



DUO
MULTILAYER
Dental Zirconia
Ceramics
CE 0197 FDA

DUO Technical Guide

Bridge the Aesthetics and
Functionality to the Next Level



DUO
MULTILAYER
Dental Zirconia
Ceramics

UPCERA

Mastering Monolithic Style

DUO is a revolutionary zirconia material that masterfully balances unparalleled strength and exquisite aesthetics. Featuring a biaxial flexural strength of 850 to 1200MPa⁽¹⁾, DUO provides exceptional durability for various dental restorations, including crowns and bridges.

Its translucency ranges from 45-48%, ensuring a natural, lifelike appearance that meets the high standards of modern dentistry. Ideal for both anterior and posterior applications, DUO is the perfect choice for dental professionals seeking a product that embodies reliability and aesthetic brilliance, setting a new standard in restorative dentistry.



(1) The flexural strength refers to the biaxial flexural strength, tested according to the ISO 6872 method.

Product concept

The design philosophy behind DUO encapsulates a sophisticated balance, articulated through the following principles that reflect its dual strengths:

Synergy of Powder and Blanks:

DUO is achieved through the meticulous integration of state-of-the-art zirconia powder from Sinocera and advanced blank manufacturing processes developed by Upcera. This innovative collaboration leverages the strengths of both divisions to deliver an unparalleled level of performance and reliability in dental restorations. The integration of these technologies allows for a uniform sintering process, resulting in high-purity zirconia with controlled defects and uniform nano-particle distribution. This contributes to improved translucency and strength, creating a reliable material that enhances the aesthetic quality of restorations.

Balance of Strength and Aesthetics:

With an impressive biaxial flexural strength of 850 to 1200 MPa and translucency ranging from 45-48%, DUO exemplifies the ideal fusion of durability and visual appeal. This allows dental professionals to create exquisite restorations that meet the highest standards of functionality and beauty, ensuring exceptional outcomes for patients.

Efficiency in Workflow and Results:

DUO has been expertly engineered to enhance workflow efficiency while maintaining uncompromising quality. Its superior performance characteristics streamline the fabrication process, particularly for monolithic restorations, saving valuable time and reducing complexity, all while consistently delivering outstanding final results.

Versatility in Application and Adaptability:

DUO's exceptional performance attributes enable it to address a wide range of clinical indications and applications. This versatility empowers dental professionals to confidently navigate diverse treatment scenarios, making DUO an indispensable asset in modern dental practice.

In conclusion, DUO embodies a holistic approach to dental restorative materials, seamlessly integrating strength, aesthetics, efficiency, and versatility.

Its foundational principles resonate with the product's name, "DUO" symbolizing a steadfast commitment to excellence in contemporary restorative dentistry.



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01 Product Information



1.1 Composition and technical data

1.1.1 Chemical Composition

| | | | | | |
|------------------------------------|-------------|--------------------------------|-------|-------------|-------|
| ZrO ₂ +HfO ₂ | 86.3%~95.5% | Fe ₂ O ₃ | <0.5% | Other oxide | <0.5% |
| Y ₂ O ₃ | 5.8%~9.7% | Er ₂ O ₃ | <2% | | |

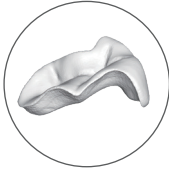
1.1.2 Technical Data



| | |
|--|---|
| Translucency (1mm, transmittance) | 45%-48% |
| Flexural Strength (Mpa) | 850-1200MPa |
| Fracture Toughness | >4MPa·m ^{1/2} |
| Density after sintering | ≥6.0g/cm ³ |
| CTE (25-500C) | (10.5±0.5)×10 ⁻⁶ k ⁻¹ |
| Accelerated aging surface monoclinic phase content | <5% |
| Chemical solubility after sintering | <100µg/cm ² |
| Radioactivity | ≤1.0Bq/g |
| Sintering temperature | 1480C |

1.2 Intended use

DUO is used to fabricate anterior and posterior dental restorations with various CAD/CAM systems.



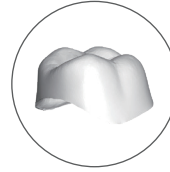
Onlay/Inlay



Veneer



Crown



Substructure Crown



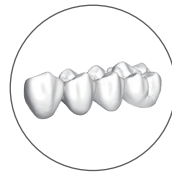
Implant-supported Single Unit



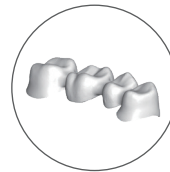
3-unit Monolithic Bridge



3-unit Substructures



Multi-unit Monolithic Bridge(≥4-unit)



Substructures Multi-unit Bridge(≥4-unit)



Implant-supported Multi-unit/Fixed Complete Dental Prosthesis

1.3 Product specifications

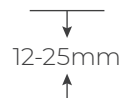
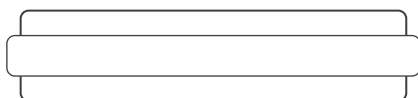
1.3.1 Packaging



1.3.2 Shades



1.3.3 Size



D98X12 D98X14 D98X16 D98X18
D98X20 D98X22 D98X25

02 Fabrication Process



Streamlined workflows for ultimate satisfaction:



2.1 CAD/CAM design

2.1.1 Material-specific frame parameters

The following parameters must be complied with when fabricating zirconium-oxide frames in the high-density sintered condition:

| Indication | Anterior region | | Posterior region | |
|-----------------------------------|-------------------------------|---|-------------------------------|---|
| | Minimum layer thickness in mm | Connector dimensions** in mm ² | Minimum layer thickness in mm | Connector dimensions** in mm ² |
| Full contour | | | | |
| Crown | 0.8 | — | 1.0 | — |
| 3-unit bridge | 1.0 | 9 | 1.0 | 12* |
| 4 or more units Max. 2 pontics | 1.0 | 12* | 1.0 | 15 |
| Cantilever bridge with one pontic | 1.0 | 12* | 1.0 | 15 |
| Framework | | | | |
| Crown | 0.4 | — | 0.6 | — |
| 3-unit bridge | 0.6 | 9 | 0.6 | 9 |
| 4 or more units Max. 2 pontics | 0.7 | 12* | 1.0 | 15 |
| Cantilever bridge with one pontic | 1.0 | 12* | 1.0 | 15 |

* Height: 4 mm, width: 3 mm, Height > width

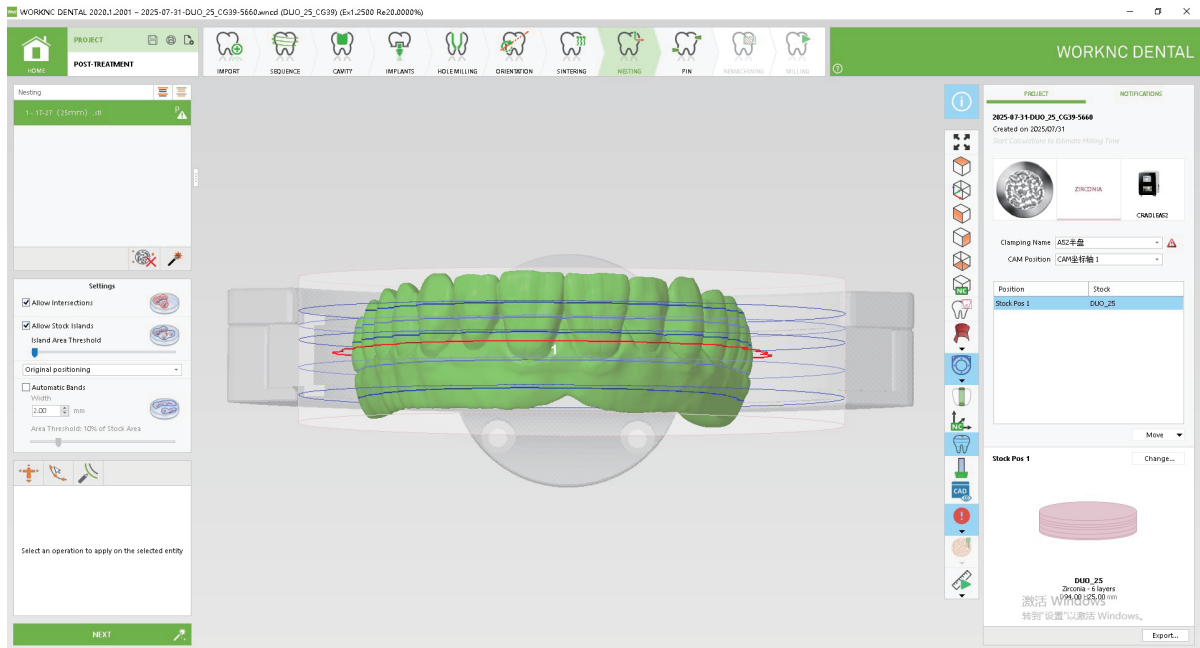
** The specified minimum connector cross-section must be positioned in the dentin area of the block

Important Note:

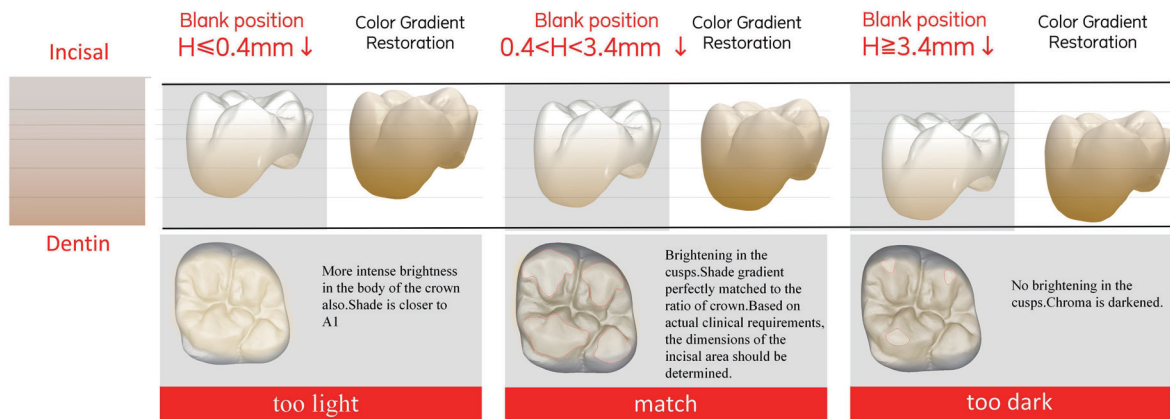
- Note that mechanical failure (e.g., fracture or chipping of the restoration) may depend on the quality of the tooth preparation.
- Ensure the minimum wall thickness of the framework on the occlusal surface is maintained even after occlusal adjustments.
- The thickness of the fabricated restoration may be adjusted based on clinical case requirements.

2.1.2 Positioning guidelines in CAM software

In the CAM software, the dentin/incisal shade distribution in the DUO blank is shown according to the integrated shade gradation and is indicated by reference lines.



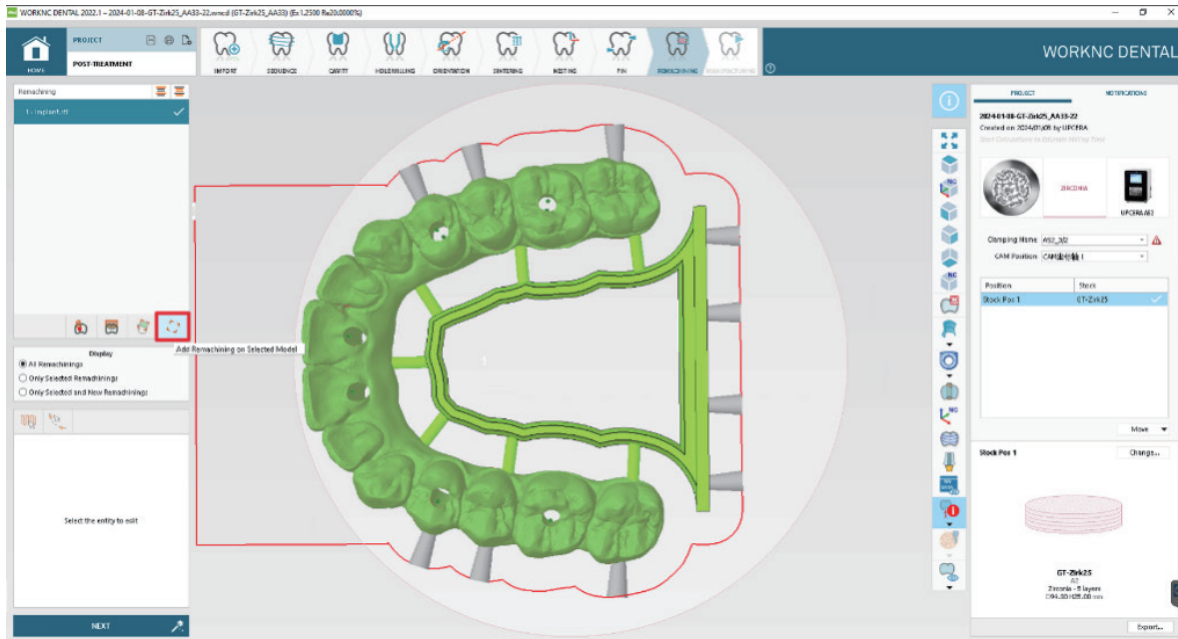
Depending on the position of the restoration in the disc – higher or lower – the exact amount of incisal area can be determined. To achieve an optimal match of the shade gradient, several factors must be considered. The selection of an appropriate blank height in relation to the restoration height is crucial for a successful outcome. The figure below depicts a 12.6mm-high restoration positioned within a 16mm block A2 for spatial layout optimization.



To avoid distortion and ensure proper fit, multi-unit restorations with significant curvature must always be sintered with a support structure. Attach a stabilizing bar perpendicular to the sintering support structure at terminal abutments.

The following bridge configurations universally require sintering support structures:

- Curved bridges (e.g., anterior dentition spans).
- Multi-unit bridges (5 units) exhibiting pronounced curvature.



Sintering support structures

- Adopt a mirror-symmetrical positioning pattern, with positioning areas strictly confined to the cervical one-third to middle one-third of the dental crown to ensure uniform stress distribution.
- Avoid setting support bars in bridge units unless necessary, particularly steering clear of connector areas.
- A lingual sintering framework must be added during long-span bridge sintering, with thickness parameters dynamically adjusted based on the anatomical morphology of the crown.
- The sintering framework wall thickness parameters should be configured to closely approximate the lingual thickness of the dental prosthesis Π (theoretical recommendation).

Note: All the above operations are based on **WORKNC DENTAL 2020.0.1923**

2.2 Milling

It is recommended to use a five-axis milling machine (e.g., Upcera FLNTMill A53) equipped with extended-length milling burs. Mill the blanks using the milling strategies specified for the material. The machine manufacturer's specifications must be strictly adhered to.



Note:

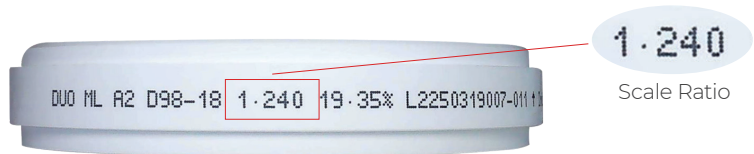
Processing Equipment Maintenance Protocol Before processing long-span bridges, execute the following:

- Replace with new burs before processing.
- Equipment calibration verification (tolerance limit ≤ 0.05 mm).

To address volumetric shrinkage inherent in the sintering process, DUO zirconia restorations are manufactured with a predetermined scaling factor. This compensation is achieved through the input of a scaling factor within the CAM software interface. Dental market offers multiple CAM software systems, each requiring distinct scaling parameter configurations. Should any issues arise, please contact the CAM software manufacturer immediately.

Material certification label:

zirconia disc specifies the exact shrinkage coefficient

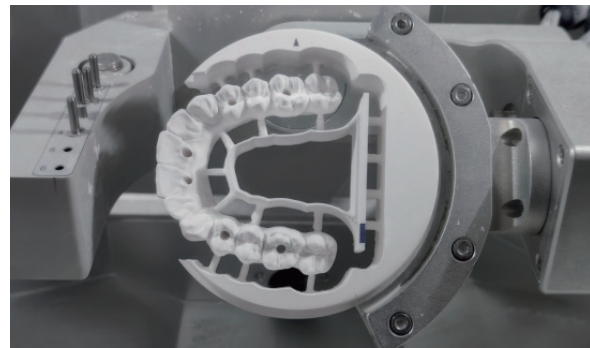


Technical escalation: In case of uncertainties, please contact your CAM supplier.

- During the installation of dental ceramic blocks, the orientation arrow must be aligned with the incisal edge direction of the restorations. Reverse positioning is strictly prohibited.



- When securing the disc in the holder, ensure both the circumferential notch and holder interface are free of contaminants. Fasten the screws sequentially in a crisscross pattern to achieve uniform torque distribution.

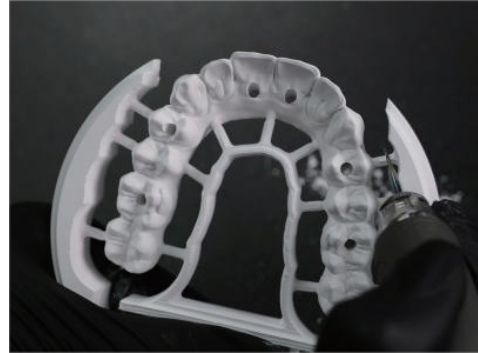


2.3 Separating and finishing

Any post-processing should be performed in the non-sintered state. To prevent material damage, proper finishing is essential after the milling process. The selection of suitable tools is critical for success.

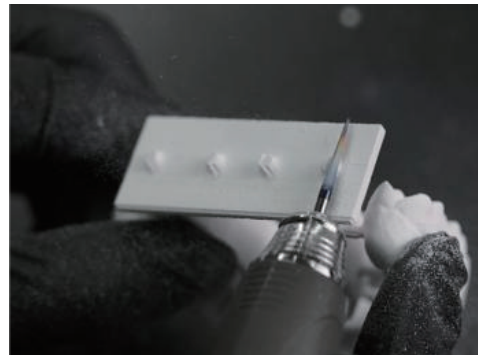
1

Fine tungsten carbide burs or diamond grinding instruments are recommended for separating the restorations.



2

Smooth out the attachment points of the holding bars.



3

Refine the cervical marginal line.



4

Proper milling cutter enables extremely fine fissures to create a natural morphology.



5

Adjust surface texture.



6

Thoroughly remove any zirconium oxide dust with a soft brush and then blast it with oil-free compressed air.



Tips and tricks

- When removing holding bars, limit the single-pass cutting depth of the bur to less than 0.5 mm to minimize stress on the material.
- During support structure removal and contour refinement, apply gentle pressure and move the tool in a single, consistent direction. Avoid back-and-forth (reciprocating) motions to reduce the risk of microcracks.
- Utilize standardized, zirconia-specific rotary instruments, maintaining uniform and controlled pressure throughout the procedure
- Replace tools immediately if the cutting edges become dull, such as when a significant drop in cutting efficiency is observed, to ensure precision and avoid damage.
- Use a soft-bristle brush to gently remove debris from both the internal and external surfaces of restorations.
- If compressed air is used for auxiliary cleaning, ensure the air is oil-free to prevent contamination .
- Wear a protective mask throughout the procedure to mitigate the risk of occupational pneumoconiosis.

2.4 Infiltration and drying (Optional)

DUO is a multilayer zirconia blank, if internal staining is performed using coloring liquids, we recommend applying the brush infiltration technique. For the internal staining process of zirconia products, please strictly follow the operating instructions provided by the coloring liquid manufacturer.

2.5 Sintering

Sintering of zirconia is one of the most critical steps in the fabrication of dental restorations.

Under high temperatures, the porous white zirconia green body shrinks, endowing the material with its final mechanical strength and optical translucency. To achieve optimal properties, strict adherence to defined sintering temperatures and dwell times is imperative.

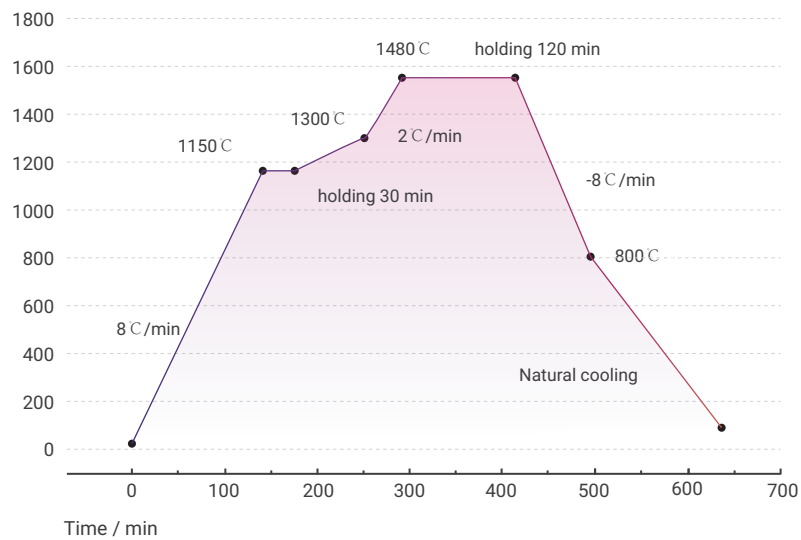
Deviations in temperature (either too low or too high) or duration (too short or too long) will compromise these properties.

For sintering DUO restorations:

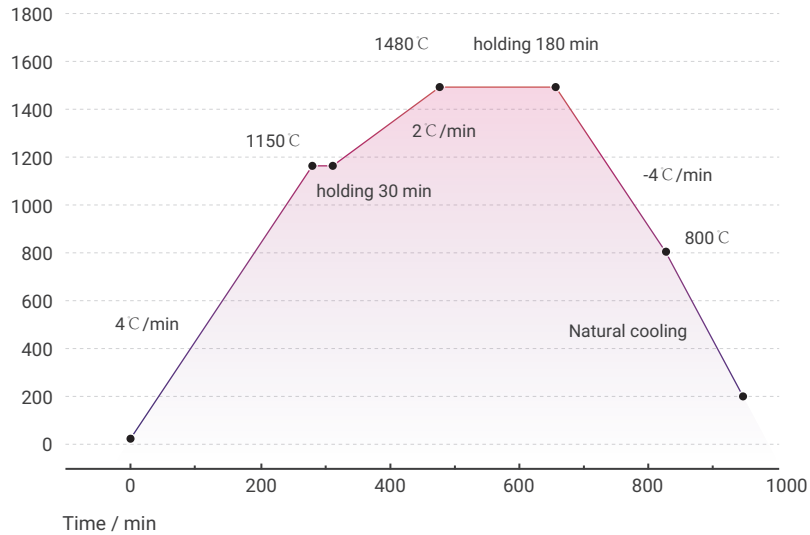
Use a high-temperature sintering furnace certified for dental zirconia processing.

Configure the furnace program to align with the following sintering schedule:

1. Standard Sintering Program



2. Sintering Program for Long-span Bridge



Tips and tricks

- Sintering temperatures are recommendations. If necessary, carry out a trial sintering cycle and adapt the sintering temperatures or times as needed.
- Restorations infiltrated with Colouring Liquids must be completely dry to prevent damage to the furnace and/or the object.
- The restorations must not come into contact with each other during sintering.
- Always keep the sintering accessories clean and free of dust so that no contamination of the sintered restorations occurs.
- Make sure that the appropriate sintering support structure is selected for the respective furnace system.
- Please also refer to the operating instructions of the respective sintering furnace.

2.6 Manual finishing after sintering

2.6.1 Grinding

Generally, the contouring of zirconia restorations is completed before sintering. However, post-sintering grinding may be required due to variations in operator proficiency. When performing post-sintering grinding under such circumstances, the following precautions must be exercised.

1. Handpiece Rotation Speed Specifications

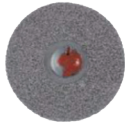


It is recommended to utilize brushless grinding handpieces, which employ digital frequency conversion control systems to achieve precise speed regulation. Integrated with brushless induction sliding rail technology, these devices significantly enhance operational stability and chuck clamping force. Key advantages include:

- Precise rotational speed control
- Enhanced equipment durability
- Reduced mechanical wear
- Superior noise suppression performance

During contouring procedures, the burs speed should be maintained below 15,000 rpm.

2. Grinding Tool Selection Guidelines

Under standard rotational speed conditions, the impact of different grinding tools on restoration edge integrity is as follows:

| | |
|--|---|
| <ul style="list-style-type: none"> – Diamond Burs <p>Material Characteristics: Silicon carbide abrasive particles</p> <p>Machining Performance: High risk of edge chipping</p> |  |
| <ul style="list-style-type: none"> – Coarse-Grit Zirconia-Specific Burs <p>Machining Performance: May still induce micro-fractures</p> <p>Usage Recommendation: Restricted to pre-contouring phases</p> |  |
| <ul style="list-style-type: none"> – Fine-Grit Zirconia-Specific Burs <p>Machining Performance: Effectively preserves edge integrity</p> <p>Best Practice: Recommended for final contouring procedures.</p> |  |

2.6.2 Polishing

Polishing the occlusal surfaces of monolithic restorations is very important. Good polishing protects the antagonist from undesired abrasion. Make sure that the occlusal surfaces are carefully polished after functional adjustment by grinding. Upcera FLNT polishers and polishing agents for oxide ceramics are recommended for polishing.



Tips and tricks

- Finishing of sintered DUO zirconia restorations should be kept to a minimum. The restoration should only be mechanically processed if it is absolutely necessary.
- Use only immaculate grinding instruments. Use only light pressure and low speed to adjust the restoration. Prevent sharp edges when finishing frameworks.
- Bridge connectors must not be post-separated with a separating disc.
- We recommend using a rubber polisher to smooth the basal side of the bridge connectors.
- The material-specific minimum wall thicknesses and connector dimensions must not be underscored during processing.
- Check the restoration for defects and cracks before and after finishing.
- During the try-on and fitting of the framework, keep the dies on the cast and try on the framework as a whole.
- Rinse the restoration under running water or use the steam jet to remove any adhering residue and dry it.

2.7. Staining and glazing

2.7.1 Staining technique

The Stains firing is carried out with Upcera Artouch/Realism Stain and Glaze Paste. These staining and glazing procedures can be carried out together or separately, depending on the situation. For further information see Upcera Artouch/Realism Instructions for Use.

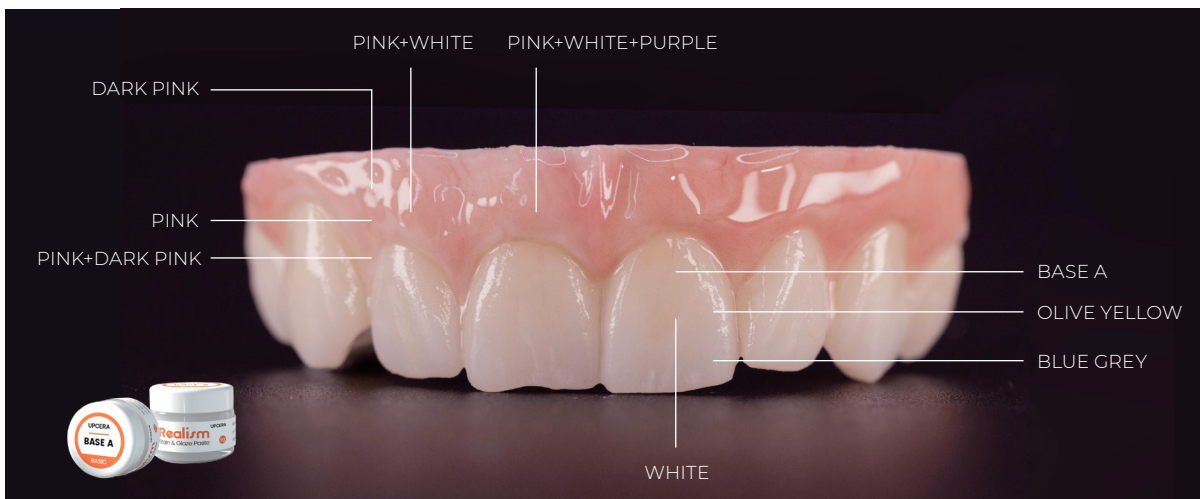


- The stain and glaze pastes can either be used by themselves or they can be mixed with each other as desired to achieve the individual characterization of the restoration. Glaze liquid can be used to mix the pastes into an appropriate consistency.
- If the paste inside the jar has separated, mix thoroughly with a glass, plastic or zirconia spatula. Withdraw desired amount of material from the jar and place it on the mixing palette. If a thinner consistency is desired, dilute the material with the Glaze Liquid with an appropriate ratio.
- Effect Shades are particularly suitable for the individual characterization of the restoration. Enamel, discoloured cervicals and fissures can be recreated in a life-like fashion.



Note:

- Shade A Flu. simulates dentin shade;
- Yellow Flu. mimics developmental lobes;
- Blue Flu. enhances incisal translucency;
- White Flu. simulates microcracks;
- Red Bright simulates dark-colored gums;
- Dark Brown Flu. simulates interdental gingiva;

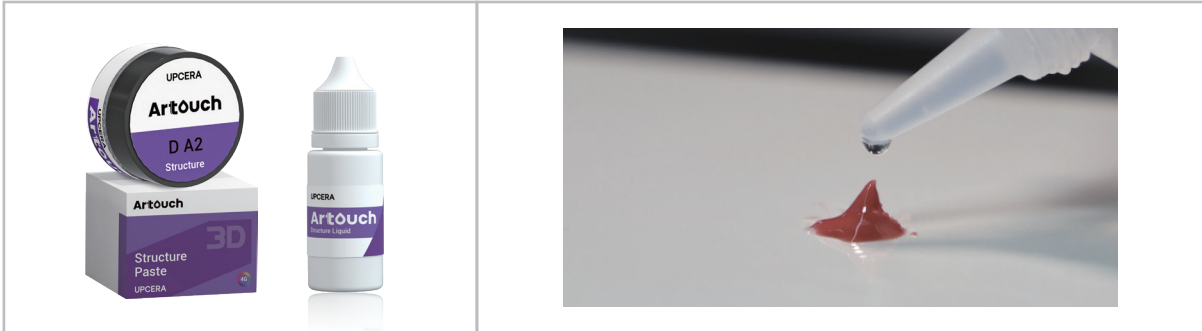


Note:

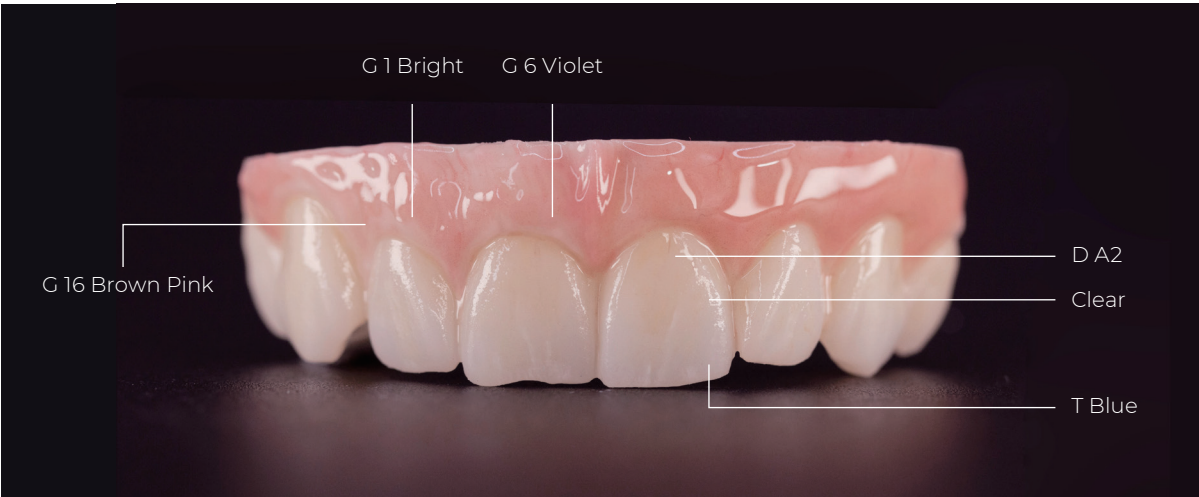
- Base A simulates dentin shade;
- Olive Yellow mimics developmental lobes;
- Blue Gray enhances incisal translucency;
- White simulates microcracks;
- Dark pink simulates dark-colored gums;
- Pink simulates interdental gingiva;

2.7.2 Micro-layering technique

The most important micro-layering steps are shown as follows. Detailed information on the ceramic paste and its processing instructions can be found in the Upcera Artouch Instructions for Use.



- The Structure pastes can either be used by themselves or they can be mixed with each other as desired to achieve the individual characterization of the restoration. Structure liquid can be used to mix the pastes into an appropriate consistency
- Apply Structure individually according to your coloring.
- Integrate nature-identical surface structure with a brush.
- The surface structure of the paste can be modeled (to keep the form, do not add too much liquid).
- Paint with Gingival Color and then glaze or design the surface texture with Gingival Structure. So esthetic results can be achieved in a very short time effortlessly. Design of papilla and alveolar areas as well as blood vessels with Gingival Structure. For example, apply G 4 dark, G 6 violet, or G 1 bright to the unfired Gingival Color



- Note:**
- G1 Bright simulates mucogingival junction
 - G6 Violet simulates marginal gingiva
 - G16 Brown Pink simulates bright-colored gums
 - D A2 simulates dentin shade
 - Opal, Clear simulates Opalescent effect and natural luminous enamel

*Due to regulatory registration differences, Artouch system is currently only applicable in Europe and the United States. For more information, please contact Upcera local representative.

03 Safety Notice



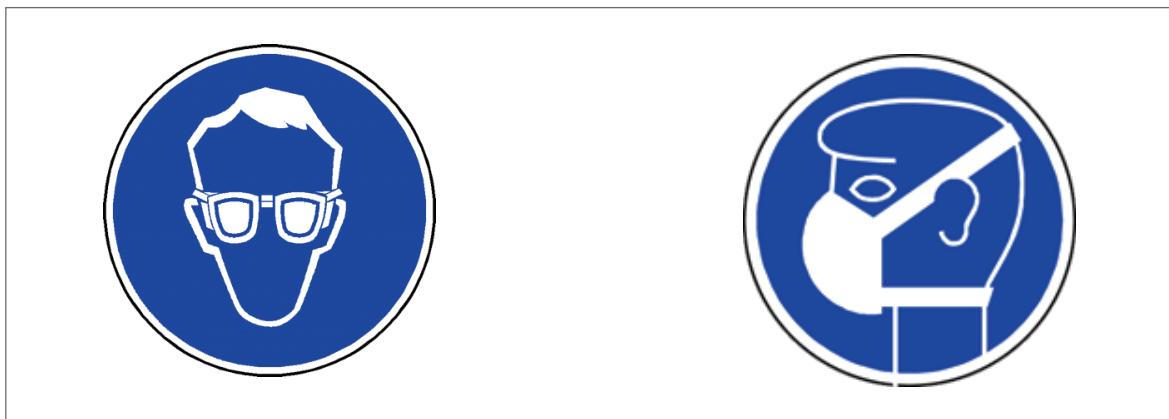
NOTE

The product shall be used only by trained personnel. The manufacturer is not liable for any erroneous results, since we have no control if this instruction is properly followed or if the product is appropriately used. Any claims for damages therefore shall be limited exclusively to the commercial value of our products.

Please make sure that the dentist has received all of the necessary information for the correct use of the product.

Safety Instruction

1. Avoid collision with hard material, avoid squeezing or shaking.
2. Don't apply to patient before the material is fully sintered.
3. This product should only be handled by dental specialists.
4. Wear a suitable face mask to prevent fine dust inhalation. Avoid fine dust air pollution by using the air blaster in short bursts only rather than a continuous flow.



Disposal

The material is not hazardous to the environment.

04 Appendix



4.1 Related product

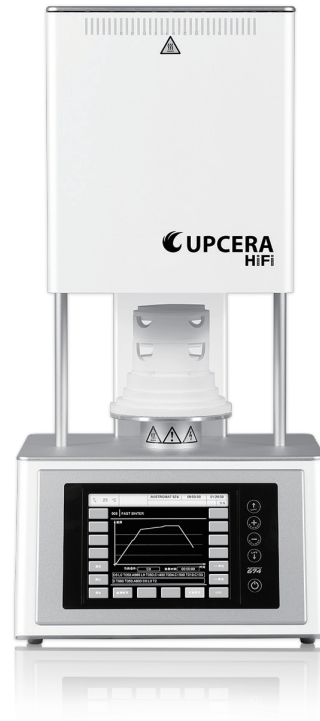
Grinding and Polishing Kits



UPCERA A53



UPCERA HiFi Sinter



FLNTShine ZrO₂ Polishing Paste



· Polishing



· Super Polishing



· Polishing Wheel

UPCERA Realism / Artouch system



4.2 FAQ

Q: How do I recognize on which side the occlusal/incisal area is located in a DUO disc?

A: The imprinted side of the disc is the incisal/occlusal area.

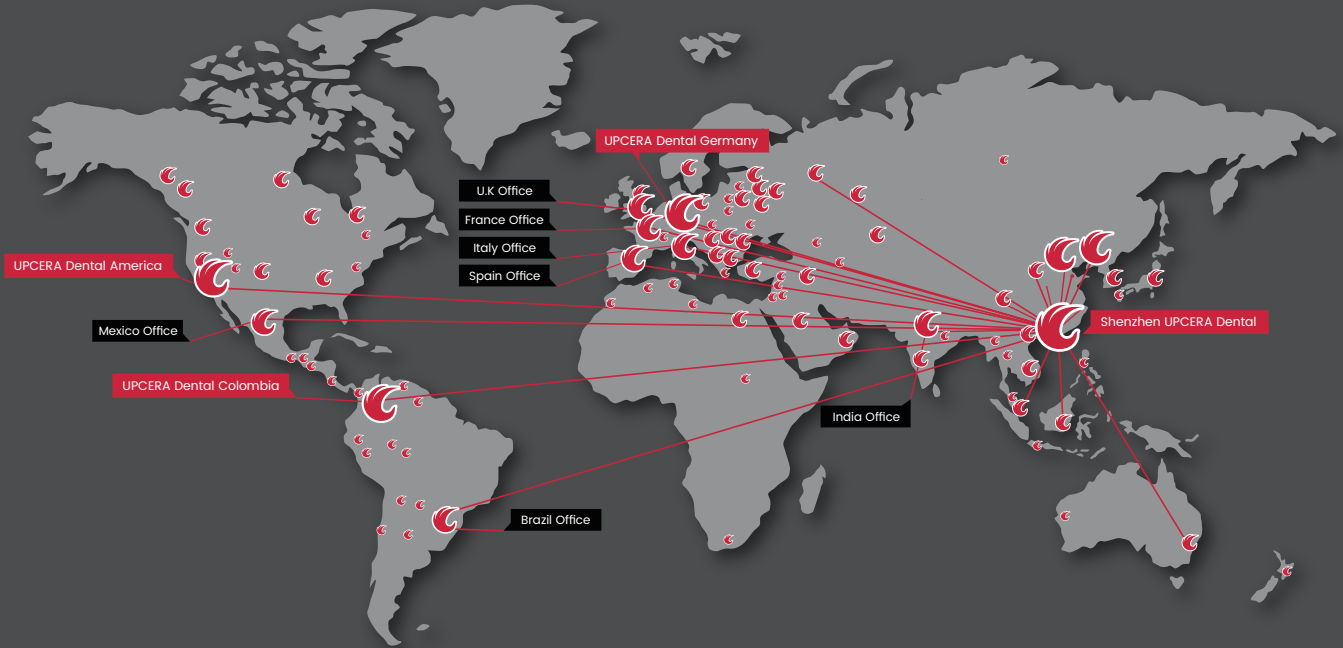
Q: Can moist frameworks be sintered?

A: Zirconia frameworks must undergo complete dehydration in a dedicated drying oven prior to sintering. Residual moisture will vaporize instantaneously during high-temperature sintering (1480-1,500°C), generating internal stresses that cause cracks.

Q: Does the surface of a monolithic restoration have to be polished before being inserted in the patient's mouth?

A: If occlusal contacts have been adjusted via grinding in the patient's mouth, polishing is imperative. Failure to observe this instruction may cause higher abrasion to the antagonist.

Going out to the world,
and becoming a leading force
in the development of global dentistry.






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Please note that the technical guide cannot replace the product IFU. Please follow the product instructions for proper usage.