Bonding Clear Aligner Attachments to “Porcelain” Crowns and Veneers – An Update on Products and Procedures

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This is an update to the original article that appeared in the Winter 2013 issue of the Journal of the AACO, titled “How to Bond Clear Aligner Attachments to ‘Porcelain’ Crowns and Veneers.” According to the authors, a new, second generation of Assure® Universal Bonding Resin (named Assure® Plus) has greatly simplified the process of bonding to porcelain, saving time, reducing products needed, and also allowing direct bonding to zirconia. The simplified procedure for bonding to porcelain and zirconia are covered in the article below.

As the demographics of orthodontic patients encompass more adults, new challenges arise in the bonding procedure. With this new segment of patients come new surfaces to bond to: gold, amalgam, stainless steel, etc. Perhaps the toughest surface a practice will encounter is porcelain. Fifteen years ago, bonding to porcelain was generally straightforward. We simply used a coupling agent—silane—to bond chemically to the glass filler. As product technology has advanced, porcelain has taken on new hybrid fillers not only for esthetic value, but also for additional strength. These fillers include alumina (aluminum oxide), zirconia, and other exotic metals.

To complicate issues, there are now 3 materials used to fabricate what are commonly referred to as “porcelain” crowns: porcelain, composite, and zirconia. All three materials look very similar to the naked eye and are currently used in the fabrication of lab-generated crowns. Cerec crowns, fabricated in the dental office, utilize porcelain as well as composite material. Oftentimes the best course of action is to contact the general dentist to confirm the material that was utilized. With proper knowledge of the substrate, correct selection of materials, and consistent technique, clinicians will be able to bond successfully to “porcelain” surfaces. Below, we will review the steps to successfully bond to all 3 materials.

**Porcelain**
1. Thorough prophylaxis—rinse and dry
2. Sandblast crown—rinse and dry (Figure 1)
3. Apply 1 thin coat of Porcelain Conditioner—air-dry for 1 minute
4. Apply 1 coat of Assure Plus—air-dry and light-cure for 10 seconds
5. Place bracket with paste—double curing time if using a light-cure adhesive

**Zirconia**
1. Thorough prophylaxis—rinse and dry
2. Sandblast crown—rinse and dry
3. Apply 1 coat of Assure Plus—air-dry and light-cure for 10 seconds
4. Place bracket with paste—double curing time if using a light-cure adhesive

**Composite**
1. Thorough prophylaxis—rinse and dry
2. Roughen crown with a fine diamond—rinse and dry (Figure 2)
3. Apply 1 coat of Assure Plus—air-dry and light-cure for 10 seconds
4. Place bracket with paste—double curing time if using a light-cure adhesive

The mechanical preparation of each surface (step 2) correlates with the Barcol hardness of the substrate. Sandblasting is imperative to properly condition porcelain and zirconia crowns because the materials are harder and more resistant to wear. Refer to the scanning electron microscope images in Figure 3: the surface in the left image has been roughened with a medium diamond, but that on the right has been sandblasted. It is easy to see that the sandblasted surface is far more mechanically retentive than the diamond bur–roughened surface. The resulting bond strength is over 20 MPa, versus a single-digit value with a diamond bur. Furthermore, the sandblasting medium produces a uniform, consistent surface without gouging the anatomy of the crown. Restoring the crown to its original glossy appearance is a much easier when the tooth surface has been micro-etched and not roughened.

**Finishing**

After removal of the bracket or attachment, you will want to polish and remove the dullness caused by the preparation process. This can be accomplished with a rubber polishing point and a dedicated polishing agent such as Restore polishing paste*. Restore is a fine diamond paste solution for removing scratches on hard surfaces such as porcelain, zirconia, stainless, or gold metal crowns. Following these simple instructions, along with using the proper products, will ensure a reliable bond to these surfaces.

*Assure Plus, Porcelain Conditioner, and Restore are from Reliance Orthodontic Products, Itasca, Ill.

![Figure 1: Sand blast Porcelain or Zirconia crown surface.](image1)

![Figure 2: Roughen composite surface with a fine diamond.](image2)

![Figure 3: Left: Diamond bur roughened Porcelain. Right: Sand-blasted porcelain](image3)