© Dental Pro Content – stock.adobe.com

issn 2193-4673 • Vol. 6 • Issue 1/2026

1/26

3D printing

international magazine of dental 3D-printing technology

case report
Contemporary provisionalisation with 3D printing:
New approaches to familiar clinical challenges

research
Laser-assisted melt printing:
Glass and ceramics directly from the printer

buyer's guide
3D printing in dentistry:
Harnessing the opportunities

dti] Dental Tribune International

reddot winner 2024

GOOD DESIGN AWARD® WINNER

GOOD DESIGN AWARD® WINNER

Dental 3D printing made simple.

Developed for 3D printing. Designed for you.

Take a closer look

asiga.com

ASIGA

Designed and manufactured in Australia.
Copyright © Asiga Pty Ltd. All rights reserved. Specifications subject to change without notice. Asiga and the Asiga logo are registered trademarks.

Dr George Freedman

Editor-in-chief

Ethical integration of AI and AM

3D printing, also known as additive manufacturing (AM), is reshaping dentistry and related industries, but its deployment must be guided by explicit ethical principles that protect patients, professionals and the wider public. Artificial intelligence (AI) can optimise AM workflows in several areas, including design and simulation, real-time process control and anomaly detection, and these capabilities must be implemented in ways that ensure transparency, accountability and meaningful human oversight. Any integration of AI and AM in dentistry should begin with a clear understanding of both technical parameters and ethical objectives, including compliance with professional standards and regulatory frameworks.

AI-enhanced design tools can simplify manufacturing, rationalise material use and accelerate production, but they must be evaluated for accuracy, repeatability, safety and performance across complex patient populations and clinical variables. Early integration of AI into the design and planning stages amplifies its impact, making it critical to embed ethics-by-design measures: representative training data, clear documentation of capabilities and limitations, and mechanisms for clinicians to review and override automated suggestions.

Conventional AM quality control relies on validated process parameters and post-production inspection, whereas AI-driven quality control is designed to detect deviations during fabrication and enable earlier intervention, reducing waste and inefficiency. However, clinicians and technicians must understand the known limitations of these systems, including false-positive and false-negative findings, missed defects and inappropriate design suggestions. When AI systems pre-analyse data and workflows to remove bottlenecks, any patient-related or commercially sensitive data must be subject to strict requirements for privacy, consent and security, and responsibility for outcomes must remain clearly assigned to identifiable human professionals.

AM in dentistry already spans resins, resin composites, ceramics, metals and emerging polymer–metal blends, but each new combination raises ethical questions about long-term safety, traceability and accountability. Bioprinting with hydrogels and bioinks for tissue scaffolds and related medical applications represents a particularly sensitive frontier, where AI-optimised AM must be coupled with rigorous ethical review, regulatory oversight and robust informed consent processes.

Advanced AI techniques, including computer vision for in-process defect detection and reinforcement learning for workflow optimisation, can substantially reduce errors, material waste and the risk of clinical failure. However, these methods must be constrained by safety-first policies, continuous performance monitoring and explicit risk–benefit assessments that prioritise patient outcomes over purely operational gains. In dentistry, AI should be treated as an adjunct to—not a replacement of—professional judgement; dentists and technicians remain ethically and legally responsible for treatment decisions, regardless of how sophisticated AM and AI tools become.

Open communication among dentists, laboratory technicians, software and hardware developers, industrial partners, regulators and the media is essential to keep the community informed, identify emerging risks early and promote standards that ensure that AI-augmented AM serves patients ethically and constructively.

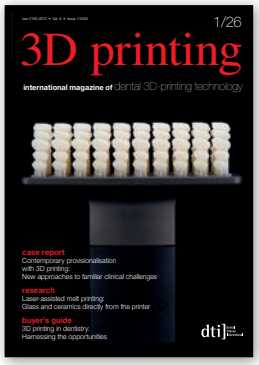
Dr George Freedman
Editor-in-chief

page 06

page 18

page 40

Cover image courtesy of
Dental Pro Content – stock.adobe.com



editorial

Ethical integration of AI and AM 03

case report

Chairside replacement of resin composite veneers using Midas 3D-printing technology: A case report 06

Contemporary provisionalisation with 3D printing: New approaches to familiar clinical challenges 14

user report

In-house 3D-printing workflows for implant restorations and Shape Memory Aligners 18

research

Laser-assisted melt printing: Glass and ceramics directly from the printer 22

interview

Dental 3D-printing emissions: "Inhalation exposure is often overlooked" 26
An interview with research scientist Dr Qian Zhang

news

Review assesses 3D-printing technologies for dental models 30

"3D printing is already delivering tangible clinical value in removable prosthodontics" 32

Print angulation affects fit and efficiency of 3D-printed aligners—study 34

Innovative composite approach improves 3D printing of lithium disilicate 35

Researchers target tuneable denture materials for next-generation prostheses 36

buyer's guide

3D printing in dentistry: Harnessing the opportunities 38

industry news

Gator Dental Arts redefines dental production with the DMP Flex 200 3D printer 46

manufacturer news 47

meetings

3D-printing expo Formnext 2026 sees strong early demand from global AM industry 54

International events 56

about the publisher

submission guidelines 57

international imprint 58

NextDent® Jetted Denture Solution

High-Precision, Monolithic Dentures

Deliver consistent accuracy, excellent aesthetics, and dependable performance supported by CE certified and FDA cleared materials.

Multi-Material

Support the separate functions of denture base and teeth with two uniquely formulated materials.

Lifelike Aesthetics

Four base shades and custom color-blended teeth shades to create lifelike aesthetics for a diverse patient needs.

Minimal Labor

Print a full plate of 15 arches with only ~20 minutes of hands on labor time.

3D SYSTEMS

© 2026 by 3D Systems, Inc. All rights reserved.
Specifications subject to change without notice.
3D Systems and the 3D Systems logo are registered trademarks of 3D Systems, Inc

www.3dsystems.com/dental

Chairside replacement of resin composite veneers using Midas 3D-printing technology: A case report

Dr Miloš Ljubičić, Serbia

Figs. 1a–c: Preoperative views of the maxillary anterior restorations. Frontal facial smile photograph **(a)**. Extra-oral close-up smile view showing the aged composite veneers **(b)**. Incisal view **(c)**.

Introduction

Digital dentistry has transformed restorative and aesthetic treatment. Technologies such as intra-oral scanning, digital smile design and chairside manufacturing allow clinicians to deliver precise, minimally invasive and efficient care. Of particular relevance, 3D printing enables the same-day fabrication of indirect restorations with favourable aesthetic and mechanical properties.

This clinical case report presents the replacement of old resin composite veneers using a digital workflow and chairside 3D printing. The treatment was completed in a single visit and followed minimally invasive principles, patient-centred planning and adhesive dentistry protocols.

Patient presentation

A female patient presented with dissatisfaction with her existing composite veneers in the maxillary anterior region. The restorations showed wear, marginal irregularities, chipping and discoloration, adversely affecting her smile and self-confidence (Figs. 1a–g).

The patient requested a natural-looking, durable and aesthetically pleasing solution, preferably without significant tooth reduction. During the initial consultation, she emphasised the importance of preserving her natural tooth structure and completing the treatment in as few visits as possible owing to professional commitments.

Clinical examination and diagnosis

A comprehensive diagnostic assessment was conducted. This included intra-oral and extra-oral photographic documentation, clinical examination of the hard and soft tissue, periodontal evaluation, occlusal analysis and assessment of the existing restorations.

Figs. 1d–g: Intra-oral frontal view with the teeth apart **(d)**. Intra-oral frontal view with the teeth in intercuspation **(e)**. Right and left lateral intra-oral views with the teeth in intercuspation **(f & g)**.

The existing composite veneers exhibited marginal discoloration, surface roughness, chipping and inadequate anatomical form. No secondary caries or pulpal pathology was detected. The periodontal tissue was healthy, probing depths were normal and there were no signs of inflammation.

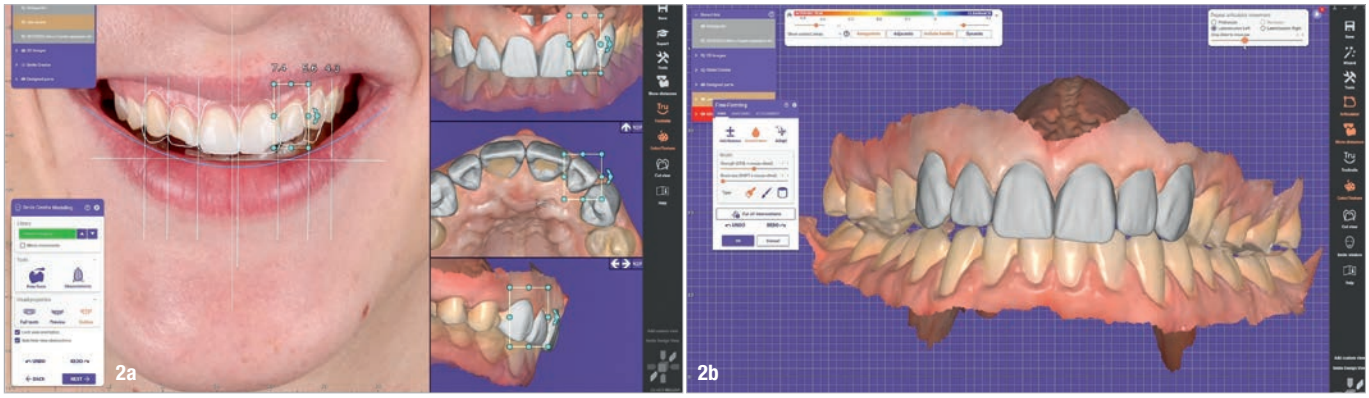
Occlusal analysis confirmed stable intercuspation and the absence of premature contacts. Temporomandibular joint function was considered to be within normal limits, and the patient reported no history of pain or dysfunction.

Based on these findings, the case was considered suitable for conservative veneer replacement using a digital workflow.

Treatment planning

After the diagnostic phase, a detailed treatment plan was formulated. The main objectives in replacing the old composite veneers were to preserve as much enamel as possible, improve aesthetics and surface texture, maintain functional occlusion and complete the treatment in a single visit.

Several restorative options were discussed with the patient, including conventional laboratory-fabricated ceramic veneers and chairside digital restorations. After reviewing the advantages, limitations, treatment duration and costs, the patient opted for a chairside digital approach using 3D printing. Informed consent was obtained, and expectations regarding shade, shape and the final outcome were discussed in detail.



Figs. 2a & b: Digital planning of the proposed maxillary anterior veneers. Digital smile design based on the patient's smile and intra-oral scan data **(a)**. Digital design of the six maxillary anterior veneers and evaluation of tooth form, tooth proportions and occlusal relationships **(b)**.

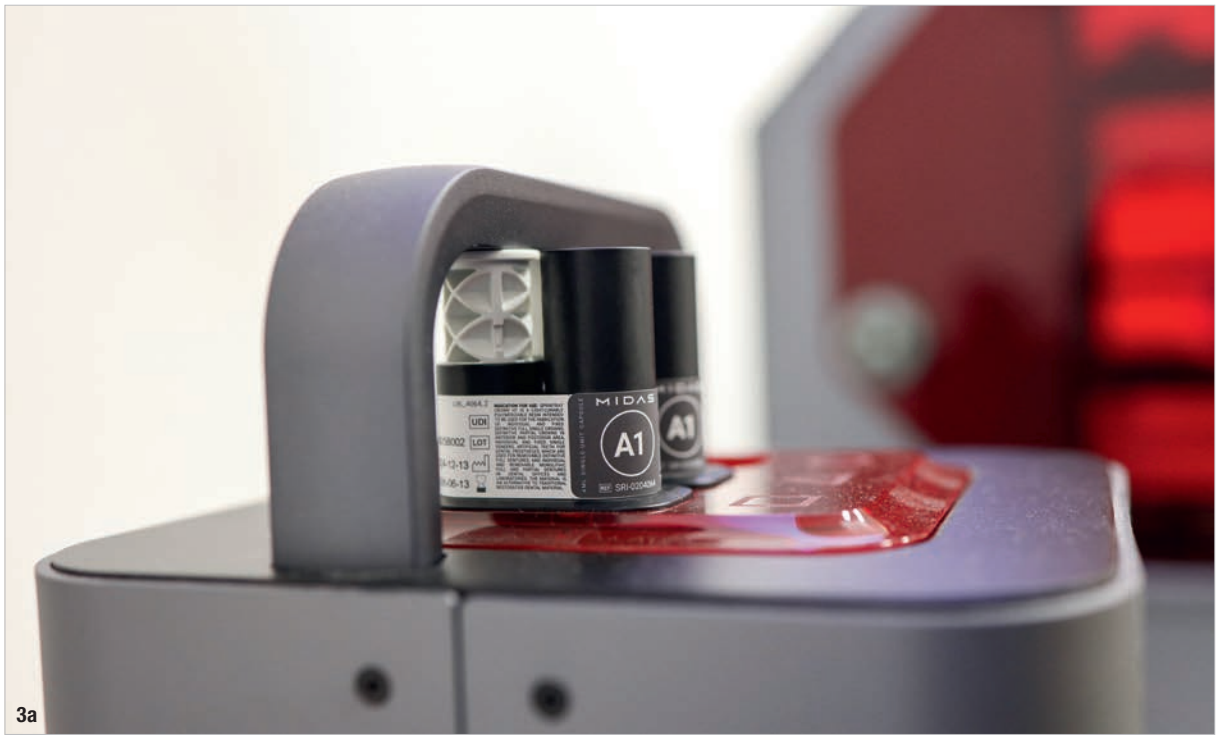


Fig. 3a: Material selection and print preparation. Crown HT Shade A1 capsule positioned in the Midas 3D-printing system.

Tooth preparation

The existing composite veneers were carefully removed using fine-grit diamond burs under magnification. Minimal preparation was performed in accordance with enamel-preserving principles. The preparation design included light facial reduction of 0.3–0.5 mm, rounded line angles and light chamfer finishing lines. The preparation was limited primarily to the previously restored areas. The aim was to maximise the enamel bonding surface and thereby support long-term adhesion and clinical longevity.

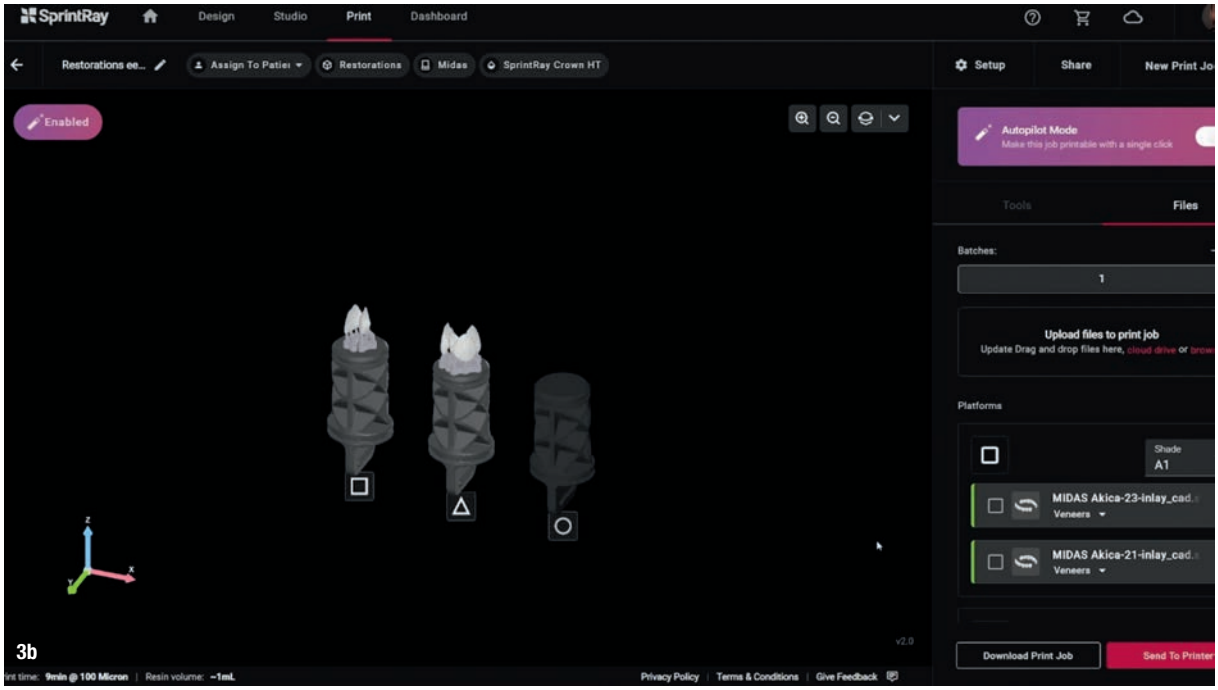


Fig. 3b: Print preparation in the SprintRay software.

4a

4b

4c

4d

4e

Figs. 4a–e: Post-printing evaluation and finishing. Printed veneers immediately after fabrication, still attached to the capsule/platform and covered with residual resin before cleaning **(a & b)**. Veneer before support removal and finishing **(c)**. Thickness evaluation as part of post-printing quality control **(d)**. Six maxillary anterior veneers before finishing and polishing **(e)**.

Digital impression and smile design

After tooth preparation, the teeth were cleaned and isolated. A digital impression was acquired using an intraoral scanner, producing high-resolution digital models and eliminating the need for conventional impression materials. The digital files were transferred to smile design software, where planning was performed. Tooth proportions, incisal edge position, smile line, midline alignment, buccal corridor, gingival symmetry and facial harmony were evaluated and optimised.

A digital smile design and virtual restorative design were generated to simulate the proposed restorations (Figs. 2a & b). The virtual preview was presented to the patient to visualise the anticipated outcome. Minor modifications were incorporated based on the patient's feedback, particularly regarding tooth length and contour. This collaborative approach increased patient involvement and improved treatment predictability.

Fabrication of veneers

The six veneers were fabricated chairside for the maxillary anterior teeth using the Midas 3D-printing system (SprintRay). A high-translucency ceramic-filled resin (Crown HT, SprintRay) was selected for its favourable mechanical properties and aesthetic performance (Fig. 3a). Shade A1 was chosen to achieve a bright yet natural appearance consistent with the patient's facial features and complexion.

Printing and post-processing

The restorations were nested and oriented in the printing software, and supporting structures were generated