

UnBreakable

Arian Deutsch, CDT

UnBreakable...is there such a material? In Dentistry, the quest for a material that blends with nature both esthetically and functionally has been a long journey indeed. Many times the longevity of a prosthesis is not necessarily a matter of material, but of other considerations such as restorative space, opposing dentition, or the presence of parafunction.



When it comes to the arena of acrylic prosthetics, particularly implant supported restorations, it becomes even more critical that a dense, durable acrylic with an adequate impact strength is used. Literature has shown that there is a 60% to 200% increase in masticatory force associated with implant retained and supported prosthetics over conventional dentures.*¹

Technique

Not only is the acrylic selection important, but also the technique by which the the acrylic is polymerized.

In this article a unique combination of material and technique is introduced that has proven to maximize the density of an acrylic, and reduce shrinkage that occurs during polymerization. Additionally this technique utilizes a closed mould system, thus reducing any potential vertical opening of the prosthesis resulting in open occlusion.

The injection system utilized in this article is the Swiss Jet flask (Merz Dental Germany) which is completely self contained and requires no ancillary hardware or special equipment set up to use. To add to it's simplicity, the Swiss Jet flask requires no compressed air or water supply.

Acrylic Selection

The acrylic used in this particular case is GC's Nature Cryl Super High Impact Acrylic. It is important to remember that the durability of an acrylic depends more on impact strength, or toughness than hardness. For example, and acrylic can be very dense and hard, yet brittle.

Both in Charpy test results and independent Kravitz impact testing*² GC's Nature Cryl Super High Impact acrylic line outperformed the leading competitors acrylics.

Swiss Jet

The Swiss Jet Flask is a corrosion resistant precision flask which can be used for all acrylic polymerization needs.

First a maxillary complete prosthesis is embedded in type IV dental gypsum in the Swiss Jet Flask (Figs. A and B).

Note the position of the Turning Bolt (Fig. C) A primary wax sprue is connected from the Turning Bolt to the waxed prosthesis at the posterior most wax in the mid palate. Next, auxiliary venting sprues are cut into the gypsum with a #8 round bur, from



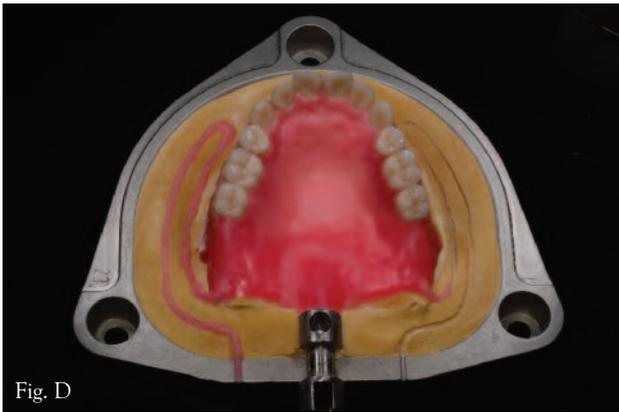


Fig. D



Fig. E



Fig. F



Fig. G

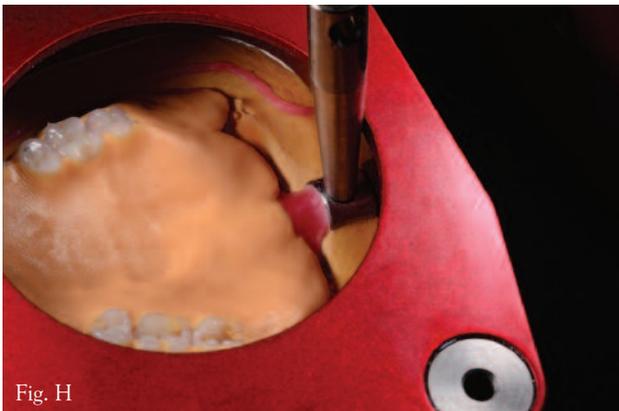


Fig. H



Fig. I

the wax up to the two small venting channels in the Swiss Jet Flask. The auxiliary venting sprues re filled with wax to preserve the vents after investing to second half of the Swiss Jet Flask (Fig. D). Two coatings of Sodium Silicate are used to isolate the gypsum surface (Fig. E).

Now the Swiss Jet Upper Flask component with guidance cones is put into place and screw tightened with hand pressure.

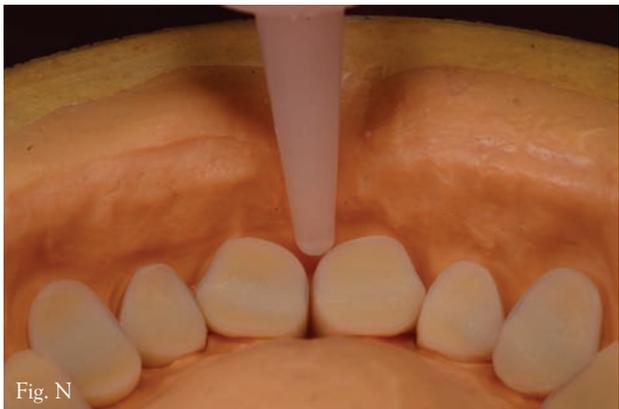
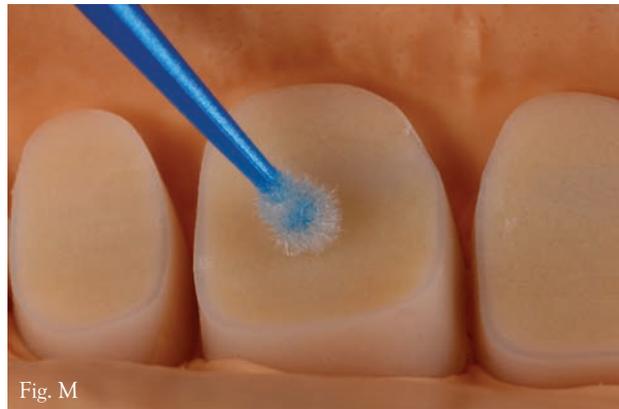
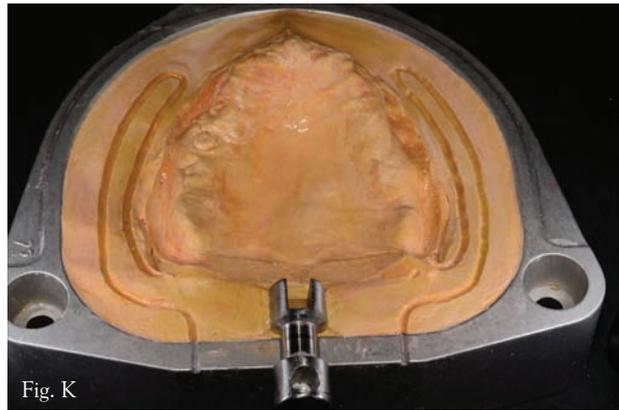
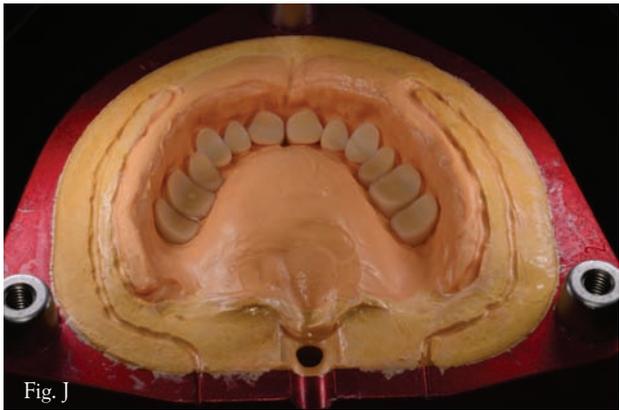
Investment of the upper component is now carried out. In this case a two part silicone was used on the artificial dentition with occlusal stops prior to investment. As soon as the investment is performed, and while the type IV gypsum is still

highly viscous, the Injector Base is placed and tightened (Fig. F), and the Channel Bolt is inserted into the fluid gypsum and enters the orifice of the Turning Bolt (Fig. G).

To illustrate how the Channel Bolt fits into the Turning Bolt, notice Fig. H.

Once the gypsum is completely set, the Channel Bolt can be turned with an Allen wrench, and removed (Fig. I), and the wax elimination is carried out, and separating medium is applied (Figs. J and K).

The Turning Bolt is reversed to allow acrylic to pass through the sprue cavity (Fig. L).



The artificial dentition is cleaned and prepared with monomer (Fig. M).

Acrylic characterization is accomplished by modifying GC Nature Ceryl Super High Impact Acrylics which have been sifted to remove fibers, and are available in a wide range of shade variations. In this case only two shades were used, and hand injected into the negative silicone mould (Figs. N and O). The shades are then blended with a brush and feathered into each other and manipulated with a wax instrument to be varied in intensity.

The base shade of GC Nature Ceryl Super High Impact is now mixed according to the manufacturer's instructions (Fig. P), and a thin PE film is placed on the injector base. The Injection

Cylinder is placed and secured with long screws. After a brief bench set, the acrylic is placed into the reservoir within the Injection Cylinder component (Fig. Q).

The Injection Piston is placed into the reservoir (Fig. R), and the Swiss Jet Flask is placed into a hydraulic press. Centrally place the flask into the hydraulic press and slowly apply pressure until acrylic extrudes throughout the auxiliary vents (Fig. S). A standard tooth pick is now tapped into each auxiliary vent with a rubber mallet (Fig. T), and the pressure is brought to 100 bar pressure, and the Turning Bolt is turned to the right 90° thereby closing the channel bolt and effectively cutting off the acrylic supplied through the sprue access (Fig. U).



Fig. P

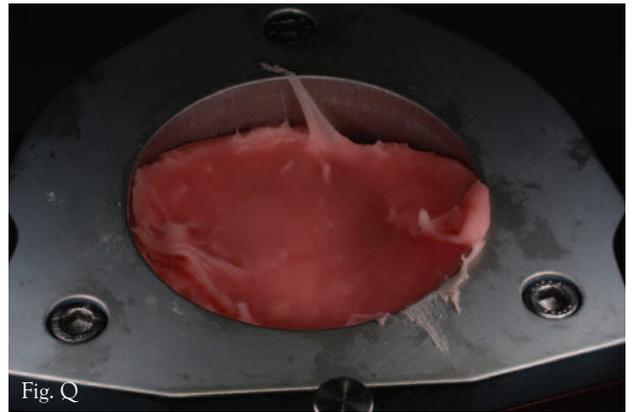


Fig. Q



Fig. R

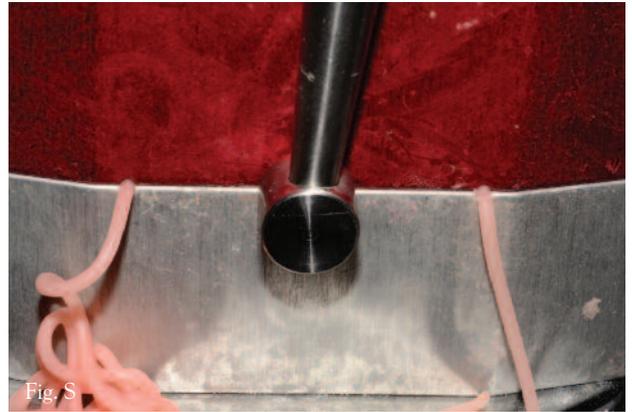


Fig. S

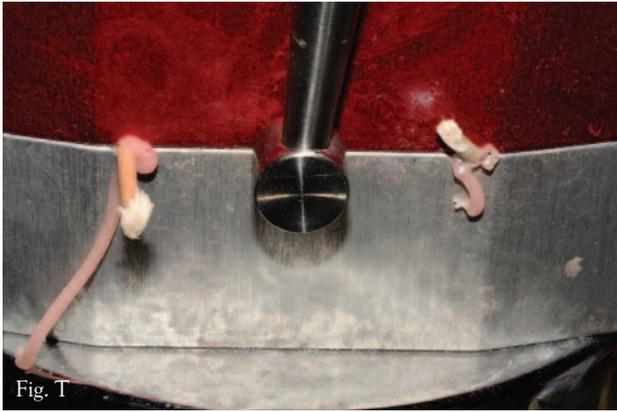


Fig. T

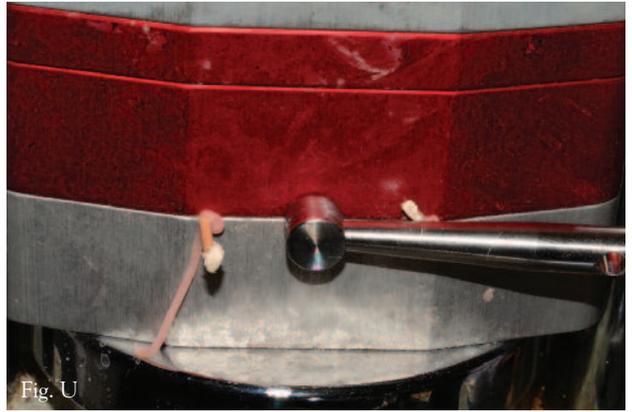


Fig. U



Fig. V

Once deflasked, the maxillary prosthesis has minimal finishing, and the dentition can be sandblasted with aluminum oxide at 2 bar pressure, steam cleaned, and characterized with a bonder and light curing stains. The results are spectacular

(Fig. V), and a wide range of shades are available in GC Nature Ceryl Super High Impact Acrylic which prepare the dental technician to meet any challenge in matching specific gingival colors.

While no dental material currently available is “UnBreakable”, the GC Nature Ceryl Super High Impact range of acrylics deliver when it comes to strength and esthetics, particularly when it comes to implant prosthetics. **ISI**

References

- *1. Fontijn-Tekamp FA, Slagter AP, van't Hof MA, et al. Bite forces with mandibular implant-retained overdentures. *J Dent Res.* 1998;77:1832-1839.
- *2. Collis J. Acrylic: The “Hard” Truth. *Spectrum dialogue - Vol. 12 No. 5 - May 2013 page 48*