Zirconia block User Instruction（4D Multilayer）

[Before use]

Zirconia blocks are produced by CIP technology and pre-sintered in low temperature. Although the product has some strength, because of porosity, please handle carefully. When you receive the product, please check as below. If there is something exceptional, please contact the sales manager.
1.Product is complete without any damage.
2.The packing is complete without any damage.

[4D Multilayer Material Usage and Technical Parameters]

Materials function

The zirconia can be used to manufacture crown, the bridges and other restoration.

Chemical Composition and Powder Characteristics

Chemical Composition

Y_2O_3	9.43wt%
Al_2O_3	0.05wt%
SiO_2	⩽0.002wt%
Fe_2O_3	⩽0.15wt%
Er_2O_3	⩽0.70wt%
Co_3O_4	⩽0.02wt%
Aging Properties	Monoclinic Phase＜5.0%
Chemical Solubility	⩽2000μg.cm^{-2}

Mechanical Property

Sintered Density	⩾6.0g/cm^3
Flexural Strength	⩾700Mpa
Fracture Toughness	⩾3.5MPam½
Hardness (Hv10)	1250MPa

[Indications]

veneer, inlay, onlay, anterior crown, anterior crown bridge（up to 7 units）, posterior crown.

[Color]

A1 A2 A3 A3.5 A4 B1 B2 B3 B4 C1 C2 C3 C4 D2 D3 D4 OM1 OM2 OM3

[Requirements for preparation]

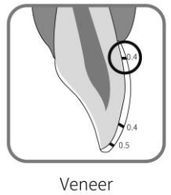
4D Multilayer zirconia is not suitable for non-shoulder preparation or shoulder with slant. Since both ways will lead to a thinner eage and risk of fracture.

Veneer:

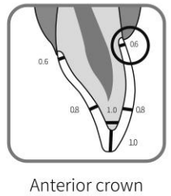
If possible, the preparation should be only for enamel.
The margin of incisal cannot be prepared on the occlusal surface or zone where changes a lot.
The preparation for incisal edge, labial surface, and cervical is at least 0.4 mm.
The inner edge of shoulder must be slick or be fluted.
Suggested to make wrapping type.

Anterior crown:

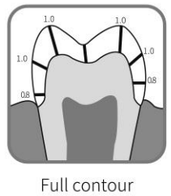
The inner edge of shoulder must be slick or be fluted.
Preparation wideth of incisal, labial and palatal should be above 0.6mm.
The axial wall must be blunt to ensure the zirconia can reach an ideal milling effect with CAD/CAM.



Veneer



Anterior crown



Full contour

Full contour:

The inner edge of shoulder must be slick or be fluted.
The minimum width of incisal edge, labial side, and palatal side is at least 0.8 mm.
Width of occlusal surface of lateral side of the lip,tongue preparation is more than 1.0mm.
The axial wall must be blunt to ensure the zirconia can reach an ideal milling effect with CAD/CAM.

[Application method]

Full contour crown and bridges(veneer): Scanning →Designing→Milling→Cleaning→Sintering→Polishing→Staining→Finishing

1.Scanning

Scanning the butment:

Scanning the base one by one. Making sure that the base should make a full contact with model.

2.Designing

Veneer:

The veneer should be no less than 0.4mm; the adhesive clearance is 0mm. The more 0.1~0.2mm should be considered,when the margin is design.

Coping:

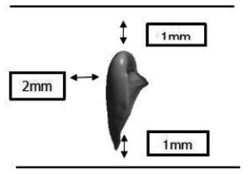
The thinnest should be no less than 0.8mm.
Increase compensation data of the Milling Burs.It is an effective way to easy the condition that the anterior cannot match the veneer of butment well due to the keenness of the veneer of butment.
The tip of the butment should be filled with wax, and then processing the scanning and designing.

3. Milling

When making restorations by using zirconia ceramic materials, make sure that a new bur should be used. And to cool zirconia by using liquid is avoided when doing milling process. After milling is finished, check that if there are any defects happening listed below:
Is there any crack? Is there any contamination? Is there any break?
If any of these defects happen, reasons must be found and restorations need to be milled again.

Layout:

Choose zirconia block of suitable thickness. When layout, put data in the middle of disc（vertical direction）.
The distance between restorations data and disc surface should be at least 1mm.
Connector should be placed in the most protruding position on buccal side. The thickness of connector should be 2mm.
(as picture shows)



Place the disc:

Directing arrow is seen on the side of “Multilayer” disc. The arrow points at the direction of incisal, namely the part of disc showing shallower color.

4. Separation of Restoration and Cleaning

Separation of restoration:

Using technician specialized hand piece and grinding head to separate restorations from blocks. Before grinding, a towel should be put on the desk to avoid restorations dropping on desk and crack or break.When operating, hand needs to find a fulcrum: hand piece speed should be controlled at 10000-12000rev/min. And then the connector need to be polished successively in one direction. Don’t separated one connector completely off at one time; Finally, the rest of connector could be polished slightly.It is not advised to make too much adjustment on the restorations in soft condition to avoid causing subfissure or chipping and so on.

Cleaning:
Cleaning up the powder on surface and inner side of restorations with brush. If cleaning is not thorough, uncleaned powder will contaminate color liquid when dyeing and the uncleaned powder will stay on the surface and inner side of restorations after high temperature sintering, forming white spots and therefore having negative effect on esthetics and positioning of restorations.

5. Sintering

Step 1: check the zirconium beads
Firstly, inspect the color, shape, number of the zirconium beads. If the yellowing and mutilated zirconium beads are found, they should be replaced immediately.
Secondly, check the adhesive zirconium bead. If any adhesive zirconium beads have been found, please separate them and ensure the mobility. The entire bottom of crucible should be covered by the zirconium beads.

Step 2: Inspect the sintering furnace, it is important to clean the furnace cavity in time if there is any contaminant there.

Cleaning method:
Scrap away the impurity in the chamber, then the waste zirconia materials can be put in the chamber and sintering.The suggestion is to clean the sintering furnace once a week.

Sintering:
The dried restoration with occlusion facing down should be put on the beads in sagger, then sinter strictly in compliance with sintering process.

6. Grinding and Polishing
Use special zirconia grinding head to trim the surface of restoration. The following three procedures (coarse grinding, fine grinding and coarse polishing) can make restoration surface smooth.

Coarse grinding:
This is the first grinding step after sintering restoration. The aim is to seat the restoration, adjust adjoining, occlusion and trim the anatomic contour.

Fine grinding:
Please make restoration surface evenly and uniformly as well as the surface texture more smoothly.

Rough polishing:
To make the surface even and smooth.

7. Staining and Glazing
Please stain the entire ceramic crown or entire zirconia crown.
Better result can be achieved by using Galze Paste.

Glaze Paste introduction:
A, B, C, D four shades.11 effect colors: blue, white, brown, pottery clay, black, orange, purple, yellow, violet and grey, pink, pale brown, transparent glaze liquid and dilution liquid.

Advantages:
Each bottle of stain contains glaze, no need to glaze additionally. The ideal effect can be achieved just by one-step staining. Product features a state of paste, intermediate denseness and fine particles. Even the beginner can learn how to use it fast and easily.

Operation method:
Please select main color scheme and effect shades according to proportioning table of Galze Paste. They should be mixed in consistency as cervical color; the cervical color and transparent glaze need to be mixed to get lighter color as middle 1/3 transitional color; The following step is to mix transparent glaze with a little blue or purple-grey, the mixture can be regarded as incisal transparent effect color. The terracotta can be used as occlusal surface color. Groove can be applied color using brown. You can glaze the whole crown directly, if nowhere in the crown could be stained. Please ensure that the whole crown should be covered by the stains.

8.Finished
Fabrication of restoration is finished.

The suggested crystallization curve:

4D Multilayer 1-5 units bridge

Start temp	Heating rate	Maximum temp	Holding time
Room temp	7.5°C/min	1000°C	130min
	3.4°C/min	1500°C	147min
	0°C/min	1500°C	120min
	Cooling rate	Cooling to	Holding time
	7°C/min	800°C	100min
	6.5°C/min	20°C	120min

4D Multilayer 6-10 units bridge

Start temp	Heating rate	Maximum temp	Holding time
Room temp	4°C/min	1000°C	245min
	3°C/min	1500°C	167min
	0°C/min	1500°C	120min
	Cooling rate	Cooling to	Holding time
	5°C/min	800°C	140min
	6.5°C/min	20°C	120min