Dental CAD/CAM technology offers productivity, increases worldwide

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NEW YORK, NY, USA and VANCOUVER, BC, Canada: CAD/CAM technology has become one of the most important developments in dentistry today. Especially on the lab side, CAD/CAM technology is expected to increase productivity, enabling labs to meet the growing demand for dental prosthetics and other restorations.

This growth is a result of the aging population and the increasing demand for more natural-looking dental aesthetics. CAD/CAM technology has met challenges in satisfying dental laboratories’ expectations of what this technology will bring to their businesses. However, the technology is evolving at a rapid pace, as new trends and technological capabilities are emerging, representing the potential to surpass what it had already offered dental laboratories.

Zirconia is the primary driver of CAD/CAM adoption, as the material can be milled into a crown or bridge only very low labor-intensive way, most often at a CAD/CAM system. Zirconia’s biocompatibility and high aesthetic qualities have led to a rapid increase in its use for dental prosthetics.

For example, the number of all-ceramic dental prosthetic units is projected to grow at a CAGR of 10.8 per cent and 10.5 per cent in the United States and Europe, respectively, over the next five years. This is well above the growth rate of other materials, such as porcelain fused to metal (PFM), which will see relatively flat growth.

While a large and growing portion of dental technicians prefer to use all-ceramic over traditional materials, all-ceramic acceptance has been met with resistance from dentists. All-ceramic materials have had above-average failure rates, with limited long-term clinical data to validate their durability and reliability. As a result, conservative dentists have continued to rely on traditional materials such as PFM.

However, research has greatly improved the overall durability of all-ceramic material, as zirconia to ceramic is similar but not more than porcelain. Despite the initial resistance, it is expected that zirconia will overtake PFM as the dominant material for CAD/CAM manufacturers invest in research and development of zirconia for durability as well as to encourage its use through the education of dentists and lab technicians.

In addition, digital printing has specialised in developing and improving the concept of disk implants, resulting in several integrated lines of basally osseointegrated (BOI) implants and their specific applications. This implant type is suitable for use in situations with a minimum vertical bone supply, eliminating the need of harvesting bone grafts from the iliac crest or performing comprehensive bone augmentation surgery.

While zirconia has traditionally been the primary driver of CAD/CAM adoption, cost and production efficiency is becoming more important. CAD/CAM technology is becoming more flexible in the type of services that it can offer dental laboratories. This is especially crucial as the number of dental technicians worldwide is projected to drastically decline in the future, due to the large number of older and retiring dental technicians. In addition, there are fewer dental technicians entering this field due to insufficient monetary compensation.

This reduction in workforce numbers, coupled with the increasing demand for dental restorations brought on by the aging population, will create greater demands on dental laboratories’ production capacity for prosthetics and other restorations. Dental laboratories in the United States and Europe are also under strain due to competition from countries with lower wages, such as China, Morocco, Turkey and Costa Rica.

The vast majority of dental laboratories around the world employ less than five dentist technicians. Many of these laboratories have hardly enough volume to warrant the purchase of an expensive CAD/CAM system with in-house milling capabilities. To reach the smaller players in the market, CAD/CAM manufacturers such as 5M ESp, DENTSPLY and Nobel Biocare have offered scanning units to dental laboratories, enabling the labs to scan and outsource the digital restoration to be milled at other locations (either a centralized milling facility or dental laboratories with in-house milling capacity).

This purchasing option allows large dental laboratories that generate sufficient volume and revenue to invest in a full CAD/CAM system with in-house milling capacity, whereas small to medium laboratories’ impact on the option of investing in a lower cost scanning unit simultaneously eliminating the continuing production costs of dental copings and frameworks.

Full CAD/CAM systems typically involve one scanner unit and one milling unit in-house. A stand-alone CAD/CAM system consists of only a scanner unit, which sends the digital impression to either a centralized milling facility, or a dental lab with milling capability. The growing popularity of the two-purchasing options is evident in the US and European markets, as there is an approximate ratio of one full CAD/CAM system to two stand-alone scanners in the total installed base.

CAD/CAM systems are becoming increasingly more affordable to dental laboratories as their prices continue to drop. For example, in the US market, the average selling prices (ASPs) of full systems and scanners are expected to drop at CAD/CAM of 4.9 per cent and 4.3 per cent, respectively.

Manufacturers and distributers are offering financing programs to help laboratories acquire the systems and, in some cases, are giving the system away for free on the condition that the lab manufacture a certain number of proprietary prosthetics. Likewise, the cost of the equipment and networks that are milled by CAD/CAM systems are rapidly dropping; this, coupled with rising gold prices, has reduced the price of a zirconia crown almost to par with a gold crown. This has made zirconia milled frameworks a strong alternative to the traditional gold crown.

There are many dentists that only use PFM restorations and abstain from zirconia. To address this issue, CAD/CAM technology is expanding beyond its initial capability of milling only zirconia material and dental devices, to include other materials, such as non-precious alloys, titanium, acrylic, resin, and even final abutments. This technological capability gives labs greater versatility in meeting customer needs by offering a greater breadth of materials and dental restorations.

The acceptance and integration of CAD/CAM technology into dental laboratories appears to be inevitable. Despite the many challenges that this technology has faced, ranging from uncertainty regarding the viability of zirconia material for dental prosthetics, to the continuing production costs of dental copings and frameworks, full CAD/CAM systems typically involve one scanner unit and one milling unit in-house. A stand-alone scanner CAD/CAM system consists of only a scanner unit, which sends the digital impression to either a centralized milling facility, or a dental lab with milling capability. The growing popularity of the two-purchasing options is evident in the US and European markets, as there is an approximate ratio of one full CAD/CAM system to two stand-alone scanners in the total installed base.

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