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# CAD/CAM

## international magazine of digital dentistry

3 2017

**practice management**
Digitising your implant practice

**case report**
Digital assisted precise planning and manufacturing of a fixed dental restoration

**cone beam supplement**
European dental imaging equipment market in a state of change

dti Dental Tribune International

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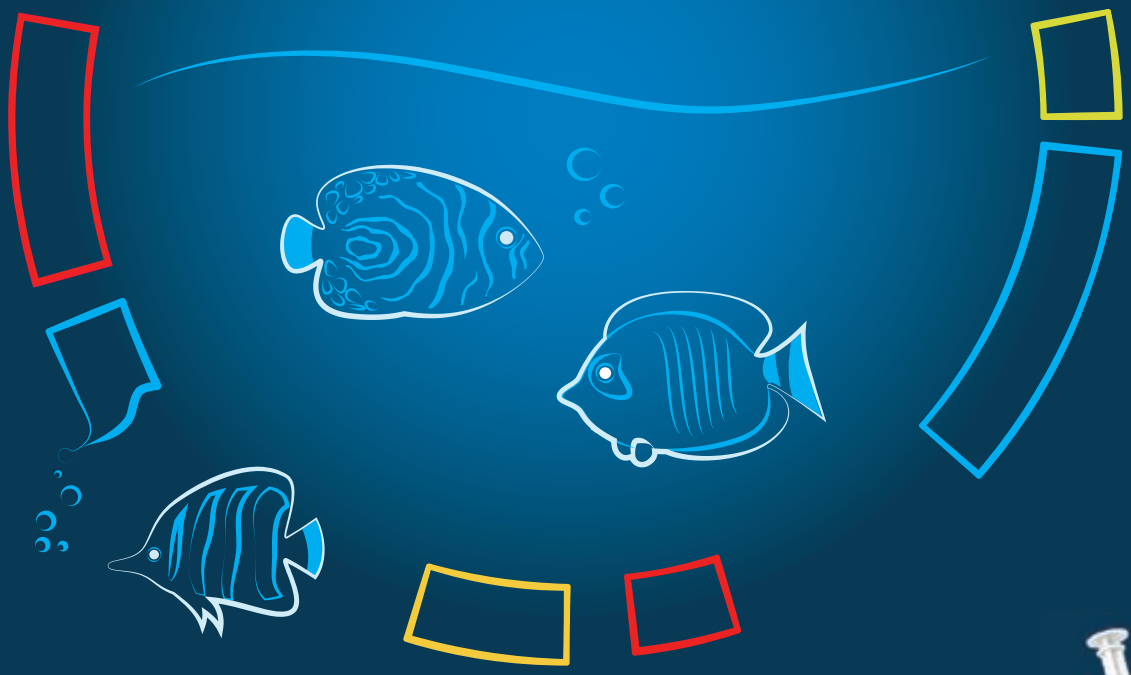

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# To print or *not* to print?

Dr Scott D. Ganz

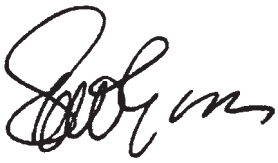
**The lost-wax method,** has been largely replaced with the advent of computer-aided design and computer-aided manufacturing (CAD/CAM) for the fabrication of everyday crown and bridge dentistry, implant superstructures, bar overdentures, and much more. Additionally, the continued development of new and improved materials have created strong, aesthetic, long lasting restorations fabricated by a subtractive process facilitated by large lab-based milling machines. Smaller in-office milling machines, combined with highly accurate intraoral scanners have helped to bring the process directly to the clinician's private office providing the state-of-the-art digital workflow for faster design and fabrication of patient-specific restorations.

For most clinicians, the term 'rapid prototyping' is a concept that applies more to big industry rather than dentistry. However, many clinicians involved with implant dentistry and guided surgery applications are familiar in some way with the term 'stereolithography'. As defined by the Oxford Dictionary, stereolithography is 'a technique or process for creating three-dimensional objects, in which a computer-controlled moving laser beam is used to build up the required structure, layer by layer, from a liquid polymer that hardens on contact with laser light'. This modality is therefore an 'additive' process, differing from the 'subtractive' process required for milling, and until recently was not practical or cost-effective for the routine dental practice.

The proliferation of low-cost 3-D printers during the past few years has ignited tremendous interest in rapid prototyping using additive fabrication modalities. Many dental laboratories, single and group practitioners around the globe have taken the digital workflow to new levels by printing models for orthodontics, oral surgery, restorative dentistry, night guards, occlusal orthotic devices, surgical templates, and much more. 3-D printing has become the new catalyst, helping to bring diagnostic and manufacturing control to the dentist, and a new fabrication process to the dental laboratory.

It must be stated that there is a significant difference in printing a word processing document from your computer to a laser printer – going from the virtual to a physical piece of paper you can hold in your hand. 3-D printing is not quite that simple. Regardless of the type or cost of a 3-D printer, in order to 'print' a file, there needs to be three-dimensional data. This data can come from an intraoral scanner, a desktop optical scanner, cone beam computed tomography, singularly or in combination. The data needs to be managed using appropriate software to produce the desired outcome. This takes knowledge and time to get it right. So as we continue to move from the analogue to the digital workflow, it may be time to evaluate the state-of-the-art and ask the question: 'To print or not to print?'

The answers to this and many other questions can be found among the pages of this publication representing some of the best clinical minds of our time. We hope that you will enjoy the current issue!



Respectfully
Dr Scott D. Ganz, DMD
Editor in Chief

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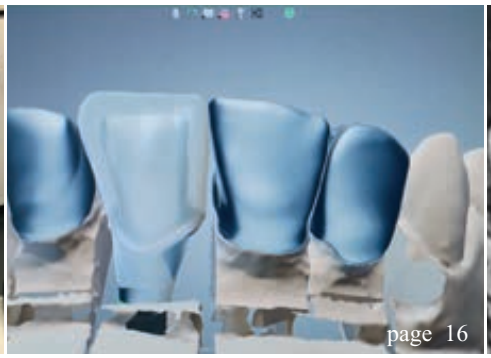
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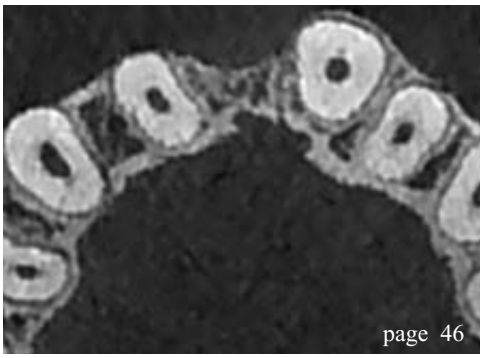
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## industry news



## cone beam supplement



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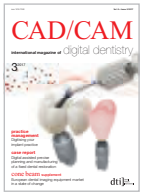


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# Digitising your implant practice

**Author:** Dr Ross Cutts, UK

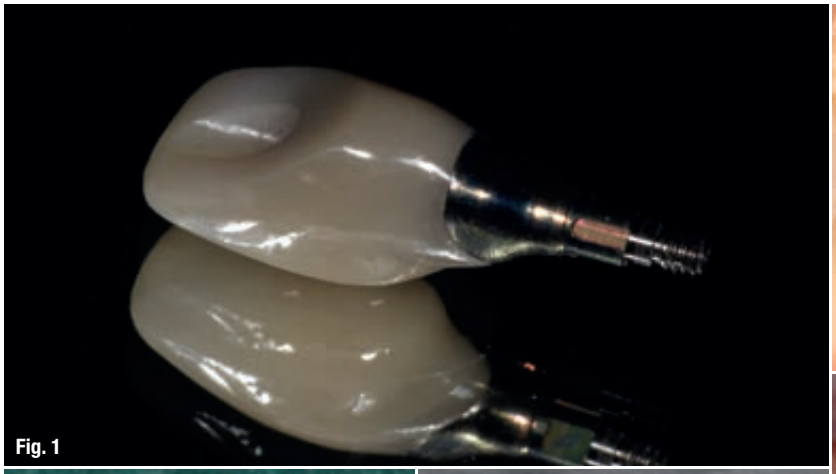
Fig. 1


Fig. 2


Fig. 3


Fig. 4


Fig. 5

**Undoubtedly,** digital dentistry is the current topic. Over the last five years, the entire digital workflow has progressed in leaps and bounds. There are so many different digital applications that it is sometimes difficult to keep up with all the advances. Many dentists are excited about the advantages of new technologies, but there are an equal number who doubt that the improved clinical workflow justifies the expense.

I have many times heard the argument that there is no need to try to fix something that is not broken. It is so true that impressions have their place and there are certainly limitations to the digital workflow that anyone using the technology should be aware of. For me, however, the benefits of digital far outweigh the disadvantages. In fact, the disadvantages are the same as with conventional techniques.

Chairside CAD/CAM single-visit restorations have been possible for over 20 years, but it was only recently that we became able to mill chairside implant crown restorations after the release of Variobase (Straumann) and similar abutments. I made my first CEREC crown (Dentsply Sirona) back in 2003 with a powdered scanner, and the difference from what I remember then to how we can make IPS e.max stained and glazed restorations (Ivoclar Vivadent) now is amazing.

## An investment not an expense

The results of a survey regarding the use of CAD/CAM technology were published online in the *British Dental Journal* on 18 November 2016. Over a thousand dentists were approached online to take part in the survey and the 385 who replied gave very interesting

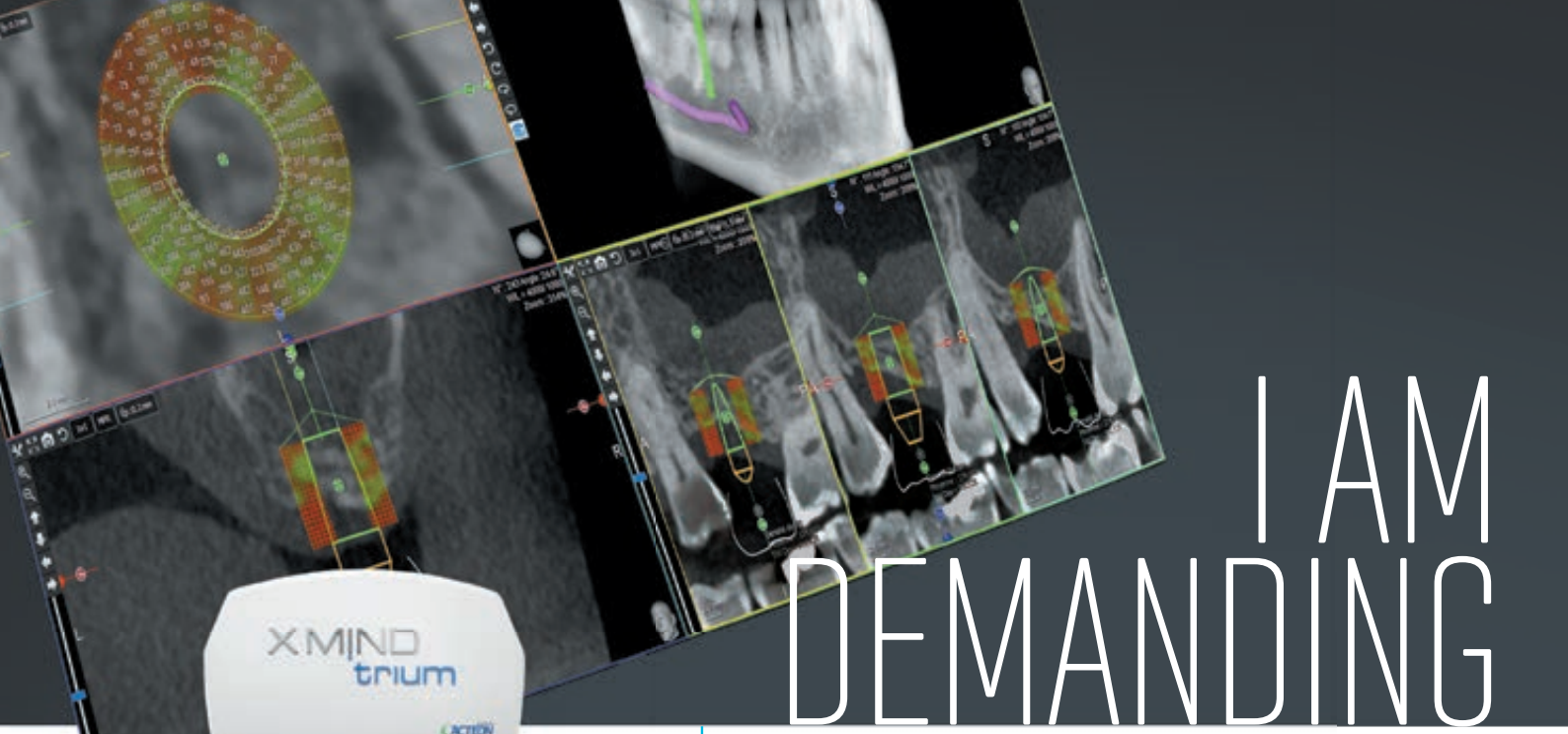

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Fig. 6


Fig. 7

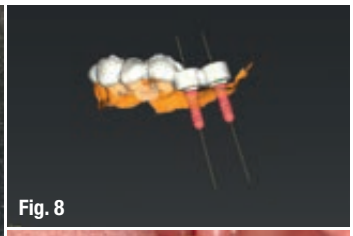


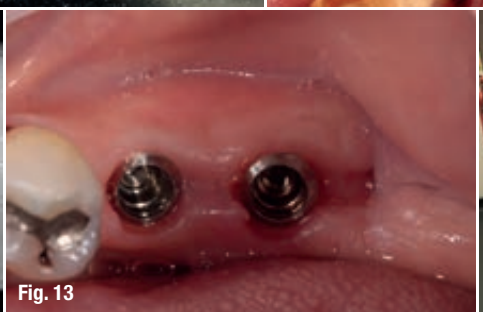
Fig. 8


Fig. 9


Fig. 10


Fig. 11


Fig. 12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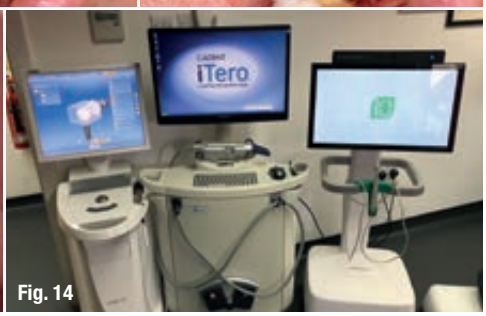

Fig. 14

responses. The majority did not use CAD/CAM technology, and the main barriers were initial cost and a lack of perceived advantage over conventional methods.

Thirty per cent of the respondents reported being concerned about the quality of the chairside CAD/CAM restorations. This is a valid point. We must not let ourselves lose focus that our aim should always be to provide the best level of dentistry possible. For me, digital dentistry is not about a quick fix; it is about raising our performance and improving predictability levels by reducing human error.

In the survey, 89 per cent also said they believed CAD/CAM technology had a major role to play in the future of dentistry. I really cannot imagine that once a dentist has begun using digital processes that he or she would revert to conventional techniques.

## What is digital implant dentistry?

Many implant clinicians have probably been using CAD/CAM workflows without even realising it, as many laboratories were early adopters, substituting the lost-wax technique and the expense of gold for fully customised cobalt–chromium milled abutments (Fig. 1).

One of my most important goals in seeking to be a successful implantologist is to provide a dental implant solution that is durable. We have seen a massive rise in the incident of peri-implantitis and have found that a large proportion of these cases can be attributed to cement inclusion from poorly designed cement-retained restorations (Fig. 2). Even well-designed fully customised abutments and crowns can have cement inclusion if the restoration is not carefully fitted (Fig. 3). This has led to a massive rise in


Fig. 15

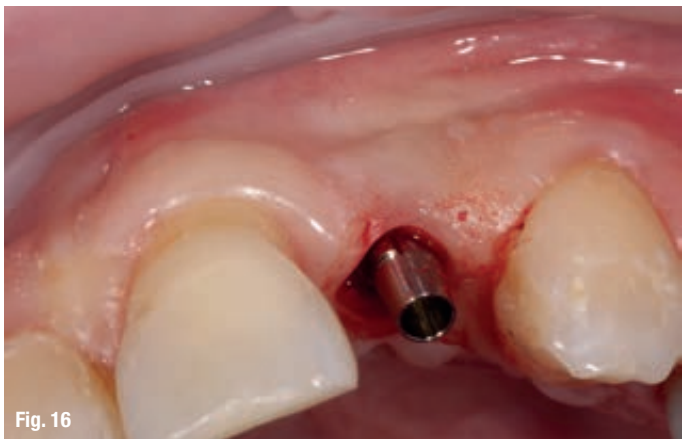
Fig. 16

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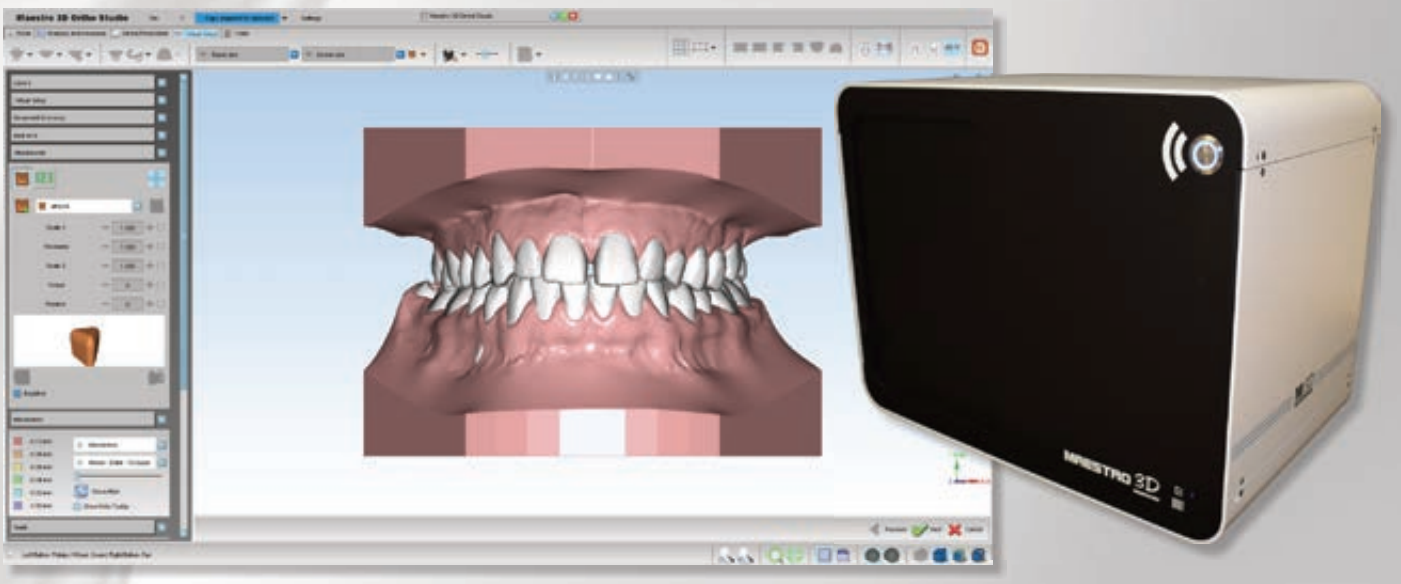


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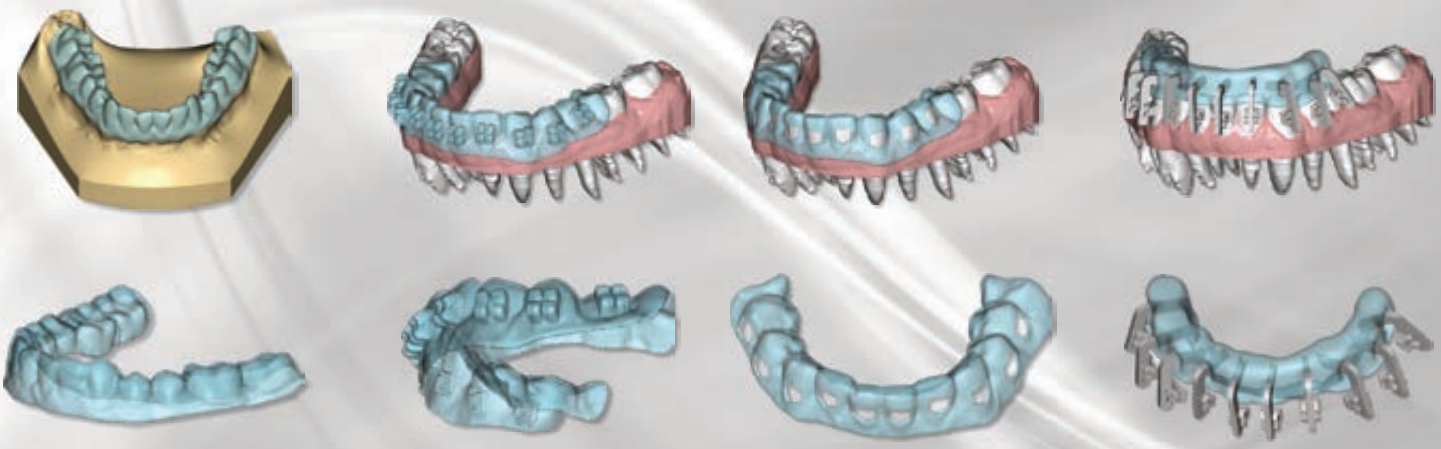

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