



# The centripital layered build-up of a posterior direct composite resin

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**T**he emergence of nanofilled composite resins has enabled dentists to provide strong, life-like aesthetic restorations. They promise better polish and handling, longevity of lustre and higher strength.

All composite resins when polymerized shrink from 1.6-5% which can cause marginal openings, internal debonding, cuspal flexure and microfracture. This polymerization shrinkage can further lead to microleakage and marginal staining, caries, post-operative sensitivity and pulpal problems.

The nanofilled composites (e.g. Premise) contain much smaller filler particles 0.02 microns compared to 0.4-1 microns with the hybrids. With the smaller particle size, there is subsequent higher filler loading, which enables considerably less shrinkage of 1.6% and also allows better polish and gloss retention.

In considering the restoration, layering of composite resin is carried out to:

- Minimize polymerisation stresses;
- Increase polymerization depth;
- Achieve good anatomic contour; and
- Obtain the best aesthetic result.

Implementation of different incremental layering techniques are used to achieve the best aesthetic result but also to minimize the stresses that are encountered with a direct composite restoration.

There are many different layering techniques used for posterior teeth from horizontal and vertical buildups to oblique layering and successive cusp build-up techniques. No clear advantage for any technique has been evidenced from the literature, but a thorough understanding of composite shrinkage and how to combat the stresses it induces on a tooth are the responsibility of every clinician that places direct resin restorations.

The following is the restorative sequence for a centripital layered build-up of a maxillary molar:



Figure 1.



Figure 2.



Figure 3.



Figure 4.

### Restorative sequence

**Shade Selection:** (Figure 1) Selection should be made at the start of the appointment and before rubber dam placement to prevent incorrect matching due to dehydration and the subsequent increase in value.

**Rubber dam placement:** (Figure 2) After local anaesthesia was given, a rubber dam was placed to adequately isolate the teeth. This allows protection from contaminants like blood, saliva, and crevicular fluid.

**Preparation:** (Figure 3) Removal of amalgam and/or caries is done with rotary instrumentation and all carious dentine is

removed along with any residual amalgam staining. The preparation only involves affected tooth structure and the adhesive preparation allows maximum preservation of tooth structure.

**Etching:** (Figure 4) The “Total Etch” technique was used with 37% phosphoric acid on enamel and dentine for 15 seconds only. The tooth was then washed thoroughly with water spray and left moist. Optibond Solo Plus (Kerr) was then applied with a disposable applicator for 20 seconds. This is done with a scrubbing motion and leaves the dentine glossy, demonstrating good resin impregnation. The bond is light cured.

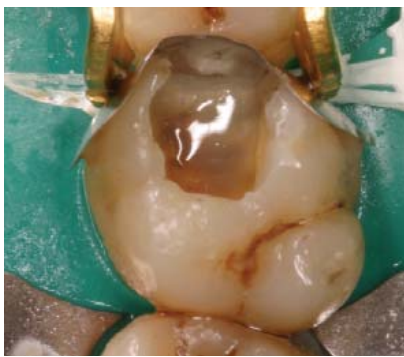


Figure 5.

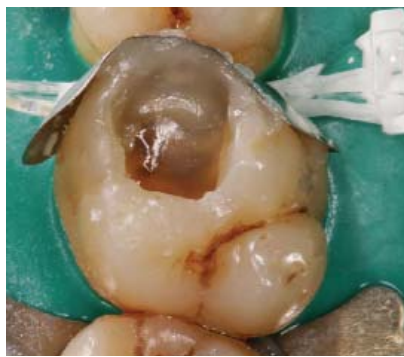


Figure 6.

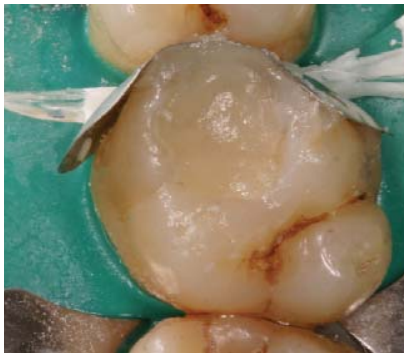


Figure 7.

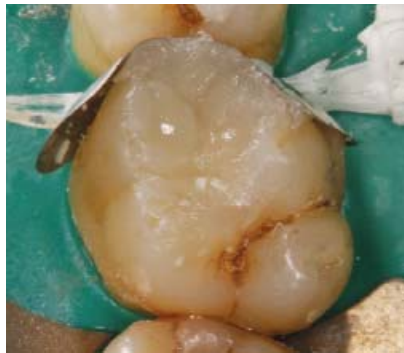


Figure 8.



Figure 9.



Figure 10.

**Internal adaptation:** (Figure 5) A layer of flowable composite resin - Revolution (Kerr) is used as the first increment. Due to its lower viscosity, it is self-adapting and enables an intimate contact with the dentine. This is first placed at the gingival margin and cured and followed by another very thin layer at the pulpal floor. Flowable composite resin has also been shown to have a stress absorbing property with it having a high modulus of elasticity, which allows it to bend and stretch more, and with this elastic elongation absorb stress from polymerisation shrinkage.

**Incremental layering:** (Figure 6) Layering our restoration reduces polymerisation shrinkage and enhances the aesthetics of the restoration allowing a natural layering of the restoration.

**Building the proximal contact:** A bite ring with a sectional matrix is used with a Lucidwedge (Hawe-Neos). The proximal contact is built up with a translucent layer of Premise (Grey Translucent) to simulate the enamel in this area. This cavity form then becomes a simple Class I restoration.

**Building the artificial dentine build-up:** (Figure 7) The artificial dentine layer is now built up with an incremental technique. Each layer is built up in diagonal increments of less than 2mm. Opposing walls are not contacted by the same increment to minimise any wall-to-wall shrinkage and minimise cuspal deflection. The shade used here was an A3 body shade of composite. This layer of artificial dentine is stopped short of where the anatomic layer of enamel begins and is approximately 1mm short of final anatomic contour.

**Building the artificial enamel layer:** (Figure 8) It has been stated by Muia that the colour from a tooth comes from the dentine with the enamel acting like a fiberoptic rod transmitting the light. Therefore the final enamel layer is a translucent layer. Any warming effects like yellow tints or opacities like white spots can be added before this final layer of translucent goes on. These tints are built up internally giving them a realistic depth.

A layer of Premise Grey Translucent was built up and the surface was invaginated with an instrument while still soft. This layer is contoured with its associated fissures and cusps and cured (Figure 9).

**Addition of occlusal staining:** This can be achieved with a number 10 endodontic file or a probe with some brown or ochre tint (Kerr Kolor Plus). This tint is run into the fissures and any excess removed with a disposable microbrush. This final layer is then cured.

**Finishing and Polishing:** (Figure 10) This was performed to reproduce the shape, contour and lustre of the natural dentition. Initial contouring is done with multi-fluted finishing burs and finishing discs for the proximal contours. All areas of the restoration are polished and the restoration checked for occlusal interferences.

**Rebonding:** All margins are then etched with 37% phosphoric acid and a surface sealant (Optiguard) is placed and cured to seal any micro-fractures from finishing procedures.

Polishing is carried out with rubber silicone points and the Optishine (Hawe-Neos), which is able to maintain the surface texture and anatomy.

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