012



300'000 rpm
806314250314012





Z850.FG.018



250'000 rpm
806314198324018

Z850F.FG.018



250'000 rpm
806314198314018



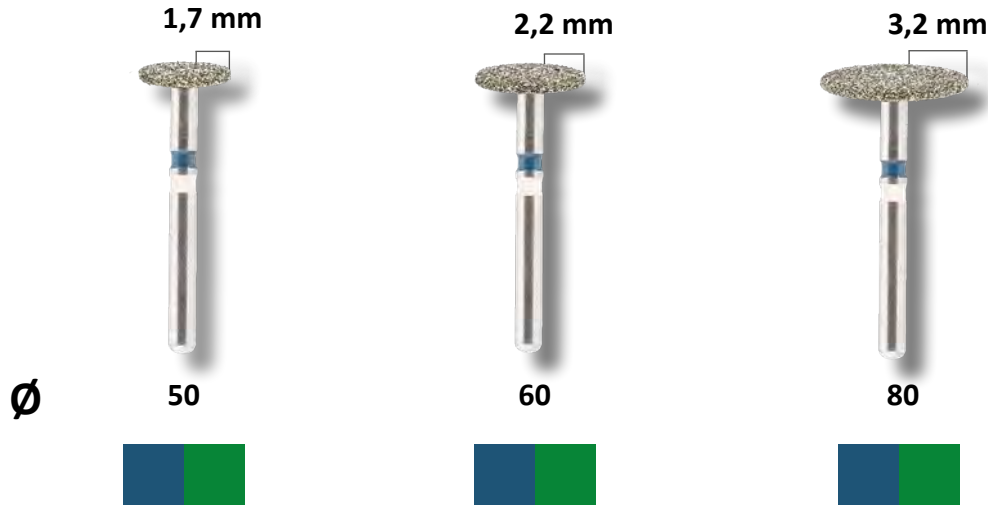
swiss laboratory

ZIRCONIA CROWN CUTTER

ZIR CUT

Retrospective clinical evaluation studies showed that zirconia restorations have about **90 % survival rate** at 3.5 years and 10 years **62.1 %**, respectively. ^{23,24,25} Removing in case of replacement or endodontic access through zirconia restorations is a very difficult task for rotary instruments since zirconia is one of the hardest materials used in dentistry. Only a few instruments can grind zirconia, and it takes much time to make even a small hole in the crown. For this challenging task, Jota has developed a series of **ZIR CUT** instruments that can remove zirconium oxide restorations **fast and efficiently**. ZIR CUT has diamond grain, which is perfectly adapted to this special challenge.

Jota had designed especially **diamond discs** to separate full-ceramic crowns and bridges with three different depths. Two grains are available to suit the indications. The additional white stripe can easily distinguish ZIR CUT instruments. Discs have extremely **high cutting efficiency and long service life**. Use these discs to separate zirconia and hard ceramics restoration on vestibular, occlusal surfaces and incisal edge avoiding cervical areas. **Z838L** cutter is applied at an angle of 45° to the crown surface to cut materials on the cervical area. After separation, vestibular and occlusal surfaces widening pliers can widen and break the restoration.



PERFORMANCE OF ZIRCUT



RECOMMENDATIONS FOR USE:

- follow the recommendations for optimal rotation speed
- it is recommended to use the instruments in the contra-angle with higher torque
- water cooling is always required, especially during the trepanation procedure (min. 50 ml/min.)
- apply low contact pressure (<2N) and intermittent movements
- avoid contact of diamond discs with soft tissue, risk of injury! Use rubber dam to remove restorations to prevent soft tissue damage.

ZIR CUT

ZIRCONIA CROWN CUTTER

ZIR CUT

Z818.FG.050

Z818.FG.060

Z818.FG.080

APPLICATION MOVIE



80'000 rpm
806314041324050

80'000 rpm
806314041324060

80'000 rpm
806314041324080





ZIR CUT

ZIRCONIA CROWN CUTTER

ZIR CUT

Z818G.FG.050

Z818G.FG.060

Z818G.FG.080

APPLICATION MOVIE



80'000 rpm
806314041334050



80'000 rpm
806314041334060



80'000 rpm
806314041334080



ZIR CUT

ZIRCONIA CROWN CUTTER

ZIR CUT

Z838L.FG.014

Z801.FG.010

Z801.FG.021

APPLICATION MOVIE



300'000 rpm
806314140526014



300'000 rpm
806314001324010



210'000 rpm
806314001324021





SINTERED ZIRCONIA POLISHING

ZIR GLOSS

It is scientific proven that the use of diamond rubber polishers is the most suitable polishing method for zirconia ceramic restorations.⁹ With the **Jota ZIR GLOSS** polishing system, we provide a precisely coordinated system for perfect high-lustre polishing of zirconium dioxide restorations. A perfect high-lustre is achieved in only **two polishing stages** using the **ZIR GLOSS** diamond polisher! The **Swivel Polishers** create a perfect high glossy surface and are ideal for polishing the occlusal areas.



swiss laboratory



SINTERED ZIRCONIA POLISHING STEP 1 PRE-POLISHING

ZIR9865M.HP.260



7'000-12'000 rpm
803104303521260

ZIR9867M.HP.110



7'000-12'000 rpm
803104372521110



swiss laboratory

all surfaces pre-polishing



SINTERED ZIRCONIA POLISHING STEP 1 PRE-POLISHING

ZIR9866M.HP.040



7'000-12'000 rpm
803104243521040

ZIR9868M.HP.140



7'000-12'000 rpm
803104543521140

ZIR9868M.HP.260



7'000-12'000 rpm
803104543521260



swiss laboratory

occlusal surface pre-polishing



SINTERED ZIRCONIA POLISHING STEP 2 HIGH-GLOSS POLISHING

ZIR9865F.HP.260

ZIR9867F.HP.110



7'000-12'000 rpm
803104303511260



7'000-12'000 rpm
803104372511110



swiss laboratory

high-lustre polishing of all surfaces



SINTERED ZIRCONIA POLISHING STEP 2 HIGH-GLOSS POLISHING

ZIR9866F.HP.040



7'000-12'000 rpm
803104243511040

ZIR9868F.HP.140



7'000-12'000 rpm
803104543511140

ZIR9868F.HP.260



7'000-12'000 rpm
803104543511260



swiss laboratory

high-lustre polishing of occlusal surface



SINTERED ZIRCONIA POLISHING

ZIR GLOSS INTRAORAL

Many studies showed that unpolished zirconia can lead to increased wear of opposing enamel and dental restorations ² and biofilm accumulation on the surface. Different studies reported that polishing the zirconia specimens yielded far **smoother surface and less antagonist enamel wear** compared with glazing. ^{19,20,21,22} Since only polishing is allowed after cementation, selecting a suitable polishing system is important.

The specially developed two-stage **intraoral Jota ZIR GLOSS** diamond polishing system **reduces surface roughness and minimizes wear on the opposing teeth**. Also, polishing **increases the longevity and aesthetics of restorations**. ³



swiss dentistry

STEP 1 PRE-POLISHING

ZIR9862M.RA.060



7'000-10'000 rpm
803204030521060

ZIR9861M.RA.040



7'000-12'000 rpm
803204243521040

ZIR9863M.RA.140



10'000-12'000 rpm
803204543521140

ZIR GLOSS

SINTERED ZIRCONIA POLISHING STEP 2 HIGH-GLOSS POLISHING

ZIR9862F.RA.060



7'000-10'000 rpm
803204030511060

ZIR9861F.RA.040



7'000-10'000 rpm
803204243511040

ZIR9863F.RA.140



10'000-12'000 rpm
803204543511140



swiss dentistry



ZIRCONIA POLISHING KIT 1446

The **KIT 1446** contains all the necessary instruments for processing and polishing various zirconium oxide restorations. **JOTA ZIRCONFLEX** for processing, adjusting and texturing surfaces. A two-stage diamond polishing system **ZIR GLOSS** allows all surfaces to be polished to a high gloss. Swivel instruments are able to penetrate with their villi into all fissures of the restoration. You don't need paste or water cooling to work with this kit. You get a restoration **with a better surface roughness** in just a few minutes than after glazing.

The smooth surface of the restoration provides **comfortable tactile sensation** for patients and **prevents plaque accumulation** on the surface of the restorations. In addition, it was scientifically proven that the polishing system does not change the structure of the zircon oxide and therefore provides **better micro-cracks resistance**.¹ The polished surface does not crack like glaze.



swiss laboratory



Video about Kit 1446 on YouTube



KIT 1446

Straight surfaces smoothing
and margins thinning...



swiss laboratory

additionally, connections points
trimming

SZ732.HP.050



10'000-15'000 rpm
655104107526050



KIT 1446

Supracontact points adjusting ...



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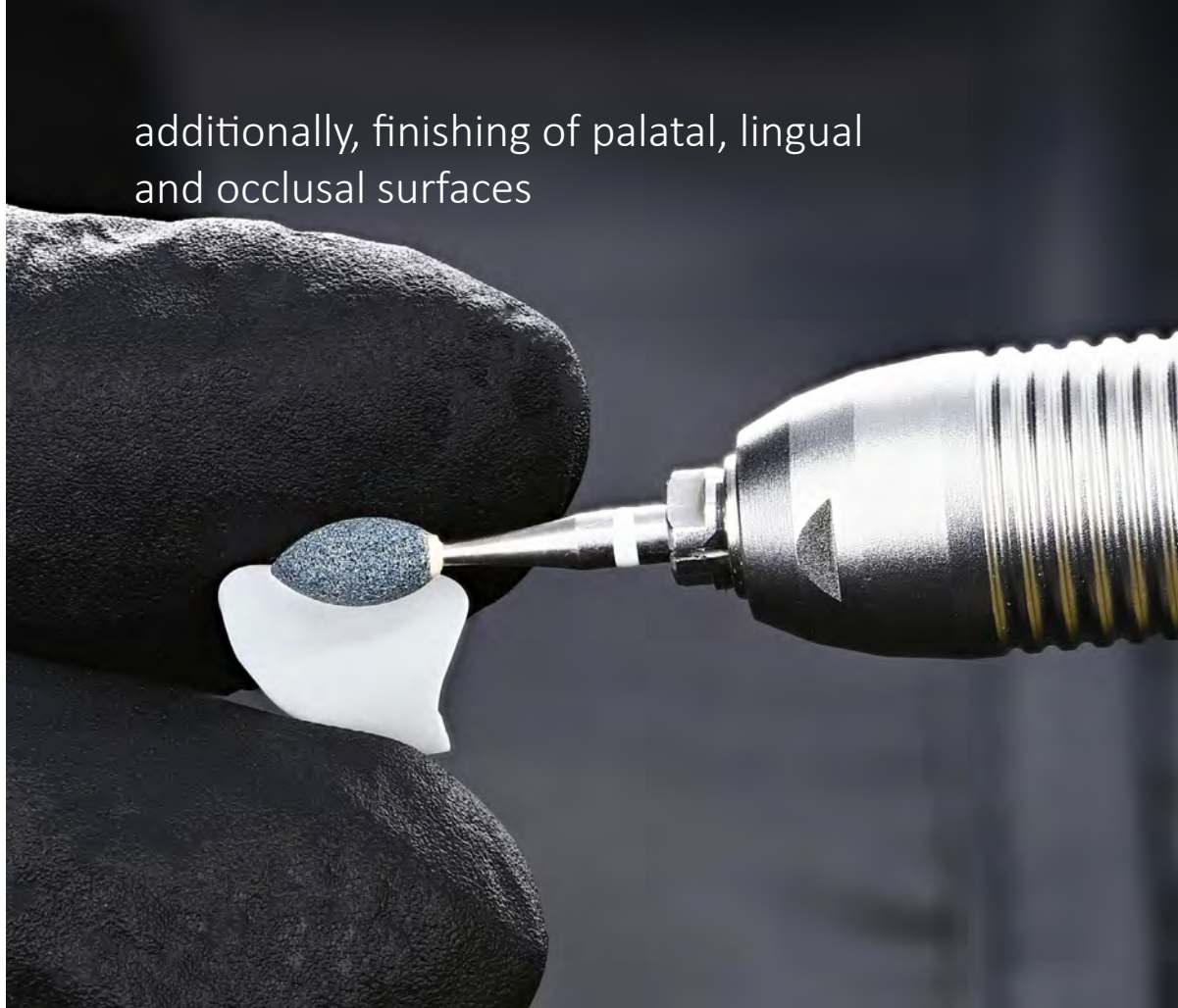
additionally, finishing of palatal, lingual
and occlusal surfaces

SZ667.HP.035



10'000-15'000 rpm

655104257526035



KIT 1446

Interdental spaces finishing ...



swiss laboratory

and labial surface texturing and margins adjusting

SZ652R.HP.035



10'000-15'000 rpm

655104199526035



KIT 1446



swiss laboratory

All surfaces pre-polishing

ZIR9865M.HP.260



7'000-12'000 rpm
803104303521260

occlusal surface pre-polishing

ZIR9868M.HP.140



7'000-12'000 rpm
803104543521140



KIT 1446



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High-lustre polishing
of all surfaces

ZIR9865F.HP.260



7'000-12'000 rpm
803104303511260

High-lustre polishing of occlusal surface

ZIR9868F.HP.140

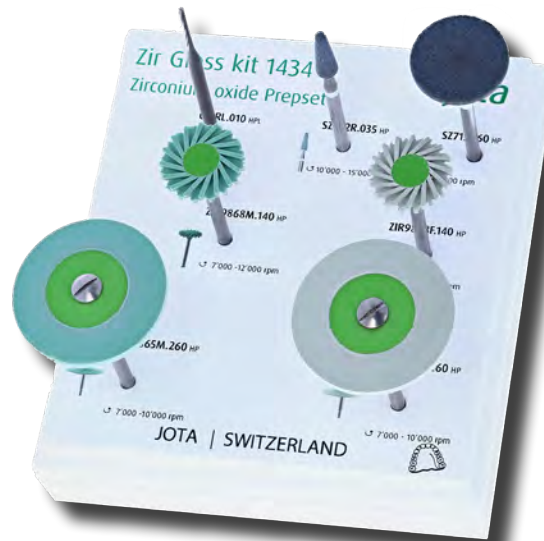


7'000-12'000 rpm
803104543511140

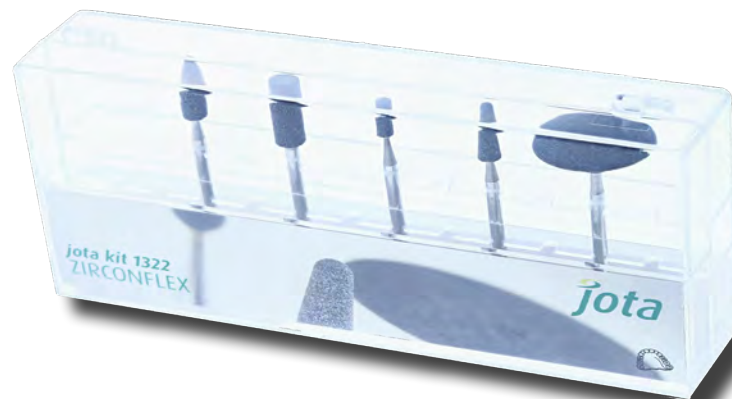


SINTERED ZIRCONIA PROCESSING KITs LAB

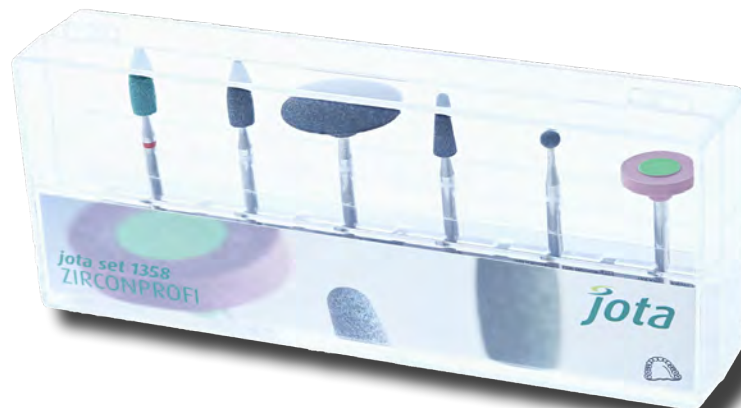
ZIR Gloss Kit 1434



**Jota Kit 1322
ZIRCONFLEX**



**Jota Kit 1358
ZIRCONPROFI**



SINTERED ZIRCONIA PROCCESSING KITS CHAIR SIDE

Jota Kit 1436
ZIR Gloss - Dentistry



Jota Kit 1441 ZIR Gloss Chairside Set



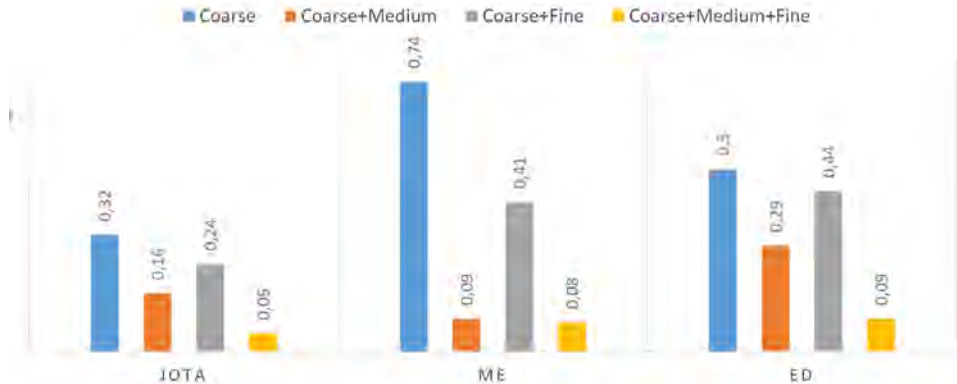
EFFECTS OF DIFFERENT FINISHING/POLISHING PROTOCOLS AND SYSTEMS FOR MONOLITHIC ZIRCONIA ON SURFACE TOPOGRAPHY, PHASE TRANSFORMATION, AND BIOFILM FORMATION

Hang-Nga Mai, Su-Hyung Hong, Sung-Hun Kim, and Du-Hyeong



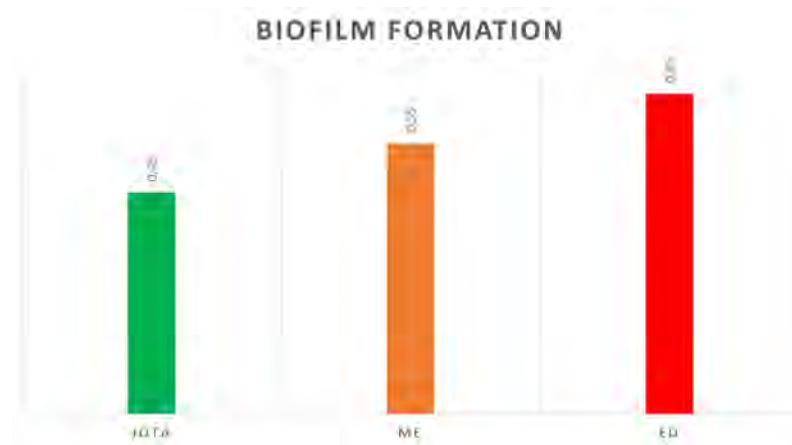
JOTA Polishing Protocol has the lowest roughness Ra values and less than after glazing.¹

SURFACE ROUGHNESS (RA) VALUES OF MONOLITHIC ZIRCONIA SPECIMENS AFTER SURFACE TREATMENT



Glazing and polishing are two options for surface smoothing of zirconia restorations. Although glazing is a popular method for restoring the high-gloss surface of the restoration, glazed layers can reportedly become worn within 6 months of the restoration. On the other hand, the polishing procedure does not add any layer to the surface of the monolithic zirconia restoration. The polishing alone removes the material by abrasion in which polishing abrasives transmit the mechanical energy to the material, resulting in the surface roughness changing. Moreover, this method can produce surface roughness of $0.2\text{ }\mu\text{m}$, which is less than or equal to that achieved with glazing. Surface roughness $\leq 0.2\text{ }\mu\text{m}$ provides minimal plaque accumulation and comfortable tactile sensation. Oral bacterial biofilm formation on the surfaces of restorations lead to surface biodegradation, secondary caries, gingivitis, and mouth odor.

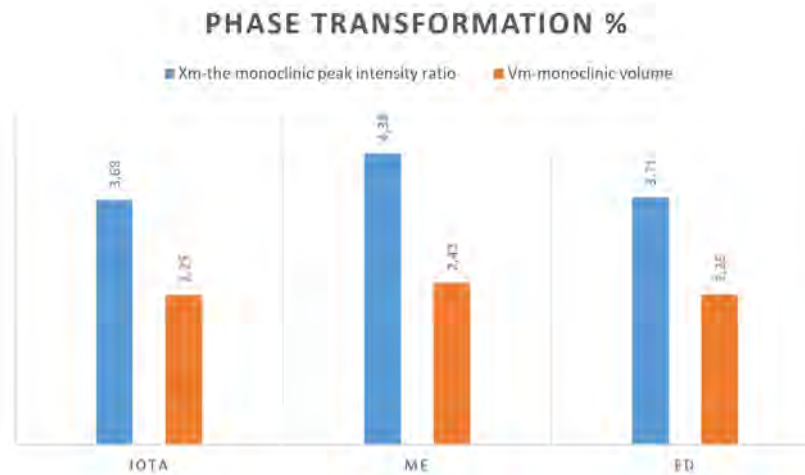
Jota Polishing Protocol showed minimal plaque accumulation on the surfaces.¹



STUDY

Zirconium-dioxide exists in three crystalline phases. Tetragonal phase provides better mechanical properties. The tetragonal phase is only partially stabilized, unfavorable phase transformation from the tetragonal phase to the monoclinic phase may occur when external energy is provided. Shape adjustments and finishing of zirconia in the clinic provides external energy to the zirconia crystal through local generation of heat and frictional force, which causes phase transformation. As a result, the increase in the monoclinic phase caused the degradation of zirconia's mechanical properties, which compromises the predictability of longevity of the prosthetic rehabilitation.

Jota Polishing Protocol showed the smallest phase transformation and therefore better crack resistance.¹

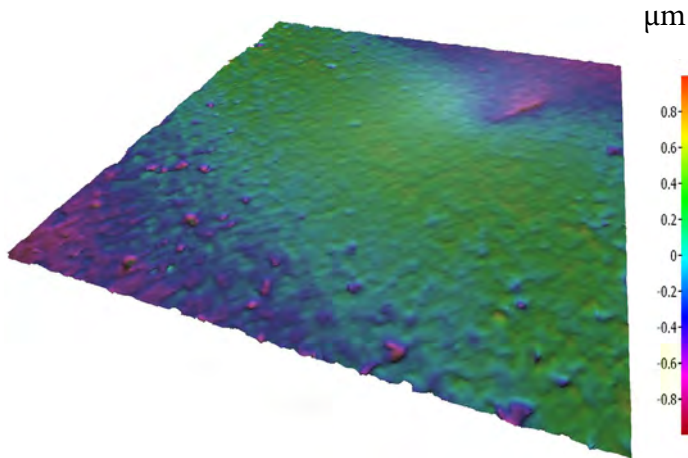


IMPORTANT!!!

All processing steps must be followed to achieve a perfectly smooth restoration surface. If the restoration has been processed with rough stones or diamond instruments, polishers cannot polish rough defects. Therefore, it is very important to use all the polishing steps. Namely, after rough processing, the mandatory use of **ZIRCONFLEX** instruments and only then polishers **ZIR GLOSS**.

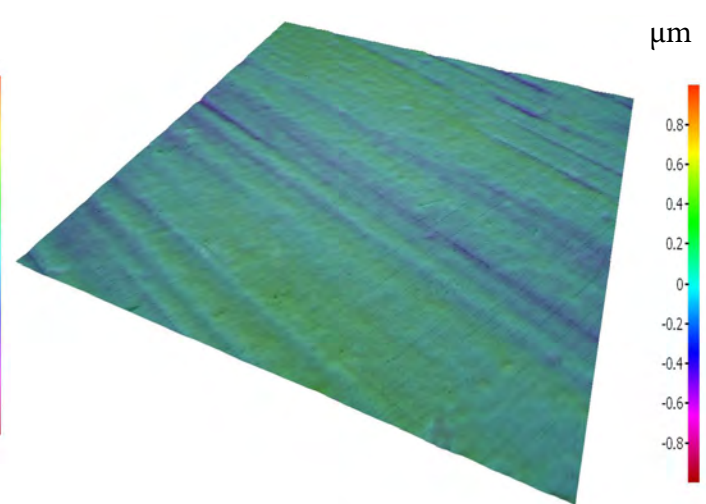
**Roughness after coarse grinding
and polishing with ZIR GLOSS.**

Mean Sa=0,213 μm



**Roughness after coarse grinding, pre-processing with
ZIRCONFLEX and two-stage polishing with ZIR GLOSS.**

Mean Sa=0,067 μm



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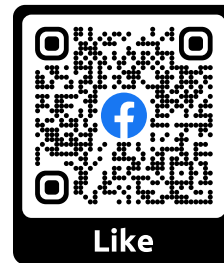
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