GC get connected 4

Your product and innovation update

2015

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Aesthetics reduced to its essentials

Essentia from GC

Essentia represents a paradigm shift in restorative dentistry with an innovative shade concept: straightforward and bold. With just seven syringes and three unique compositions, optimized for their respective use, you now have the solution for all your aesthetic restorations. Follow your intuition.

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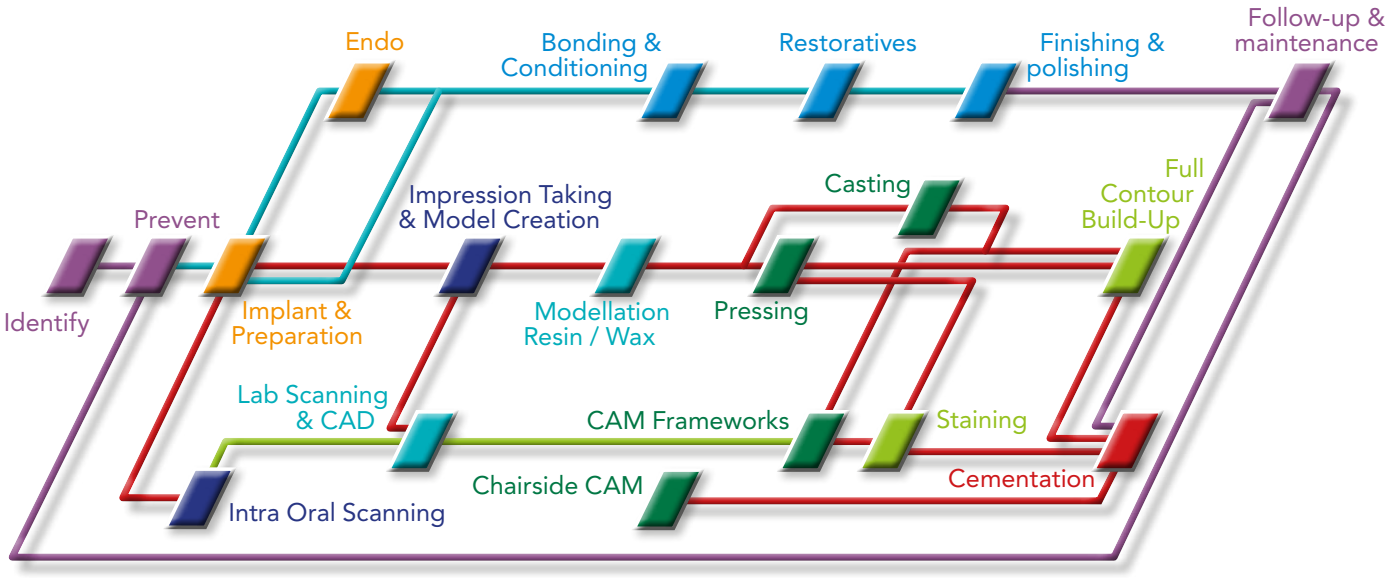

Dear readers

Welcome to our fourth issue of GC Get Connected and thank you for reading!

Dear reader,

Glad you found your way to the 4th edition of GC Get Connected, thanks again for showing your interest. It's safe to say we've got more than enough topics to catch your interest in this issue.

The first part of 2015 will be hallmarked by the 36th International Dental Show in Cologne. From 10-14 March 2015 you can join us on our booth (N010-O029) in the Kölnmesse in Cologne (Germany) and meet our team of product specialists.

We've got some exciting innovations to share with you. Some of these are also featured in this issue, so look no further for in-depth case studies and more information! The new composite Essentia will impress you: with just 7 syringes, it can achieve aesthetic results for all your restorations. GC's innovative glass ionomer-based restorative, EQUIA Forte, completes the range of restorative approaches. GC has entered the CAD/CAM world with Cerasmart, the force absorbing hybrid ceramic CAD/CAM block for precision, strength and flexibility. Characterisation is easy with Optiglaze Color, a colouring glaze to adapt the shade as much as needed. At the lab side, GC has the Initial Zirconia disks, a high quality Zr disk with optimized physical properties. They can be combined with the Initial Lustre Pastes and Lustre Paste Gum for the highest aesthetic level in no time. Initial, the ceramic line has been expanded with Initial LiSi, a specialized veneering ceramic designed for lithium disilicate frameworks.

The multitude of possible methods, workflows (analog or digital) and approaches is certainly one of the main characteristics of modern dentistry. An advantage to some, it may also prove to be a challenge to maintain a clear view for others. So we have created a "GC metro map". Generally it simplifies a public transport network in major cities worldwide, but we made it into a schematic design of the entire GC product portfolio and how each product is related.

First of all, this map clearly shows GC's presence in each domain. But also it shows that once you have chosen a certain trajectory or line, you don't have to stay on this line for the entire ride. GC keeps your options open, and like in real life, it's always interesting to get off the beaten track and explore unknown areas. For more info, check the centre page of this issue!

In conclusion, also in 2015 we have an exciting line-up of trainings at our GC Europe campus. Check the schedule via campus.gceurope.com and contact your local GC office. GC Iberica now even has its own training centre in Madrid. And even if you're more comfortable to learn at home, there's always our series of online webinars. Head to our YouTube account to look at recordings of past webinars, or to our Facebook know about future webinars.

Enjoy browsing this issue, hoping to see you soon!

Michele Puttini
President, GC Europe

Welcome to GC 'get connected', GC Europe's newsletter that showcases our latest product innovations, techniques and trends in restorative dentistry.

Let's get social

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essentia

The smart simplification of a composite system!

Javier Tapia Guadix, DDS, CG Artist

Leonardo da Vinci said that simplicity is the ultimate way of sophistication. When it comes to developing an aesthetic dental composite material, we tend to overcomplicate things, caused either by old recurring concepts, by industry competitiveness or by wrong analysis of nature observation. However, ultimate simplification is possible when we jump across these problems and start from scratch. Developed within the GC Europe Restorative Advisory Board, Essentia represents the minimalism inside the composite world, a simplified system that enables an easy but effective aesthetic restoration with a very limited amount of shades. The complete kit, with just 7 shades and 4 modifiers, becomes a paradigm shift in layering composites.

The classic concept of a composite material with a big variety of hues and chroma within its range is starting to become obsolete. The actual tendency is to have a unique hue but still with a big range of chroma options. We took the simplification further to create a new approach with only three dentins and two enamels as a base.

Regarding teeth, the base color (hue, value and chroma) is mainly given by dentin, followed by a modulation of value by enamel. Value is also determined by the opacity of a translucent material, opaque materials have a higher value, while translucent materials have a lower value. It is known that matching hue and chroma is not as important for a successful restoration as matching value.

Using the same base opacity for all dentin shades in a system can generate problems as younger teeth have very little chroma

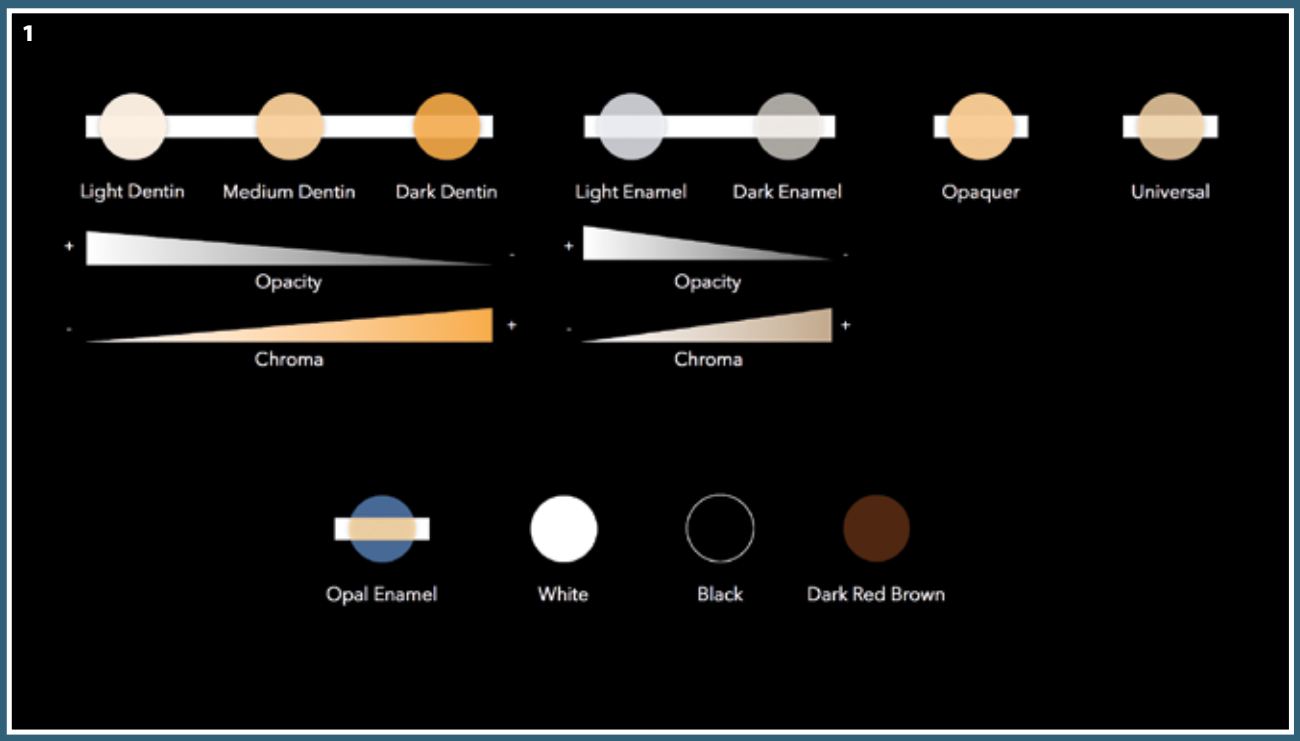


Table 1. Essentia complete shade range. Main shades (top row) & Modifiers (bottom row).

Table 2. Basic combinations of dentin and enamel shades.

and high opacity, while elder teeth have very high chroma and low opacity. Essentia is designed to use just three dentins (light, medium and dark) with increasing chroma and decreasing opacity in order to match the natural aging process. Enamels act in a very similar way, with whiter and more opaque enamel on young teeth and more translucent and chromatic on older teeth. Essentia uses just two enamel shades, one with high value (light) and another one with lower value (dark) and small amount of chroma.

Together, these three dentins and two enamels give four basic combinations that are used as a base for any anterior restoration: light dentin with light enamel (junior/bleach), medium dentin with light enamel (young), medium dentin with dark enamel (adult) and dark dentin with dark enamel (senior). Dark dentin and light enamel can be combined for posterior restorations, enabling a high chromatic dentin substrate to be modulated by higher value enamel on the occlusal surface.

Some specific situations such as a discolored substrate might require an additional step when layering composites. The system contains a high-filled opaque flowable composite in order to block discolorations with a very thin layer application. For young incisors with strong opalescent halo, Essentia provides a special enamel shade, optimized for a very natural opalescent effect.

For intrinsic or extrinsic characterization such as fissure staining or white spots, Essentia also features three flowable stains: white, black and dark red brown. Finally, to leave the door open for further simplification, one universal shade with an optimized chameleon effect was also included in the system. This material is designed to be used mainly in posterior region for one shade restorations. Its properties also make it a good option for heated composite cementation procedures.

From a chemical point of view, it is important to notice that dentin and enamel shades have different compositions. While dentin shades are optimized for a higher scattering effect mimicking that of the natural dentin, enamel shades are designed for a higher translucency with a very high polishability and gloss retention.

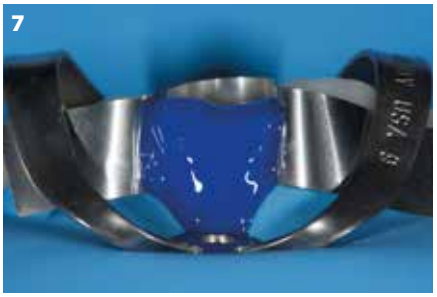
As demonstrated in the case reports, the clinical outcome of this simplified material is reaching high standards, with naturally blending restorations that integrate harmonically in the mouth. This shows that the ultimate simplification of composite systems is no longer a future possibility, but a present reality.

Essentia is designed to use just three dentins (light, medium and dark) with increasing chroma and decreasing opacity in order to match the natural aging process.

Posterior Case

1. Initial pre-operative situation. Occlusal caries on first lower molar
2. Absolute isolation
3. Preparation finished
4. Bonding agent applied
5. Dentin composite application. Dark Dentin shade
6. Enamel composite application. Light Enamel shade
7. Fissure staining application. Black and Dark Red Brown mixture
8. Finishing and polishing
9. Immediate post-operative situation
10. Final post-operative situation after full rehydration

Anterior Case



1. Initial pre-operative situation. Discolored centrals with old restorations, color mismatch

2. Initial pre-operative situation. Discolored centrals with old restorations, color mismatch

3. Initial pre-operative situation. Smile view

4. Shade evaluation with polar eyes. Small amounts of composite are applied and light-cured (without bonding agent). Light Dentin and Medium Dentin over cervical third, Light Enamel and Opal Enamel over incisal third (on both central and lateral)

5. Absolute isolation, left central incisor

6. Preparation. Removal of old restoration, minimal enamel reduction (0.1-0.2mm) and surface sandblasting (27µm)

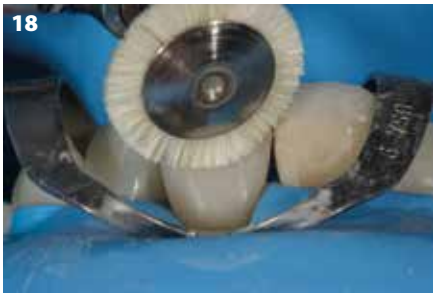
7. Enamel etching (35% Phosphoric Acid)

8. Bonding application

9. Silicon key application for creation of palatal enamel shell

10. Palatal enamel shell applied. Light Enamel shade

Anterior Case



11. Proximal wall reconstruction with help of matrix and wedge. Light Enamel shade

12. Dentin build-up, from cervical to incisal, one shade. Light Dentin shade

13. Application of opalescent effect shade at incisal third. Opal Enamel shade

14. Enamel build-up, from cervical to incisal, one shade. Light Enamel shade

15. Shape contouring and pre-polishing with disc

16. Polishing with diamond rubber point

17. Shape refining and superficial texture with diamond bur

18. Final gloss with goat hair brush and diamond paste

19. Proximal polishing with Epitex strips

20. Final after polishing

Anterior Case

21. Sub-exposed picture with contraster for incisal translucency and opalescent effect check

22. Preparation on right central incisor

23. Intra-operative situation on right central incisor, palatal enamel shell and dentin shade already applied

24. Final intra-operative situation

25. Final intra-operative situation with contraster, sub-exposed picture

26. Final intra-operative situation with contraster, texture check with soft-box illumination

27. Final post-operative situation after full rehydration

28. Final shade evaluation with polar eyes. Good color match with lateral incisor

29. Final post-operative situation after full rehydration. Surface texture check

30. Final post-operative situation after full rehydration. Smile view

Javier Tapia Guadix *was born in 1978 in Madrid, Spain. He finished dental school at the European University of Madrid in 2003. Working then as associate professor in the prosthetics department in 2004.*
In 2005 he started his career as professional computer graphics artist, focused on illustration, animation and application development. He founded the company Juice - Dental Media Design for this purpose. He received the Collegiate Merit Award by the Spanish College of Dentists from the 1st Region in 2005, for his collaboration in the commission of new technologies. In 2011 he founded together with Panaghiotis Bazos and Gianfranco Politano the Bio-Emulation group. He actively collaborates with several universities across Europe and is member of GC Restorative Advisory Board. Javier works in his private practice in Madrid, focused on restorative dentistry and esthetics. He is an international lecturer with participation in numerous congress, hands-on courses and live courses. He published several articles in restorative dentistry, dental photography and computers in dentistry.

Cerasmart™, a step-by step description in the form of a clinical case report

Dr. Andreas Mattmüller, Oberweser, Germany

Another new block for CEREC machines on the market. You might ask yourself: "Do we really need that? " Of course, we can always argue that the existing blocks are working well and that until now we achieved perfect results with them. However, this argumentation also prevents any progress to be made.

In the case of Cerasmart, GC succeeded in developing a block which combines the benefits of ceramics and composites. Through a very complex and patented production process, the Elasticity and Flexural Strength (231 MPa) of the material were increased significantly.

I had the opportunity to test this new block during the trial phase. Clinically, what is standing out is the fact that the preparation limits are very precisely milled, to improve the long term stability of the margins. The shade adaptation is also very good.

The following case report is developed to explain the different steps used for this material.

Fig. 1 & 2 Tooth 37 showing important tooth structure defects on all surfaces.

Fig. 3 & 4 Conservative treatment using Fuji IX Glass ionomer cement and GC G-ænial Flo A3 cervically

Fig. 5 Choice of the type of restoration in the CEREC-Software
Fig. 6 Choice of the material

Fig. 7 & 8 Preparation for the optical impression

Fig. 9 & 10 Preparation according to defined preparation principles

Fig. 11 & 12 Powdering and optical impression

Fig. 13 & 14 Scanning of the antagonist jaw and occlusion registration

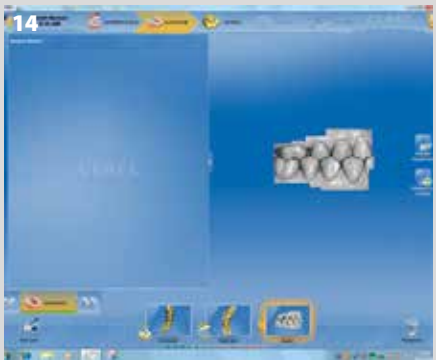
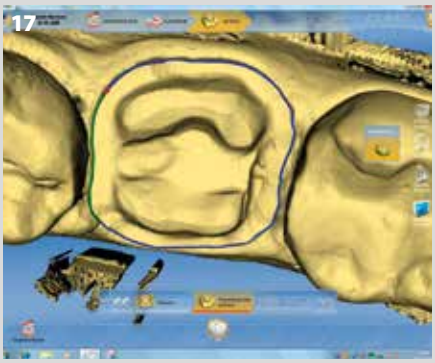


Fig. 15 & 16 Set-up of the correlation between preparation model and antagonist jaw

Fig. 17 & 18 Defining the preparation limits and the insertion axis



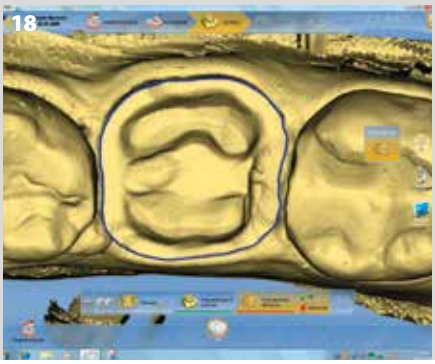


Fig. 19-22 Modelling the restoration

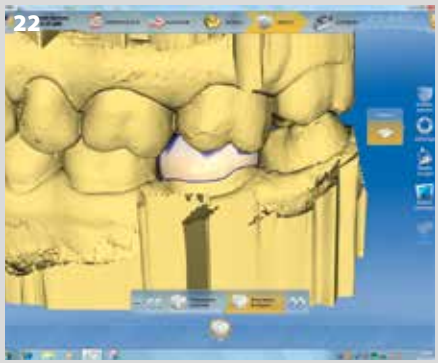
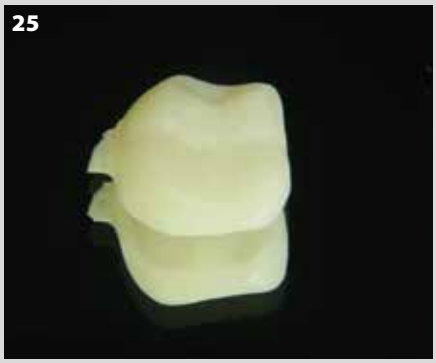


Fig. 23 & 24 Set-up of the milling position and start of milling

Fig. 25 & 26 Milling result



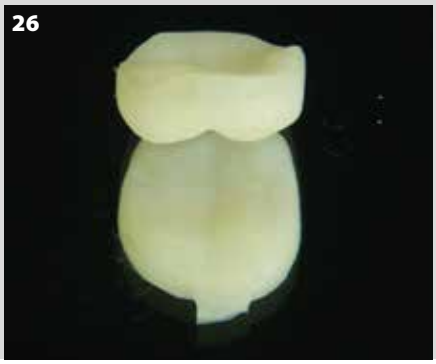


Fig. 27 Preparation for characterisation: sandblasting with 25-50 µm aluminium oxide followed by steam cleaning or ultrasonic device, final cleaning with alcohol.
Ceramic Primer II is dispensed, applied and let to dry, before the application of Optiglaze Color.

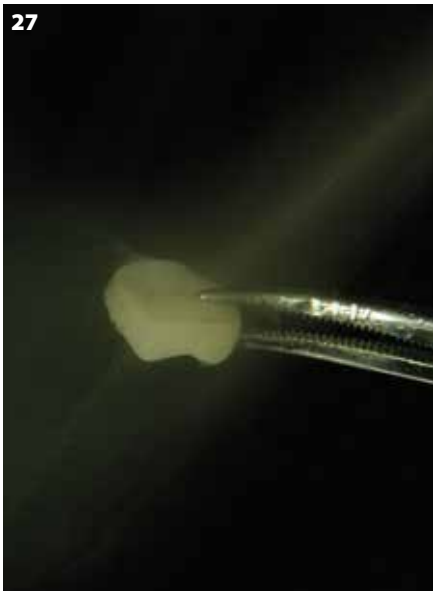


Fig. 28-31 Individual characterisation with Optiglaze Color, using a light-curing device with 400-430nm wavelength

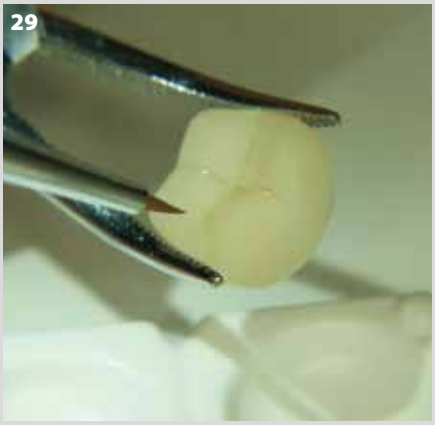


Fig. 32 & 33 Polishing using different rubber points of decreasing grits (Twist from EVE is used here):

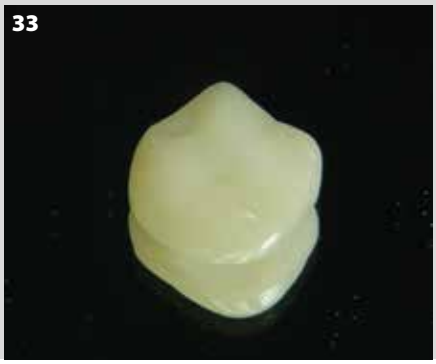


Fig. 34 & 35 Trial-fit in the mouth, showing perfect adaptation

Fig. 36 Application of the rubber dam

Fig. 37 Preparation for luting: sandblasting with Aluminium Oxide 25-50 µm, with 0.2 Mpa pressure, followed by steam cleaning or ultrasonic device. Final cleaning with alcohol

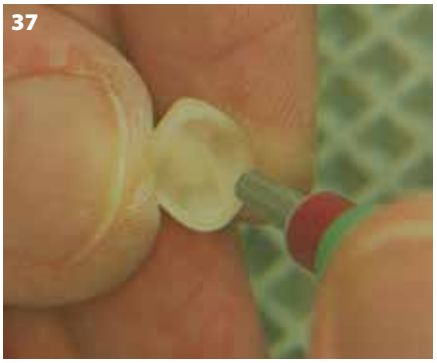


Fig. 38 & 39 Conditioning with Ceramic Primer II and dry

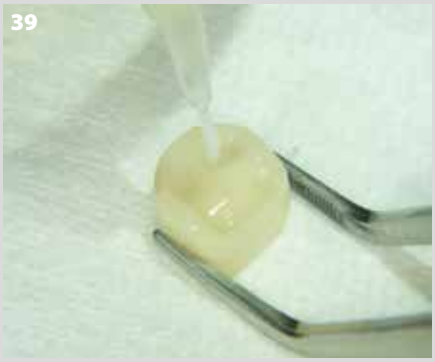
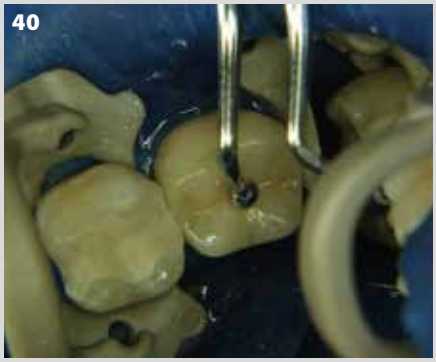


Fig. 40 & 41 Luting using a dual cure adhesive resin, following the manufacturer's instructions



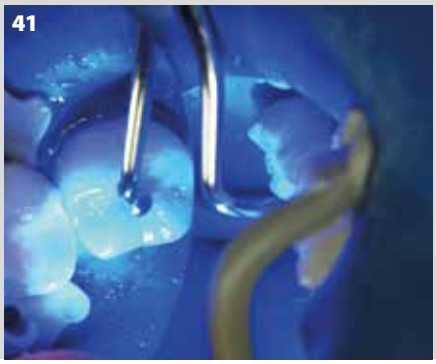


Fig. 42 & 43 Final restoration in place
The shade adaptation of Cerasmart can be perfectly observed.

Dr. Andreas Mattmüller

Born in 1956 in Germany, Andreas Mattmüller first graduated as Dental Technician in 1980. After various employments both in the industry and as dental technicians, he decided to continue his curriculum in dentistry and graduated as a dentist from the University of Munich and Frankfurt/Main in 1987.
He then became scientific assistant to Prof. Dr. D. Windecker in Frankfurt / Main from 1987 till 1989, after which he established his own practice in in Upper Weser.

Dr Mattmüller is member of various dental associations, amongst them DGCZ German Society for Computerized Dentistry; DGZH German Society for Dental Hypnosis;

Z.A.H.N. Dental Study Circle Hessen Lower Saxony and cooperates in the practice of Ernst- Moritz- Arndt from the University of Greifswald. He also participates in the Quality Assurance Project "Ceramic Success Analysis" of the AG Ceramics and DGCZ.

Dr Mattmüller published in various journals on the subject prophylaxis and alloys- and ceramic systems. He is also giving various lectures to dental technicians and dentists on the subject: Golden Gate System, treatment planning, impression methods and practice marketing. He is particularly focusing on being a Cerec - speaker and moderator of several ceramic working groups.

HIGHLIGHT on the concept of Biomimetics

Interview with **Dr. Gil Tirlet**

Gil Tirlet
Private practice
Senior Lecturer (Paris Descartes University)
Hospital practitioner (Charles Foix Hospital, Ivry sur Seine)
Member of the International Bio-emulation Group
Head of Bio-emulation consultations (Charles Foix Ivry sur Seine)

1/ "Hello Gil, can you tell us about the Bio-Emulation, or biomimetics, which you are working on"?

The term comes from the Greek, bios (life) and mimesis (imitate). Otto Schmitt (American academic and inventor) coined the English term biomimetics to describe the transfer process from biology to technology. In the scientific field, biomimetics means the reproduction or copy of a model or reference.[1, 2] More precisely, the concept of biomimetics consists in artificially reproducing and imitating natural processes in living organisms. We can also use the term bio-emulation, which means the reproduction of nature by bio-mimetic imitation.[1]
Biomimetics has only been considered a science for a few decades, and was defined by, amongst others, Janine Banyuls (Biologist and Environmentalist) in 1997. It is an innovative process, based on the transfer and adaptation of principles and strategies used by living organisms and ecosystems, to produce sustainable goods and services and make human societies compatible with the biosphere.

She is the author of the reference book "Biomimetics: Innovation inspired by Nature", in which we find this crucial sentence: "Biomimetics introduces an era based not on what we can extract from nature, but what we can learn from her".

In modern dentistry, the concept of "Biomimetics" is synonymous with the natural integration of biomaterials: meaning biological, biomechanical, functional and cosmetic integration, closely mimicking the physiological behaviour of natural teeth.[1, 2] Thanks to sophisticated bonding techniques and developments in ceramic materials, it now seems possible to strive towards biomimetic correspondence between cosmetic substitution materials and the anatomic substrate of a natural tooth.[1, 2] This modern concept originated in a histo-anatomic study of the natural tissues of teeth. Ideally, the tooth and restoration biomaterial should be, biologically and visually, a real "functional unit" that is able to withstand the biomechanical loads it is subjected to in its environment.
Biomimetics combines both these fundamental parameters at the heart of current treatments: tissue preservation and bonding. In the framework of modern dentistry, this paradigm change in the field of fixed prosthetics concerns both current uses and the biomaterials and bonding processes it uses. It is universally understood that conventional

fixed prosthetics based on mainly mechanistic concepts which cause excessive or extreme loss of tissue are no longer biologically or biomechanically acceptable.[3, 4, 5]

2/ "Does this mean that we won't cement crowns anymore?"

No absolutely not, but it will no longer be the first resort in a very significant number of clinical situations, both in anterior and posterior teeth, on vital and non-vital teeth.
As Pr. Urs Belser reminds us, nowadays only damage to the crown which cannot reliably mechanically support good quality bonding shall be an indication for treatment with a single crown.[3] Outside of this specific indication, a peripheral crown should be done in the framework of prosthetic re-intervention. Of course, crowns are still available for treatment, but its first-resort use has now been considerably reduced, in favour of partial restoration.

3/ "Could you tell us more about the "No post, No crown" concept?

Once again Pr. Pascal Magne, a real international icon of biomimetic dentistry, introduced and defined the concept of "No Post, No Crown dentistry".[5]
Bonding techniques now enable dentists to prescribe and carry out partial restorations in many situations, in anterior and posterior teeth, vital and non-vital teeth. These partial restorations can be used in contexts where loss of tissue is sometimes substantial, caused by pathological erosion/wear, which is increasing in all countries around the world, affecting all ages, and sometimes to the extreme.[6, 7, 8]
The tissue preservation in partial restorations compared to peripheral restorations has been quantified on anterior and posterior teeth.[10]
It is linked to excellent life-span, for example in cases of veneers when preparations remain in the enamel[11] or in the case of inlays/onlays.[12]
Thus, by following the therapeutic gradient[13] based on tissue preservation, we can say that when the conditions permit them (see above, according to Urs Belser), partial restorations, direct or indirect, are preferable to crowns.
I teach this approach in my practice with my friend Dr. Jean Pierre ATTAL, at our University (Paris Descartes) and we hope to continue teaching it to our students and dentists, who come for professional training every year.
Moreover, it is important to remember, if you allow me to focus on France, that this approach solves a real public health issue, as well as reducing the cost of invasive treatment funding.

Illustration of the concept of Biomimetics

Clinical Case 1

4 years Follow up

Clinical Case 2

3 years Follow up

4/ "How will the population evolve and what changes shall be made to our treatment practices?"

It is an excellent question as the increase in our fellow citizen's lifespan (on average three months every year) means an increased use of re-intervention on restorations. This means that the optimal conservation of tissues during the first clinical intervention on the tooth is a necessity, to make future re-interventions possible and easier.

Indeed, failed partial restorations are not only easier to manage than failed peripheral restorations, but in almost all cases, the tooth can be kept and a new partial restoration can be done.[13] The vicious circle of restorations ending in the loss of the tooth is halted and the tooth can remain on the arch for longer. We must remember that what interests us is the longevity of the restored tooth on the arch, and not the restoration itself.

5/ "Finally Gil, in your opinion, will all countries follow this path?"

It is already the case in many countries, including in France, even though my country is unfortunately still very much caught up in the state and political management of healthcare.

Things are slowly changing despite the obstacles, and I want to give an optimistic message, that of our patients, many of whom dread and refuse "Low Cost" dentistry.

I remain convinced that in many countries, including my own, it is now time to implement a "Quality and Ethics" label at all stages of treatment, and this demand will increase in the next few years, both for practices (mostly grouped together, a change required by the high structural costs) and prosthetics laboratories.

What better answer to the commodification of dentistry that is currently underway all over Europe than "Quality" and "Ethics".

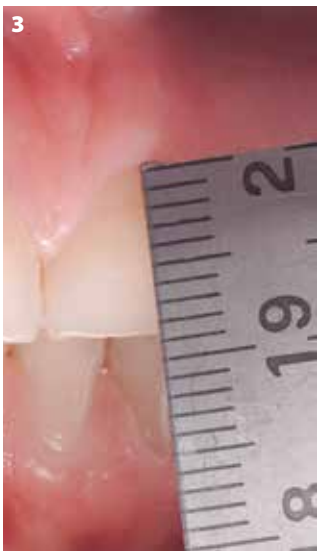
Bibliography

1. Magne P, Belser U. Restaurations adhésives en céramique : approche biomimétique. Quintessence 2003
2. Bazos P, Magne P. Bioemulation: biomimetically emulating nature utilizing a histo-anatomic approach; structural analysis. Eur J Esthet Dent. 2011 Spring ; 6 (1) : 8-19.
3. Belser U. Changement de paradigmes en prothèse conjointe. Réalités Cliniques. 2010; 21 (2): 70-95.
4. Rich B, Goldstein GR. New paradigms in prosthodontic treatment planning: A literature review. J Prosthet Dent. 2002; Aug; 88 (2) : 208-14.
5. Magne P. Interview. Brit Dent J, Aug 25 2012, Vol 213, N°4; 189-191.
6. Vailati F, Belser UC. Full-mouth adhesive rehabilitaion of a severely eroded dentition: the three step technique. Part 1. Eur J Esthet Dent. 2008 Spring; 3 (1): 30-44.
7. Vailati F, Belser UC. Full-mouth adhesive rehabilitaion of a severely eroded dentition: the three step technique. Part 2. Eur J Esthet Dent. 2008 Summer; 3(2): 128-46.
8. Vailati F, Belser UC. Full-mouth adhesive rehabilitaion of a seve- rely eroded dentition: the three step technique. Parts 3. Eur J Esthet Dent. 2008 Autumn ;3 (3) : 236-57.
9. Edelhoff D, Sorensen JA. Tooth structure removal associated with various preparation designs for posterior teeth. Int J Periodontics Restorative Dent. juin 2002;22(3):241-9.
10. Edelhoff D, Sorensen JA. Tooth structure removal associated with various preparation designs for anterior teeth. J Prosthet Dent. mai 2002;87(5):503-9.
11. Gurel G, Sesma N, Calamita MA, Coachman C, Morimoto S. Influence of enamel preservation on failure rates of porcelain laminate veneers. Int J Periodontics Restorative Dent. feb 2013;33(1):31-9.
12. Van Dijken JWV, Hasselrot L. A prospective 15-year evaluation of extensive dentin-enamel-bonded pressed ceramic coverages. Dent Mater Off Publ Acad Dent Mater. sept 2010;26(9):929-939.
13. Tirlet G, Attal J-P. Le gradient thérapeutique: un concept médical pour les traitements esthétiques. Inf Dent. 2009; (41/42):2561-8.
14. Bazos P, Magne P. Bio-imitation : reproduction de la nature par imitation biomimétique fondée sur une approche histo-anatomique. Analyse structurale. Eur J Esthet Dent. 2011, Automne 2011.Vol 3, n°3, 196-207.
15. Tirlet G, Crescenzo H, Crescenzo D, Bazos P. Ceramic adhesive restorations and Biomimetic dentistry : Tissue preservation and adhesion. The International Journal of esthetic Dentistry. Vol 9, N°3, 2-17, Autumn 2014.
16. Tirlet G, Crescenzo H. Crescenzo D, Petitjean M, Dagba A. Les Restaurations adhésives en céramique. La « Biomimétique » au service du sourire. JPIO. Mai 2012, 59-70.

Biomimetic rehabilitation of two eroded front teeth

This patient came to consult me for a cosmetic problem related to her 2 maxillary central incisors (11 and 21). Their smaller size is linked to a vertical loss of tissue due to chemical erosion caused by years of eating lemons every day. The erosion is both vestibular and coronal and mainly and rather curiously affected these 2 teeth only. A view of the palate shows chemical erosion (concave lesions) on the coronal margins of both these incisors.

In this "clinical case" we wish to insist on the leading concept in modern dentistry, the Biomimetic or Bio-emulation approach, which aims to preserve the thickness of the enamel "casing", increasing the longevity of restorations thanks to the most advanced adhesive techniques. In addition to the durability of the restoration, bio-emulation enables greater conservation of the natural tooth on the arch.



Clinical Case

1a. Initial situation with erosion and wear of 11 and 21. This chemical wear has mainly led to a vertical loss of tissues, explaining the loss of dominance in the smile as well as a lack of vestibular substance.

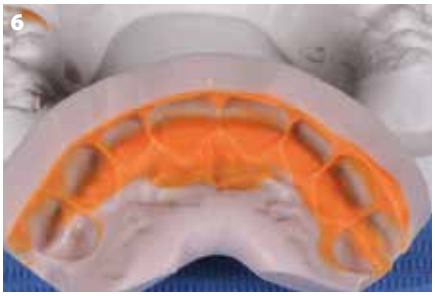
1b. Higher magnification of the maxillary central incisors.

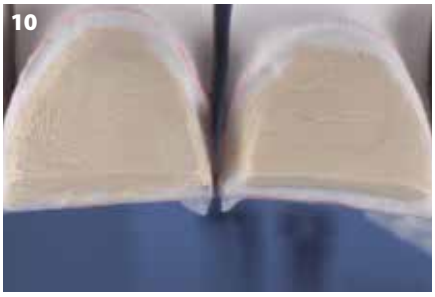
2. Palatal view with concave wear of coronal margins of 11 and 21.

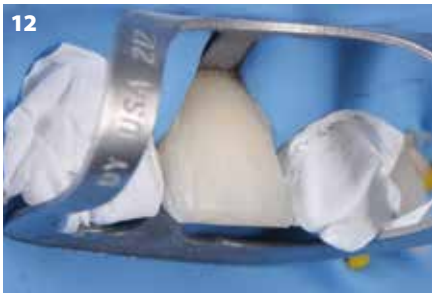
3. Vertical loss is fairly significant (8.5 mm residual length compared to the usual 10.5 to 11 mm).

4. The loss of dominance of the central incisors compared to the lower lip vermilion is visible on this ¾ view.

Clinical Case







5. Diagram of the cosmetic project materialised by wax ups of 11 and 21, made using the initial photographs (face, smile, tooth and gingiva) and the cosmetic project.

6. A plaster duplicate enables a laboratory silicone mould (Zhermack) rebased with light silicone.

7. This mould enables the transfer of the cosmetic project directly into a clinical situation by the use of a bis-acrylic composite (Luxatemp, DMG) to obtain two masks or mock-ups.

8. Once these mock-up are validated, they enable the calibration of preparations to preserve the enamel as much as possible.

9. Final view of the enamel preparation. The thickness of the future veneers will be 0.6 mm.

10. Preparation on unique positive models.

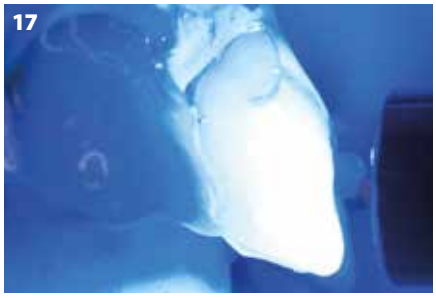
11. Permanent veneers ready for clinical and cosmetic trials.

12. View of the operative area of 21, to carry out the surface treatments and bonding of ceramic restorations. The adhesive used for the procedure is OptiBond Solo Plus (Kerr).

13. Cementing with G-ænial universal Flo (shade A2), an injectable low viscosity composite material (GC).
Despite the higher volume shrinkage as compared to conventional composites, G-ænial Universal Flo presents one of the lowest values of shrinkage stress as compared to other flowables.
The fluid consistency of the material enables great comfort of use. Its filler rate is also an advantage to improve the wear resistance of the cementation, particularly in wear contexts.

14. Elimination of excesses using specially designed brushes (Flat Brush, GC).

Clinical Case



15. Elimination of excesses after polymerization of the injectable composite using a surgical knife no. 15. Blades no. 12 are usually preferred for this use.

16. Clinical view after cementation of the 2 ceramic veneers (e.max, Ivoclar). Esthetic Oral Laboratory (St Tropez, France)

17. Second polymerization under glycerine

18. Final view, 1 week after cementation. The dominance as well as the shape and surface texture are restored, and are perfectly compatible with the maximum preservation of enamel.

19. Clinical view, 1 week afterwards with contrastor to appreciate the fine cut of margins of the restoration (Laboratoire Esthetic Oral).

20. Final view of the smile with restoration of the maxillary central incisors which gives the smile a harmonious line.

21. Final view.

22. Final view (Photo taken with 2 light boxes).

Recommended GC step-by-step for cementation of veneers

G-ænial Universal Flo

1. Preparation of the ceramic restoration:

Etch the ceramics with Hydrofluoric acid ~9% for max 60 sec (feldspar ceramics) or max 20 sec (lithium disilicate – e.max®). Rinse and dry thoroughly.
Apply **Ceramic Primer II** according to IFU.

2. Preparation of the tooth:

Selectively **etch enamel with phosphoric acid** for 10 sec, rinse and dry.
Apply a bonding agent, **G-ænial Bond** according to IFU and light cure.

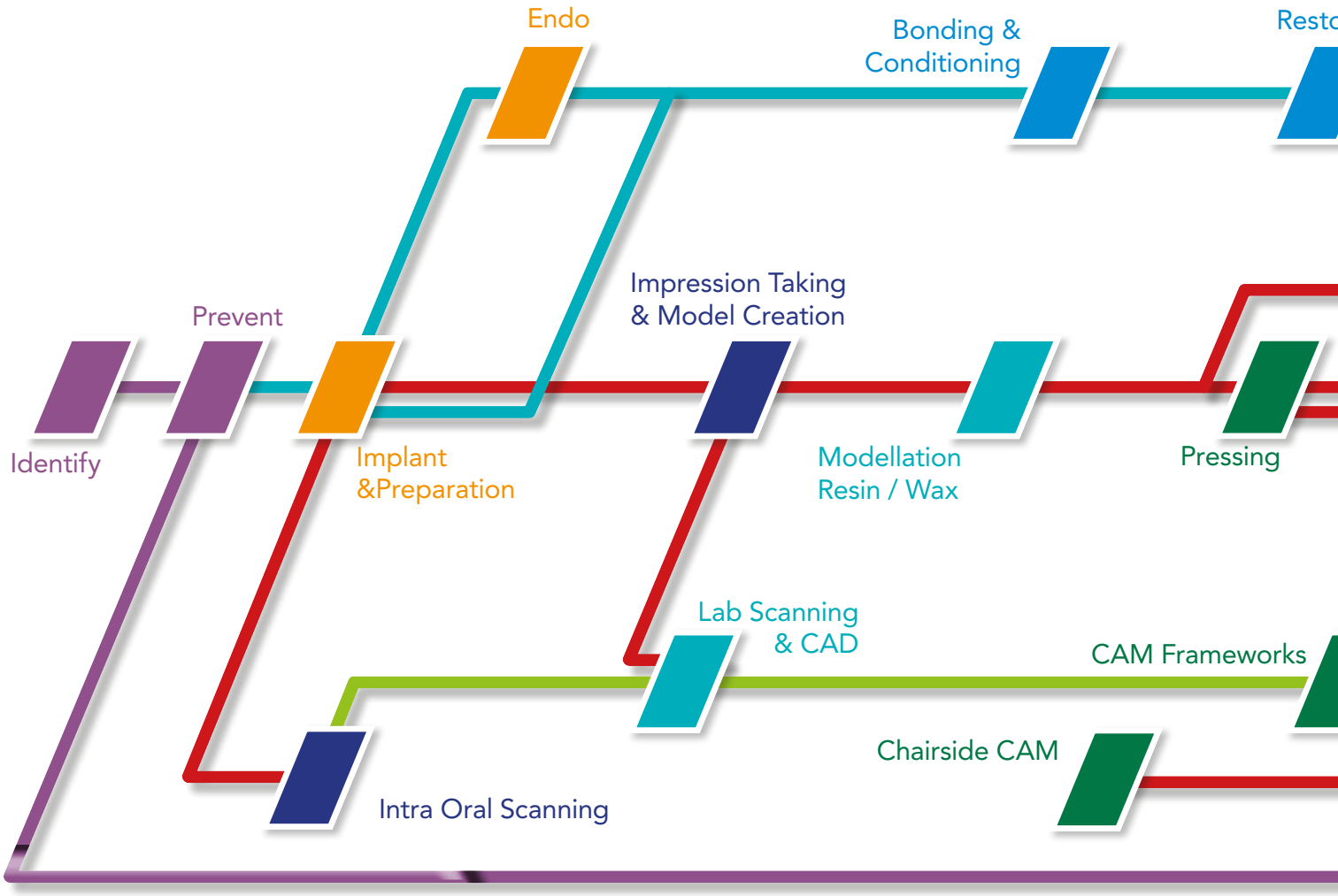
3. Cementation:

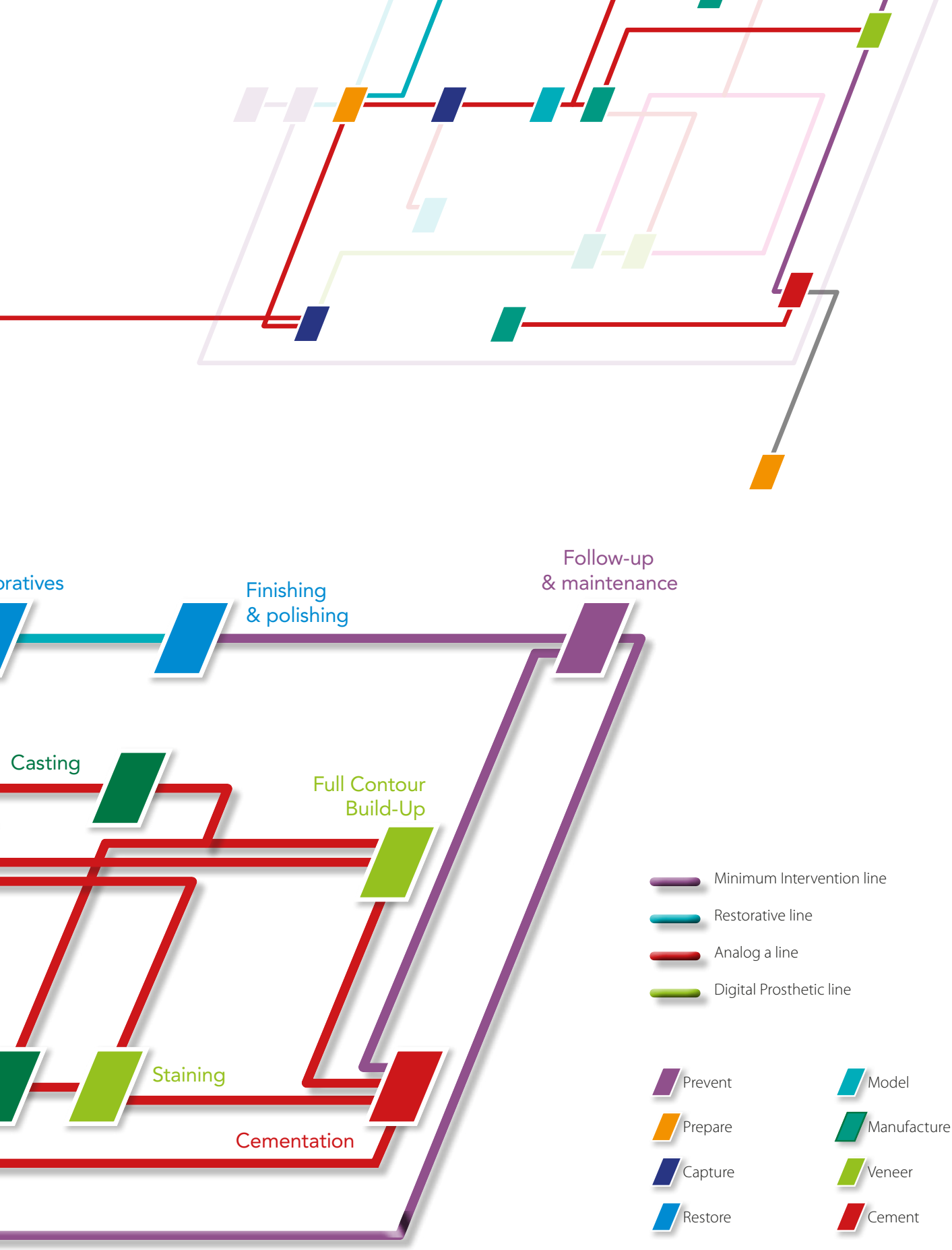
Apply G-ænial Universal Flo on the bonding surface of the restoration.
Seat the restoration of the preparation. Remove excesses with a brush, a probe or a blade. Light cure each surface for 40 sec with maximum light intensity.
Polish the margins with a soft instrument that does not affect the ceramics.

Metromap

The multitude of possible methods, workflows (analog or digital) and approaches is certainly one of the main characteristics of modern dentistry. An advantage to some, it may also prove to be a challenge to maintain a clear view for others.
From problem to solution is a journey with different 'stops' and in our dental profession, this means from preparation until cementation of the prosthetic work, from preparation to finishing of the direct restoration. We at GC, as a responsible manufacturer, we see it as our task to show you the different 'ways to Rome'.
So we have created a "GC metro map". Generally it simplifies a public transport network in major cities worldwide, but we made it into a schematic design of the entire GC product portfolio and how each product is related.
First of all, this map clearly shows GC's presence in each domain. But also it shows that once you have chosen a certain trajectory or line, you don't have to stay on this line for the entire ride. GC keeps your options open, and like in real life, it's always interesting to get off the beaten track and explore unknown areas.
The different lines offer a solution fro the beginning to the end and the different stops show you where GC can offer you one or more products that will help you in getting the best reults depending on your preferences of procedures. Get Connected. Together towards the best solution for your patients!

Get Connected, Together towards the best solutions for your patients.




oratives
Finishing
& polishing
Follow-up
& maintenance
Casting
Full Contour
Build-Up
Staining
Cementation
Minimum Intervention line
Restorative line
Analog a line
Digital Prosthetic line
Prevent
Prepare
Capture
Restore
Model
Manufacture
Veneer
Cement

Composite 3D - diastema closure - & biomimetic effects

Ulf Krueger-Janson, Frankfurt am Main, Germany

Adhesive restorations are often the easiest way to correct aesthetically displeasing tooth positions. This procedure involves a quick and simple method, which allows the creation of restorations featuring harmonious proportions. This purely additive treatment is very well received by patients, because it results in a quick and aesthetically pleasing change. The step-by-step procedure to design a natural emergence profile is described below. The main tools are a silicone index and a clear matrix strip.

Realization of a mock-up for the visualization of the end-result and the creation of a silicone key

In order to obtain natural-looking proportions, it is necessary to prepare a mock-up. This is prepared as follows: a composite resin in an opaque dentin shade is applied to the non-conditioned (unetched and unbonded) tooth surface (Fig. 2). After light-curing, it becomes clear if the shade selection is correct and can be adopted for the final restoration. In order to create natural-looking restorations, the length and width ratios should already be visualized in the mock-up. The proportions of the pair tooth can be mimicked and corrected if necessary. Finally, an impression of the mock-up is made from lingual / palatal side (Fig. 3), in order to obtain a design tool known as a silicone index (Fig. 4). The silicone index shows the palatal areas of the mock-up. Therefore it is important to ensure that the palatal and in particular the interdental structures are shaped according to anatomical criteria, even during the preparation of the mock-up. To obtain a better fit and repositioning of the silicone matrix for the subsequent treatment stage, the patient should bite on two cotton rolls in the posterior area. The patient can also bite directly onto the back of the silicone key (Fig. 5), to ensure a better repositioning.

Fig. 1 Initial view of the interdental diastema between 12 & 13.

Fig. 2 A Composite Shade dentine AO3 is used to create a mock-up. The role of the mock-up is to visualise the outcome of the treatment and to create a silicone key used as a design tool.

Fig. 3 An impression of the palatal and incisal area is taken with a silicone. The patient bites on the cotton roll positioned in the posterior area.

Fig. 4 The palatal surface and interdental structures are clearly visible on the silicone key.

The interdental areas should be precisely shaped, since they play an important role in the later creation of the emergence profile. When the silicone index is checked to ensure a perfect repositioning (Fig. 6), these anatomical elements can be re-assessed. The center line and contour lines should be clearly visible.

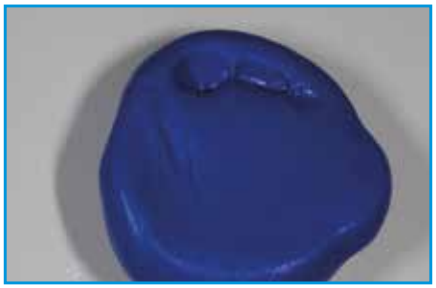


Fig. 5 Bite on the back of the silicone key with opposition dentition which will ensure correct re-positioning of the key.

Fig. 6 Re-positioning the silicone index after removal of the mock-up. The impression of the interdental areas is clearly visible.

Non-invasive diastema closure with Composite - procedure

For the preparation of the restoration, the vestibular and interdental surfaces of the teeth are roughened with an EVA head (oscillating), in order to increase the adhesive bond and to eliminate impurities or demineralised enamel structures (Fig. 7). Using a fine diamond bur only coated on one side, a small sub-gingival area can also be roughened. This should be done without irritation to or bleeding of the gingiva. This is followed by the retraction of the gingiva. In order to make this possible without irritation, a retraction cord of size 0 is favoured. The next step is the placement around the tooth to be restored of a transparent matrix (Fig. 8).

Fig. 7 The enamel is roughened by the oscillating EVA head.

Fig. 8 A transparent strip is positioned into the sulcus and around the palatal side of the tooth. The optimal positioning of the silicone index can be ensured by asking the patient to bite into the already created impression on the back side of the silicone.

The clear strip is pushed into the sulcus and away from the palatal by the silicone index on the tooth. Previously, the silicone index was adapted in the incisal area in order to prevent the deformation of the strip.

The distal papilla of tooth 12 is displaced by applying pressure. (Fig. 9) Likewise, it creates an open space for the creation of a new, broader emergence profile. The etching is carried out as per the manufacturer's instructions. The etching gel is applied to the narrow areas around the strip

with a brush in order to enable optimal etching on all surfaces. The same procedure is applied for the bonding step. After conditioning, the strip is pushed into the desired position with a Heidemann spatula and a first layer of flowable material is applied, using an opaque dentine shade (G-aenial Universal Flo AO3; (Fig. 10). Using the tip of a probe, the material is first placed onto the palatal surface and then applied to the interdental area. It is important to make sure that not too much material is applied, to allow the application of a further layer of composite. Since the strip is held by the silicone index, it can be pulled into the desired position by tugging gently with a pair of tweezers.

The shape of the composite in the incisal area can be modified by using a probe. As shown in Fig. 10, the material can also be adapted in the subgingival area.

Fig. 9 Biting fixes the index. A Heidemann spatula opens the area.

Fig. 10 The flowable composite is applied and the strip is pulled in the desired. direction using pliers. In the incisal area, the composite is shaped using tip of a probe.

The primary design of the emergence profile is hereby completed. The next material applied is a layer of opaque dentine AO3 from a paste-type composite (G-ænial Anterior, GC), which completes the distal part of the restoration.

The final composite layer is made using a semi-translucent material, in this case JE Junior Enamel shade (G-ænial Anterior, GC). This semi-translucent layer mimics the whitish translucent area found in the proximal parts of natural teeth. (Fig. 11)

Fig. 11 Final layer using Junior Enamel shade.

Fig. 12 Contouring with the EVA instruments

Fig. 13 Designing the incisal structures.

The final contour is now made with the EVA tool, and the restoration is polished. (Fig. 12 and 13) This procedure causes an atraumatic transformation of the interdental papilla. Even after polishing, no irritation of the tissue can be detected (Fig. 14 and Fig. 15).

Fig. 14 The tooth has been enlarged.

Fig. 15 Natural looking proportions with a sloping distal incisal edge. The incisal width is therefore visually reduced.

For tooth 13, the broadening is carried out using the same technique. The strip is again wrapped around the tooth (Fig. 16 /17) and fixed with the silicone index. A flowable material is also applied to the mesial area and positioned with the strip (Fig. 18).

After polishing, the shade can be assessed. Since the tooth is getting dehydrated during the restoration process, the tooth structure will appear lighter at the end of the treatment compared to a natural tooth. The end–result at 6 weeks (after rehydration) shows a good shade adaptation.

Fig. 16 Fixation of the strip.

Fig. 17 Opening of the interdental area.

Fig. 18 Application of flowable composite shade AO3.

Fig. 19 Finished and polished restoration. The interdental contact area has been restored

Fig. 20 A wider perspective shows the harmonious integration of the fabricated composite restoration.

Fig. 21 Picture taken 6 weeks after treatment. Full gap closure with anatomical moulding of the interdental papilla. The incisal edge has been modified to take into account the functional movements. The adaptation of the colour into its surrounding environment looks very natural.

Conclusion:

Through the restoration of the incisal edges of both teeth, ideal proportions could be re-created. The widening and the interdental gap closure integrate inconspicuously into their dental surroundings.

With a combination of flowable and paste-type composites and a creative technique, the restoration procedure became quick and practical. By allowing a better adaptation of the composite in the sub-gingival area, the strip technique enabled the creation of a natural-looking emergency profile. This direct and non-invasive approach (tape technique - direct aesthetic management) offered rapid results and demonstrated a perfect aesthetic integration.

Ulf Krueger-Janson

is vice president of the German Society of restaurative and regenerative dentistry. Ulf Krueger-Janson is a certified member of the European Society of CD, member of the "Neue Gruppe" and other expert groups, such as the German Association for Aesthetic Dentistry (DGÄZ) and German Association for Conservative Dentistry (DGZ). He has more than 15 years of experience in all-ceramic systems and treatments with Composites. The use of innovative digital techniques for finding solutions and treatment planning are currently the focus of his dental methodology. He is author of various international publications, since many years trainer and lecturer at home and abroad. Docent for MSc. Degree. In 2010 he published the book 3D Composite.

Modern Solutions for Direct Posterior Restorations

Professor Ivana Miletic, Department of Endodontics and Restorative Dentistry, School of Dental Medicine, University of Zagreb, Croatia

In order to restore effectively lost tooth structure, the chosen restorative material should demonstrate properties similar to natural tooth together with good adhesion, low polymerization shrinkage, high load bearing capacity and anticariogenic effect. The choice of a material also has to be adapted to the clinical situation, taking into account the patient's age, caries risk and aesthetic requirements, the possibility to isolate the tooth, the functional demands placed on restorations[1] and some economic considerations.

The most popular posterior restorative materials are resin-based composite, which are a combination of an organic part (matrix), an inorganic part (fillers) and coupling agents. Since their introduction on the market in the beginning of the 1960's, lots of attempts have been made to improve their composition in order to overcome two key shortcomings: lack of mechanical strength and high polymerisation shrinkage[2]. Improvements in composite materials have been especially focused on reinforcing the inorganic part, which is responsible for physical and mechanical properties like hardness, flexural strength, modulus of elasticity, coefficient of thermal expansion and wear resistance. The filler size in composite materials is directly connected to the mechanical properties of the material. Nanofilled composites are developed to offer materials that are more easily polished and have greater wear resistance[3]. This high wear resistance will be particularly important in the posterior region. When using nano-sized inorganic particles, the percentage of fillers in the material is increased, particles are uniformly dispersed in the organic matrix and the space between the particles is reduced, which reinforces and protects the organic matrix[4,5,6]. These nano fillers can be used in conventional composite materials, but also in flowable

composites. Conventional composites based on this technology can be categorized according to nanomer or nanocluster filler particles[7]. Nanomers are isolated discrete particles, with dimensions ranging from 5 to 100 nm, while the size of nanocluster filler particles may significantly exceed 100 nm[8]. Nanohybrid composites contain finely ground glass fillers and nanofillers in a prepolymerized filler form[9]. An example of nanohybrid composite material is G-ænial (GC, Tokyo, Japan) which consists of 400 nm strontium glass, 100 nm lanthanoid fluoride and 16 nm silica in prepolymerized forms. This composite is available in Anterior and Posterior versions. The variation of particle sizes and interfaces within the G-ænial material enables the reflection of light on the restoration in a similar way as within the tooth structure. For this reason, a very nice aesthetic result can be achieved even when using only one color of this material (Fig. 1-6).

The advantages of flowable composite materials are their good adaptation and adherence to the cavity margins and the fact that they are more elastic when compared to conventional composite resin materials, thereby capable of buffering some of the stress applied onto the restoration. The main disadvantages of flowable composite are generally considered to be their lower physical and mechanical properties. Bayn et al.[10] emphasized that flowable composites from the first generation, due to the lower inorganic part in their composition, exhibit a higher polymerization shrinkage in comparison to conventional composite materials. Recently, a new composite material (G-ænial Universal Flo, GC, Tokyo, Japan) was introduced, featuring improved physical, mechanical and optical properties. The inorganic part of the material is based on strontium glass particles with a size of 200 nm, which are the smallest particles that have been added to a flowable composite material. The adhesion between the inorganic and organic parts is improved as well as its elasticity, saturation of colour and futhermore, the material features excellent wear resistance and polishability and is offered in a broad spectrum of shades. Thanks to these improvements, this material can be used for posterior restorations of occlusal and approximal cavities using a standard procedure (Fig. 7, 8). According to the manufacturer, G-ænial Universal Flo is a thixotropic material which stays in place after application, unlike other flowable composites. This characteristic is especially desirable when restoring cervical parts of teeth (Fig. 9,10).

In light of Minimum Intervention concepts for restoring teeth, a new promising material for posterior restorations is a micro laminated GIC with adhesive and bioactive properties, enabling hard dental tissue preservation and remineralisation. This new material

Fig. 1 Old amalgam restoration

Fig. 2 Cavity after removal of amalgam filling and secondary caries

Fig. 3 Dentin adhesive

Fig. 4 Application of adhesive

Fig. 5 Flowable composite

Fig. 6 Restoration with G-ænial (shade A1)

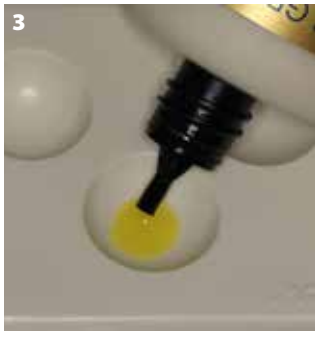
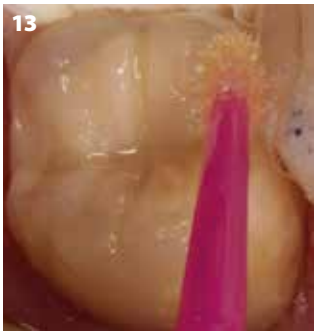


Fig. 7 and 8 Restoration with G-ænial Universal Flo

Fig. 9 and 10 Restoration with G-ænial Universal Flo



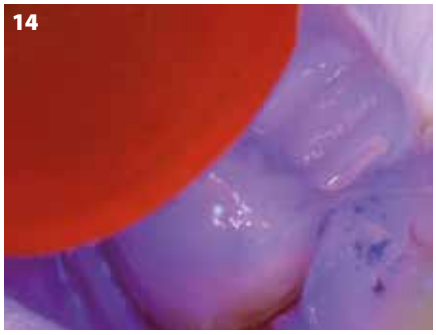


Fig. 11 and 12 Removal of old filling and application of EQUIA Forte Fil

Fig. 13 Coating of the surface with EQUIA Forte Coat

Fig. 14 Light polymerization for 20 sec.

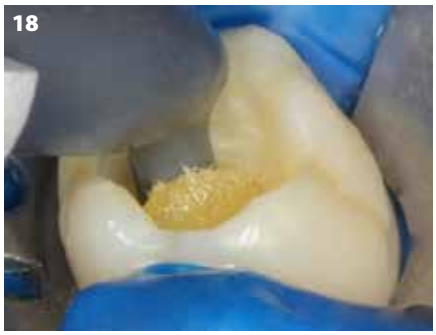
Fig. 15 Final restoration with EQUIA Forte

Fig. 16 and 17 Replacement of old amalgam filling with EQUIA Forte system

EQUIA Forte is especially useful when complete dry field cannot be achieved.

has shown long-term clinical success, which is supported by scientific data[11, 12]. The main disadvantage of glass-ionomers has been until recently their low mechanical strength, which made them unsuitable for use in high stress areas, such as occlusal and approximal areas. The new **EQUIA Forte** system consists of EQUIA Forte Fil and EQUIA Forte Coat. According to the manufacturer, its physical properties are superior to the existing EQUIA restorative system introduced in 2007. The highly reactive small glass particles added to the new material contribute to improving its flexural strength, by releasing metal ions which support the crosslinking of polyacrylic acid. Additionally, EQUIA Forte Fil adopted high-molecular-weight polyacrylic acid, which makes the cement matrix stronger and chemically more stable. EQUIA Forte Fil is placed easily in "bulk" directly in a cavity (Fig. 11, 12). After the hardening of the material and the finishing procedure, a thin layer of EQUIA Forte Coat is applied (Fig. 13) and polymerized for 20 sec. (Fig. 14 & 15). EQUIA Forte Coat is based on the same technology as EQUIA Coat, featuring nanofillers uniformly dispersed in the coating liquid, together with the addition of a new multifunctional monomer with efficient reactivity. This monomer makes the coating layer harder and smoother. Thanks to its moisture tolerance, EQUIA Forte is especially useful when complete dry field cannot be achieved (Fig. 16, 17).

A major concern is still how to restore endodontically treated teeth. Endodontic treatment is usually performed on teeth with severe loss of tooth substance. Previous carious lesions, pre-existing restorations and access cavities are factors responsible for reducing the amount of healthy dentin and thus increasing the probability of fracture under functional forces. Panitivisai and Messer[13] showed that cuspal deflection increased while adding more extensions to the cavity preparations. When an access cavity was incorporated into a preparation, cuspal deflection was the greatest. Therefore, it is essential to develop new materials helping to prevent the fracture of endodontically treated teeth. Recently, a fibre-reinforced composite has been introduced as a new material for dentin replacement, with a composition incorporating glass fibres into the organic matrix of the composite. By combining fibres and composite materials, it is possible to overcome some of the limitations of conventional composites such as high polymerization shrinkage, brittleness and low fracture toughness[14]. Garoushi et al.[15] concluded that by adding continuous bidirectional or short random fibre-reinforced composite substructures under the particulate filler composite resin, the load-bearing capacity and compressive fatigue limit of restorations could be



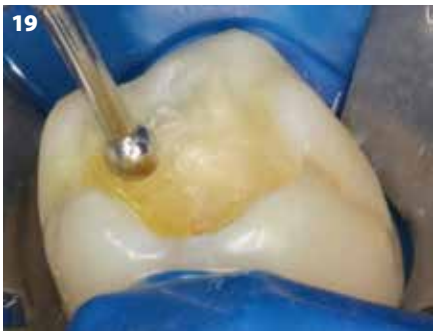


Fig. 18 Application of everX Posterior

Fig. 19 Adaptation of material with instrument to the cavity walls and cavity bottom and undercuts

Fig. 20 everX Posterior in the cavity

Fig. 21 Final layer of light-cured restorative composite G-ænial

increased. everX Posterior (GC, Tokyo, Japan) is a material based on this fibre-reinforcement technology. It is based on the combination of an organic resin matrix (bis-GMA, TEGDMA and PMMA) forming an Interpenetrating Polymer Network (IPN) and randomly orientated E-glass fibres and inorganic filler particles. IPN means that the material consists of two independent polymer networks (linear and cross-linked), which are not connected by chemical bond. Another advantage of fibre-reinforced composites is that the polymerization shrinkage is controlled by the direction and orientation of fibres[17, 18].
everX Posterior has anisotropic properties because fibres are mainly oriented randomly (Fig. 16). However when placing the material in a cavity using instruments, fibres are mainly oriented in the horizontal plan (Fig. 17, 18). As a result, shrinkage has different values in the horizontal direction, causing less stress on cavity walls.

everX Posterior should always be covered with a layer of one to two millimeters of particulate composite resin (Fig. 19). According to the manufacturer, everX Posterior is indicated as a reinforcing base material for direct composite restorations especially in deep, large posterior cavities. Endodontically treated teeth can also strongly benefit from its properties, as fibres have the ability to slow down, arrest or redirect crack propagation, thus reducing the risk of catastrophic failures.

New developments in dental materials continue to offer innovative modern solutions to all clinical situations and enable to challenge the usual treatment approaches by providing alternative materials or methods which bring novel benefits. Continuous learning about these new materials' properties and indications is crucial for practitioners to be able to offer tailor-made solutions to patients, which match their requirements and give the best possible prognosis of success.

Ivana Miletić, *DMD, PhD was born in 1971. in Zagreb. She graduated at the School of Dental Medicine, University of Zagreb in 1995. Since then, she has been working at the Department of Endodontics and Restorative Dentistry in the University of Zagreb, where she gradually became full Professor (in 2008) and actively participates in teaching in clinic, pre-clinic and continuous education. She is also head of postgraduate and PhD courses. She got her master degree in 1998, PhD in 2000; and passed the specialist exam in endodontics and restorative dentistry in 2004.*
She is an author and co-author of four course books and more many scientific, review, educative and specialized articles in extenso which are also cited in many international journals and course books. She is particularly specialised in the field of Endodontics, where she actively worked on various scientific projects from 1996 till today.
She has been participating on many national and international congresses, and has held many lectures. She is an active member of Croatian Chamber of Dental Medicine, Croatian Endodontic Society, Croatian Medical Association, European Endodontic Society, ORCA and IADR. She is the president of the Croatian Society for Minimum Intervention Dentistry.

References

1. Burgess JO & Cakir D. Material selection for direct posterior restoratives. www.ineedce.com.
2. Garoushi S, Vallittu PK, Watts DC, Lassila LV. Effect of nanofiller fractions and temperature on polymerization shrinkage on glass fiber reinforced filling material. Dent Mater. 2008; 24:606-10.
3. Ferracane JL. Resin composite—State of the art. Dent Mater. 2011; 27:29-38.
4. Bayne SC, Taylor DF, Heymann HO. Protection hypothesis for composite wear. Dent Mater 1992;8:305-9.
5. Turssi CP, Ferracane JL, Vogel K. Filler features and their effects on wear and degree of conversion of particulate dental resin composites. Biomaterials. 2005;26:4932-7.
6. Lim BS, Ferracane JL, Condon JR, Adey JD. Effect of filler fraction and filler surface treatment on wear of microfilled composites. Dent Mater. 2002;18:1-11.
7. Endo T, Finger WJ, Kanehira M, Utterodt A, Komatsu M. Surface texture and roughness of polished nanofill and nanohybrid resin composites. Dent Mat J. 2010; 29:213-23.
8. Cramer NB, Stansbury JW, Bowman CN. Recent advances and developments in composite dental restorative Materials. J Dent Res. 2011; 90:402-16.
9. Senawongse P, Pongprueksa P. Surface roughness of nanofill and nanohybrid resin composite after polishing and brushing. J Esthet Restor Dent. 2007; 19:265-75.
10. Bayne SC, Thompson JY, Swift EJ Jr, Stamatiades P, Wilkerson M. A characterization of first-generation of flowable composites. J Am Dent Assoc. 1998;129:567-77.
11. Gurgan S, Kutuk Z, Ergin E, Cakir F. Four-year randomized clinical trial to evaluate the clinical performance of a glass ionomer restorative system. Oper Dent. 2015;
12. Diem VT, Tyas MJ, Ngo HC, Phuong LH, Khanh ND. The effect of a nano-filled resin coating on the 3-year clinical performance of a conventional high-viscosity glass-ionomer cement. Clin Oral Invest 2014; 18:753-9.
13. Panitvisai P, Messer HH. Cuspal deflection in molars in relation to endodontic and restorative procedures. J Endod. 1995; 21:57-61.
14. Wolff D, Geiger S, Ding P, Staehle HJ, Frese C. Analysis of the interdiffusion of resin monomers into pre-polymerized fiber-reinforced composites. Dent Mater. 2012; 28:541-7.
15. Garoushi S, Vallittu PK, Lassila LV. Short glass fiber reinforced restorative composite resin with semi-inter penetrating polymer network matrix. Dent Mater. 2007; 23:1356-62.
16. Vallittu PK. Interpenetrating polymer networks (IPNs) in dental polymers and composites. J Adhes Sci Technol. 2009; 23:961-72.
17. El-Mowafy O. Polymerization shrinkage of restorative composite resins. Pract Proced Aesthet Dent. 2004;16:452-3.
18. Tezvergil A, Lassila LV, Vallittu PK. The effect of fiber orientation on the polymerization shrinkage strain of fiber-reinforced composites. Dent Mater. 2006; 22:610-6.

Rediscover GC FujiCEM 2

with **Dr. Lucile Dahan**

Taking the most of the launch of the new SLIDE & LOCK system for FujiCEM 2, GC Get Connected recently spoke with Dr. Lucile Dahan, a dentist based in France, about the use of GC FujiCEM 2 in her practice.

Dr. Lucile Dahan is a dentist in Paris, France. She is also a member of the Academy for Adhesive Dentistry.

All the prosthetics have been done by the dental technician Asselin Bonichon, Laboratoire Nouvelles Technologies, Paris

As a clinician, what are the most important features that you look for in a resin modified glass ionomer luting cement (RMGI)?

Dr Lucile Dahan: I expect a RMGI cement to offer:

- visual control of the homogeneity of the mixture between the two pastes
- a working time which is sufficiently long to allow for the assembly of an unitary element or a plural prosthesis
- a relatively short setting time
- good mechanical properties at low thickness
- low dissolution over time and under stress
- a "dentine" shade to allow the most aesthetic cementation possible
- easy removal of excess
- high radio-opacity to verify the absence of excess in the interproximal area

For which indications do you use FujiCEM 2?

Dr Lucile Dahan: FujiCEM 2 is a resin modified glass ionomer cement. I use it to cement prosthetic parts with the following criteria:

- sufficient intrinsic retention: opposing walls of the tooth preparation enable the prosthetic part to be kept in place
- excellent marginal adaptation: the prosthetic part adapts perfectly to the preparation without excessive friction and with margins of less than 100 microns (detection threshold of the probe)

The RMGIs (resin-modified glass-ionomer cement) proved their value in the cementation of metallic or porcelain fused to metal (PFM) elements[1,4]. So I systematically use FujiCEM 2 to assemble this type of dental-supported crown, as well as inlay-cores.

Despite having increasingly high mechanical properties, resin-modified glass ionomer cements (RMGI cements) are still not recommended for assembling inlays/onlays in ceramic or composite as the first-line treatment[2,3].

The question arises in the case of all ceramic crowns, whether they are glass-based, such

as e.max® (Ivoclar Vivadent), alumina-based or zirconium-based. For the choice of the material used to cement, the clinical situation guides me. I ask myself the following questions:

- can I establish a waterproof surgical site?
- will the optical properties of my luting cement influence the final aesthetic result of my prosthesis?

If the answer to both of these questions is yes, I will bond instead of cement. However, most of the time the margins of the preparation are subgingival, and total control of humidity in this area proves to be difficult. Therefore it is necessary to anticipate and ensure that a primary retention of the preparation is created. Therefore, cementation with FujiCEM 2 is becoming a reliable alternative for the assembly of full-ceramic crowns[1,5].

When did you first start to use FujiCEM 2 and what were your initial thoughts about it?

Dr Lucile Dahan: I started to use FujiCEM 2 in 2012. Previously, I used FujiCEM and before that, Fuji Plus to assemble my crowns. With FujiCEM 2, I found notable improvements:

- delivery mode in an auto-mixing syringe: the use of Fuji Plus in capsule (which requires the use of a vibrator) was quite restrictive, especially in a group practice where the vibrator is often shared.
- a colour difference between pastes A and B which was greater than with FujiCEM. The reliability of the mixture is now easier to check.

FujiCEM 2 is a reliable, easy-to-use and versatile product!

As compared with FujiCEM, the working time is suitable and the setting time is less than 3 minutes. As for the excess, it is simple to remove.

Initially, FujiCEM 2 cartridge was used in a "metal dispenser " which I didn't find really convenient and the mixing tips were difficult to attach. Subsequently, GC launched a new plastic "dispenser" which is both small and light, named the GC FujiCEM 2 Dispenser. This plastic dispenser offers a better handling and takes up much less space in the storage drawers. I really like this dispenser and, for me, it is a considerable advantage of the FujiCEM 2.

What results have you had since using GC FujiCEM 2?

Dr Lucile Dahan: **It's my "routine cement." I also use it in the anterior as well as posterior, for the cementation of crowns or inlay cores, both for young & older patients...**

FujiCEM 2 can be used alone or with the Fuji Plus Conditionner[6] if we want to improve its mechanical properties. **Up to now, I have not experienced any debonding, whatever the prosthetic substrate. I have only carried out a few crowns on vital teeth, but I have not noted any post-operative sensitivity from my patients.**

Do you have any advice for dentists who want to start using FujiCEM 2?

Dr Lucile Dahan: The best advice I could give is to read the instructions for use thoroughly before using it for the first time. Everything is specified, such as the fact that you should not use hydrogen peroxide (H_2O_2) to disinfect surfaces before cementing.

Cementation of an inlay-core

Fig. 1 Preparation of the inlay-core 24.

Fig. 3a & 3b With the regular mixing tips of FujiCEM 2, it is not so easy to place the cement into the root canal. Thanks to the thin elongation tip of the new GC FujiCEM 2 Mixing Tip SL for Endo, it becomes really easy to inject directly FujiCEM 2 into the root canal, minimizing the presence of air bubbles inside the cement.

For me, the "SLIDE & LOCK" system was the final development needed to make FujiCEM 2 perfectly ergonomic.

Fig. 4a & 4b The angulation of GC FujiCEM 2 Mixing Tip SL for Endo offers a better access to maxillary teeth.

Fig. 2 Discard the first pastes coming out of the cartridge, before dispensing FujiCEM 2 in the prosthetic part.

Fig. 5 Cementation of inlay-core (realisation of A. Bonichon, Laboratoire LNT, Paris).

Fig. 6 Removal of excesses from the preparation.

Although the visual control of mixing is made easier by the colour difference between the two pastes, I always check the proper extrusion of components before putting the mixing tip on.

Of course, the best cements would not be anything without properly cleaning the assembly surfaces:

- Tooth preparation: cleaning the surface with a wet pumice and a brush mounted on an angle against a blue ring or by alumina sandblasting (27 microns on the dentine, 50 microns on a metallic inlay core). I might use the Fuji Plus Conditionner if the rinse can be carried out without risk of bleeding of the marginal gingiva.
- In the inner part of prosthesis: whatever the nature of the crown, I always disinfect it in sodium hypochlorite or alcohol. If the inner part is metal-based, I sandblast it using alumina at 50 microns before assembling it. In the case of an e.max® crown, I etch the inner surface with hydrofluoric acid for 20 seconds and then add silane to optimise the adhesion with the resinous part of the FujiCEM 2.

What are your first impressions of the "SLIDE & LOCK system" and new mixing tips?

For me, the "SLIDE & LOCK" system was the final development needed to make FujiCEM 2 perfectly ergonomic. The mixing tips (GC FujiCEM 2 Mixing Tip SL & GC FujiCEM 2 Mixing Tip SL for Endo) can be easily attached and detached quite intuitively, without forcing.

Cementation of an e.max® full-ceramic crown

The GC FujiCEM 2 Mixing Tip SL for Endo is a new type of mixing tip that is essential. This thinner and angled mixing tip presents a number of advantages:

- direct injection of the cement into the root canal during the cementation of inlay-core
- easier access to the posterior teeth notably if one wishes to carry out a double coating on a second maxillary molar
- the dispensing of FujiCEM 2 is much more precise in the inner part of the prosthesis

Therefore, FujiCEM 2 is a reliable, easy to use and versatile product!

Fig. 1 Preparation of tooth 45 after removal of the temporary crown.

Fig. 2 Etch of the inner part of the restoration with hydrofluoric acid 9% for 20 seconds.

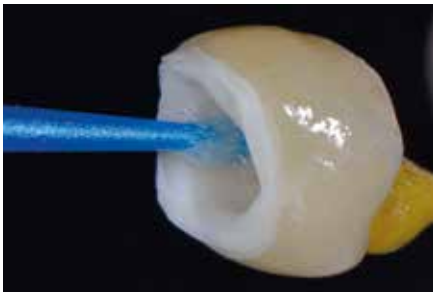


Fig. 3 Application of silane in the inner part. This surface treatment is meant to optimize the adhesion between the resin part of the FujiCEM 2 with the glass-ceramics e.max®.

Fig. 4 Cleaning the preparation by sandblasting with 27 microns alumina. A retraction cord is placed in the gingival sulcus to facilitate the access of the preparation's margins containing gingival fluid and to allow an easy removal of excess cement.

Fig. 5 Discard the first pastes coming out of the cartridge, before dispensing FujiCEM 2 in the prosthetic part.

Fig. 6 Dispense FujiCEM 2 in the inner part of the prosthesis. The new mixing GC FujiCEM 2 Mixing tip SL for Endo offers a precise and easy application.

Fig. 7 Cementation of the crown. When the cement reaches a rubbery consistency, excesses of cement are easily removed with a probe 6.

Fig. 8 Final view of the full-ceramic crown e.max® 45 (Realisation: A. Bonichon, Laboratoire, LNT, Paris)

References:

1. Edelhoff.D, Ozcan.M, Clin Oral Impl Res 2007;18 (Suppl.3) :193-204
2. Hill.EE, Lott.J. Aust Dent J. 2011 Jun;56 Suppl 1:67-76
3. Haute Autorité de Santé. reconstitution d'une dent par un matériau incrusté (inlay-onlay): rapport d'évaluation technologique. HAS 2009:1-82.
4. Yoneda.S, Morigami.M, Sugizaki.J,Yamada. T, Quintessence Int 2005;36 :49-53
5. Pospiech.P, Clin Oral Inves 2002;6 :189-97
6. Yapp.R, Hirano.K, Nelson.P, Powers JM. The Dental Advisor Research Center 2012 ;47.

Monolithic milling - individually characterised

Smart surface sealing with milled PMMA-Restorations: GC OPTIGLAZE Color

by ZTM **Christian Rothe**

Digitally modelled and monolithic milled restorations have become a frequently applied technique in daily laboratory practice, for example when creating high quality long term temporary restorations. Efficiency, durability and material homogeneity are substantial arguments in favour of this way of working. So far, however, there was a drawback of milled full contour restoration: there was no direct way to obtain an aesthetically pleasing result. This gap in the manufacturing process has now been "filled" with GC Optiglaze Color. The light-curing, nano-filled material for surface characterization and sealing provides a very simple solution.

1. The long-term temporary restoration

The CAD / CAM-based monolithic fabrication of long-term temporary restorations is an economic solution to keep costs manageable. Neither patient nor dentist wants to invest a lot of time and money in a temporary solution. Nevertheless, certain requirements should still be met. The long-term temporary is a treatment solution and should have a high grade material, little plaque vulnerability and natural-looking aesthetics. With GC Optiglaze Color, we have found a way in which all these conditions and desires can be fulfilled efficiently.

1.1 Digital Set-up and Try-in

Six implants were placed in the upper and lower jaw; a long term temporary was to be placed on the implants. The wax-up / set-up was digitally constructed. This way, possible parameters and effects (of tooth position, length and width) can be checked beforehand, correctly and at low cost. Ideally, from a planning point of view, the STL data of the master model are digitized, as well as the old dentures.
To have a trial the patient's mouth, we created a white resin try-in from the digital data, leading to a wax trial set-up adapted to all the important parameters in the mouth. A white try-in is ideal for fitting; it clearly shows the traces of the articulation paper. This is an important building block for the construction of the long-term temporary. The successively developed set-up (try-in) is digitized, wherein the opaque representation of the plastic allows lossless import of the information and transferring the information in the CAD / CAM software. The STL data of this set-up serve as a basis for the virtual design of the long-term temporary.

1.2 Framework for the long-term temporary Restoration

Dental long term temporaries are full anatomic designs. Since the gingiva will be layered separately, this area has been reduced from the digital design by approximately 0.8 mm. Now the data can be imported into the CAM software and milled from a PMMA blank. This high quality base material is used in the corresponding tooth color. After milling, the result is a 1:1 reproduction of the virtual setup, the ideal starting point for the completion of the long-term temporary. With GC Optiglaze Color, the nano-filled sealing material, these full anatomic milled teeth should be characterized individually.

1.3 Layering the gingival area (GC Gradia Gum)

To make the gingival area look lively and naturally, this area (that was reduced from the digital framework) will be created/ veneered individually with GC Gradia Gum, a light-cured composite. The system integrates flowable opaque masses (Gum Opaque), different-colored pasty body masses and a gel-like modifier. Since we deal with a temporary in the illustrated case, we wanted to keep the veneering relatively simple. With the malleable material, the base of the gums is created and a "liquid" mass (GM35) imitates an off-white gum line. After light-curing, the result is a natural-looking prosthetic gingiva. The polishing and the material density of the veneering can further optimized with the application of a sealer (GC Optiglaze).

1.4 Individual characterisation of teeth (GC OPTIGLAZE Color)

Now, the fully anatomically milled teeth will be enhanced with a natural play of colors, with GC Optiglaze Color. The light-cured, nano-filled material is conceived for easy and natural looking surface characterization and sealing.
As easily as in "painting by numbers", the desired color can be applied and light-cured, without polishing! The material is stored at room temperature and applied directly to the desired location. Next, we incorporate a light microtexture on the surface of the fully anatomical tooth Fine perikymata or interplay between concave and convex regions ensure the outcome looks lively. For the color modification, GC Optiglaze Color comes up again, to make the surface differentiated with a few brush strokes. It's fun to work with this material; the color you prefer can be chosen from a wide range of colors and applied to the surface with a fine brush.

Fig. 1 The blueprint: a digital set-up (full anatomical)

Fig. 2 & 3 The build-up data of the digital set-up are uploaded to the nesting-software and milled from a white resin blank (Try-in).

Fig. 4 After a fitting in the patient's mouth, the entire set-up is digitalised, to develop a long term temporary with reduced gingival area!

Fig. 5 Layering the gingival areas with light-curable composite (GC Gradia Gum). The easy to shape consistency of this material guarantees a morphological reproduction of the gingiva.

Fig. 6 & 7 Front view: the framework before and after layering the gingiva. The area of the teeth is fully anatomically milled from plastic

Fig. 8 & 9 Occlusal view: the framework before optimizing with GC Optiglaze Color. The area of the teeth is fully anatomically milled from plastic.

Whether bluish transparent in the region of the incisal edge, warm reddish in the deep fissures or a fine white point on the cusp – a limited film thickness results in individually characterized "teeth" with vibrant color depth, translucency and natural shine. Light-curing can be done with polymerization from a conventional light curing unit. Finally, we also have the layered gingival, additionally characterized by a red and pink sealing material. A major advantage is that the restoration does not need to be polished now. Because in addition to the accented color scheme, GC Optiglaze Color simultaneously increases the surface resistance. As such, the plaque vulnerability is substantially reduced and resistance increased.

2. Result

The long-term temporaries for the upper and lower jaws are screwed onto the implants. For the visible screw channels, we have cut small cap inlays made of PMMA and color matched them with GC Optiglaze Color shades of the restoration. The screw holes can be closed almost invisibly. Long term temporaries realized in this way feature high-quality materials (industrially produced PMMA Blank), which cannot be realized by conventional means. With the efficient Technique (GC Optiglaze Color) long-term temporaries were given a polychromatic appearance and an impressive three-dimensional depth. The extensive color selection, the thin film thickness (25 to 50 microns), the high discoloration and abrasion resistance and natural-looking, long-lasting gloss turn long term temporary restorations into a high standard treatment. The color effect of GC Optiglaze Color according to the manufacturer withstands up to 50 000 thermocycles, making it a stable solution in the long run.

3. Other indications for GC OPTIGLAZE Color

GC Optiglaze Color, the nano-filled surface sealant offers many treatment options. Besides the described indications, prefabricated teeth can be individualized and removable prostheses can be designed in such a way that they come close in shape to a veneered restoration. The variety of colours of GC Optiglaze Color and ease of use (Technique) enable a high aesthetic appeal that is preserved for a long time.

Christian Rothe

1997 - 2001	Training as a dental technician
2002	Works at the Specialist Dental Centre of Berlin Military Hospital (FZZ)
2001 - 2005	Works in various laboratories
2005	Master Dental Technician - Examination at the HandWerksKammer, Berlin
2005	Established his own dental laboratory
2009	Starts as a lecturer
2010	Member of the Master's Thesis Commission, Berlin
2014	Expert for Functional and aesthetic dentistry, at the Deutsche Gesellschaft fur Ästethische Zahnmedizin (DGÄZ) / Akademie für Praxis & Wissenschaft (APW) / Zahntechniker Innung Düsseldorf (ZID)
	Continuous development through participation in seminars, trainings and workshops.

Fig. 10 & 11 The long term temporary restorations for lower and upper jaw are given a natural and truly individual iridescence with GC Optiglaze Color

Fig. 12 Close-up. The natural-looking long-term temporary PMMA is screwed on the implants. For the screw channels in the visible range, we have cut small cap inlays made of PMMA and color- matched these to the restoration with GC Optiglaze Color.

Fig. 13 The two restorations on the master models. This was achieved fairly easily.

Fig. 14 & 15 Occlusal view The fully anatomically milled teeth have been characterized by GC Optiglaze Color. We have given the fissures with the colored paint some depth, giving the teeth a natural look.

Fig. 16 Whether bluish transparent in the region of the incisal edge, or hot reddish in the deep fissures - the very thin application of GC Optiglaze Color makes teeth stand out with vibrant color depth, translucency and natural shine.

A new solution to compensate firing shrinkage with translucent shades.

by **Dr. Vincenzo Mutone,** Italy

Nearly all ceramic restorations that we see in our laboratory, whether they be crowns, bridges or long-span restorations, and regardless of whether they were manufactured using a complex or simplified build-up technique, undergo some volume shrinkage during the sintering process. The shrinkage effect is more severe the larger the restoration, but all are affected, including individual crowns.

Individual crowns

Fig. 01

Fig. 02

Long-span bridges

Fig. 03

Fig. 04

1. Adding dentine powders in the areas corresponding to the dentine and enamel areas on the incisal surface;

Fig. 05

Fig. 06

2. Overlaying enamel powders in the incisal and dentinal areas;

Fig. 07

Fig. 08

3. Adding neutral translucent powders in the incisal and dentinal areas;

Fig. 09

Fig. 10

4. Adding enamel and translucent powders in the incisal areas and mixes of dentine-enamel powders and/or dentine/translucent powders in the dentinal areas.

Fig. 11

Fig. 12

A new solution to compensate firing shrinkage with translucent shades.

Solutions to this common problem can depend on the experience and skill of the technician and how much time is available for a correction firing. Even an experienced technician might be uncertain about the most appropriate solution, knowing that the layer of product added to complete the shape will probably affect the end result. This is particularly true when the ultimate goal is to build a restoration whose shade matches one in a standard shade guide, maybe because the prosthetic dentist provided a specific shade reference or because the technician chose a shade judged to be the most appropriate for reproducing the appearance of the natural teeth.

The most critical and sensitive part of the crown in this correction layering is that reproducing the dentine area. This is the portion most severely affected by the addition of dentine, enamel and translucent powders with different characteristics that will consequently affect the hue, shade, intensity and value of the restoration.

Observing a sample of dental technicians using different build-up materials and techniques, I noticed that correction firings to complete the shape of the restoration were carried out using repetitive processes that could be classified into four groups:

A new solution to compensate firing shrinkage with translucent shades.

Obviously different techniques produce different outcomes. The following observations were made after correction firings using the four techniques described above:

Fig. 13


Fig. 14

1. Group 1 appeared to lack depth in the dentine area and often showed a sharp transition between the dentine and enamel areas;
2. Group 2 showed an excessive amount of enamel, affecting the dentine color, which deviated from the original shade;
3. Group 3 appeared to be different from the selected shade because the excessive amount of neutral translucent powder made the shade more gray, thus reducing the value;
4. Group 4 showed a final shade in which the dentine area featured a less saturated chroma compared to the desired starting shade.

The CST powders combine chroma and translucency features unique among current ceramic systems. These features help achieve the desired shape while ensuring a good match with the selected reference shade. In other words, these translucent powders enable the technician to produce the desired shape while guaranteeing life-like translucency and the brightness that is typical of natural teeth.

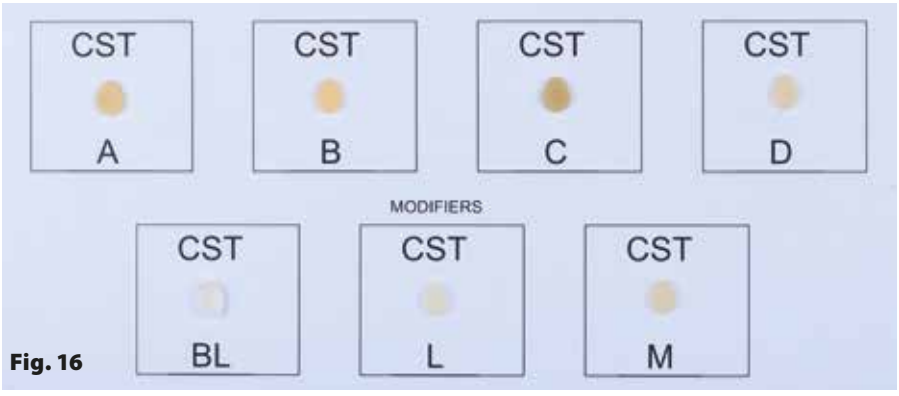


Fig. 16

The simplified Chroma Shade Translucent (CST) system includes just four base shades (one for each group of Vita shades) and three modifiers. By combining these powders, the entire Vita Color Shade Guide can be reproduced simply.

Fig. 17

Comparing the results of these four strategies that are aimed at solving the problem of volume shrinkage, we see that none of them produces a perfect match with the selected reference shade. But GC has introduced a new range of correction powders to its Initial MC line – called Chroma Shade Translucent (CST) – that solve the shrinkage problem by simplifying and standardizing the firing steps that are usually employed to achieve the final volumes.

Fig. 15

The powder combinations are summarized in the following table:

Vita shade	CST	Powder ratio	CST	Powder ratio
BL	BL	1		
A1	A	1	BL	3
A2	A	1	L	3
A3	A	1	M	3
A3.5	A	1	M	1
A4	A	1		
B1	B	1	BL	3
B2	B	1	M	3
B3	B	1	M	1
B4	B	1		
C1	C	1	BL	2
C2	C	1	BL	1
C3	C	1	M	4
C4	C	1		
D2	D	1	BL	1
D3	D	1		
D4	D	2	C	1

Fig. 18

A new solution to compensate firing shrinkage with translucent shades.

With the new CST system, correction is achieved by building up the volume, starting from the dentine portion then covering it and gradually thinning the layering down to the incisal area.

Fig. 19

Fig. 20

The incisal area is then finished using the usual technique, with enamel and translucent shades.

Fig. 21

Fig. 22

These new powders can be used effectively to build up occlusal areas where the amount of dentine is minimal. Indeed, the technician simply has to cover the opaque with a thin layer of dentine shade or opaque dentine.

A layer of translucent shade matching the color of the restoration is then applied on top.

Fig. 24

Fig. 25

Finally, the occlusal margins are finished with conventional and occlusal enamels.

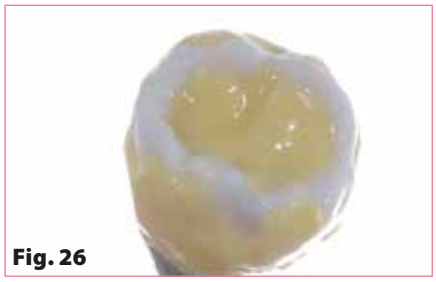


Fig. 26

Fig. 27

The correction firing achieves the desired characteristics i.e. the shade matches that of the reference shade guide while adding depth to the restoration.

Fig. 23

This use of the translucent shade allows a result that simulates depth in the occlusal area, while fully matching the selected shade.

Fig. 28

A new solution to compensate firing shrinkage with translucent shades.

APPLICATION OF CST POWDERS IN SELECTED CLINICAL CASES

Thanks to the characteristics of these powders, their range of applications is broad and versatile, as we can observe in this clinical case, which follows the first firing.


Fig. 29

In the next step, the case is completed with a correction firing using CST powders.


Fig. 30


Fig. 31


Fig. 32


Fig. 33

Observed in the patient's mouth, the finished restoration consistently matches and blends in with the remaining natural teeth.

In this second, much more extensive and complex case, we can see that, due to firing-induced shrinkage phenomena, the shapes and contours need to be adjusted.


Fig. 34

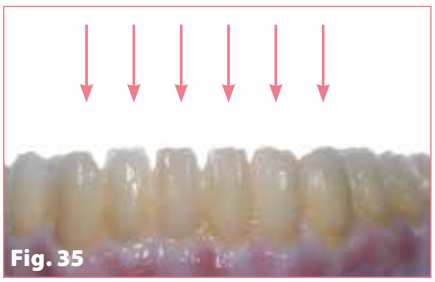


Fig. 35

The volumes are completed as necessary by adding CST translucent powders in the areas marked by the red circles.


Fig. 36


Fig. 37

The final result fulfills the patient's needs and requirements.

Fig. 38

These powders can also be used to build veneers. The following case shows how they are used to correct the shapes and contours.

Fig. 39

Fig. 40

The use of translucent shades can be fully appreciated after finishing and polishing, with an excellent degree of integration with the natural teeth.

Ideal effect of CST powders used for building veneers.

Vincenzo Mutone

was born on January 20th, 1965 and obtained his qualification as a dental technician in Naples IPSIA "Casanova".

He opened his own lab in 1983. He holds a lab since 1983.

He took part in many courses in Italy and abroad among which some with Klaus Muetherties and Willi Geller, from whom he learnt his practical teaching and aesthetic philosophy, attending his lab in Zurich (CH). He was business partner and co-owner of the Oral-Design 2 lab along with Mr. Giuseppe Zuppardi in the years 1994-1996. When this experience was over he met professionally Mr. Atoshi Aoshima, who led him to appreciate the Japanese aesthetic school. After this, he started another project that led him to make a systematics for ceramic masses multistratification.

In the last decade he has held conferences and communications on metal ceramics and aesthetics in many national and international meetings.

Today he focuses particularly on prosthesis implant and aesthetics using modern materials such as zirconia and CAD-CAM methods. He is also taking part in projects that aim to carry out and spread implantology based on computer planning with immediate function application and in the making of a multistratification system on zirconia oxide structures.

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