

The AccuBond System for Indirect Orthodontic Bonding

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Precise, individualized bracket placement is critical in orthodontic treatment. In one study, patients who required bracket repositioning averaged 5.5 more months of treatment and 3.7 more visits compared with those who needed no repositioning; patients with loose brackets required a mean 2.8 more months of treatment and 1.5 more visits than those without loose brackets.¹ Reducing the need for bracket repositioning can greatly improve treatment efficiency and productivity.

Direct bonding requires the adhesive to be forced rapidly into the retentive elements of the bracket base. Because brackets have been reduced in size in recent years to increase interbracket distances, this application of the bonding adhesive into the bracket base has become even more difficult and time-consuming.

Indirect-bonding techniques have been developed to improve the accuracy of bracket placement, reduce chairtime, and avoid bond failures, thus shortening treatment time, but these systems have not always demonstrated such results.²⁻⁴ Despite the advantages of indirect bonding, difficulty in isolating posterior teeth and problems with resin flash and inadequate bond strength have slowed its adoption.⁵

This article describes a new indirect, single-

tray bonding system, developed for use with GAC's In-Ovation* R (metal) and C (ceramic) brackets, that overcomes the disadvantages of previous direct and indirect techniques. It provides accurate and stable bracket placement, simplifies tray placement and removal, and reduces chairtime.

The AccuBond System

The AccuBond* system uses two adhesives to construct a custom base for each bracket. The first, ultrafluid material creates an adhesive foundation that interlocks with the retentive elements in the bracket base. Another polymer covers this completely filled foundation to form the custom base (Fig. 1).

The AccuBond tray material (Fig. 2) is not an acrylic, silicone, or polyvinyl siloxane. Its high elasticity enables the tray to conform tightly to the shape of the dental model, and its flexibility allows easy intraoral removal. The thinness of the material facilitates light-curing. Most important, the material does not warp after forming, nor does it distort after being removed from the dental cast.

The blue inner-tray material covers the bracket undercuts, so that the brackets are held in the transfer tray without being embedded in the outer tray material. The blue inner liner does not interfere with light curing.

For bonding to the teeth, a fluoride-releasing adhesive was developed with a film thickness of less than 100 microns. Because the custom bases are precured, the appliances can be light-cured in place, allowing full bond strength to be reached more quickly than when the entire adhesive must be cured in the bracket base. The AccuBond sys-



Fig. 1 In-Ovation R and C brackets with AccuBond 2-layer custom bases.

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tem thus permits the immediate placement of full-size wires.

Laboratory Procedure

A fast-setting polyvinyl siloxane or polyether impression is made in the orthodontic office and shipped to the laboratory (Fig. 3). Alternatively, the orthodontic team can pour the casts, trim them, and ship them to the laboratory. The first cases should be sent with the orthodontist's prescription,



Fig. 2 AccuBond outer shell.



Fig. 3 Polyvinyl siloxane full-arch impression.

extensively described, from which the laboratory develops an orthodontist-specific database. Succeeding prescriptions require only the variations for each patient.

With either shipping method, the laboratory performs final trimming of the stone casts and draws the bracket-placement reference lines (Fig. 4). Using a 10-megapixel digital camera and a macro lens, the lab takes close-up images of each bracket from three angles and posts them on a secure website; each view includes a millimeter gauge to facilitate adjustments (Fig. 5). After receiving an e-mail that the images are available for viewing, the orthodontist must view the brackets and approve the positions or request repositioning.

Once the orthodontist approves all bracket positions, the laboratory begins to construct the AccuBond tray system. The tray is trimmed for ease of insertion and removal, and the centerline and canines are marked to guide placement. Completed trays are mailed to the clinician in a protective container.

Clinical Procedure

1. Clean the mandibular teeth to be bonded, using pumice or air-powder polishing.



Fig. 4 Brackets placed on dental cast in laboratory, with reference lines drawn.

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2. Etch the teeth as usual, then dry each tooth thoroughly.
3. Using a microtufted brush,** apply two coats of the AccuBond primer/sealant to the inner surfaces of each mandibular custom base (Fig. 6). Light-cure the bases. Similarly, apply two coats of the AccuBond primer/sealant to the teeth and light-cure them.
4. Just before insertion, place a small amount of AccuBond indirect adhesive on each custom base (Fig. 7). Quickly insert the tray in the mouth, using the centerline and canine markings for guidance. Seat the tray using only occlusal and incisal pressure; do not push on the brackets (Fig. 8).
5. Holding two fingers on the most distal molar occlusal surfaces, or using an instrument such as a plugger, light-cure all the brackets, beginning occlusally with the molars (Fig. 9), followed by the gingival, mesial, and distal surfaces. Two staff members can light-cure simultaneously on the right and left sides. This teamwork reduces stress on the staff and the patient.
6. Lift the anterior edge of the tray with a scaler, and cut 2-3mm vertical interproximal fringes with a crown-and-bridge scissor to assist in tray removal. If there is a lingual button on the mandibular first molar, lift the tray off the button before proceeding.

**Microbrush, registered trademark of Microbrush International, 1376 Cheyenne Ave., Grafton, WI 53024; www.microbrush.com.

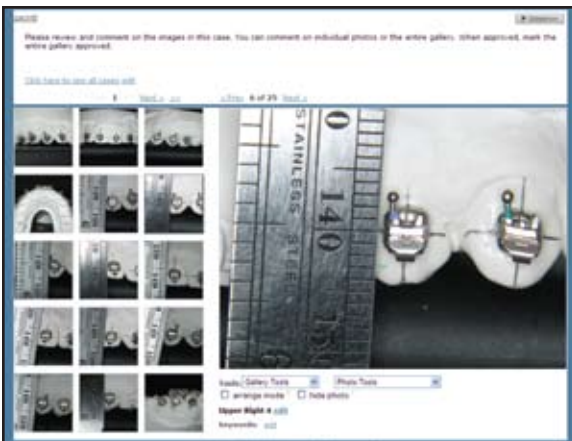


Fig. 5 Screen images of brackets on models, with millimeter gauges.



Fig. 6 AccuBond primer/sealant applied to inner surfaces of custom bases.



Fig. 7 AccuBond indirect adhesive applied to custom bases.



Fig. 8 Insertion of full-arch mandibular AccuBond tray.



Fig. 9 Light-curing of brackets, beginning with occlusal surfaces of molar brackets.



Fig. 10 Tray rolled from lingual to buccal to free it from posterior teeth.



Fig. 11 Free side of tray grasped with Weingart plier.

7. Using a dental scaler, lift the tray at the most posterior tooth on the lingual side and begin to roll the tray toward the buccal (Fig. 10). Grasp the free end of the tray with a Weingart plier (Fig. 11). Repeat these steps in the other posterior segment.

8. Peel the tray from the lingual/occlusal to the labial/buccal, finally clearing the incisors (Fig. 12). Do not lift the tray from the buccal or facial side; it is designed for lingual removal only, because the brackets are labially placed.

9. Remove any remaining blue inner-tray material with a dental scaler, beginning on the occlusal or incisal edge and lifting and rolling toward the gingival to avoid inadvertent bracket removal (Fig. 13).

10. Remove any flash with a scaler and floss. Flash can be minimized by using only small amounts of adhesive on the custom bases.

11. Repeat this procedure for the maxillary arch. Archwires can be placed immediately after removal of the outer tray and inner blue material (Fig. 14).

If necessary in certain situations, the AccuBond tray can be sectioned for placement.

Debonding of both metal and ceramic brackets is routine, with no need to remove excess adhesive from the perimeter of the bracket bases. The debonding fracture occurs within the custom base, not at the enamel surface.

Advantages

A major advantage of the AccuBond transfer tray is that it is seated with only occlusal pressure,



Fig. 12 Final tray removal.



Fig. 13 Removal of blue inner liner with scaler.



Fig. 14 BioForce* wire placed immediately with full bracket slots (different patient).



Fig. 15 AccuBonded brackets with BioForce superelastic archwires.

requiring no additional pressure to force the bracket against the tooth surface (which could actually disturb the bracket position). Another is that the custom base for every bracket in the AccuBond tray, unlike a standard bracket base, compensates for variations in tooth anatomy. Bracket positioning can thus be individualized according to specific esthetic and occlusal requirements.

Only small amounts of adhesive are needed for bonding, minimizing the need for removal of excess adhesive. Precuring the custom bases allows faster bond-strength development to withstand the stress of immediate wire insertion.

In our office, the AccuBond system has substantially reduced immediate failures compared with direct bonding. In 95% of our cases, using .018" bracket slots, we can immediately place .018" \times .018" BioForce* wires. If we cannot use this size wire because of crowding, we substitute an .016" \times .016" BioForce wire. We typically refrigerate the wires, but for extreme deflection, we apply refrigerant directly to the wire in the mouth and then bend it into the slot (Fig. 15).

We commonly bond from second molar to second molar and place a full-size archwire in 20-30 minutes. This includes lingual attachments and any appliances placed to disclude the teeth, protect the TMJ, or control the vertical dimension. Patients and staff both find the procedure faster, more comfortable, and more convenient than other indirect or direct techniques.

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