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Optimizing digital workflow for esthetic restorations

Artiom Lijnev, DDS, MSc,[a] Pep Serra, DDS, PhD,[b] Carlos Pérez-Albacete Martínez, DDS, MSc, PhD,[ac] Raúl Ferrando Cascales, DDS, MSc, PhD,[ad] José Eduardo Maté Sánchez de Val, DDS, MSc, PhD,[ae] and Álvaro Ferrando Cascales, DDS, PhD[af]

ABSTRACT

This presentation combines a conceptual overview with a real clinical application. A 24-year-old woman, referred for esthetic enhancement, received porcelain veneers using the Bright Corus protocol. The outcome was biologically respectful, esthetically harmonious, and anatomically precise, with minimal human intervention and a high degree of predictability. This treatment exemplified how artificial intelligence-driven digitally assisted dentistry can enhance the reliability of restorative procedures by orchestrating a unified, precision-guided workflow. (J Prosthet Dent xxxx;xxx:xxx-xxx)

A key advantage of digital workflows in restorative dentistry is the ability to guide the entire treatment process while minimizing distortions between the initial design and the definitive fabrication,[1] significantly reducing human-induced errors commonly associated with traditional approaches.[2,3] The main distinction among digital systems lies in how they manage optimization, particularly through algorithms responsible for initial design selection, adaptation to the finish line, and the capacity to mill the restoration without compromising anatomical fidelity.[4,5] The overarching goal is to preserve mesh integrity and avoid deformation throughout the workflow.[6]

In conventional digital protocols, several critical stages are prone to distortion. These include the initial design phase, where a dental laboratory technician manually adapts a stock library tooth to the clinical treatment, followed by mesh readaptation after tooth preparation—a step that often alters the original anatomical proposal (Fig. 1). During milling, the lack of optimization in both toolpath strategy and material compatibility frequently requires manual corrections, further compromising precision.[7,8]

To address the limitations of conventional computer-aided design and computer-aided manufacturing (CAD–CAM) workflows, Bright Corus introduced a

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The authors declare no conflicts of interest related to this study.
[a]Adjunct Professor, Department of Biomaterials Engineering, Faculty of Medicine, Universidad Católica de Murcia (UCAM), Murcia, Spain.
[b]Chair of Scientific Board, Corus, Sant Cugat del Vallés, Barcelona, Spain.
[c]Adjunct Professor, Department of Biomaterials Engineering, Faculty of Medicine, Universidad Católica de Murcia (UCAM), Murcia, Spain.
[d]Adjunct Professor, Department of Biomaterials Engineering, Faculty of Medicine, Universidad Católica de Murcia (UCAM), Murcia, Spain.
[e]Adjunct Professor, Department of Biomaterials Engineering, Faculty of Medicine, Universidad Católica de Murcia (UCAM), Murcia, Spain.
[f]Adjunct Professor, Department of Biomaterials Engineering, Faculty of Medicine, Universidad Católica de Murcia (UCAM), Murcia, Spain.

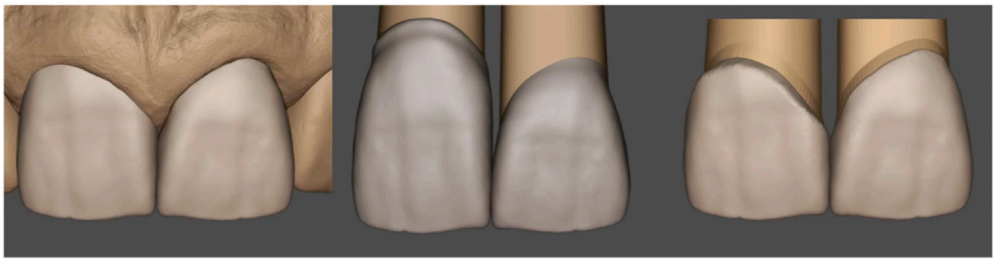

Figure 1. Example of mesh readaptation from initially proposed design to definitive tooth preparation. Traditional workflow illustrated in the right central incisor, where overcontouring is evident. In contrast, the left central incisor demonstrates optimal congruence achieved through AI-based mesh selection.

Figure 2. Extraoral frontal photographs of the patient before (left) and after (right) treatment with the Bright Corus protocol.

Video 1. **Video 1 (Still).** Evaluation phase of leucite-reinforced feldspathic porcelain veneers prior to final cementation. Note the cervical contouring designed and milled using artificial intelligence-guided protocol, which shows optimal emergence profile and anatomical integration. A video clip is available online. Supplemental material related to this article can be found online at doi:10.1016/j.jhazmat.2020.124747.

connection-based and artificial intelligence-driven strategy in which every stage of the digital chain, from initial design to definitive milling is orchestrated by intelligent algorithms. Built upon an extensive portfolio of libraries derived from high-resolution scans of natural teeth and grouped by morphological proportions, the system applies reverse engineering principles to identify the patient's individual dental ratio (LAC proportion, defined by the mesial, distal, and cervical zenith reference points that determine the natural tooth contour and automatically select the most anatomically compatible library. Rather than deforming or compressing a generic template, the proposed protocol preserves the integrity of the original morphology, particularly in the cervical region, where distortions are most frequent, especially during readaptation to the finish line, which often requires manual refinement.

Each library features a highly detailed and homogeneous mesh architecture that ensures optimal milling accuracy and surface continuity. Mesh density is redistributed to enhance anatomical detail, while the milling strategy is optimized to ensure that the designed morphology is faithfully reproduced during fabrication, considering the specific mechanical properties of the selected restorative material. By maintaining the same digital libraries throughout the trial restoration, interim, and definitive restoration stages, Bright Corus achieves a seamless transfer of form and texture, ensuring predictable esthetic and functional outcomes (Fig. 2).[9]

PATIENT CONSENT

Informed patient consent has been obtained.

APPENDIX A. SUPPORTING INFORMATION

Supplemental data associated with this article can be found in the online version at doi:10.1016/j.prosdent.2025.11.007.

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Corresponding author:
Dr Álvaro Ferrando Cascales
Department of Biomaterials Engineering
Faculty of Medicine
Catholic University of Murcia (UCAM)
Campus Los Jerónimos, 135
Guadalupe, Murcia 30107
SPAIN
Email: aferrando@ucam.edu

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