

Smile design and advanced provisional fabrication

Mike Malone, DDS

Cosmetic reconstruction is much more predictable when superb provisionals are used as a blueprint for the final restoration. This article provides details for a technique that can be used to fabricate indirect multilayered composite provisional restorations

for porcelain veneers and complex full-arch cases.

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A complex smile reconstruction can be very rewarding for the dentist and the patient or it can end up with disappointing or even disastrous results. The success or failure of a complex restorative case (especially one that involves any redesign of the anterior teeth) depends on two important steps: proper planning and well-designed provisional restorations.

Proper planning

The patient interview is one of the most important steps of complex smile design.¹⁻³ Patients must be questioned regarding their goals and esthetic desires. Some know exactly what they are looking for but most will require some time with the dentist and the office staff to determine their goals. A comprehensive examination (including mounted study models, complete periodontal charting, radiographs, and photographs) also is essential. Computer imaging or a direct resin mock-up are good ways to ensure that the dentist and the patient agree on the smile design.

Well-designed provisional restorations

Well-designed and attractive provisional restorations will lead to a completed case that is satisfactory



Fig. 1. A patient who was unhappy with her small, gapped teeth.



Fig. 2. The patient in Figure 1, after bleaching and six provisional veneers.



Fig. 3. The patient in Figure 1, after receiving six veneers that replicated the smile designed using the provisionals.

patient. The biggest change in the patient's smile occurs on the day that the provisional restoration is created, not when the final porcelain restorations are placed (Fig. 1–6). Well-made provisional restorations make cosmetic reconstruction far more predictable. Provisional restorations made indirectly on a model not only provide a more accurate fit but also allow the patient to relax while the dentist or assistant makes the temporary in the dental laboratory. The extra 10–20 minutes required for the impression and model work is worth the predictably excellent results. Ten steps for ideal indirectly fabricated provisional restorations are listed below.

Visualize the end result

After an initial consultation and comprehensive examination, plan the smile design with the patient using a direct mock-up or computer imaging (Fig. 7 and 8). This is the first step in giving patients what they want.

Create an accurate wax-up

For an ideal wax-up, the desired image of the final smile should be sent to the technician. Any changes to the tissue height should be done before the impressions for the wax-up are taken (Fig. 9). A very detailed wax-up provides the necessary information to create a predictable ideal provisional restoration (Fig. 10). This is a very important step and only dentists who are very accomplished with wax should attempt it.

Construct precise templates

Since the provisional restoration will be fabricated with a visible light-cured (VLC) resin, the template must be transparent. Most transparent temporary templates (such as shims and crown forms)



Fig. 4. A patient with collapsed vertical and old-looking teeth.



Fig. 5. The patient in Figure 4, after receiving both full maxillary arch and mandibular molar provisionals.



Fig. 6. The patient in Figure 4 at the completion of treatment, following the smile design achieved using the provisionals.

are made on a vacuum-former using thermoforming plastic. Unfortunately, the vacuum is lost before the plastic can form completely over the model, resulting in a poor reproduction of the model detail. An ideal template is constructed using a 1.0 mm thick piece of precise thermoforming plastic. These thermoforming machines use positive air pressure to push

the plastic around the model, resulting in an exact reproduction of the model that is an accurate copy of the wax-up. The finished thermoformed template is accurate but too flexible to be used alone. The trimmed template should be placed back on the model so that the positive-pressure thermoformer can fabricate another, more rigid template over the first one.



Fig. 7. A patient who sought treatment for a "gummy smile."



Fig. 8. Computer imaging is utilized during treatment planning.



Fig. 9. The patient in Figure 7, after crown lengthening was performed to raise the tissue level.



Fig. 10. A completed wax-up for the patient in Figure 7.



Fig. 11. Biocryl and Copyplast templates are made with models of the wax-up.



Fig. 12. The Copyplast and Biocryl templates are fitted on the model of the completed preparations.

The second template is made from 3.0 mm of very rigid thermoforming plastic. After trimming the plastic with a heated trimmer (Soft Lining Trimmer, Almore International, Portland, OR; 800.547.1511), smooth the edges with an acrylic bur. The rigid template should fit over the more accurate first template so that it can be used to form a precise copy of

the original wax-up (Fig. 11).

Use a preparation guide for accurate reduction

Either a thermoformed plastic guide or silicone putty guide made from the model of the wax-up can be used to help determine the proper reduction of the tooth preparations. This is especially valuable when the teeth are rotated or out of alignment.

Excellent impression for the provisional model

For best results with complex provisional restorations, use a very accurate model of the prepared teeth to fabricate it indirectly. Any final impression material will work; however, in the author's experience, the bonding hydrocolloid/alginate system is the best.

After completing the preparations, a radiosurgery unit (Dento Surg 90 FFP, Ellman International, Inc., Oceanside, NY; 800.835.5535) forms a trough around each tooth to make all margins accessible; at that point, the field is washed with water and sprayed with silicone spray (Prepwet, Dux Dental, Oxnard, CA; 800.833.8267). Cadco Syringeable Hydrocolloid (Dux Dental) is flowed over the prepared teeth; this step is followed by mixing Cadco Extra Fast Set Alginate (Dux Dental) with cold water (to delay setting time and increase the bond) in an alginate stock tray. Allow the material to set for approximately two minutes and remove with a snap; at that point, the impression can be poured with a fast-setting stone (Snapstone, Whip-Mix Corp., Louisville, KY; 800.626.5651).

Relate template to model ideally

Clean the model carefully to eliminate bubbles or imperfections that might keep the template from seating completely. After the template is fully seated, draw a red line along the border. This line will indicate when the template has returned to the fully seated position after it has been filled with provisional material (Fig. 12).

Use a reliable and esthetic provisional material

To achieve the most ideal result, the resin should be placed in layers using



Fig. 13. The resin enamel layer is placed and shaped in the template.

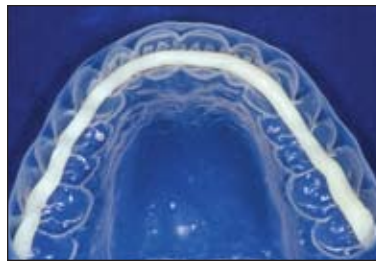


Fig. 14. A "rope" of Triad Light is placed over the enamel layer in the template.



Fig. 15. Triad Light is blended into the enamel layer.



Fig. 16. Rubber Sep is painted on the prepared teeth of the model.



Fig. 17. The model is secured with a rubber band and photocured.



Fig. 18. The provisional after removal from the curing unit.

different colors and translucencies. In the author's experience, Triad VLC (Dentsply Trubyte, York, PA; 800.877.0020), a photocured hybrid, is the most dependable resin for strength and beauty; it is available in seven shades. Radica (Dentsply Ceramco, Burlington, NJ; 800.487.0100) is even more durable and wear-resistant than Triad, making it ideal for more advanced cases, especially long-span bridges and complex implant cases.

Layer the provisional material for ideal esthetics

To create a typical multi-unit anterior restoration in the B1 range, a very small roll of the enamel shade is placed in the incisal portion of the anterior teeth of the template (but only on the facial aspect). Mamelon effects are sculpted into the material (Fig. 13). Using the light shade, a second layer is placed (Fig.

14 and 15); more material should be placed in the incisors and less in the canines. This layer is followed by a layer of medium shade resin.

At this point, none of the material is cured. The resin must be warmed to ensure that it will flow easily. Place the first template with the layers of resin into the second template and insert them into a small zip-lock bag. Place the bag into a hot water bath (approximately 165–170°F) for five to six minutes.

While the resin is warming, paint the preparations on the model with Rubber Sep (George Taub Products and Fusion Co., Jersey City, NJ; 800.828.2634) (Fig. 16), a release agent that also serves as a die spacer to facilitate removal of the processed provisional. After air-drying the Rubber Sep, paint the entire model with a model-releasing agent. Remove the template from the zip-lock bag, seat it completely on the

model, and secure it with a rubber band (Fig. 17).

Cure the template for the appropriate time (as recommended by the manufacturer) and remove it carefully from the model (Fig. 18). At this point, another layer of glycerin (to cure the oxygen-inhibited layer) should be applied to all margin areas and the template should be cured for another five minutes (Fig. 19).

Perform ideal shaping and polishing

Medium and fine acrylic burs should be used to trim the excess resin. The author uses a Brasseler Supra green stone wheel 722.11.120 (Brasseler USA) to trim the interproximal embrasures (Fig. 20). For an ideal shape, use the Vision Flex diamond disc (Brasseler USA) to finalize the interproximal contacts (Fig. 21). This particular disc is flexible enough to allow for precise



Fig. 19. Glycerin is applied to the provisional.



Fig. 20. A tapered green stone is used to shape interproximal areas.



Fig. 21. A diamond disc for final shaping of the interproximal contacts.



Fig. 22. The patient in Figure 7, one week after placement of a 28-unit provisional restoration.



Fig. 23. Two anterior views of the patient in Figure 7, one week after the completion of treatment using layered authentic veneers.

shaping of the interproximal areas with ideal visibility.

An excellent polish can be achieved with medium pumice and a wet rag wheel, followed by an acrylic polishing agent such as Shure Shine (Patterson Dental, St. Paul, MN; 800.328.5536) on a dry rag wheel. A finishing coating agent such as Palaseal (Heraeus Kulzer, Armonk, NY; 800.431.1785) also can be utilized.

Achieve a stable occlusion

Before polishing and cementing, the final esthetic adjustments should be made and the occlusion should be finalized. Remember, these provisionals should imitate the final restorations as closely as possible; to that end, the occlusion must be comfortable and stable.

The patient should return approximately one week later for a follow-up visit to confirm the final

esthetics of the provisional or to make necessary changes (Fig. 22). When both doctor and patient are satisfied with the results, impressions and photographs should be taken so that the technician can duplicate the provisional esthetics.

Summary

Predictable excellence in anterior tooth restoration should result when dentists pay attention to detail, starting with a preclinical consultation and comprehensive examination, followed by a properly sequenced series of restorative steps. Learning to design, construct, and use excellent provisional restorations is the key to completing the ideal smile makeover (Fig. 23).

Disclaimer

The author recently received materials and equipment from Dentsply to evaluate a new product for pro-

visionalization. He has no financial interest in any of the products mentioned in this article and has received no other compensation from any of the manufacturers listed here.

Author information

Dr. Malone is an accredited member and Past President of the American Academy of Cosmetic Dentistry. He currently is in private practice in Lafayette, Louisiana.

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