

Sept 92
projet en mini 92
(3 mois après la Refuse
du Hesson)

Chairside Creations

The sophia bioconcept System

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Recently, the computer has even infiltrated our operatories. Perhaps the most extraordinary example of in-operatory computer application is the dental CAD/CAM (an acronym for computer assisted design/computer assisted manufacture). With the introduction of the *sopha bioconcept* CAD/CAM earlier this year, reconstruction possibilities include full crowns and copings. The *sopha bioconcept* CAD/CAM carves complete occlusal surfaces matched up to the patient's dentition and the dentist's occlusal preferences.

The greatest advantage of using the *sopha bioconcept* CAD/CAM instead of traditional laboratory methods lies in its speed and accuracy. Current research and development indicates that in the near future the *sopha bioconcept* will be

The Machine

The CAD/CAM machine consists of three modules. (Fig. 1) The first is called the Opticast — a three-dimensional laser camera, a motorized platform, and a souped-up computer. This module is used to take pictures of the tooth preparation. The second module is the Biocad — a high-powered computer with specialized software. The Biocad designs the restoration and creates instructions for the third module. The third module is a five-axis micro-milling machine that carves restorations from solid blocks of material.

The Procedure

Once the tooth is prepared, a small impression of the prepared tooth and its two neighbors is taken along with a small checkbite. The model is poured and placed on the platform of the Opticast. (Fig. 2) The platform is motorized and it tilts in various directions to allow the laser camera to view the prepa-

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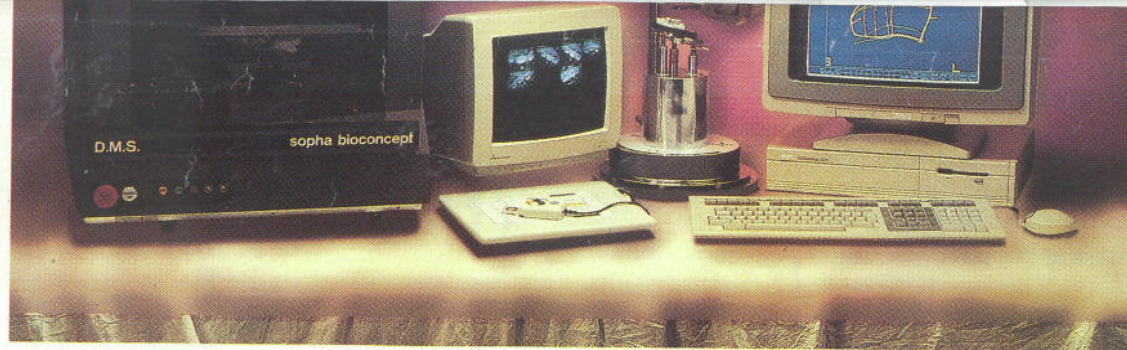


Fig. 1

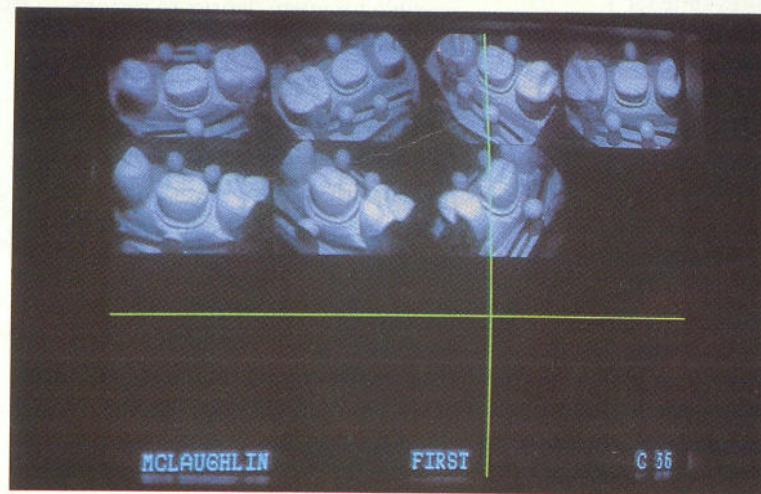


Fig. 3

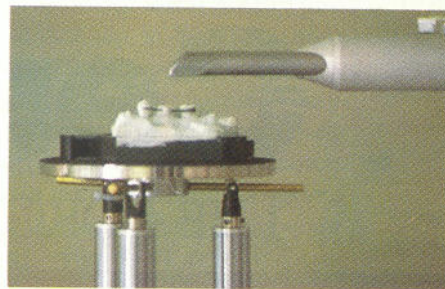


Fig. 2

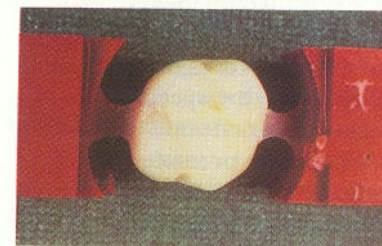


Fig. 4

The sophia bioconcept System

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ration from all sides. Next, the bite is placed on the model and the operator takes one last picture. The total time for complet-

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This portion of the technique will change radically. Laser cameras have already been used in the mouth, effectively eliminating the need for a conventional

impression. The optimal clinical technique for this procedure is currently being studied.

After taking the pictures, the various views are displayed on a television monitor. (Fig. 3)

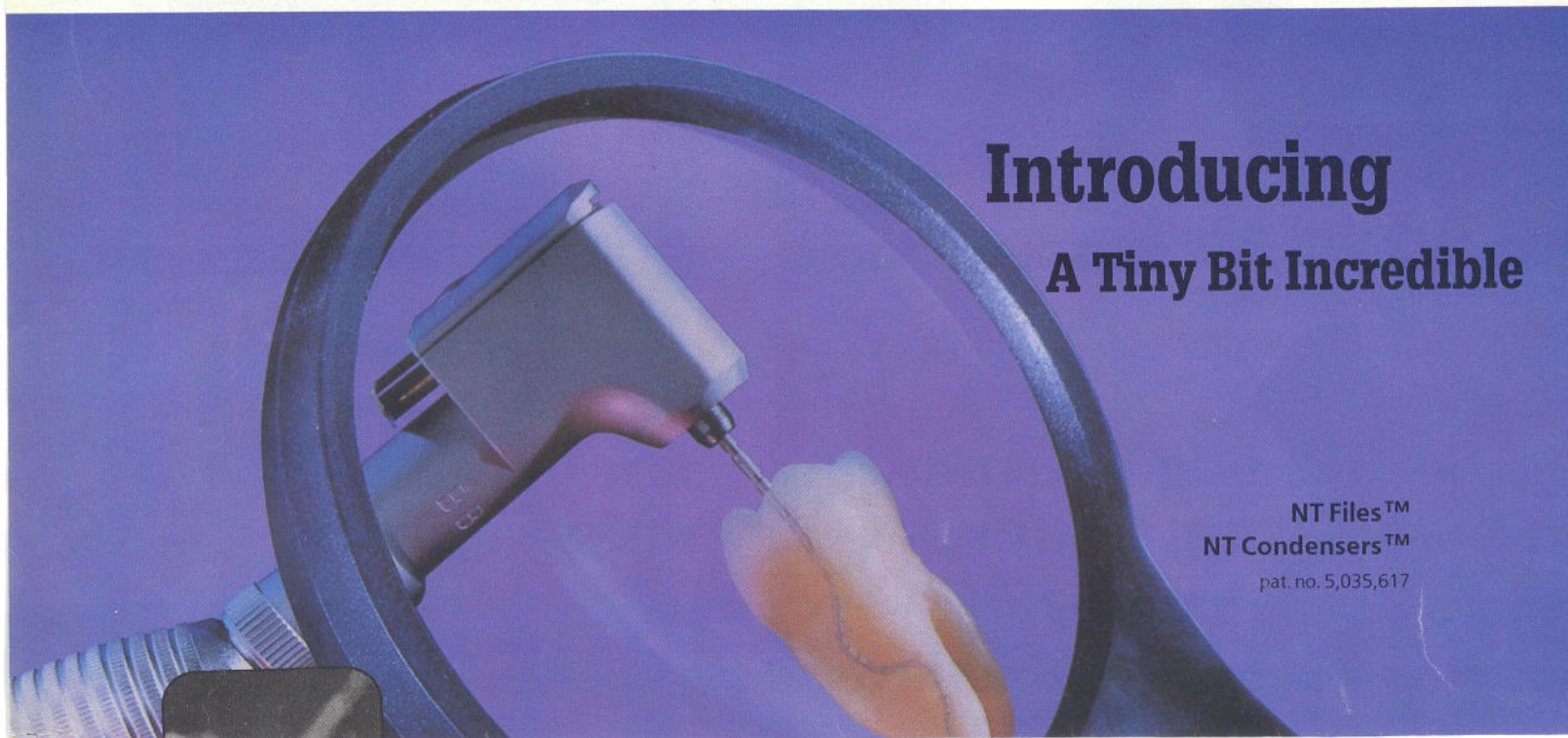
Using a mouse, the operator indicates where he or she would like the contact points and finish line and identifies other important landmarks. Once this is done, the computer assembles the views into a three-dimen-

sional model of the prepared tooth and its environment. After a final check by the human operator, the information is sent to the Biocad station.

The Biocad

At the Biocad, the computer designs the finish line and creates the cement space to the operator's specifications between zero and 800 microns clearance. The Biocad computer is loaded with a library of designs for 32 ideal teeth. It selects the appropriate design and adjusts it to fit the exact requirements of the current preparation. Not only will the occlusal design fit the opposite bite, but it will also reflect the particular theory of occlusion that the doctor favors. The computer then completes a final check for any high spots or places where the restoration may be too thin and then the restoration is sent to the milling machine.

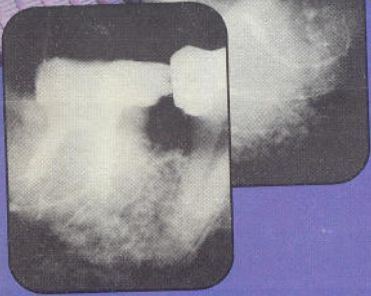
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X-rays courtesy Dr. J.T. McSpadden

Conventional rules have always said never use endodontic files in a rotary handpiece.

But now the rotary handpiece has been re-invented. And, incredibly, the endodontic file has been re-invented, this time in Nickel-Titanium. The rules have been broken and the results have certainly been non-conventional.

Considering all the times you've seen "new and improved," it's no wonder you're skeptical.

- But consider the fact that Nickel-Titanium can be stressed 10 times more than stainless steel.
- Consider Nickel-Titanium files are 500% more flexible than stainless steel.
- Consider the canals can be enlarged 5-15 times faster than by hand.

And, consider the handpiece can be set at a slow 150 RPMs with compensating torque.

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The milling machine is fitted with an array of eight diamond burs. It automatically selects the correct burs and checks them for wear. The machine is self-lubricating and has a closed-circuit coolant supply. All the operator needs to do is load a block of the material to be milled and the machine carves out the restoration according to instructions from the Biocad. The milling time is between 80 and 140 minutes, but a soon to be available enhancement should reduce it to 45 to 75 minutes.

After the Milling

After the milling process, the operator cuts the sprues from

the restoration and does any necessary staining. (Fig. 4)

The machine is equipped with software for carving full crowns and copings from blocks of Empress or millable Dicor/MGC. The software for creating inlays and onlays is scheduled to be released by the end of the year, but even it does not represent the limits of the machine. Even though software is not presently available, the machine has experimentally milled complete three-unit bridges.

Other Uses

The machine has also been used with a wide variety of materials. Composite, plastic, ceramic, and titanium have all been successfully milled. The machine is approved for ceramic materials, although doubtlessly others will be approved in time. Any material capable of being milled can be handled by the machine. In this sense, sophia bioconcept CAD/CAM's technology is very durable. If a dentist or laboratory owns a sophia bioconcept CAD/CAM machine, whenever they want to switch from one application or material to another, all that is needed is a floppy disk with the new software and a block of the new material.

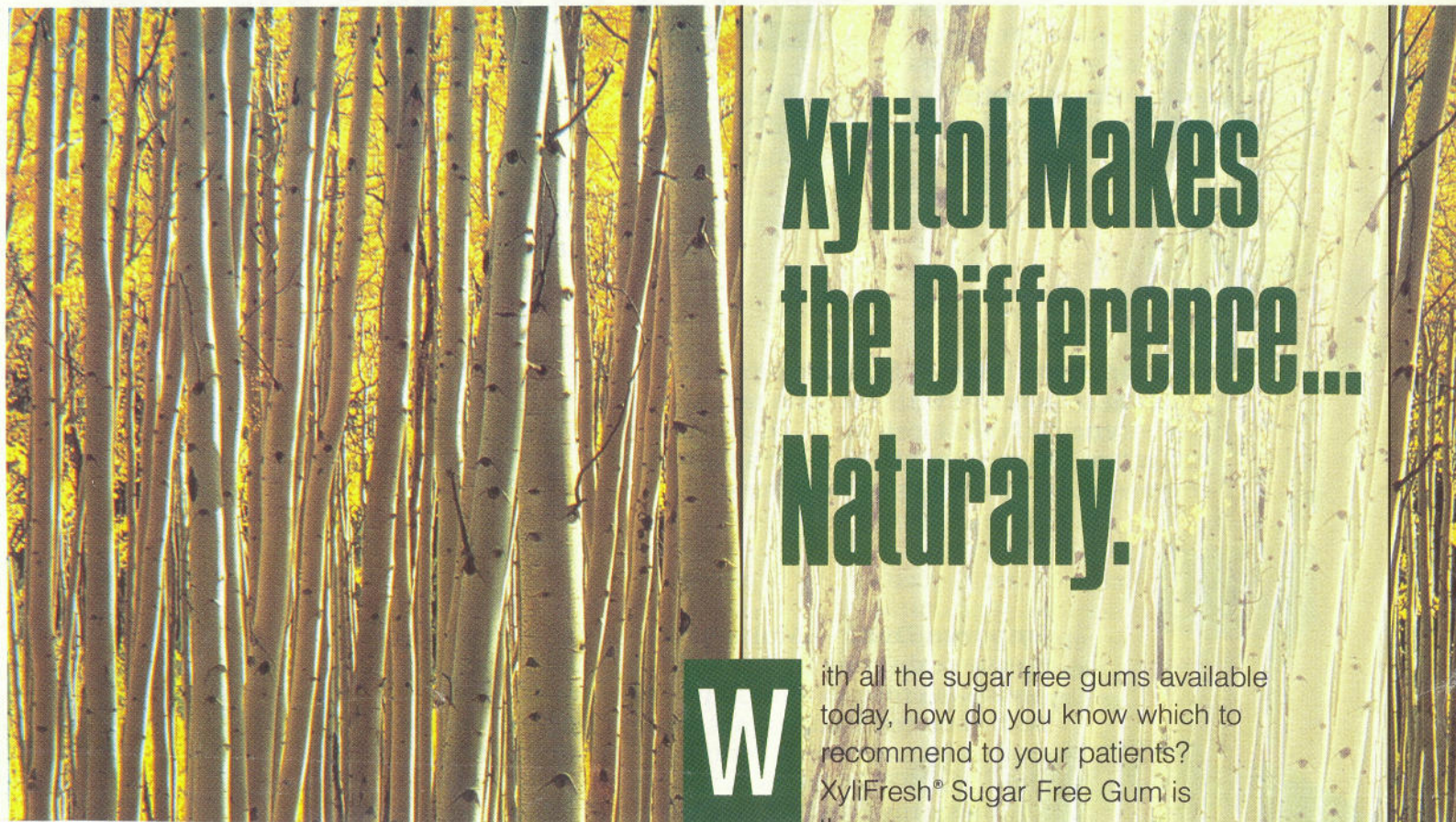
ing the profitability of the CAD/CAM. Taking all things into account, most offices find the machine profitable if they produce one and one-half to two restorations per working day. Once this number is exceeded, profitability increases rapidly. ■

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Sophia bioconcept sponsors a series of two-day, hands-on CAD/CAM workshops. The workshops feature such speakers as François Duret, inventor of the dental CAD/CAM. The workshops are held in a variety of locations. For information, call (310)444-5944.

References

1. Belser, UC, MacEntee, MI, and Richter, WA. Fit of three porcelain-fused-to-metal marginal designs in vivo: and a scanning electron microscope study. *J Prosthet Dent* (53):24-34, 1985.
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Research

The system has proven to be very precise and accurate. Three years of research at the University of Southern California School of Dentistry showed that the precision at the margin using composite material was within 50 microns. This figure is quite impressive when you take into account that the precision of a traditional crown made by a talented technician is usually between 50 and 100 microns^{1,2}.

To the patient, however, the most important feature of the sophia bioconcept CAD/CAM may be the fact that they can have a finished permanent restoration installed in a single visit. There is no need for wearing a temporary. There is no need for a second injection of Novocain or to take time off from work for a second dental visit. It is easy to imagine how the availability of this service will greatly enhance a dental practice.

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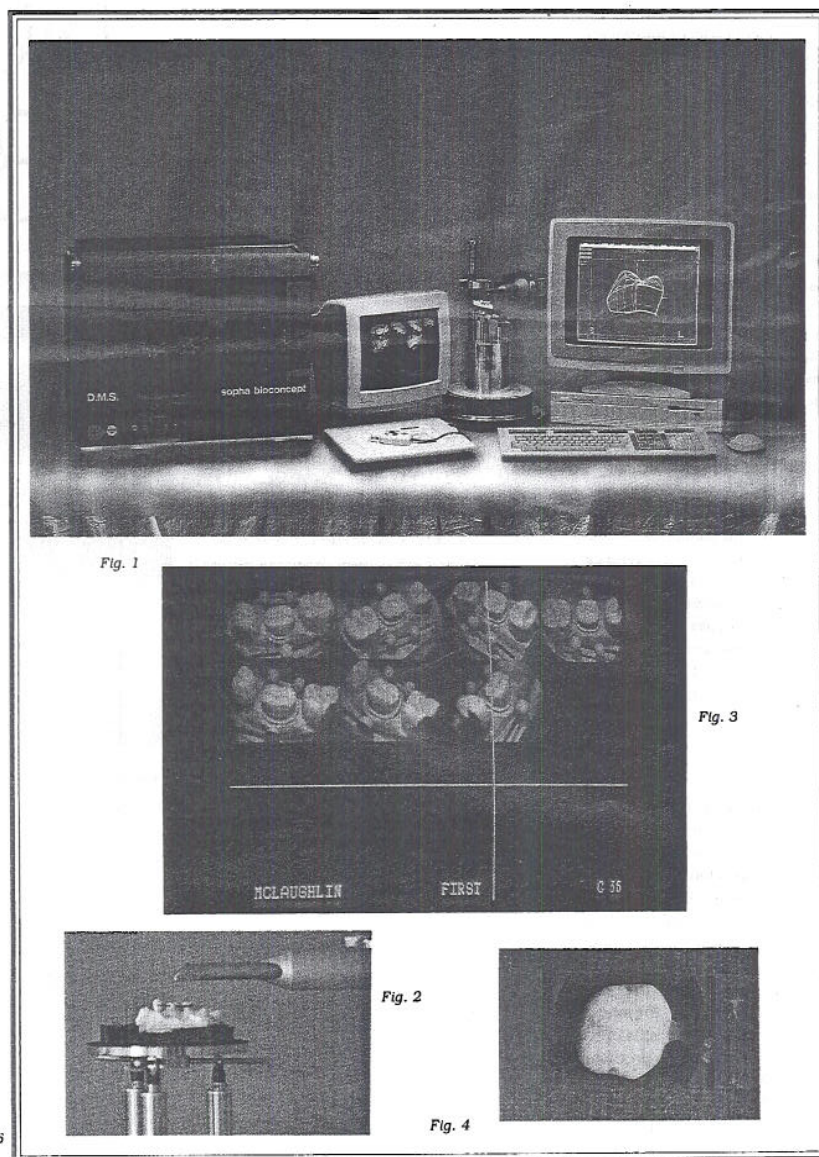
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