

Noritake

Super Porcelain
EX-3

**TECHNICAL
INSTRUCTIONS**

CE 0120

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Noritake Super Porcelain EX-3

Tradition and Innovation in Ceramic Technology

Noritake has 100 years of successful experience in ceramic technology. It is world famous for its exquisite china. During the past few decades, it has used its expertise in applied ceramic science to become a world leader in ceramic electrical insulators and abrasive materials. In 1987, Noritake brought its knowledge and years of experience to the dental field by developing and introducing NORITAKE SUPER PORCELAIN EX-3, a complete dental porcelain system of the highest quality.



Clinical cases contributed by : Gerard. J. Chiche, DDS
Restorations fabricated by : Hitoshi Aoshima, RDT

- **Reproduction of Natural Tooth Color**
- **Outstanding Resistance to Fractures**
- **Outstanding Resistance to Greening**
- **Natural Fluorescence**
- **Exceptional Handling Characteristics**

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Distinctive Features

Natural & Beautiful



Before

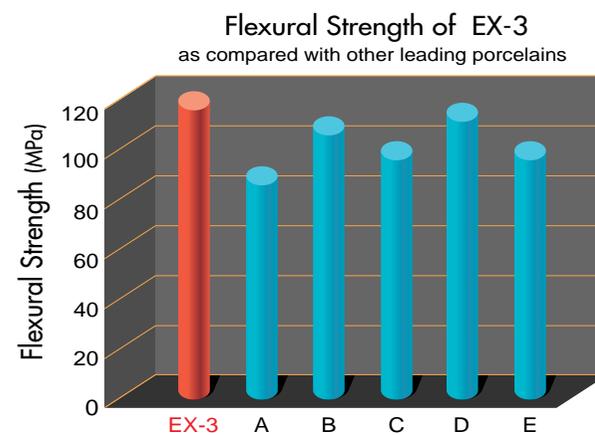


After

Laminate Veneer Restorations using EX-3 and Screening Porcelain

Mechanical Properties

EX-3 has strong mechanical property among available PFM porcelains.



Paste Opaque EX-3

- Easy to use
- Thinner coat
- Allows more space for porcelain build-up
- Complete masking of metal oxides
- Prevents blackline at margin

Thickness comparison



Powder opaque



Paste opaque of other company

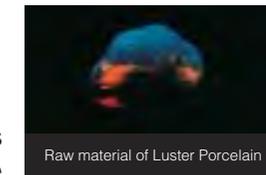


Noritake EX-3

Among the baked layer, we can find random minute holes.

Luster Porcelain

- Natural opalescence
- Fine polishable surface structure
- Less wear of the opposing tooth



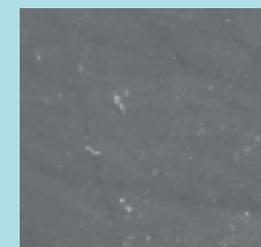
Raw material of Luster Porcelain



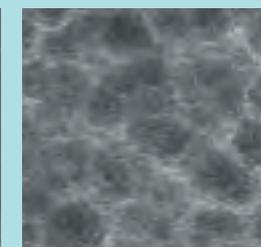
Luster Porcelain under the transmissive light

Because of the fine particle size of its composition, Luster Porcelain can achieve the selective reflection which assures the Opalescence seen in the natural teeth. Noritake Luster Porcelain exhibits minimal wear in the mouth due to the smaller and consistent particle size resulting in less wear of the opposing teeth.

Comparison with natural tooth and other low wearing porcelains



Natural tooth



Noritake Luster Porcelain



Company E



Company B

testing done after acid etching of porcelain with SEM at 3000 magnification

Internal Stain

Internal Stain was first developed by Mr.Hitoshi Aoshima.

- Easy to reproduce the characterizations of natural tooth structure
- Can see characterizations before baking
- Matched CTE for EX-3

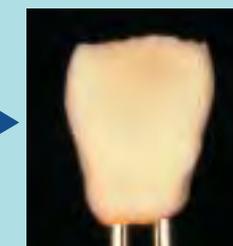
Steps for IS



Baked Body and Enamel



Apply IS as if drawing on a canvas.



After IS is baked, build-up with Translucent



Finished crown

Recreation of the natural dentition

With its outstanding resistance to greening and pinkish shade, Noritake Super Porcelain EX-3 has been proved to simulate the bluish white fluorescence of the natural dentition successfully by most analysis reports and ceramists. Furthermore, assured by the excellent chroma and brightness balance between Opaque and Body, even in the case of insufficient space of porcelain build-up, the natural simulation can be realized without the permeation of Opaque shades.



Noritake Shade Guide

Noritake Shade Guide is developed utilizing Noritake shade concept that is less greenish color and more pinkish color. It is composed of four basic shade series and two Noritake original shade series. Two series of Noritake original shade are intermediate shades (NP_{1.5}, NP_{2.5}) and bleached shades (NW₀, NW_{0.5}).

About n Color Shade

To improve the recreation of Noritake Shade, n color shade contains chroma intensified Body and Paste Opaque of the shade. With the intensified chroma, it even can be used in the case of insufficient space of porcelain build-up.



Basic Technique

Metal Framework Preparation



Preparation Form of Abutment Tooth

Please make sure to keep an appropriate space for the incisal edge, the labial side and the lingual side in abutment tooth. Confirm the preparation form of abutment tooth. Wax the metal framework from for build-up of porcelain.



Metal framework adjustment

After the necessary adjustment of the metal framework, proceed a smooth surface treatment in order to keep the porcelain application in the same thickness. The appropriate thickness is 0.3mm for precious alloys and 0.2mm for Ni-Cr alloys. Use an alumina point or a carbide bur for precious and semi-precious alloys; use a carborundum point for Ni-Cr alloys. To ensure a good bond between the porcelain and the alloy, sandblasting is necessary with 50 micron of aluminum oxide. For the yellow color precious alloy, use the glass beads for the sandblasting.



Degassing

Follow the instructions of the metal manufacturers for degassing after the cleaning in acetone ultrasonically. Do proceed the degassing in order to increase the bonding between the porcelain and the alloy.

Opaque Porcelain (Paste or Powder Type)

Universal Paste Opaque

How to use Universal Paste Opaque

Scoop out the desired amount and the desired shade of Universal Paste Opaque and put it on the palette. The surface of Universal Paste Opaque is covered with extra liquid in order to avoid drying. Please incline the jar and clip up from the no-liquid part.

attention Don't mix liquid with paste opaque inside the jar. Don't dispose liquid from the jar.

Wash Application

Be sure the surface of the metal framework is completely free of moisture. Using the tip of the brush, rub the surface with a small amount of Universal Paste Opaque to form a very thin layer.

attention Only dry brush should be used. DO NOT mix with even a small amount of water.

See page 40 (Baking Schedule Type C, D)

1st Application

After a thin layer is rubbed, keep coating the metal framework with Universal Paste Opaque. 80% of the metal color should be hidden. Do not need too much condensation. Bake the metal framework after making sure that no residue remains. If Universal Paste Opaque residue is found, use a dry brush to remove it from inside of the metal framework. The surface has an almost egg shell look after first baking.

attention When dilute the desired amount of Paste Opaque with UP Liquid. Be careful that over-dilute will lead to fractures after baking.



2nd Application

Apply the second layer of Universal Paste Opaque until the color of the metal framework is completely covered. Be sure that no Universal Paste Opaque residue remains inside of the metal framework.

attention When using Universal Paste Opaque on Ni-Cr alloys without beryllium and Co-Cr alloys, Clean the entire surface of the baked opaque with the running water or steam cleaner to wash out substance that may cause greening.

Universal Paste Opaque Modifier Application

Universal Paste Opaque Modifier can be mixed with Universal Paste Opaque to customize the shade or can be applied alone for minor modifications. When Modifier is used as a stain, dilute it with UP Liquid to make desired viscosity and apply during the second application.

attention Apply earth brown or reddish brown separately. If earth brown or reddish brown is mixed with other shades, the desired color can not be obtained after baking. The desired color can be changed after baking due to the storage condition. Internal Stain can be used on Paste Opaque also.

In case of using conventional Paste Opaque and POBA, please see page 40 (Baking Schedule Type A and B)

Powder Opaque

Preparation of Opaque Mixture

Pour the suitable amount of Opaque powder and mix it with Meister Liquid.

attention DO NOT mix Opaque powder with Paste Opaque. If Opaque powder has to use with Paste Opaque, only apply Opaque powder after the first Paste Opaque is baked.



Wash Bake

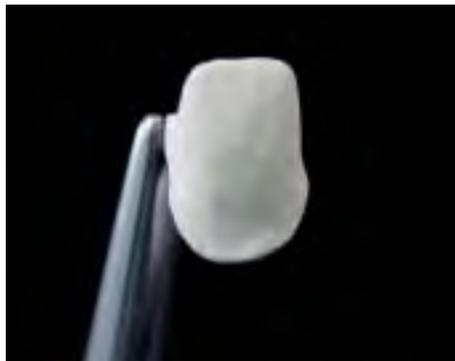
Wet the metal framework surface with a moist brush. Then apply a thin layer of Opaque to the surface with an instrument or a brush and bake it. Follow the baking schedule precisely.



See page 40 (Baking Schedule Type E)

Application of 2nd Opaque Layer

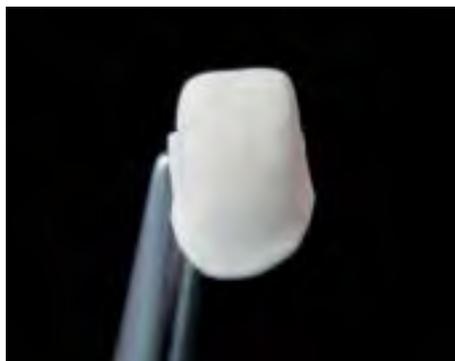
After the completion of the first Opaque layer, apply the Opaque of 0.3mm thickness to cover the metal color and bake it.



See page 40 (Baking Schedule Type F)

2nd Baking

The surface should have egg-shell gloss appearance after the second baking.



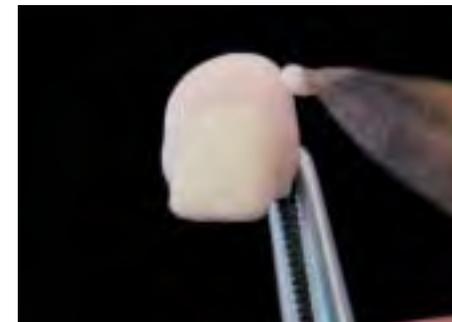
Build-up Techniques of Porcelains

Cervical Porcelain

Build-up of Cervical Porcelain

Refer to Color Combination Table to mix Body and Cervical for the desired cervical color. Apply the mixture of Body and Cervical at the gingival and the proximal regions. After adequate condensation, place the crown onto the die. If Cervical is not used, apply Body in the same manner.

See page 37, 38 (Color Combination Table)

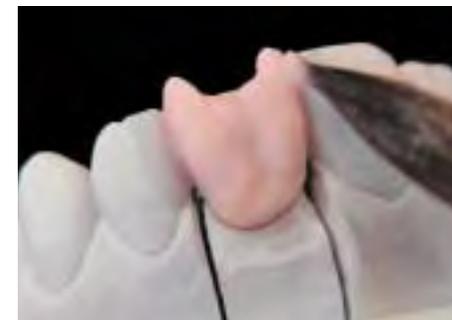


Body Porcelain

Build-up of Body Porcelain

Build up with the desired Body color. Match the dimension and form to the symmetric tooth in order to recreate the shade precisely.

Build-up of Body porcelain is accomplished. Keep a 1.5 ~2.0mm thickness on the lingual side of the incisal edge in order to make the cut-back easy.



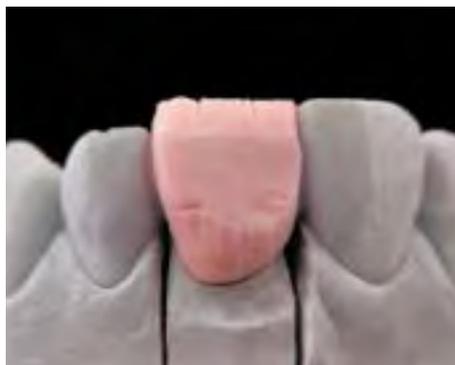
Cut-back

Cut back Body in order to make a space for building up Enamel Porcelain. First, divide the crown into three parts along the length and mark the guidelines with a knife.

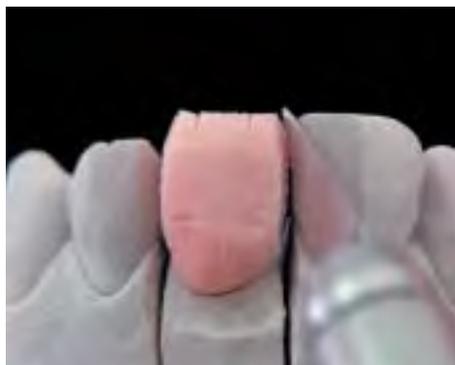




On the labial surface, cut back one-third part from incisal edge (about 1.0mm to the lingual side) and connect the guideline. Then, divide the incisal edge into three parts from the mesial side to distal side and mark the guideline.



Cut back the central one-third part about 0.3mm on the labial surface.



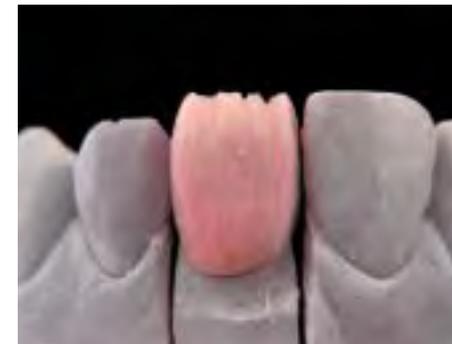
Cut-back of Proximal Surface

Cut-back the proximal area (about 0.5mm) with a cutting-knife to the lingual side.



Create the Mamelon Structure

Create the mamelon structure with reference to the three guidelines on incisal edge.



Some irregular structure can recreate natural feeling.



The Thickness Confirmation

Confirm the thickness of porcelain after the build-up of Body. The minimum thickness of Body porcelain should be at least 0.8mm.

Opacious Body, see page 21.



Enamel Porcelain

Build-up of Enamel Porcelain

Build up one-third of the cut-back incisal edge with Enamel Porcelain. Over-built-up of Enamel porcelain causes the whiter shade. Be careful of the build-up thickness.



Don't apply the Enamel porcelain to the lingual side. Smooth the lingual surface with an instrument.

Luster or Translucent Porcelain

Build-up of Luster or Translucent Porcelain

Build up Luster or translucent porcelain to cover the whole crown surface.



Luster Porcelain, see page 31.

With the consideration of shrinkage, build up the porcelain to 10% larger than that of the symmetric tooth.

The translucency degree of the translucent porcelain is as below:

$$T_x > T_0 > T_1 > T_2$$

In four translucent shades, T_x shows the highest degree of transparency, and then, T_0 , T_1 , and T_2 shows the lowest degree of transparency.

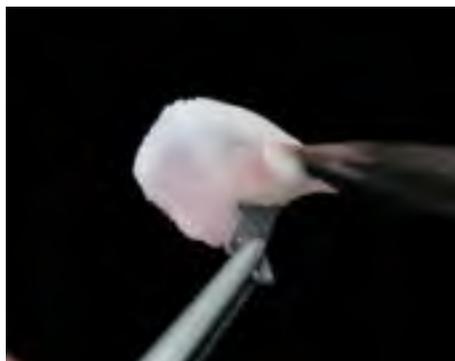


Apply the porcelain to the lingual side.



Build-up of Proximal Area

Remove the metal framework from the die and add the Translucent to the shortage part of the proximal area.



Condensation

To minimize shrinkage, hold the crown with tweezers and repeat the condensation with an instrument for 2 or 3 times.

Be careful not to do the condensation too much in order to avoid crumbling.

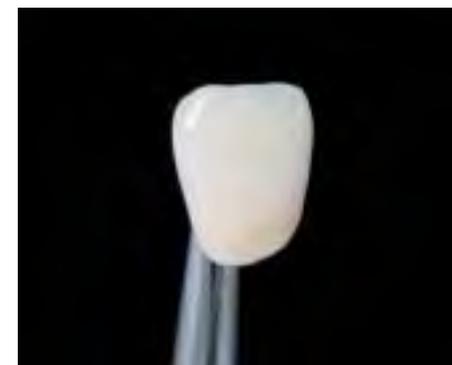


Brush off the excess porcelain with a dry brush.



Clean Up the Internal Surface

Examine the internal surface and eliminate the contamination with a dry brush.



Baking of 1st Body Porcelain

The surface should be egg-shell like appearance after the first body baking. Any shortage can be corrected by adding porcelain and baking again. In that case, the baking schedule should be as same as the first body baking. In the case of correcting the contact area with a little porcelain, the highest baking temperature should be about 10 degrees lower than the baking schedule.

See page 40 (Baking Schedule Type H, I, J)

Morphological Correction



Morphological Correction

First, start the morphological correction from the proximal area. Polish it by using the straight part of the Meister Point (DP-05), which makes it easy to modify the contact area.



Likely, create the labial groove with DP-05. Proceed it by vertical direction first, then by horizontal direction.



Use Meister Point (DP-02) to create the serration and the natural tiny grooves.



Use Detail Checker to check the surface texture and the shade in the middle of morphological correction. Glossy surface can be appeared by applying Detail checker thinly on the surface.



The Final Polish with Meister Cones

Perform the final morphological correction with the reference of the symmetric tooth. Polish the roughness specially on the proximal and margin area with Meister Cones.



Polish with Pearl Surface C and the Glazing
Polish with Pearl Surface C before glaze baking.

See page 40 (Baking Schedule Type M, N)



Polish with Pearl Surface F

Perform a fine polish with Pearl Surface F to achieve a partial gloss after self glazing in a lower temperature (30-40°C lower than the Body baking temperature).



Build-up of Add-On Porcelain

Any shortage can be corrected by adding Add-On porcelain (AD-T, AD-B) after the glazing. It can be done by baking it simultaneously with the glazing without vacuum.

See page 40 (Baking Schedule Type Q)

ADDMATE, See page 27



Completion

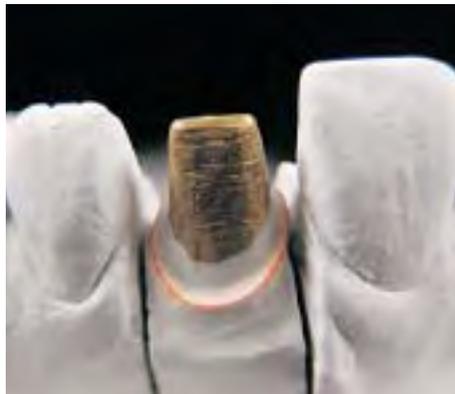
Finished crown in the mouth.

Advanced Technique

Margin Porcelain

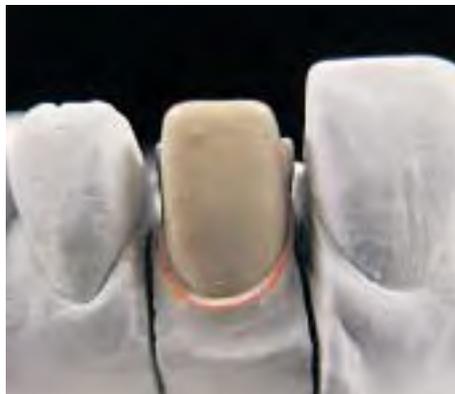
Special Features

- ① Because of its small shrinkage, the margin porcelain retains a good fitting after baking. Furthermore, it can avoid rounding off after the consecutive bakings of body porcelain.
- ② With its appropriate opacity, 13 basic shades can recreate the excellent natural chroma around the cervical area.
- ③ A new additional shade "Clear Margin" has been introduced to recreate a more vivid appearance.



Preparation Form for Porcelain Margin

In order to fabricate a porcelain margin, a shoulder or a deep chamfer is required. The common bevel chamfer preparation is too thin, which might cause the breakage and make the color simulation difficult.



Metal Framework Form

The porcelain margin of the metal framework should be made approximately half (1/2) of the width on the shoulder. Following the instruction, apply Opaque and baking.



Magic Separator Application

Apply Noritake Stone Hardener or Cyanoacrylate thinly on the margin area of the abutment tooth. Remove the excess.

Apply Magic Separator after it is dried.



Build-up of Margin Porcelain

Mix Margin Porcelain with Forming Liquid or Magic Former.

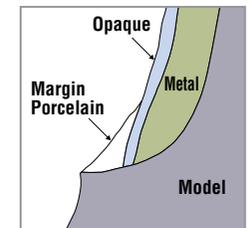
Apply the adequate amount of Margin Porcelain to the gingival part. Make sure if the inside of the metal framework is clean. Then, put the metal framework onto the abutment die.

NOTE Margin Porcelain mixed with Magic Former becomes hard after drying.



Application on the Die

Press Margin Porcelain to the cervical area with a spatula. Do not apply too much Margin Porcelain in order to avoid the opacity.



Condensation

In order to minimize the shrinkage, repeat the condensation with an instrument.



Brush off excess Margin Porcelain with a dry brush.

NOTE Please dry enough when Magic Former is used.



Removal form the Die

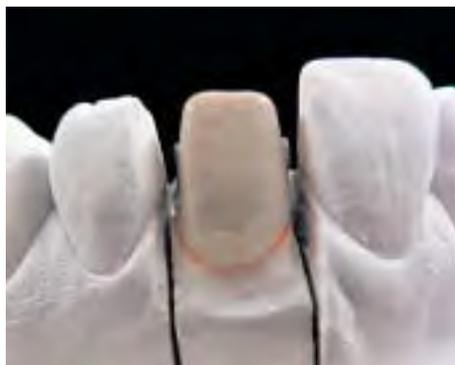
Carefully and gently twist and pull the framework upwards away from the die to remove.



Internal Examination and 1st Margin Bake

Carefully examine internal framework surface. Eliminate any excess particles using a dry porcelain brush, then fire on first Margin bake.

See page 40 (Baking Schedule Type G)



After 1st Margin Bake

Perform with additional Margin build-up if shrinkage occurs.



The 2nd Margin Application

Apply Magic Separator to the margin area of the die again and reseat the coping on the die. Next, create a slightly wetter, thinner mix of margin ceramic, apply it to the margin area and vibrate gently into the gap. Finally, brush away excess ceramic from the margins, examine the internal coping surface and bake as directed for the first margin bake.

See page 40 (Baking Schedule Type G)



The 2nd Baking

The adequate view after the second baking shows that the metal framework and the porcelain join smoothly. If necessary, use Margin Porcelain Retouching Powder (MRP) to correct the shortage of the margin area after glazing.

attention MRP can't be used befor glazing because of its lower temperature.



Margin Correction with MRP

Build-up MRP

Apply a thin mixture of MRP (Margin Retouch Powder) porcelain to the marginal area of the restoration after glazing.

ADDMATE, See page 27



Remove the Excess

Re-seat the restoration on to the die, vibrate to condense the ceramic and ensure that the restoration is completely seated on the die.

Remove the excess MRP porcelain with a brush and took the crown from the die carefully. Then, bake it according to the baking schedule.

See page 40 (Baking Schedule Type P)



Morphological Correction

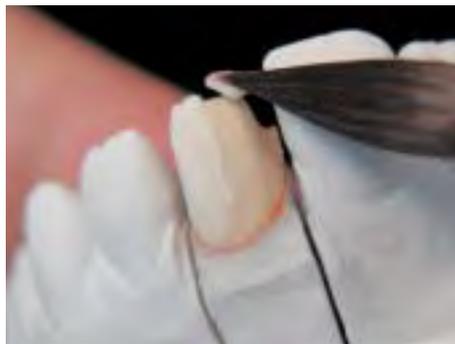
Polish the serration and roughness at the labial margin with a silicone point such as Meister Point (SF-41).

Opacious Body Porcelain

Special Features

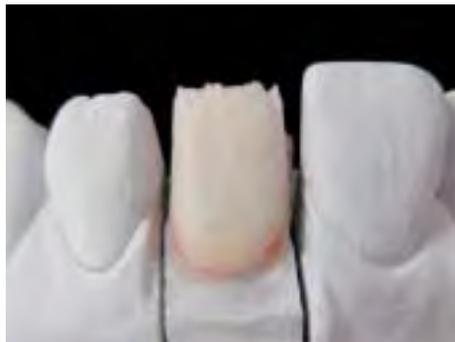
Opacious Body Porcelain is formulated with an intermediate degree of translucency between that of opaque and body porcelain. By using opacious body, the degree of translucency can be easily controlled.

- ① In the cervical areas of tooth crown where thick body porcelain becomes too translucent, by using Opacious Body in this area, the degree of translucency can be easily controlled. Some other different situations due to the different thickness area of porcelain.
- ② a. The porcelain in the bonding basal surface area is thick and has a different translucency in the abutment tooth area.
b. In the case of a bridge, the porcelain in the abutment tooth area has a different translucency and thickness.



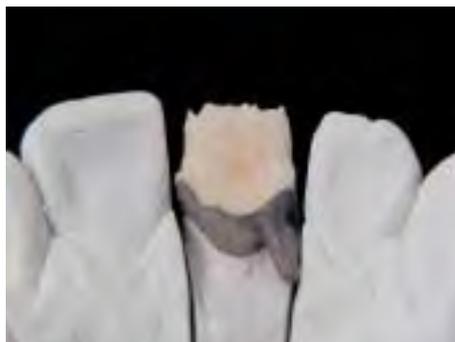
Application

Apply Opacious Body about 0.3mm thickness to the whole crown.



Labial Side

Build up the natural dentine incisal form.



Lingual Side

Clinically, it is widely used to the lingual side of anterior tooth and the occlusal surface of molar.



After Baking (Labial Side)

Bake it by following the baking schedule. Build up Body, Enamel and Translucent porcelain after baking.

See page 40 (Baking Schedule Type H, I, J)



A Case of Pontic

Compared with the translucency of abutment tooth, the porcelain on the pontic side looks very thick.



A Case of Modifying the Frame Thickness

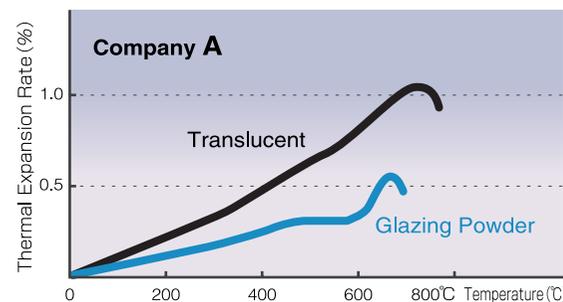
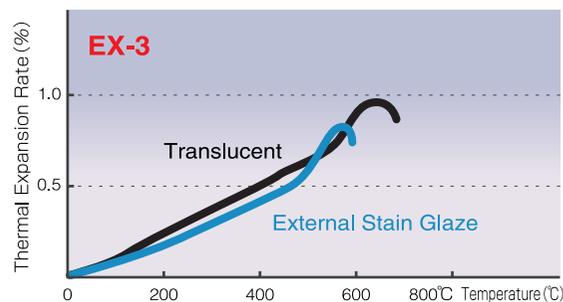
In the case of making a bridge, Opacious Body can prevent the dispersion of translucency and shade color in the incisal area.

Stain Porcelain

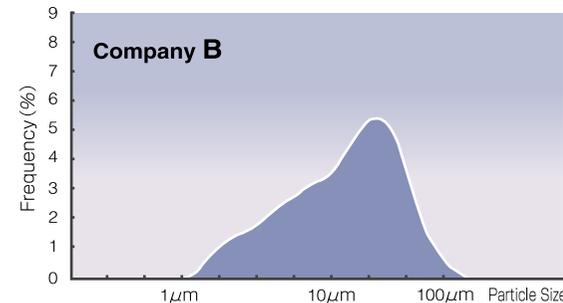
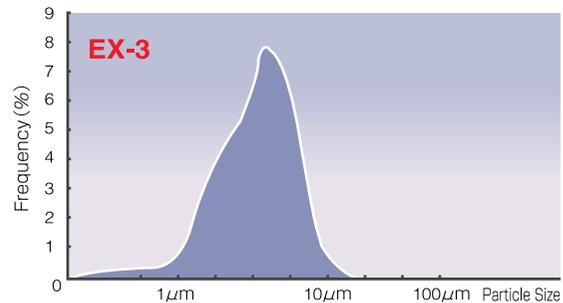
Special Features

- ① The thermal expansion coefficient (CTE) of External Stain (ES) is almost the same as that of EX-3 porcelain. Therefore, ES cannot be detached from the tooth surface by tooth brushing for a long time after its oral insertion. A wide availability of ES will enable easy characterization.
 - ② The IS has also has the same CTE as that of EX-3 porcelains. Bubbles and cracks cannot be generated by the baking of porcelain after IS application on the porcelain. It will not only produce very delicate colors but also prevent opaque color permeation by IS staining even when there is not enough space for porcelain build-up.
- Remarks** Internal Stain is made exclusively for internal staining and does not make the porcelain surface glossy by itself. External Stains are recommended for the staining on the porcelain surface.
- ③ Finer grain size due to our new technology will further improve reproduction of more natural delicate colors.
 - ④ The newly introduced A+, B+, C+ and D+ in ES and IS will intensify chroma of the build-up porcelain.
 - ⑤ ES and IS have an ideal fluorescence as EX-3 porcelain does.

Thermal Expansion Curve



Particle Size Distribution



Remarks

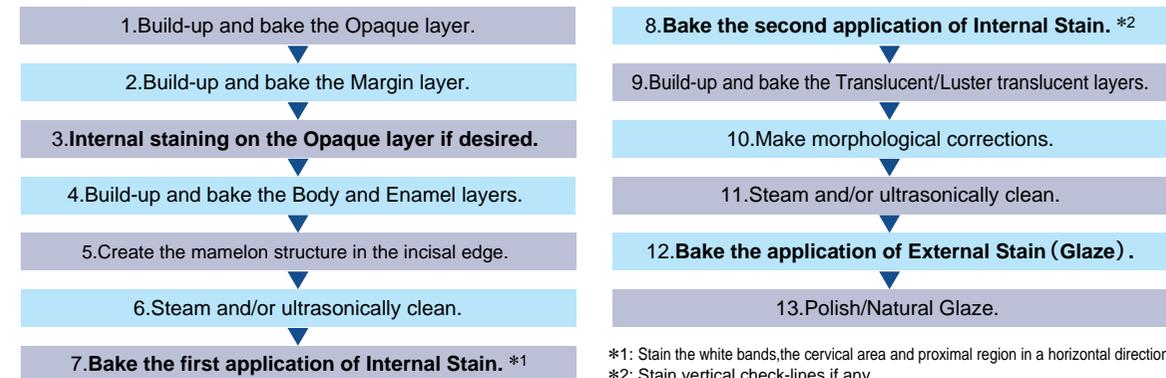
- ① Confirm if there is no dust or grease on the tooth. When applying IS after morphological correction, clean the tooth ultrasonically in acetone solution or water.
- ② There is a risk of blackening when using the stain liquids of other manufacturers. Be sure to use "Noritake IS liquid" for Internal Stain and "Noritake ES Liquid" for External Stain.
- ③ After mixing Stains with liquid on the palette, avoid letting it sit for a long time and avoid making repeated additions to the original mixture.
- ④ Using stain from which too much moisture has evaporated will result in bubbles. IS Liquid contains ingredients which may dissolve some plastics. Please handle with extreme caution in the presence of plastic materials.

Color Variation

External Stain		Internal Stain	
Pure White	—	Pure White	—
White	—	White	—
Gray	—	Gray	—
Black	—	Black	—
Blue	—	Blue	—
Incisal Blue 1	—	Incisal Blue 1	—
Incisal Blue 2	—	Incisal Blue 2	—
Green 1	—	Green 1	—
Green 2	—	Green 2	—
Yellow	—	Yellow	—
Orange 1	—	Orange 1	—
Orange 2	—	Orange 2	—
Mamelon Orange 1	—	Mamelon Orange 1	—
Mamelon Orange 2	—	Mamelon Orange 2	—
Cervical 1	—	Cervical 1	—
Cervical 2	—	Cervical 2	—
Cervical 3	—	Cervical 3	—
Earth Brown *1	—	Earth Brown	—
Reddish Brown *2	—	Reddish Brown	—
Salmon Pink	—	Salmon Pink	—
Pink	—	Pink	—
Red	—	Red	—
A+	—	A+	—
B+	—	B+	—
C+	—	C+	—
D+	—	D+	—
Fluoro	—	Fluoro	Clear

*1: ES Earth Brown is a new name for former Brown 3. *2: ES Reddish Brown is a new name for former Brown 4.

Operation Procedure



*1: Stain the white bands, the cervical area and proximal region in a horizontal direction.
*2: Stain vertical check-lines if any.

External Stain



Chroma Intensifier (A+, B+, C+, D+)

If more chroma is needed after morphological correction, intensify chroma using External Stain A+ in order to match the exact shade of A3.



After steaming or ultrasonically cleaning, apply Noritake ES liquid first. Then, apply ES A+ on the tooth.



In order to match the shade exactly, apply ES A+ comparing shade with Noritake Shade Guide.

IS Fluoro*



IS Fluoro, is the clear Internal Stain to increase the fluorescence. Not only applying it after baking of Body and Enamel porcelains, but also applying to surface of zirconia coping for PFZ (porcelain fused to zirconia) and to surface of opaque for PFM (porcelain fused to metal) .

None of porcelain on the Zirconia Framework (right)
IS Fluoro on the Zirconia Framework (center)
Vertical section of the natural tooth (left)

*Nor available in Cerabien

Internal Stain



Internal Staining on Opaque/OB/Margin

Application of IS directly on cervical, incisal or occlusion area of Opaque/OB/Margin is very useful for producing natural color in less porcelain space area.



Surface Treatment of Body and Enamel

After baking Body and Enamel, make the mamelon structure and internal shape with discs or points where necessary. After shape correction, clean the surface with aluminum oxide sandblast (0.3MPa), ultrasonically or steam clean.



1st Application and Baking of IS

Wet the surface with IS Liquid before application of IS. First application of IS should be in a horizontal direction. In this case, apply the mixture of Incisal blue 2 and Bright (Dilution) on the mesial and distal angle. The ratio is 1:1. And apply A+ on cervical and central area of lingual side. After finish of first IS application, bake it according to baking schedule.



2nd Application and Baking of IS

Apply second IS in a vertical direction. In this case, apply the mixture of Mamelon Orange 2 and White to create enamel crack. The ratio is 2:1. In order to model the crack, apply Incisal Blue 2 very slightly beside the crack. After baking IS, it looks whitish. When confirming the actual characterizations after IS baking, wet the surface with Noritake Detail Checker or IS Liquid.



Completion

After baking Translucent or Luster Porcelain, make morphological correction. The characterizations of natural tooth structure is reproduced very easily.

Super Porcelain ADDMATE

Special Features

ADDMATE is a correction porcelain which can be used with any porcelain fused to metal (PFM) with a thermal expansion coefficient range of $12.0\sim 13.0\times 10^{-6}/^{\circ}\text{C}$, except porcelain fused to titanium (PFT). ADDMATE makes even the most difficult porcelain corrections possible, such as post-solder corrections, fine morphological adjustments after glazing and the correction of air bubbles.

Applications and usage of ADDMATE

Post-glazing Morphological Retouching and Correction	Build-up ADDMATE on contacts and areas of insufficient porcelain. Then, bake it. Note For large area correction or retouching which needs large amounts of porcelain, it is preferable to use regular Noritake Super Porcelain EX-3.
Correction of Areas Contaminated by Dust Particles	Remove dust particles lodged in the porcelain, often appearing as black spots, with a carbide bur. Clean the contaminated area by alumina sandblasting at 0.15MPa. After steaming or ultrasonic cleansing, build-up ADDMATE in a shade compatible to the area of correction. Then, bake it.
Correction of Bubbles	<p>a. Correction of pinholes. Pinholes are pinpoint air bubbles that emanate from within the porcelain to the surface. The correction is made by using a tapered instrument to apply ADDMATE into the pinhole. Do not expand the size of the pinhole. Build up with slightly excessive ADDMATE in consideration of shrinkage then bake it. Grind away excess porcelain with a silicone point and polish it.</p> <p>b. Correction of swollen air bubbles. (1) Grind away the swollen air bubble and surrounding porcelain with a carborundum point or carbide bur, widening the pit. To make the correction look natural, we recommend that the pit be ground vertically when the pit is near the incisal 1/3, and in the mesiodistal direction when the pit is near the cervical 1/3. (2) Sandblast the metal at the bottom of the pit by alumina sandblasting at 0.15MPa. (3) Build-up ADDMATE opaque to the same thickness as the surrounding opaque. Avoid excess build-up of opaque as shrinkage is minimal. Using a brush, thoroughly remove all excess ADDMATE opaque adhering to the body porcelain layer. (Excess opaque adhering to the body porcelain layer will cause a boundary line after baking.) (4) Before the opaque dries, build-up ADDMATE in a shade compatible with the body porcelain. Build-up ADDMATE slightly excess to allow for shrinkage after baking. (5) After baking, grind away excess porcelain and finish.</p>
Correction of Cracks	<p>Note When cracks are caused by the incompatibility of thermal expansion coefficients between the porcelain and the metal, corrections are not possible.</p> <p>a. Mix ADDMATE with slightly more ADDMATE forming liquid than usual. Apply a single layer to the area of the crack. b. Apply vibration using an ultrasonic condenser or a similar tool. c. Bake at a temperature 40°C (72°F) lower than the normal glazing temperature of your PFM. For example, if your normal glazing temperature is 920°C ($1,688^{\circ}\text{F}$), bake at 880°C ($1,616^{\circ}\text{F}$). (For post-solder corrections, stabilize it with soldering investment.)</p>
Correction of Porcelain Detached from Metal	<p>a. Grind away porcelain in a gradient in order to facilitate additional build-up. b. Alumina sandblast the exposed metal area at 0.15MPa. c. As per "Baking Schedule TYPE Wash bake of opaque (see next page)", apply opaque wash bake in one thin layer and bake it. d. Build-up ADDMATE opaque in the same thickness as the surrounding opaque. e. Before the opaque dries, build-up ADDMATE (in excess to allow for shrinkage) in a shade compatible with the body porcelain. f. After baking, grind away excess and polish to desired finish. (For post-solder corrections, stabilize with soldering investment.)</p>
Correction of Margin Porcelain	<p>a. Apply Noritake's ADDMATE Separator to the working model and fit the PFM to be corrected onto the model. b. Mix ADDMATE body and opaque at a ratio of 10 to 1 and build-up on the chipped area or portion of the margin which needs correction. c. Carefully remove the PFM from the working model and bake it at a relatively low temperature, to avoid glossiness or rounding of edges. Polish to desired finish.</p>
Fine Correction of Porcelain Laminate Veneer (PLV) after Removal from the Refractory Model	<p>a. Apply Noritake's Magic Separator to the master model. b. After fitting PLV to the master model, build-up ADDMATE to the deficient area. c. Remove PLV from the master model. Bake at a relatively low temperature on a porcelain mat, to avoid glossiness or rounding of edges. Polish to desired finish.</p>

Baking Schedule

STEP TYPE	DRY-OUT TIME	LOW TEMP.	HEAT RATE	HIGH TEMP.	VACUUM	RELEASE VACUUM	HOLD TIME
Wash bake of opaque	5min.	450°C 842°F	45°C/min. 81°F/min.	700°C 1,292°F	96kPa	700°C 1,292°F	1min. UNDER VACUUM
Correction after post-soldering	5min.	450°C 842°F	40°C/min. 72°F/min.	660°C 1,220°F	96kPa	660°C 1,220°F	1-2min. UNDER VACUUM
Correction on margin or PLV	5min.	450°C 842°F	45°C/min. 81°F/min.	680°C 1,256°F	96kPa	670°C 1,238°F	0
In case of self-glaze	5min.	450°C 842°F	40°C/min. 81°F/min.	700°C 1,292°F	96kPa	690°C 1,274°F	0

Note The above is only a guideline. Different porcelain furnaces may necessitate adjustments to recommended temperatures. 96kPa=72cmHg

Color Table

Use the table below as a guide for achieving desired shades when using ADDMATE.

OPAQUE	CORRESPONDING SHADES	BODY	CORRESPONDING SHADES
Light Opaque	A1O, A2O, A3O, B2O	Light Body	A1B, A2B, A3B, B2B
Dark Opaque	A3.5O, B3O, B4O	Dark Body	A3.5B, A4B, B3B, B4B

For shades other than those listed above, use one of the following ADDMATE shades.

E	For all enamel shades
T	For all translucent shades
LT	For Luster Porcelain translucent shades

Precautions when using ADDMATE

- ADDMATE is a low temperature fusing porcelain. The following precautions must be followed in order to avoid imperfections such as blackening or whitening of the porcelain.
 - Use only ADDMATE forming liquid when mixing.
 - Use only Noritake Magic Separator when separating PFM from the gypsum die.
 - If tissue paper fiber mixes with the porcelain slurry during water absorption of the condense procedure, the fiber will not completely burn off. After drying, check to make sure that no residual tissue fiber remains.
 - Always use freshly mixed porcelains.
- Periodically fire your porcelain furnace, while empty, at around $1,000^{\circ}\text{C}$ ($1,832^{\circ}\text{F}$) to keep the interior clean.
- Temperature variations of the porcelain furnace may be significant at lower ranges. Determine the exact baking program by test before actual baking.
- To prevent deforming of the solder area when using soldering material of a low fusing temperature, first stabilize by using soldering investment. Avoid contact with porcelain. Then, proceed to correction baking.
- When making corrections to areas near the solder, thoroughly remove flux, etc.
- Do not build-up and fire ADDMATE on top of soldering material. Cracks may result.
- After firing ADDMATE, do not subsequently bake any higher temperature porcelains such as Super Porcelain EX-3.
- After use, tightly close ADDMATE jars and store.
- Always use appropriate protection to avoid inhalation of porcelain dust.
- Always use protective eye goggles when grinding or polishing porcelain.

Tissue Porcelain



Noritake has line-uped 7 tissue colors in each category, EX-3 and EX-3 PRESS LF for PFM (porcelain fused to metal), CZR and CZR PRESS LF for PFZ (porcelain fused to Zirconia).

Noritake
Hiro Tokutomi

Line-up of Tissue Colors

These line-up tissue colors can reproduce lifelike gingival colors of crowns, bridges and implant-restorations.



The Example of Build-up

Tooth area : CZR Gingival area : CZR PRESS LF



1 To increase the bonding strength between zirconia framework and porcelain, apply a very thin layer of Tissue 4 as wash-bake.



2 Apply Tissue 4 (Low translucency and High value) to adjust translucency in the basal area of framework.



3 Apply Tissue 7 in the margin area of framework, to create strong reddish gingival color.

*SS Modifier (CZR), Opaque Modifier : (EX-3) and Internal Stain can be used for adjusting gingival color.



4 After baking.



5 Apply Tissue 6 to create bright gingival color in the cervical area.



Complication

To control Brightness, Opacity and Reddish level can reproduce lifelike gingival color.

Speed Enamel Porcelain

EX-3 Speed Enamel is a new item specially developed for 2 layers build-up technique. Comparing with the conventional enamel, Speed Enamel has a beautiful opalescent effect. The esthetic restoration can be obtained easily with a simple application method. It is suitable to not only esthetic work but mass-production.

Start your simple & beautiful work with Speed Enamel NOW !

Clinical Case Application



1 After Paste Opaque application and bake



2 Pick Body and Speed Enamel



3 Body Application



4 Cut-back



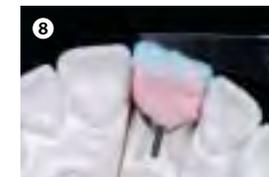
5 Mamelon Structure



6 Apply Speed Enamel on Mamelon Structure



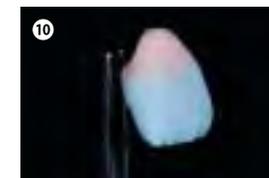
7 Apply Speed Enamel covering half of the surface



8 Cut-Back (lingual side)



9 Apply Speed Enamel on the lingual side



10 Apply Speed Enamel on the proximal area



11 After bake and morphological correction



12 Finish

Luster and CCV (Clear Cervical) Porcelain

Special Features

- ① Luster Porcelain reproduces the fine surface structure and luster of natural tooth.
- ② A unique combination of fine surface particles produces a selective reflection of light which results in the same opalescence seen in natural teeth.
- ③ Luster Porcelain has translucent, bright, vivid colors, therefore, darkening at the incisal edge or at the occlusal surface will not occur.
- ④ Color changes in natural teeth caused by aging have been thoroughly studied. Luster Porcelain features a complete line of colors consistent with these changes.

Luster / Shades and Applications

LT ₀ (Luster T ₀)	Use mainly for a highly translucent incisal edge and for the simulation of highly translucent enamel, likely to be seen through the dentin.
LT ₁ (Luster T ₁)	Effective for achieving the brightness of natural tooth enamel.
TBlue (Translucent Blue)	Use mainly at the incisal edge of juvenile's restoration to reproduce a pale blue and youthful translucency.
Aqua Blue 1**	More bluish than LT TBlue. Mixing with other Luster or Tx is recommended.
Aqua Blue 2**	More bluish than LT TBlue and a little grayish, i.e. softer, than Aqua Blue 1. Mixing with other Luster or Tx is recommended.
LT Natural	Use mainly on the incisal edge and proximal surface to reproduce a high translucency seen in the elderly.
LT Super Gray**	More gray than LT Natural. Useful for reducing value on incisal and for creating beautiful contrast effect with Translucent porcelains.
LT Yellow**	Use to reproduce a light "HALO EFFECT" to show a depth in the central occlusal surface. Apply LT Yellow on Mamelon Orange shade to avoid the permeation of Orange shade.
Incisal Aureola	Use to reproduce the "HALO EFFECT" caused by the full reflection of light at the incisal edge.
Sun Bright	Use to reproduce the orange enamel like color at the incisal edge seen in the middle-age and elderly. Also, to reproduce a crown with a deep orange or amber enamel-like color.
Creamy Enamel	Use mainly at the cusp of molars, and occasionally for the area from the distal and proximal surfaces adjoining the incisal edge of the front teeth through the area surrounding the angle of the incisal edge.
Creamy White	Use to achieve a dense, milky color. Also, to be mixed and used in combination with other LP shades.

attention When Luster Porcelain should not be used

- ① When the distance between the tip of a metal frame and the incisal edge of the porcelain is too short.
 - ② When porcelain does not fully cover the molar occlusal surface.
 - ③ When the thickness of the porcelain is extremely thin and, therefore, the opaque reflection rate is high.
- For the above cases, the usual enamel and translucent porcelain should be used to produce a more natural appearance.

CCV (Clear Cervical) / Shades and Applications

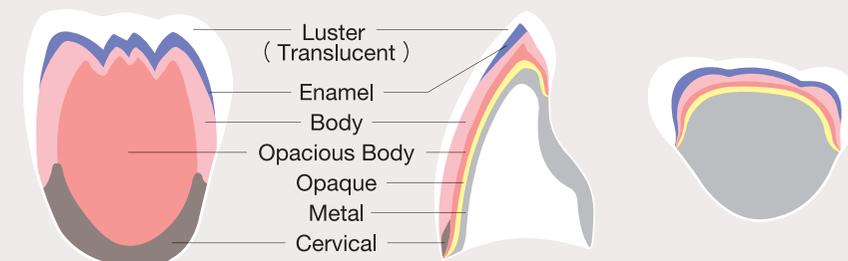
To create depth of color, without changing chroma

CCV-1**	For bright shades like shades A ₁ to A ₃	CCV-2**	For dark shades like A _{3.5} to A ₄
CCV-3**	For reproducing surfaces exposed by receding gums	CCV-4**	① Same as CCV-3, but with a more reddish hue ② For anterior lingual fossae

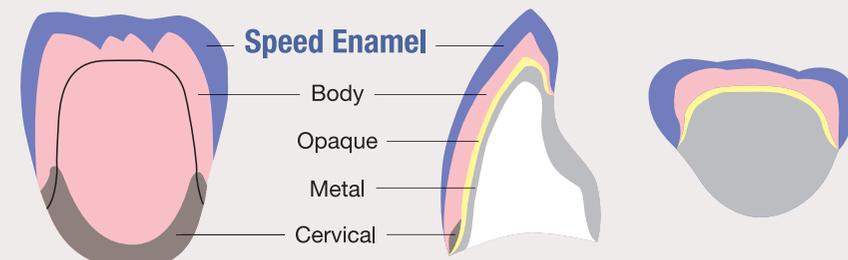
**Not available in Cerabien and Ti-22

Layering Sketch

3 BASIC LAYER BUILD-UP



2 LAYER BUILD-UP with SPEED ENAMEL



Clinical Cases

case A

Kurt R. Schneider, DDS
Naoki Hayashi, RDT



before



after

case B

Alan Sulikowski, DDS
Aki Yoshida, RDT



before



after

case C

Yasukazu Miyamoto, DDS
Kazunobu Yamada, RDT



before



after

case D

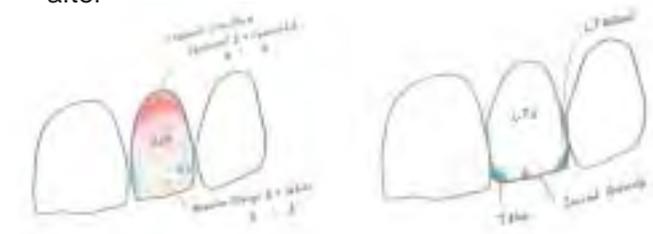
Gerard J. Chiche, DDS
Hitoshi Aoshima, RDT



before



after



case E

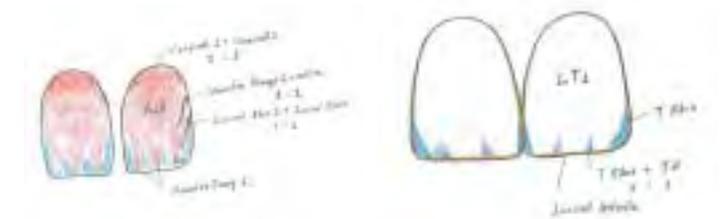
Gerard J. Chiche, DDS
Hitoshi Aoshima, RDT



before



after



EX-3 Line-Ups

Paste Opaque	6g	POA1/POnA1	POA2/POnA2	POA3/POnA3	POA3.5/POnA3.5	POA4/POnA4	POB1/POnB1	POB2/POnB2	POB3/POnB3	POB4/POnB4	POC1/POnC1	POC2/POnC2	POC3/POnC3	POC4/POnC4	POD2/POnD2	POD3/POnD3
Paste Opaque Modifier	3g	POD4/POnD4	PONP1.5	PONP2.5	PONW0	PONW0.5	POEW0	POEW	POBA							
Universal Paste Opaque	6g	UPnA1	UPnA2	UPnA3	UPnA3.5	UPnA4	UPnB1	UPnB2	UPnB3	UPnB4	UPnC1	UPnC2	UPnC3	UPnC4	UPnD2	UPnD3
Universal Paste Opaque Modifier	3g	UPnD4	UPNP1.5	UPNP2.5	UPNW0	UPNW0.5	UPEW0	UPEW								
Powder Opaque	10,50,200g	A1O/nA1O	A2O/nA2O	A3O/nA3O	A3.5O/nA3.5O	A4O/nA4O	B1O/nB1O	B2O/nB2O	B3O/nB3O	B4O/nB4O	C1O/nC1O	C2O/nC2O	C3O/nC3O	C4O/nC4O	D2O/nD2O	D3O/nD3O
Powder Opaque Modifier	10,50g	D4O/nD4O	NP1.5O	NP2.5O	NW0O	NW0.5O	EW0O	EWO								
OM Gray																
Body	10,50,200g	OM Orange	OM Pink													
Enamel	10,50,200g	A1B/nA1B	A2B/nA2B	A3B/nA3B	A3.5B/nA3.5B	A4B/nA4B	B1B/nB1B	B2B/nB2B	B3B/nB3B	B4B/nB4B	C1B/nC1B	C2B/nC2B	C3B/nC3B	C4B/nC4B	D2B/nD2B	D3B/nD3B
Speed Enamel	10,50,200g	D4B/nD4B	NP1.5B	NP2.5B	NW0B	NW0.5B	EW00B	EW0B	EWB	EWYB						
Margin	10,50g	E1	E2	E3	Silky E1	Silky E2										
Margin Modifier	10,50g	S1	S2	S3	S4											
Margin Retouching	10,50g	MA1	MA2	MA3	MA3.5	MA4	MB1	MB2	MB3	MB4	MC2	MC4	MD3	MD4	MNP1.5	MNP2.5
Margin Dilution	10,50g	MNW0	MNW0.5													
Opacious Body	10,50,200g	M Clear	M Peach	M Orange												
Cervical	10,50,200g	MRP														
Mamelon	10,50g	MDL														
Translucent	10,50,200g	OBA1	OBA2	OBA3	OBA3.5	OBA4	OBB1	OBB2	OBB3	OBB4	OBC1	OBC2	OBC3	OBC4	OBD2	OBD3
Luster	10,50,200g	OBD4	OBNP1.5	OBNP2.5	OB Enamel	OB White	OB Orange	OB Pale Pink								
Clear Cervical	10,50,200g	CV-1	CV-2	CV-3	CV-4											
Modifier	10,50g	Mamelon 1	Mamelon 2													
Tissue	10,50g	Tx	To	T1	T2											
Add-on	10,50g	LT0	LT1	T Blue	Aqua Blue 1	Aqua Blue 2	Creamy Enamel	Sun Bright	Incisal Aureola	Creamy White	LT Natural	LT Super Gray	LT Yellow	ELT1	ELT2	ELT3
External Stain	3g	CCV-1	CCV-2	CCV-3	CCV-4											
Internal Stain	3g	White	Gray	Blue	Green	Yellow	Light Orange	Orange	Brown	Pink	Dark Pink	Coral Pink				
Addmate	10g	Tissue 1	Tissue 2	Tissue 3	Tissue 4	Tissue 5	Tissue 6	Tissue 7								
	10,30g	AD-T	AD-B													
	3g	Gray	Black	Blue	Green 1	Green 2	Yellow	Orange 1	Orange 2	Cervical 1	Cervical 2	Cervical 3	Earth Brown	Reddish Brown	Pure White	Pink
	10,30g	Salmon Pink	Red	A+	B+	C+	D+									
	3g	Glaze														
	3g	Incisal Blue 1	Incisal Blue 2	Mamelon Orange 1	Mamelon Orange 2	Reddish Brown	Earth Brown	Cervical 1	Cervical 2	Cervical 3	White	Red	Salmon Pink	A+	B+	C+
	3g	D+	Bright	Fluoro	Gray											
	10g	Light Opaque	Dark Opaque	Light Body	Dark Body	Enamel	Translucent	Luster Translucent								

Color Combination Table

	A ₁		A ₂		A ₃		A _{3.5}		A ₄		B ₁		B ₂		B ₃		B ₄		C ₁		C ₂		C ₃		C ₄	
Paste Opaque	POA ₁	POnA ₁	POA ₂	POnA ₂	POA ₃	POnA ₃	POA _{3.5}	POnA _{3.5}	POA ₄	POnA ₄	POB ₁	POnB ₁	POB ₂	POnB ₂	POB ₃	POnB ₃	POB ₄	POnB ₄	POC ₁	POnC ₁	POC ₂	POnC ₂	POC ₃	POnC ₃	POC ₄	POnC ₄
Universal Paste Opaque	UPnA ₁		UPnA ₂		UPnA ₃		UPnA _{3.5}		UPnA ₄		UPnB ₁		UPnB ₂		UPnB ₃		UPnB ₄		UPnC ₁		UPnC ₂		UPnC ₃		UPnC ₄	
Powder Opaque	A ₁ O	nA ₁ O	A ₂ O	nA ₂ O	A ₃ O	nA ₃ O	A _{3.5} O	nA _{3.5} O	A ₄ O	nA ₄ O	B ₁ O	nB ₁ O	B ₂ O	nB ₂ O	B ₃ O	nB ₃ O	B ₄ O	nB ₄ O	C ₁ O	nC ₁ O	C ₂ O	nC ₂ O	C ₃ O	nC ₃ O	C ₄ O	nC ₄ O
Margin	MA ₁		MA ₂		MA ₃		MA _{3.5}		MA ₄		MB ₁		MB ₂		MB ₃		MB ₄		MC ₂ +MDL (1+1)		MC ₂		MC ₄ +MDL (1+1)		MC ₄	
Opacious Body	OBA ₁		OBA ₂		OBA ₃		OBA _{3.5}		OBA ₄		OBB ₁		OBB ₂		OBB ₃		OBB ₄		OBC ₁		OBC ₂		OBC ₃		OBC ₄	
Body	A ₁ B	nA ₁ B	A ₂ B	nA ₂ B	A ₃ B	nA ₃ B	A _{3.5} B	nA _{3.5} B	A ₄ B	nA ₄ B	B ₁ B	nB ₁ B	B ₂ B	nB ₂ B	B ₃ B	nB ₃ B	B ₄ B	nB ₄ B	C ₁ B	nC ₁ B	C ₂ B	nC ₂ B	C ₃ B	nC ₃ B	C ₄ B	nC ₄ B
Cervical	—		A ₂ B+CV-1 (2+1)		A ₃ B+CV-1 (1+1)		A _{3.5} B+CV-1 (1+1)		CV-1		—		B ₂ B+CV-2 (2+1)		B ₃ B+CV-2 (1+1)		CV-2		—		C ₂ B+CV-3 (2+1)		C ₃ B+CV-3 (1+1)		CV-3	
Enamel	E ₂		E ₂		E ₃		E ₃		E ₃		E ₁		E ₂		E ₃		E ₃		E ₂		E ₃		E ₃		E ₃	
Speed Enamel	S ₂		S ₃		S ₃		S ₃		S ₄		S ₁		S ₃		S ₃		S ₄		S ₃		S ₃		S ₃		S ₄	
Luster (Translucent)	LT ₁ (T ₁)										LT ₁ (T ₁)						LT ₁ (T ₁)									

	D ₂		D ₃		D ₄		NP _{1.5}	NP _{2.5}	NW ₀	NW _{0.5}	EW ₀₀	EW ₀	EW	EWY
Paste Opaque	POD ₂	POnD ₂	POD ₃	POnD ₃	POD ₄	POnD ₄	PONP _{1.5}	PONP _{2.5}	PONW ₀	PONW _{0.5}	POEW ₀	POEW ₀	POEW	POEW
Universal Paste Opaque	UPnD ₂		UPnD ₃		UPnD ₄		UPNP _{1.5}	UPNP _{2.5}	UPNW ₀	UPNW _{0.5}	UPEW ₀	UPEW ₀	UPEW	UPEW
Powder Opaque	D ₂ O	nD ₂ O	D ₃ O	nD ₃ O	D ₄ O	nD ₄ O	NP _{1.5} O	NP _{2.5} O	NW ₀ O	NW _{0.5} O	EW ₀ O	EW ₀ O	EWO	EWO
Margin	MD ₃ +MDL (1+1)		MD ₃		MD ₄		MNP _{1.5}	MNP _{2.5}	MNW ₀	MNW _{0.5}	MDL	MDL	MNW ₀ +MDL (1+1)	MNW ₀ +MDL (2+1)
Opacious Body	OBD ₂		OBD ₃		OBD ₄		OBNP _{1.5}	OBNP _{2.5}	—	—	—	—	—	—
Body	D ₂ B	nD ₂ B	D ₃ B	nD ₃ B	D ₄ B	nD ₄ B	NP _{1.5} B	NP _{2.5} B	NW ₀ B	NW _{0.5} B	EW ₀₀ B	EW ₀ B	EWB	EWYB
Cervical	D ₂ B+CV-4 (2+1)		D ₃ B+CV-4 (1+1)		CV-4		—	NP _{2.5} B+CV-1 (2+1)	—	—	—	—	—	—
Enamel	E ₂		E ₃		E ₃		E ₂	E ₂	Silky E ₂	Silky E ₂	Silky E ₁	Silky E ₁	Silky E ₂	Silky E ₂
Speed Enamel	S ₃		S ₃		S ₄		S ₂	S ₃	S ₁	S ₁	Silky E ₁	Silky E ₁	Silky E ₂	Silky E ₂
Luster (Translucent)	LT ₁ (T ₁)						LT ₁ (T ₁)		LT ₁ (T ₁)		ELT ₂		ELT ₁	

Color Combination Table of Noritake Value Shade

Converting VITA® 3D-Master® Shades to Noritake Value Shades

VITA® 3D-Master® Shade	Noritake Value Shade	Opaque (Universal Paste Opaque / Paste Opaque)	Margin	Body	Opacious Body	Enamel	Translucent / Luster
0M1	—	UPNW ₀ / PONW ₀	MNW ₀	NW ₀ B	—	Silky E ₂	T ₁ / LT ₁
0M2	—	UPNW ₀ / PONW ₀	MNW _{0.5}	NW _{0.5} B	—	Silky E ₂	T ₁ / LT ₁
0M3	—	UPNW _{0.5} / PONW _{0.5}	MNW _{0.5}	NW _{0.5} B	—	Silky E ₂	T ₁ / LT ₁
1M1	NV1110	UPNW _{0.5} / PONW _{0.5}	MA ₁	1110B	OB1110	E ₁	T ₁ / LT ₁
1M2	NV1120	UPnB ₁ / POnB ₁	MA ₁	1120B	OB1120	E ₁	T ₁ / LT ₁
2L1.5	NV2015	UPnB ₂ / POnB ₂	MB ₂	2015B	OB2015	E ₁	T ₁ / LT ₁
2L2.5	NV2025	UPnB ₂ / POnB ₂	MB ₂ +MD ₄ ^{*1}	2025B	OB2025	E ₁	T ₁ / LT ₁
2M1	NV2110	UPnB ₁ / POnB ₁	MC ₁	2110B	OB2110	E ₁	T ₁ / LT ₁
2M2	NV2120	UPnB ₂ / POnB ₂	MB ₂	2120B	OB2120	E ₁	T ₁ / LT ₁
2M3	NV2130	UPnB ₂ / POnB ₂	MB ₃	2130B	OB2130	E ₁	T ₁ / LT ₁
2R1.5	NV2215	UPnA ₁ / POnA ₁	MA ₂	2215B	OB2215	E ₁	T ₁ / LT ₁
2R2.5	NV2225	UPnA ₂ / POnA ₂	MA ₂	2225B	OB2225	E ₁	T ₁ / LT ₁
3L1.5	NV3015	UPnC ₂ / POnC ₂	MC ₂	3015B	OB3015	E ₂	T ₁ / LT ₁
3L2.5	NV3025	UPnB ₃ / POnB ₃	MB ₃ +MD ₄ ^{*1}	3025B	OB3025	E ₂	T ₁ / LT ₁
3M1	NV3110	UPnC ₁ / POnC ₁	MC ₂	3110B	OB3110	E ₂	T ₁ / LT ₁
3M2	NV3120	UPnB ₃ / POnB ₃	MB ₃	3120B	OB3120	E ₂	T ₁ / LT ₁
3M3	NV3130	UPnB ₃ / POnB ₃	MB ₄	3130B	OB3130	E ₂	T ₁ / LT ₁
3R1.5	NV3215	UPnD ₃ / POnD ₃	MA ₃ +MC ₂ ^{*1}	3215B	OB3215	E ₂	T ₁ / LT ₁
3R2.5	NV3225	UPnA ₃ / POnA ₃	MA ₃ +MC ₂ ^{*1}	3225B	OB3225	E ₂	T ₁ / LT ₁
4L1.5	NV4015	UPnC ₂ / POnC ₂	MA ₄ +MC ₂ ^{*1}	4015B	OB4015	E ₂	T ₁ / LT ₁
4L2.5	NV4025	UPnB ₃ / POnB ₃	MA ₄ +MB ₃ ^{*1}	4025B	OB4025	E ₂	T ₁ / LT ₁
4M1	NV4110	UPnC ₂ / POnC ₂	MC ₂	4110B	OB4110	E ₂	T ₁ / LT ₁
4M2	NV4120	UPnB ₃ / POnB ₃	MA ₄	4120B	OB4120	E ₂	T ₁ / LT ₁
4M3	NV4130	UPnB ₄ / POnB ₄	MA ₄	4130B	OB4130	E ₂	T ₁ / LT ₁
4R1.5	NV4215	UPnA ₂ / POnA ₂	MD ₃ +MC ₂ ^{*1}	4215B	OB4215	E ₂	T ₁ / LT ₁
4R2.5	NV4225	UPnB ₄ / POnB ₄	MA ₄	4225B	OB4225	E ₂	T ₁ / LT ₁
5M1	NV5110	UPnA ₄ / POnA ₄	MA ₄	5110B	OB5110	E ₂	T ₁ / LT ₁
5M2	NV5120	UPnA ₄ / POnA ₄	MA ₄	5120B	OB5120	E ₂	T ₁ / LT ₁
5M3	NV5130	UPnA ₄ / POnA ₄	MA ₄	5130B	OB5130	E ₂	T ₁ / LT ₁

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Baking Schedule

	Dry-out time	Low Temperature		Start Vacuum		Heat Rate		Vacuum Level	Release Vacuum		Hold Time	High Temperature		Cool Time
	min.	°C	°F	°C	°F	°C/min.	°F/min.	kPa ^{*1}	°C	°F	min.	°C	°F	min.
A POBA	8	500	932	500	932	65	117	96	1000	1832	1 (with vacuum)	1000	1832	0
B Paste Opaque 1 st and 2 nd	8	500	932	500	932	65	117	96	980	1796	1 (without vacuum)	980	1796	0
C Universal Paste Opaque 1 st and 2 nd (High Noble, Noble, Ni-Cr w/Be alloys)	8	400	752	400	752	65	117	96	980	1796	1 (without vacuum)	980	1796	0
D Universal Paste Opaque 1 st and 2 nd (Ni-Cr w/out Be, Co-Cr alloys)	8	400	752	400	752	65	117	96	1000	1832	1 (without vacuum)	1000	1832	0
E Powder Opaque 1 st	3	650	1202	650	1202	55	99	96	950	1742	0 ^{*4}	960	1760	0
F Powder Opaque 2 nd	5	650	1202	650	1202	55	99	96	950	1742	0 ^{*4}	960	1760	0
G Margin Porcelain 1 st and 2 nd	5	650	1202	650	1202	55	99	96	935	1715	0	945	1733	0
H Body / Enamel / S.Enamel / Translucent (1-3 units)	7	600	1112	600	1112	45	81	96	920	1688	0	930	1706	0
I Body / Enamel / S.Enamel / Translucent (4-6 units)	10	600	1112	600	1112	45	81	96	925	1696	0	935	1715	0
J Body / Enamel / S.Enamel / Translucent (Over 7 units)	15	600	1112	600	1112	45	81	96	930	1706	0	940	1724	0
K Body (Minor Adjustments)	7	600	1112	600	1112	45	81	96	910	1670	0	920	1688	0
L Internal Stain 1 st and 2 nd	3	650	1202	—	—	55	99	0	—	—	0	830 ^{*2}	1526 ^{*2}	0
M Self Glaze only	5	650	1202	—	—	50	90	0	—	—	0	930 ^{*3}	1706 ^{*3}	0
N Self Glaze with after-polishing	5	650	1202	—	—	50	90	0	—	—	0	890	1634	0
O Extenal Stain / Glaze powder	5	650	1202	—	—	50	90	0	—	—	0	910	1670	0
P MRP	5	650	1202	—	—	55	99	0	—	—	0	850	1562	0
Q Add-on	5	650	1202	—	—	55	99	0	—	—	0	880	1616	0
R Addmate (Minor adjustments)	5	450	842	450	842	45	81	96	690	1274	0	700	1292	0
S Degassing for NORI-VEST (Using a burnout furnace only)	0	300	572	—	—	30	54	0	—	—	20	1080	1976	0
T Wash bake for Refractory	10	600	1112	600	1112	45	81	96	940	1724	0	950	1742	4
U Body for Refractory	10	600	1112	600	1112	45	81	96	940	1724	0	950	1742	4
V Glaze for Refractory	10	600	1112	—	—	45	81	0	—	—	0	950	1742	4

Note The above program is only a guideline. Baking temperature may be varied with the peculiarities of different furnace.

*1 96kPa = 72cmHg (29 inchesHg) *2 This case is for 1-3 units. Set the high temperature the same as Body baking.

*3 This case is for 1-3 units. Reduce 40°C (72°F) from the high temperature of Body baking.

*4 1min. holding-time might be necessary depending on the peculiarities of different furnace.

