Final Finishing of Composites and Laminates

by Ronald E. Goldstein, DDS

The first and most important principle of all finishing is to begin the finishing procedure with the appropriate carbide or diamond. This means never using a coarser diamond or lesser-bladed finishing bur than is absolutely necessary to accomplish initial surface removal. For instance, if there is considerable bulk present after placement of composite resin on a fractured incisor, it will be necessary to begin with an 8-bladed finishing carbide (ET™ 6 or 9). If the surface is porcelain, the choice would be a 30-μ diamond (DET 6 or 9).

It is a mistake to be totally committed to either diamonds or carbides, because each has its place, and sometimes mixing and matching instruments can be a real asset. In other words, although we may routinely use carbides to finish anterior composite resins, posterior hybrids may require not only carbides, but diamonds as well. For example, occlusal anatomy is easier to form using diamonds if the polymerized composite restoration is extremely hard. The round-ended diamonds have a more efficient penetrating capacity under lower speeds than the carbides. Hence, it can be much easier to place the anatomy in posterior occlusal surfaces with diamonds. The DOS2 and DOS3 are particularly helpful for this purpose (Figure 1).

However, when using diamonds—even under slow speeds—be careful of the grabbing and ditching potential of these instruments. The 15-μ diamonds are well-suited for carving occlusal anatomy. Then, a 30-bladed carbide (OS1UF, OS2UF, and OS3UF) can be used to obtain a semigloss finish even before polishing procedures are begun (Figures 2 and 3). The finished surfaces provided by the 30-bladed carbides produce a final smoothness acceptable for restorations.

Any polishing accomplished after these instruments are used tends to blend the restoration into the natural tooth surface.
Figure 5—The finished surfaces provided by the 30-bladed carbides produce a final smoothness acceptable for restorations.

Figure 6A—One problem with using the typical 7901 style finishing bur is that its convex shape tends to carve concavity into the tooth and root surface, potentially causing sensitivity.

Figure 6B—A straight emergence profile lends itself to the correct shape of the ET 3 or ET 4. The tip of the ET burs are safe-ended, thus helping to reduce sensitivity.

Figure 7A—This patient is unhappy with the discoloration of her teeth.

rather than refine any additional groove or fissure surface.

A properly finished restoration cannot mask inadequate preparation, insertion, or any poorly executed step of the technique that would be necessary for successful esthetic and functional restorations. However, proper finishing can make the difference between an ordinary- and an extraordinary-looking restoration.

Technique Objectives

In addition to being simple, finishing procedures should be easily reproducible. This also implies fewer steps with fewer instruments. Finally, the clinician must bear in mind that the technique requires patience and allowing sufficient time to obtain the maximum result.

Clinicians must strive to meet two objectives when doing any type of restorative treatment: (1) improving and finalizing margins and contours that will help make the restoration biocompatible with the natural tooth and tissue; and (2) developing maximum surface luster to enhance esthetics, reduce stain and plaque retention, and minimize wear and fracture potential. A properly finished restoration should include the following aspects: (1) a well-finished margin, which implies no overhangs, no voids, or extensions of restorative material that could interfere with tissue health; (2) a sufficiently smooth surface that will not attract bacterial plaque or food stains; (3) suitable surface texture that blends in or matches adjacent or opposing natural teeth; (4) color matching with the existing adjacent, opposing, or preselected tooth shade; and (5) a surface finish devoid of too obvious contour, finishing bur, or diamond marks.

Finishing: Composite Resins

The primary considerations for finishing any restoration are based on certain criteria: (1) instrument shape; (2) the surface of finishing instruments; (3) the surface texture of the restoration; and (4) the sequence of therapy (restoration contour or final contour polishing and polymerization).

Instrument Shape

The goal of instrument design is to provide the clinician with shapes that will make it easier to efficiently and correctly contour tooth surfaces. For a number of years after composite resins were introduced, patients complained of postoperative gingival sensitivity. A major cause of this was the use of a convex finishing bur (7901 series) (Figure 6A).

The convexity tends to produce a concavity in the tooth, thus exposing nerve endings. To correct this problem, a straight but tapered, round-ended bur was designed (ET™ series), which provides the ability to achieve a straight finish that coincides with the straight emergence profile of the crown as it erupts from the gingival sulcus (Figure 6B).

Anterior Finishing

The correct instrument shape

About the Author

Ronald E. Goldstein, DDS, has been practicing in Atlanta, Georgia, since 1982. Dr. Goldstein is Clinical Professor of Oral Rehabilitation, Medical College of Georgia School of Dentistry in Augusta, Adjunct Clinical Professor of Prosthodontics at Boston University Henry Goldman School of Dental Medicine, Visiting Professor of Oral and Maxillofacial Imaging and Continuing Education at the University of Southern California School of Dentistry in Los Angeles, and Adjunct Professor of Restorative Dentistry the University of Texas Health Science Center at San Antonio, Texas.

Dr. Goldstein is renowned for his contributions to esthetic dentistry, lecturing extensively around the world, and coauthoring articles and books. He is coeditor-in-chief of the Journal of Esthetic Dentistry.
for finishing anterior restorations depends on the type of surface being finished. Figures 7A through 7G illustrate the basic sequence of finishing instruments used on a patient who is having her discolored teeth bonded with composite resin. For the labial surface, a long, tapered, straight-edged instrument is preferred (ET° 6 or 9), which allows the basic straight shape of the labial surface to be easily contoured (Figure 6B).

For cervical finishing, a much smaller, but also tapered finishing instrument (ET° 3 or 4) (Figure 6B) conforms to the desired straight emergence profile as the tooth emerges from the gingival sulcus. For linguo finishing, the rounded, “football-shaped” instrument (OS1) can best supply the appropriate curve.

**Posterior Finishing**

In posterior regions, a three-tier system of contouring and polishing is suggested. Actually, the clinician can basically rely on four instruments to finish most composite restorations. The first instrument used in the same sequence should be small enough and thin enough to remove any overhang or excess margin build-up. Usually a 4-mm tapered-point instrument is best suited for this purpose (ET° 4).

The basic occlusal anatomy is begun using the rounded football-shaped instrument (OS1) (Figures 1 through 5). The 30-bladed OS1UF is perfectly designed for occlusal equilibration (Figure 9). Grooves and fissures are placed next, using the round-ended tapered series of diamond or carbide instruments. The OS2 (Figure 2) places the basic groove and the OS3 (Figure 4), an extremely narrow, round-ended bur, permits the gnathologic carving of the final groove or occlusal secondary anatomy. Polishing the posterior composite is easily accomplished with a series of impregnated cups and points. Any interproximal areas that may need reopening are best carved using an “ET cutting” (H132-A [Brasseler]) bur because, instead of having a polished round end, this bur is made to also cut on the end (Figure 13). Polish and paste can be used in combination with the points or cups.

**Surface of Instruments Carbide vs Diamond**

The most frequently asked question about instruments is “Should I use a carbide or a diamond?” The answer is that either may be appropriate. Each has its own advantages, as well as disadvantages, and although there are definite properties associated with each type of finishing instrument, in most cases the answer ultimately depends on the clinician’s personal preference. However, there is a tendency among clinicians to personal preference for finishing with either a carbide or a diamond.

Some clinicians believe that carbides tend to pluck out filler particles from the composite, whereas others cite the potential damage to enamel and cementum when contouring with diamonds. However, Boghosian, Randolph, and Jekkals point out that carbides should not be used at the higher speeds when trimming and finishing microfilled composite resins because they tend to disrupt the surface. They also found that diamond instruments operating at low speeds did not damage the surface of either microfilled or small-particle hybrid composite resins. However, high-speed finishing with carbide burs on small particle (hybrid) composite resins produces a nondisrupted surface that is free from the striations and grooves left by diamond burs. Therefore, their results suggest that the instrument choice should also be based on the type of composite resin chosen for the restoration.

There is, however, another important factor to consider. Depend-
Esthetic Dentistry

via the four-abrasive-disk system of final contouring and polishing

ticles may take place during the

al or carbide during the initial

ion may be a matter of per-

restorations. texturing is best accomplished

Figure I 2—Cosmetic contouring can be

cially abrasive disks and strips, the

pheric choice. Although some

and properly polished

awa are to be bonded, the chances are

adent to plan ahead, especially during the build-

mmelons are to be included, the clinician must plan

chance with the amount of thickness and type

Figure 12—Cosmetic contouring can be

and polishing will be done by ro-

in abrasive disks and strips, the

estion is determined, the better the

tortured and finished.

Breaking up light reflection can

of final contouring and polishing

oblate most or all of the

uested from the start. By highlighting certain parts

urface texturing is desired, then slight

horizontal indentations are placed first in an

Figure 11—For labial finishing of ceramic

of final contouring and polishing via the four-abrasive-disk system could more than compensate for

strument of choice should be the one that the

or diamond (Figure 8).

Polishing: Wet or Dry?

The question of whether to pol-

Polishing dry tends to create a dry

slurry that acts as the polishing me-

Albers advocates dry disk ing with a final superfine disk for

microfilled composites. However, polishing wet also creates a slurry that polishes but helps reduce fric-

tional heat problems, which can help eliminate the chance of a “white line” around the margin.

Surface Texture

One factor that too often is over-

looked is the type of surface texture desired on the labial surface. The usual objective is to match the ex-

isting, adjacent, or opposing teeth. However, if 8 or 10 anterior teeth are to be bonded, the chances are

that the restorative dentist will want to create different surface textures. Basic choices vary from completely

smooth to a highly texturized surface. In younger-looking smiles, slight grooves or mamelons may

provide a more realistic appearance. The grooves help to break up the light reflected on the labial sur-

face, but they should not be placed so deeply that they look unnatural. Although surface texture can

be built into the restoration when the composite is being applied to the tooth, it is usually easier to carve

the desired texture with the 16-
or 30-bladed carbide burs (ET9UF) (Figure 7D) or an 8-µ diamond

(DET9UF) (Figure 11). However, if deeply contoured mamelons are to be included, the clinician must plan

ahead, especially during the build-up phase, as the body and incisal composite colors are placed. The

sooner and more exactly the placement is determined, the better the tooth will look after final contour-

ing. Otherwise, the correct shade of composite might be inadvertently removed as the mamelons are con-
toured and finished.

Sequence of Therapy

The first prerequisite to finishing any restoration is planning the finish. Consideration must be given to the amount of thickness and type of surface texture desired before insertion. Because removing a certain amount of composite from the outer surface is unavoidable, the restoration must be sufficiently

Figure 11—For labial finishing of ceramic restorations, texturing is best accomplished with a DET9UF.

Polishing: Wet or Dry?

The question of whether to pol-

ish wet or dry remains one of the controversies in restorative dentistry.

Figure 8—It is important to have the full range of finishing instruments so one has complete flexibility with each patient and each procedure to choose the best entry level instrument for finishing based on the amount of bulk to be reduced.

Figure 9—The OS1UF is an ideal shape for finishing endodontic access restorations that end on ceramic surfaces. It is also useful in occlusal equilibration of natural and composite tooth surfaces.

Figure 10—as an alternate, the DET3UF diamond is an 8-µ ultra-smooth finishing diamond for either composite resin or porcelain.
overbuilt to allow for cutting back to the desired surface. This means that if color is being inlaid to create a special effect, such as translucency, failure to properly calculate the amount of composite resin that will later be removed could interfere not only with the intensity of incisal stain, but also with the relative placement. The more restorative material removed during the finishing process, the more chance there is that the original tooth shade or internal build-up will be exposed. In the past, it was believed that a polymerized composite resin under a matrix was the best possible surface the composite could have. However, the soft resin material was found to wear away quickly, leaving a rougher, less esthetic surface. Therefore, it is better to polish all composite restorations.

**A Simplified Finishing Technique**

To a great extent, it is the cervical margin that dictates both the anatomy and the contour of the tooth. Therefore, the labial surface is trimmed first with a 9-mm ET carbide or diamond (Figure 7B). As soon as the labial surface is roughened out, the cervical area is trimmed with a 3-mm ET carbide or diamond. This allows the clinician to enter the sulcus and do the finishing with only minimal tissue irritation. If a carbide is being used, the ET3 is used first, followed by the ET3F, a 16-bladed carbide, to produce a smoother subgingival surface. The same principle applies when using the ET diamonds—the red or 30-μ diamond is used first and the yellow-banded or 15-μ diamond is used for finishing. If the adjacent or opposing teeth need cosmetic contouring, the 30-μ diamond (DET6) is also preferred (Figure 12). After the cervical margin is completed, the contour and the size of the labial surface will be easier to visualize. Usually, the labial contours are finalized by first using a 9-mm ET9F and polishing with an ET9UF 30-banded bur or yellow-banded 9-mm DET9F diamond. If lingual contouring is necessary, it can be easily completed by using an OS1 carbide or diamond. This football-shaped instrument is perfectly formed to re-create the proper contours on the lingual surface, as well as eliminate any occlusal dislocations. Incisal length can be controlled by using a coarse SOPLEX™, Flexi Disc™, or Ceramicel® disk, mounted with either a contra-angle or straight handpiece. Using this disk is important when trying to match the length of the adjacent teeth. The final step in finishing the direct-composite labial veneer is to polish the restoration with a series of abrasive disks and strips. It is important to sequence the order of use from coarse to smooth disks. Generally speaking, each of the four abrasive disks should be used in the order of coarse to smooth using water as the lubricant. The only area left to polish may be subgingival and here it is helpful to use gentle polishing with an impregnated “cup-shaped” instrument that can slide into the gingival sulcus and smooth any rough areas. Polishing pastes can be used in the impregnated cups or in a non-impregnated prophylaxis cup.

**Evaluating the Finish**

After the final polish and a thorough rinse to make sure all excess polish is washed off the teeth, the teeth should be dried and inspected from different views with the dental light reflecting at various angles. An area that is insufficiently polished will show scratches and should be refinished until the restoration is free from surface scratches or other defects.

**Conclusion**

The best restoration will result from developing an orderly sequence of treatment plus spending extra time on the contouring and finishing both of the composite and the ceramic restoration.

**Selected Reading**


