issn 1616-7390 • Vol. 17 • Issue 1/2026

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CAD/CAM

international magazine of dental laboratories

user report
Efficient production of a hybrid implant-supported full-arch prosthesis

case report
A single-visit digital workflow for endodontic treatment and restoration

opinion
Dental technicians and the digital future: Why embracing change secures the profession

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Éric Berger

Master dental technician

Craftsmanship redefined

The latest developments in CAD/CAM dentistry make one thing clear: we are not witnessing the disappearance of craftsmanship, but its transformation. This new issue of CAD/CAM reflects that shift through a series of clinical cases and technical insights that highlight how digital tools are extending, rather than replacing, the expertise of dental professionals. Across these contributions, the common thread is not technology for its own sake, but its role in supporting more precise, considered and biologically sound treatment decisions.

This is particularly clear in the case by Dr Jotautas Kaktys on biomimetic restoration. While the preservation of natural tooth structure has long been a central restorative principle, advances in adhesive materials and digital workflows are making conservative treatment decisions more predictable and more nuanced. The decision between direct and indirect restoration is increasingly shaped not by defect size alone, but by a deeper understanding of biomechanics and material behaviour. Here, technology supports the process, but clinical judgement drives the outcome.

A similar balance between technological precision and biological understanding can be seen in chairside digital printing, as illustrated in the cases by Drs Christoph Wenninger and Anna-Lena Mörtl. This workflow introduces another dimension: immediacy. Functional and aesthetic temporisation in the anterior region can now be achieved with remarkable accuracy and colour reproduction. Managing gingival tissue, however, especially when using the biologically oriented preparation technique, remains a biologically sensitive task. The machine can fabricate the restoration, but it cannot interpret tissue response. That responsibility stays firmly in human hands.

Even traditionally rooted concepts such as the pinlay are being revisited through the same digital lens. As shown in the article by Dr Les Kalman and Lina Kalman, digital scanning, CAD, milling, thermographic imaging and digital shade analysis breathe new life into established techniques. This is not nostalgia; it is evolution. Established ideas can take on new relevance when refined by contemporary tools.

That pragmatic view also guides the comparison between milling and printing. Additive manufacturing is invaluable for models, guides and temporary restorations, offering speed and flexibility. However, when it comes to definitive restorations, subtractive methods still provide unmatched reliability in terms of fit, durability and biocompatibility. The future is not about choosing one over the other, but about understanding their respective strengths.

At the centre of all this stands the dental technician. Far from being sidelined, this role is becoming more critical. Mastery today means more than manual skill; it requires digital fluency, adaptability and a willingness to rethink workflows continually. Digital transformation is not simplifying dentistry. It is making it more demanding, more nuanced and ultimately more rewarding. The future belongs to those who can integrate technology, materials and human expertise into coherent, thoughtful practice, and the contributions in this CAD/CAM issue offer a timely opportunity to explore the cases, techniques and perspectives shaping that next phase.

Éric Berger
Master dental technician

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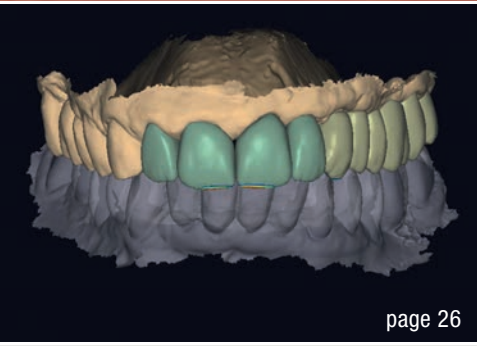
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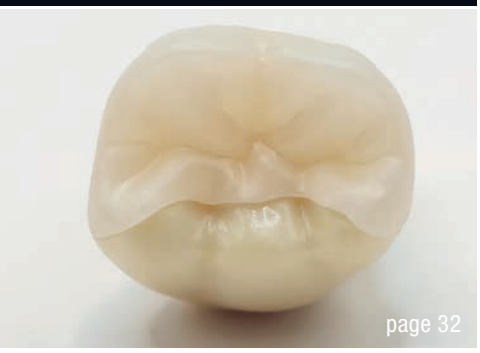
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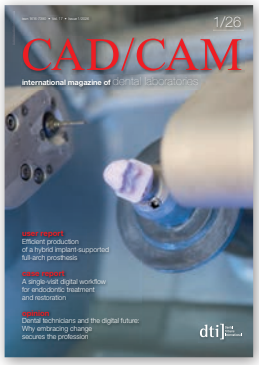

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CREATING PERFECTION

Efficient production of a hybrid implant-supported full-arch prosthesis

Maximiliano Paterlini, Spain

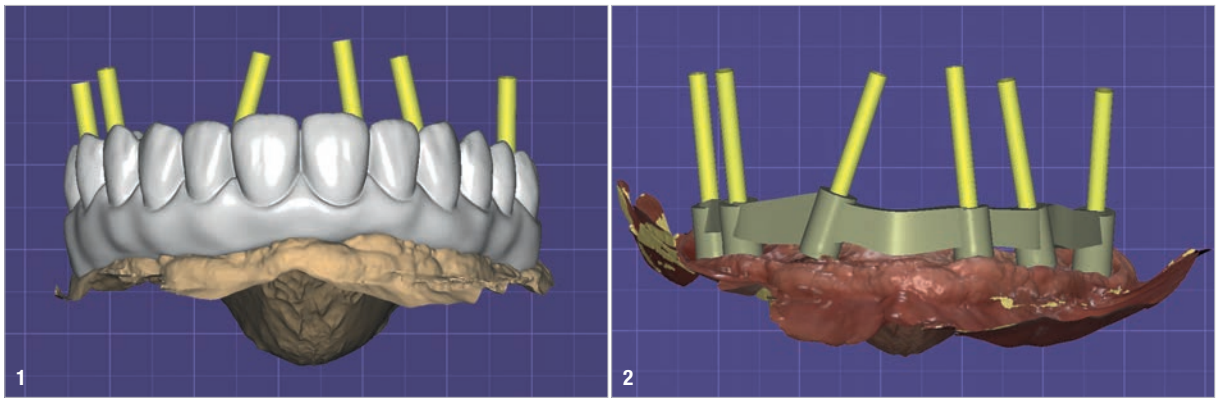


Fig. 1: Complete design of the teeth and gingiva in exocad software. **Fig. 2:** Design of the passive bar on the implants.

Introduction

A metal–acrylic hybrid prosthesis has traditionally been a popular choice for implant-supported full-arch prostheses. More recently, zirconia has come to the fore. Acrylics are lighter and less expensive, but zirconia offers an excellent combination of strength and aesthetics. This article describes a protocol for fabricating hybrid prostheses consisting of a primary structure made of titanium and a secondary structure made of zirconia.

Digital design and passive fit

The tooth and gingival morphology were designed in DentalCAD (exocad; Fig. 1). On the basis of this design, a passive bar was designed (Fig. 2), manufactured in aluminium and sent to the clinic for testing and adjustment.

Unlike teeth, which are connected to the bone via the periodontal ligament, implants have a rigid connection to the bone. Therefore, the passive fit of the superstructure is particularly important. A misfit can have negative effects, such as detrimental stress at the bone–titanium junction or prosthetic complications such as screw loosening. After verifying the seating of the aluminium bar, the dentist sectioned and splinted it in the corrected position to achieve a passive fit (Fig. 3) and then sent it back to the laboratory.

At the laboratory, the implant analogues were attached to the corrected bar, and their positions were secured in a gypsum base (GC FUJIROCK EP Premium Line, Polar White) using a silicone base former. The resulting analogue and model assembly was then scanned with scan bodies in place, and the meshes were superimposed

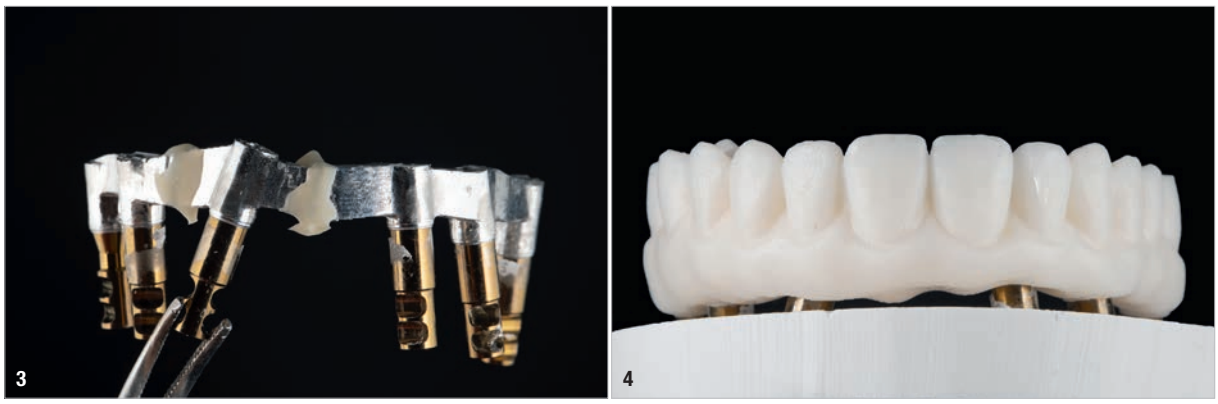


Fig. 3: Aluminium bar after sectioning and splinting to achieve a passive fit. **Fig. 4:** 3D-printed prototype on the model.

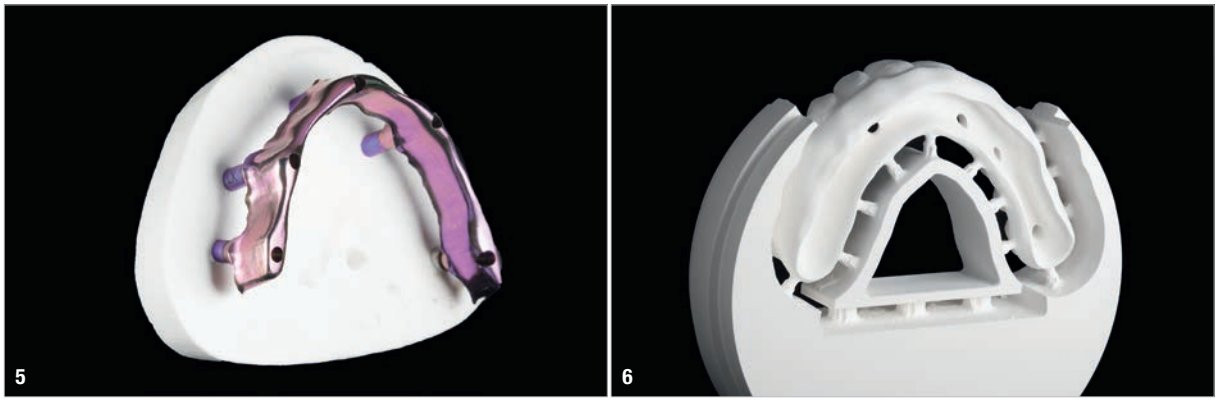


Fig. 5: Primary titanium structure. **Fig. 6:** Secondary zirconia structure milled from GC Initial Zirconia Disk Multilayer Elite.

in exocad software to locate the corrected positions of the analogues in the 3D space of the original design.

Prototype verification and framework fabrication

Once this position had been confirmed, a prototype based on the digital design and incorporating the optimised implant positions was 3D-printed (Fig. 4). This step allowed verification of gingival pressure, function and aesthetics intra-orally before proceeding to the definitive structures.

After verification of the passive fit and the intra-oral mock-up, the primary and secondary structures were designed using Blenderfordental plug-ins for Blender software. The primary structure consisted of a titanium bar (Fig. 5) that would be screwed on to the prosthetic abutments and then completed with a secondary zirconia structure. A minimum material thickness of 0.8 mm was maintained around the screw access holes. The secondary structure was milled from a 25 mm GC Initial Zirconia Disk Multilayer Elite blank (Shade A2; Fig. 6).

The zirconia structure was then customised. Manual vestibular reduction was carried out in both the white and pink areas using different burs and stones in order to achieve an individualised effect between the teeth (Fig. 7). These manual changes were made while the material was still in its green state, allowing the morphology to be refined before sintering.

> “GC Initial offers a complete system for achieving high-quality prostheses efficiently.”

Characterisation of the zirconia structure

After sintering (Fig. 8), internal characterisation of the gingiva and teeth was carried out using GC Initial IQ Lustre Pastes ONE, GC Initial Spectrum Stains and GC Initial IQ Lustre Pastes NF Gum Shades (Figs. 9a & b). For the teeth, Lustre Neutral Fluo was used as a fluorescent base, and different colours were then applied on top to create various chromatic areas and effects. The cervical areas of the teeth were coloured using Lustre Body B (L-B). On the canines, this was applied more intensively in order to give them more chroma than the incisors.

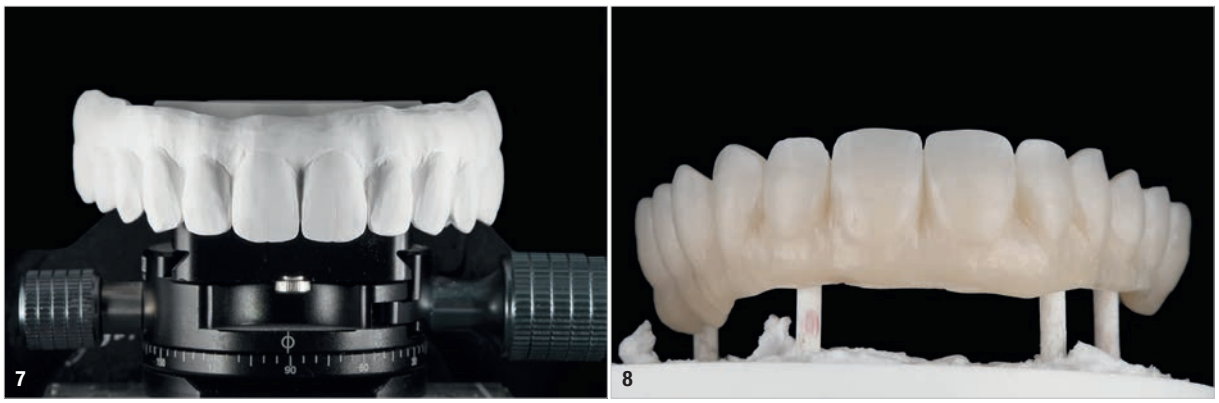


Fig. 7: Zirconia framework after removal from the disk and manual cutback. **Fig. 8:** Zirconia framework after sintering.

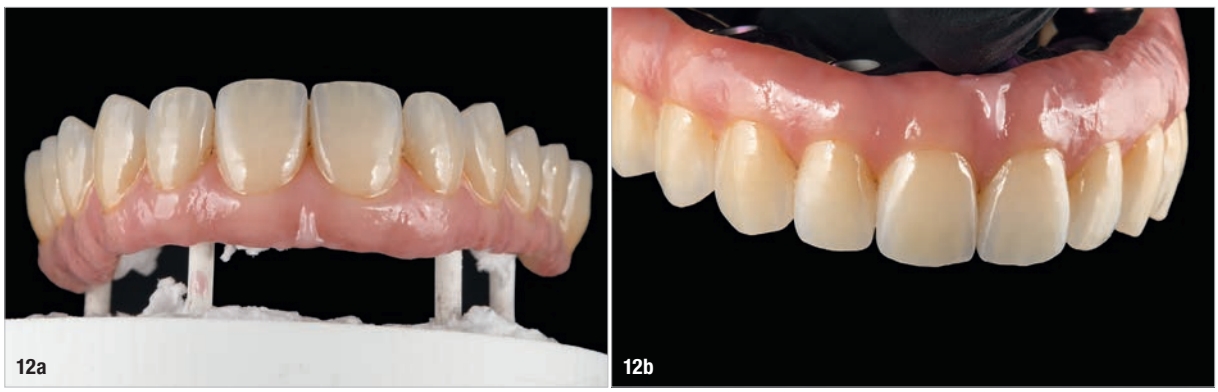
Figs. 9a & b: Application of GC Initial IQ Lustre Pastes ONE, GC Initial Spectrum Stains and GC Initial IQ Lustre Pastes NF Gum Shades during internal characterisation at an earlier **(a)** and a more advanced **(b)** stage. **Fig. 10:** Result after firing of GC Initial IQ Lustre Pastes ONE, GC Initial Spectrum Stains and GC Initial IQ Lustre Pastes NF Gum Shades. **Fig. 11:** Application of GC Initial Zr-FS for characterisation of the teeth and gingiva.

In the middle area of the central and lateral incisors, a light-refracting zone between the cervical and incisal areas was created using a mixture of Lustre Value (L-V) and Lustre Enamel Effect 1 (L-1), contributing to a more natural appearance. In the incisal area, a light-absorbing zone was created at the free edge using Lustre Enamel Effect 5 and a mixture of Lustre Enamel Effect 6 and Lustre Enamel Effect 3. The mamelons were created using a mixture of L-V, L-1, Lustre Body B (L-B) and SPS-4.

The gingival characterisation was completed using L-N as a non-fluorescent base, to which different gingival shades were added to create a natural appearance. The free gingiva was coloured using G-23, LP-M4 and G-24, while G-35 was used for the attached gingiva and G-36 for the alveolar mucosa. After firing, the natural colour and gloss were already visible (Fig. 10).

Final layering and clinical result

Further characterisation was then carried out using GC Initial Zr-FS. Masses of this feldspar-based zirconia veneering ceramic added depth and vitality to the structure. Enamel Opal EOP-2 and EOP-3 and Enamel E-58 were



Figs. 12a & b: Result after glazing, shown from frontal **(a)** and angled views **(b)**.

Fig. 13: Bluish 3D effect at the incisal edges, adding visual depth and lifelike appearance to the prosthesis. **Fig. 14:** Intra-oral frontal view of the final result after insertion of the prosthesis. **Figs. 15a & b:** Extra-oral frontal **(a)** and angled views **(b)** of the final result.

used to mimic enamel, while Cervical Translucent CT-22, Fluo Dentin FD-92, Dentin D-A2 and Clear Fluorescence CL-F were used for the teeth. Gum GM-24, GM-34 and GM-36 were combined with Gum Universal to complete the gingiva (Fig. 11).

The result was a high-end prosthesis composed of a high-precision titanium bar and a zirconia secondary structure, an approach that stands out as a premium option for full-arch rehabilitation (Figs. 12a & b). The blue effect at the incisal edges was the result of the combination of the internal characterisation and the application of EOP-3 in the same zone, creating a 3D effect (Fig. 13). Its smooth, polished surface would facilitate maintenance and support optimal hygiene. The prosthesis was seated in the mouth and evaluated clinically, showing a stable intra-oral result (Fig. 14) and a harmonious final appearance (Figs. 15a & b).

Material properties and workflow benefits

GC Initial offers a complete system for achieving high-quality prostheses efficiently. Its most notable benefits are the following:

– *Stability:* The GC Initial materials perform reliably and predictably. When combined with a sound protocol, they give dental technicians excellent control throughout the workflow.
– *Reproducibility:* Used within consistent protocols, these materials support reliable, repeatable outcomes and help minimise the risk of error.
– *Time:* Customisable workflows allow adaptation according to the needs of each case, enabling greater efficiency and productivity.
– *Aesthetics:* With the appropriate protocol, vibrant shades and consistency of results, a highly aesthetic and natural-looking outcome can be achieved case after case.

Taken together, these advantages make GC Initial an excellent option for delivering durable and aesthetic prostheses. By prioritising quality and precision, dental technicians can help ensure a lasting positive impact on both patients and clinicians.

about

Maximiliano Paterlini trained as dental technician at the Institut La Ferreria in Barcelona in Spain, from which he graduated in 2011. He subsequently undertook advanced training under leading dental technicians worldwide. In 2020, he opened his own studio in Málaga in Spain, focusing on aesthetic fixed prostheses and CAD/CAM workflows. Since 2022, Paterlini has collaborated with GC and has published case-based articles on restorative workflows.