Light cured adhesives have changed dramatically in the past 10 years due to an emphasis on bonding in moist environments. Dental adhesive experts at 3M have pondered the ability of a barnacle to adhere consistently to a boat, but until recently have been unable to achieve high adhesion intraorally to surfaces that are difficult to keep dry. Dental adhesive technology in a wet field stemmed from the desire for restorative dentists to bond to dentin. Resin-reinforced, glass ionomers have gained wide popularity since no etching has been advocated and the teeth can be moist, although mixing is required. Silverman et al\(^1\) reported excellent long term adhesion, but he describes a mixing and bracket placement procedure that is both time consuming and technique sensitive. Bishara et al\(^2\) recently showed high bond strengths with these compounds, however, his study confirms the need to acid etch the enamel surface to achieve an acceptable bond strength. Other techniques such as the use of adhesion promoters\(^3\) and microetching can significantly increase shear bond strength but in most instances is not necessary (exceptions include bonding to a metal surface or fluorosed teeth\(^4\)).

Moisture contamination after etching is the principle cause of early bond failure, and is an inherent problem all orthodontists face on a daily basis....

Conventional BIS-GMA orthodontic adhesives and primers require dry etched enamel (figure 1) for mechanical adhesion which is largely due to their hydrophobic properties and absence of chemical adhesion (figure 2). Moisture contamination after etching is the principle cause of early bond failure, and is an inherent problem all orthodontists face on a daily basis if using these conventional bonding agents. There is probably no treatment system in orthodontics that is as technique sensitive as bonding in hard to reach areas such as second molars or partially erupted teeth. This has directed many orthodontists to seek hydrophilic adhesives that are capable of achieving adequate bond strength for brackets. In a recent study conducted by Cohen et al, adequate bond strengths were consistently achieved in vitro after a 20 second etch with polyacrylic acid\(^5\). The author discusses the simplicity of the powder/liquid light cured, resin-modified, glass ionomers, however, mixing is still required as well as the following manufacturer’s suggested curing times, which reduces efficiency and speed. “Anterior teeth: 40 seconds total moving from lingual to gingival to incisal; Posterior teeth: 40-60 seconds total moving from gingival to occlusal to mesial to distal.” Clinicians report sporadic bond failure when full sized wires are placed after approximately one year of treatment. A no-mix, resin-reinforced, glass ionomer has shown promise in certain orthodontic applications. However, none have been specifically formulated for orthodontic bonding.

3M Unitek recently released a new ethanol-based priming agent, Transbond\(^\text{TM}\) MIP Moisture Insensitive Primer, that can be used with light cure resins such as APC\(^\text{TM}\) Adhesive Coating System and Transbond\(^\text{TM}\) XT Adhesive as well as chemically cured Concise\(^\text{TM}\) Adhesive and Unite\(^\text{TM}\) Adhesive. The result is a wider range of bonding applications which includes moist and difficult access areas. The shear bond strength attained on an etched wet tooth surface rivals or exceeds the conventional...
bonding technique\(^9\) (figure 3). The advantage of no-mix Transbond\(^{TM}\) MIP Primer is its ease of use and its compatibility with many conventional adhesives. The technique steps used are no different from the conventional acid etching technique; however, less emphasis is now placed on completely drying the tooth prior to applying the Transbond MIP primer. This greatly enhances the speed and efficiency\(^{10}\) of bracket placement, which enables the clinician to place brackets, bonds or attachments in previously unattainable or difficult locations (figure 4, 5). Transbond MIP primer viscosity is such that it has excellent wetting (water seeking) and flow properties. It also demonstrated normal shear bond strengths after 6 months of aging\(^{11}\). The clinical pictures shown here are the required steps, including all bonding applications in both wet and dry fields, (e.g., figure 6-14). Our office participated in a multi-practice clinical trial whereby a 50% reduction in molar bond failure rate was observed\(^{12}\). This bond failure rate reduction has also been observed in 18 months of long term clinical use of Transbond MIP primer.

In summary, using 3M Unitek Transbond\(^{TM}\) MIP Moisture Insensitive Primer as instructed means excellent results can be obtained with optimal speed and efficiency. Whether you use APC\(^{TM}\), Transbond\(^{TM}\) XT, Concise\(^{TM}\) or Unite\(^{TM}\) Adhesives, studies show that 3M Unitek Transbond MIP primer offers excellent performance in 3 critical areas:

- Shear Bond Strength
- Shelf Life
- Ease and Versatility of Use (wet and dry fields)

Figure 4: Impacted canine
Figure 5: Bonded molar
Figure 6: 30 second etching with 37% phosphoric acid.
Figure 7: Thorough rinsing followed by drying to check for etching efficacy.
Figure 8a, 8b: Transbond\(^{TM}\) MIP Moisture Insensitive Primer applied copiously to the center of each tooth (one half of the arch).
Figure 9: Gentle air “burst” (2-5 seconds).
Figure 10: Brackets positioned on the first half of the arch (posterior to anterior placement).
Figure 11: Brackets cured (10 seconds per interproximal surface).
Figure 12: Transbond\(^{TM}\) MIP Moisture Insensitive Primer placed on the second half of the dental arch (water chasing properties can be observed if slight moisture is present).
Figure 13: Brackets placed, positioned, then cured, on the 2nd half of the arch.
Figure 14: Archwire placed 5-8 minutes after initiation of procedure.

REFERENCES
6 GC Fuji Ortho™ LC Light-Cured Reinforced Glass Ionomer Cement for Orthodontic Bonding”, Instructions for use, 201252SK.
7 Various anecdotal reports, USC Electronic Study Club.
12 3M Unitek internal document.

Reprinted from Orthodontic Perspectives Vol. V No. 2.
© 1998, 3M. All rights reserved.