EduVision: Journal of Innovations in Pedagogy and Educational Advancements
Volume 2, Issue 4, April 2026
brightmindpublishing.com
ISSN (E): 3061-6972

CAD/CAM TECHNOLOGIES IN MODERN DENTISTRY: CLINICAL APPLICATIONS AND FUTURE PERSPECTIVES

Mamedov Izmir
Samarkand State Medical University,
Samarkand, Uzbekistan

Akhmedova Madina Abdumannonovna
Samarkand State Medical University,
Samarkand, Uzbekistan

Guseynova Sabina Tagirovna
PhD, Associate Professor, Department of Therapeutic Dentistry,
Dagestan State Medical University

Patimat Arsenovna Kurbanova
Fifth-Year Student, Faculty of General Medicine,
Dagestan State Medical University

Tagir Sabirovich Guseynov
5th-Year Student, Dentistry Department,
Kuban State Medical University

Ali Magomedovich Shekhmirzaev
4th-Year Student, General Medicine Department,
Dagestan State Medical University

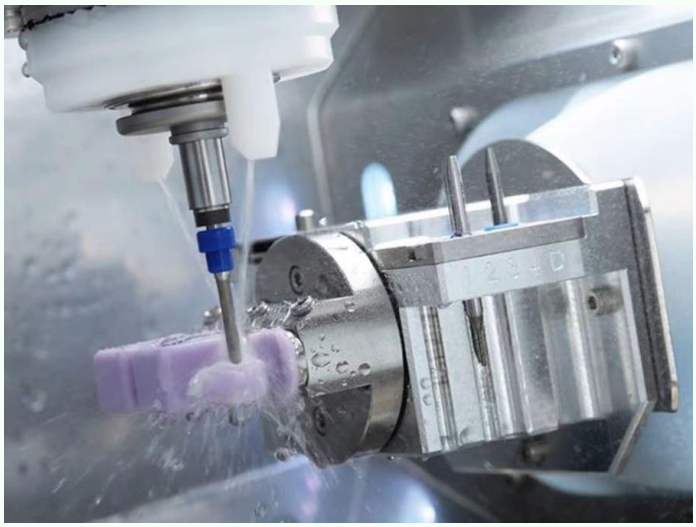
Abstract

Computer-Aided Design and Computer-Aided Manufacturing (CAD/CAM) technologies have revolutionized modern dentistry by enhancing precision, efficiency, and clinical outcomes. This paper explores the principles, applications, advantages, and limitations of CAD/CAM systems in dental practice. The integration of digital workflows allows for improved diagnosis, treatment planning, and fabrication of dental restorations. The study highlights the role of CAD/CAM in prosthodontics, orthodontics, implantology, and restorative dentistry, emphasizing its impact on patient satisfaction and treatment success.

EduVision: Journal of Innovations in Pedagogy and Educational Advancements
Volume 2, Issue 4, April 2026
brightmindpublishing.com
ISSN (E): 3061-6972

Introduction

The rapid advancement of digital technologies has significantly transformed the field of dentistry. Among these innovations, CAD/CAM systems have emerged as a cornerstone of modern dental practice. These systems enable the digital design and automated manufacturing of dental restorations with high accuracy and efficiency. Initially introduced in the 1980s, CAD/CAM technology has evolved to become an integral part of clinical and laboratory procedures.



PRINCIPLES OF CAD/CAM TECHNOLOGY

CAD/CAM systems consist of three main components: data acquisition, data processing, and manufacturing. Data acquisition is performed using intraoral or extraoral scanners to capture the geometry of teeth and surrounding structures. The digital data is then processed using specialized software, allowing the clinician to design restorations. Finally, the manufacturing phase involves milling or 3D printing the restoration using advanced materials such as ceramics, zirconia, or composite resins.

CLINICAL APPLICATIONS

CAD/CAM technology is widely applied in various dental disciplines. In prosthodontics, it is used to fabricate crowns, bridges, veneers, and dentures. In implantology, CAD/CAM enables precise planning and production of surgical guides and implant-supported restorations. Orthodontics benefits from digital aligner

EduVision: Journal of Innovations in Pedagogy and Educational Advancements
Volume 2, Issue 4, April 2026
brightmindpublishing.com
ISSN (E): 3061-6972

systems and customized appliances. In restorative dentistry, CAD/CAM allows for chairside restorations, reducing treatment time and improving patient comfort.

ADVANTAGES

The use of CAD/CAM systems offers numerous advantages, including high precision, reduced human error, time efficiency, and improved aesthetics. Digital workflows eliminate the need for traditional impressions, enhancing patient comfort. Additionally, CAD/CAM allows for better communication between clinicians and dental laboratories, leading to more predictable outcomes.

LIMITATIONS

Despite its benefits, CAD/CAM technology has certain limitations. The initial cost of equipment and software can be high, limiting accessibility. Furthermore, the learning curve associated with digital systems may require additional training for clinicians. Material limitations and technical issues may also affect the final outcome.

FUTURE PERSPECTIVES

The future of CAD/CAM in dentistry is promising, with continuous advancements in artificial intelligence, materials science, and digital workflows. The integration of AI is expected to enhance diagnostic accuracy and automate treatment planning. Improved materials will provide greater durability and aesthetics, further expanding the applications of CAD/CAM technology.

CONCLUSION

CAD/CAM technology has significantly improved the quality and efficiency of dental care. Its ability to produce accurate, эстетically pleasing, and durable restorations makes it an essential tool in modern dentistry. Continued advancements will further enhance its capabilities, ensuring better outcomes for both clinicians and patients.

REFERENCES

1. Asrorovna, X. N., Baxriddinovich, T. A., Bustanovna, I. N., Valijon O'g'li, D. S., & Qizi, T. K. F. (2021). Clinical Application Of Dental Photography By A Dentist. The American Journal of Medical Sciences and Pharmaceutical Research, 3(09), 10-13.

EduVision: Journal of Innovations in Pedagogy and Educational Advancements
Volume 2, Issue 4, April 2026
brightmindpublishing.com
ISSN (E): 3061-6972

2. Bustanovna, I. N. (2024). Hygienic Assessment of The Condition of The Oral Mucosa After Orthopedic Treatment. International Journal of Scientific Trends, 3(3), 56-61.
3. Bustanovna, I. N. (2024). Complications Arising in the Oral Cavity after Polychemotherapy in Patients with Hemablastoses. International Journal of Scientific Trends, 3(3), 62-66.
4. Bustanovna, P. I. N. (2024). Further Research the Features of the Use of Metal-Ceramic Structures in Anomalies of Development and Position of Teeth. International Journal of Scientific Trends, 3(3), 67-71.
5. Ghasemi Darestani, N., Gilmanova, A. I., Al-Gazally, M. E., Zekiy, A. O., Ansari, M. J., Zabibah, R. S., ... & Akhavan-Sigari, R. (2023). Mesenchymal stem cell-released oncolytic virus: an innovative strategy for cancer treatment. Cell Communication and Signaling, 21(1), 43.
6. Islamova N. B., Sh N. N. STUDY OF CHANGES IN PERIODONTAL DISEASES IN POSTMENOPAUSAL WOMEN //Conferences. – 2023. – С. 15-17.
7. Islamova, N. B. (2022). CHANGES IN PERIODONTAL TISSUES IN THE POSTMENOPAUSAL PERIOD. In Стоматология-наука и практика, перспективы развития (pp. 240-241).
8. Pallathadka, H., Khaleel, A. Q., Zwamel, A. H., Malathi, H., Sharma, S., Rizaev, J. A., ... & Jawad, M. A. (2024). Multi-Drug Resistance and Breast Cancer Progression via Toll-Like Receptors (TLRs) Signaling. Cell Biochemistry and Biophysics, 1-16.
9. Fakhriddin, C. H. A. K. K. A. N. O. V., Shokhruh, S. A. M. A. D. O. V., & Nilufar, I. S. L. A. M. O. V. A. (2022). ENDOKANAL PIN-KONSTRUKSIYALARNI ISHLATISHDA ASORATLAR VA XATOLAR TAHLILI. JOURNAL OF BIOMEDICINE AND PRACTICE, 7(1).
10. Rizaev, J. A., Nazarova, N. S., & Vohidov, E. R. (2024). HOMILADOR AYOLLARDA PARODONT KASALLIKLARI RIVOJLANISHINING PATOGENETIK JIHATLARI. Журнал гуманитарных и естественных наук, (11 [2]), 104-107.
11. RIZAEV, J., & KUBAEV, A. (2020). Preoperative mistakes in the surgical treatment of upper retro micrognatia. International Journal of Pharmaceutical Research (09752366), 12(1).

EduVision: Journal of Innovations in Pedagogy and Educational Advancements
Volume 2, Issue 4, April 2026
brightmindpublishing.com
ISSN (E): 3061-6972

12. Kizi, J. O. A., & Bustanovna, I. N. (2024). FAMILIARIZATION WITH THE HYGIENIC ASSESSMENT OF THE CONDITION OF THE ORAL MUCOSA IN ORTHOPEDIC TREATMENT. European International Journal of Multidisciplinary Research and Management Studies, 4(05), 89-96.
1. Ugli, A. A. A., & Bustanovna, I. N. (2024). STUDY OF THE CONDITION OF PARODONT IN PERIODONTITIS IN FETAL WOMEN. European International Journal of Multidisciplinary Research and Management Studies, 4(05), 149-156.