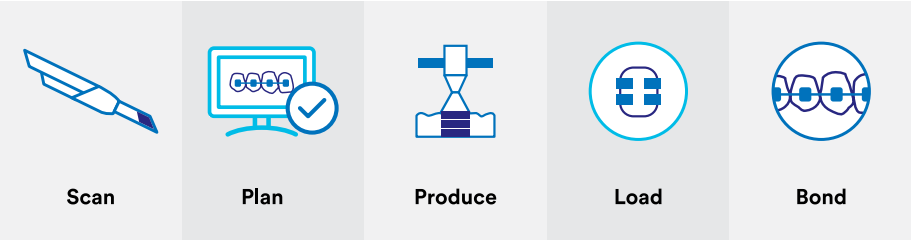
Digital Flash-Free Bonding: An Evolutionary Step in Bracket Placement

David Solid,
3M Oral Care

David Solid, MBA, has worked at 3M in the orthodontics business for more than 20 years in various roles centered around customer service, marketing, brand management and education. In his current role, David is focused on building education that helps to connect orthodontists with the scientific advancements within the specialty that contribute to quality and efficiency.



Accurate bracket placement and *successful bonding* are among the most critical elements of efficient orthodontic treatment. Brackets in the desired position lead to expected movement according to the treatment plan; a low number of bond failures helps to reduce the number of emergency appointments and lost time during the course of correction.

Because of the importance of these factors, the history of orthodontics includes many innovations to help achieve reliable and consistent results, and the most recent advancements in technology continue the evolution.

Indirect Bonding

The technique of indirect bonding has been identified to offer a number of advantages in this area, when perfected. Compared to direct bonding, research has shown that indirect bonding achieves greater bracket positioning accuracy in height, mesio-distal position, and angulation[1,2]. Additional reported advantages include reduced chair time at bonding, better marginal ridges, simplified archwire adjustments and improved productivity[3,4,5].

Indirect bonding is not the most common form of bonding, however, potentially due to the technique sensitivity in transferring the placed brackets to the patient's teeth, and the variability that comes in working with multiple materials. Inconsistency in any of the steps can lead to bond failure. The need, then, is to achieve the benefits of indirect bonding in ways that can reduce the traditional complexity of the system.

The Impact of Digital Technology

Technologies available in other medical disciplines are gaining relevance in orthodontics, particularly in bonding, and especially when integrated to act as a digital system. A Digital Flash-Free Bonding process combines the newest solutions in collecting and analyzing clinical data, creating a plan, and creating an efficient bonding procedure.

Many of the variables that have traditionally made indirect bonding a technique-sensitive process have been replaced or eliminated, allowing for a more manageable protocol. Digital scanning removes the complexity in working with impression

material. Bracket placement software provides analysis and measurement tools to assist in accuracy. And 3M™ APC™ Flash-Free Adhesive coated brackets eliminate the presence of cured flash that needs to be removed after bonding.

The first step in implementing Digital Flash-Free Bonding into a practice is the decision on whether the bracket delivery tray will be created in the practice or from an external source, such as a laboratory. Creating the tray in the practice requires the investment in a 3D printer and associated material, but it can provide the practice full control of all steps in the bonding process. The orthodontist should decide if the practice is better suited to print these trays, or work with a lab that will provide the trays.

Digital Flash-Free Bonding, then, is comprised of five steps: Scan, Plan, Produce, Load and Bond. More specifically, after the arches are digitally scanned, the analysis and bracket placement is done with software. From the plan, translucent trays are created with wells in the shape of the bracket. APC Flash-Free Adhesive coated brackets are loaded into the trays on the day of bonding.

In the case where a practice decides to work with a dental lab to provide trays, the digital scan can be loaded into their software, where a proposed setup can be analyzed, adjusted, and approved. Once confirmed, the bracket placement associated with the setup will be used to create bonding trays, which will then be mailed to the practice. On the day of bonding, APC Flash-Free adhesive coated brackets are loaded into the trays and kept in a light-tight box until the bonding appointment time.

There are two production options when a 3D printer is installed in the practice. After using software to place virtual brackets onto the patient scan, a 3D-printed arch can be created of the brackets positioned onto the teeth. From that model, a traditional indirect bonding tray can be created, which will include wells in the tray designed for the chosen brackets. Alternatively, bonding trays complete with bracket wells can be printed directly, assuming the printer and software's capability can provide the required level of detail.

On the day of bonding, a team member in the practice will load the correct brackets into the trays and hold them in a standard indirect bonding light-tight box. During the appointment, the tooth preparation steps remain the same, but because the brackets are light cured instead of chemical cured, and because there is no step to remove cured flash, the total intraoral time of the appointment is reduced, compared to traditional indirect bonding.

Over the years, the critical fundamentals of bracket placement have remained unchanged: accuracy of placement, efficiency in bonding, and simplicity to control variability. But technological advancements are providing new levels of accessibility to those fundamentals. Digital scanners, planning software, 3D printers and APC Flash-Free Adhesive coated brackets assist in the balance of accuracy and efficiency. Integrating these solutions together into one protocol can deliver a positive start to treatment for patients, assistants and orthodontists alike.

Talk to your 3M Oral Care Sales Representative about in-office courses in practices where this unique protocol is being followed.

References

1. Nojima, Lincoln, et al. Indirect orthodontic bonding - a modified technique for improved efficiency and precision. Dental Press J Orthod. 2015 May-June;20(3):109-17.
2. Koo, BC, et al. Comparison of the accuracy of bracket placement between direct and indirect bonding techniques. Am J Orthod Dentofacial Orthop. 1999;116(3):346-51.
3. Guenther, T and Larson, B. Indirect Bonding: A Technique for Precision and Efficiency. Semin Orthod, 2007;13:58-63.
4. Kalange, J. and Thomas, R. Indirect Bonding: A Comprehensive Review of the Literature. Semin Orthod 2007;13:3-10.
5. Yildirium, K and Saglam-Aydinatay, B. Comparative assessment of treatment efficacy and adverse effects during nonextraction orthodontic treatment of Class I malocclusion patients with direct and indirect bonding: A parallel randomized clinical trial. Am J Orthod Dentofacial Orthop 2018;154:26-34.

▸▸ *Learn more about APC Flash-Free Adhesive*

Innova Vol. XXV No. 2