

3D printing

international magazine of dental printing technology

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Dr George Freedman

Editor-in-chief



The economic impact of 3D printing

Dentistry has traditionally been driven by form, function and, more recently, aesthetics. These are the parameters of the science and art of dental medicine. While these boundaries continue to shape the development and growth of the profession, there is an additional, ever-present component that must be considered, the financial side of dental practice.

Most dentists throughout the world are private practitioners. This means that they operate small businesses that are very sensitive to operating costs, patient acceptance of fees and other market factors. If an innovative procedure offers similar, or better, results to the patient at a lower cost to the dentist, the new technique becomes very attractive to the practitioner, particularly if the initial investment is low, and the learning process is short and easy.

Historical examples of this fiscally influenced model are quite numerous: the adoption of local anaesthetic that allowed single-appointment treatment of multiple teeth; the incorporation of high-speed handpieces that mainstreamed dental access by greatly leveraging clinical productivity; the replacement of acrylics by ceramics for improved function and aesthetics; and the substitution of semi- and non-precious alloys for gold in dental restorations when pure metal prices became prohibitive. The response of the profession has been quite logical, quite rapid and very necessary.

3D printing provides a similar positive paradigm shift to dental practice. In the current environment of digitisation and automation, additive manufacturing not only de-

livers higher quality and more-customised dental treatment, but also accomplishes this at a significantly lower cost to the dentist. The practitioner is thus faced with a very pleasant dilemma: whether to maintain prices and thereby improve the bottom line, or to lower treatment prices, thereby attracting more patients (again improving the bottom line).

As practices are electing to incorporate digital technology, they have a number of options. The in-office manufacturing of restorations is very attractive for both patient and dentist. The foremost choices are 3D printing and milling, both effectively eliminating laboratory costs. Both systems require a digital scanner and accompanying software (preferably open-platform). Here the similarity ends. The initial investment for a milling system is ten times more expensive than for a printing system of comparable accuracy. Milling blocks are ten to 30 times more expensive than the materials used by the printer. The complete 3D-printing office set-up is readily affordable for the single practitioner, and the low entry cost encourages the dentist to upgrade to newer technology as it becomes available. This is a major reason that the acceptance of 3D printing is so rapid and so widespread.

It is widely accepted that the digital transformation of dentistry has not only begun but is rapidly establishing itself as one of the main drivers of the future. Dentists who do not embrace this trend will simply be left behind.

Dr George Freedman
Editor-in-chief



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Leading market research firm predicts massive growth for dental 3D-printing market

By Dental Tribune International



By 2028, the value of the dental 3D-printing market is expected to surge to US\$6.7 billion, from US\$3.0 billion currently—a compound annual growth rate of 17.5%—according to a recent report by MarketsandMarkets. This substantial growth is largely attributed to the technology's advantages of speeding up product development, crafting high-quality complex items, enabling mass personalisation and reducing wastage. Factors like the ageing population and the increase in dental caries further boost the significance of 3D printing in dentistry.

The report dissects the market based on application, technology, region, product and service, and end user. The key takeaways include:

- *Regional growth:* The Asia-Pacific region is witnessing strong growth, owing to its vast patient base, the rise of dental practices and dental tourism.

- *Driving forces:* A growing geriatric population, a surge in cosmetic dental procedures and the integration of 3D printers in medical establishments underpin the market's expansion.
- *Promising opportunities:* The rising trend of CAD/CAM technology and advancements in dental 3D-printing resins promise lucrative prospects.
- *Challenges:* High set-up and operational costs can hinder the market, particularly for small to medium-sized laboratories. The costly nature of 3D-printing materials compared with conventional alternatives and the lack of insurance coverage for 3D-printing procedures further exacerbate this issue.
- *Industry dynamics:* The high prevalence of dental diseases globally, especially caries in developed countries, signals a growing demand for restorative procedures, which 3D printing can address. However, the industry struggles with the dearth of a skilled workforce proficient in additive manufacturing.

The report also provides a comprehensive technological overview. Vat photopolymerisation is the dental 3D-printing segment projected to grow at the highest compound annual rate over the forecast period. It is primarily utilised for crafting dental implants, dentures and craniomaxillofacial guides because of its superior resolution and surface finish. In particular, the liquid crystal display subcategory of vat photopolymerisation is expected to be the fastest-growing segment between 2023 and 2028, owing to its cost-efficiency and compact size.

It would also be wise to take note of key market participants, including 3D Systems, Stratasys and Desktop Metal, all based in the US. These entities have fortified their market position through strategic partnerships, acquisitions and expansions.

In summary, the dental 3D-printing market is on an uptrend, propelled by technological advancements, growing demand and strategic industry alliances. However, high costs and a skills gap pose challenges that the industry must address in order to sustain its growth.

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New study investigates 3D-printing use in dental practice

By Iveta Ramonaite, Dental Tribune International

A recent survey conducted by the American Dental Association (ADA) investigated the prevalence, applications and user experience of 3D printing in dentistry. It found that, although the use of 3D printing in dental practice is currently low, those who adopted it reported improved efficiency and reduced cost. The aim of the study is to inform current users about other users' experiences and to advise non-users about the potential benefits of the technology.

The survey report considered the responses of 277 members of the ADA Clinical Evaluators Panel. It found that only 17% of the participating dentists currently use a 3D printer in their practice, of which 67% have been using it for less than two years.

"Although this survey found that 3D printer use in private practices is currently low, it is growing due to workflow efficiencies and expanded applications associated with continuing developments and progress with these technologies," co-authors Dr Kevin Frazier, vice dean and professor of restorative sciences at the Dental College of Georgia at Augusta University in the US, and Dr Marta Revilla-León, director of research and digital dentistry at the Kois Center in the US, said in a press release. "Non-users should continue to monitor these trends for adding 3D printing in their own practices."

The most common uses for a 3D printer were to complement or enhance other digital technologies, control workflows, improve efficiency, use existing digital skills or procedures, and reduce cost or manufacturing time.

Regarding usage, nearly half of the users said that they use a 3D printer for 25% of their cases per month, mainly for diagnostic models (62%), followed by splints and occlusal devices (50%) and then surgical guides (48%). The most common problems experienced with 3D printing involved software and printing failure.

Among the 83% respondents who do not use 3D printers, 44% cited using a laboratory, 39% high financial investment and 34% lack of perceived benefit as their reasons for not using 3D printing. Among non-users, 21% were considering investing in a 3D printer and 35% were considering undergoing training.

"3D printing was chosen for this survey because it was one of the top four topics on several 'hot' or 'emerging' trends in dentistry lists, and we wanted to know how our colleagues were responding to the advances in 3D-printing technology that have led to expanded applications for practice," Drs Frazier and Revilla-León noted.



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