

Introducing CAD BRACE: Computerised indirect bonding system

By Terence Whitty



“CAD BRACE offers an affordable accurate solution to computerised indirect bonding which ultimately allows the clinician to spend far less time chairside at delivery with a proven end result...”

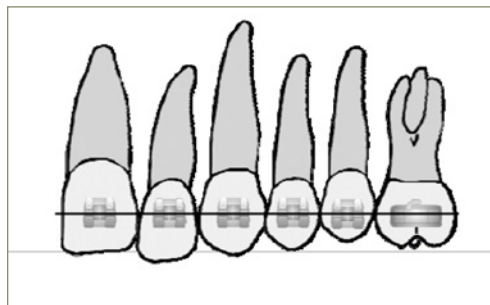


Figure 1. Brackets placed incorrectly can lead to undesirable results - note height of brackets on crowns.

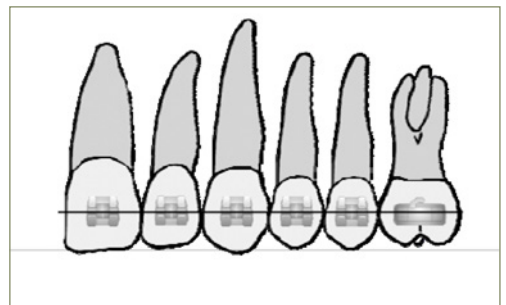


Figure 2. When brackets are placed correctly, desirable results are the result. Bracket positioning is critical!

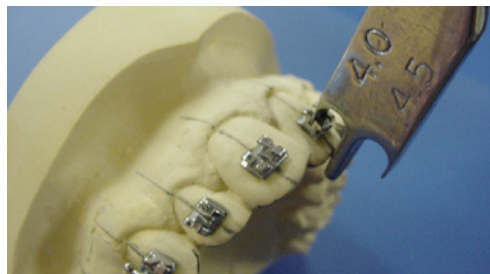


Figure 4. Old School manual positioning of brackets on a model for indirect bonding.

Custom Height	3.0	3.5	4.0	4.5	4.0	4.5
Standard Height	3.0mm	4.0mm	4.5mm	5.0mm	4.5mm	5.0mm
Angulations Requested						

Figure 3. A typical prescription. The numbers indicate a measurement from the incisal edge or cusp tip. CAD BRACE can deal with standard or custom prescriptions.

Straight teeth are now more popular than they have ever been, with millions of dollars spent every year on advertising same. Straight white teeth these days project a healthy, youthful aura, even

on older patients and people are catching on fast. There are many ways these days to get that elusive perfect smile but there is no more efficient and reliable way to get teeth straight than with good old fashioned braces.

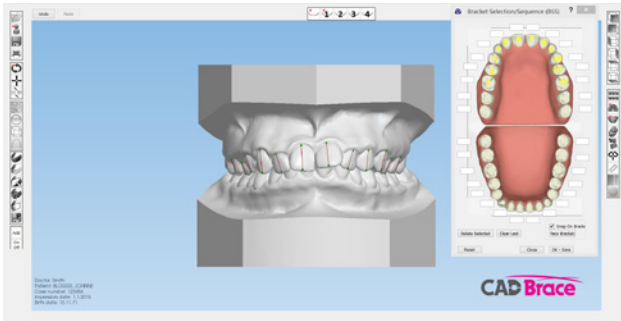


Figure 5. Models are imported into the software and the long axis is marked on each tooth.

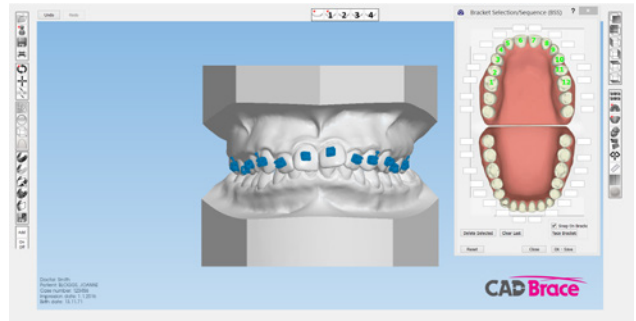


Figure 6. Brackets are automatically positioned based on prescription and tooth size and shape.

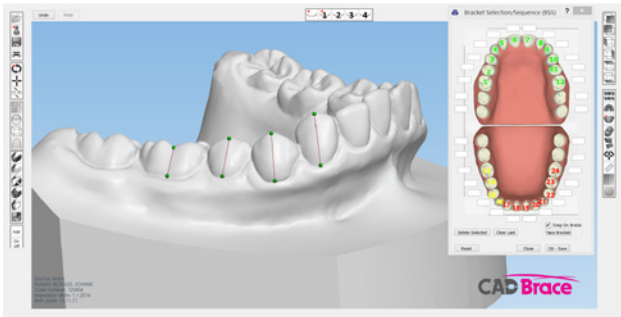


Figure 7. Lower model axis marking.

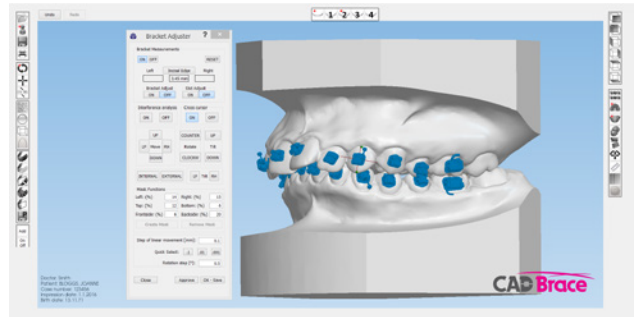


Figure 8. Brackets can be fine-tuned for position with an accuracy of up to 1 micron.

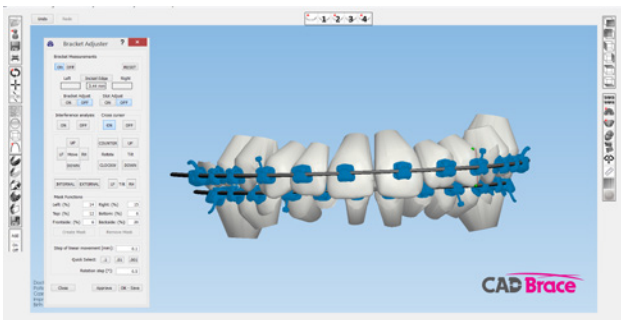


Figure 9. Predictive movement based on bracket position.

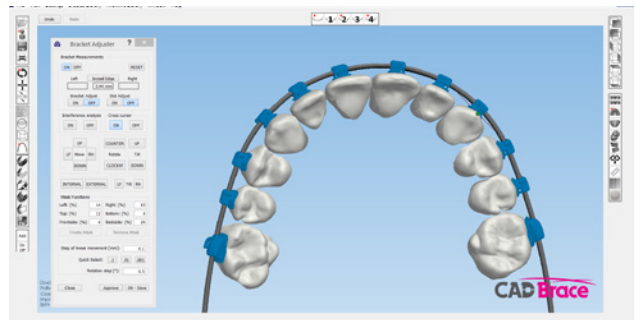


Figure 10. Occlusal view of predictive positioning - upper.

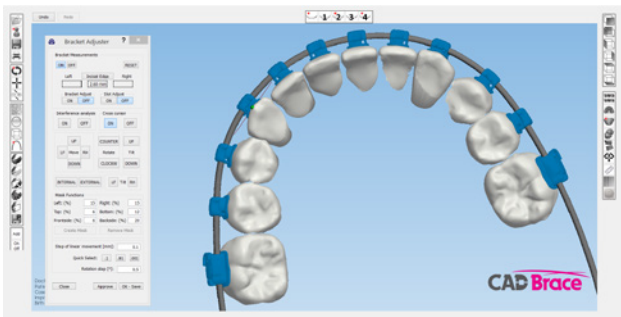


Figure 11. Occlusal view of predictive positioning - lower.

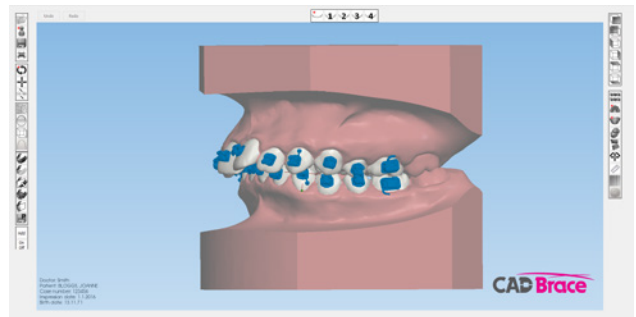


Figure 12. Setup ready for export and tray fabrication using 3D printing technology.

Orthodontic brackets, or what most people know as “braces”, are traditionally positioned onto the teeth with adhesive chairside, one at a time in effect, using a direct bonding technique. This is a time-

consuming process and one that takes great skill by the clinician to position each bracket optimally. However, there is an alternative to this direct bonding technique and that is the indirect bonding

method. Indirect bonding is where the brackets are typically set up on a stone model of the patient’s teeth first, in a more controlled environment than the mouth. A transfer tray is then made.



Figure 13. Dual delivery tray on a model.



Figure 14. Exploded view showing hard and soft indirect bonding trays.

Scientific studies have concluded that the indirect bonding technique is significantly (twofold) more accurate than the direct technique for all teeth in both labial and lingual orthodontics. Despite the accuracy and clinical time salvaged, 90% of clinicians still do not use indirect bonding. Many reasons exist for this choice: materials expense, required laboratory technique, training of personnel, difficulty in achieving consistent and predictable bracket adhesion to the teeth and more.

Many clinicians feel that insufficient pressure on the bracket during curing of the adhesive causes the failure of brackets to bond to teeth with the indirect method. Polyvinylsiloxane and vacuum or pressure formed transfer trays often have excessive flexibility that prevents tight contact between brackets and teeth during the adhesion process. However, when the technique is utilised correctly, studies have shown there is no difference between the bond strengths of orthodontic brackets either directly or indirectly.

In a nutshell, the pre-adjusted edge-wise appliance is probably the most popular bracket system available today and the positioning of these brackets, when attached to an archwire, allows for three-dimensional movement of the teeth. The height and inclination of the bracket on each individual tooth is adjusted so a wire can fit into the bracket slot, thus aligning the teeth (Figures 1 and 2). This is an overly simplified explanation, but conveys the basic idea.

New *CAD BRACE* from Fabdent now offers a digital alternative to indirect bonding that uses digital scanning and CAD design to precisely compute bracket positioning within 1 micron of ideal. This exact bracket placement is computed based upon the final tooth position (FTP), so it now easy to see the expected end result before you start treatment.

The process (Figures 5-12) is as follows:

1. A scan is taken of the patient's dentition either with an intraoral scanner or traditionally based on an impression/model.
2. The brackets are selected from the library - if your bracket system is not in the library it can be added for a one off digitisation fee. This makes *CAD BRACE* capable of using any system.
3. The teeth are identified and the long axis is indicated on each tooth.
4. The computer then calculates the ideal bracket position by determining the final tooth position first and then working backwards. Manual adjustment can be made to fine tune the bracket position.
5. The setup is then sent to the doctor for approval. If any adjustments are desired, the doctor can quickly do this in their copy of the viewing software, supplied free of charge with their first case.
6. Once approved, the transfer trays are fabricated and delivered within 7 working days.

There are many methods of creating transfer trays for indirect bonding but the gold standard is a dual hard/soft vinyl system. The inner tray is a soft vinyl material and the outer tray is a hard

polycarbonate material. This soft inner tray hugs the brackets and the outer tray gives stability to the whole appliance during delivery and bonding. After bonding is completed the hard outer tray is removed and then the inner tray is peeled away from the brackets. Because the materials are transparent, chemical or light curing adhesive can be used. *CAD BRACE* uses high end 3D printing technology to help produce the hard/soft delivery trays.

CAD BRACE offers an affordable accurate solution to computerised indirect bonding which ultimately allows the clinician to spend far less time chairside at delivery with a proven end result.

About the author

Terry Whitty lectures nationally and internationally on a variety of dental technology and material science subjects and runs a busy laboratory in Sydney's Eastern Suburbs, specialising in high tech dental manufacturing. Using the latest advances in intra- and extraoral scanning, CAD/CAM and 3D printing technologies, most specialties are covered including fixed and removable prosthetics, orthodontics and computer implant planning and guidance. He also specialises in the latest injection systems for traditional and CAD designed removable prosthetics and various associated dental appliances. His articles appear in various international journals.

For more information, contact Fabdent on 1300-878-336 or see www.fabdent.com.