Instruction for Use

Dental Ceramic

Model: Metal Ceramic

Instruction for Use

【Device Name】Dental Ceramic

【Model and Specifications】Metal Ceramic (JC) (Refer to Appendix 1 for details)

【Chemical Composition】SiO_2(50-60%), Al_2O_3(14-17%), K_2O(7-12%), Na_2O(7-10%), CaO(1-4%), BaO < 3%, SrO < 2%, B_2O_3 < 1%, Others < 2%.

【Intended Use】Dental ceramic (metal ceramic and zirconia ceramic) is used for the fabrication of dental restorations (inlays/onlays, veneers, touch-ups, etc.). Dental ceramic is coated on the surface of the metal crown or zirconia crown, made into the shape of the tooth crown, and then sintered into the form of a restoration in which the inner crown and this dental ceramic are sintered as one, for the restoration of damaged or missing teeth.

【Clinical Indications】Indicated for tooth damage (decayed tooth, damaged tooth, etc.), fixed-bridge restorations for tooth absence, aesthetic restoration for tooth discoloration.

Metal Ceramic is a veneering ceramic for metal substructures made of high gold content, reduced gold content as well as non-precious alloys in the conventional CTE range(25~500℃): 13.8~14.9(x 10^{-6} K^{-1}).

【Clinical Benefit】As effective materials with good biocompatibility and wear resistance, Dental Ceramic in dental restorations are aimed at repairing damaged / missing tooth such as damaged natural crown, absence of tooth or deformed teeth, and at recovering their masticatory function, remaining healthy tooth structure.

【Applicable Population】People who need dental prosthesis restoration. Human above 18 years old.

【The Intended user】All Dental Ceramics (Metal Ceramic, Zirconia Ceramic) are processed through dental laboratories or by dental professionals.

【Intended use environment】Dental Ceramics (Metal Ceramic, Zirconia Ceramic) are processed in dental laboratories or dental institutes, and intended used in human intraoral.

【Contraindication】Bruxism and allergic reactions to dental materials / ingredients in this product.

【Precautions & Warnings】

- For dental use only.
- If accidental contact with eyes or prolonged contact with inhalation of oral tissues occurs, flush immediately with large amounts of water.
- Consulting with a doctor in case of toothache, allergy and crack on prosthesis are strongly recommended.
- the operator must undergo special training and be skilled in the operation of the product.
- When working with the products, wear suitable safety goggles/face protection, gloves and safety clothing.
- Our products must be used in accordance with the actual version of the instructions for use.
- Any misuse may cause damage, resulting from incorrect handling or usage.
- The user is furthermore obliged to check the product before use with regard to its suitability for the intended area of applications.
- All apparatus for mixing shall be clean and dry.
- Spatula, made from material that is not readily abraded by the dental ceramic powder (glass is recommended). Instruments used for the mixing procedure shall be made of materials that do not contaminate the ceramic material.
- We cannot accept any liability if the product is used in conjunction with materials and equipment from other manufacturers that are not compatible or not authorized for use with our product.

- If serious incidents have occurred in connection with the product, they must be reported to BAOT Biological Technology Co., Ltd., and the competent authority of the Member State in which the user and/or patient is established.

【Handling】In the case of dust formation use an extractor unit or the dust mask (or grind when wet). Protective goggles should be worn when grinding the fired ceramic.

【Instructions】The product is a veneering material used with inner alloy crown to make into metal ceramic porcelain restorations. Mix the ceramic powder with the corresponding liquid until paste and then following the work instruction and firing parameters to operate. Formative Liquids(CFS, OF, and GY) are produced by the manufacturer is recommended used for Dental Ceramic.

- Modeling the Bond (Wash opaque), Opaque with the Opaque liquid (OF).
- Modeling Opacious Dentine, Dentine, Semi-transparent, Transparent with the Modeling liquid (CFS).
- Modeling the Glaze, Corrective, Stain with the Glaze & Stain liquid (GY).
- Combine the formative liquid and the ceramic powder according to categories and specifications in the proportions recommended as reference below:

Model	Porcelain Powder	Formative Liquid	Recommended Powder and Liquid mixing proportion
Metal Ceramic	BOND (WO)	Opaque liquid (OF)	1g : 0.67g
	Opaque	Opaque liquid (OF)	1g : 0.43g
	Opacious Dentine, Dentine, Semi-transparent, Transparent	Modeling Liquid (CFS)	1g : 0.39g
	Glaze, Corrective, Stain	Glaze & Stain Liquid (GY)	1g : 0.67g

- Avoid vigorous mixing which will tend to incorporate air bubbles with the paste and, both during and after mixing, examine for compliance with Uniformity and be free from extraneous materials by visual inspection.
- Detailed Operation Steps and Attentions are given in the Appendix 2.
- Troubleshooting Guide are given in the Appendix 3.

【Coefficient of Thermal Expansion (25-500℃)】12.3~13.3 ($\times 10^{-6}K^{-1}$).

【Glass Transition Temperature】600 (± 20)℃

【Transportation】The product is not regulated for transport of dangerous goods. Examine whether the package of the containers are integrate and tighten closed before transport. No divulgence, no collapse, no precipitation or no damage during the course of transportation. Don't put the goods together with strong base, water and so on. During transport should prevent exposure, rain and high temperature.

【Storage】Do store at proper temperature or keep out of intense light. Keep the product out of the reach of the children. Package tight closed.

【Dispose】This product is not regarded as hazardous waste. When dispose the product or its container can be refer to national or local regulations.

【Date of Manufacturing】See the labelling.

【Shelf life】Metal Ceramic (Powder): 5 years, limited time of use after opening packaging: 6 months.

Metal Ceramic (Paste): 1 year, limited time of use after opening packaging: 3 months, just suggest use it as soon as possible.

【Country of Origin】Made in China

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Treubstraat 1,2288EG,Rijswijk, The Netherlands
SRN:NL-IM-00000454

【Symbol】

Symbol	Instruction	Symbol	Instruction
	Fragile, handle with care.		Temperature limitation: - 18 °C ~ 50℃
	Consult instructions for use, or consult electronic instructions for use(eIFU)		Humidity limitation: 30% ~ 80%
	Keep dry		Do not use when the packing is damaged
	Attention(See user's manual)		Stacking limit by 5 layers
	Date of manufacturing		Prevent from heat
	Date of expiry		Prescription Use (Rx)
	Lot number		Manufacturer and address
	Conformity to the requirements of the applicable EC directives		Authorized Representative in the European Community/European Union
	Medical device, indicates the item is a medical device		Importer

Suggested profile and training of users

BAOT Dental Ceramic are designed for use by professional users. This specification is made clear by the labeling of BATO products with the symbol "Rx only". The specialist users are dentists and dental technicians who have excellent prior knowledge in the use of our products due to their many years professional training and/or university education. Follow-up training is the responsibility of the expert users and is offered by BAOT specifically for BAOT products. This guarantees safe handling of BAOT products at every point in the application process.

Product reliability

Information on reporting serious incidents in connection with medical devices, general risks associated with dental treatments, residual risks and Summary of Safety and Clinical Performance (SSCP) is available in EUDAMED database (URL: https://ec.europa.eu/tools/eudamed) under the product Basic UDI-DI: 697313331CE01BG.

Safety data sheets can be downloaded at https://www.baotdent.com or requested by fax at (+86) (0)760-87893825 or by Email: baotw@baot.biz.

Disclaimer

Please note: Our products must be used in accordance with the instructions for use. We do not accept any liability for damage resulting from incorrect handling or usage. The user is furthermore obligated to check the product before use with regard to its suitability for the intended area of applications. We cannot accept any liability if the product is used in conjunction with materials or equipment from other manufacturers that are not compatible or not authorized for use with our product and this results in damage.

Date of issue of these Instructions for Use: 2024-10. After the publication of these instructions for use, any previous versions become obsolete. The current version can be found at https://www.baotdent.com

Appendix 1:Product introduction of Metal Ceramic (JC) series

Category			Shades	State	Spec. (g)
Opaque	BOND		BOND	Powder	2, 5, 7, 10, 15, 50, 100, 200
				Paste	2, 3, 5, 7, 10, 15
	Wash opaque		WO	Powder	2, 5, 7, 10, 15, 50, 100, 200
				Paste	2, 3, 5, 7, 10, 15
	Opaque	16 color series	A1 A2 A3 A3.5 A4 B1 B2 B3 B4 C1 C2 C3 C4 D2 D3 D4	Powder	2, 5, 7, 10, 15, 50, 100, 200
				Paste	2, 3, 5, 7, 10, 15
		30 color series	B1M1 BL1 B1M1 BL2 B1M1 BL3 B1M1 BL4 B1M1 B1M2 B2L1.5 B2L2.5 B2M1 B2M2 B2M3 B2R1.5 B2R2.5 B3L1.5 B3L2.5 B3M1 B3M2 B3M3 B3R1.5 B3R2.5 B4L1.5 B4L2.5 B4M1 B4M2 B4M3 B4R1.5 B4R2.5 B5M1 B5M2 B5M3	Powder	2, 5, 7, 10, 15, 50, 100, 200
				Paste	2, 3, 5, 7, 10, 15
Dentine	Opacious Dentine	16 color series	A1 A2 A3 A3.5 A4 B1 B2 B3 B4 C1 C2 C3 C4 D2 D3 D4	Powder	2, 5, 7, 10, 15, 50, 100, 200
		30 color series	B1M1 BL1 B1M1 BL2 B1M1 BL3 B1M1 BL4 B1M1 B1M2 B2L1.5 B2L2.5 B2M1 B2M2 B2M3 B2R1.5 B2R2.5 B3L1.5 B3L2.5 B3M1 B3M2 B3M3 B3R1.5 B3R2.5 B4L1.5 B4L2.5 B4M1 B4M2 B4M3 B4R1.5 B4R2.5 B5M1 B5M2 B5M3	Powder	2, 5, 7, 10, 15, 50, 100, 200
	Dentine	16 color series	A1 A2 A3 A3.5 A4 B1 B2 B3 B4 C1 C2 C3 C4 D2 D3 D4	Powder	2, 5, 7, 10, 15, 50, 100, 200
		30 color series	B1M1 BL1 B1M1 BL2 B1M1 BL3 B1M1 BL4 B1M1 B1M2 B2L1.5 B2L2.5 B2M1 B2M2 B2M3 B2R1.5 B2R2.5 B3L1.5 B3L2.5 B3M1 B3M2 B3M3 B3R1.5 B3R2.5 B4L1.5 B4L2.5 B4M1 B4M2 B4M3 B4R1.5 B4R2.5 B5M1 B5M2 B5M3	Powder	2, 5, 7, 10, 15, 50, 100, 200
		Dentine Modifier	DM-1A DM-1B DM-1C DM-1D DM-1E DM-1F DM-1G DM-1H	Powder	2, 5, 7, 10, 15, 50, 100, 200

Enamel	Semi-transparent	Semi-transparent	E-1A E-1B E-1C	Powder	2, 5, 7, 10, 15, 50, 100, 200
		Semi-transparent Effect	EE-1A EE-1B EE-1C EE-1D EE-1E EE-1F EE-1G EE-1H	Powder	2, 5, 7, 10, 15, 50, 100, 200
		Cervical	C-1A C-1B C-1C C-1D C-1C 003	Powder	2, 5, 7, 10, 15, 50, 100, 200
		Cervical Effect	CE-1A CE-1B CE-1C	Powder	2, 5, 7, 10, 15, 50, 100, 200
		Opal Translucent	OT-1A OT-1B OT-1C OT-1D OT-1E	Powder	2, 5, 7, 10, 15, 50, 100, 200
		Pearl Translucent	PL-1A PL-1B PL-1C	Powder	2, 5, 7, 10, 15, 50, 100, 200
		Luminary	LM-1A LM-1B LM-1C LM-1D LM-1E LM-1F LM-1G LM-1H	Powder	2, 5, 7, 10, 15, 50, 100, 200
		Mamelon	MM-1A MM-1B	Powder	2, 5, 7, 10, 15, 50, 100, 200
		Margin	M-1A M-1B M-1C M-1D	Powder	2, 5, 7, 10, 15, 50, 100, 200
	Transparent	Transparent	T-1 T-1A T-1B T-1C T-1 061 T-1 062 T-1 064 T-1 063 T-1 065 T-1 068 T-1 071 T-1 075	Powder	2, 5, 7, 10, 15, 50, 100, 200
		Window	WIN-1	Powder	2, 5, 7, 10, 15, 50, 100, 200
		Gingiva	GIN-1A GIN-1B GIN-1B 073 GIN-1B 074 GIN-1B 076 GIN-1B 077	Powder	2, 5, 7, 10, 15, 50, 100, 200
	Glaze	Glaze	G-1 G-1A	Powder	2, 5, 7, 10, 15, 50, 100, 200
				Paste	2, 3, 5, 7, 10, 15
		Corrective	COR-1A COR-1B COR-1C COR-1D	Powder	2, 5, 7, 10, 15, 50, 100, 200
				Paste	2, 3, 5, 7, 10, 15
		Stain	S-1A S-1B S-1C S-1D S-1A 011 S-1A 012 S-1A 013 S-1A 014 S-1B 021 S-1B 022 S-1B 023 S-1B 024 S-1B 025 S-1B 026 S-1B 027 S-1B 028 S-1C 031 S-1C 032 S-1C 033 S-1C 034 S-1C 035 S-1D 041 S-1D 042 S-1D 043 S-1D 044 S-1D 045 S-1D 046 S-1D 047 S-1D 048 S-1D 049	Powder	2, 5, 7, 10, 15, 50, 100, 200
				Paste	2, 3, 5, 7, 10, 15
Formative Liquid	Opaque Liquid		OF	Liquid	15, 50, 240
	Modeling Liquid		CFS	Liquid	15, 50, 240
	Glaze & Stain Liquid		GY	Liquid	5, 15, 50, 240

【Firing Parameters】

Model/Type / Process	Metal Ceramic					
	BOND	Opaque	Margin	Body*	Add on	Glaze & Stain
Initial Temp (℃)	550	550	550	550	550	550
Drying Time (min)	2	3	3	3	2	2
Heating Time (min)	2	3	3	3	2	2
Heating Rate (℃/min)	60	60	55	55	55	55
Firing Temp. (℃)	960	940	930	920	910	890
Holding Time (min)	1	1	1	1	1	1
Cooling Time (min)	4	4	4	4	4	4
Cooling Temp. (℃)	550	550	550	550	550	550
Vacuum Start (℃)	550	550	550	550	550	/
Vacuum End (℃)	960	940	930	920	910	/

Note:

Please kindly note, as the manufacturer recommended, the inner alloy crown must be in the conventional CTE range: CTE (25~500℃): 13.8~14.9(x 10^{-6} K^{-1}).

(1) *Body: including Cervical, Opacious Dentine, Dentine, Enamel, Transparent, Gingiva.

(2) Add on: the second add-on porcelain material.

(3) According to the characteristics of different porcelain ovens, the firing parameters can be adjusted appropriately, and attention should be paid to test and confirm the firing situation before production.

Appendix 2: Operating Procedures

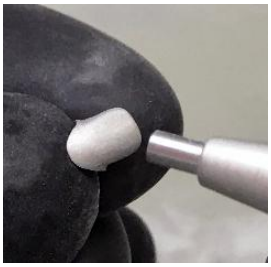
Basic Process

1. Metal Inner Crown Processing

Polishing

Polish the metal inner crown to ensure a smooth and well-shaped surface.

* The design of the metal inner crown should be reasonable, ensuring a minimum thickness of 0.3mm after trimming.
* Avoid sharp edges to prevent porcelain fractures.
* When trimming the crown, strictly follow the alloy manufacturer's operating manual and perform oxidation sintering as instructed.



Sandblasting

Sandblast the metal surface to roughen it.

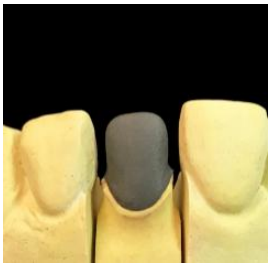
* Roughening the surface enhances mechanical bonding strength.
* Remove polishing residues to reduce the likelihood of bubble formation.

Cleaning

Clean the metal inner crown using an ultrasonic cleaner for approximately 1 minute.

* Thoroughly clean residues from surface textures to reduce bubble formation and the risk of porcelain fractures.

Note: Some alloys require acid pickling after oxidation sintering and/or sandblasting (follow the alloy manufacturer's operating manual).



Oxidation

After cleaning, dry the crown and oxidize it in a vacuum environment according to the alloy manufacturer's operating manual.

* Eliminate gases adhered to the metal surface to reduce bubble formation.

Note: After oxidation, use tweezers to handle the inner crown, sandblast it again, and clean it with steam to prevent surface contamination, which could weaken bonding strength.

2. **Applying Base Opaque Porcelain –** Enhances Bonding Strength and Provides Initial Opacity

Blending

If the base opaque porcelain WO is too dry, dilute it with the dedicated OP liquid to achieve the optimal consistency as shown in the diagram.

* Stir with a plastic stick, avoiding the introduction of water or body porcelain liquid to prevent uneven opacity.
* Seal the bottle tightly after use to prevent contamination.

Coating

Apply a thin first layer of WO with a brush, then sinter.
* Do not use a water-dipped brush.

Sintering

Refer to the firing parameter chart for sintering.

Applying Opaque Porcelain – OP for Opacity and Color Separation

Blending

If the opaque porcelain (OP) is too dry, dilute it with the dedicated OP liquid to achieve the optimal consistency as shown in the diagram.
* Stir with a plastic stick, avoiding the introduction of water or body porcelain liquid.

Coating

Evenly brush the second layer of opaque porcelain (OP) to completely cover the metal crown. Dry it before sintering.
* Use a carving knife dipped in OP to apply it to the interdental spaces, avoiding excessive thickness in these areas.
* After applying OP, gently vibrate it to ensure even distribution on the metal surface.

Sintering

Refer to the firing parameter chart for sintering.
* Ensure the OP is dried to a white appearance before sintering to prevent bubbles and cracks.
* The sintered opaque porcelain layer should have a smooth surface without exposed base color; otherwise, an additional layer is required.

3. Applying Body Porcelain

Blending

If the OP is too dry, dilute it with the dedicated OP liquid to achieve the optimal consistency as shown in the diagram.

* Stir with a plastic stick, avoiding the introduction of water or body porcelain liquid.

Layering Porcelain

Evenly apply OP with a plastic stick to cover the metal color. Dry it before sintering

* Use a carving knife dipped in OP to apply it to the interdental spaces, avoiding excessive thickness in these areas.
* After applying OP, gently vibrate it to ensure even distribution on the metal surface.

Note

Refer to the firing parameter chart for sintering.

* Ensure the OP is dried to a white appearance before sintering to prevent bubbles and cracks.
* The sintered OP should have a smooth surface without exposed base color; otherwise, an additional layer is required.

4. Applying Translucent and Transparent Porcelain

Applying Translucent Porcelain

Layer translucent porcelain on the incisal one-third of the crown

* Use a slightly moistened brush to gently smooth the porcelain, ensuring tight bonding between layers.

Applying Transparent Porcelain

Layer transparent porcelain on the incisal two-thirds of the crown, covering the translucent porcelain.
The incisal edge can be slightly extended.

Use tweezers to hold the lingual metal edge of the crown and fill the adjacent areas with body porcelain and transparent porcelain.

Sintering

Refer to the firing parameter chart for sintering.

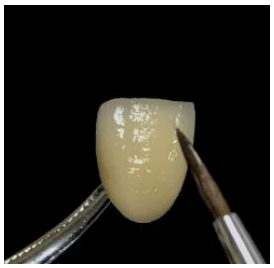
* Insufficient or excessive sintering can lead to instability in the crystalline structure and color of the porcelain crown.

5. Contouring and Glazing

Contouring

After firing, adjust the crown's shape and confirm whether additional porcelain is needed.
If additional porcelain is required, the sintering temperature can be 5°C–10°C lower than the initial sintering temperature.

* Avoid excessive additions, as this may result in color cloudiness.



Glazing

Mix glaze powder with glaze liquid into a paste, then apply it using a glaze brush in the conventional manner.
* Stir thoroughly to ensure even mixing of the glaze powder and liquid. If the mixture is too dry or too thin, the gloss after sintering will be insufficient.

Shade Matching

Compare the glazed porcelain crown with the corresponding shade guide. If the color is insufficient, use a staining agent for coloring. Continue color matching after staining until the desired color is achieved.

Sintering

After glazing, refer to the firing parameter chart for sintering. Vacuum is generally not required.

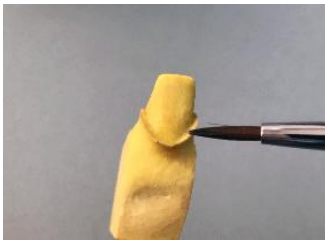
* Excessively high sintering temperatures may result in overly rounded crown shapes, overly bright glaze surfaces, and unnatural colors.
* Insufficient sintering temperatures may result in a dry, dull surface without gloss.

Advanced Techniques

Applying Shoulder Porcelain

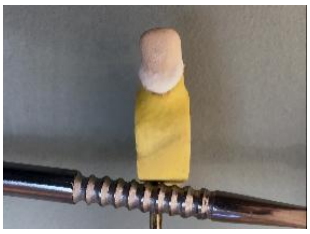
Shoulder porcelain replaces the metal shoulder, offering better biocompatibility and aesthetics.

1. Ensure the shoulder slope has sufficient thickness to prevent porcelain fractures.



2. Applying Separator

3. Applying Shoulder Porcelain



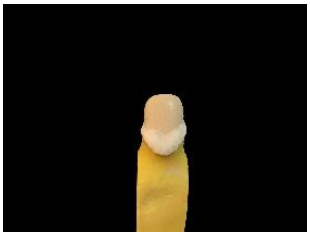
4. Vibrate to compact the porcelain powder and reduce shrinkage.

5. Add additional shoulder porcelain after sintering.

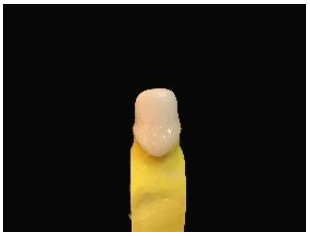
6. After Sintering Shoulder Porcelain

Apply Cervical Porcelain

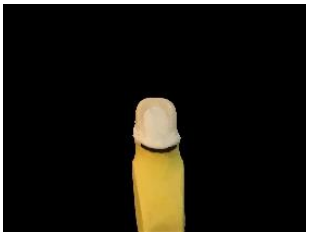
Enhance the cervical color for a more natural and realistic appearance.



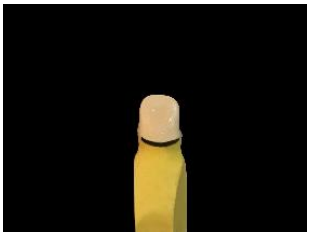
1. Layer porcelain on the labial cervical area.



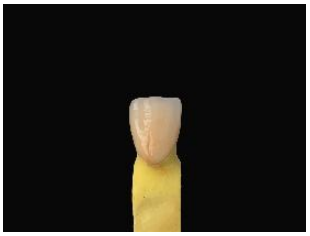
2. After sintering, the cervical color deepens.



3. Layer porcelain on the lingual cervical area and lingual fossa.



4. After sintering, the lingual cervical and lingual fossa colors deepen.



5. Post-Sintering Labial Effect

6. Post-Sintering Lingual Effect

Applying Opaque Body Porcelain

Opaque body porcelain compensates for insufficient porcelain space and inner crown design. It also prevents color discrepancies caused by inconsistent body porcelain thickness, avoids color breaks due to short inner crowns, and prevents OP exposure due to thin body porcelain.

1-1. Short central and canine teeth are prone to color breaks during layering.

1-2. Use opaque body porcelain to lengthen the central and incisal edges.

1-3. Successfully avoid color break issues.

2-1. Excessive inward retraction of the lateral incisor cervical area can cause color discrepancies due to thick body porcelain.

2-2. Use opaque body porcelain to build up the lateral incisor cervical area.

2-3. Successfully avoid color discrepancy issues.

Applying Staining Porcelain

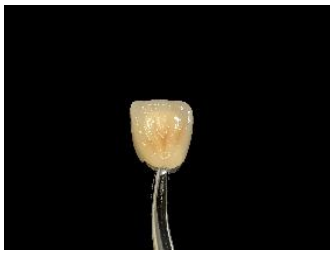
Used for internal and external staining, developmental groove coloring, color correction, and personalized customization.

1. Use a thin blade to carve cracks.

2. Use a glaze brush to fill staining porcelain for internal staining.

3. Continue with translucent and transparent layers.

4. Post-Sintering Labial View



5. External staining of developmental grooves.

6. Post-Sintering Lingual View.

Appendix 3: Troubleshooting Guide

Step 1: Select a compatible metal inner crown.			
Selection of metal inner crown:	Parameters	Recommendations	Reasons
	Thermal Expansion Coefficient	CTE (25 ~ 500°C):13.8 ~ 14.9 (× $10^{-6}K^{-1}$)	CTE outside the required range may cause porcelain cracking.
	Vickers Hardness	≤ 330HV	Excessive metal hardness can lead to microcracks.
	Recycled Metal	Not recommended for reuse	Recycled or mixed metals may cause porcelain cracking.
Step 2: Perform proper metal inner crown treatment.			
Metal inner crown treatment:	Grinding	Use tungsten carbide to remove sharp edges and uneven surfaces.	Sharp surfaces may cause porcelain cracking, and depressions may lead to bubbles.
	Sandblasting	Use #110 - #130 aluminum oxide sand to remove investment material, metal debris, and oxides from the metal surface.	Unclean metal can hinder metal-ceramic bonding, causing porcelain detachment; sandblasting enhances mechanical bonding strength.
	Cleaning	Use ultrasonic or steam cleaning to remove sandblasting residues.	Deep cleaning removes impurities, enhances mechanical bonding, and prevents bubbles and porcelain detachment.
	Oxidation	Remove oil and gas to form an oxide layer.	Prevents porcelain cracking, bubbles, and improves chemical bonding strength.
Step 3: Ensure the porcelain powder remains uncontaminated. Take out an appropriate amount of porcelain powder each time. Once removed, it is not recommended to return the powder to the bottle.			
Step 4: Confirm the furnace temperature is accurate. Additionally, calibrate the furnace every 2-3 months.			
Application of Opaque Porcelain:	Issues	Cause	Solutions
	Bubbles	Impurities or gas in the metal inner crown.	Thoroughly sandblast, clean, and degas through oxidation.
		Porosities in the metal inner crown.	Redo the inner crown for large porosities; grind smooth for small porosities.
		Water mixed into the OP paste.	Dilute the OP with a dedicated liquid; ensure no water on the OP brush.
		Insufficient drying time.	Extend the drying time.
		Vacuum issues in the furnace.	Inspect and correct the furnace vacuum level.
	Cracks	Opaque porcelain applied too thickly or unevenly.	Apply the opaque porcelain evenly, with sufficient but not excessive thickness, especially in interproximal areas.
	Incorrect Color	Water mixed into the OP paste or overly diluted.	Dilute the OP with a dedicated liquid to the appropriate consistency.
		Opaque porcelain layer too thin.	Apply an additional opaque layer.
Applying Body Porcelain	Issues	Cause	Solutions
	Bubbles	Bubbles or gaps in the opaque porcelain layer before applying body porcelain.	Inspect the opaque layer before application; repair with OP if necessary.
		Insufficient porcelain powder compaction.	Use vibration to enhance compaction.
		Excessively high sintering temperature.	Follow the recommended sintering temperature chart; reduce by 5°C if necessary.

	Detachment	Use of recycled or welded metal.	Use new metal for the inner crown.
		Contamination of the metal or opaque layer.	Identify and eliminate contamination sources; avoid oil stains and direct hand contact.
		Insufficient firing temperature for the opaque porcelain.	Adjust the temperature according to the sintering parameter chart.
	Fractures	Insufficient drying time or overly rapid temperature increase.	Extend the drying time or reduce the heating rate.
	Shrinkage Cracks	Porcelain layer not connected to developmental grooves.	Fill gaps and lightly vibrate to compact the porcelain powder.
	Edge Breakage	Insufficient support at the metal edge.	Ensure the metal edge thickness is at least 0.3mm.
	Incisal Fractures	Excessive porcelain thickness or insufficient cooling time.	Avoid excessive porcelain buildup; extend the cooling time.
		Undersized inner crown.	Redo the metal inner crown
	Contouring Cracks (Soft Feeling)	Low sintering temperature resulting in incomplete crystallization, leading to weak bonding between crystals and cracking during grinding; or over-sintering, causing increased glass phase, surface brittleness, and ease of grinding and cracking, giving a false impression of softness.	Adjust the furnace temperature according to the sintering parameter chart. The recommended maximum sintering temperature is 930°C. These parameters apply to calibrated furnaces.
	Incorrect Color	Contamination of the furnace chamber by volatile sources.	Raise the temperature from 550°C to 960°C under vacuum and fire for 10 minutes to volatilize and remove contaminants.
		Show-through, improper ratio of body, translucent, and transparent porcelain.	Use a ratio of 7:2:3 for body: translucent: transparent porcelain.
		Bluish color due to low sintering temperature or short firing time.	Increase the sintering temperature and extend the firing time; clean the furnace regularly.
	Murky color	Disorderly layering of porcelain or low temperature during application.	Apply porcelain in an orderly manner with distinct layers; use appropriate vibration force and frequency.
		Abnormal vacuum level in the furnace.	Set the furnace vacuum level correctly according to the parameter chart.
Applying Glaze	Insufficient Gloss	Firing temperature too low	Increase to the appropriate firing temperature.
		Surface not cleaned properly after adjustments	Clean the tooth surface thoroughly before glazing.
		Glaze powder not mixed or applied evenly	Mix the glaze powder thoroughly and apply evenly.
	Excessive Roundness and Shine	Firing temperature too high or multiple firings	Reduce firing temperature and the number of firings.

Note: Information regarding troubleshooting can be found on our website at https://www.baotdent.com, search for the keyword: "Troubleshooting Guide."