

# Simplifying Finishing and Polishing Techniques for Direct Composite Restorations

Written by Howard S. Glazer, DDS Thursday, 01 January 2009 00:00

There are no “standard” techniques in place for finishing and polishing composite resins. “All roads lead to Rome” is a phrase often used when discussing the creation of a proper high-shine polish for composites because there are so many different methods available to achieve this goal. Composite surfaces are finished and polished to improve their aesthetic quality, and for protection against the aggressive oral microorganism environment that can colonize in rough and improperly polished surfaces. Patients want their fillings to have a smooth feel when touched by their tongue and to look natural in appearance.

Undoubtedly, the newer generations of composites, along with the continual rise in the number of both anterior and posterior composites placed, has increased the emphasis on the need to have a simplified, systematic approach to efficiently finish and polish direct composite restorations to yield aesthetic excellence. The continual evolution of composite resins provide for materials that vary in both formulation and application. The most notable change in composite resin characteristics is that of filler particle size. Today’s composite resins are much smaller and harder than the composite resins of the late 1990s.

For nearly 20 years the techniques and rationale for polishing direct resin composites has changed very little. The primary rationale for polishing includes the following:

- Maintenance of proper oral health: Bio-film and plaque retention is prevented with a highly polished (smooth) tooth surface.
- Aesthetic appearance: Proper finishing and polishing gives the restored tooth asymmetry with the adjacent teeth.
- Occlusal/bite relationship: Proper finishing and polishing allows for occlusal relations to remain compatible with the opposing dentition, creating ideal physiological standards for supporting tissues.
- Strength: Intraoral polishing of composites can create properties similar to those achieved by glazing indirect ceramic restorations in the laboratory.



**Figure 1.** A 16-year-old patient with a fractured tooth No. 9. There was dentin involvement, but no pulp exposure or root damage. Minor enamel splintering (not requiring treatment) was visible at the incisal edge of tooth No. 11.



**Figure 2.** The defect was restored with an aesthetic composite using an incremental technique. Excess removal and contouring was done with a 10-bladed carbide-finishing bur (Safe End SE8-10 [SS White Burs]) because it selectively removes the composite while conserving enamel, unlike a diamond bur.



**Figure 3.** A 20-bladed carbide bur (Safe End SE8-20) was then used to create a smooth surface ready for polishing. This photograph shows the noncutting tip which helps to avoid any grooves and protect soft tissues when finishing areas close to the gingival margin.



**Figure 4.** Depending on the location of the filling and the length of the area to be treated, a variety of instrument lengths are available: short Safe End burs SE3 and SE4 are best suited for interproximal spaces/transitional areas at the gingival margin.



**Figure 5.** The Safe End Finishing Bur Kit (SS White) offers clinicians a set of 10 and 20 blade instruments in 5 different lengths for composite resin finishing.

## COMPARING FINISHING INSTRUMENTATION AND TECHNIQUES

In contrast to diamonds, carbide-finishing burs perform a cutting rather than a grinding action. This action allows carbide burs to chip away the substrate with greater precision that can be produced with a grinding action. The hardened-metal blades act by means of plastic deformation of the substrate, and deformation-associated shear forces occurring between blades and surface.<sup>1</sup> As a result, carbide finishing burs with a sufficient number of blades (10, 20, or 30) will produce smoother surfaces than finishing diamonds. Surprisingly, the roughness values may even be better than those obtained by the use of aluminum-oxide-coated polishing discs, which are frequently regarded as the standard tools for composite polishing.<sup>2</sup> For excess bulk removal of composite resin, scalpels, scalers, abrasive stones, and discs can be used. Interproximal areas can be treated with interdental strips or oscillating systems with diamond-coated inserts. Normally, dentists also use rotary instruments to trim away excess material. Suitable types of carbide finishing burs have a clear advantage over fine-grit diamonds for this step because they work selectively, meaning they “differentiate” between soft composite and hard enamel, thus helping to conserve the natural tooth structure.

However, not all carbide finishers are equally suitable. Working parts with nonrounded angles may damage composite, and in particular enamel surfaces.<sup>3</sup> This applies to both burs with nonrounded flat ends and those with pointed cutting tips. Ideally, carbide-finishing burs with noncutting tips, and rounded transitions between tip and cutting blades, should be used. This will also help to protect soft tissues when finishing transitional areas between the filling material and tooth structure close to the gingival margin.

The Safe End Finishing Bur system (SS White Burs) is one example of finishing burs designed to meet these requirements. These specialized burs were developed for the trimming and finishing of tooth-colored plastic filling materials. The 10-bladed version is used for excess removal and contouring, and the 20-bladed

version subsequently produces smooth surfaces ready for polishing (Figures 1 to 5). The blades of both versions remove composite material both effectively and selectively, ensuring maximum conservation of the highly valuable enamel layer.



**Figure 6.** An example of a single step silicone polishing system (Jazz Supreme [SS White]) for composites shown in an autoclavable aluminum block.



**Figure 7.** For final polishing, a single-step silicone polisher was used. If only light pressure is applied, the instrument does not remove any additional material. A perfect high-shine polish is achieved by giving the surface a “tender stroke” which removes fine debris produced during polishing.



**Figure 8.** The final result: an excellent match between the restoration and the adjacent tooth in shape, color, and surface quality.



**Figure 9.** The cup-shaped polisher is best-suited for large surfaces, or transitions between filling and tooth in cuspal areas.



**Figure 10.** The knife-edge polisher (Jazz Supreme [SS White]) can be used for fissures, lingual surfaces, or transitional areas in interproximal spaces. The fourth shape is the small flame, which is optimal for finishing and polishing of pits and fissures.

## SIMPLIFIED POLISHING

Surfaces appear shiny when they reflect incident light. Selecting the proper polishing system for use is often confusing since there are a variety of different polishing systems on the market today. One type available example uses abrasive-coated polishing discs (Soflex Discs [3M ESPE]; OptiDisc [Kerr/Hawes]). Many other polishing systems use impregnated rubber in various shapes: disks, points and cups. Some are impregnated with diamonds (eg, CompoMaster [Shofu]; ComposiPro [Brasseler Burs]; Pogo [DENTSPLY]; Jiffy High Shine [Ultradent]), while others may be impregnated with aluminum oxide (eg, Flexipoints and cups [Cosmedent]; One Gloss [Shofu]; Jiffy Polishing [Ultradent]), or a combination of aluminum oxide-silicone-carbide impregnation (eg, Astropol [Ivolar Vivadent]; Hawe HiLusterPLUS [Sybron/Kerr]).

There is also a wide selection for ceramic polishers that may incorporate embedded aluminum oxide, diamond-impregnated polishing brushes, and felt discs. Polishing ceramic with rubber-impregnated disks, cups, or points (eg, Ceramaster [Shofu]; Ceramic Pro Dialite [Brasseler Burs]; CeraGlaze [Axis Dental]; Define Double Diamond [CLINICIAN'S CHOICE]), is necessary especially after making any adjustments to the fired porcelain. Additionally, polishing pastes designed to be used with polishing cups, silicone polishers, or even rotary carbide burs designed to produce the ultimate high-shine polish, are available.<sup>4</sup> Most of these systems create smooth, shiny surfaces.

The question as to which can produce the best results, depends on the test method used—or sometimes the sponsor of the respective study.<sup>1-13</sup> However, it is definitely be advantageous to have a quick, systematic, and uncomplicated product that allows the operator to achieve an excellent polish in as few steps as possible. So, it is ideal that the 20-bladed Safe End Carbide Finishing Burs already leave a very smooth surface virtually ready for polishing. Silicone polishers (such as Jazz Supreme One-Step Universal Polishers [SS White] shown in Figure 6) offer a simplified system which is capable of easily creating a high, glossy shine on all tooth-colored direct restorative materials. These reusable instruments differ from multi-step polishers in that simply applying more or less pressure can vary the amount of material removed. This eliminates the need to change instruments and reduces the time it takes to accomplish these procedures when compared to using multi-step systems.

The kit contains 4 shapes: disc, cup, and 2 points of different lengths that work on all tooth surfaces including facial, occlusal and interproximal (Figure 7 to 10). The room-temperature manufacturing process, in which very fine diamond particles are embedded in a flexible rubber matrix, makes them particularly heat-resistant, colorfast and durable. The manufacturer recommends using these single-step composite polishers in a blue-ring contra-angle at approximately 8,000 to 15,000 rpm. Apart from speed, another point should be observed: A true high-shine polish will be achieved only if the correct pressure is applied. The contact pressure influences the number of diamond particles exposed, which means that almost no enamel will be removed if only light pressure is used. The diamond grains are subject to microscopic fracturing when under load; this creates a fine-grain polishing slurry that produces the gloss reflective property necessary for final composite restorative aesthetics.

## DISCUSSION AND CONCLUSION

There is a significant savings of time that is realized when using a simplified system for finishing and polishing composite resin restorations as described in this article. It is advantageous to have one polisher that will contour, prepolish and create an ultra high glossy shine. Most traditional polishing systems require the use of 2, 3, or even more polishers used in a “step-down” method that progress from coarse to medium and then to fine grit, in order to accomplish these tasks. Simplifying these systems can also help clinicians in reducing their office overhead while still being able to create aesthetic excellence on all types and sizes of composite resins.

In the past, selecting the proper finishing and polishing system for composite restorations was often a guessing game. Dentists had to choose from countless products and recommendations that were composite specific in nature. There is no longer a need for separate polishing systems and materials for each class of composite placed.

This article has presented a simple and effective approach to simplifying this selection process. After the pretreatment of the filling surface with special carbide finishing burs, only one additional step is required for polishing. The use of a diamond-impregnated composite polisher at the correct pressure quickly creates the natural high-shine polish desired, without any polishing pastes and endless instrument changing.

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