orodent

WITH ORODENT BE DIFFERENT

ZIRCONIA INSTRUCTIONS FOR USE

Mission

“To be a winning team, capable of passionately guiding internal and external customers to change, giving them unlimited prospects for prosperity”.

Our goal:

To be an Italian excellence where values such as passion and enterprise are breathed in the air.

To offer a product designed with and for the customer.
For us, feedback is precious because it allows us to continuously improve our service

Our production is made to provide quality and safety. Each batch is subjected to strict and scrupulous checks to guarantee high quality standards.

We want the best for our customers! We use exclusively powders from Tosoh Corporation, a leading Japanese company in the production of zirconium oxide.

The continuous development of Tosoh powders allows us to improve our devices in terms of quality by increasing and developing our Zirconia disc lines.

Because we are one of the few companies worldwide to have the right to display the special "100% made from Tosoh Powder" logo synonymous with quality, safety and excellence.

In 2021 Orodent srl received an important award from Tosoh Corporation as a Technical Partner for their mutual commitment to produce Zirconia discs aimed at exceeding their customers' expectations.

TOSOH

TOSOH CORPORATION

CERTIFICATE OF TECHNICAL PARTNERSHIP

Orodent Srl

Is hereby certified as a

TECHNICAL PARTNER

of

Tosoh Corporation's

Advanced Ceramics Division

On April 7, 2023

Orodent Srl and Tosoh Corporation's Advanced Ceramics Division hereby declare their mutual commitment in partnering to provide a stable supply of zirconia to thereby meet and exceed the expectations of their customers.

This certificate is valid until the end of March 2024.

For Tosoh Corporation

Hideyuki Itose
General Manager

For Orodent Srl.
Via Maria Gaetana Agnesi, 8/10 - 37014
Castelnuovo del Garda, Italy

Mr. Gaetano Gambini
President

Tosoh Corporation
3-8-2, Shiba, Minato-ku, Tokyo 105-8623, Japan
Tel: +81-3-5427-5170 Fax: +81-3-5427-5217
www.tosoh.com

Contents

Zirconia Discs for CAD-CAM

Zirconia Discs for CAD-CAM

TYPES

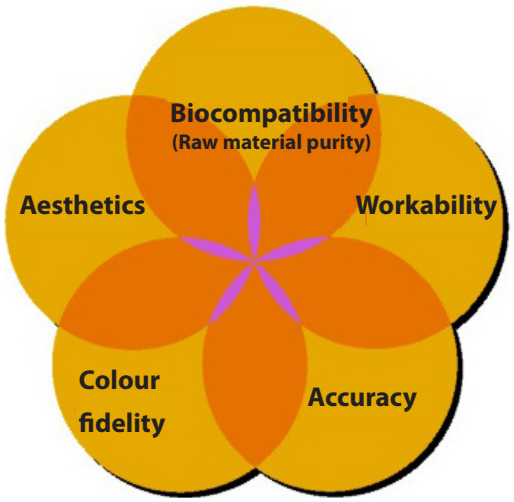
Zirconia Type	Flexural Strength	Trans-lucence (1mm)	Crowns	Reduced bridges	Full bridges	Sintering temperature	Type and Usage
White Matt	1400 MPa	35%	●	●	●	1450°	Full arch with reduced thicknesses for ceramic coating.
High Translucent	1200 MPa	43%	●	●	●	1530°	From single crowns to extended bridges of up to 12 units, both anatomical and reduced for veneering with ceramics.
Bleach	1200 MPa	45%	●	●	●	1530°	From single crowns to extended bridges of up to 12 units.
Preshaded	1200 MPa	43%	●	●	●	1430°(matt) 1530°(traslucent)	From single crowns to extended bridges of up to 12 units.
Gold	1200 MPa	45%	●	●	●	1530°	With a NATURAL BASE similar to colour A1, it is suitable for single crowns and extended bridges up to 12 units.
Eos	900-1100 MPa	fino a 48%	●	●	●	1530°	Multilayer with progressive translucency. From single crowns to extended bridges of up to 12 units.
Thor	1200 MPa	45%	●	●	●	1530°	Multilayer. From single crowns to extended bridges of up to 12 units.
Venus	850 MPa	49%	●	●		1530°	Multilayer with high translucency. For single crowns, reduced bridges up to 3 units, inlays.

Raw Materials

RAW MATERIALS

All ORODENT Zirconium Oxide discs are manufactured with powders produced by the Japanese TOSOH CORPORATION, which guarantees the highest quality standards available on the world market. The composition of the powders is strictly compared with their specifications on the certificates issued by TOSOH CORPORATION for each batch sold.

The purity of the powders and the strict manufacturing standards are the basis of the quality of the devices derived from them. The manufacturing protocols define the quality plan for the devices, which can be summarized as follows:



The single-layer discs mainly used until a few years ago in the various types (white, gold and coloured) are simple devices which have a single shrinkage value over the entire height of the disc. In the last few years, multilayer discs with different colours and characteristics between layers have been introduced onto the market (multilayer with a single shrinkage value and progressive).

Initially, the powders (opaque white, translucent and coloured) did not have the same shrinkage percentage value, so the different compositions in the same disc produced different shrinkage percentages between one layer and the other, producing internal tensions that rendered the discs defective.

The problem was solved thanks to a patent (Pat. EP2024300 and related family) owned by Kuraray Noritake whose intellectual property makes it clear that only powders with the same percentage shrinkage value may be used for the production of multilayer discs.

Orodent Srl obtained from Kuraray Noritake the necessary authorisations for the fruition of the important patent whose number is printed on each multilayer disc.
Very few companies in Europe can benefit from this patent.

TOSOH CORPORATION has developed a special line of powders (white and coloured with different degrees of strength and translucency) marked with the letter .m (multilayer) that undergo the same % shrinkage during pre-sintering and sintering heat treatments.

TOSOH

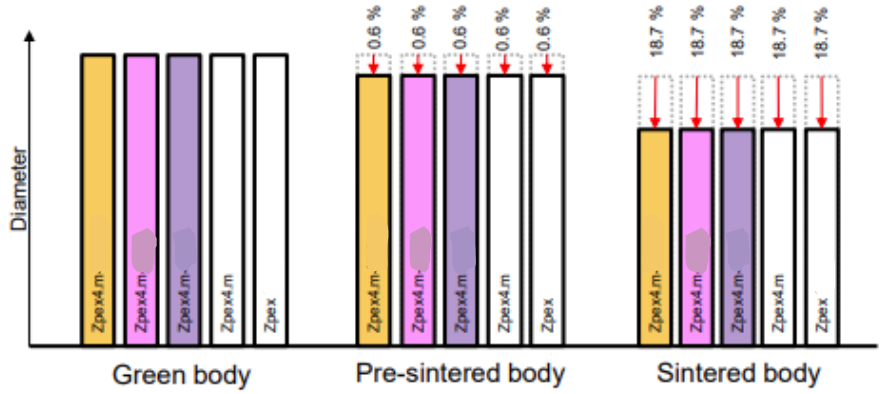
TOSOH ZIRCONIA POWDER

Technical Bulletin

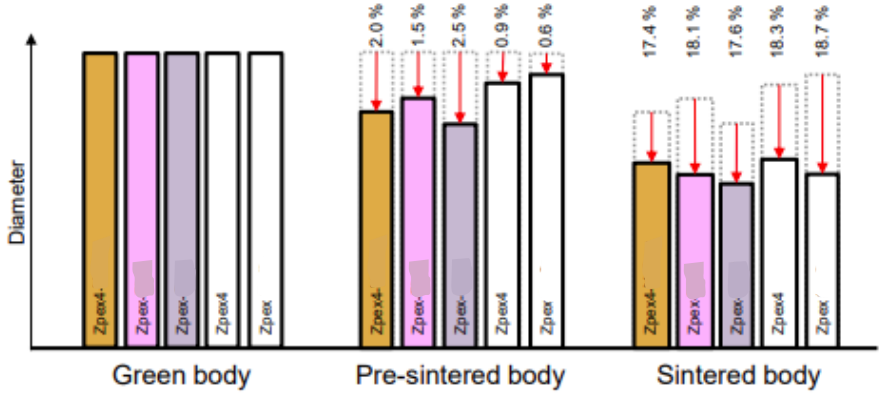
Technical Data Sheet Zpex®4.m color series

● Shrinkage

<Zpex4.m series + Zpex Smile>



<Zpex4 series + Zpex Smile>



You can keep the same disk size at any stage by same condition, with Zpex4.m series and Zpex Smile. Hence the same mold can be used.

TOSOH CORPORATION
Advanced Ceramics Department
3-8-2, Shiba, Minato-ku, Tokyo, Japan
Tel: (03)5427-5170
E-mail: zirconia@tosoh.co.jp

TOSOH USA, INC.
3600 Gantz Road
Grove City, OH 43123 U.S.A.
Toll Free Tel: 866-844-6953
E-mail: info.tusa@tosoh.com

TOSOH EUROPE B.V.
Rembrandt Tower, Amstelplein 1,
1096 HA Amsterdam, The Netherlands
Tel: +31-20-565-0010
E-mail: info.tse@tosoh.com

Multilayer Discs

THE CHOICE OF MULTILAYER DISC TYPE

THOR

High-strength multilayer: for the fabrication of single crowns, reduced bridges and extended bridges up to 12 units.

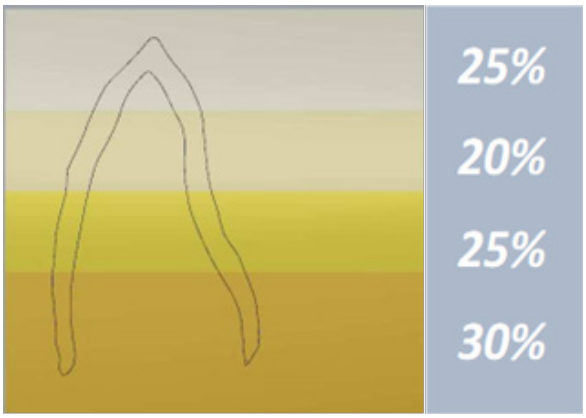
EOS

Multilayer progressive translucency: for the fabrication of single crowns, reduced bridges and extended bridges up to 12 units.

VENUS

Highly aesthetic multilayer: ideal for the fabrication of single crowns, reduced bridges of up to 3 units, inlays.

MULTILAYER DISCS: COLOUR SPECIFICATION FOR LAYER



Enamel

1st transition layer

2nd transition layer

Body

Neck

The disc should be placed on the milling machine with the print facing upwards, corresponding to the enamel part.

98 X 12 mm.	98 X 14 mm.	98 X 16 mm.	98 X 18 mm.	98 X 20 mm.	98 X 22 mm.	98 X 25 mm.
3 mm.	3,5 mm.	4 mm.	4,5 mm.	5 mm.	5,5 mm.	6,25 mm.
2,4 mm.	2,8 mm.	3,2 mm.	3,6 mm.	4 mm.	4,4 mm.	5 mm.
3 mm.	3,5 mm.	4 mm.	4,5 mm.	5 mm.	5,5 mm.	6,25 mm.
3,6 mm.	4,2 mm.	4,8 mm.	5,4 mm.	6 mm.	6,6 mm.	7,5 mm.

3D M	VITA CLASSICAL											
A 0	A 1	A 2	A 3	A 3,5	A 4	B 1	B 2	B 3	C 1	C 2	C 3	D 2	D 3
OM 1	A 0,5	A 1,5	A 2,5	A 3	A 3,5	B 0,5	B 1,5	B 2,5	C 0,5	C 1,5	C 2,5	D 1,5	D 2,5
OM 2	A 1	A 2	A 3	A 3,5	A 4	B 1	B 2	B 3	C 1	C 2	C 3	D 2	D 3
OM 2	A 1	A 2	A 3	A 3,5	A 4	B 1	B 2	B 3	C 1	C 2	C 3	D 2	D 3
OM 3	A 1,5	A 2,5	A 3,5	A 4	A 4,5	B 1,5	B 2,5	B 3,5	C 1,5	C 2,5	C 3,5	D 2,5	D 3,5

THICKNESS = COLOUR

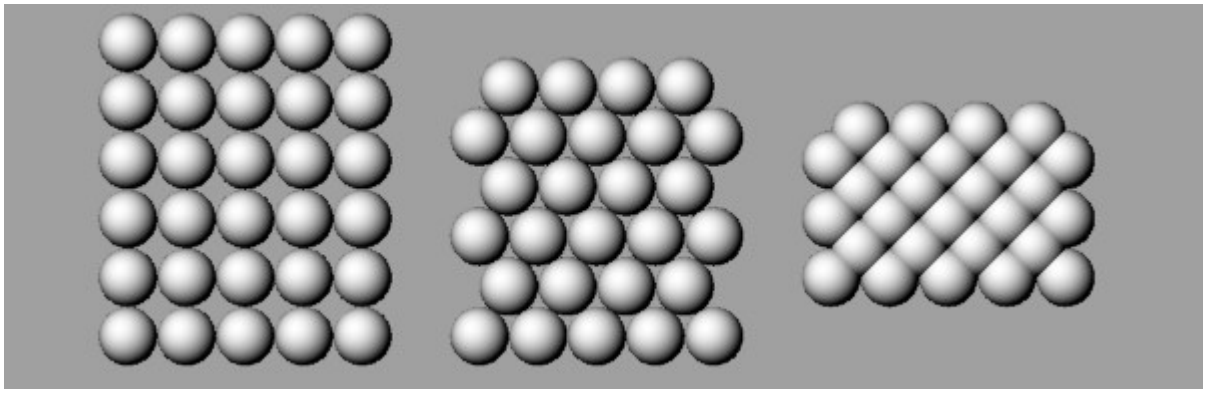
In order to achieve the exact shade desired, it is necessary to consider that the result will also depend on the thickness: the thicker the structure, the less translucent and bright it will be.

Example: full elements will result more saturated, hence a darker colour. In these cases, it is suggested to choose a lighter shade than desired and to use the stain colours after sintering

In addition, the positioning of the elements in a multilayer disc also influences the final result: if the tooth is placed in the higher part of the disc, it will be lighter, on the contrary, the lower part will be more saturated (as visible in the photo below).


Powders
Technology

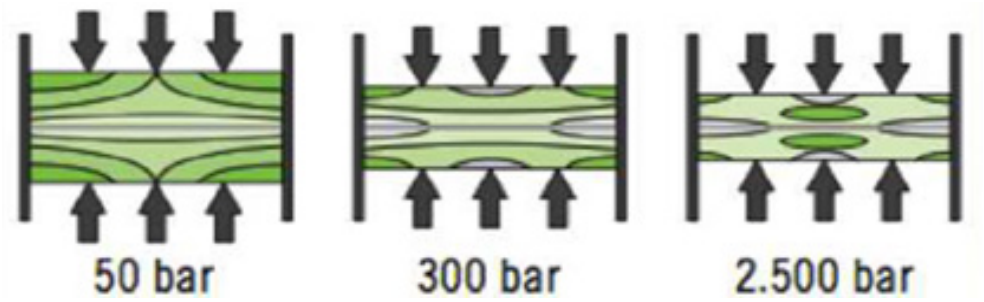
POWDERS TECHNOLOGY



POWDER | PRESSED STATE PRE-SINTERED | AFTER SINTERING STATE

- Zirconium oxide powders have a density of 1.5 g/cm^3
- With pressing and pre-sintering, a density of 3.1 g/cm^3 is obtained
- With sintering, all porosities are eliminated and the final density of 6.06 g/cm^3 is obtained

THE PRESSING



LOW | MEDIUM HIGH | VERY HIGH

- Pressing is a fundamental process that affects the quality of the product. It determines the weight of the powders used for the production of the disc, which will correspond to the number of sintering necks formed in the structure, making it more stable and robust.

- The pressing parameters are defined according to the grain size of the powder to obtain the correct density (3.1 g/cm3) and maximum workability.
- Pre-sintered zirconium oxide is suitable for milling with light equipment and finished in details even manually.

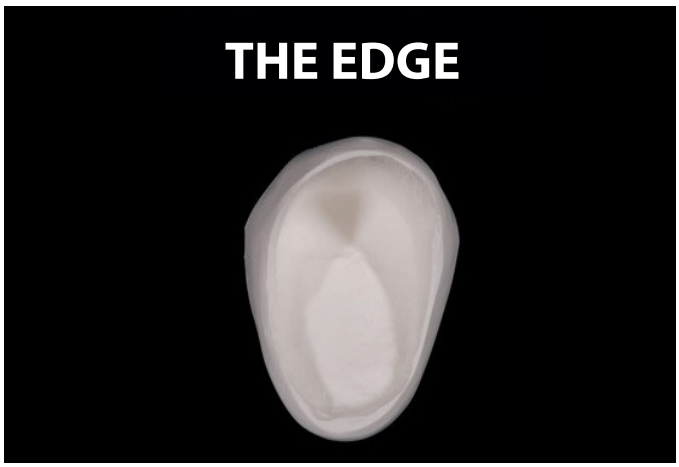
-During sintering, it acquires the physical strength characteristics by compacting completely.

PRE-SINTERING

LONG TIME PRE-SINTERING AT LOW TEMPERATURE FOR A GREATER WORKABILITY

Pre-sintering in this way allows to have the material to be obtained in its chalky state (non-vitrified), offering important advantages:

- Good workability with the possibility of finishing the prosthesis in every detail with hand tools before sintering, avoiding the need to intervene afterwards with greater difficulty and the risk of damaging the prosthesis (operation not recommended)
- Longer tools' life (up to 700 elements with a bur for roughing)
- The extended time in the furnace ensures the homogeneity of the pre-sintering heat treatment, which makes it possible to obtain a good hold on the thinnest parts (edges)



CAD-CAM Indications

CAD-CAM Indications

CAD INDICATIONS

Minimum Thicknesses / Connections Structure

Dental sector	Minimum thickness (mm)	Connection's Section in mm2
Crowns	0,6	-
United Crowns	0,7	9
Bridges up to 3 Elements	0,8	9
Bridges of 4 and more elements with two intermediate elements	1,0	10
Cantilever dental bridge	1,2	10

BEFORE MILLING - INDICATIONS

- Carefully clean the pod holder after each use: the disc must be placed on a flat surface free of shims that could cause cracks
- Close the disk holder gradually, taking care to tighten the screws uniformly and progressively using a torque wrench with a force of less than 0.2 N/m
- The blank holder must be cleaned after each cycle of use. If left inside, the dust will not allow an uniform closure on the surface of the disc shoulder: the pressure applied to close the blank holder could cause fractures
- If you use a milling machine that also makes metal workpieces, it is essential to clean and dry the machine of coolant. It could mix with the Zirconia powder and cause malfunctions and tools' breakage
- It is suggested to mill Orodent discs dry. During milling, watch out for fine powders, which can irritate eyes and skin and damage the lungs. Make sure that the suction works perfectly

MILLING PARAMETERS

FOR ALL MACHINING ATTACK ANGLE 1 °

ROUGHING: Spherical tool: length 20 mm diameter 2 mm
Removal: 33% in terms of cutter diameter
20000rpm, Progress xy 2000mm/min, Removal in z 0.6mm

FINISHING: spherical tool: length 20 mm diameter 1mm
Removal: 15% in terms of cutter diameter
29000rpm, Progress xy 1000mm/min, Removal in z 0.05mm

Preparation Line: spherical tool: length 20 mm diameter 1mm
29000rpm, Progress xy 350mm/min, Removal in z 0.05mm

Holding inner cavity: spherical Tool: length 20 mm diameter 1mm
29000rpm, progress xy 1000mm/min, removal in z 0.05mm

External Finish: spherical Tool: length 20 mm diameter 1mm
29000rpm, Progress xy 2300mm/min, Removal in z 0.05mm

Upturn machining allowance: spherical Tool: length 10 mm diameter 0.6mm
Removal: 10% in terms of tool's diameter 29000rpm,
Progress xy 400mm/min, Removal in z 0.04mm
EMERGENCY EDGE >0.2mm

BEFORE SINTERING - INDICATIONS

The use of suitable tools is essential for finishing Orodent zirconia elements. The use of non-dedicated instruments may cause the contamination of the zirconia. It is recommended to keep the following tips in mind when removing the elements from the block:

- Zirconia always breaks where the thickness is less. To avoid breakage of the work or parts of it, disconnect the connections reducing their thickness one by one until they detach from the block
- It is suggested to carry out all finishing works at pre-sintered state, avoiding touch-ups after sintering
- Finish only with suitable milling cutters, at low speed and low pressure, avoiding transmitting vibrations to the structure



Finishing the elements well means minimising finishing after sintering, and thus reducing the risk of tensions and the formation of cracks.

CAD-CAM Indications

- Do not use polishing rubbers for colored restorations
- Milled elements must be carefully removed from the support using diamond burs for micromotors
- We suggest to use only thin and small-diameter burs
- Collar edges that are too thin are not suitable for sintering, as the marginal area rounds off during sintering and becomes too short
- After finishing, the restoration must be thoroughly cleaned. To remove the milling dust, use an oil-free compressed air jet and/or clean thoroughly using a soft brush
- Make sure that all milling residues have been removed before sintering
- Do not sandblast the restoration with corundum or polishing beads

Colorodent

Infiltration colours

INTRODUCTION

The main feature of COLORODENT infiltration liquids is the special composition that allows the colour to infiltrate up to 2 mm deep, avoiding the risk of white parts emerging during retouching.

COLORODENT liquids are produced on a neutral base at ph 5.5, avoiding the risk of damaging the heating elements of the oven and not requiring long drying times.

They can be used by immersion infiltration or applied with a brush, in both cases before sintering.

The "COLORODENT" range consists of 3 lines, two of which are dentine and one for characterisation: Basic, Gold and SuperColori.

Dentine lines: COLORODENT Basic and COLORODENT Gold

CORODENT Basic

The type of zirconia on which the colour is applied is white: for this reason, the liquid contains all the pigments necessary to achieve the desired shade of the Vita shade guide.

It is therefore suitable for:
- High Translucent
- Bleach
- White Matt

COLORODENT Gold

It has a specific formulation for application on pre-coloured zirconia.

It is indicated for:
- Preshaded
- Gold
- Thor
- EOS
- Venus

Characterisation line: COLORODENT SuperColori

BLUE: to be applied on the mamelons and the circumference of the occlusal ridges (to emphasise the effect of depth in the outer occlusal areas). Available in 2 different shades: light and medium.

GREY: ideal for cuspal parts, can lower the colour value in areas of transparency. Available in 2 different shades: light and medium.

ORANGE and BROWN: for the pits and to emphasise shades in the cervical area.

VIOLET: for cuspal parts and occlusal ridges.

PINK: to be used as a base for the gingiva

Before starting

Materials Needed:

- Brush to remove the excess powder and air jet
- Brush without metal parts for applying the liquids
- Paper towel
- Water for cleaning brushes and containers
- Plastic tweezers

Instructions:

We recommend starting with characterisation with Colorodent SuperColori liquids, and then dipping into the desired dentine colour, using Colorodent Basic liquids when working on white zirconia, or Colorodent Gold liquids when working on precoloured zirconia. The recommended immersion time is 15-20 seconds.

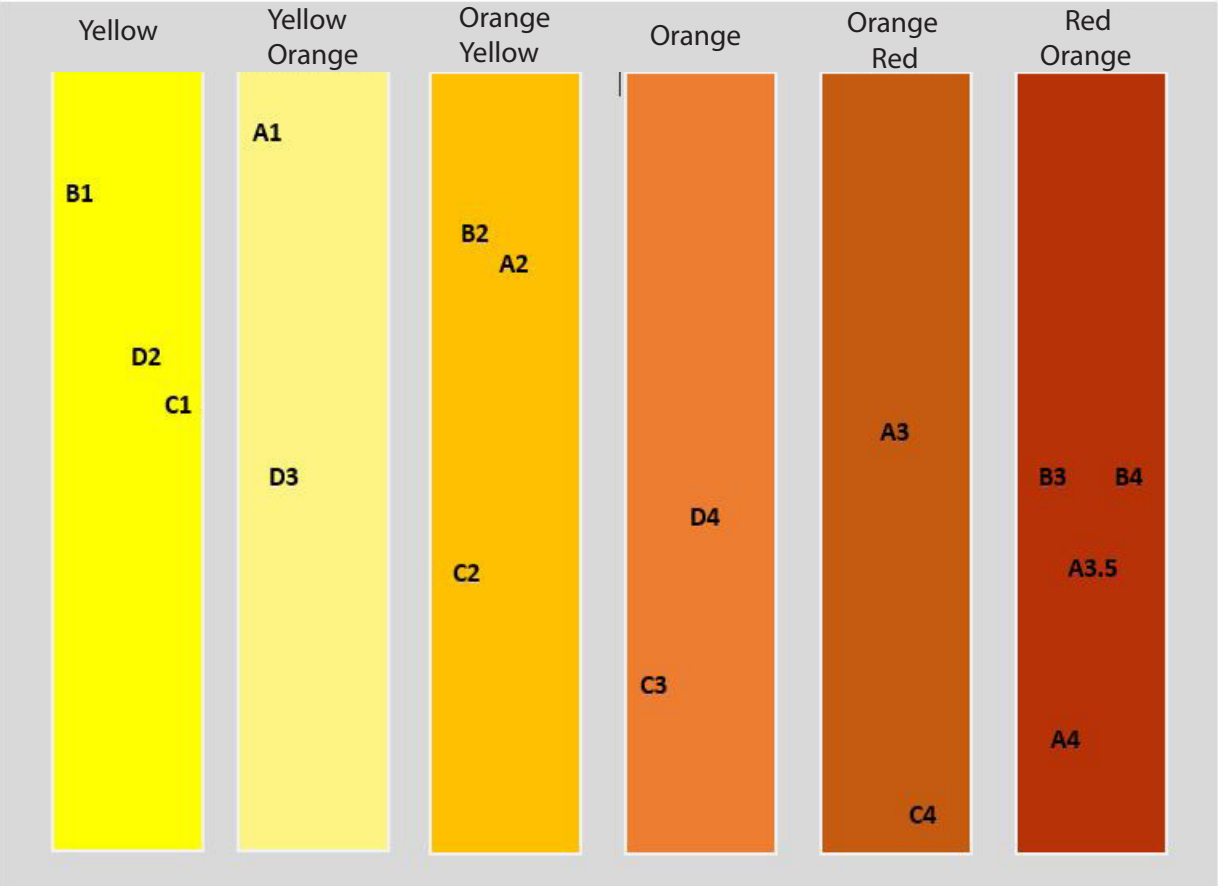
DIPPING TECHNIQUE

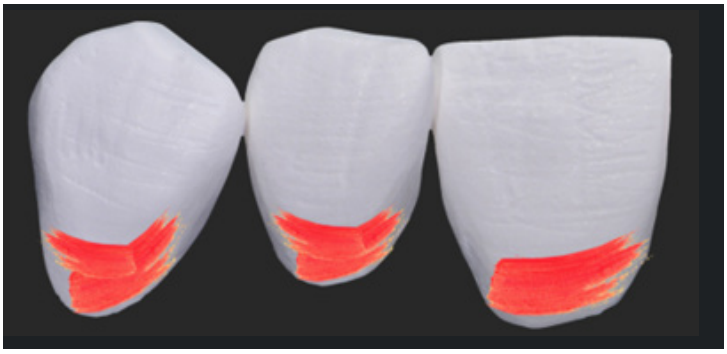
Liquid	Type of Zirconia	Immersion time
Colorodent Basic	High Translucent	15 seconds
	Bleach	10-15 seconds
	White Matt	15 seconds
Colorodent Gold	Thor	20 seconds
	EOS	20 seconds
	Venus	20 seconds
	Gold	20 seconds
	Preshaded	20 seconds

BRUSH TECHNIQUE

Below a colours table which suggests shades matches for the three areas of the tooth (incisal, middle and neck area).
Considering the table below, we proceed with the choice of colours:
we move to the right to infiltrate the neck and to the left to infiltrate the incisal margin.

Example of A3 colouring on GOLD zirconia:
Neck: A3.5
Middle third: A3
Incisal margin: A2

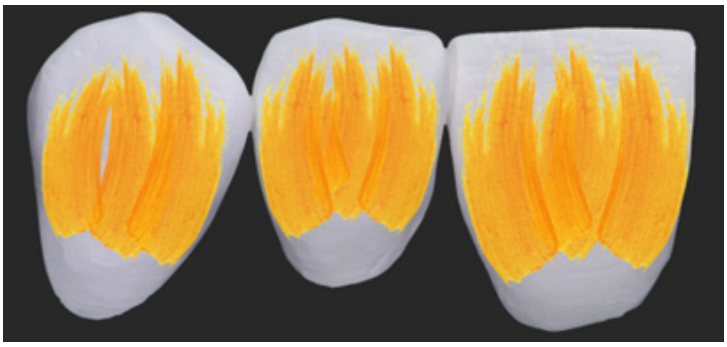




STEP 1
External applications with Colorodent Gold A3,5 or A4

No. of external brush strokes x4
Brush strokes in the cavity x1

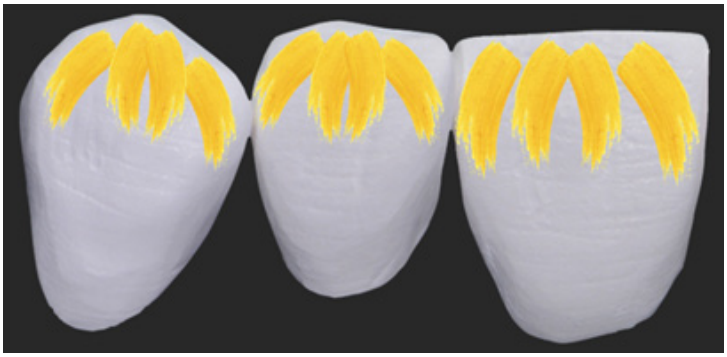
Recommended brush:
Brush #6 Smile line



STEP 2
External applications with Colorodent Gold A3

No. of external brush strokes x3

Recommended brush:
Brush #6 Smile line



STEP 3
External applications with Colorodent Gold A2

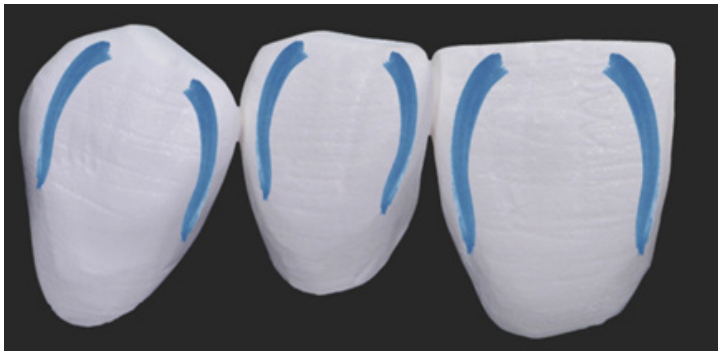
No. of external brush strokes x2

Recommended brush:
Brush #6 Smile line

STEP 4
External applications with Colorodent Super-Colori Brown (if needed)

No. of external brush strokes x1

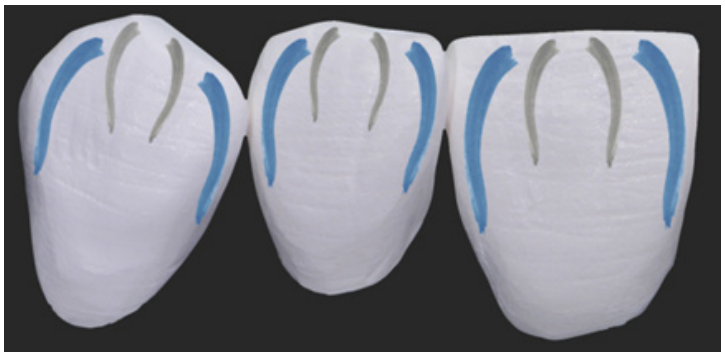
Recommended brush:
Brush #1 Smile line



STEP 5
External applications with Colorodent Super-Colori Blue Medium

No. of external brush strokes x2-3

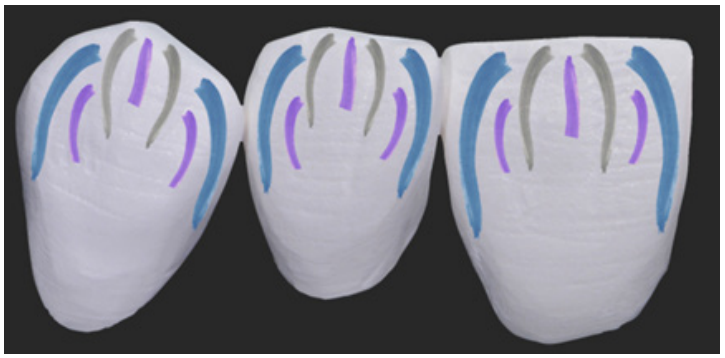
Recommended brush:
Brush #1 Smile line



STEP 6
External applications with Colorodent Super-Colori Grey Medium

No. of external brush strokes x1-2

Recommended brush:
Brush #1 Smile line



STEP 7
External applications with Colorodent Super-Colori Violet

No. of external brush strokes x1-2

Recommended brush:
Brush #1 Smile line

Proceed with sintering according to the instructions in the manual

PRECAUTIONS

- Store Colorodent liquids in a cool, dry place not exposed to light
- Shake the bottle well before use
- Do not mix Colorodent liquids with colouring liquids from other manufacturers
- If food colouring is added to the Colorodent liquid, store in the refrigerator
- Wash the application brush and liquid support with water before use
- Use brushes without metal parts
- Before applying Colorodent liquids, remove dust from the element using a soft brush and/or compressed air
- Do not handle the item with latex gloves
- The use of heat lamps or hot air jets (hairdryers) for drying is not recommended, as they oxidize the pigments contained in the liquids
- Infiltrate the elements no more than one hour before sintering
- Decontaminate the oven frequently
- Periodically check the oven heating elements
- Avoid the use of non-compliant carrier plates in the sintering furnace because they could absorbe the colour and discolour the element. For this reason, it is advisable to lay out a bed of alumina balls on which the products are to be placed

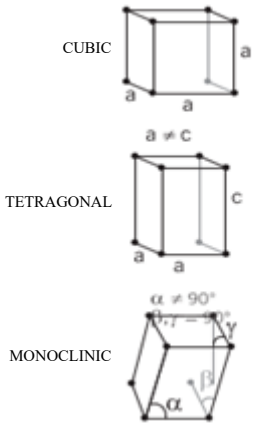
Sintering

Sintering

SPECIFIC FEATURES OF ZIRCONIUM OXIDE

Zirconium oxide has the property of resisting heat very well and can be called a poor heat conductor. In its pre-sintered state, its structure has 50 percent porosity that further retards heating, just like some building materials.

During sintering the structure compacts, undergoing a dimensional shrinkage of 18-19% due to the loss of porosity. Shrinkage occurs according to temperature (e.g. at 1100°C 4% shrinkage - at 1200°C 8% shrinkage, etc.).



Zirconia has 3 molecular forms:

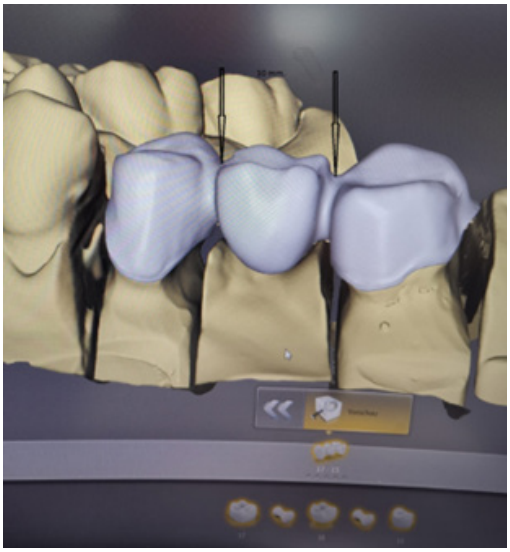
- Up to 1170°C: **monoclinic** crystal structure
- From 1170°C to 2370°C: **tetragonal** form, with volumetric contraction of the maximum value of 5%
- From 2370°C to 2690°C: **cubic** form

SINTERING PROGRAMS

The heat treatment must be chosen according to the thicknesses of the prosthesis and the type of zirconia: in particular, the choice of sintering program must guarantee homogeneous heating between the inner and outer layers of the prosthesis to obtain a uniform and three-dimensional shrinkage, paying particular attention to prostheses with elements of different thicknesses.

PROCEDURE:

1) Measure the thickest element on the milled element before sintering.
2) Calculate the distance from the heating surface to the farthest point to it (core of the element) by dividing the thickness by two



The first sintering ramp will heat the element without changing its structure.
The second sintering ramp will cause the three-dimensional shrinkage of the structure that occurs together with temperature.
It is essential to choose the program with the most suitable gradient for the second heating ramp for the integrity and aesthetics of the prosthesis.
The duration of the third ramp depends on the heat dissipation capacity of the oven.

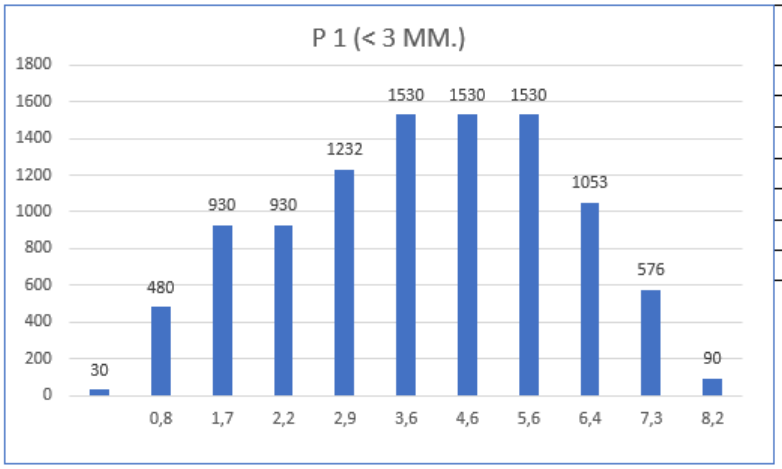
GUIDELINES FOR PROGRAMMING THE SINTERING FURNACE

Thickness	1,2	2,4	3,6	4,8	6	7,2	8,4	9,6
\ 2	0,6	1,2	1,8	2,4	3	3,6	4,2	4,8
Gradient	9,0	7,2	4,8	3,6	2,9	2,4	2,1	1,8

		P1		P2		P3		P4
I Ramp: Heating								
Start temperature	30	30	30	30	30	30	30	30
End temperature	930	930	930	930	930	930	930	930
Gradient	9	9	9	9	9	9	9	9
MIN.	100	100	100	100	100	100	100	100
			30	30	30	30	30	30
II Ramp Sintering								
Start temperature	930	930	930	930	930	930	930	930
End temperature	1530	1530	1530	1530	1530	1530	1530	1530
Gradient	9,0	7,2	4,8	3,6	2,9	2,4	2,1	1,8
MIN.	67	83	125	167	208	250	292	333
	120	120	120	120	120	120	120	120
III Ramp Cooling								
Start temperature	1530	1530	1530	1530	1530	1530	1530	1530
End temperature	90	90	90	90	90	90	90	90
Gradient	-9,0	-9,0	-9,0	-9,0	-9,0	-9,0	-9,0	-9,0
MIN.	160	160	160	160	160	160	160	160
Total minutes	447	463	535	577	618	660	702	743
Total hours	7,4	7,7	8,9	9,6	10,3	11,0	11,7	12,4

Sintering

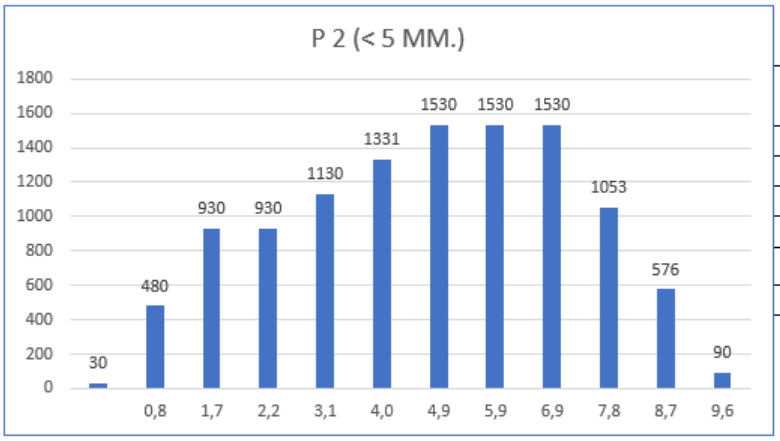
PROGRAM 1



Starting temperature	Finishing temperature	Gradient	min.	h
30	930	9,0	100	1,7
930	930	-	30	0,5
930	1530	7,2	83	1,4
1530	1530	-	120	2,0
0	0	-	0	-
0	0	-	0	8,2

Tot. h	**8,2**

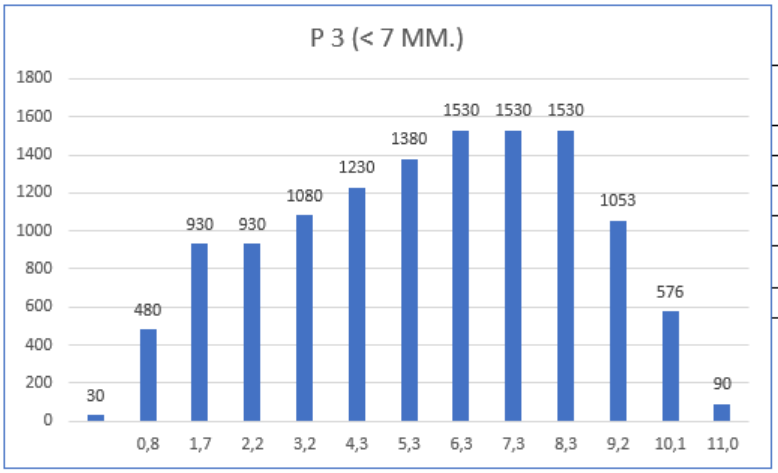
PROGRAM 2



Starting temperature	Finishing temperature	Gradient	min.	h
30	930	9,0	100	1,67
930	930	-	30	0,50
930	1530	3,6	166,67	2,78
1530	1530	-	120	2,00
1530	100	- 9,0	160	2,67

Tot. h	**9,6**

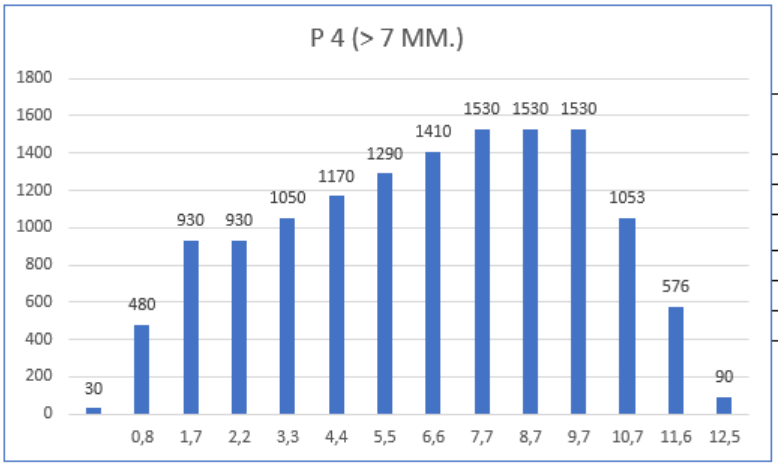
PROGRAM 3



Starting temperature	Finishing temperature	Gradient	min.	h
30	930	9,0	100	1,667
930	930	-	30	0,5
930	1530	2,4	250	4,167
1530	1530	-	120	2
1530	100	- 9,0	160	2,667

Tot. h	**11**

PROGRAM 4



Starting temperature	Finishing temperature	Gradient	min.	h
30	930	9,0	100	1,7
930	930	-	30	0,5
930	1530	1,8	333	5,6
1530	1530	-	120	2,0
1530	100	- 9,0	160	2,7

Tot. h	**12,4**

The milled element is pre-sintered and for this reason up to a temperature of 930°C the structure does not experience any shrinkage.
Going up with the temperature (from 930°C) it is necessary to adjust the thermal gradient to the thicknesses to achieve homogeneous heating and three-dimensional shrinkage.

A thermal gradient that is too high can:

- Cause tensions that expose the prosthesis to the risk of losing precision and in the worst cases leads to fractures that can also occur during post-sintering treatments or in mouth.
- Lead to incomplete loss of porosity compromising the translucency value (opaque and/or mottled result)
- Limit the flexural strength of the prosthesis
- The same inconveniences can also occur with fast Sintering, which is only recommended for single crowns that have homogenous thicknesses, as opposed to bridges that alternate crowns with full-elements

PLACEMENT OF THE ELEMENT IN THE SINTERING FURNACE

- It is possible to place the elements (up to 5) in a specific container and on zirconia spheres (lying, not immersed)
- Place the elements in the container with the cusps facing upward for optimal heat radiation
- It is recommended to lift the container off the furnace plate with supports

FULL ARCH STRUCTURES:

- Place the extended bridges parallel and equidistant from the oven heating elements
- Over a total of 6 elements, it is necessary to prepare at the design stage a stabilizing bar (frame) less than 5 mm thick and possibly hollowed out. Full and thick stabilizer may require longer sintering programs
- If possible, design the structure with connectors placed on the elements with higher thicknesses

FINAL RESULT

After Sintering

CERAMIZATION AND CHARACTERIZATION

After sintering, the zirconia structure appears to be compact and more conductive, but it maintains its own characteristics as a refractory material and expands as a function of temperature expressed by the CET (coefficient of thermal expansion) 10 x 10-6.
During heat treatments we must remember the concepts expressed for sintering.
It is essential to adjust the heating and cooling times according to the thicknesses of the structure as shown in the following table:

Thickness	Starting temperature	Drying	Closing time	Gradient	Vacuum	Cooling	Oven opening
1mm	300- 350°C	2 min	4 min	35°C	400-450°C	3 min	< 200°
4mm	300- 350°C	3 min	6 min	30°C	400-450°C	4 min	< 200°
6mm	300- 350°C	4 min	8 min	25°C	400-450°C	8 min	< 200°
>6mm	300- 350°C	4 min	10 min	20°C	400-450°C	12 min	< 100°

Note: Avoid thermal shocks when opening the oven.

VISION 3D ARTISTIC

Orodent suggests the Vision 3D Artistic kit for zirconia characterization and finalization.
The Vision 3D Artistic system, with its coordinated finishing and finalization components, makes it possible to impart natural and aesthetic effects such as translucency, chroma, halo, mamelons, enamel cracks, opalescence and fluorescence to all types of frameworks (whether small crowns up to monolithic bridges).
The components of the Vision 3D Artistic kit consist of fluorescent paints, fluorescent colors, sculptural masses and a special glaze mass.

After Sintering

VISION 3D ARTISTIC COMPONENTS

	NAME	INDICATION	TRANSLUCENT	OPACITY	OPALESCENCE	FLUORESCENCE	EFFECT	SCULPTURE
Shades	Shade A	Base /Chroma	✔					
	Shade B	Base /Chroma	✔					
	Shade C	Base /Chroma	✔					
	Shade D	Base /Chroma	✔					
Effect Stains	3D Stain Blue	Incisal / windows	✔				✔	
	3D Stain Sky	Incisal	✔				✔	
	3D Stain White	brightener / Halo		✔	✔	✔	✔	
	3D Stain Gray	Incisal	✔				✔	
	3D Stain Honey	Chroma / Effect	✔				✔	
	3D Stain Redbrown	Effect /Fissure					✔	
	3D Stain Olive	Effect					✔	
	3D Stain Pink	Incisal / Gingiva	✔				✔	
	3D Stain Red	Gingiva	✔				✔	
	3D Stain Violet	Incisal	✔				✔	
	3D Stain Darkbrown	Fissure / Effect					✔	
	3D Mamelon Ivory	Mamelon / Halo		✔	✔	✔	✔	
Sculpture Mass	3D Clear	Structure layer	✔		✔	✔		✔
	3D Incisal	Structure layer	✔		✔	✔		✔
	3D Opal	Structure layer	✔		✔	✔		✔
	3D Arctic Blue	Structure layer	✔		✔	✔		✔
Glaze	Glaze Paste					✔		
Stain	Staining Fluid							

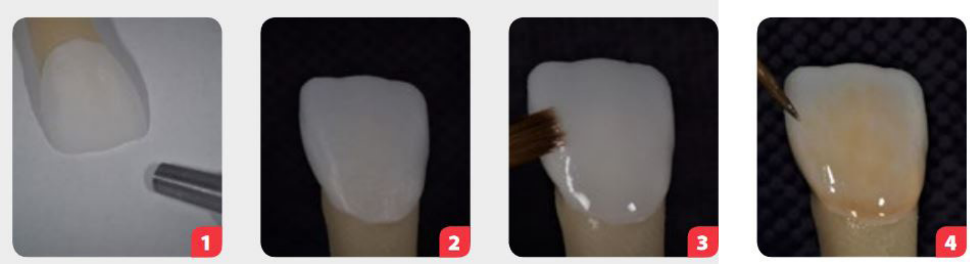
INSTRUCTIONS

- Store in a cool and dry place
- Compounds/pastes should not come in contact with water
- Mix stain and mass components well before each use
- Do not change the consistency of sculpture masses. If too much fluid is used, modeling stability is not guaranteed
- For a layer thickness greater than 0.4 mm on zirconia, use Vision Zirkon layered ceramic
- Always use Vision 3D Artistic Fluid for rewetting

After Sintering

SURFACE PREPARATION

- The glazed and smooth surfaces should be lightly roughened with glass beads. 50 µm and maximum 2 bar air pressure.
- Then clean with steam or distilled water in an ultrasonic device.
- Important. Mix stains well before use.
- Storing for a long time can lead to slight separation between powder and liquid



CHARACTERIZATION

- Wet the surface with a little liquid and glaze.
- Proceed with coloring in the desired colors and effects.
- Colour fixation firing

FIRING PARAMETERS

Firing	Starting temperature	Drying time	Gradient	Final temperature	Maintenance	Vacuum
Colour Fixing on Zirconia	450°C	2 min	40°C	800°C	1 min	Yes
Anatomical Zirconia Glaze Firing	450°C	2 min	40°C	790°C	1 min	Yes
3D Sculpture Mass	450°C	4 min	40°C	750°C	1 min	Yes

After Sintering

SPECIFIC FOR GLAZE FIRING

Depending on the desired degree of gloss, additional glasure (glaze) firing may be required.
See Glaze firing table:

Firing	Starting temperature	Drying time	Gradiente	Final temperature	Maintenance	Vacuum
Glaze firing	450°C	2 min	25-30°C	745°C	1 min	Yes

SPECIFIC FOR SCULPTURE MASSES

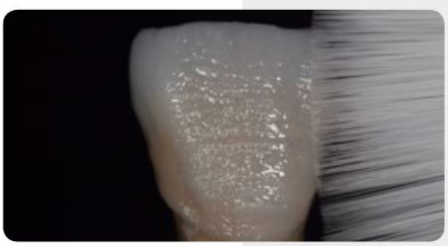
By covering the ceramic surface that has been individualized with Stains, a three-dimensional effect of the color layer is achieved, which can hardly be distinguished from a normal layered veneer. Especially for fully anatomical translucent zirconia, when space is limited, natural aesthetics are easily achieved. The optimal layer thickness of Sculpture materials ranges from 0.1 to max 0.4 mm thick. In addition, regular layering materials (Vision-Zirkon) should be used according to the respective framework material. The texture of the sculpture materials should be similar to that of ceramic veneer composites.

Indications:

- Take out a small amount and mix with a clean spatula
- Apply the desired mass to the surface of the restoration and shape the mass with a clean brush into the desired shape
- Use a fine dry fan brush to introduce transverse and longitudinal structures into the surface
- Sculpture masses are fired according to the instructions

3D SCULPTURE FIRING PARAMETERS

Firing	Starting temperature	Drying time	Gradiente	Final temperature	Maintenance	Vacuum
3D Sculpture Mass Firing	400°C	4 min	40°C	750°C	1 min	Yes


ZIRCONIA CEMENTATION

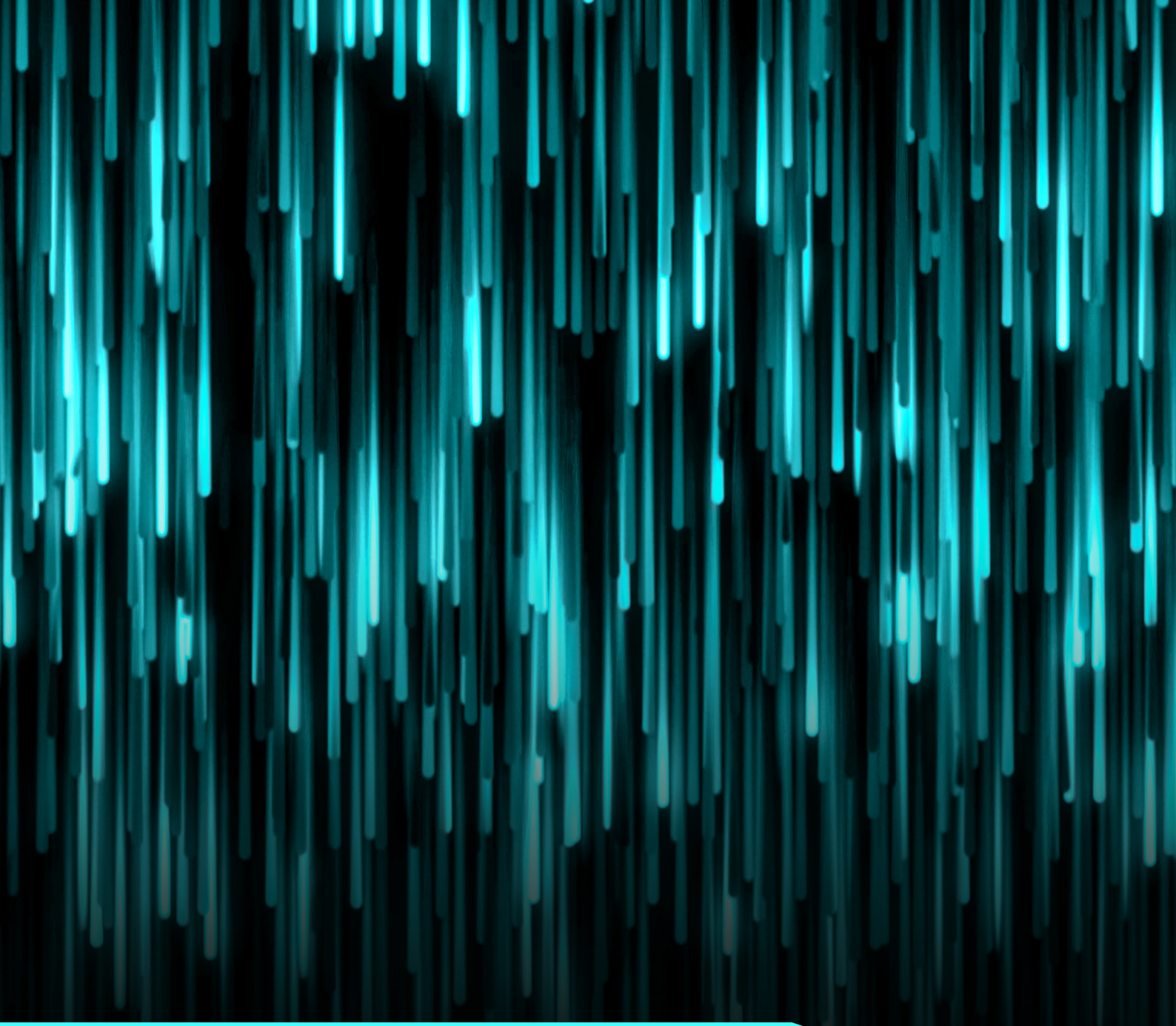
- Oxyphosphate cements
- Inomeric glass cements
- Resinous cements
- Self-adhesive cements

ADHESION PROBLEMS

Cements containing MPD phosphonic groups (Panavia, Superbond, Alloy Primer) chemically bind Zr cores, increasing the bond strength (Friederich R. 2002, Lehmann, 2009). In this case, cementation has to be done with adhesive technique and its related problems.

To date, the best adhesive method appears to be with resin cements with separate Zirconia primer (containing MDP) or with resin cements that already incorporate this molecule, these types of cements distribute the occlusal load much better.
After testing the restoration, it is found to be contaminated with saliva and therefore may not give good adhesion, so it is recommended to sandblast at low pressure (1Atm 50 microns) or clean the restoration well with alcohol or alkaline. Keys to Successful Placement of Zirconia Restorations, Gary Alex, DMD

- Self-adhesive cements (Unicem) manage to have good adhesion strengths (Bulot D, 2003)
- Sandblasting before cementation does not seem to reduce the number of decementations (Harder, 2009), even if it does improve adhesion strengths in the laboratory (Lehmann, 2009)
- It cannot be sufficiently roughened by HF (absence of glass components)
- It cannot be roughened by sand-blasting-Not by chemical bonding with silanes due to low silica content (<1%)
- Treated with silanization (Rocatec) by high bonding values, 17 Mpa (Bo-Kyoung 2005) but not very durable on aging tests (12.8 Mpa after 150 days-Kern M, 1998)



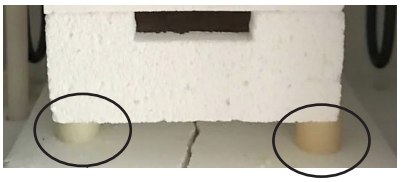
HOW TO AVOID FAILURES

How to Avoid Failures

CIRCUMSTANCE	PROBABLE CAUSE	SOLUTION
BREAKING OF THE DISC EDGE OR BREAKING OF SOME PARTS OF THE DISC DURING THE MILLING PHASE	Ring or pod holder with powder residues	We recommend thorough cleaning after each use
	Not optimal tightening of the disk on the pod carrier (usually happens on pod holder with screw tightening)	Use of torque wrench with 0.20 Nm tightening taking care to act on the screws in a homogeneous and progressive way
ACCIDENTAL DETACHMENT OF THE ELEMENTS DURING THE MILLING STAGE	Limited offset	Create an offset of at least 3 mm for crowns and 4 mm for circular rings and create connectors with a maximum diameter of 2 mm
	Wrong design in CAD phase, position of the product near the edge of the disc	It is suggested to place the connectors on elements with greater thickness (e.g., elements without cavities)
BREAKAGE OF SOME PARTS OF THE STRUCTURE OR BREAKAGE NEAR A THROUGH HOLE	Incorrect positioning in CAM phase (near the edge or horizontally with respect to the origin point)	Place the structure vertically to the point of origin, in this way the cutter will be able to reach all points more easily
	The cutter does not have enough space to make the hole or cannot reach some points due to a large undercut	Make sure that during the CAD phase the minimum thickness of 0.6 mm required for the zirconia has been respected
THE STRUCTURE IS NOT MADE IN ALL ITS PARTS	Wrong choice of disk height	Place the product in the blank, always calculating an extra portion of material, at least 0.5mm per side

CIRCUMSTANCE	PROBABLE CAUSE	SOLUTION
PRESENCE OF CHIPPING ON THE ELEMENTS	Tool wear	Regularly check the wear of the tool, possibly choose high performance diamond tools
PRESENCE OF EXCESS POWDER INSIDE THE CAVITY AFTER SINTERING	Non-depth dust cleaning before sintering	We recommend using a brush and a compressed air jet
PRESENCE OF COLOUR SPOTS ON THE ELEMENTS AFTER SINTERING	The heating elements or the oven plate may have absorbed over time the colouring liquid (often with an acid component) that is applied to the zirconia before sintering	Choose water-based colors (use litmus paper to measure the PH of the colour)
		Decontaminate the sintering furnace periodically, using a specific decontaminate for zirconia sintering furnaces (at this stage also insert the plate that is usually inserted in the furnace)
	Incorrect choice of sintering program	Choose the appropriate sintering program, based on the most important thickness of the artifact
STRUCTURE BREAKAGE AT THE FINISHING STAGE BEFORE SINTERING	Using the micromotor at excessive speed	Finish only with suitable cutters, at a low number of revolutions and with little pressure, avoiding transmitting vibrations to the structure and overheating it
	Detachment of connectors in an uneven way	Disconnect the connectors by reducing their thickness one by one until detachment from the pod. It is recommended to use only fine, small diameter cutters

CIRCUMSTANCE	PROBABLE CAUSE	SOLUTION
BREAKAGE OF BRIDGES AND CROWNS AT THE EXIT OF THE SINTERING	Stabilizer bar present, but not emptied internally	Solid stabilizer with high thickness requires longer sintering time
	Connectors between the bar and the bridge with too high thicknesses	Design connectors with a maximum diameter of 2 mm
	Wrong choice of sintering program	Choose the program according to the thickness of the element, as indicated in this using manual
	Incorrect placement of extended bridges in the oven	It is suggested to place the extended bridges keeping them parallel to the resistances of the oven 
	Thermal shock	It is recommended to open the oven at a temperature below 100°C
	Position of the connectors on the thinnest elements	It is suggested to design the work with the connectors positioned on the elements with greater thickness (e.g., solid elements)

CIRCUMSTANCE	PROBABLE CAUSE	SOLUTION
ZIRCONIA APPEARS MATT	Choosing a too short sintering program	Choose the program according to the maximum thickness of the element
	Elements placed directly on the surface of the plate or charging container	Up to 5 elements it is recommended to place the elements on zirconia spheres by placing the cusps upward  For better heat radiation, it is advisable to lift the element container with shims 
	Damaged heating elements	Replace the damaged heating elements
	Oven not calibrated: it does not actually reach the indicated temperature	There are products on the market (zirconia pad) able to indicate what temperature the oven actually reaches. The other solution to increase the translucency of the product is to gradually reach the final temperature of 1550°C
	Touch-up with unsuitable tools	Use specific tools for zirconia

CIRCUMSTANCE	PROBABLE CAUSE	SOLUTION
BREAKAGE OF BRIDGES AND CROWNS AFTER FIRING IN THE OVEN FOR CERAMICS	Too high heating gradient	See table in "Ceramization and Characterization" (Final Phase) in this user manual
COLOR RESULT TOO DARK OR TOO LIGHT WITH PRECOLORED MULTILAYER ZIRCONIA	Incorrect choice of disc colour	Place the element in the disk correctly (in the centre)
	Important thickness of the product	Considering that thickness increases colour saturation, it is recommended to take advantage of the cuspal layer of the disk
TOOL AND DISK BREAKAGE USING A METAL MILLING MACHINE	Presence of coolant that mixes the zirconia powder	It is suggested that the machine be cleaned and dried of coolant lubricant. It may mix with Zirconia powder and create tool malfunction and breakage
BREAKAGE OF THE PROSTHESIS AFTER A SHORT PERIOD OF USE	Temporary Cementation (Temp Bond)	Avoid temporary cementation (Temp Bond) using the recommended cements in this user manual
	Inadequate thicknesses	Follow the instructions regarding thicknesses (for crowns, bridges, connectors) in the "Cad-Cam Procedure" chapter of this user's manual
	Too fast sintering	Follow the sintering program selection method given in this user's manual

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ORODENT SRL

Address: M.G. Agnesi, 8-10 **CAP:**37014

City: CASTELNUOVO d/G - VERONA (VR)

ITALIA

Telephone: +39 045 6450635

E-mail: sales@orodent.com

Web: www.orodent.com

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