

Powered by science to work like magic.

How combining 3M technologies in a novel way sparked a game-changing breakthrough for orthodontic brackets.

APC™ Flash-Free
Adhesive Coated Appliance System

At 3M, science is at the heart of everything we do. Our 46 technology platforms work together to solve your biggest challenges, and our researchers are always in pursuit of new and surprising connections. APC™ Flash-Free Adhesive, which offers fewer steps, lower bracket bond failures and quicker clean-up, is an example of these connections at work.

Bringing you this time and labor saving advance took equal parts cutting-edge science and good old fashioned human intuition. Want to know more? Here's a look at how it all came together.

A flash of inspiration

In 2005, 3M scientist Dr. David Cinader was facing a dilemma. Precoated brackets, introduced by 3M in the 1990s, had already made a big difference for orthodontists looking to reduce the number of steps it takes to place and bond brackets. However, customers were telling Cinader they could use an even better solution.

“Our customers were very happy with the time and effort they saved by using precoated brackets, but we still had room for improvement,” Cinader said. “I observed customers struggling with removing adhesive flash and started thinking about how 3M could help.”

Flash clean-up is a known annoyance because it is time consuming and lengthens the overall appointment time, but there are other challenges as well. Cleaning away flash can lead to accidental movement of the bracket, requiring additional repositioning. And uncleared flash can promote plaque accumulation.

Cinader felt that if it were possible to stop flash from occurring in the first place, orthodontists could significantly improve the efficiency of their procedures.

Collaborative breakthrough

Developing a solution with the right performance meant thinking about orthodontic adhesives in an entirely new way. For as long as they had been made, these adhesives had always been based on the same types of materials found in dental restoratives. But why not try a more novel approach?

Cinader's breakthrough came when he overheard colleagues discussing the properties of foam packaging that was going to be used on another 3M orthodontic product.

“Foam is compressible, and I had been thinking that what we needed was a compressible adhesive,” recalled Cinader. “The idea was to control the flow of adhesive and stop it from flashing.”

After a few experiments it became clear that the foam wouldn't perform as needed, but Cinader kept working to find a solution. Eventually, more collaboration with fellow 3M scientists led him to the idea of using nonwoven material as the adhesive carrier on his reinvented precoated bracket.

A key technology platform

Nonwoven materials are fabrics made from fibers that aren't joined by weaving or knitting. Instead, they are created by bonding fibers mechanically, thermally or chemically. Like adhesives, nonwovens are among 3M's key technology platforms. They are used in diverse products including Filtrete™ Home Filtration Products, Scotch-Brite™ Scrub Sponges and Thinsulate™ Thermal Insulation.



A tiny nonwoven mat soaked in liquid adhesive resin is the secret behind the flash-free performance of 3M's APC™ Flash-Free Adhesive coated brackets.

Cinader soaked a small amount of nonwoven material in methacrylate-based adhesive resin and attached it to a bracket.

“When placed on the tooth and pressed, the nonwoven mat exudes the resin and creates a smooth meniscus around the edge of the bracket that makes uniform and consistent contact with the surface of the tooth,” said Cinader. Using nanotechnology, another 3M technology platform, Cinader and his colleagues developed a special filler material for the adhesive resin. “This makes the adhesive drift less and appear clearer due to the low amount of filler used, eliminating the need to clean up flash.”

Superior bonding performance

Available in orthodontics as the APC™ Flash-Free Adhesive Coated Appliance System, this system can reduce bonding time by 40% per bracket. It also provides reliable bond strength and more predictable performance with an average bracket bond failure rate of less than 2%. What’s more, the unique smooth meniscus formed beneath the nonwoven mat seals the tooth surface around the bracket, protecting the enamel from acid erosion caused by microleakage for improved oral hygiene.

Removing the brackets from the patient’s teeth is also easier. The lower amount of filler used means orthodontists can use a low-speed handpiece to remove remnants and maximize patient comfort.

Innovation continues

Not only do the adhesive coated brackets themselves represent an advance in technology, but they are packaged in an innovative way that enhances their time-saving potential.

Because of the less viscous nature of the adhesive resin, the precoated brackets need to be carefully packaged to avoid resin leakage and damage to the nonwoven mat. To address this challenge, the 3M team designed a funnel-like “blister” package that protects the brackets during shipment while ensuring they can be quickly and easily removed during procedures. They are also presented in the correct position and orientation to go directly into the mouth.



Choice and convenience

APC Flash-Free Adhesive is now available on Victory Series™ Low Profile Brackets from 3M, which means the entire mouth can be bonded with this innovative adhesive with your choice of 3M premium ceramic or metal ligated or self-ligated brackets and Victory Series™ Superior Fit Buccal Tubes.

The story of how Dr. David Cinader took his idea for flash-free adhesive from idea to finished product is a perfect example of both 3M’s culture of innovation and commitment to making sure the customer’s voice is heard.

For more information on how you can make your practice 100% flash-free, contact your local 3M representative.



Dr. David K. Cinader is a Senior Product Development Specialist in the Oral Care Solutions Division at 3M Company. He holds a B.S. Degree in Chemical Engineering from Michigan Tech University and a Ph.D.

in Chemical Engineering from Northwestern University. He is a named inventor on over 50 patent applications on dental and orthodontic adhesives and bonding appliances. David joined 3M Unitek Research and Development in September 1999 and has been involved in orthodontic adhesive development including Transbond™ Plus Self-Etching Primer and APC™ II, APC™ PLUS, Transbond™ IDB, and Transbond™ Supreme Low Viscosity Adhesives.



APC™ Flash-Free Adhesive is now available for use with the following products:



Clarity™ ADVANCED Ceramic Brackets



Clarity™ SL Self-Ligating Brackets



SmartClip™ SL3 Self-Ligating Brackets



NOW!
Victory Series™ Low Profile Brackets



Victory Series™ Superior Fit Buccal Tubes