for a metal bracket, for a plastic bracket a fissure bur is used to remove the cement and roughen the bracket base.

The water-soluble adhesive had the advantage of being cleaned off easily by brushing the bracket base gently with a toothbrush under running water. Fried and Newman (1983) used wallpaper adhesive for temporary bonding of brackets onto the model. The wallpaper adhesive set in one hour, so it allowed time for any bracket position change. To speed up the cure, warm air was used to make the adhesive set in 3-5 minutes. Other water-soluble craft glue, like Tacky Glue was used for temporary bonding (White, 1999; White, 2001). Also, a specially designed laboratory adhesive used for indirect bonding was also developed (Moshiri and Hayward, 1979; Kasrovi et al., 1997; Collins, 2000).

Rajagopal and co-workers (2004) described a technique that left no adhesive on the bracket base when the brackets were removed from the stone model. They first used Micropore adhesive tape to cover the mesh base of the brackets. Then the brackets were bonded onto the model by cyanoacrylate glue. Once the transfer tray was made and removed from the cast, the Micropore tape would adhere to the cast because of the strong bond of the glue, while the adhesive-free brackets would embed into the transfer tray.

Customised bracket base by composite resin was another widely described method in indirect bonding. Before bonding brackets onto the working model, a thin coat of water-soluble separating medium should be painted on the model and allowed it to dry. The brackets were then bonded onto the working model using composite resin. Once the transfer tray was formed over the working model, the model was soaked in water to dissolve the separating medium. Then the brackets were loosened off the working model with a customised bonding base. Command-set composite, such as light-cure composite (Hickham, 1993; Read and Pearson, 1998; McCrostie, 2003; Kothari, 2006; Higgins, 2007; Kalange, 2007), was usually used to form the customized bonding base as the bracket position can be changed if desired before composite setting. Setting of the composite could be done by a TRIAD curing unit (Hickham, 1993; Sondhi, 2001; Kalange, 2007) or a chairside light-curing gun (McCrostie, 2003). Adhesive coated brackets were also used in the indirect bonding technique to speed up the laboratory process (Cooper and Sorenson, 1993; Kalange, 1999; Sondhi, 1999; Sondhi, 2001; Guenthner and Larson, 2007; Sondhi, 2007). Besides light-cure resins, the thermal-cure composite was another widely used command-set composite (Sinha et al., 1995; Moskowitz et al., 1996; Guenthner and Larson, 2007; Kalange, 2007; Moskowitz, 2007). It gave enough time for the clinician to check the bracket position before curing. Setting of the composite was done by putting the setup model into an oven and heating it up at 325ºF for 15-20 minutes. Some clinicians experienced problems with heat-cured resin, like brackets floating during heating or plastic brackets which could not tolerate the heat (250ºF-300ºF), making the procedures cumbersome (Sondhi, 2001). Chemically cured composite was also used for bonding base construction (Thomas, 1979; Aguirre, 1984; Reichheld et al., 1990; Kothari, 2006; Kalange, 2007) but its drawback was limited working time for bracket placement.

Bracket position

Bracket position plays a critical role in today's straightwire appliance system. The concept of straightwire appliance was originated by Andrews (1989). He proposed that if the dentition was in ideal occlusion following the "Six Keys To Normal Occlusion (Andrews, 1972)", all midpoints of the clinical crown on the facial axis (FA point) lined up to form a horizontal plane referred to as "Andrews Plane". Therefore, if the straightwire appliance could position to this FA point, which represented the midpoint of the tooth that separates the gingival half of the clinical crown from the occlusal half along the facial axis, the teeth would align in the optimal occlusion. However, in reality using the center of the clinical crown for bracket placement did not optimize the occlusion in most of the patients. Eliades and co-workers (2005) validated that aligning the bracket slot with the center of the clinical crown (FA point) consistently produced unbalanced proximal contacts in excess of 1 mm, as well as an increased absence of occlusal contacts.

Roth (1981b; 1981a; Roth and Rolfs, 1981) discussed that orthodontic treatment should be planned from a functional occlusal perspective. In this philosophy, brackets should be placed at the point of maximum convexity on the premolars, while the tip of the canines should be 1 mm longer than the tip of the adjacent premolars. The incisal edge of the maxillary lateral incisor and central incisor were bracketed equal in height, which was 1 mm shorter than the tip of the upper canine. He assumed that the central incisors would be 0.5 mm to 1 mm longer than the lateral incisors after settling.

Recently, the MBT philosophy recommended placement of brackets based on measuring the length of the central incisor. After the length of the central incisor had been established, the rest of the bracket placement should follow the bracket-positioning chart (McLaughlin et al., 2001). They also recommended the use of a specialised bracket-positioning gauge to aid bracket placement. Although this approach resulted in good overall positioning of the teeth, there were still some drawbacks. As the bracket-positioning chart was developed on a dentition in which all of the teeth were ideally proportioned, a small central incisor in a patient with overall large teeth might under-seat the rest of the brackets in that arch.