Wear is real, so are our solutions

Technique Guide for severe wear

Smile for the World

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'Wear' to start?

There's no strict rule for choosing direct or indirect wear treatment, but the goal is always to stay as minimally invasive as possible. Most cases start with direct restorations. However, in complex cases with severe or pathological wear, indirect materials may be required. As a continuation of the previous guide on direct techniques, this document illustrates the step-by-step workflow for indirect wear treatment.

Scan for more information!

INITIAL PHASE P2

- Clinical & functional diagnosis
- Aesthetic & functional treatment planning

TRANSITIONAL PHASE P5

- Wax-up, creation of models, keys and provisionals
- Mock-up & Mock-up guided tooth preparation
- Intermediate phase

FINAL RESTORATION P13

- Restoration manufacturing
- Cementation

PREVENTION AND MAINTENANCE

Clinical & functional diagnosis

Wear is a multi-dimension condition - it can be physiologic or pathologic, moderate or severe, localized in a single tooth, small group of teeth, or in the entire mouth, and present in countless combinations that challenges detection and treatment.

Attrition

Abrasion

Erosion

Moderate

Tooth structure loss <1/3

Severe

Tooth structure loss >1/3

When would you consider tooth wear to be severe?

1. **Extent of wear**
   Degree of tooth loss.
2. **Affected surfaces participating in occlusion**
   Occluding tooth surfaces involved in wear.
3. **Localized or generalized**
   The number of teeth affected.
4. **Patient age**
   Is tooth wear typical for patient's age?
5. **Progression**
   The rate at which tooth structure is lost over time.
6. **Etiological factors**
   Underlying causes contributing to tooth wear.

Loomans B, Opdam N, Attin T, Bartlett D, Edelhoff D, Frankenberger R, et al. ***Severe tooth wear: European consensus statement on management guidelines.*** *J Adhes Dent. 2017;19(2):111–119.*

Aesthetic-functional treatment planning

When dealing with severe tooth wear, all the factors presented on the previous page must be carefully evaluated as part of the clinical diagnostic process.

Regular check-ups to identify tooth wear etiology and severity.

Educating patients is key to stopping tooth wear from progressing.

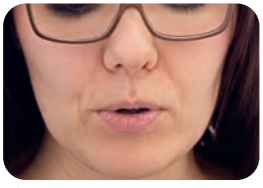
Series of casts or digital 3D scans to monitor wear progression over time.

Careful treatment planning is even more essential in severe generalized wear for the higher case complexity. It should take into account dental aesthetics, functional requirements, and biomechanical considerations of the planned restorations, while adhering to minimally invasive principles. **Vertical Dimension of Occlusion** (VDO) should be defined within the individual comfort zone, balancing function, aesthetics, and phonetics.

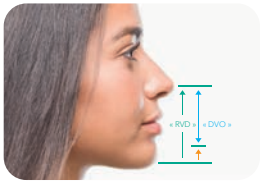
According to the literature, a permanent increase in VDO of up to 5 mm in the incisal region is generally considered safe, predictable, and well tolerated.

Facial aesthetics
What is suitable and preferred by the patient for their overall facial features.

Joint stability
Determine the centric relation via a leaf gauge.



Phonetics
The ability of the patient to clearly speak should be maintained. Test via phonetics like “S”, “M” and “F”.



Freeway space
It should be 2-4 mm between the vertical dimension of occlusion (VDO) and resting vertical dimension (RVD).

TIP!

Use Revotek LC as the material of your Lucia Jig

- Easy to shape
- Decide when you light-cure
- You can verify the occlusion several times without deformations

Cases provided by:
Dr. K. Karagiannopoulos, UK, Prof M. Peumans, Belgium, Dr. C. Moussally, France, Dr. P. Swerts, Belgium

Wax-up

A close collaboration between the dentist and the dental laboratory is essential to achieve a functional and aesthetic rehabilitation as shown in the following workflow. Wax up technique on a study model is important to evaluate the clinical case and define the most suitable treatment approach.

1

Take an impression, either conventionally or by using an intraoral scanner.

2

Transfer this impression to an articulator (digital or analogue) and checked.

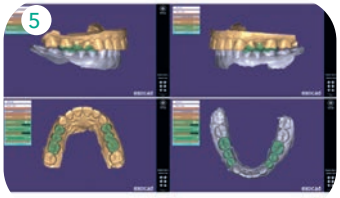
3

Plan the anterior design and evaluate the aesthetic changes.

4

Validate the increased space in VDO with the articulator system and patient in centric relation (CR).

5



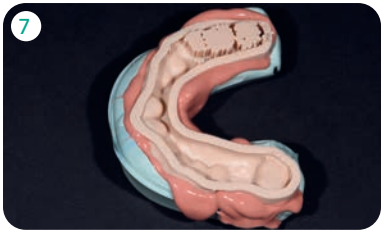
Continue with the posterior design after confirming that the increased space is feasible.

6

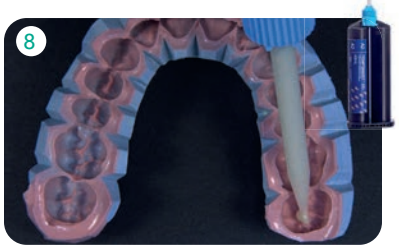
Either 3D-print or make a negative copy of your model.

Following the diagnostic wax-up in the rehabilitation of severe tooth wear, a **mock-up–guided approach** can be used to accurately translate the aesthetic and functional treatment plan into the clinical preparation. This technique allows the clinician to control the amount of tooth reduction according to the planned restorative space and occlusal scheme, thereby supporting the **minimal invasive concept** by preserving enamel and removing only the tooth structure required for the definitive restorations.

Mock-up



Take an impression of the 3D printed or the negative copy of your model prepared by your lab at step 6.



Fill up the inner part of the impression with TEMPSMART DC.

TIP!

Beginning at the deepest point of the occlusal surface in the impression and always keep the tip immersed in the material.

TIP!

Bleeding of the cartridge prior to the first use.

TIP!

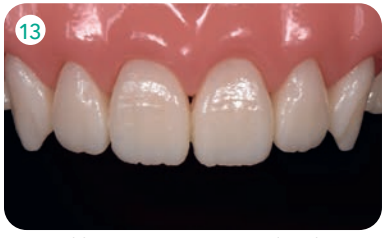
Separate a small amount of TEMPSMART DC setting outside of the impression. The sample will serve as a test piece to determine the moment of impression removal.

Place impression intra-orally within 45 sec of dispensing.
For Teflon placement, please refer to intermediate phase with TEMPSMART DC.

2-2.5 min after start of mix remove excess material and remove the impression from the mouth.

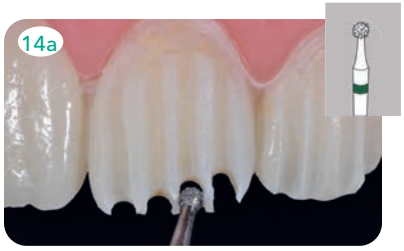
Check if there are voids or gaps before polishing. In those cases apply G-Multi PRIMER and correct those areas with G-ænial Universal Injectable.

Finish and polish surface by using your favorite composite polisher system.

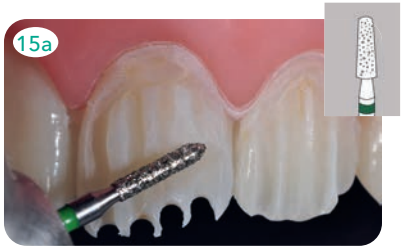


Control bite to minimise occlusal stress and load.

Mock-up guided tooth preparation - I. Veneer



Prepare the grooves on the mock-up using a coarse-grit spherical diamond bur.

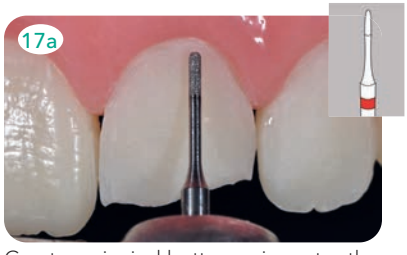


Connect the grooves using a coarse cylindrical diamond bur with the long axis of the bur perpendicular to the previously prepared.

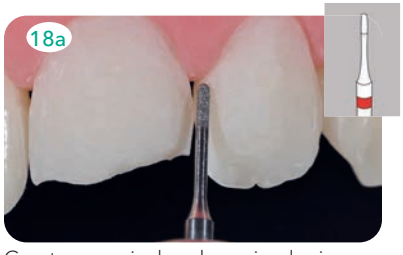
TIP!

Before starting the tooth preparation, check gingival health and clean all the teeth.

Finish this surface using a fine cylindrical diamond bur.

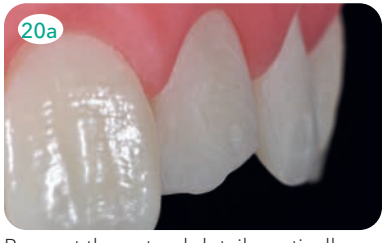


Create an incisal butt margin on tooth 21 using a fine flame-shaped diamond micro-bur.



Create a cervical and proximal micro-margin using a cylindrical diamond micro-bur with a rounded tip.

Polish proximally with diamond strip. Final visual control.

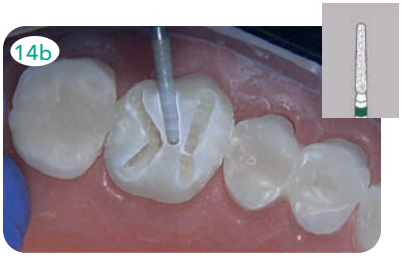


Respect the natural details vertically and transversally.

TIP!

A silicone key can be used in vertical section to evaluate the thickness of the preparation.

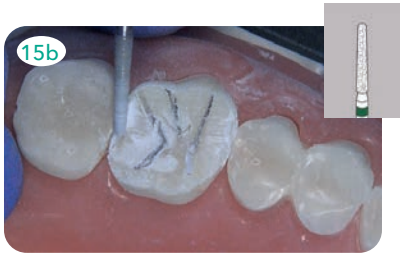
Mock-up guided tooth preparation - II. Overlay



Prepare the grooves on the occlusal surface of the mock-up using a coarse cylindrical diamond bur.

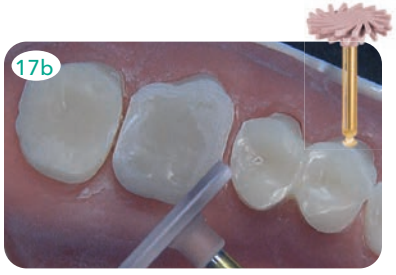
TIP!

Mark the groove with a pencil to ensure you do not overprepare.



Connect the grooves with a coarse cylindrical diamond bur with the long axis of the bur perpendicularly to the previously created.

Finish the margins of the preparation by rounding the borders with a coarse cylindrical diamond bur.



Tooth polishing is performed to smooth the prepared surfaces and preventing sharp edges.

Final check of the preparation is performed to ensure proper thickness and smoothness.

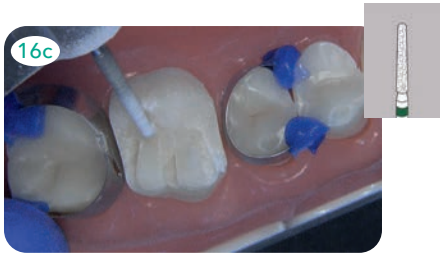
TIP!

- Respect minimum preparation thickness recommended for the selected restorative material.
- Maintain smooth, rounded internal angles to reduce stress concentration.
- Ensure a 6°–10° axial wall taper to improve retention and facilitate insertion.
- Eliminate undercuts to allow proper seating of the restoration.
- Preserve sufficient axial wall thickness to enhance resistance and retention.
- Properly open contact points to achieve correct marginal adaptation and contour.

Mock-up guided tooth preparation - III. Crown

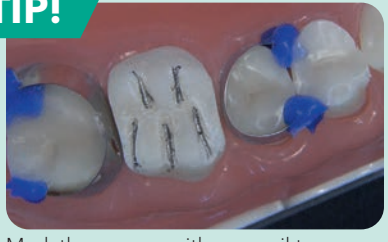
After having performed the mock-up, protect the adjacent teeth using a metal matrix.

Release the interproximal space with a coarse flame-shaped diamond bur.



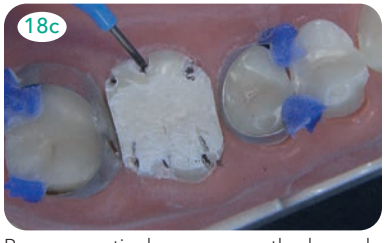
Prepare the grooves on the occlusal surface of the mock-up using a coarse cylindrical diamond bur.

TIP!



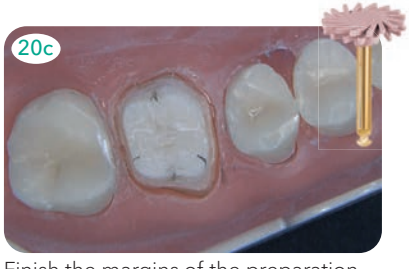
Mark the groove with a pencil to ensure you do not overprepare.

Connect the grooves with a coarse cylindrical diamond bur with the long axis of the bur perpendicularly to the previously created.



Prepare vertical grooves on the buccal and lingual surfaces using the same bur and mark them with a pencil.

Connect the grooves with a coarse cylindrical diamond bur with the long axis of the bur perpendicularly to the previously created.



Finish the margins of the preparation by rounding the borders. Then tooth polishing is performed to smooth the prepared surfaces.

TIP! Use GC Fit Checker

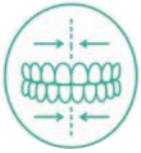
To check pressure spots and the fit accuracy of prosthetic works.

Intermediate phase

When treating severe tooth wear, an important step is the transitional phase, during which the new VDO, is tested before starting definitive treatments.

Key parameters to evaluate during the transitional phase:

Absence of pain


Function (e.g. occlusion)

Aesthetics

Speech

Adaptation/comfort with new VDO

MATERIAL SELECTION

During this phase, non-invasive and reversible materials are used to test the proposed changes before definitive treatment, including **PMMA, polycarbonate, composite resin, resin nanoceramic.**

	PMMA	Composite Resin (e.g. bis - acryl material, direct composite, ...)
Features	• Long-term clinical data available • Multiple fabrication methods (milling / printing) • Low cost	• High physical properties (flexural strength, fracture toughness) • High aesthetics • High accuracy • No preparation needed
GC Solution	• Temp PRINT • Unifast III	• G-ænial Universal Injectable • TEMPSMART DC

If you choose composite resin for the intermediate phase, check the Injection Moulding Technique step by step:

Aini, T., Güth, J.-F., Seidel, K., Görl, S., & Graf, T. (2025). ***Restoration of severe tooth wear: Converting the splint jaw position into definitive restorations.*** *Journal of Esthetic and Restorative Dentistry. https://doi.org/10.1111/jerd.13479*

Intermediate phase – I. GC Temp PRINT

After mock-up–guided tooth preparation (veneer, overlay, or crown), the provisional restoration is fabricated using 3D printable light curing composite and then placed according to the specific workflow.

Temporary crowns are digitally designed and printed with GC Temp PRINT.

Printing supports are removed with burs.

Shape and finish until desired anatomy is achieved.
Sandblast with 25-50µm AlOx. 1,5 bar.
Clean and dry.

Apply OPTIGLAZE color for individual effects, long-lasting gloss and high wear resistance. Then light-cure.

Lute the provisional GC Temp PRINT restoration using your temporary cement.

Long term temporary solution.

Courtesy of MDT S. Lusty, UK

GC temporary cement

FREEGENOL TEMPORARY PACK
Zinc oxide cement

GC Fuji TEMP LT
Glass ionomer provisional luting cement

For additional information, consult the related IFU's.

Intermediate phase – II. TEMPSMART DC

Alternatively to using materials such as PMMA, the spot etching technique can be considered as a valid option when placing provisional restorations made of bis-acrylic material (e.g. TEMPSMART DC).

Place Teflon tape interproximally and, using a flat spatula, gently tuck it into position.

For retention, perform spot etching away from the margins on each tooth. Carefully rinse off and dry.

Apply a small amount of G-Premio BOND to the center of the tooth, wait for 10 sec; and dry for 5 sec and light-cure.

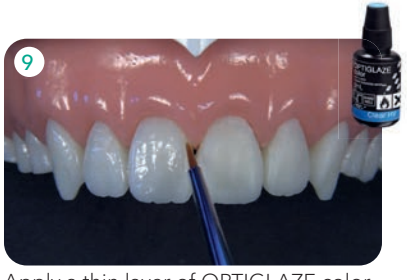
Discard a pea size amount of the material. Place TEMPSMART DC into the impression.

Place impression intra-orally within 45 sec of dispensing. Remove the excess.

Remove the impression between 2-2.5 min after dispensing the material.

Trim excess material using a scalpel blade.

Finish the margins using an extra fine flame-shaped diamond bur, applying very light pressure to refine the margins.



Apply a thin layer of OPTIGLAZE color. Light-cure and check the occlusion.

Final restoration

After the intermediate phase, which may last several months, and once the patient has adapted to the new occlusal position without pain and with satisfactory function, aesthetics, and phonation, the patient returns to the clinic, where the provisional restoration is removed, margins and/or preparations are refined as needed, and a new scan is taken.

Material selection for the definitive restoration—such as nano-hybrid composite, lithium disilicate, or zirconia—is then based on functional demands, clinical indications, and aesthetic requirements.

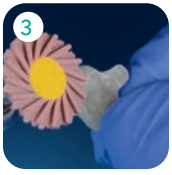
MATERIAL SELECTION

	Category	Lithium disilicate	Hybrid ceramic	Zirconia
	Materials	**Initial LiSi Block**	**CERASMART270**	**Initial Zirconia Disk & Initial Zirconia Disk ML Elite**
Physical properties	Biaxial Flexural Strength (MPa)	408	270	600-1200
	Elasticity/Buffering masticatory forces	-	+++	-
	Preventing antagonist wear	+	+++	+
Handling	Intra-oral repair	+	+++	+
	Polishability	+++	+++	+
	Fast Processing	++	+++	+
Aesthetics	Aesthetics	+++	++	++
	Anterior indications	+++	+	+
	Characterisation options	IQ ONE SQIN Initial LiSi	OPTIGLAZE color/ GRADIA PLUS Lustre Paint	Initial Zr-FS / Initial IQ ONE SQIN

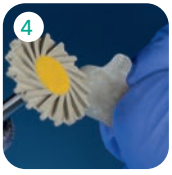
POLISHING OF INITIAL LISI BLOCK RESTORATION

Remove sprue with a diamond disc.

Polish with coarse polishing disc.



Polish with medium polishing disc.



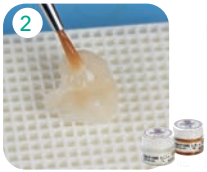
Finish with fine polishing disc.

Polish with goat hair wheel and GRADIA DIAPOLISHER paste (optional).

Final result.

PAINTING OF INITIAL LISI BLOCK RESTORATION

Remove sprue with a diamond disc.



Set the base by glazing with L-NFL shade of Initial IQ Lustre Pastes ONE.

Paint with L-A shade of Initial IQ Lustre Pastes ONE for dentin effects.

Fire.
Detailed firing instructions can be found in the Initial Lustre Pastes ONE Technical Manual.

Final result.

RESTORATION PRE-TREATMENT

Clean, rinse and dry the preparation.

Check the fit. Remove the restoration and clean it.

Etch with hydrofluoric acid for 20 sec. Rinse and dry the restoration.

Apply Silane such as G-Multi PRIMER on the restoration.

POLISHING OF CERASMART270 RESTORATION

Remove sprue with a diamond disc.

Polish with medium polishing disc.

Polish with fine polishing disc.

Polish with goat hair wheel and GRADIA DIAPOLISHER paste (optional).

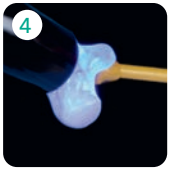
Final result.

PAINTING OF CERASMART270 RESTORATION

Remove sprue with a diamond disc.

Paint the fissures and cervical areas with OPTIGLAZE color.

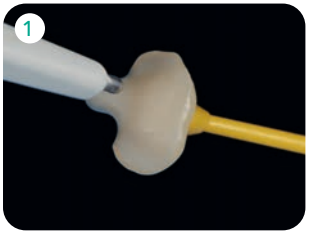
Add gloss with OPTIGLAZE color Clear HV.



Light-cure according to the manufacturer's instructions.

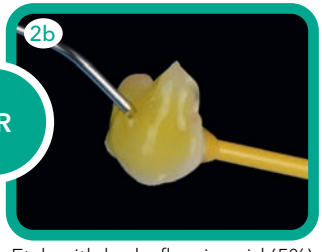
Final result.

RESTORATION PRE-TREATMENT

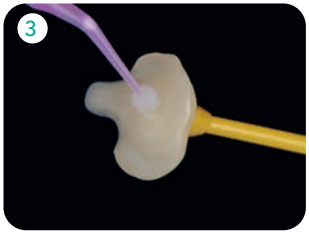


Clean, rinse and dry the restoration.

Sandblasting with 25-50µm alumina 0.15MPa/1.5 bar.



Etch with hydrofluoric acid (5%) for 60 sec. Rinse and dry the restoration.



Apply Silane such as G-Multi PRIMER on the restoration.

POLISHING OF ZIRCONIA RESTORATION

Use only dedicated dental instruments for preparation & finishing of zirconium, lithium disilicate & veneering ceramics.

Courtesy of MDT C. Fischer, Germany

Individual adjustment of gloss level can be done using dedicated instruments and diamond paste.

PAINTING OF ZIRCONIA RESTORATION

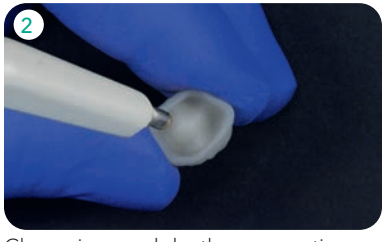
The framework is shaped and contoured using dedicated instruments. After pre-polishing with a dedicated ceramic polisher, the finished framework as well as the surfaces, which require ceramic application, are softly sandblasted with 50 microns Alu-Oxid at max. 1,5 bar pressure.

Courtesy of MDT M. Brüsch, Germany

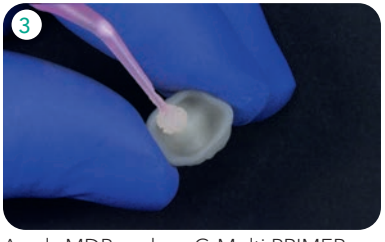
After the final firing, an unsurpassed vitality and a very natural glaze is easily obtained.
The convincing natural end-result is achieved in just one Lustre Pastes ONE firing!

RESTORATION PRE-TREATMENT

Sandblasting with 50µm alumina 1.5 bar.



Clean, rinse and dry the preparation.



Apply MDP such as G-Multi PRIMER into the restoration.

Luting

Lithium disilicate:
Etch with 5-9% HF for 20 sec.

Hybrid ceramics:
Etch with 5-9% HF for 20 sec **OR**
Sandblast (30–50 µm Al_2O_3, ~1 bar).

Zirconia:
Sandblast
(25- 50 µm Al_2O_3, 1–2 bar).

Restoration material

Restoration primer with silane is required for glass ceramics and hybrid ceramics;
Restoration primer with MDP is optional for zirconia with G-CEM ONE.

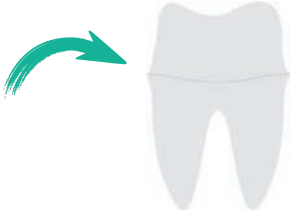
No restoration primer required with FujiCEM Evolve.

G-Multi PRIMER
can be used for any restoration.

G-CEM ONE
Universal resin cement

FujiCEM Evolve
Resin modified glass ionomer cement
(Indicated for retentive preparations)

Tooth primer is recommended for preparations that lack retention and resistance shape.



G-CEM ONE Adhesive Enhancing Primer
(or G-Premio BOND + light-cure)
can be used for any occasion.

No tooth primer required with FujiCEM Evolve.

Prepare the teeth for the treatment

Courtesy of Prof. M. Peumans, Belgium

Check gingival health and clean all the teeth.

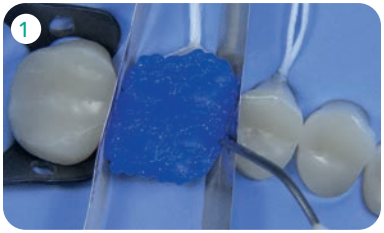
Clean the surface with pumice and water.

OR

Courtesy of Dr. P. Swerts, Belgium

Sandblasting the surface is recommended to ensure a clean working area.

Luting – Resin cement

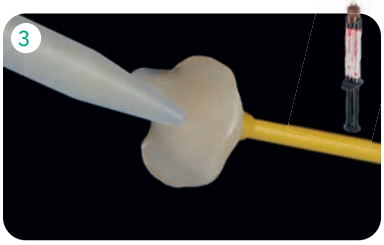


Selective or Total etch techniques are recommended.
Rinse & dry.

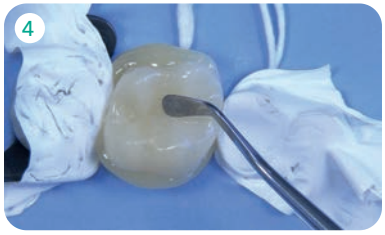
Apply G-CEM ONE AEP, wait for 10 sec; and dry for 5 sec.
Light-cure is not needed.

OR

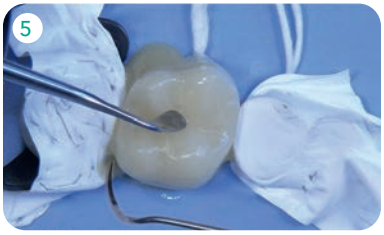
Apply G-Premio BOND, wait for 10 sec; and dry for 5 sec and light-cure.



Extrude the G-CEM ONE directly onto the restoration.



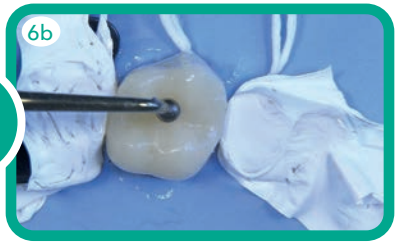
Seat immediately and maintain moderate pressure. Working time is 2 min 45 sec at 23°C.



When cement feels rubbery, remove the excess while maintaining moderate pressure. Excess can be tack-cured for 1 sec.

While maintaining moderate pressure, light-cure all surfaces/margins.

OR



Let the material set for 4 min in case restoration does not let the light to pass through.

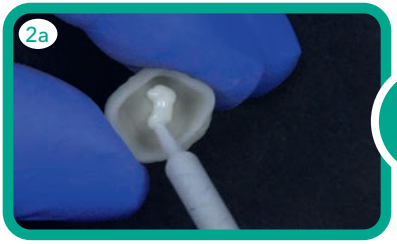
Do the final polishing with polishing rubbers or discs.

TIP!

Apply GC Modeling Liquid on a brush and/or instrument, to optimize the resin viscosity/consistency and ease the excess removal.

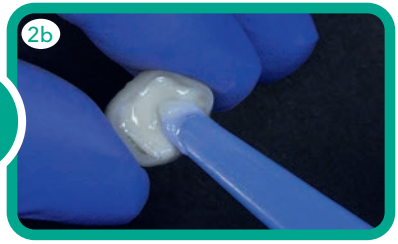
Luting – Glass ionomer cement

Bleed the syringe before use to ensure even extrusion of the pastes.



Apply FujiCEM Evolve directly into the restoration using mixing tip.

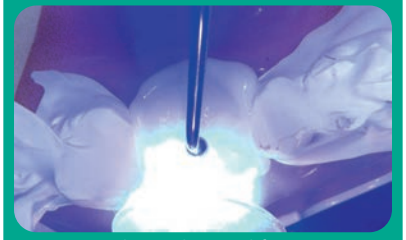
OR



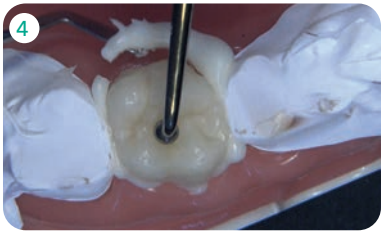
Mix the pastes for 10 sec. Apply the mixed FujiCEM Evolve directly into the restoration.

Immediate seat onto the preparation. Maintain moderate pressure.

OPTIONAL



Excess can be tack-cured for 3 sec.



When the cement feels rubbery, remove the excess while maintaining moderate pressure.

Proceed with the occlusion check and finishing after 4 min 30 sec after seating the restoration.

Discover the **GC Luting Guide**
From Fuji I, all the way to G-CEM ONE.

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GC Temp PRINT

- Excellent stable mechanical properties
- MMA-free/for DLP printing
- Compatible with OPTIGLAZE color

Initial LiSi Block & Press

- Superior aesthetics
- Refined lithium disilicate with HDM technology for unsurpassed physical properties
- Smooth margins and superior polishability due to the homogeneous structure

Initial Zirconia Disk ST/HT/UHT
Initial Zirconia Disk Multilayer Elite

- High strength
- Versatile and suitable for a broad range of clinical indications
- Outstanding aesthetics combined with Initial IQ ONE SQIN

G-CEM ONE

- High performance for any type of restoration
- Technique tolerant
- High colour stability in 4 shades for invisible margins
- Can be used with the Adhesive Enhancing Primer or G-Premio BOND for maximum bond strength

TEMPSMART DC

- Superior aesthetics with 6 shades
- The ultra-fine fillers give it superior gloss which lasts over time
- Featuring a comfortable working time, the final light-curing will allow to reduce the setting time while reaching optimal hardness.

CERASMART270

- Homogeneous filler dispersion – strong, smooth and long-lasting
- Buffers heavy bite forces
- Easy chairside repair

Initial IQ ONE SQIN

- Clear form and fine texture details in the wet stage - no changes after firing.
- Self-glazing properties - Get a beautiful glazed finish in one single firing.
- Optimal fluorescence level - Ensures the look of natural teeth under all light circumstances.
- Maximal aesthetics within a micro-layer

Initial Zr-FS

- High content of extremely pure special selected feldspar
- Superior aesthetics on all types of high tensile strength zirconium frameworks
- Very good wettability, high stability and smooth surfaces
- Superior natural aesthetics on high tensile strenght Zr-frameworks

FujiCEM Evolve

- One-step application, less technique-sensitive than resin cements
- Moisture-tolerant
- Optimal adhesion to zirconia
- Low film thickness and precise adaptation

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