Abstract
Bracket placement is one of the most important keys to a successful orthodontic treatment outcome as stated by Roth. The need for accurate bracket positioning began after the introduction of the Pre-adjusted Edgewise Appliances (PEA). Different bracket positioning methods have been advised by various authors and systems. On the one hand there was the midpoint bonding while on the other hand was the prescribed height using the incisal edge as a reference. Therefore, a 2D bracket positioning gauge was designed, using both horizontal and vertical planes and evaluated for its accuracy in bonding of PEA brackets.

Key words: Bracket positioning gauge, 2D gauge, PEA gauge, Metal ramps on probe.

Introduction
With the introduction of the PEA brackets, tooth positioning became individualized with all a 3 planes of space.1 In order to gain full expression of a PEA bracket, precise bracket positioning added to a full size archwire would be necessary.2 Mid point bonding as a guide has various drawbacks:

1. Individual variability of tooth anatomy  
2. Manually positioning of each bracket is time consuming  
3. Lacks chairside efficacy and accuracy

All the above factors usually lead to rebonding or repositioning of the brackets at a later date resulting in increased chair time, which lead to prolonged treatment time. Studies have shown that bracket positioning using the incisal edge as a reference is more appropriate than midpoint bracket positioning.3

This led to the use of gauges using the incisal edges as a reference. 3M Unitek® came out with their own bracket positioning gauge,4 which is useful in improving the vertical positioning of the bracket. This may improve the positioning of the brackets but still archwire bending or bracket repositioning may be necessary for inaccuracies in bonding.1 We also noticed that this gauge failed to provide the brackets with ideal angulations not only due to faulty bracket positioning along the horizontal plane but also be due to irregular incisal margins, attrition, gingival recessions, excessive length of clinical crown or operator-caused errors.

In order to improve the precise positioning of the bracket during bonding it is essential to involve both the vertical and horizontal references. Therefore, a 2D bracket positioning gauge was designed in our department at Al-Adan Dental Center Kuwait, using both planes and evaluated for its accuracy in bonding of PEA brackets.

Materials and Design
The basic design of this gauge is as follows:

A straight metal probe is used. A metal ramp is soldered at the base of the probe. This ramp is designed to lie on the incisal edge of the tooth while bonding. A metal piece that fits into the bracket slot is soldered to the metal probe at the preferred distance from the metal ramp. Finally, the straight probe acts as a horizontal guide by coinciding with the long axis of the root (Figs. 1,2).

This design helps the practitioner to position the bracket with correct vertical and horizontal
relationships simultaneously. This 2D bracket positioning gauge should be used in conjunction with a panoramic view as well as clinical assessment of the long axis of the root. This in turn reduces the need to reposition the brackets or adding additional 2nd order bends in the wire.

**Conclusion**

Bonding errors can be minimized by making multiple wire bends or by rebonding the brackets in order to correct the tooth position and some may even underfill the slot to deal with bracket inaccuracies to help in ideal bracket positioning. Therefore this gauge will be a very useful guidance tool for those orthodontists who enjoy the direct bonding technique.

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**References**