

# GC get connected<sup>11</sup>

Your product and innovation update



2018

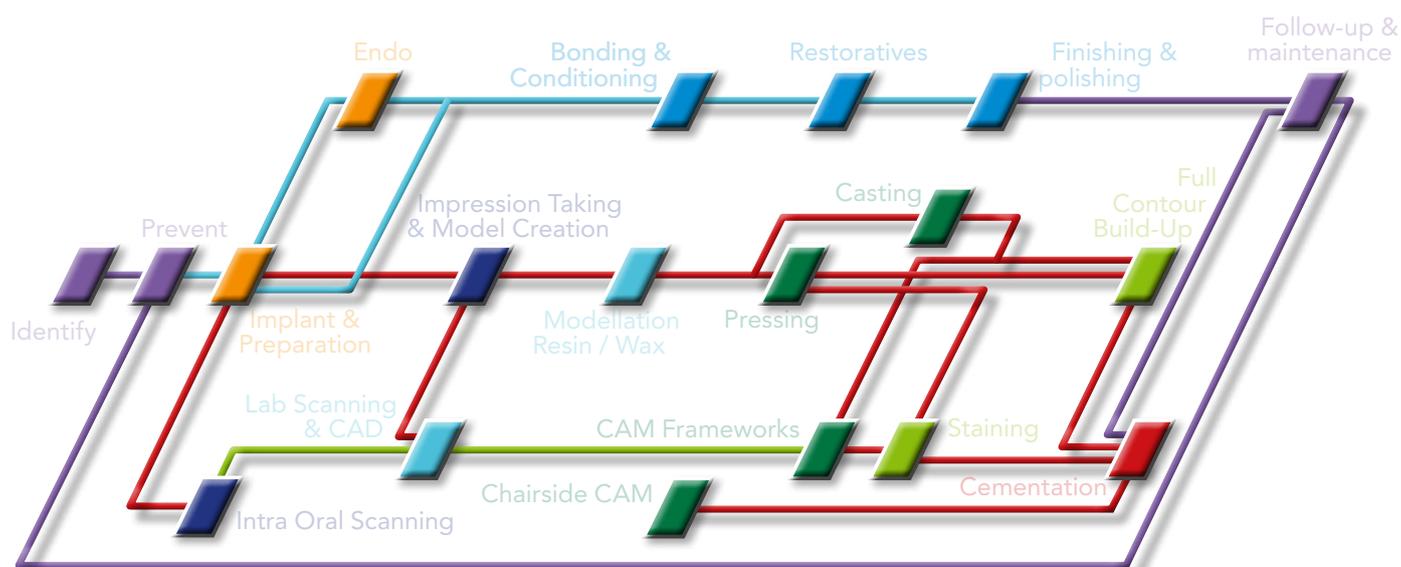


*cover image: courtesy of Djemal Ibraimi*

# GC

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## Dear readers

Welcome to the 11<sup>th</sup> edition of GC's Get Connected newsletter.

*Dear reader,*

*The second quarter of 2018 is all about celebrations for GC.*

*Our all-embracing ceramic system, GC Initial, turns 15. The Initial line emerged from a bold and aspiring vision: to enable dental technicians to obtain the desired outcome for each restoration with the same systematic approach. Each GC Initial ceramic is adapted to meet the needs of its particular fabrication process and framework, such as coefficient of thermal expansion, adhesion and shading. This ensures high reproducibility and reliability, which in turn increase effectiveness and reduce time and costs. This unique concept lies at the heart of the line's success.*

*To celebrate the anniversary in style, GC Initial Ceramics go "on Tour" with practical Master courses all over Europe. During the coming 15 months, hands-on courses will be given by renowned dental technicians. For more information check out the dedicated Initial on Tour website: [www.initialontour.com](http://www.initialontour.com). Everyone is invited to take part in this unforgettable experience!*

*G-ænia<sup>®</sup> Universal Injectable was released and enthusiastically received amongst the dental community. Thanks to an excellent strength and wear resistance, this product is indicated for all cavity classes, even on the occlusal surface. The bendable dispensing tips, which can reach the bottom of any cavity, and injectable & thixotropic viscosity make this product a very user-friendly composite.*

*Additionally, in this GC Get Connected, we're presenting a case on Aadvia Implants. The unique surface of this implant system is due to the high purity of alumina particles and acid etching, which enhance and stimulate osseointegration. The geometry of the implant body is designed to distribute mechanical stresses evenly over the entire implant length. The combination of a hermetic conical seal as well as the "platform switching" effect discourages bacterial infiltration from the area of the epithelial connective joint. The result is better preservation of bone and soft tissue volumes, thus improving the long-term aesthetic results.*

*Let's celebrate all these incredible products together. Happy reading!*

*Josef Richter*

*President, GC Europe N.V.*



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High-strength  
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**GC**

# Injection moulding with composite to obtain a predictable aesthetic outcome

Clinical step-by-step with  
G-ænial® Universal Injectable  
and EXACLEAR transparent silicone

By Dr. Ali Salehi, France



*Dr. Ali Salehi graduated in 2007 as a Master in Dentistry at the Faculty of Dental Medicine of Strasbourg University, France. During his Master course, he completed an Erasmus internship at the Faculty of Dentistry of the Johannes Gutenberg University in Mainz, Germany. From 2008 until 2015, he worked as a clinical consultant at the Department of Prosthetics of the University of Strasbourg. Since December 2015, he became a part-time Clinical-University Assistant in the same department. In parallel, he also works in his private practice in Strasbourg since 2011. His clinical work has been honored with several prizes, such as the 1st prize in the clinical category of the "European Talent Awards" of 3M ESPE (2015), the 3rd prize in the "Essentia European Facebook contest" of GC (2016) and the 1st prize at the Grand Prix of Aesthetic Dentistry of the French dental journal "Réalités Cliniques" (2017). Dr Salehi also actively participates in many trainings & conferences at various national and international events. His main topics of interest include dental photography, aesthetic dentistry, adhesive dentistry and minimally invasive dentistry.*

Using the injection moulding technique, composite restorations are created by injecting the composite into a silicone key that is directly positioned into the patient's mouth. The main advantage of this technique is that restorations can be first modelled in wax on a stone model, and then copied and transferred in detail to the natural teeth.

**For complex morphologies, challenging aesthetic cases or cases requiring reestablishment of the occlusal vertical dimension, a predictable result can be obtained and chair time reduced with this relatively simple procedure. Adjustments can also be made afterwards if needed.**

Because these restorative treatments usually comprise extensive surfaces, the composite used should be strong and wear resistant enough and also offer the desired optical properties. G-ænial Universal Injectable is an ideal product for this indication thanks to its great thixotropy and excellent mechanical & aesthetic properties.

## Injection moulding with composite to obtain a predictable aesthetic outcome



**Fig. 1-2:** Initial situation.

A 34-year-old, pregnant woman came to the dental office with the request to improve the aesthetic appearance of her smile. Her chief complaint concerned the shape of the lateral incisors (Fig. 1-2). She had already undergone a bleaching treatment and two veneer-lays on the heavily discoloured teeth 14 and 15, due to endodontic treatments covered with voluminous amalgam restorations in the past. After explaining the different options, she decided to go for a treatment with direct composites because of financial reasons and the idea of the minimally invasive nature of the procedure.

A wax-up was made of the desired tooth morphology that had been defined in consultation with the patient (Fig. 3). Next, a non-perforated metal impression tray was filled with a transparent vinyl polysiloxane material (EXACLEAR, GC) and placed over the stone model with the wax-up (Fig. 4-5). The tray's only purpose being to be used as a mould to create the key, a full-arch tray with a smooth inner surface was selected so that the silicone could



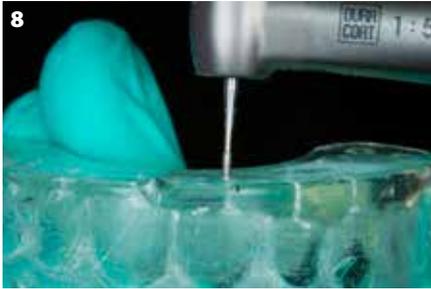
**Fig. 3:** A wax-up was made in consultation with the patient.

be retrieved easily in its whole and without damage (Fig. 6-7). Care was taken not to press too hard, so that all incisal edges were covered with a sufficiently thick layer in order to avoid potential tearing or deformation which could lead to a bad reproduction of the wax-up in the mouth of the patient. The tray was sufficiently filled to cover all teeth, up to the second premolars.

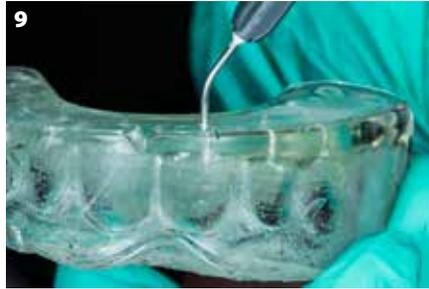


**Fig. 4-7:** A metal impression tray was filled with transparent vinyl polysiloxane (EXACLEAR, GC) and used to copy the stone model with the wax-up.

## Injection moulding with composite to obtain a predictable aesthetic outcome



**Fig. 8:** A needle-shaped bur was used to drill holes through the silicone key ending in the middle of the incisal edge.



**Fig. 9:** It was checked whether the holes were large enough to enable the tip of the composite syringe to pass easily and completely.

As a rule of thumb, the silicone key should always extend so far that it includes at least two teeth distally from the teeth to be treated on both sides; this ensures stability of the key when it is positioned in the mouth and a proper reproduction of the aesthetic project for a more predictable

final result. In this regard, it should be noted that in a more ideal situation, a rubber dam could be used. In this case, the teeth should be sufficiently exposed through the dam and the clamps placed distally enough to avoid interference with the key. The latter should be trimmed cervically to

allow proper seating without any tension between the key and the rubber dam.

A fine, needle-shaped bur was used to drill the holes in the key through which the composite will be injected (Fig. 8). These holes were positioned at the middle of the incisal edge of each tooth, half-way between the distal & mesial borders, and made as small as possible but large enough to enable the tip of the composite syringe to pass easily and completely (Fig. 9). Care was taken not to damage the vestibular part inside the silicone key with the bur, to maintain the information of surface texture that had been created during the wax-up. This will guarantee a proper transfer and respect the idea of a predictable final aesthetic result.



**Fig. 10:** Neighbouring teeth 11 and 22 were isolated using Teflon tape.



**Fig. 11:** The enamel of tooth 21 was etched to enhance micromechanical retention

After cleaning, the procedure was started with a central incisor. The neighbouring teeth were isolated with Teflon tape (Fig. 10). Then, the enamel was etched (Fig. 11) to create extra micromechanical retention, carefully rinsed and dried. A frosty appearance of the surface was obtained (Fig. 12). A universal adhesive (G-Premio BOND, GC) was applied, left undisturbed for 10 seconds and thoroughly dried with maximum air pressure for 5 seconds before light-curing (Fig. 13).



**Fig. 12:** After etching, the enamel surface showed a matt appearance.



**Fig. 13:** The universal adhesive G-Premio BOND (GC) was applied in accordance with the manufacturer's instructions and light-cured.

## Injection moulding with composite to obtain a predictable aesthetic outcome



**Fig. 14:** G-ænial Universal Injectable (GC) was injected into the silicone key.

Next, the silicone key was positioned onto the teeth and the composite was injected (Fig. 14). G-ænial Universal Injectable (GC), shade A1 was selected for the procedure because of its high filler load and wear-resistance. The syringe was placed in the hole and slightly orientated towards vestibular. During the injection, a little bit of overflow is needed to ensure that all small voids at the margins and interproximal spaces are filled. This can easily be verified through the transparent key (Fig. 15). Next, G-ænial Universal Injectable was light-cured through the transparent silicone. After removal of the key, the excess was taken out with a surgical scalpel blade (blade #12, Swann-Morton; Fig. 16). Further finishing was done with a flame-shaped bur at the cervical margin, to correct any possible overcontouring, (Fig. 17) and with metal strips (New Metal Strips, GC) interproximally (Fig. 18). Metal strips are more rigid than transparent ones, which makes them more efficient and easier to use. Note that even though some bleeding might occur during this stage, finishing and polishing should be carried out thoroughly as smooth margins will help the gingiva to heal faster but also maintain the gingival health over time. The same procedure was repeated on the other incisors and the canines (Fig. 19-20).



**Fig. 15:** Due to the high transparency of the key, it can be visually checked if a sufficient amount of composite has been injected to cover the entire surface. The composite can also be easily light-cured through the key.



**Fig. 16:** The excess was removed with a scalpel (blade #12). Due to the presence of the Teflon tape, the excess did not stick to the neighbouring teeth and it was easy to remove.



**Fig. 17:** A flame-shaped finishing bur was used.



**Fig. 18:** Interproximally, the margins were finished with metal strips.



**Fig. 19:** The same procedure as shown for tooth 21 was repeated for the other teeth. Application of G-Premio BOND on tooth 12.



**Fig. 20:** Injection of G-ænial Universal Injectable (GC) into the EXACLEAR key.



**Fig. 21-22:** Result immediately after curing the composite.



**Fig. 23-25:** Gingival healing 3 days after the treatment.



**Fig. 26-28:** Final polishing was done at the recall session.

Immediately after, it can be seen that the surface texture of the wax-up was transferred in detail to the direct veneers in the oral cavity, which gives the teeth a very natural and lifelike appearance (Fig. 21-22). Three days after the treatment, the gingival tissue had healed entirely (Fig. 23-25). In the recall session one week later, the surface was polished again with soft rubbers and cotton wheels with polishing paste

(DiaPolisher Paste, GC) (Fig. 26-28), to enhance the gloss while preserving the texture (Fig. 29-30).

**The injection moulding technique is an easy approach that allows to plan restorations with complex morphology in advance and copy them in a predictable manner to the clinical situation.** Even the surface texture can be copied from the wax-up,

which saves valuable chair-time. In order to have a long-lasting result, the composite needs to have good mechanical properties. **Considering the interesting properties of G-ænial Universal Injectable, being even stronger than many paste composites, it can be safely used for that purpose.**



**Fig. 29-30:** Result after final polishing.

# More than just a curing light

Benefits of D-Light® Pro in day-to-day use

By **Dr. Alessandro Devigus**, Switzerland



*Dr. med. Dent. **Alessandro Devigus** was born in 1962. He obtained his degree in dental medicine at the University of Zürich in 1987. In 1990, he established his own private practice focused on digital technologies. Since October 2000 he is CEREC-instructor at the University of Zürich (Clinic for Geriatric and Special Care Dentistry).*

*He is a renowned instructor of various international courses on CAD/CAM and digital technologies. Furthermore, he is a member of the New Group of which he was President in 2010-2011. He is also a group member of Bio-Emulation, an active Member of the EAED and ITI Fellow and Speaker. He is the Editor in Chief of the "European Journal of Esthetic Dentistry" (Quintessence).*

The majority of modern composites for intraoral use are cured using a photopolymerisation process. Nowadays, the polymerisation lights used for this purpose function almost exclusively with LED light sources. The light from blue LEDs has a wavelength of 450-490nm, making it well suited for photoactivation of camphorquinone<sup>1</sup>. The latest generation of LED lights radiates over a larger range of wavelengths, so that they can also cure materials with initiators such as TPO or PPD.

The GC D-Light Pro uses two LED light sources: a blue one with a 460-465nm peak wavelength and a violet one with the peak at 400-405nm. This enables reliable curing of all light-curing materials with their initiator spectrum within 400-480nm in 20-second cycles (Fig. 1). In Low Power mode, the power is reduced to 700mW/cm<sup>2</sup> in order to generate less heat around cavities near the pulp. Other LED lights currently on the market also have this option.

**One innovation is the Detection mode, which uses only near-UV light.** Articles were published several years ago showing that many composites exhibit a high fluorescence when exposed to light in the range of 385-405nm, and thus

become visible (Fig. 2-3)<sup>2</sup>. When they absorb light with a particular wavelength (=excitation light), various molecules simultaneously emit light with a longer wavelength. This behaviour (absorption of short-wave light, emission of longer-wave light) is called fluorescence. Fluorescent light was described as a way to assist with caries detection as early as in the 1980s, because carious tooth substance also fluoresces<sup>3</sup>.

We found this new Detection mode a particularly convincing benefit in day-to-day use. **It is increasingly common that old composite fillings need to be identified and removed, an undertaking which is not always easy under normal light conditions.**

**Near-UV light is a great help in visually distinguishing the composite from the natural tooth.** It can also be used to monitor the resin cement margins on inlays, onlays or veneers once they have been attached, meaning that any excess can be removed more easily and precisely. Small defects on existing fillings can also be identified and repaired more easily. **After preparation, near-UV light also makes it easier to assess the thickness of the remaining dentin, because dentin fluoresces more strongly than enamel.** Remnants of polishing paste and plaque are also more visible than under normal light, and therefore also easier to remove (Fig. 4).



**Fig. 1:** The GC D-Light Pro cures reliably at 1400mW/cm<sup>2</sup>.



**Fig. 2:** The composite restorations on teeth 21 and 22 are difficult to see with the naked eye.



**Fig. 3:** Using the Detection mode, the restorations on teeth 21 and 22 are easily seen during a check-up.



**Fig. 4:** The Detection mode clearly helps to visualise remnants of polishing paste.

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# An aesthetic project with Initial™ LRF CAD/CAM restorations



**Dr. Max Cordelette** obtained the title of 'Doctor in Dental Surgery' at the Faculty of Odontology of Lille in 1986. Currently, he works in his private practices in Lille. He is a CEREC trainer, certified by the ISCD since more than 25 years and a referral dentist of Sirona and Dentalinov. Since 2009 he is a member of the e-dentisterie association specialised in CEREC clinical training where he has moderated several scientific symposia: in Mauritius (2012), Val d'Isère (2013), South Africa (2014), French Polynesia (2014), Guadeloupe (2015) and Bali (2018). He is also a member of AFORI, CFAO-CADCAM association (club of CEREC Francophone users) and has authored many scientific publications. In 2015, he co-created with Fabienne Jordan the ACACFAO Esthétique, the Academy of CFAO-CAD CAM dedicated in Esthetic at Aix en Provence.

By Dr. Max Cordelette, France

Our patients are becoming more and more self-conscious and demanding; good communication tools are essential for a successful and predictable treatment outcome. In this clinical case, we used leucite-reinforced ceramics (Initial LRF from GC) milled with CAD/CAM. The CAD design can be made entirely in collaboration with the patient, so that the aesthetical outcome could be fully customised to the patient's desires and expectations.

## An aesthetic project with Initial™ LRF CAD/CAM restorations

A 48-year-old female patient came to our dental office with an aesthetic complaint. I noticed that she was very conscious about her smile which had been bothering her for 30 years. I also took note of the phonetic disorders caused by continuous contact of the incisors with the lower lip and substantial loss of tooth tissue, which had been repetitively restored with composites but appeared unaesthetically (Figs. 1 and 2).



**Figure 1:** Front view of the initial situation. Insert: note the position of the incisal edge of the maxillary teeth in relation to the lower lip.



**Figure 2:** Initial view of the maxillary teeth.



**Figure 3:** Chu's Proportion Gauge was used to determine the ideal length of the teeth based upon their width.

The treatment plan was set up in consent with the patient. Shortening the length of the teeth was a functional necessity. She also wanted her teeth aligned and slightly brighter. She was not motivated to have the gingival contour corrected and preferred to avoid periodontal surgery.

All teeth were vital except for tooth 22, which was heavily restored with composite, comprising the proximal surfaces.

A successful treatment requires a thorough analysis of the smile and the entire face of the patient. Photographs of the face, profile and smile were stored on the iPad. The EASY (Esthetic Analysis by Smile academy) aesthetic guide analyses face, smile, occlusion, dental and gingival composition. It then renders a concrete treatment plan, which may reassure your patient as to the objectives to be reached.

First, a direct composite mock-up was made to determine the shape of the restorations. In this step, the treatment is still reversible and modifications are possible, so the patient has control over the aesthetical outcome. In this case, it was also necessary to validate the new length of the incisors and its influence on the phonetics.

G-aërial composite from GC was chosen because of its aesthetic qualities and easy handling. A direct composite veneer was made on the vestibular surface of tooth 12. All proximal composites were changed and special attention was paid to the cervical area and gingival contour.

Chu's Proportion Gauge (Hu Friedy) was used to maintain the height-width proportions of the central and lateral incisors (Fig. 3) between 76 and 86%. The central incisors were still slightly too long, but it was decided in agreement with the patient that she would test this length during her holidays.

The patient returned to the dental office after thirty days: her speech was well adapted to the change in position of the incisal edge and the new height-width proportions. Harmony of the tooth colour and the surface condition of the final teeth still needed to be determined.

A visual validation by the VITA Toothguide 3D Master shade guide and the use of Vita's Easyshade Advance 4.0 enabled to determine the shade in agreement with the patient and to verify the selected shade throughout the session.

An aesthetic preview software - in this case, Smile Designer Pro – facilitated the communication with the patient in terms the expected aesthetic outcome. It was imported into the CAD/CAM software as a guide for the restoration design.

Scanning and milling of the glass ceramic (Initial LRF, GC) were done with the Omnicam Sirona camera and CEREC system and for a variety of reasons, including the possibility of direct CAD/CAM: intraoral impression taking, multi-scan catalog registration, guided design CAD, integration of Smile Design software in tracing mode, characterisation of surfaces, direct milling of feldspar ceramic elements.

A first digital impression was made prior to any preparation of the tooth surfaces and integrated into a catalog of images called "BioCopy".

Special attention was given to tooth 22. The colour of the die was different from the other, vital teeth. As known, it is very difficult to manage the final colour of six ceramic restorations when the prepared natural teeth have different colours.

An adhesive post-and-core build-up was made on 22 using a fibre glass post (GC Fiber Post) and a dedicated composite (GC Gradia Core). The other teeth were prepared, reducing the direct composite mock-up; this way, the mockup could serve as a guide for the preparation, facilitating accurate, conservative reduction. Grooves with a determined depth were prepared to establish benchmarks to guide the preparation. (Fig. 4).

After preparation, a good homogeneity of colour between the 22 and other teeth was seen (Fig. 5), facilitating the aesthetic integration of the restorations.

A scan of the preparations and adjacent teeth was saved in a catalog called "Maxillary". The bite registration in maximum intercuspation was saved in the "vestibular" catalog. The last scan of the antagonists in the "Mandibular" catalog completed the intraoral recordings.



**Figure 4:** The teeth were prepared through the mock-up, facilitating conservative reduction.



**Figure 5:** Final preparation of the four upper incisors.

The CEREC software then proposed suitable restorations, thanks to the modeling algorithms that render suggestions adapted to the registered clinical situation. The "Bio Jaw" mode models the restorations on the arch in a harmonious way and gives the choice between ovoid, square or tapered tooth shapes (Fig. 6).



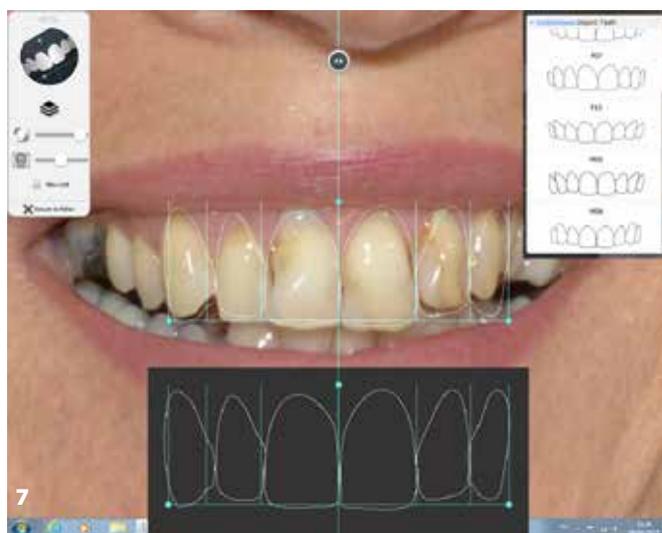
**Figure 6:** Scan of the preparations and superposition of the "Bio Jaw" suggested restorations.

## An aesthetic project with Initial™ LRF CAD/CAM restorations

At the first consultation, the patient said she wanted to have a natural smile, not to have something entirely perfect but with a lifelike touch. The “Bio Jaw” mode of CEREC calculates a virtual proposal that is often too perfect.

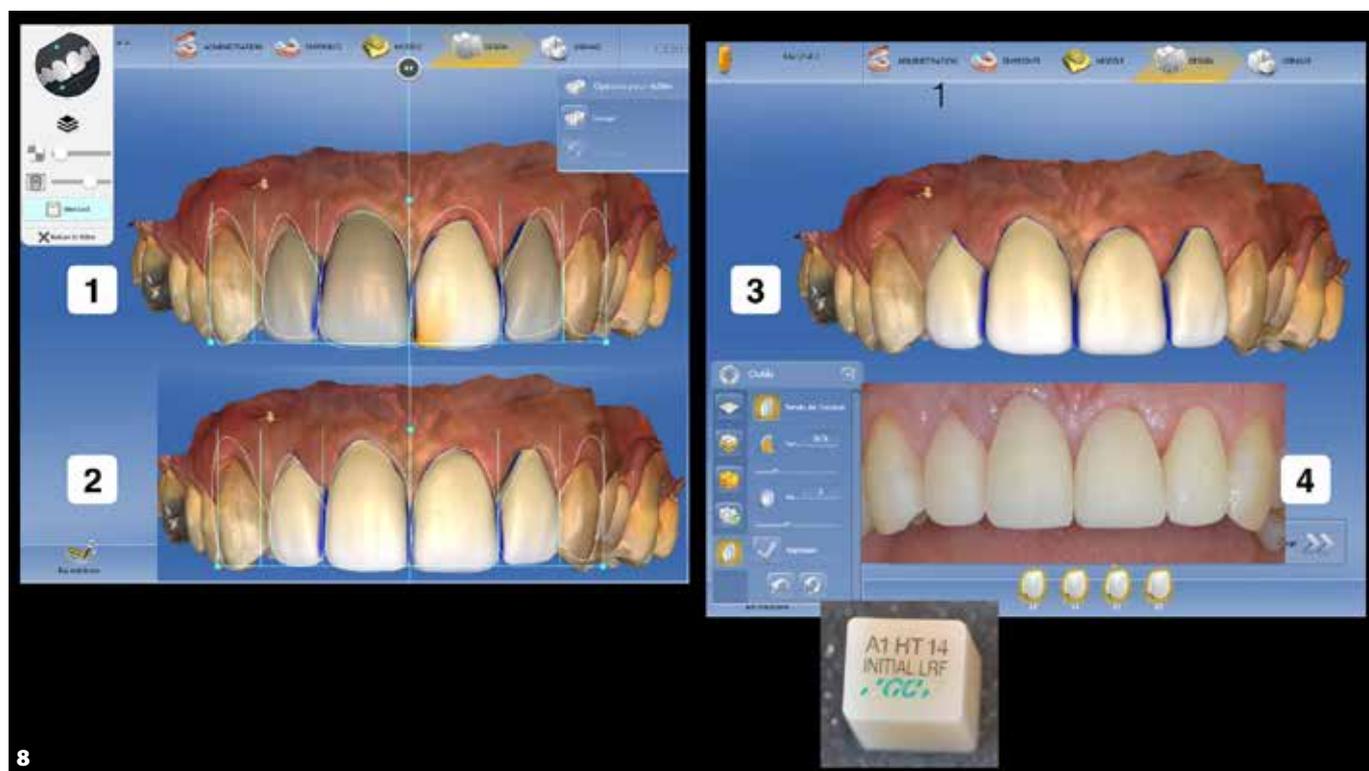
Another method could be Paul Kano’s SKIN Concept; one chooses the most appropriate teeth together with the patient from a portfolio of physical models, by measuring the height of the central incisors and the intercanine distance. The mock-up is then reduced based on a thermoformed dental tray. The selected tooth model can also be scanned and placed in the “BioCopy” catalog of Cerec (requires a manual correlation); this virtual mock-up renders a realistic animation and surface morphology.

In our clinical case, the patient insisted on having a preview of her smile. We opted to use the ‘Smile Designer Pro’ software. This one has two main advantages: a library of virtual teeth (Fig. 7) and the integration with CEREC software by a layer (Fig 8.1 and 8.2) superimposed on the design of our restorations (Fig 8.3).



**Figure 7:** The proposed tooth shape in ‘Smile Designer

A leucite-reinforced glass ceramic - the Initial LRF block from GC – was selected because of its great aesthetic properties. It is less fragile than conventional feldspathic porcelain and thus easier to manipulate. The surface is very smooth after milling and the margins are thin, without chipping.



**Figure 8:** Left: Superposition of the ‘Smile Designer Pro’ proposal onto the models in the CEREC software (8.1 and 8.2). Right: Comparison between the restoration design in CEREC (top right, 8.3) and the try-in of the Initial LRF restorations right after milling (bottom right, 8.4).

The fitting of the milled restorations and their virtual design from the CEREC software can be compared as seen in Fig. 8.3 and 8.4.

The restorations were fit in the mouth with G-CEM LinkForce Try-In Paste, shade A2 (GC) and then characterised with the glaze and stains before firing. If no characterisation is needed, Initial LRF can be mechanically polished; the firing step is optional. The intaglio surface of the restorations was treated with G-Multi PRIMER (GC).

After isolation, the universal adhesive G-Premio BOND was applied on the teeth in accordance with the manufacturer's instructions and light-cured. This adhesive contains several functional monomers, so bonding to the teeth as well as the composite restorations is assured. The universal adhesive resin cement G-CEM LinkForce, shade A2 (GC) was applied on the intaglio surface of the restorations. Some glycerine gel was applied at the cervical margins during the light-curing through the restorations to avoid the formation of an oxygen-inhibited layer.

After excess removal and polishing of the margins, the final result can be seen. A perfect shade integration could be obtained (Figure 9).

The patient had difficulties controlling her emotions in front of the mirror. The teeth had a very natural and lifelike appearance, occlusion plane was harmonised and the incisal edge was now in a normal relationship with the lips (Figure 10). The preparation and implementation of aesthetic treatment plan took time and some organisation was required before scheduling the treatment session. After this planning phase, the esthetic project was concluded in a single session, making use of chairside CAD/CAM.

The virtual design software can complement the information towards the patient on the expected outcome, and serve as a guide for the mock-up. However, one must always take into account that the proposal needs to be realistic and achievable, not to disappoint the patient.

Listening, communication, trust, interactivity and overall design are the elements to be mastered for a successful aesthetic result. Once the objectives are set, the clinical act itself and the appropriate tools account for the realisation: the digital chain of the impression and design to the



**Figure 9:** Mimicry and integration of the leucite-reinforced feldspathic restorations (Initial LRF).



**Figure 10:** Front view, 15 days after treatment with the Initial LRF restorations. Maxillary teeth, 15 days post-op.

manufacturing of the materials, the dedicated materials, the choice of the luting material and the characterisation of the surfaces. The best reward for our work is the emotion of our patients in front of the mirror, their satisfaction and gratitude.

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# Indirect CAD/CAM restoration with GC CERASMART®:



Dr. **Christoph Blum** studied at Johannes Gutenberg University in Mainz and runs a group practice with his father Dr. Norbert Blum in Bad Ems. They use modern technology in their practice, including DVT diagnosis and CEREC. Since 2013, Christoph Blum is specialised in implantology and oral surgery for the Association of Dentists of Rhineland-Palatinate. With their dentist colleagues and in their own practice's laboratory, the Blums cover the whole of dental medicine in their practice.

Hybrid ceramic allows customisation without a firing process

By **Dr. Christoph Blum**, Germany

In CAD/CAM processes, chairside-manufactured inlays are a high-quality, long-lasting alternative to direct fillings made from amalgam, cements or composites. From an aesthetic perspective, ceramic inlays are often preferred to gold inlays. If such a high-quality, tooth-coloured restoration emerges, Dr. Christoph Blum and dental technician Mandy Meffert believe that it should also have individual features. While previously this was a time consuming and resource intensive practice, now they can add individual characteristics quickly and easily without a firing process, using the hybrid ceramic block CERASMART (GC).

## Indirect CAD/CAM restoration with GC CERASMART®:

In our practice, comprising a dental laboratory, we have been successfully using the CEREC CAD/CAM system in tooth-coloured posterior restorations for the last five years. In the past six months, we have also been using the new CAM/CAM hybrid ceramic block CERASMART to manufacture inlays, among other things. Apart from inlays, this material can also be used to manufacture other metal-free, indirect restorations such as onlays, veneers and full crowns.

For me, the CAD/CAM hybrid ceramic block CERASMART is not a ceramic restoration material in the classic sense of the term: it combines a high level of bending strength and break-resistance with good aesthetics. Because its surface hardness is still “soft” enough to minimise wear and tear to the antagonists, I now also prefer this material for patients with bruxism. In the short time we have been using it, our experience of temporary restorations in which we replaced less fracture resistant materials with CERASMART has also been positive. Another reason why we like to use CERASMART is its high level of edge stability compared to other blocks.

CERASMART is well suited for quick, cost-effective chairside restorations because, due to its composition, the blocks can be milled quickly and the tools can be used without requiring labour-intensive preparation. Furthermore, the dental technician or dentist can also quickly use OPTIGLAZE Color (GC) to provide a customised finish. With the large range of colours of ready-to-use, light-curing sealants, it is easy to paint on individual colour features and achieve a really aesthetically-pleasing result, as the following case study shows.

Anyone not wishing to make use of this can simply opt for a conventional chairside polish. We customise all the inlays that we manufacture as standard, because we believe that an inlay is a quality piece of craftsmanship and should reflect this. We therefore carry out finishing processes in the laboratory and intraorally directly on the patient, to showcase the individuality of their restoration and the care that goes into it.

### Case Report

Teeth are very important to this 31-year-old patient and she complained about her worn restorations documented with photographs of her teeth (Fig. 1). After her pregnancy, she visited our practice to ask for a stable, long-lasting, metal-free and aesthetically-pleasing restoration of the occlusal surface of teeth 16 and 17. Once the different restorative treatment options had been explained to her,

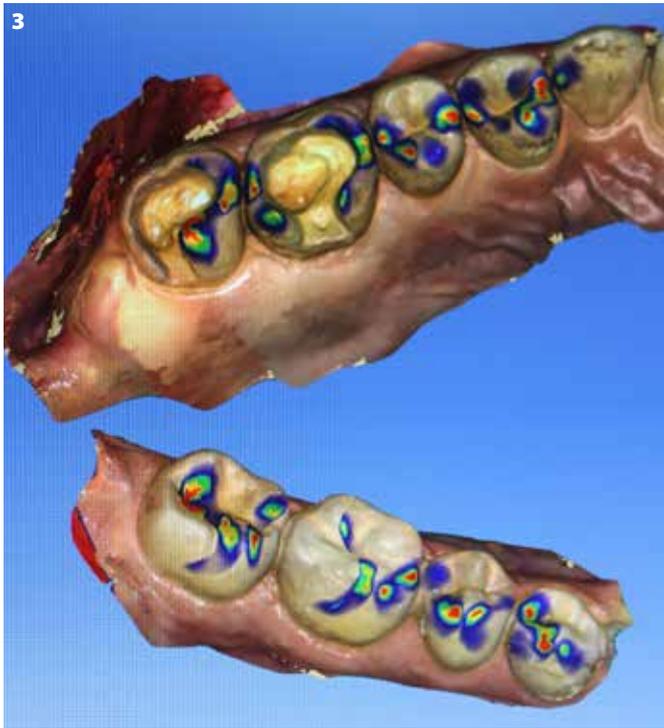
the patient decided against a composite filling and a metallic restoration (gold inlay) and instead chose a tooth-coloured chairside restoration. As for the material, we chose CERASMART because, in addition to its tool-specific qualities of high fracture resistance and good flexural strength, it offers the benefit of easily customisable colouring which does not require a technician or firing oven.



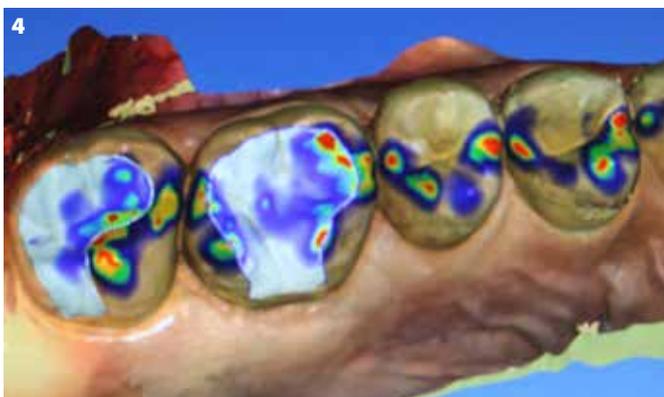
**Fig. 1:** Initial situation: worn restorations on teeth 16 and 17.



**Fig. 2:** Situation immediately after preparation.



**Fig. 3:** Virtual models of the prepared teeth and the antagonists.



**Fig. 4:** Virtual modelling of the inlays.

We started with the traditional process for a chairside restoration, with preparation according to the usual rules for CERASMART inlays (Fig. 2) and optical impression taking with the CEREC OmniCam. After calculating the digital models (Fig. 3) and virtual construction of the inlays in the CEREC 4.4 software program/inlay biogeneric design mode, these were finely milled (Fig. 4) from the selected CERASMART blocks A2 HT14 for tooth 16 and A2 LT14 for tooth 17 using the MCXL Premium milling unit. After the attachment point has been sanded and any other

procedures have been carried out (e.g. going over fissures), gloss can be added using special polishing pastes such as DiaPolisher Paste (GC) or ceramic polish with diamonds (Turbo Shine Lab, acurata).

The attachment point is generally placed orally, in the two palatal offshoots in this case, to avoid unnecessary further work after the milling process. The attachment points were ground using an extra-fine carbide cutter with teeth (acurata) (Fig. 5). Note that in this case, the plaster model was created for demonstration purposes only.

Rather than polishing using the DiaPolisher Paste, according to the manufacturer's recommendation, character may also be added after the preparation using OPTIGLAZE Color Glaze, as was the case here. The restoration was initially degreased with alcohol, cleaned and then steamed. After applying a thin layer of the bonding agent CERAMIC PRIMER II (GC) and air drying it (Fig. 6), we added the



**Fig. 5:** Prepared CERASMART inlays before customisation.



**Fig. 6:** Application of a thin layer of restoration primer (CERAMIC PRIMER II).

## Indirect CAD/CAM restoration with GC CERASMART®:



**Fig. 7, 8:** Customisation of the CERASMART inlays on the model.

various colours using a thin paintbrush and a fine endo needle. A red-brown colour was inserted into the fissures; the cuspid ridges and marginal ridges were characterised using a mixture of blue and grey (Fig. 7 and 8). White

accents may be added, depending on the structure of the natural teeth. There was no interim curing; the whole workpiece was cured for just 5 minutes in the light curing unit (Solidilite V by Shofu). Once the inlay had been



**Fig. 9:** Selective enamel etching using 37% phosphoric acid as preparation prior to cementation.



**Fig. 10:** Situation after selective enamel etching and application of G-Premio BOND. The cavities appear slightly glossy.



**Fig. 11:** Inlays cemented on teeth 16 and 17 using G-CEM LinkForce.

successfully placed, based on a visual check and perfect fit, the workpiece was prepared for adhesive cementation of the restoration, initially by sandblasting in the laboratory in accordance with CERASMART's instructions for use, and finally steamed clean again.

We prefer this process for its simplicity (alternatively, the restoration can be treated with 5% hydrofluoric acid for 60 seconds, then cleaned and dried). Then, CERAMIC PRIMER II was applied to the intaglio surface as a silane bonding agent. Finally, after selectively etching the enamel using 37% phosphoric acid (Fig. 9 and 10), the inlay was cemented into the cavity using G-CEM LinkForce (Fig. 11).



**Fig. 12:** Occlusion and articulation check.



**Fig. 13:** Four months after treatment, the restorations fit well into their natural environment.

When the treatment was complete, the inlays integrated well into the natural environment. An aesthetically pleasing gloss was created thanks to the shiny surface seal (Fig. 12). The image taken at the check-up four months after the treatment confirmed that the restoration was successful (Fig. 13).

The new hybrid ceramic CERASMART is a very good material for indirect chairside restorations. As well as the qualities of the material and the individual design options for this hybrid ceramic, I was impressed by the economic aspects of combining CERASMART and OPTIGLAZE color: it is now possible, without requiring much technical expertise or time, to offer an aesthetically pleasing solution that is tailored to the patient. In our practice, we have even gone so far as to let our suitably trained dental assistant carry out the characterisation procedures on the inlays, which helps her develop her consultation skills and motivates her on a personal level.



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**Dr. Mathieu Contrepois** graduated in 2011 from the faculty of Dentistry of Bordeaux, France. In 2016, he obtained a postgraduate degree in Aesthetic Dentistry at the University of Strasbourg, France. He has also been teaching as an assistant professor in Prosthetic Dentistry at the faculty of Dentistry of Bordeaux from 2013 to 2017. He has published several articles on prosthetic and aesthetic dentistry, notably in the *Journal of Prosthetic Dentistry* and in the *International Journal of Esthetic Dentistry*. He is also an active member of the cosmetic dentistry society SYMBIOSE. Currently, Mathieu works in his private practice in Bordeaux, where he focuses mainly on restorative and aesthetic dentistry.



**Jérôme Bellamy** has been a dental technician for 25 years. He learned and practiced all the aspects of his profession in different laboratories of France. Established in Bordeaux for twelve years, he is the passionate technical manager of the laboratoire Global Esthetic, specialized in aesthetic rehabilitations and global rehabilitations. He is involved for the laboratory part in dental training in the GAD Center and Digital Smile Design.

# Bonded ceramic Restorations: Management of two different substrates

By **Mathieu Contrepois** and **Jérôme Bellamy**, France

Research in the field of biomaterials has led to the advent of glass ceramics enriched with lithium disilicate. This type of ceramic combines bonding ability, mechanical strength, choice of degree of translucency and high aesthetic potential. The current adhesive techniques associated with this material have changed the principles of preparation of indirect restorations towards a dentistry more respectful of dental tissue. Hence, veneers, also called bonded ceramic restorations (BCRs) are the core of aesthetic adhesive dentistry<sup>1</sup>.

## Bonded Ceramic Restorations: Management of two different substrates

### Clinical case

A 25-year-old woman came for a consultation because she did not like the appearance of the voluminous composite restoration on tooth 11 (Fig. 1).

The latter was done urgently one month ago. The patient had indeed lost an old composite made three years ago, at the same time that a veneer was made on tooth 21. Both restorations were made after a brutal fall. The patient indicated that 21 was vital and 11 had been devitalized, which explained the slight discolouration. She also reported that tooth 21 had been sensitive to cold for some time. The clinical examination showed a fracture of the veneer at its palatal margin which probably caused the sensitivity (Fig. 2).

Finally, the patient requested not to have composites and wanted a more reliable restoration. After reflection, the therapeutic solution chosen is the realization of 2 BCRs on 11 and 21. An aesthetic project simply consisting of a slight lengthening of the central incisors and an adjustment of their shape was established. This was materialized on the study models, in the laboratory, by means of a wax-up on teeth 11 and 21 (Fig. 3). The project was then transferred to the mouth using a silicone key that allows for a mock-up. The result was satisfactory in terms of dental proportions. In the following session the calibrated preparations were made through a new mock-up (Fig. 4) to follow the principle of tissue economy<sup>2-4</sup>.



**Figure 1:** Smile of the patient before treatment.



**Figure 2:** Presence of a palatal fracture of the veneer on tooth 21.



**Figure 3:** Wax-up created at the laboratory.



**Figure 4:** Calibrated preparations through the mock-up.

This was especially true for 11, since for 21 it was necessary to remove the existing fractured veneer without removing additional healthy tissue. Special instrumentation was used to avoid damaging the adjacent teeth and the periodontium (Fig. 5).



**Figure 5:** Preparation technique respecting the surrounding tissues.

The occlusal impact points were mainly tested in maximum intercuspit occlusion (MIO), which resulted in lowering the palatal preparation margin on 21 and thus avoiding contact with it (Fig. 6)<sup>5</sup>.



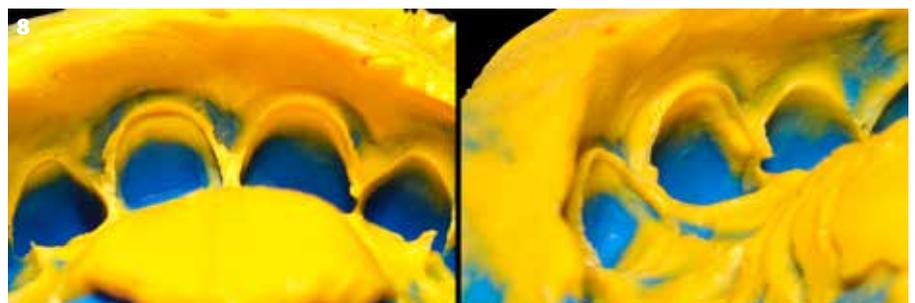
**Figure 6:** Check of the occlusion and lowering of the preparation limit of the palatal side of tooth 21 in order to avoid occlusal contact on the margin.

A control of the reduction thicknesses is then carried out using a silicone key, then the preparations are validated (Fig. 7). The tint of the two supporting teeth is raised with a dedicated shade guide, in order to take into account the discolouration of 11.



**Figure 7:** Validation of the thickness and preparation limits.

After making the impression (Fig. 8) and pouring the models, the ceramist used a pressing technique to create lithium disilicate frameworks from a low-translucency GC Initial™ LiSi Press (LT) ingot.



**Figure 8:** Double mixed impression technique presenting an excellent registration of the margins.

## Bonded Ceramic Restorations: Management of two different substrates

These frames were then veneered using GC Initial™ LiSi powders (Fig 9). The dentine mass was first applied to the cervical half of the tooth. Then an unsaturated dentine mass and a CL-F mass were applied onto the remaining half. The free edge was then veneered with different opalescent and transparent masses (EOP-3, TM-05, neutral). Finally, the incisal third was covered with incisal (E-58 and E-57), and CT-22 was added to the cervical area to slightly saturate it.

The shapes were then refined (curved, transition lines) using the “two-shade pencil technique” (Fig. 10)<sup>6</sup>.

The surface micro-relief was also created before final glazing (Fig. 11).

After validation of the restorations, the rubber dam was placed and the BCRs were retrieved (Fig. 12) and then bonded with a resin cement (G-CEM LinkForce, GC) combined with a universal adhesive (G-Premio BOND, GC) used in total-etch mode (Fig. 13).

The occlusal adjustments were made after checking the static and dynamic occlusion in order to integrate the restorations in the previous guidance. A clinical check-up after one month allowed to appreciate the good biological, functional and aesthetic integration of the restorations (Figs 14 and 15).



**Figure 9:** Stratification steps of the aesthetic ceramic GC Initial LiSi on Initial LiSi Press LT framework.



**Figure 10:** Work on the transition lines using the two-colour pencil technique.



**Figure 11:** Work on the micro-texture of the surface.



**Figure 12:** Placement of the operator field and verification of the seating of the BCRs.



**Figure 13:** Cementation of the restorations.



**Figure 14:** Integration of the restorations at the dentogingival level one month after treatment.



**Figure 15:** Integration of the restorations at the level of the smile.

### Discussion

An internal bleaching of tooth 11 together with mesial angle repair by a new composite restoration could have been an alternative therapeutic solution. Similarly, a composite repair of the fractured BCR on tooth 21 could have been considered. These possibilities were not retained. The decision was primarily motivated by the quality and durability of the aesthetic outcome desired by the patient.

The fracture of the previous BCR on tooth 21 resulted from two imprudences that should not be repeated. The first was to leave the palatal margin on an MIO contact weakening the restoration at this level. The second came from the choice of the material, since it was a feldspathic ceramic, mechanically unsuited for the

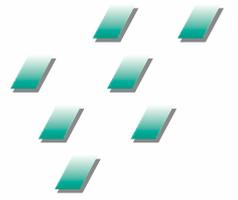
considerable volume of the restoration. The paradox of this clinical case lies in the fact that the 11, which was endodontically treated received a smaller BCR (butt margin) while the rather bulky BCR was made on the 21, which was vital. This shows that it was the initial tissue loss that guided the type and shape of the preparation<sup>6</sup>, thus placing it in its proper place within the therapeutic gradient<sup>7</sup>. For the laboratory, the difficulties lie in the management of the shade of 11 and the significant difference in thickness between the two preparations. The choice of the low translucency (LT) ingot solved the first problem by allowing the slight discolouration to be sufficiently masked at the level of 11. It was then necessary to act on the thicknesses of the framework. The manufacturer recommends a minimum

value of 0.4 mm to maintain some mechanical strength. The latter was chosen for the frame of 11 because it is in adequacy between the preparation and the final volume of the restoration. It allows on the other hand to obtain the desired masking effect. At 21, with the larger and more extensive preparation, a thicker frame (0.9 mm) was designed to achieve a shape corresponding to the final volume of the future restoration and to obtain increased mechanical strength. It were the stratification steps that finalized the harmonization of the two elements. Thanks to the adhesive revolution and the improvement of the materials, the preparations were essentially guided by the initial tissue loss and the prosthetic project. The technique and the artistic sensitivity of the prosthetist are essential to obtain a good optical and aesthetic integration of the restorations.

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# GC

# Full arch implant rehabilitation: a case report

By Dr David Garcia Baeza, Spain



**Dr. David Garcia-Baeza** obtained his degree in dentistry at the European University of Madrid (EUM) in 2002. In 2006 he obtained the certification in implant and oral rehabilitation, also from EUM. He now runs a private practice at the CIMA center in Madrid, Spain, which is dedicated to aesthetics, restorative dentistry and implants. He is an Associate Professor in the Department of Periodontology at UEM and Assistant Professor in the Department of Aesthetic Dentistry at the Complutense University of Madrid. He is also member of the EAO (European Association of Osteointegration), SEPES (Spanish Society of Prosthodontics) and SEPA (Spanish Society of Periodontology). He has several publications in international journals and has given many national and international lectures on aesthetic and restorative dentistry.

Partial or total loss of teeth not only affects facial aesthetics but also vital functions such as chewing and phonation. In this case, an implant-supported restoration is a good alternative to conventional full prostheses for patients with edentulism. The use of implants considerably improves the retention of a prosthesis and its functionality, thereby improving the patient's quality of life.

## Full arch implant rehabilitation: a case report

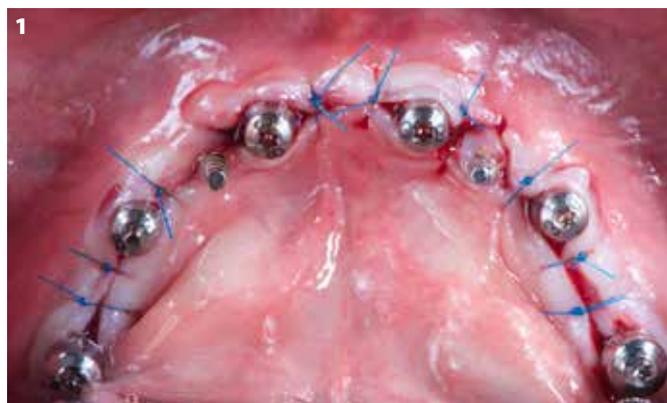
Prosthetic treatments of the edentulous jaw with dental implants are divided into two categories: fixed and removable restorations<sup>1</sup>.

The factors that determine the type of implant-supported restoration for a complete edentulous patient are the amount of space from the bone to the occlusal plane (prosthetic space) and the lip support. When the space available for the prosthesis is less than 10 mm and there is lip support, a fixed porcelain-to-metal restoration is advisable. When there is more than 15 mm of prosthetic space and absence of lip support due to bone resorption, an implant-supported overdenture restoration is recommended, which will give that lip support not provided by the bony structures of the patient<sup>1</sup>. The patient can remove the overdenture for cleaning and maintenance, since the space underneath the prosthesis is not directly accessible with the prosthesis in place.

However, when the prosthetic space is between 11 mm and 15 mm, and the bone structures provide sufficient lip support, a hybrid prosthesis can be considered.

A hybrid prosthesis consists of a cast metal framework covered by acrylic, which supports artificial teeth. The original design of the hybrid prosthesis developed by Swedish researchers using the two-stage endosseous implant system developed by Brånemark. The prosthesis consisted of a gold alloy framework attached to the copings of the implants, and on this framework conventional acrylic resin denture teeth were secured with acrylic resin<sup>2</sup>. Zarb et al. described the treatment of severely resorbed complete edentulous maxillae with a hybrid prosthesis using a metallic structure with acrylic artificial teeth, with prosthetic spaces larger than 15mm<sup>3</sup>.

An incorrect adaptation between metal structures and implants can cause bone loss and failure of



osseointegration, and this is clinically decisive. It is generally accepted in literature that passive settlement of a prosthesis is required for maintenance and long-term success of an implant treatment. In addition, the literature has implied that incorrect adaptation of metal may cause mechanical and biological complications. The loosening of both the prosthesis and the abutment screws and even the fracture of different system components have been attributed to the lack of support and maladaptation of the prosthesis.

A 68-year-old patient consulted us with a complete upper mucosal-supported denture, with which he was relatively comfortable, and his own teeth on the lower arch. However, the remaining natural dentition suffered from very advanced periodontal disease with attachment loss of more than 80%; these teeth had Class II and III mobility, which made it very difficult to chew.

The proposed treatment plan for the patient was to extract the lower teeth and rehabilitate the lower arch using implants and a fixed prosthesis to maintain the same comfort as with his natural teeth, and for the upper arch to replace the full denture.

Normally, when teeth are extracted from a complete arch and an immediate restoration is placed, it creates a problem





**Fig. 3:** Frontal view. Patient smile.



**Fig. 4:** Frontal view. Patient initial picture.

of adaptation for the patient, especially in the lower arch area. To help the patient during this period of healing and osseointegration of the implants, two provisional implants were placed.

Once the extractions were healed, 6 Aadva Tapered Regular Implants 4x10 mm were placed, at the position of molars, first bicuspid and anterior incisors. The bone quality and quantity were good, and once the expected osseointegration time had passed, healing abutments were placed. In this case, two abutment diameters were used, narrower (SR Abutment 3.8 x 2 mm) for the incisor and bicuspid areas where there is less inserted gum tissue and wider (SR Abutment 4.3 x 2 mm) in the posterior area.

After this second phase, there was a waiting period for the tissues to heal prior to the start of the prosthetic phase. Therefore, an impression was taken with closed tray copings, which is very simple but does not give a very exact replica; This was used to make a metal rigid impression tray that was secured with plaster to only one of the implants.

Once placed in the mouth, open tray copings were then used and they were splinted to the structure with a special plaster mixture; once this had set, everything was registered with a vinyl polysiloxane impression paste. This technique

gives a very accurate master cast, so a very good fit was ensured.

Once the final model with the different analogs was ready, the planning started. First, the old complete upper denture was analysed. In this type of cases it is very useful to do a lateral analysis. We placed a narrow lead foil strip on the upper and lower central incisor before photographs and X-rays were taken. This served as a reference for the relationship between the position of the anterior teeth and the bone.

With the lateral X-rays, the positioning of the transitional abutments can be seen; this is very important since all the manipulation from the different tests that need to be done will be carried out far from the head of the implant.



**Fig. 5:** Initial situation. Intraoral view.

## Full arch implant rehabilitation: a case report



**Fig. 6:** After extractions. Frontal view.



**Fig. 7:** After extractions. Occlusal view.



**Fig. 8:** Healing Abutments. Occlusal view.



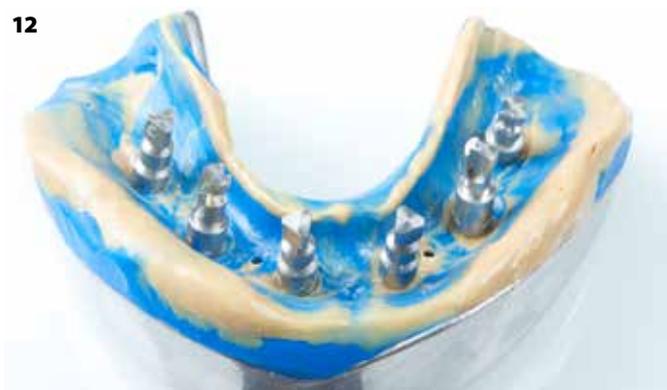
**Fig. 9:** Healing Abutments. Frontal view.



**Fig. 10:** Closed tray coping impressions.



**Fig. 11:** Closed tray coping impressions. Occlusal view.



**Fig. 12:** Preliminary impression.



**Fig. 13:** SR abutments at gingival level.

Once the fulcrum point and inclination of the upper incisor for lip support were determined, we could start to design the new upper arch, giving the patient a new occlusal plane and a new incisor position. The Fox plane helped us to obtain the correct plane and we used the Kois Bow as the craniomaxillary reference.

Once the models were placed in the articulator and adjusted to the parameters from the patient, the laboratory technician created a wax-up for both the upper and lower arches so the correct fit could be assessed, including the patient's occlusion and aesthetics.

As the images show, the upper arch was narrower than the lower one because those teeth were lost much earlier, which means that for a correct functioning of the complete upper prosthesis while chewing, the posterior sectors had to be placed at a crossbite. This way, the force will act on the alveolar bone ridge when chewing food and will not cause displacement of the prosthesis.

Once confirmed that everything worked properly, the next step was constructing the metal structure based on the wax-up design. This was once again checked with the teeth in position as a last confirmation prior to the final



**Fig. 14:** Rigid Metal Tray Impresion.



**Fig. 15:** Rigid Metal Tray Impresion with plastic dam.



**Fig. 16:** Fixing with plaster.



**Fig. 17:** First step. Final impresion.



**Fig. 18:** Final impresion.



**Fig. 19:** Master Model.

## Full arch implant rehabilitation: a case report



**Fig. 20:** Wax test. Smile parameters.



**Fig. 21:** Fox plane test.

manufacturing. At that time, confirmation of the modifications made could be verified by using the lead foil strip, as well as confirmation of the occlusion.

That was the moment when the final prostheses were made; the upper one was made as wide as possible in the



**Fig. 22:** Panadent Articulator phase.

posterior area to retrieve maximum stability, and the lower one was placed on implants. It was fit in the mouth and small adjustments had to be made to correct the small misalignments that normally occur in manufacturing.

The treatment of a complete edentulous patient using oral rehabilitation on implants begins by discussing treatment expectations and a meticulous intraoral and extraoral examination, following a systematic workflow to help in the diagnosis. This includes studying photographs and X-rays, which have evolved remarkably in recent times; analysing models on a semi-adjustable articulator and following a protocol to select the proper prosthetic rehabilitation on implants, choosing from overdentures, hybrid prostheses or fixed prostheses.

Implant-supported hybrid prosthesis can be an alternative treatment procedure when a fixed restoration of porcelain metal does not meet a patient's requirements for aesthetics, good phonetics, proper oral hygiene and oral comfort<sup>11,12</sup>.

Brida et al. proposed an edentulous patient classification system for implant-supported fixed prosthesis, classifying them into four types according to the following factors:

- amount of tissue loss
  - position of the anterior teeth in relation to the location of the residual ridge
  - lip support
  - smile line
  - need for prosthetic material for gingiva color (pink acrylic)
- Class I includes patients who require gingiva-colored prosthetic material such as pink acrylic to obtain aesthetic



**Fig. 23:** Lead foil on the old denture for X-ray evaluation.



**Fig. 24:** Lateral X-ray.

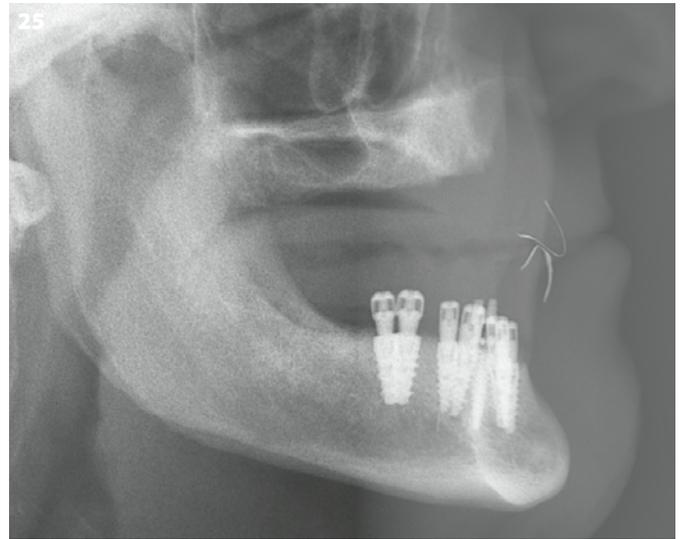
tooth proportions and optimal prosthesis contour, providing an adequate lip support.

Class II is for patients who require pink acrylic only to obtain esthetic tooth proportions and for prosthesis contour. Lip support is not a consideration since the difference in lip projection with and without any prosthesis is generally insignificant.

Class III contains patients who do not require gingiva-colored prosthetic material.

Class IV is assigned to patients who may or may not require pink acrylic, depending on the result obtained after surgical intervention<sup>10</sup>.

Our case was classified as Class II.



**Fig. 25:** Close up. Lateral X-ray.

Fabrication of hybrid dentures, in patients with adequate interocclusal space, provides the dentist with several advantages regarding the aesthetic appearance, including replacement and decrease of soft tissue support in the bulkiness of metal substructure and in the height of crowns



**Fig. 26:** Wax-up.



**Fig. 27:** Wax-up frontal view.



**Fig. 28:** Models in the correct position.

## Full arch implant rehabilitation: a case report



**Fig. 29:** Left view wax-up.



**Fig. 30:** Right view wax-up



**Fig. 31:** Frontal view wax-up.



**Fig. 32:** Model in the articulator. Lower design.

compared to the metal supported porcelain prosthesis. In addition to these aesthetic advantages, hybrid prostheses work as shock absorbers, reducing load forces on implants<sup>13</sup>.

The success rate of implanted-supported hybrid prosthesis treatments is high, as demonstrated by a systematic review published in 2014, which included 18 studies for evaluation, high survival rates were found (5 to 10 years) from 93.3% to 100% for the prostheses and from 87.9% to 100% for the implants<sup>14</sup>.

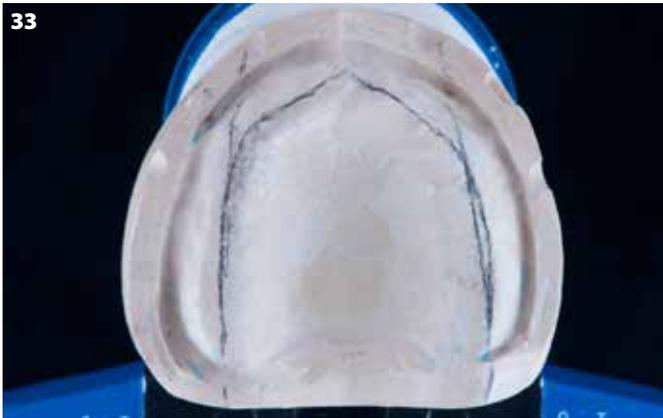
In a retrospective study where the main complications after rehabilitation with an implant supported hybrid prosthesis were evaluated, it was observed that the main complication was mucositis that affected 24% of cases, followed by problems with the prosthetic screws in 13.7% of the cases, including, for example, thread wear or loss, and with the same frequency (13.7%) fracture of the prosthesis teeth or

prosthesis detachment. These problems were related to an incorrect record of vertical dimension, an inadequate occlusion or lack of passive adjustment of the metallic structure. Another problem encountered was the access to the entrance holes of the prosthetic screws (7.8%)<sup>15</sup>.

Making a lower jaw hybrid restoration is a good option for rehabilitation of edentulous maxilla, and it should be considered as a treatment option when evaluating a patient as it improves aesthetics, functionality, and proprioception; it is easy to clean, requires less prosthetic maintenance, can be removed at any time and repaired at a very low price.

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**Fig. 33:** Upper arch.



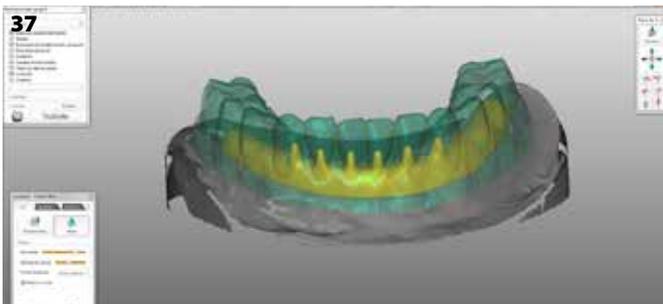
**Fig. 34:** Model in the articulator.



**Fig. 35:** Final wax-up Frontal view.



**Fig. 36:** Final wax-up.



**Fig. 37:** Aadva software. Structure design.



**Fig. 38:** Anterior view, final wax-up.

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## Full arch implant rehabilitation: a case report



**Fig. 39:** Lead foil test for the new design, intraoral situation.



**Fig. 40:** Lead foil test for the new design.



**Fig. 42:** Final restorations. Frontal view.

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**Fig. 41:** Final restorations. Lateral view.



**Fig. 43:** Final smile.



**Fig. 44:** Final restorations.



**Michael Brüscher** trained as a dental technician from 1976-1979, after which he was employed as a dental technician working mainly with gold and ceramics. In 1986 he completed his Master dental technician degree in Düsseldorf and then became a laboratory director focusing on all-ceramic restoration work. In 1989 he set up his own, privately based dental laboratory specialising in functional and aesthetic prosthetics with a focus on multichromatic-additive veneering techniques for composite and porcelain, precision fabrication methods for crowns, inlays, onlays and veneers made from composite and all-ceramic materials. Brüscher is an international adviser and course presenter for workshops on system-coordinating all-ceramic restorations. He has become well-known for his exceptional 3D presentations. He is an active member of the German Association for Aesthetic Dentistry (DGÄZ) and the Dental Excellence-International Laboratory Group and has been a specialist in Dental Techniques at EDA since 2008. He is considered to be an authority on the subject of all-ceramic and biomaterials and functional restoration work and regularly presents workshops and publishes papers.

# 15 years Initial™: the birth and evolution of a highly innovative class

By Michael Brüscher, Germany



The GC Initial™ Ceramic line is celebrating its 15 year existence this year, with success by the millions and, above all, countless enthusiastic devotees.

The idea of this ceramic range was born much earlier. In late 2001 a very small team of experts came together with the aim of gauging the possibilities for a new, all-embracing ceramic system. At the time, the prevailing European dental market was already more predatory than a growth market, so a highly exceptional concept was called for.

Meticulous analysis of the veneering ceramics market revealed a shortcoming of all the ceramic materials hitherto developed: they were not suitable for universal use. There was no ceramics manufacturer at that time providing dental technicians with a system for all possible framework materials that was cohesive, practical and, above all, user-friendly.

Ceramists were often compelled to process materials from a wide variety of suppliers which each needed to be handled differently. The expenditure in terms of time, money and failure management was correspondingly high. We wanted to bring this time that practitioners needed to constantly rethink and switch products to an end.

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The Basic, Basic Plus and Advanced Modules of the Initial Ceramics. The Initial MC Paste Opaque Set was especially developed for Initial MC.



**The idea is born**

The vision for Initial was to develop a ceramic system that offers ceramists the possibility of applying a consistent, uniform layering and colour strategy regardless of the substructure.

Everything – literally everything – was to be achieved with Initial. Starting from a conventional 2-3 layering technique, through to a lifelike, bio-aesthetic build-up, Initial, while working across systems was to meet every requirement!

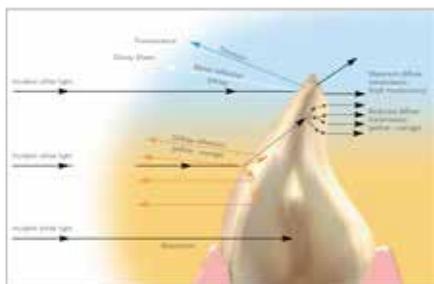
The bio-aesthetic layering method, analogous to the make-up of a natural tooth, should be highlighted. It was and still is today a unique selling point of the GC Initial ceramic range.

In theory it was a very forward-looking, visionary project. In practice we were brought back down to earth very quickly. Despite this or precisely because of this – we were all obsessed by this vision of Initial by then. For us there was simply no alternative, there was no turning back!

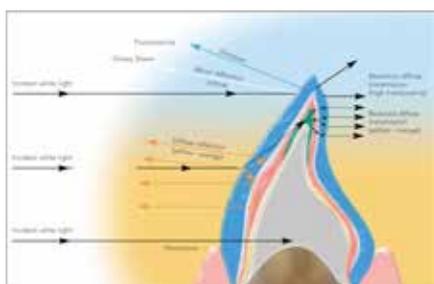


Shade tabs for Initial MC/LF/Ti.

Light handling properties of natural tooth



Light handling properties of GC Initial restoration



GC Initial Ceramics are based on the structural form of nature.

**The problem-solving stage**

The synchronisation of the vastly different ceramics posed by far the greatest problems for us. Colour, handling, shrinkage, opalescence, fluorescence, etc. everything had to be the same in the system of all types of ceramic. Ceramists needed to be able to rely on achieving an absolutely comparable result with a metal-ceramic, for example, as with a zircon-ceramic by using the same layering technique. However, there were secondary concerns, the ‘side-shows’ around the main attraction, which took up a huge amount of time.

Simply to establish the colour foundations of the bio-aesthetic layering technique (the INside materials), over 2500 tooth shades identified in patients were evaluated and the essence of these was transferred to the INside ceramics. We also engaged enthusiastically in the never-ending skirmishes about size/scope, packaging and container design of such a range. Naturally opinions differed considerably on these points.

A great deal of our own mistakes and imponderables from outside jeopardised the already tight schedule. This meant that a very small team of experts for a project of this magnitude constantly had to re-organise and rediscover itself. At all costs we wanted to meet the planned launch deadline of the end of March 2003 at IDS.

## Testing and troubleshooting

By the end of 2002 all the variables had been finalised or at least decided and commissioned. The factory had managed to produce and deliver all the materials required in the desired excellent quality. Nevertheless, how would the Initial system prove its worth in everyday use in what can sometimes be harsh reality?

All six types of ceramic were pushed to their limits and beyond based on a previously established, complex 'stress programme'. Every conceivable handling error in the laboratory was taken into consideration so that, after market launch, users could be offered expert support as quickly as possible.

It is well known that euphoria can move mountains. I cannot remember how many mountains we all had to move in those 14 months in the run-up to IDS 2003, but what suddenly stood in our way in January 2003 seemed insurmountable. The team member appointed to deal with the directions for use disclosed to the other team members in early January 2003 that he could not finalise them in time for IDS. This threatened to burst our grand dream like a soap bubble. After the colleague gave up, I was the only dental technician in the team and hence the only one who could still rescue things. I did not have long to think about it. Action was needed quickly. We absolutely wanted to launch Initial at IDS 2003. But how on earth could we – or could I – do it in the short amount of time left?

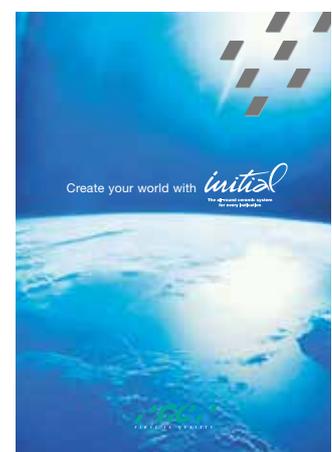
It was high-risk, but I said goodbye to my wife, my laboratory, my business partner, my lab team, my dentists and friends for two months to take advantage of the slight chance that we might still be able to finish the manuals.

All the other remaining team members divided the outstanding jobs between them as best they could. Our mood had plunged to an absolute depth, but we continually psyched each other up and that feeling 'when the going gets tough, the tough get going' gave us wings. And we achieved the almost impossible!

## The vision becomes reality

The launch at IDS far exceeded all our expectations. We were able to proudly present to amazed and astounded trade fair visitors our unique ceramic concept with utmost conviction. Without much publicity, yet very successfully (which is always an indication of a very good system) **Initial was launched** gradually after 2003, first in Europe, then the USA. Since then, Initial has also been marketed throughout Asia.

It was the right decision to concentrate initially on the Benelux countries, Austria, Switzerland and Germany. In the first two years post-launch, we gained tremendous experience in quick support and response to the market's needs. Constant rethinking, updating and expansion of the system would be necessary. The US market launch in May 2005 saw the Initial line expanded with new bleach shades.



The launch at IDS.

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**Continual evolution**

In November 2006 a **Gum Shades Set for MC/Zr** was presented and brought onto the market. This set – very important for implant techniques – was developed in close cooperation with the newly formed Inner Circle, a dental technology working group centred on Initial.



.....  
The Inner Circle.  
.....

The Inner Circle consists of selected Initial users/opinion leaders from the individual countries who convey the philosophy of the Initial ceramics line to the users through seminars, hands-on courses, workshops, etc.

The year-round interactive exchange of experiences takes place at the annual meeting at the GC European Headquarters in Leuven (Belgium). The participants exclusively receive the latest developed test materials.

Four years post-launch we realised that we had set new standards in the high-end veneer sector, but, looking at the system as a whole, we were rather too complex for the world market with its different trends and demands. To position Initial more broadly, it was important to provide a system to produce high-quality and aesthetically convincing restoration work without major investment and at an attractive price for the patient as well.



The ingenious **Lustre Pastes** were launched in 2007. This unique three-dimensional ceramic stain made it possible to produce aesthetic restorations with just one glaze firing. At that time there were still two Lustre Paste Sets, one for high-CTE and one for low-CTE ceramics.

The firstly introduced **Initial IQ –“One body”**, also launched in 2007, existed of two lines of press-over systems, one for metal and one for zirconia frameworks. Due to its success, layer-over systems for the same frameworks were launched in 2009 and 2011. The base materials have a certain degree of light dynamics and can therefore be used even for the anterior teeth without additional layering, a unique selling point.

In June 2010 the **Initial Lustre Pastes NF** were launched to further simplify the system. Now there was just one paste for all ceramics. The Lustre Pastes NF are extremely popular and also used by many non-users of Initial every day for refining the aesthetics.



As the worldwide market works over 70% with non-precious alloys in this sector, the **Classic Line** launched at IDS 2013 – with a Paste Opaque CL specially adapted to non-precious metals. This range, mainly aimed at production laboratories that prefer the 3-layer technique but by no means want to compromise on material quality, made Initial accessible for a broader market.

The Inner Circle for Initial was systematically expanded to the whole of Europe to keep adapting the GC Initial System to the current prevailing market needs without distorting the character of the system.

For example, the **Chroma Shade Translucent (CST) ceramic powders** developed and systematised in Italy were brought onto the market in 2014. This

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small kit, consisting of only seven powders, enables the user to make incredibly simple and hassle-free correction firings for all 16 Vita Classic shades.

Due to the clear, logical structure of the CST powders, this small set, exclusive to the GC Initial MC line, got off to a very successful start in 2014.

Despite all the euphoria about all the classic "manual" ceramic products developed for us technicians, we are also working intensively on the very future-oriented production variants for Initial.

CAD/CAM, 3D printing, etc. are increasingly coming to the fore and an innovative classic like Initial will also follow these trends, once again with its own unique emphases.

In 2014 the first **Initial Zirconia Disks** ST/HT produced in-house were also presented. In addition to the best possible material properties, the main focus was on perfect compatibility with the Initial Zr-FS veneering ceramic.

In the background, however, a very special highlight had been developed for some time.

The market dominance of a single supplier in the field of lithium disilicate seemed, on the surface, initially overwhelming and seemingly showed no room for development in this field.

However, the biggest weakness of a lithium disilicate restoration to date – veneering it with the associated low-fusing layering material – was the actual path to us becoming active in this area.

Existing Initial products, such as the Lustre Pastes NF, harmonise perfectly with monolithic lithium disilicate restorations and refine them in aesthetic hemispheres previously considered impossible.

Moreover, our core competence was in demand here once again to create a simpler veneering ceramic for lithium disilicate, with warm and bright colours for optimal aesthetics, remaining stable after multiple firings. It was a gratifying challenge to eliminate the known disadvantages with a unique veneering ceramic and simultaneously transfer the Initial philosophy to such a very low sintering material as well.

Thanks to the very effective collaboration of all parties involved and the mutual trust in each other's expertise, **Initial LiSi** was launched in time for IDS 2015. All genes of the Initial concept and their bio-aesthetic strategy with their colours and unique light dynamics were given to the new LiSi ceramics.

Due to its precise alignment to this framework material, LiSi impresses with its extraordinary aesthetics, strong colours, and boasts previously unknown handling properties, firing behaviour and above all reliability. A dream for every user!

The complex system of quality assurance of the company GC has proven itself in the best way. All initiated/developed products are first tested in a very small circle, then provided to the Inner Circle and finally these materials are handed over to selected, differently oriented laboratories for everyday field testing.



The Initial Zirconia Disks are perfectly compatible with the Initial Zr-FS veneering ceramic.



The GC Initial Layering App.



Initial LiSi tackled the problems of low value and colour stability after multiple firings.

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The Initial Lustre Pastes NF, V-Shades.



The Initial Lustre Pastes NF, Gum Shades.

This way, weak points were recognised and eliminated even before the market launch. As in the past, this approach made it possible to create a very special, unique and safe product.

Of course, the already active Initial users have a special benefit. Part of the Initial overall concept, LiSi also guarantees harmonious integration into the Initial concept. The result is an extremely short familiarisation period, as LiSi is optimally oriented to the proven Initial layering structure.

In the same year, the **Initial Lustre Pastes NF** System was extended by a very remarkable variant – the **Gum Shades**.

Monolithic constructions made of lithium disilicate or zirconium dioxide are adequate materials for very complex restorations, especially for implant prosthetics. Very often, those can only be designed with massive gingival reconstructions. In the contemporary CAD/CAM process, it is possible to directly shape this gingival area and simultaneously mill it from the framework material in a precise manner.

By colouring the framework materials prior to the sintering process (zirconium dioxide), the tooth and gingival areas can then already be coloured. However, this does not meet high aesthetic standards.

A much more sophisticated aesthetic outcome is effortlessly achieved with Lustre Pastes NF and the new Lustre Pastes Gum Shades. They stand up to any aesthetic comparison with a complex, polychrome layered gingiva and often even surpass it.

In 2015 and 2016, intensive work was also carried out on testing and conceptual planning for logical, helpful and necessary additions to the Initial overall concept. The highlight of all these considerations was the **LiSi Press** ceramic, which was presented at the IDS 2017 in Cologne. It was relatively late that the decision was made to offer the very user-friendly and very secure lithium disilicate market its own product. **Initial LiSi Press** is the first GC ceramic whose basic features and designs were not conceived and manufactured in Europe but in Japan, the home country of GC.

Compared to the lithium disilicate products already on the market, explicit improvements in processing, grey value stabilisation, chroma and strength have been developed and realised. A significant improvement of the material lithium disilicate was also achieved by GC's own HDM technology (High Density Micronisation). As a result, the material is significantly finer-grained than comparable products, and is thus also much easier to process. The biaxial flexural strength significantly transcended the classic value of 450 MPa and thus became the absolute top range for lithium disilicate.

**An exactly matched overall system between LiSi Press, LiSi layering ceramic, Lustre Pastes NF, New Spectrum Stains, etc. is also a unique selling point, just like the deliberate reduction of this system to 23 press pellets.**

Only four translucency variations in HT, MT, LT and MO were needed, all of which have a slightly increased white content, which effectively reduces the greying of lithium disilicate during multiple firings.

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The Initial LiSi Family is an exactly matched overall system for lithium disilicate restorations.

The new **LiSi PressVest** investment can also certainly be considered a highlight. Here, all relevant properties and features for a high-precision pressing result were significantly improved. The absence of a reaction layer, very long working time, optimal fluidity and extremely fine grain offer an excellent control and precision that enables me to do my daily work with lithium disilicate pressing very precisely and in a relaxed manner.

**Initial LRF BLOCK**, a leucite-reinforced feldspar CAD/CAM block in five high and low translucency V-shades for full-contour was launched at IDS 2017. With this chairside solution, dentists could acquaint themselves hands-on with Initial for the first time. Even the appreciation started rather slowly, the growing enthusiasm for its dazzling aesthetics yet without the brittleness that is a common disadvantage of feldspar has been reassuring. The Initial LRF BLOCK offers a natural analogue light dynamic with a perfectly balanced translucency, fluorescence and opalescent character.

At the beginning of this year, two other additions have been made to the Initial Product Portfolio. The **Enamel Opal Boosters** for Initial MC, Zr-FS, LiSi can be used pure or mixed and boost the opalescent character of the enamel. The **Initial Spectrum Stains** are powder stains available in a variety of 16 colours are adapted to the aesthetical colour concept of the Initial ceramic portfolio. By using either the Glaze or the Glaze Paste Liquid the stains & glaze can be adapted to the preferred consistency of the user. True to the Initial philosophy, the Initial Spectrum Stains are compatible to a wide CTE range, perfectly adapted to fit on nearly all types of dental ceramics.

**Aesthetics, economy and progress – the Initial System combines all this in an ingeniously simple way and thus facilitates our everyday work very efficiently.**

**In the past fifteen years, a great number of different innovative materials have been developed and significant improvements in the system have been realised. It is even not possible to name everything here.**



The Initial LRF BLOCK is a leucite reinforced feldspar ceramic. Easy to mill, yet strong and beautiful.



Easy divesting with LiSi PressVest.



The Initial Spectrum Stains preserve texture and can be used for internal as well as external staining.

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The Opal Booster Set brings about a natural opalescence that can be mainly perceived in the incisal area.

The generally increased aesthetic awareness of patients should not be underestimated, especially for anterior restorations. Increasingly, perfectly idealised, highly aesthetic copies of natural teeth are required here.

Suboptimal colouring and disharmony in the design are no longer accepted or "tolerated" in the anterior region by self-confident patients. This is where the real art of dental technology begins; **the aim is to copy nature, while at the same time perfecting aesthetics and function.**

Not an easy task. We all dream of simplifying our own individual technical dental performance when producing the perfect restorations.

Using a digital workflow is currently the only thing which promises us the simplest conceivable handling.

However, this digital workflow is not as simple as it sounds. The challenge lies in adding character to the very uniform computer-animated restorations generated on the production-optimised platform of the "digital workflow". Can natural aesthetics and economy find harmony?

Every working method has its time and its justification as long as it is demanded and used for everyone's benefit.

The Initial concept follows and connects all these market trends and will always be "on a par" with them.

**Let's Initialise!**

**Postscript**

Having consciously omitted to mention anybody by name in this article, I would like to take this opportunity here to thank all my companions on this journey for their endless patience, commitment, support and devotion that enabled us to create something quite wonderful and real out of our shared vision on Initial. Vision requires courage and we certainly had courage.

I would also like to thank the many, many users. Through your enthusiasm and your input, you have made a huge contribution towards Initial being what it is today.

And last but not least, my thanks of course go to GC, who for fifteen years have put extraordinary trust in me, opened up lots of new avenues and smoothed the way for me.

In conclusion, I would do it all over again!!!



**Discover the program on  
[www.initialontour.com](http://www.initialontour.com)**

# Colour and brightness



**Luigi Russo** was born in Pozzuoli on 8 July 1977 and graduated from the Alfonso Casanova Institute in Napoli (Naples, Italy) in 1996. Then, he worked as an employee in 3 different dental labs where he learned the art of prosthodontics. Since 2005, he owns a dental lab in Naples. Over the years, he has developed an in-depth knowledge of the various aesthetic materials by participating in several activities such as congresses, conferences and training courses with outstanding speakers, renowned both on a national and on an international level, including V. Mutone, L. Santocchi, Y. Odanaka, R. Iafrate, J. Endo, C. Nannini and M. Fukushima. He closely collaborates with GC Italy as he is a member of the Competence Lab team for which he gave live demos at the Colloquium conferences held in Caserta and in Brescia and organised several initiatives at his own laboratory. He was also speaker at the regional conference in the Abruzzo region.  
Facebook page: [LuigiRusso Lab](#)

Proper brightness of a zirconia-ceramic restoration using Initial™ Zr-FS ceramic

By Luigi Russo, Italy

The importance of brightness in a restoration is sometimes underestimated with more emphasis placed on the “hue and chroma”, which often are still the decisive aspects for the success of a product. However, from our perspective, a restoration without the proper brightness (value) will be dull and lacking vitality, in other words, unnatural.

To confirm this, we take a look at how this aspect could be enhanced beyond the material upon which we perform the layering.

This specific case involves a case study on a zirconia coping. This concept can also be transferred to metal and lithium disilicate by applying fluorescent white opaque dentin liners and coloured opaque dentins.

Case study

This clinical case study shows an improvised temporary restoration applied immediately after preparation. The laboratory was asked to produce a rapid intervention due to the young age of the patient (Fig. 1). After a quick and careful evaluation of the case, a zirconia-ceramic crown on a “white opaque ZrO<sub>2</sub>” structure was chosen as the most appropriate option. This decision allowed us to operate from a “high value” initial situation rather than a low one (Fig. 2).



Figure 1: Picture of the temporary restoration sent by the studio.



Figure 2: Model with the zirconia coping in situ.

When testing and defining shade, this image shows how difficult it is to find a good match between the shade of a natural tooth and conventional colour scales; when presented with difficulties of this type, we must rely on our experience and knowledge of our own ceramic system in order to be able to make the best choice for the case at issue (Figs. 3 and 4).



Figure 3 & 4: Comparison of shades with standard V-shade guide.

**Chart and layering approach on opaque white zirconia in the anterior region.**

The coping was initially conditioned by a connection firing with Lustre Pastes NF (Fig. 5); we then proceeded to create an opaque buffer in the cervical third with a mixture of fluorescent powders and internal stains (IN-44: sand) following the technique described by Vincenzo Mutone (Fig. 6).

The mesial and distal areas were constructed using Opaqus Dentin Modifier with substantially intense chroma modification (ODM-2: yellow/gold and ODM-1: white), with the objective of obtaining more depth (Fig. 7).

The layering phase under consideration involves the

application of significant quantities of light Fluo Dentin (FD-91: light) to the entire surface in the cervical third area (i.e. the area where the tooth shows the most brightness when light shines through it), from the middle third to the incisal third in such a quantity and consistency as to enable a glimpse of the underlying structure, and finally, in the incisal third, the simulation of the structure with mamelon features (Fig. 8). A mixture of IN-44, IN-51 (olive) and FD-91 was superimposed to maintain the chroma of the selected dentines in order to attain the shade chosen for the crown (Fig. 9).

The restoration under construction was layered with Dentin DA-3 from the cervical third to the middle third (Fig. 10) in order to complete the morphology with a mixture of dentines B2:2 – C2:1 (Fig. 11).



**Figure 5:** Firing of connections with Initial Lustre Pastes NF.



**Figure 6:** IN-44 modified with cervical fluorescent shades.



**Figure 7:** Mesial and distal modified opaque dentine.



**Figure 8:** Fluorescent white opaque dentine liner FD-91.



**Figure 9:** IN-44, IN-51 and FD-91.

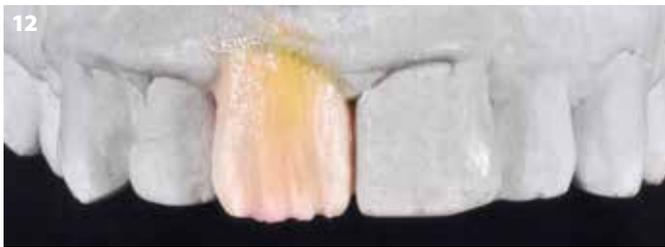


**Figure 10:** Dentine layering of cervical third.

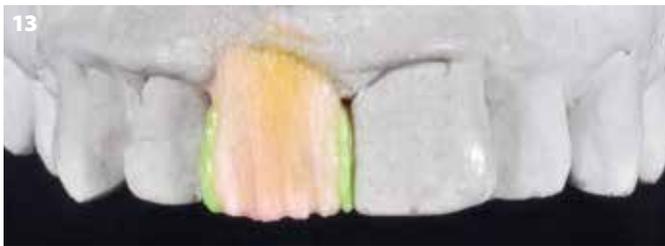
## Colour and brightness



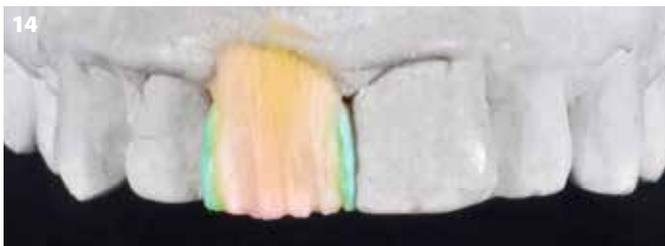
**Figure 11:** Completion of contour with dentine mixture.



**Figure 12:** Dentinal cutback.



**Figure 13:** Medial and distal layering of enamel.



**Figure 14:** Thin, transparent, blue line.



**Figure 16:** Translucent layering.

When cutting the dentine, the observations made during shade selection must be accounted for. In this case, the depth of the mamelons was shallow; therefore, we removed little material (Fig. 12).

The enamel layer E-59 (which corresponds to VITA Shade A3), was applied in the proximal areas during the first phase; these aided the penetration of light without creating black areas, or so-called “middle-distal shadows” (Fig. 13). A thin layer of blue Transparent Modifier (TM-01:blue) was then applied on top (Fig. 14). It was completed by constructing a frame with the same enamel, the central part that is distinguished by Intensive Enamel (EI-14: yellow), which creates a warmer area, mimicking the effect present in natural teeth (Fig. 15).

The process was finalised by alternating various Translucent Modifiers (Fig. 16).

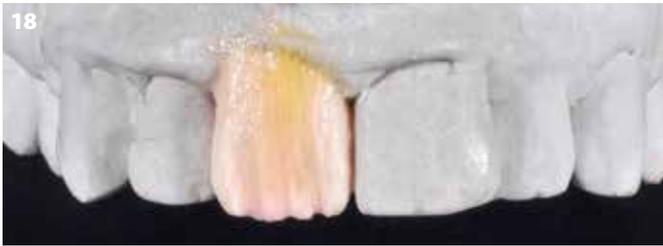
The incisal edge was created with buildups simulating the mamelons alternated with fluorescent dentines. In this case, it was considered appropriate to layer horizontally in the middle third, where the colour ‘Internal Stains’ was applied to wet ceramic (once learned, this technique is preferable, as the colour is more three-dimensional and less static than with the conventional technique of fixating the colours) (Fig. 17).



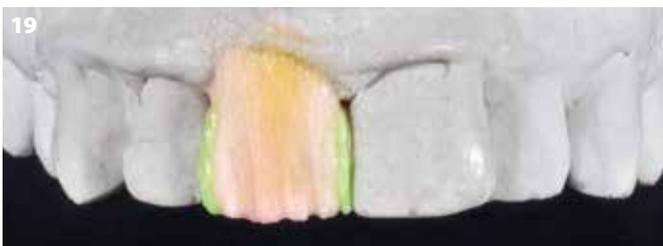
**Figure 15:** Completion of enamel contour.



**Figure 17:** Layering of mamelons and stains on wet ceramic.



**Figure 18:** Completion of first firing with fluorescent clear translucent CL-F.



**Figure 19:** Result of first firing on the model.



**Figure 20:** In situ control of first firing.



**Figure 21:** Beginning of second firing with dentine and translucent modifier.

This was completed by covering everything with Clear Fluorescence (CL-F), which is translucent ceramic upon which additional colours can be applied (Fig. 18). The firing of the first layer produced a satisfactory result (Fig. 19). It is essential for the first firing to be validated in the patients mouth, particularly when creating a single central incisor, in order to gain an understanding of where and to what extent issues remain that need to be resolved in order to achieve the targeted result (Fig. 20).

A mixture of dentine (DA-3) and translucent modifier TM-03 (rosa) (Fig. 21) was applied for the second firing at the cervical area, with Opaqus Dentin Modifiers ODM-1 and ODM-2 in the proximal areas; we continued the stratification with coloured transparent and translucent layers (Fig. 22).

The rest of the layering was completed by applying a mixture of TM-02 and BLD-2 (Bleach Dentin White); the central area of the crown was completed with natural Enamel E-58 (corresponds to VITA Shade A2) and E-59 in order to enhance the mesial and distal slopes (Fig. 23). The final result is clearly shown on the model after careful macro and micro surface texturing (Fig. 24) with an



**Figure 22:** Translucent and translucent coloured layering.



**Figure 23:** Completion of second firing.



**Figure 24:** Result after macro and micro texturing.

## Colour and brightness

inherent gloss attained by adding small areas of surface shading and then applying mechanical polishing to better control the various degrees of gloss (Fig. 25).



**Figure 25:** Result after creating inherent gloss (mechanical polishing).



**Figure 26:** Frontal view a few days after delivery.

After several days, the clinical images demonstrate a favourable outcome of the emergence profile with regards to the tissues and a good integration of the superficial texture of the restoration (Fig. 26, 27 and 28). The frontal clinical images and the isolation of the gingival tissues demonstrate a “balanced” correspondence of the chroma, i.e. value of the constructed crown in comparison with the patient’s natural crown (Fig. 29).

This layering technique was inspired by the studies conducted over the years by Vincenzo Mutone on how to imitate the brightness of natural teeth with ceramics.



**Figure 27:** Right lateral view for better perception of texture and gingival emergence.



**Figure 28:** Left lateral view for better perception of texture and gingival emergence.



**Figure 29:** Frontal view after a few months.

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# GC Initial™ LiSi Press sets the new benchmark for lithium disilicate

Lithium disilicate is a glass ceramic with proven clinical success, which quickly gained enormous popularity because it is both strong and aesthetic.

Researchers from the Kanagawa Dental University in Japan and the Ludwig-Maximilians-University of Munich in Germany investigated the mechanical properties of three pressable lithium disilicate ceramics. Initial LiSi Press exhibited the best properties in all tests<sup>1</sup>. It showed significantly higher flexural strength, less wear and better resistance to acid than both other lithium disilicate ceramics from competitive manufacturers. Electron microscopic analysis revealed the unique size and distribution of lithium disilicate crystals in the glass matrix of Initial LiSi Press.



## High Density Micronisation (HDM)

The superior physical properties and chemical stability of Initial LiSi Press can be attributed to its ingenious microstructure. Thanks to the HDM-technology, the ultrafine lithium disilicate crystals are densely and equally dispersed throughout the entire glass matrix.



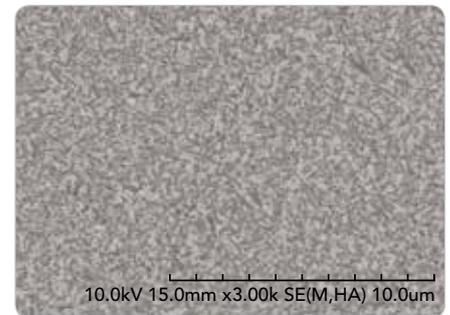
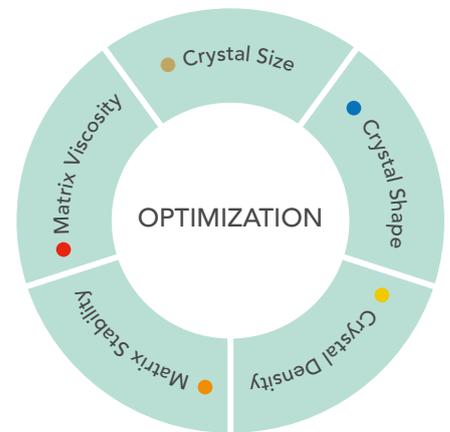
## GC Initial™ LiSi Press sets the new benchmark for lithium disilicate

Initial LiSi Press has a more homogeneous structure than traditional lithium disilicate restoratives, which are composed of larger crystals. Irregularities in a material pose the opportunity for cracks to initiate under masticatory forces. At the surface, those are the sites where delamination occurs. The unique structure of Initial LiSi Press renders the material much smoother, resistant to fracture and friendlier for the opposing teeth.

Also, the glass matrix, which is considered responsible for chemical solubility, is filled more optimally by the higher proportion of lithium disilicate crystals in Initial LiSi Press, rendering it more stable over time.

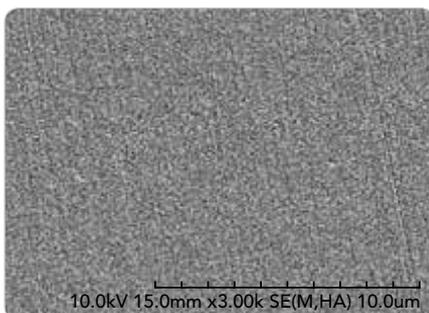
With these qualities, Initial LiSi Press remains true to the original mission of the GC Initial concept – to provide the most efficient, aesthetic, and stable option on the market today.

- 1 Katsura Ohashi, Yuka Kameyama, Yuuki Wada, Tomoyasu Midono, Kaori Miyake, Karl-Heinz Kunzelmann and Tomotaro Nihei. 2017. Evaluation and comparison of the characteristics of three pressable lithium disilicate glass ceramic materials. International Journal of Development Research, 7, (11), 16711-16716.

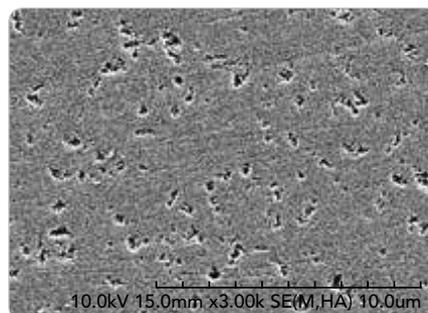


HDM - High Density Micronization

Indications for Initial LiSi Press			
Veneer	Inlay/Onlay	Crown	Bridge



Initial LiSi Press after second polishing



Conventional lithium disilicate after second polishing

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