The art of polishing a composite restoration lies in the ability to take a macroscopically rough surface, and remove the visible scratches and indentations on that surface down to a level at which they are no longer visible without magnification. The polishing process therefore involves using abrasive materials of successively finer particle sizes, to sequentially scratch the surface of the composite. The abrasives typically used in dentistry include larger (20-50µm) diamond particles on burs; aluminium oxide coated discs; polymer cups, points, wheels and brushes impregnated with aluminium oxide, diamond or silicon carbide particles; and glycerine based pastes containing very small diamond or other abrasive particles.

These various systems are employed in a similar manner. Initially, a larger particle abrasive is used first and this coarse “polisher” will remove the major dips and bumps in the surface of the composite restoration, leaving an overall levelled and even surface that is scratched macroscopically and thus looks dull when viewed. A smaller particle-sized finer, abrasive is then used to remove these larger macro scratches to leave behind only smaller micro scratches which may give the appearance of the beginnings of a sheen to the smoothed composite surface. Still smaller particle sizes are then used for successive polishing stages. The size of the resultant scratches that these leave in the composite surface becomes so small that the scratches are now smaller than the shortest wavelengths of visible light. As the scratches are now so small, they do not refract the incident beams of light that strike the surface of the now polished composite. The incident light thus bounces away cleanly from the composite surface without refracting and this provides the appearance to our eyes of a highly polished, lustrous surface.

A highly polished composite surface is desirable for several reasons. Most often, aesthetics is quoted as a major reason for requiring a nicely polished restoration even though a counter argument is often put forward that composite restorations are always wet in the mouth and thus look reflective. However, other benefits of highly polished composite restorations include: a reduction in plaque accumulation, reduction in staining of the composites, and evidence that the wear of some composites may be linked to rougher surfaces.

It stands to reason that in order to shape, finish and polish a composite restoration, several instruments and steps are required after placement. Most clinicians will employ a rotary reduction instrument to reshape the composite and this may be a diamond or carbide bur, or an abrasive disc in a handpiece.

“multi-stage polishing systems have found great acceptance with clinicians striving to obtain highly polished composite restorations when compared with ‘one-step’ polishing systems...”

Figure 1. For this practical demonstration, the micro-hybrid composite Esthet.X (Dentsply) was applied straight from its syringe to a typodont tooth prepared for a veneer.
Once shaped, the polishing stages commence to bring a lustre to the finished surface. It is not possible to transition from a coarse abrasive to a super fine abrasive without stepping through some incremental stages in between. Accordingly, multi-stage polishing systems have found great acceptance with clinicians striving to obtain highly polished composite restorations when compared with “one-step” polishing systems.4

Many techniques have been presented to effectively polish composite restorations, yet the literature remains divided on which polishing system or technique performs the best. Clinicians are aware that finer particle-sized composites such as microfill and nanofill composites are more susceptible to polishing and the consensus of the literature supports this.3,5 Some reports claim that the polishing system chosen is the determining step for obtaining an adequate final polish.6 Other research has focussed on the method used for polishing to identify that a specific load, speed and time of application of the polishing system is important for obtaining an excellent final polish.7 However, refuting this, another study has demonstrated that there is no optimal combination of load, speed and time of application of polishers that is necessary for obtaining a final polish and instead, a range of values that would be used in normal clinical practice produced acceptable results.8

Having had the opportunity to work with many different composite materials and polishing systems, it is the author’s opinion that a degree of trial and experimentation is required to obtain the optimal finish and polish for a composite restoration. The clinician must be aware of the filler type of the composite that they are working with and then they must “experiment” with different polishing systems and techniques to determine a methodology that will work for their chosen composite. The author’s preferred technique for polishing micro-hybrid composites is presented in Figures 1-5.

Figures 2a and 2b. After application of the composite to the typodont tooth, a 12-fluted Carbide Bur (Jet, SDS Kerr) was used to refine the surface and establish shape and morphology to the composite surface.

Figures 3a and 3b. After refining the shape of the composite and placing surface anatomy features (“finishing” stages), the initial polishing stages are commenced. The Enhance® point (Dentsply) is an aluminium oxide impregnated, urethane dimethacrylate rubber point. It creates a very smooth surface by actively cutting the composite. It is an excellent instrument for removing composite flash and smoothing down finish lines on enamel, but it will also quickly remove surface anatomy from the restoration if not used judiciously. The Enhance point should be used with light pressure.
Figures 4a and 4b. After smoothing out the surface with the Enhance point, another rubber point is used to impart gloss. The PoGo® (Dentsply) point is also a urethane dimethacrylate-based point, this time containing fine diamond powder. This point can be used with medium speed and more pressure and will bring a satisfactory shine to the surface of the restoration.

Figures 5a and 5b. If a higher gloss is desired, the silicon carbide impregnated Occlusbrush #5210 (Hawe, Kerr) can be used at medium speed with light pressure to effect a high gloss lustre to the restoration. The final restoration now has a smooth glassy surface and this has been achieved without removing the surface anatomy that had been shaped into the composite, as excessive pressure with coarse abrasive systems was avoided by using multiple polishers of sequentially smaller particle sizes.

References

About the author
The author will be co-presenting a 2-day program in the Prosthodontist Masters Series continuing education program on February 22 and 23, 2008, at Surfers Paradise, QLD. The other presenters will be Drs Tony Rotondo and Didier Dietschi. Dr Dietschi is a well-published and world renowned composite clinician based in Geneva, Switzerland. He is making his only Australian appearance at this course, and will be conducting a limited attendance “hands-on” composite workshop on 25 February 2008 immediately after the 2-day program. For more info about the course, please email: michael@teethfirst.com.au

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