

Gemstone User Guide



Gemstone *ST – Multi*

Shaping the future of premium dentistry

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[Gemstone Zirconia disc instruction for use]

Gemstone Zirconia Disc is pre-fired at a low temperature by cold isostatic pressing. High-quality raw materials make the disc has a uniform texture, aesthetics appearance, good strength, strong bio-compatibility, and excellent anti-aging performance, No radiation, non-allergic, stable performance, can meet the individual needs of different restorations, This disc is the first choice for biomimetic aesthetic zirconia.. But the material still has some porosity, so please handle it carefully. Please check the following details when you receive the goods, if any special situation, please contact the regional manager immediately.

1. Whether the outer packaging is completed;

2. Whether the product is in good condition;

3. Label content: Company name, product name, model No., specification, size, batch number, date

[Scope of Application]

Anterior full crowns, Posterior full crowns, Anterior inner crowns, Posterior inner crowns , crown bridge, Inlay, Veneer, Implant superstructures

Most suitable for: Posterior full crowns, inlays, etc.

[Inapplicable]

Extremely deep subgingival abutment preparation, severely atrophic residual teeth, patients with severe nocturnal bruxism, and other cases not described in the application.

Remarks: Above are for reference only. The specific operation depends on the preparation condition of the clinician

[Color optional]

ST-ML is a color high strength zirconium block, no need to porcelain later, and easy to personalized processing

Multilayer 9 colors:

A1,A2 ,A3,A3.5, A4, B1 ,B2 ,B3 , B4, C1 , C2 ,C3 ,C4 ,D2 ,D3 ,D4

[Anterior]

1. The shoulders of the anterior teeth must be blunt, smooth, and continuous. Generally, they are prepared as angular shoulders or right-angled shoulders.

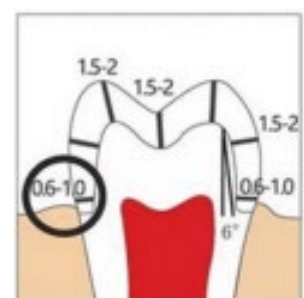
Note: The shoulder must be clearly prepared. Considering the aesthetics, the anterior teeth generally choose the subgingival shoulder, and reserve 0.5-1mm under the gum.



2. The occlusal contact area should be located at the part supported by the hard tissue of the prepared tooth
3. The thickness of the all-ceramic crown should be uniform, the incisal end is 1.5-2.0mm, and the labial-lingual and adjacent surfaces are 1.0-1.5mm
4. During the preparation of the anterior teeth, there should be no jaw interference in the protruding and lateral sides, so as to ensure that the teeth will not come into contact with all directions early when occlusal, which will affect chewing and cutting food. This not only ensures the beauty of the teeth, but also ensures their function.
5. The shaft wall must be blunt to ensure that the ceramic block can achieve the ideal grinding effect during CAD/CAM processing

[Posterior]

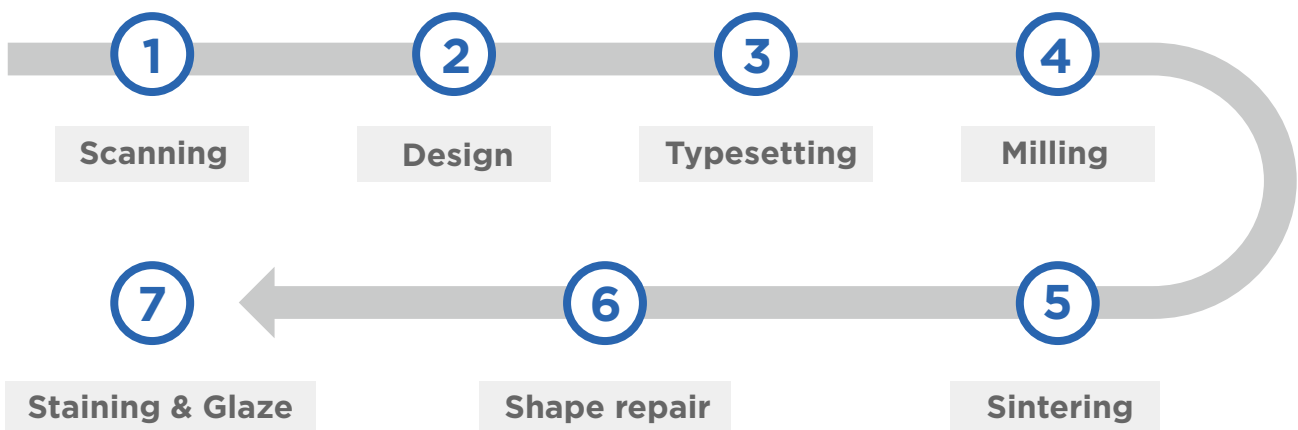
1. The inner wall of the shoulder must be smooth or grooved
2. Tooth preparation is based on the elimination of undercuts and the establishment of retention shape, with a functional tip of 1.5 mm and a non-functional tip of 1.0 mm.



3. A height of 1.5-2mm is prepared for the maxillofacial surface, which can generally withstand sufficient occlusal force.
4. The degree of convergence of the buccal-lingual axial surface is 6-10°; the flat gingiva of the neck forms a non-angular shoulder with a width of 0.6mm.
5. The preparation width of the lip side and lingual side should more than 0.6mm
6. The occlusal contact area should be located in the part supported by the hard tissue of the prepared tooth.
7. The shaft wall must be blunt to ensure the disc can achieve the ideal grinding effect during CAD/CAM processing.

[Seven-step workflow]

SHT-ML is a superior material focused on the dental restorations and can be used in the DEPRAG digital workflow. From the initial intraoral scan to the final restoration, it takes nine steps. DEPRAG has validated the workflow of equipment and materials throughout the process and will process individual restorations with faster production and higher quality.

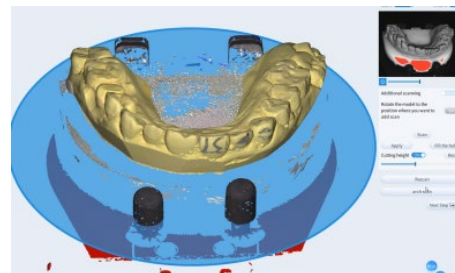


[Operation guide]

Scanning

Choose a high-precision scanner to obtain an accurate restoration model data.
Precautions:

1. Before scanning, please check the impression and model for air bubbles, plaster tumors and delamination;
Checking the abutment undercut;
Checking whether the abutment teeth, adjacent teeth, and contralateral teeth are complete;
Checking that the occlusal space is suitable.



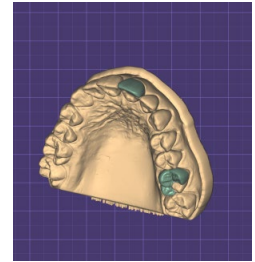
2. Make sure the abutments fit perfectly with the base of the model.
3. Regularly calibrate the scanner to ensure the scanning accuracy,

Design

Designing according to the doctor's request. Anterior teeth focus on aesthetic function, and posterior teeth focus on masticatory function.

According to the actual situation of the patient, the occlusal curve is designed for the opposing dentition and occlusal conditions, while avoiding stress concentration.

1. The minimum thickness of the single crown is at least 0.5mm, the thickness of the lingual side of the tooth crown should be greater than 0.8mm, and the missing body is adjacent. The thickness of the incisal end of the crown or the occlusal surface should be greater than 1.0mm. The minimum thickness of the veneer is 0.4mm.



2. Since the geometric structure of the zirconia bridge is the key to the crack resistance, the area of the connecting body should be as large as possible when designing. At least 12mm.

3. When designing the dental bridge, there should be a common seating path and a reasonable restoration space. The occlusal distance is too small, the abutment teeth are too undercut, and the shoulder preparation.

If the condition of the abutment tooth is unreasonable and unsuitable for fabrication, it is necessary to communicate in time.

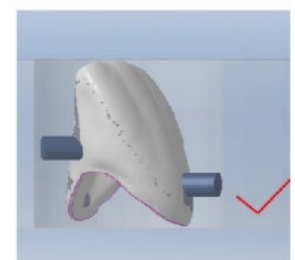
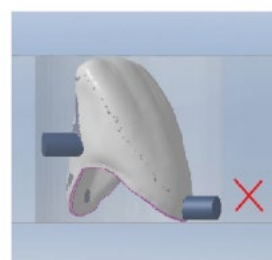
Precautions

1. As ST-ML zirconium block is multi-layer color, the sintered restoration has a natural color & characteristics, and the compact density, no need much further polish, So please ensure the shape of the complete coordination when designing.

2. In order to avoid ceramic collapse in the later stage, the structure of the base crown should be designed reasonably to avoid stress concentration

3. No more than two consecutive units of missing bridges.

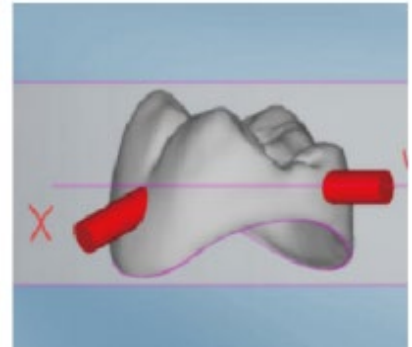
4. Avoid dissociation loss.



Typesetting

SHT-ML zirconia blocks has a natural gradient color effect. To show the accuracy of the excessive color of the restoration from the neck to the incisal end, it was necessary to ensure the restoration was properly positioned in the material, otherwise it would affect the final effect

- 1 . Select the appropriate fixture.
- 2 . Before typesetting, select the material type and size according to the shape, size and length of the restoration.
- 3 . Enter the correct shrink ratio.
- 4 . The processing area of the rowed teeth cannot exceed the boundary of the selected material.
- 5 . When cutting on a used zirconium block, please notice the orientation of the machined area in the fixture, Keep a enough space to avoid hurting the fixture.
- 6 . When multiple teeth or bridges need to be processed in one zirconium plate, a certain space should be left between the teeth to facilitate the addition of connecting rods to fix the teeth.
- 7 . When typesetting, place the data in the middle of the disc in the vertical direction, and leave a distance of at least 0.5mm between the tooth data and the surface of the zirconium disc.



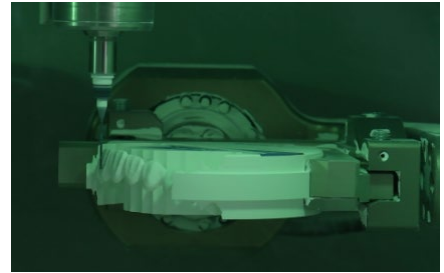
Precautions

1. The connecting rod should added to the high point of the prosthetic body.
2. Keep the height as consistent as possible and keep a safe enough distance from the neckline.
3. The connecting rod is parallel to the zirconium plate, do not have too much angle.
4. The connecting rod of the long bridge should be placed on the bridge body, not at the connecting body. It is recommended to add a lingual reinforcing rod to the bridge body of a longer unit.

Packing requirements: The side with the "arrow" mark on the side is the Incisal of the material to indicate the direction.

Milling

Placing the zirconium disc in the milling equipment.



Precautions

1. Before processing: Checking the burs regular to ensure the burs are sharp enough to achieve the stability of the cutting equipment.
2. Do not put your hands into the equipment during processing.
3. Checking whether the edge of the cut restoration is chipped or damaged after the processing is completed.

If any of the above situations occurs, it is necessary to find out the reason and decide whether to re-cut according to the specific situation.

Separation

Separating and trimming the finished crown with special handpieces and grinding heads. When the tooth bridge is removed from the zirconium disk, only the lip buccal side of the tooth bridge and the lateral support rod of the transverse rod need to be removed. And you should be careful to avoid the fracture and hidden crack.



Precautions

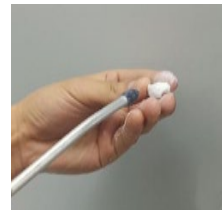
1. Zirconia grinding tools cannot be mixed with metal grinding tools to avoid contamination of zirconia restorations by metal debris.
2. Before polishing, put a towel or sponge on the table to prevent the restoration from cracking or breaking when it falls on the table.

3. The correct way to divide the connecting rod: divide the connecting rod in stages in the same direction (clockwise or counterclockwise).
4. Grind half of the connecting rod first, and then carry out secondary division until the restoration falls off.

(Note: A connecting rod cannot be completely divided at one time)

Cleaning

Cleaning the surface of the restoration and the powder in the crown with a brush or porcelain brush thoroughly.



Precautions

Keeping the cleaned crown away from water, sweat stains, oil stains, dust, metal instruments and powder to avoid contamination

If the cleaning is not thorough, the powder will adhere to the surface of the restoration and inside the crown after high-temperature sintering, forming white spots, which will affect the beauty and positioning of the restoration; at the same time, the staining solution will be polluted during soaking, affecting the accuracy of the color.

Sintering - Sintering curve

Curve 1 (8.4 h)		
Segment No.	temperature/°C	Time/min
1	50	1
2	100	17
3	1000	150
4	1000	10
5	1530	106
6	1530	120
7	80	97

Sintering - Curve1: Standard sintering (8.4 h)

Curve1: Standard sintering (8.4 h)	
Starting temperature	Room temperature
1st stage rate of heating	3°C/min
1st stage Max temperature	100°C
2nd stage rate of heating	6°C/min
2nd stage Max temperature	1000°C
Holding time	10min
3rd rate of heating	5°C/min
3rd stage Max temperature	1530°C
Holding time	120min
Cooling rate	15°C/min
Cooled to	80°C

Sintering - Fast sintering curve (1.5h)

Curve 1 (1.5 h)		
Segment No.	temperature/°C	Time/min
1	50	1
2	100	2
3	1100	15
4	1100	2
5	1530	30
6	1530	40
7	900	10

Sintering - Curve 2: Sintering process (1.5h)

Curve 2: Sintering process (1.5h)	
Starting temperature	Indoor temperature
1st stage rate of heating	25°C/min
1st stage Max temperature	100°C
2nd stage rate of heating	66°C/min
2nd stage Max temperature	1100°C
Holding time	2min
3rd rate of heatin	15°C/min
3rd stage Max temperature	1530°C
Holding time	40min
Cooling rate	63°C/min
Cooled to	900°C

Precautions

- Maximum heating rate: 10°C/min
- Maximum temperature range: 1480–1500°C, 1500°C is the most suitable sintering temperature
- Keep the highest temperature for two hours then cooling the furnace temperature below 80°C to avoid thermal shock caused by rapid cooling
- **The teeth should be placed maxillofacial down onto zirconium beads inside the crucible**



Precautions for using zirconium beads

1. Zirconium beads should be replaced in time when the following situations occur:
 - 1) Severe discoloration
 - 2) The shape is incomplete or damaged
 - 3) The color is dark, no permeability
2. Before sintering, check whether the zirconium beads are adhesive. If yes, please separated them to ensure their good fluidity.
3. The number of zirconium beads should be able to cover the whole crucible bottom (1-2 layers) completely.
4. When replacing the zirconium beads, the new zirconium beads should be empty-burned with the waste zirconia for 1-2 times, then used for sintering of the restoration.

Cleaning and maintenance of sintering furnace

1. Cleaning method: gently scrape out the impurities in the furnace, and then put the waste zirconia scraps into the furnace for air burning. The sintering furnace is cleaned once a week.
2. When the equipment is not used for a long time, the furnace should be closed to ensure a dry environment inside the furnace.
3. Please keep the operation room of the sintering equipment clean and avoid dust, metal chips or dusty, to avoid the adverse effects on the heating element.
4. Thoroughly drying the restoration before sintering can reduce the pollution to the sintering furnace.

Shape trimming

1. Use zirconia special grinding head to repair the surface of the body. The surface of the prosthetics was smoothed by three steps: rough grinding, fine grinding and rough polishing. Before grinding, place in place. Apply a small amount of lipstick with a brush to the dental cavity of the restoration, bring the restoration to the model, and trim the part showing the red fulcrum.



2. Rough grinding: As the first step of grinding after sintering zirconia, the main function is to wear teeth, adjust the adjacent and occlusal surface.

3. Fine grinding: Follow the steps of rough grinding, and further trim the anatomical morphology of teeth, such as tooth flower, development groove, etc., and do some personalized trimming to make the surface grain of teeth neat, even and delicate.

4. Rough casting: make the tooth surface neat, even and smooth.

The grinding sequence was as follows: emplacement → occlusion adjustment → marginal ridge trimming → lip-lingual side → cut end → development groove

Note

1. Ensure the repair instrument in smooth positioning, then carry out the shape trimming

2. Do not trim too much or too little. Too much dressing will lead to cavities in the prosthesis, which will be easy to crack in the later use. Too little trimming the restoration won't fit the patient.

3. The whole process from coarse grinding to fine polishing should be used in accordance with the functional order of the needle. Pay attention to unidirectional light grinding when grinding.

4. During the grinding, if the restoration is heating, please cooling it with water.

5. In the process of grinding, the operator's hand should have a fulcrum, and the speed should not be too fast to avoid hidden cracks.

6. Use a polishing wheel containing rubber binder to polish the thin part of the edge to avoid edge collapse. It is best to form an oblique downward Angle of 45° with the edge to avoid the vertical edge resulting in too short edge.

7.If the neck margin of the tooth is not dense and not match during the porcelain process, please trim it ion time.

Staining & Glaze

Cleaning the surface with steam or ultrasonic oscillating cleaner before external staining, then dry it.



The external staining and glazing of restoration can be carried out with DEPRAG Super Vision Stain&Glaze. Please reference the DEPRAG Super Vision Stain&Glaze paste instruction for detailed steps.

The sintering curves of different brands of external stain pastes should refer to the instructions of corresponding products.

Complete