

**DR NADEEM YOUNIS**

BDS MSc DGD(UK) DPDS
Principal dentist at Bridge Dental Practice in Burnley. He is currently president of the British Academy of Aesthetic Dentistry (BAAD) (www.baad.org.uk) and runs hands-on composite courses with the Northwest Dental Academy (www.northwestdentalacademy.com).

**CONTACT**

☎ 01282 423973

✉ younis_nadeem@hotmail.com

🌐 www.bridgedentalpractice.co.uk

The use of direct composite resin restorations has increased dramatically over the last few years (Eltahlah et al, 2018).

Changes in patients' expectations and growing aesthetic demands can now be met by recent advancements in composite resins, with their improved physical and visual properties.

A natural-looking restoration that mimics the tooth structure can be achieved by using the most appropriate composite material and layering techniques, and reproduction of the tooth anatomy, with skilful finishing and polishing of the composite restorations.

Finishing involves contouring the restorations to obtain the desired anatomy and complete any necessary occlusal adjustments.

Meanwhile, polishing is the reduction of surface irregularities created by the finishing instruments (Daud et al, 2018).

A smooth surface and high gloss composite resin restoration is desirable, not only for aesthetic reasons, but also for oral health and the restored dentition's long-term integrity.

A rough surface affects the restoration's aesthetics (Barakah and Taher, 2014). It makes the composite susceptible to staining and reduces the reflectance of the material which, in turn, affects the perceived colour of the composite resin.

In addition, rough composite resin surfaces will result in retention of microorganisms, leading to faster colonisation and maturation of dental plaque (Konishi et al, 2003; Montanaro et al, 2004).

Roughness of greater than two microns results in steep increases in biofilm formation. Less than 0.2 microns is recommended to provide ideal surfaces for intraoral restorations.

INDISTINGUISHABLE FROM NATURAL TOOTH ENAMEL

From an aesthetic point of view, a high gloss finish will help make the restoration indistinguishable from enamel because the colour of the reflected light is more predominant than the colour of the composite resin material. On the other hand, a composite restoration with a reduced glossy finish will be more obvious to the human eye, even if the shade match to the surrounding natural tooth is accurate (O'Brien et al, 1984).

There are many factors that can affect the final polish obtained with composite resin restorations. Filler particle size, resin matrix composition, the polishing system used, wet or dry polishing conditions, as well as the applied force and the time taken, can influence the final gloss achieved.

FINISHING AND POLISHING PROTOCOL FOR HIGH GLOSS RESULTS

The following describes the author's finishing and polishing protocol, which he has been applying for more than 15 years.

The step-by-step process combines a number of techniques and best practice adopted by several composite resin artistry experts.

In Figure 1, the upper right central incisor has been built up with a direct composite resin restoration. The transitional line angles are marked on the restoration and the adjacent tooth for reference.

A Kulzer red ring tapered diamond bur is used to adjust the labial and interproximal surfaces and round off the transitional line angles (Figures 2a and 2b). The three levels of the labial curvature can be adjusted with the same bur, or by using a medium coarse Sof-Lex disc or any medium grit disc (Figures 3a and 3b).

A number 12 scalpel blade can be used to remove any excess composite or unbonded resin from the

Nadeem Younis presents a proven step-by-step protocol for finishing and polishing direct composite resin restorations, with beneficial results for aesthetics, oral health and long-term integrity

Smooth, high gloss result for composite resin restorations



proximal area (Figure 4). The fine tip of the scalpel is the ideal instrument in cases where the margin of the proximal box extends into an area where the natural anatomy becomes concave.

Metal strips or diamond-impregnated polishing strips, such as Epitex, can be employed where the surface to be finished is convex or flat (Figures 5a and 5b).

Once the primary anatomy has been established, developmental grooves may be marked with a pencil (Figure 6). The grooves are reproduced by applying light, intermittent pressure with a diamond bur held at an angle (Figures 7 and 8).

Figure 9 shows the composite resin restoration on the central incisor where the primary and secondary anatomy have been defined. The

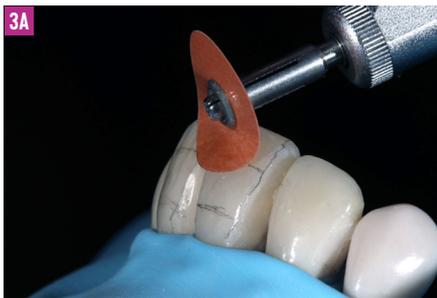
composite restoration appears dull with ‘scratch’ marks evident from the use of the diamond bur or the medium coarse Sof-Lex disc. This marks the end of the finishing stage. To help differentiate the composite restoration from the tooth structure, diamond burs can be used intermittently at low speeds without water. Care should be taken to avoid heating the composite surface above 200°F, which



FIGURE 1: Transitional line angles are marked on the restoration and adjacent tooth for reference



FIGURES 2A and 2B: The primary anatomy is adjusted with a Kulzer red ring tapered diamond bur (250 - 012F)



FIGURES 3A and 3B: Labial adjustment can be carried out by using a bur or medium coarse Sof-Lex disc

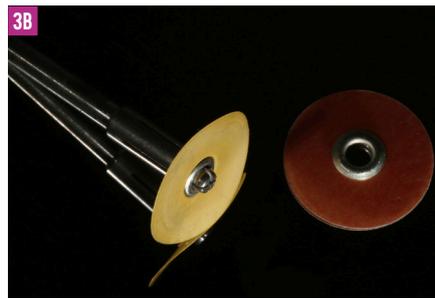


FIGURE 4: A number 12 scalpel blade can be used to remove excess composite or unbonded resin from the proximal area



FIGURES 5A and 5B: Epitex polishing strips or metal interdental strips can be employed in areas where the surface is convex or flat



FIGURE 6: Once the primary anatomy has been established, developmental grooves may be marked with a pencil



FIGURES 7 and 8: The grooves are reproduced by applying light, intermittent pressure with a diamond bur held at an angle



FIGURE 9: The primary and secondary anatomy are defined





FIGURES 10A and 10B: Shofu Brownie polishers can be used to remove the scratch marks



FIGURE 11A: Venus Supra pre-polisher



FIGURE 11B: Venus Supra polishing burs



FIGURE 12: Venus Supra high gloss polishing system helps create a highly aesthetic result



FIGURES 13 and 14: A superfine Sof-Lex disc is employed in the final stage of the finishing and polishing protocol



FIGURES 15 and 16: Case one – the patient presented with unsightly, discoloured anterior composite restorations



FIGURE 18: Case one – postoperative dentition restored with Kulzer Venus Pearl, followed by finishing and polishing



FIGURES 19 and 20: Case one – at the one-week review appointment, good integration with the existing dentition was recorded and a high gloss appearance of the composite restorations had been achieved with finishing and polishing

may cause degradation of the resin surface and jeopardise the marginal integrity of the restoration.

For gross composite removal, a diamond bur with a water spray in the air rotor handpiece is recommended (Morgan, 2004).

In order to remove the scratch marks, the author uses a Shofu Brownie polisher (Figures 10a and 10b) followed by the Kulzer Venus Supra alumina-impregnated silicone points for a high gloss appearance and aesthetic result (Figures 11-12).

The smooth surface produced by aluminium oxide-containing discs and silicone points is thought to be related to their ability to cut the filler particles and resin matrix equally (Özgünlaltay, Yazici and Görücü, 2003). Brownie polishers and the Venus Supra silicone points are highly effective at removing or polishing composites. However, removing natural tooth structure is more challenging. It is advisable to use the polishing systems with a water spray to keep the heat generation to a minimum.



FIGURE 17: Case one – the underlying tooth structure after existing composite removal





FIGURE 21: Case two – the patient presented with stained restorations and enamel defects in the upper and lower anterior teeth



FIGURE 24: Case two – immediate polish before rubber dam removal

Brownie silicone polishers are impregnated with high-quality abrasive agents and are recommended to be used at 5,000 to 7,000rpm. The Venus Supra polishing points are latex free and made from synthetic rubber impregnated with microfine diamond powder and colour pigments. Available in five different shapes for all restoration surfaces, the pre-polisher set (pink) is used first, followed by the high gloss set (grey). It is recommended to use each set with a water spray, ideally at 7,500rpm but no more than 10,000rpm.

To achieve a high-quality gloss, a superfine Sof-Lex disc, or any superfine disc, is employed in the final stage of the protocol. Rapid motions need to be applied over the labial and approximal surfaces to minimise heat generation (Figures 13 and 14).

CASE STUDIES

The following cases illustrate how the author's finishing and polishing protocol has been adopted following direct composite resin restorations.

Case one

A patient in her 50s presented with discoloured anterior composite resin restorations (Figures 15 and 16). Figure 17 reveals the underlying tooth structure after composite removal. Figure 18 shows the dentition after restoration with Kulzer Venus Pearl composite opaque dentine shade Opaque Light Chromatic (OLC) and Universal Shade B1,

PRODUCTS USED

Brownie Shofu
Epitex GC
Venus Pearl Kulzer
Venus Supra Kulzer



FIGURE 22: Case two – the underlying tooth structure after composite removal and tooth preparation



FIGURE 25: Case two – polish and review at one-week postoperative appointment

followed by finishing and polishing.

At the one-week review appointment, good integration with the existing dentition was recorded. The high gloss appearance of the composite restoration had been achieved after finishing and polishing with a combination of Kulzer fine diamond burs, Brownie and Venus Supra polishers and Sof-Lex discs (Figures 19 and 20).

Case two

A young patient presented with old, stained composite resin restorations and enamel defects in the upper and lower anterior teeth (Figure 21). Figure 22 shows the underlying tooth structure after composite removal and tooth preparation. Figures 23 and 24 reveal the teeth after build-up with Venus Pearl Opaque Medium Chromatic (OMC) and A1 shades, and the initial polish before rubber dam removal. At the one-week review appointment, a highly glossy appearance has been accomplished by adopting the finishing and polishing protocol

ENHANCED CPD

GDC anticipated outcome: C
CPD hours: one

Topic: Aesthetic dentistry

- **Educational aims and objectives:** To present a step-by-step protocol for finishing and polishing direct composite resin restorations.
- **Clear anticipated outcomes:** Correctly answering the questions on page 102 will demonstrate the reader understands the benefits of following a protocol for finishing and polishing direct composite resin restorations.



FIGURE 23: Case two – composite resin build-up

described above, restoring the patient's smile and confidence (Figure 25).

CONCLUSION

Spending more time on the finishing and polishing of composite resin restorations can help to achieve outstanding aesthetics and contribute to oral health and long-term tooth integrity.

The finishing and polishing protocol is a multistep process that, when followed methodologically using appropriate instruments and polishing systems, can create restorations with a high gloss and lasting lustre, with a range of composite resin materials. 

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