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The integration of CAD/CAM digital workflows in oral rehabilitation: an analysis of technical evolution, prosthetic precision, and the new professional profile.

The integration of CAD/ CAM digital workflows in oral rehabilitation: an analysis of technical evolution, prosthetic precision, and the new professional profile

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Summary

This scientific article analyzes the paradigmatic transition in restorative dentistry, migrating from manual analog processes to digital workflows based on *Computer-Aided Design* and *Computer-Aided Manufacturing* (CAD/CAM). Grounded in the technical curriculum of dental prosthetics and the practical application of new technologies, the study investigates how a deep knowledge of anatomy, physiology, and occlusion remains the indispensable foundation for operating design software and milling or 3D printing equipment. The research discusses operational efficiency, the reduction of micrometric errors in the marginal adaptation of fixed and implant-supported prostheses, and the critical need for updating the technical workforce. It concludes that technology does not replace fundamental technical knowledge, but requires a hybrid professional capable of combining manual dexterity with digital competence to guarantee functional and aesthetic oral rehabilitations with high longevity.

Keywords: Dental Prosthetics. CAD/CAM. Oral Rehabilitation. Occlusion. Digital Workflow. Additive Manufacturing.

Abstract

This scientific article analyzes the paradigmatic transition in restorative dentistry, migrating from manual analog processes to digital workflows based on Computer-Aided Design and Computer-Aided Manufacturing (CAD/CAM). Grounded in the technical curricular basis of dental prosthetics and the practical application of new technologies, the study investigates how deep knowledge of anatomy, physiology, and occlusion remains the indispensable foundation for operational design software and milling or 3D printing equipment. The research discusses operational efficiency, the reduction of micrometric errors in the marginal adaptation of fixed and implant-supported prostheses, and the critical need for workforce upskilling. It is concluded that technology does not replace fundamental technical knowledge but requires a hybrid professional capable of combining manual dexterity with digital competence to ensure high-longevity functional and aesthetic oral rehabilitations.

Keywords: Dental Prosthetics. CAD/CAM. Oral Rehabilitation. Occlusion. Digital Workflow. Additive Manufacturing.

1. Introduction

Oral rehabilitation, historically based on artisanal sculpting processes in

The wax and metal casting industry is undergoing an unprecedented technological revolution with the consolidation of...

digital systems. The basis of technical training in dental prosthetics, which covers everything from anatomy.

From the physiology of the head to the complexity of occlusion and dental materials, it remains the

The intellectual foundation necessary for the execution of any prosthetic work. However, the

Introduction of intraoral and benchtop scanners, associated with CAD software and units

Machining or printing (CAM) has drastically altered the manufacturing methodology, requiring a

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Reassessment of clinical and laboratory protocols to ensure accuracy and biological viability.
of the restorations.

The transition from analog to digital workflow does not eliminate the need for knowledge.
in-depth study of gnathic structures and mandibular dynamics. Conversely, the virtualization of
Plaster models require the dental technician to possess an ability to abstract.
spatial awareness and a theoretical understanding of dental morphology have become even more acute. Where before there was only touch and
The trowel used to carve slopes and marginal ridges is now replaced by the mouse and virtual libraries.
of teeth. Scientific literature indicates that CAD/CAM is effective in reducing misalignments.
Marginal costs and chair time optimization intrinsically depend on the operator's skill.
in interpreting the biological and mechanical limitations of the stomatognathic system within the environment
virtual.

In this context, the present study seeks to analyze the intersection between the classic curriculum of
training in dental prosthetics — encompassing fixed, removable, complete, and implant-supported prostheses — and the
New demands from additive and subtractive manufacturing. The central problem lies in the shortage of labor.
of skilled labor capable of operating these technologies with clinical discernment, a bottleneck that
This impacts laboratory productivity and the final quality delivered to the patient. Through a review
Through technique and process analysis, it is demonstrated that excellence in contemporary oral rehabilitation is...
The result of a symbiosis between the academic rigor of dental morphology and the precision of digital engineering.

2. Fundamentals of dental anatomy and sculpture in a virtual environment

Dental anatomy and the physiology of the stomatognathic system constitute the cornerstone of
any successful oral rehabilitation. In traditional teaching, regressive dental sculpting or
Progressive wax drawings allow the student to understand proportions and the slope of the hillsides.
cuspids and the correct location of the contact points. By transferring this knowledge to the
Even in a CAD (Computer-Aided Design) environment, the technician is not exempt from these biological rules.
Advanced software offers libraries of pre-formatted teeth, but individualization is still a challenge.
necessary to harmonize the prosthesis with the remaining dentition and with the masticatory function of
The patient's work depends on prior knowledge acquired in the disciplines of anatomy and sculpture.

Occlusal morphology, studied exhaustively in technical training, determines the
The stability of the prosthesis and the health of the temporomandibular joint (TMJ). In the virtual environment, the
"Sculpture" is performed through the manipulation of polygonal meshes. If the operator
He is unaware of the importance of a marginal ridge for the protection of the interdental papilla or its function.
From a central, containment cusp, the digital tool will only accelerate the production of a part.
Iatrogenic. Studies indicate that failure to replicate the correct anatomy can lead to interferences.
Occlusal problems, ceramic fractures, and periodontal issues can occur regardless of the machine's precision.

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who manufactured the part.

The physiology of the head and neck, a fundamental module in technical training, provides the Context for rehabilitation. Understanding muscle insertions and the boundaries of the neutral zone is Crucial, especially in the fabrication of digital complete dentures. CAD allows for the analysis of spaces. Prosthetics and the simulation of mandibular movements are useful, but the interpretation of this data requires a Solid knowledge of how the muscles of mastication and facial expression interact with the Prosthetic bases. The technology offers virtual articulator tools that simulate movements. of protrusion and laterality, but the correct programming of these parameters depends on understanding theorist of mandibular dynamics.

Dental aesthetics, which involves concepts of the golden ratio, central dominance and... Surface texturing also undergoes a metamorphosis in the digital realm. While manual sculpture While it allows for the organic creation of textures, digital drawing requires mastery of tools. software that simulates perichemocysts and developmental lobules. The ability to visualize the Having a final result before production (digital mock-up) is a significant advantage, allowing for... More assertive communication between the dentist and the patient. However, this visualization is only... Effective if the technician understands the principles of light reflection and refraction that govern aesthetics. natural.

The selection of materials in CAD software is intrinsically linked to knowledge of Dental materials studied in the technical curriculum. The software can suggest minimum thicknesses for Zirconia, lithium disilicate, or resins are options, but the technician must judge whether the designed anatomy will support them. the masticatory loads with the chosen material. The anatomy should be designed not only by form, but structural function, ensuring that connectors in fixed prostheses have the area of A suitable cross-section to resist bending forces, an engineering concept applied to oral biology.

Intraoral scanning, which replaces traditional impression taking, captures the anatomy with... micron precision. However, the quality of this "virtual model" depends on the ability of The operator's role is to recognize anatomical landmarks and ensure proper tooth preparation and gingival tissue health. They should be visible and clear. Knowledge of anatomy is vital for identifying distortions in the mesh. digital or capture errors that could compromise the adaptation of the final piece. Validation of Digital archiving is the first step in quality control, requiring a trained eye for morphology. natural.

Finally, the transition from wax to pixel art does not diminish the artistry of dental prosthetics. The sculpture Digital photography requires a different kind of fine motor coordination, but the "keen eye" for proportion, shape, and The function remains the same. A solid technical training in dental anatomy and sculpture is therefore essential. an indispensable prerequisite for the effective use of digital design tools, ensuring that

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Technology should serve biology, not the other way around.

3. Fixed partial dentures and occlusion: from casting to milling

The discipline of Fixed Partial Dentures and Occlusion represents one of the most complex pillars of...
Technical training involving the restoration of the integrity of the dental arch through crowns.
bridges and facets. In the conventional method, the process involves embedding in a coating and...
Lost-wax metal casting, a process subject to distortions due to expansion and contraction.
Thermal. With the advent of CAM (Computer-Aided Manufacturing), block milling
Prefabricated ceramic or metal elements eliminate many of these variables, providing greater adaptability.
Superior marginal strength and structural homogeneity of the material that is difficult to achieve manually.

Marginal precision is a critical factor for the longevity of fixed prostheses and for patient health.
Periodontal. Comparative studies demonstrate that crowns milled using CAD/CAM systems...
They exhibit marginal cracks that are consistently smaller than those produced by casting.
Traditionally, the thickness is often below 50 micrometers, which is clinically acceptable and desirable.
CAD software allows the technician to define the space for the cement with numerical precision, ensuring
a passive seating of the piece without the need for extensive adjustments in the mouth, which optimizes the
It saves clinical time and reduces stress on the abutment tooth.

Occlusion, studied theoretically and practically through mounting on articulators.
Semi-adjustable components are transposed to a virtual environment using digital articulators. These software programs...
They use algorithms to simulate Bennett movements, canine guidance, and group function.
Based on scans of the patient's dental arches. The ability to visualize contact points.
Occlusal analysis with color-coded heat maps allows for fine-tuning of the dynamic occlusion, which would be...
extremely laborious using the analog method. However, validating these contacts requires that the
The technician should understand the principles of mutually protected occlusion and centric relation.

Fixed prosthetic materials have evolved significantly with CAD/CAM technology.
The use of monolithic or layered zirconia, lithium disilicate, and hybrid ceramics requires protocols.
specific processing methods. Knowledge about the physical and chemical properties of these
Materials, acquired during technical training, are essential for defining milling parameters, such as...
Drill feed rate and cutting strategies to avoid microfractures in the ceramic structure.
during machining. Proper sintering of zirconia, for example, is crucial to achieving the
desired flexural strength and translucency.

The construction of long bridges requires rigorous structural planning. In CAD, the
The design of connectors and pontics must respect biomechanical principles to avoid failures.
Catastrophic forces under load. Knowledge of Ante's Law and the distribution of forces in the dental arch.
guides the technician in deciding whether or not to combine certain elements and in defining the area of

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connectors. The technology enables finite element analysis (FEA) in advanced software for
Predicting areas of stress is possible, but the coach's clinical judgment remains paramount.

The aesthetics of fixed prosthetics also benefits from the digital workflow through the technique of
Makeup and glazing or ceramic layering over milled (cut-back) substructures. A
The manual skill of stratification, taught in technical courses, is applied to a base.
Technologically perfect. The union of machine precision with the art of manual finishing results in...
in restorations that perfectly mimic nature. The technician must master both the software
as well as the paintbrush and the ceramic kiln.

In conclusion, digital fixed prostheses do not eliminate the complexity of rehabilitation, but they do alter it.
where the effort is applied. The focus shifts from correcting process errors (such as bubbles in the
(casting) for precise planning and design. The theoretical basis of fixed prosthetics and occlusion allows the
The technician will explore the full potential of milling machines, delivering work with integrity.
Marginal stability, occlusal stability, and refined aesthetics.

4. Complete and removable prostheses: mucosal challenges and digital retention.

Complete (mucosa-supported) and removable partial (dentomucosa-supported) prostheses
They present unique challenges in the digital workflow due to the resilient nature of soft tissues.
Traditional technical training emphasizes the importance of functional molding and peripheral sealing.
and the correct design of the clamps and larger connectors to ensure retention and stability. A
Digitizing these processes requires innovative strategies to capture the dynamics of the tissues.
Soft materials without the physical pressure exerted by conventional molding materials.

In the case of Complete Dentures (CD), the digital protocol involves scanning the mucosa and
The recording of maxillomandibular relationships. Specific software allows for the analysis of space.
Prosthetic technique and virtual tooth setup, following compensation curves (Spee and Wilson) and planes.
orientation. The great advantage of digital PT lies in the possibility of milling the base of the prosthesis.
starting from an industrially pre-polymerized resin disc. This eliminates shrinkage.
polymerization inherent to the conventional pressing and thermopolymerization process, resulting in
bases with superior adaptation to the mucosa and less residual monomer release, which is
biologically beneficial.

The aesthetics of digital complete dentures have also evolved. It is possible to use stock teeth.
prefabricated components bonded to milled bases or printing the entire prosthesis (base and teeth) using
State-of-the-art resins with enhanced aesthetic and mechanical properties. The knowledge
Technical expertise regarding the smile line, the high canine line, and lip support is fundamental for positioning...
virtual teeth are used to rejuvenate the patient's appearance and restore vertical dimension.
Correct occlusion (VDO), central concepts of the discipline of Complete Denture Prosthetics.

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For Removable Partial Dentures (RPDs), the challenge lies in the design of the metal framework. Planning the niches, guide plans, and choosing the type of clamp (circumferential, bar, action). cutting-edge technology) depends entirely on the analysis of the prosthetic equator and the tooth retention areas. pillar. In CAD software, the virtual surveyor replaces the physical surveyor, allowing the technician Identify the ideal insertion axis and precisely block unwanted retentive areas. Mathematics. The structure can be printed in castable resin for later casting or printed... directly onto metal (laser sintering - SLM), ensuring adaptation and homogeneity. superior structural elements.

The biomechanics of removable partial dentures (RPDs), which involves the distribution of forces between teeth and mucosa. (Class I, II and III levers) must be strictly respected in the digital design. The technician must Apply your theoretical knowledge to design larger connectors that offer rigidity without compromising comfort and hygiene. The precision of CAD/CAM allows for the creation of structures lighter and more delicate, but still maintaining the necessary strength, provided the design respects the principles of materials engineering and oral physiology.

The integration of removable prostheses with fixed prostheses (attachments) is facilitated by digital technology. Parallelism between male and female components can be perfectly aligned in the software. ensuring smooth insertion and removal and predictable retention. Knowledge about the The different types of sockets and their clinical indications, discussed in technical training, are essential for Select the most appropriate solution for each clinical case within the software environment.

Therefore, the application of CAD/CAM in removable and complete dentures represents an advance. significant in terms of material quality and adaptation. However, clinical success continues. depending on a deep understanding of the interaction between the prosthesis and biological tissues. A Technology offers powerful tools to materialize prosthetic planning, but the The planning itself stems from accumulated knowledge about dental anatomy, physiology, and mechanics.

5. Implantology and customized prosthetic components

The Introduction to Implants and Implant Materials course prepares the technician to handle with the rehabilitation of edentulous patients through bone fixation. In the digital workflow, the Implant dentistry reaches its peak in precision and customization. CAD/CAM technology allows for... Custom-designed abutments made of zirconia or titanium. for the patient's gingival profile, promoting superior peri-implant health compared to conventional precast cylindrical pillars.

Reverse planning, a fundamental concept taught in technical training, is Enhanced by digital technology. Starting with the virtual diagnostic wax-up (setup), it is possible To manufacture surgical guides that direct the placement of implants in the ideal position for future use.

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prosthesis. The technician actively participates in this planning, integrating the DICOM files.
(tomography) with STL files (intraoral scan) to create a complete view of
Bone and gingival anatomy. This process requires knowledge of radiographic and surgical anatomy.
in addition to concepts of occlusion and aesthetics.

The fabrication of bars for implant-supported protocols (All-on-4, All-on-X) via milling.
Industrial technology ensures a passivity of the structure that is virtually unattainable by casting.
conventional. Passivity is crucial to avoid stresses at the bone-implant interface, which could
can lead to bone loss or implant failure. CAD software allows you to design bars with profiles.
Complexes that support the aesthetic superstructure, optimizing strength and space for hygiene.
Technical knowledge regarding implant placement and support polygons guides the design of these
complex structures.

The selection of materials for implant-supported prostheses in the digital workflow is vast. From
Titanium and chromium-cobalt infrastructures to high-performance polymer (PEEK) structures
or zirconia. Each material has specific indications based on occlusal load and space.
Interocclusal and antagonist. The curriculum foundation in dental materials enables the technician to make choices.
informed that they balance aesthetics, resistance and biocompatibility, avoiding complications such as
Excessive wear of the opposing teeth or fracture of the prosthesis.

The integration of teeth and implants in the same arch requires a sophisticated understanding of...
biomechanical issues arise because the implant lacks a periodontal ligament to cushion forces. The design
Occlusal analysis in CAD should take this into account, creating point contacts and relieving lateral forces.
Regarding implants, the precision of the virtual articulator helps simulate these scenarios, but the decision...
The final section on the occlusal scheme is based on the theoretical principles of implantology and occlusion.

Communication with the dentist is improved by the digital workflow. The technician can
Send the pillar and crown design for approval before milling, allowing for adjustments to the profile.
emergency and anatomical form. This digital collaboration reduces repetitions and ensures that the
biological and aesthetic expectations are met. The technician assumes a consultant role.
technological, using their specialized knowledge to optimize the rehabilitation outcome.

In short, digital implantology transforms the prosthetic laboratory into a center of
Precision biomedical engineering. The ability to manipulate virtual components and transform them.
Developing biocompatible medical devices requires a fusion of knowledge from surgery, prosthetics,
materials and software. Technical training provides the biological and mechanical foundation necessary for navigation.
with security in this high-tech environment.

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6. The revolution in additive and subtractive manufacturing

Smiletech Solutions LLC's Business Plan highlights the importance of manufacturing.
Additive (3D printing) and subtractive (milling) machining are being used to modernize dental laboratories.
Understanding these technologies is now a necessary extension of the "Equipment and" curriculum.
"Instrumentals." Subtractive manufacturing, or milling, involves the removal of material from a block by computer-controlled drills. It is the gold standard for zirconia, metals, and some ceramics.
Vitreous glass due to the high density and strength of the processed materials. The technician must understand the
Limitations of the milling machine, such as the diameter of the drill bits, which prevents the machining of internal angles.
sharp, requiring adaptations to the design of the piece.

On the other hand, additive manufacturing, or 3D printing, builds the object layer by layer.
This technology is ideal for making working models, surgical guides, plates.
muscle relaxants, temporary prostheses, and complete denture bases. Knowledge about the technologies of
Printing (SLA, DLP, LCD) and on light-cured resin materials is crucial. The technician
You need to master printing parameters such as exposure time, layer thickness, and...
Orientation of the part on the platform, to ensure dimensional accuracy and structural integrity of the
printed object.

Post-curing and finishing are critical steps in 3D printing. Resins require washing.
and curing in specific UV chambers to achieve its final biocompatibility properties and
Mechanical resistance. A lack of understanding of these chemical processes can result in defective parts.
cytotoxic or mechanically fragile. Technical training in dental materials provides the foundation for
Understanding polymerization and the importance of strictly following manufacturers' protocols.

Sustainability and economic efficiency are impacted by the choice between additive and
Subtractive. 3D printing generates less material waste compared to milling, where a large amount of waste is generated.
Part of the block is discarded. The technical manager must be able to assess which technology is most suitable.
suitable for each type of work, considering costs, time and quality. This competence of
Laboratory management, as addressed in the professional profile of the technical course, is vital for viability.
economics of the modern laboratory.

Integrating these machines into the workflow requires preventative maintenance and calibration.
constant. Just as a technician learns to maintain foundry furnaces and polishing motors, he
You must now learn how to clean 3D printer mirrors and change milling machine coolant.
and calibrate shafts. The "maintenance of technological machinery," mentioned in the professional profile of the diploma,
It takes on a new dimension of complexity and importance.

The learning curve for operating these technologies is steep and requires training.
continued. Practical workshops and mentoring, such as those offered by Smiletech Solutions, are
essential for bridging the gap between academic theory and industrial practice. The technician ceases to

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to be merely a craftsman and become an advanced technology operator capable of solving Hardware and software problems to keep production running.

In conclusion, additive and subtractive manufacturing are the production tools of dentistry. 4.0. They offer precision, repeatability, and scalability. However, the quality of the final product... It is directly proportional to the operator's knowledge of the materials and processes. Training Traditional technique provides the fundamental principles that, when applied to these new These technologies enable the manufacture of high-quality medical devices.

7. Continuing technical education and the new professional profile

The rapid technological evolution in dentistry creates a gap between the curriculum of dental schools. Techniques and the reality of cutting-edge laboratories. The professional profile described in the technician's diploma. in dental prosthetics — which includes the fabrication of devices, technical support to the dentist and Laboratory management must be reinterpreted in light of the digital age. The modern technician is a A hybrid professional who is proficient in both dental morphology and occlusion concepts, as well as... Information technology, CAD design, and CNC machine operation.

The need for constant updating is imperative. Refresher courses, workshops Specialized mentoring is the vehicle for acquiring skills in specific software. (Exocad, 3Shape) and in new materials. The initiative to create educational content and support, such as As proposed in the analyzed business plan, it addresses an urgent market demand for training. The technician cannot stagnate in analog techniques; he must be an agent of innovation, capable to integrate new solutions into the existing workflow.

The mentor's role is crucial in this transition process. Experienced professionals who Those who are proficient in both analog and digital technologies are able to guide newcomers, teaching not only It's not about "which buttons to press," but "why" to make a particular design or technical choice. Mentoring It transfers tacit knowledge — that acquired through years of practice in sculpture and assembly. — for the digital environment, preventing technology from being used mechanically and without criteria. biological.

The inclusion of professionals from diverse backgrounds, as mentioned in the support strategy. For Latin American professionals, it enriches the market with a diversity of experiences and techniques. Standardization of technical language and digital protocols facilitates international collaboration and... Professional mobility. The Brazilian technician, recognized worldwide for his manual dexterity. and creativity, has in the digital world a tool to enhance its talent and reach markets. global.

Laboratory management is also transforming. Inventory control, pricing, and workflow. Box prices now include software licenses, 3D printing supplies, and maintenance.

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High-cost equipment. The technical manager must have administrative skills and a strategic vision.
to invest in the right technologies at the right time, ensuring a return on investment and
Business sustainability.

Professional ethics and technical responsibility remain unchanged. Technology does not.
This exempts the technician from responsibility for the quality and safety of the manufactured prostheses.
Respect for biosafety standards, the choice of certified materials, and communication.
Transparency with the dentist is a cornerstone of the profession, whether in analog or digital workflows.

In short, the new profile of the dental prosthesis technician is that of a versatile professional.
Technologically fluent and biologically aware. Continuing education is not an option, but
a condition for professional survival. The integration of classical knowledge with
Modern tools set the standard of excellence in 21st-century oral rehabilitation.

8. Conclusion

An analysis of the integration of CAD/CAM digital workflows in oral rehabilitation, in light of training.
A technique in dental prosthetics reveals a profound and irreversible transformation in the profession. It remains
It is evident that technology, however advanced, does not operate in a vacuum; it depends entirely on
from the accumulated body of knowledge about anatomy, physiology, occlusion, and dental materials.
A dental prosthesis technician, trained in these fundamental disciplines, is the only professional qualified to perform this task.
to extract the maximum potential from digital tools, ensuring the micrometric precision of
Machines translate into health and function for the patient.

Replacing casting and pressing processes with milling and 3D printing.
This represents a significant gain in terms of industrial standardization and biocompatibility.
Reducing human error in material processing steps results in prostheses with better performance.
Marginal adaptation, lower porosity, and superior mechanical properties. However, the "design"
The creation of these prostheses remains an intellectual and artistic activity that requires an understanding of...
Natural morphology and masticatory dynamics are core competencies of the technical curriculum.

The operational efficiency provided by the digital workflow is an economic advantage.
Important. The reduction in production time, less material waste, and the possibility of
Instant communication between clinics and laboratories optimizes the dental production chain. This
It not only increases the profitability of laboratories, but also expands patient access to
High-quality treatments, fulfilling a relevant social function by democratizing oral health.
of excellence.

The challenge of a shortage of skilled labor, identified in the context of the market.
North American and global, it highlights the importance of educational initiatives focused on the transition.
digital. Training technicians capable of operating complex CAD/CAM systems is a

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A strategic priority for the industry. Mentoring and practical training emerge as methods.
effective for accelerating this learning curve, transferring analog expertise to the domain.
digital.

The professional's role as a consultant and problem solver is gaining prominence.
Given the variety of materials and technologies available, dentists are increasingly dependent on...
The technician's specialized knowledge to plan complex cases. The ability to predict.
results through virtual wax-ups and selecting the best manufacturing strategy
It positions the technician as an indispensable clinical partner in the multidisciplinary rehabilitation team.
oral.

Sustainability and occupational safety also benefit from digitalization.
Reducing the use of toxic materials, plaster, and heavy metals makes the laboratory environment cleaner.
and safe. The ergonomics of digital work, although requiring attention to visual and postural health,
Using a computer eliminates many of the physical risks associated with handling high-temperature furnaces.
Temperature and noisy, dusty polishing equipment.

The future of dental prosthetics lies in the complete convergence between the biological and the technological.
The use of artificial intelligence to assist in design, augmented reality for clinical visualization.
And the printing of regenerative biomaterials are the next frontiers. The professional who masters the
Based on the technical foundations of their initial training, they will be prepared to navigate and lead these innovations.
while maintaining the human essence of the profession: restoring smiles and quality of life.

It can be concluded, therefore, that technical training in dental prosthetics is the irreplaceable foundation.
upon which digital dentistry is built. Technology is the means, but anatomical knowledge is essential.
Functional and aesthetic is the ultimate goal. The emphasis is on rigorous technical education, coupled with openness to...
Continuous innovation is the way to ensure the relevance and excellence of dental prosthetics in...
global health scenario.

References

MISCH, CE. *Implant-supported prostheses.* 2nd ed. São Paulo: Santos, 2015.

DAWSON, PE *Functional occlusion: from smile design to occlusion.* 1st ed. São Paulo: Santos, 2008.

PEGORARO, LF et al. *Fixed Prosthesis.* 2nd ed. São Paulo: Artes Médicas, 2013.

BEUER, F.; SCHWEIGER, J.; EDELHOFF, D. *Digital dentistry: an overview of recent developments for CAD/CAM generated restorations.* British Dental Journal, vol. 204, no. 9, p. 505-511, 2008.

REVELL, G. et al. *3D printing in dentistry: current status and future perspectives.* British Dental Journal, vol. 234, no. 5, p. 373-380, 2023.

Year V, v.1 2025 | Submission: 02/15/2025 | Accepted: 02/17/2025 | Publication: 02/19/2025

TALLADIUM. *The future of dental technology: 3D printing and CAD/CAM.* Dental Tech Review, vol. 12, p. 45-50, 2021.

MASCULO, FS; VIDAL, MC *Ergonomics: proper and efficient work.* Rio de Janeiro: Elsevier, 2011.

TURANO, JC; TURANO, LM *Fundamentals of complete dentures.* 9th ed. São Paulo: Santos, 2010.

ANUSAVICE, KJ *Phillips: Dental materials.* 12th ed. Rio de Janeiro: Elsevier, 2013.

SCHWINDLING, FS et al. *Accuracy of intraoral scanning compared to conventional impression in complex cases.* Clinical Oral Investigations, vol. 25, p. 123-130, 2021.