The presence of diastemas in the anterior aesthetic zone can be displeasing to a person’s smile and many patients are motivated to improve their appearance either with orthodontic treatment or restoratively with veneers, crowns, and/or composite resin bonding.

Increased patient demand for optimal aesthetics with less invasive procedures has resulted in the extensive utilisation of free hand composite resin bonding in the anterior region. To achieve a successful directly bonded restoration, the dentist must have a comprehensive understanding of adhesive dentistry, which involves manipulation of composite resin, proper preparation and isolation, and an understanding of the optical properties of the natural tooth and their relationship to anatomical morphology.

Composite resin bonding to close diastemas is a conservative and a relatively inexpensive means of enhancing one’s smile and is often carried out in a single visit procedure in many dental practices.

In selecting a composite resin material for this case there are certain features that are necessary:
1. Sculptability: the material should be easy to shape and sculpt with minimal slumping;
2. Fracture Toughness: resistance to fracture in stress bearing areas;
3. Modulus of Elasticity: similar modulus of elasticity to natural tooth structures;
4. Polishability: easy to attain polish and maintenance of gloss over time;
5. Shrinkage: minimal polymerization shrinkage to reduce microleakage and stresses at the restoration/tooth interface.

Venus, a microhybrid composite resin by Heraeus Kulzer has been chosen as the restorative material for this case. Use of a microhybrid composite resin not only provides the strength needed in these situations but also the aesthetics with good polishability and lustre.

The Bis-GMA based resin contains fillers consisting of barium aluminum boron fluoride silica glass and highly-dispersed silicon dioxide. The barium glass fillers average 0.7 microns characterized by a very narrow particle size distribution.

To achieve natural life-like restorations, the clinician needs to establish a chromatic colour map and layer the restoration with successive layers of dentine, enamel and translucent effects so that the restoration has optical properties that reflect, refract, absorb and transmit light naturally. This allows the restoration to feature polychromaticity, and have a depth of colour that appears like natural tooth structures (Figure 1).

Venus (Figure 2) is built around 23 shades in three opacities. These three opacities are an opacious dentine shade, enamel (body) shade and translucent shades. Shade selection is completed with a matched handmade 2 Layer shade guide (Figure 3), and a feature of Venus composite is it’s “Colour Adaptive Matrix”, which enables the natural tooth and restoration to blend optically with the filling virtually indistinguishable from the surrounding tooth structure.

The following case describes the use of direct composite resin to close diastemas in the anterior teeth to address the aesthetic concerns of the patient (Figures 4-7).

**Restorative Sequence**
1. **Pre-operative assessment and Shade Selection:** Assessment of the patient should be made along with any contraindications to treatment. Special attention must be made if there are any occlusal concerns like bruxing or in “deep bite” situations. Shade selection is made prior to treatment to compensate for the elevated value of teeth if dehydrated. Due to the different opacities/translucencies of the different tooth substrates - with dentine being more opaque and enamel more translucent - we need to choose materials that mimic this characteristic. Opaque dentine shades give the restoration a natural depth of shade (chroma) in the core of the filling. Enamel shades, which have medium transparency and chroma can be layered over this dentine shade to produce natural-looking shades in the anterior region. The incisal shades, which have the greatest transparency and least chroma, should only be used in combination with enamel and dentine shades for the build-up and are often used to imitate incisal edges.

2. **Mock-Up:** It can be difficult to select the correct shade and opacity and it is the
3. Isolation: The teeth were isolated with non-latex rubber dam (Flexidam - Roeko) using a full arch approach. The palate was sealed with a quick setting bite registration material (Figure 8).

4. Preparation: is completed with a pumice slurry and judicious use of a diamond bur to clean the surface for optimal adhesion.

5. Bonding: The teeth were then prepared for bonding using the “Total Etch” technique with 37% phosphoric acid on enamel for 15 seconds only. The adjacent teeth are separated by Teflon tape so that the etch is not inadvertently allowed on the adjacent teeth (Figure 9). A fifth generation bonding agent (Optibond Solo Plus - Kerr) was then applied using a scrubbing motion to allow good resin impregnation and cured.

6. Stratified (layered) build-up of artificial dentine: In closing the diastema, there is often the need to block the “shine-through” of the oral cavity. This is often seen as a silhouette of the cavity form with a grey translucent appearance of the restoration. It may be necessary to use an opacious dentine (A2O) replacement with higher colour saturation, allowing the light to be reflected back to the eyes. Opaque dentine shades exhibit the greatest depth of shade and are ideal for building up areas of lost tooth structure, which require their shade or lightness to be masked. Each increment is applied and contoured with a...
long bladed instrument (TNCVIPC, Hu Friedy) and smoothed out with an artists
sable brush. Each increment is polymer-
ized for 10 seconds allowing placement
of subsequent increments without
deforming the underlying composite
layer. To prevent overbuilding of the arti-
ficial dentine layer, there is a need to
monitor the composite from the incisal
aspect to provide adequate space for the
final artificial enamel layer. If this has
been overbuilt, the clinician can cutback
the composite with a rotary bur and re-
bond to this cut composite.

7. Stratified (layered) build-up of artifi-
cial enamel: To reproduce the optical
effects of enamel, a layer of translucent
composite (T2) is overlaid over the dentine
shade (A2). This translucent layer allows the
colour of the underlying restorative material
to show through, and gives the tooth a real-
istic depth and colour. Anticipating the final
contour and developing the restoration in
increments while considering the occlusion
and anatomy allows the clinician to mini-
mize the finishing procedures. This results in
a restoration with improved physical proper-
ties with less microfractures.

8. Characterisation: Often tints and
modifiers can be used to add internal char-
acteristics to the restoration and these are
often placed before the final enamel layer.
In this case, no such tints were placed at
the artificial dentine stage but placed into
the final enamel layer to have a surface
effect. The adjacent teeth exhibited
eamel crazing so use of a white tint with
a #8 endodontic file (Figure 10) was used
to indent the unset enamel composite and
form crack lines. This small crack was
then refined with artists sable brushes to
reduce their prominence.

9. Space closure: management of the
spacing and symmetry of the teeth are cru-
cial to the proper appearance of the
restoration in these diastema closure
cases. Measurement of the restorations
can be carried out with a digital ruler with
fine calipers (Dentagauge 3 - Erskine
Dental) (Figures 11 and 12) to ensure cor-
rect shape and width of the restoration
especially in relation to the contralateral
teeth. The subsequent diastemas were
closed between 11, 12, 13, 22, and 23 with
the technique as described.

10. Finishing and Polishing: is carried
out to reproduce the shape, contour and
lustre of the natural dentition. Initial con-
touring is done with finishing discs (Figure
13) and multifluted burs (Figure 14). These
multifluted carbide burs are used dry with
light pressure. This dry finishing allows
the clinician to visualize the margins and
any flash present. The interproximal region
was finished with silicon carbide finishing
strips and occlusion is checked carefully to
ensure there are no interferences in centric
or lateral movements. The final polish is
achieved with silicone rubber points that
are composed of aluminium oxide parti-
cles and silicon that remove surface defects and establishes a high lustre. A silicon carbide brush can also be used (Figure 16). The final polish is accomplished with a soft goat-hair brush and fluffy cloth wheel mop with diamond finishing paste (Figure 17).

Conclusion
The closure of diastemas in the anterior zone to improve the patient’s smile has been presented with direct composite resin bonding. A layered approach that mimics the polychromaticity of teeth allows us to build natural restorations. These restorations are practically invisible and blend harmoniously with the natural dentition. Correct hue, value, chroma, translucencies and opalescence provided with modern resin materials like Venus (Heraeus Kulzer) allow us to copy nature’s beauty. The development of form, function and aesthetics with direct resin can be achieved with proper and meticulous technique to provide the patient with a natural looking smile with minimal economic and biologic cost (Figures 18-23).

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