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CAD/CAM

international magazine of dental laboratories

industry news
Quality and inventory management in the dental laboratory

case report
Monolithic multilayer zirconia crowns in the aesthetic zone

features
Back and neck pain in dentistry: A new reality

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Magda Wojtkiewicz

Managing Editor

Exploring the power of CAD/CAM technology

Welcome to the latest issue of our CAD/CAM **magazine**, where we delve into the exciting advancements and applications shaping the modern dental landscape. As digital technology continues to revolutionise dentistry, it has become increasingly indispensable for both dentists and dental technicians alike.

In recent years, CAD/CAM technology has undergone remarkable development, transforming the way dental professionals approach treatment planning, restoration fabrication and patient communication. Embraced by dentists and dental technicians worldwide, CAD/CAM technology has become an integral component of modern dental practices and laboratories.

The growing adoption of digital workflows has paved the way for enhanced precision, efficiency and aesthetic outcomes in dental treatments. With CAD/CAM technology, dental professionals can now design and fabricate restorations with unparalleled accuracy, ensuring optimal fit, function and aesthetics for their patients.

Industry has played a pivotal role in driving the advancement of CAD/CAM technology. Many companies globally have launched cutting-edge surgical guides, milled implant abutments, and milling blocks and discs, among other products, offering dental professionals innovative solutions for restorative dentistry. Additionally, advancements in quality and inventory management have streamlined workflows in dental laboratories, optimising efficiency and productivity.

Digital workflows have simplified complex treatments such as implant treatment, and several platforms offer comprehensive digital solutions that enhance treatment planning, surgical precision and prosthetic outcomes. Similarly, new digital solutions have expanded options for orthodontic treatment, providing patients with more efficient and discreet alternatives.

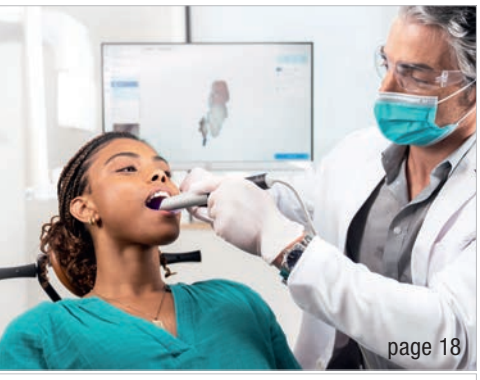
As digital technology continues to evolve, so too do the trends and applications shaping modern dentistry. This CAD/CAM issue explores the Personal Oral Protocol concept, pioneered by dental technician Eric Berger, which exemplifies the personalised approach enabled by digital technology, tailoring treatment plans to individual patient needs and preferences.

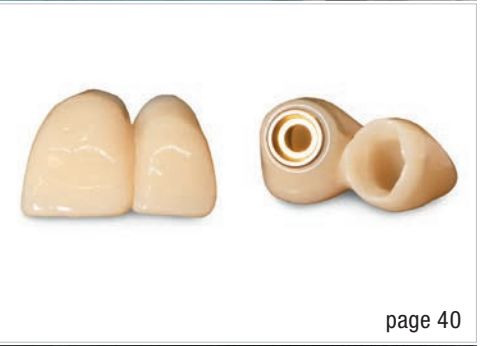
In this issue of CAD/CAM **magazine**, we also present captivating case reports, showcasing the digital workflow of immediate implant placement and restoration, full-mouth prosthetic reconstruction with implant-supported overdentures and the use of monolithic multilayer zirconia crowns in the aesthetic zone. We also address important topics like ergonomic considerations in dentistry, featuring an interview with physical therapist Timothy Caruso on managing back and neck pain, and we highlight the growing trend of eco-friendly dentistry, giving insights from Peter Suresh on sustainable practices in dental care. Lastly, our practice management section offers valuable advice on motivating dental teams, courtesy of productivity expert Jerko Bozikovic, and our meetings section provides a list of upcoming international events and a review of the recent exocad Insights 2024 conference.

In this issue of our magazine, we celebrate the transformative power of CAD/CAM technology and its profound impact on modern dentistry. We hope you find inspiration, innovation and practical insights to elevate your practice or laboratory to new heights of excellence.

Sincerely,

Magda Wojtkiewicz
Managing Editor


page 18


page 40

page 50

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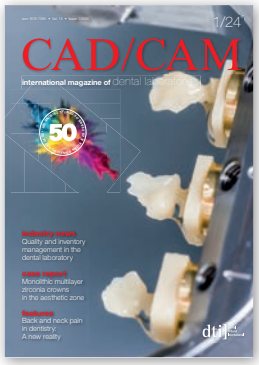

editorial

Exploring the power of CAD/CAM technology 03

news

Major contributors revitalise WHO global strategy for oral health 06

New study shows bacteria love some restorative materials more than others 08

Asia Pacific's digital dentistry renaissance 10

industry news

HASS Bio announces global launch of Amber Mill H block and disc 12

Quality and inventory management in the dental laboratory 14

Making implantology simple with the MIS digital workflow 16

ClearCorrect launches new digital solutions globally 18

trends & applications

Personal Oral Protocol concept 20

interview

CAD/CAM NobelProcera abutments demonstrate excellent prosthetic survival and low complication rates 24
An interview with Dr Ian Lane

case report

Digital workflow of immediate implantation and immediate restoration in the aesthetic zone 26

Bimaxillary prosthetic reconstruction with implant-supported overdentures 32

Monolithic multilayer zirconia crowns in the aesthetic zone 40

features

Back and neck pain in dentistry: A new reality 44
An interview with Timothy Caruso

Eco-friendly dentistry: "The best time to start was yesterday. The next best time is now." 46
An interview with Peter Suresh

manufacturer news 48

practice management

Motivating your team 50

meetings

Yes, we CAD!—exocad Insights 2024 54

International events 56

about the publisher

international imprint 58

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Major contributors revitalise WHO global strategy for oral health

Anisha Hall Hoppe, Dental Tribune International

The World Health Organization (WHO) has unveiled a new global oral health action plan, seeking to improve oral health outcomes and reduce the burden of oral disease worldwide by 2030. Part of a greater plan to integrate oral health into the universal health coverage framework and address the social and commercial determinants of oral health, the new action plan aims to enable people to achieve the best possible standard of oral health, thus improving their overall well-being and ability to participate fully in society.

Oral disease affects around 3.5 billion people worldwide and, despite being preventable for the most part, remains widespread owing to various risk factors and socio-economic variables.

The WHO strategy is the first concrete step towards implementing the World Health Assembly's resolution on oral health, which was adopted in 2021. It outlines actions for WHO member states, international partners, civil society and the private sector. The overarching goal is to foster a comprehensive and coordinated approach to improving oral health around the world.

The actions the WHO will take according to the plan:

1. developing ambitious national responses to promote oral health;
2. reducing the incidence of oral disease and oral health inequalities;
3. strengthening efforts to integrate oral health into universal health coverage; and
4. establishing a framework for tracking progress, including specific targets and indicators, by 2030.

It will take serious collaboration with a number of stakeholders, according to WHO, to achieve a global difference in oral health. One key stakeholder, FDI World Dental Federation, has contributed to the action plan, helping to ensure that the strategy is effective and can better meet the diverse needs of different populations.

More information and access to the documentation of the WHO 2023–2030 global oral health agenda, including the resolution on oral health, the global strategy on oral health and the global oral health action plan, can be found online: www.who.int/publications/i/item/9789240090538.

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New study shows bacteria love some restorative materials more than others

Dental Tribune International

Although various synthetic materials have achieved near-perfect results in dental restorations, they cannot completely replicate natural tooth structure, often resulting in clinical failure due to secondary caries and periodontal disease. Two major contributing issues are the formation of biofilm and bacterial adhesion to restorative materials. Using single-strain bacterial adhesion models, researchers in Japan have investigated the influence of dental material type and surface properties on bacterial adhesion. The findings suggest that the chemical composition of the material plays a crucial role in bacterial adhesion, potentially more than surface roughness or surface energy.

The study investigated three grades of yttria-stabilised zirconia and a CAD/CAM composite resin. Bovine dentine served as the control. The surface roughness of all materials was maintained at a highly polished level. The materials were tested against the strains of five bacterial species: *Porphyromonas gingivalis* (implicated in periodontal disease), *Streptococcus oralis, Streptococcus sanguinis, Streptococcus gordonii* (all three early-colonising bacteria) and *Streptococcus mutans* (associated with dental caries).

The results showed that there were no significant differences in surface roughness among the highly polished samples. Surface wettability varied, but no correlation was found between surface energy and bacterial adhesion. The yttria content in the zirconia did not significantly affect bacterial adhesion. However, the composite resin exhibited higher bacterial adhesion compared with zirconia, attributed to its higher carbon, oxygen and silicon contents.

Bacterial adhesion patterns differed among the materials. For *P. gingivalis*, the control group showed the highest adhesion and the composite resin the lowest. For *S. oralis*, *S. sanguinis* and *S. gordonii*, the highest adhesion was observed on the control and composite resin surfaces, followed by the zirconia samples. For *S. mutans*, the control group showed significantly higher adhesion compared with the experimental groups. The researchers noted that "the results clearly show that the material type strongly affects bacterial adhesion during the first hour of incubation, which is an important factor for clinical use".

This study confirms that dental material type significantly influences bacterial adhesion, even when surface roughness is controlled. The composite resin, despite its polished surface, showed higher bacterial adhesion, similar to the control with a rougher surface. Considering both mechanical and biological properties when selecting materials for dental restorations is key, according to the researchers.

They recommended further research, including co-culturing models and long-term studies, to fully understand the biocompatibility and clinical performance of these materials. "Given the complexity of the physicochemical properties of different materials, we suggest that biological indicators related to bacterial adhesion should be explored for optimal clinical outcomes," wrote the researchers. Employing bioactive agents and superhydrophobic surfaces in restorative materials may offer future solutions for reducing bacterial adhesion and improving clinical outcomes.

Editorial note: The study, titled "Does dental material type influence bacterial adhesion under the same polishing conditions? Direct observation using a fluorescent staining technique: An in vitro *study", was published online on 1 June 2024 in* Dental Materials Journal*, ahead of inclusion in an issue.*

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