

A Combined System
for Efficient and Durable Bonding:
3MTM VHBTM Tapes and
3MTM Adhesive Sealants

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What manufacturers need—and want—from a panel bonding system

Manufacturers have a long list of inter-related needs when it comes to panel bonding systems.

- A system should enable *high throughput* in order to keep productivity humming.
- *Strength* is vital—a bond must provide a reliable hold.
- In addition to strength, manufacturers need bonding systems that *will last for the long term*.
- *Aesthetics* are a concern for many applications. Products that are in the public eye need to look sharp.
- *Leak resistance* is an important quality for any products that will be used outdoors or in other applications where they will be exposed to water.

Finding the bonding products and processes to meet these criteria has often been a challenge, especially when cost-effectiveness becomes a factor. Traditionally, mechanical fasteners like screws, rivets and welds have been used, but this approach can leave a lot to be desired.

The drawbacks of mechanical fasteners

Mechanical fasteners are used in countless manufacturing applications. However, when compared to the above list of needs for panel bonding, the limitations of these fasteners become clear. Users know that for many applications, mechanical fasteners do not provide great durability. Screws and rivets can become loose over time due to vibration, thermal expansion and contraction. When fasteners become loose, not only does the bond weaken, but leak points can then be formed on the panel. Additionally, if dissimilar metals are used in the fasteners and substrates, this can lead to galvanic corrosion.



Mechanical fasteners dimple the surface of the trailer.

In addition to their durability drawbacks, mechanical fasteners can pose aesthetic challenges as well. For applications like trailers or buses, rivets and screws dot the surface of the sides, marring what could be a smooth surface for graphics. In the sun, trailer sides held on with rivets and screws can also take on a quilted pattern—not the best way to display a crisp appearance.



Mechanically fastened panels can take on a distorted quilted appearance when exposed to heat.

Introducing the 3M Combined System for Panel Bonding



Fortunately, modern alternatives to mechanical fasteners are making it easier for manufacturers to meet their list of needs efficiently and cost effectively.

3M has designed a bonding system that combines two of its groundbreaking product lines, 3M™ VHB™ Tapes and 3M™ Adhesive Sealants. Together, these products can help manufacturers meet a rigorous list of requirements. With 3M™ VHB™ Tape

providing an instant hold, and 3M™ Adhesive Sealant offering lasting strength and sealing, manufacturers can achieve bonds that leave mechanical fasteners far behind.

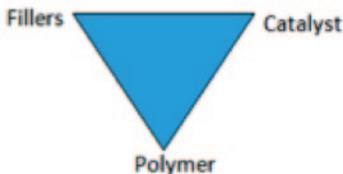
3M™ VHB™ Tape—Instant Hold



3M™ VHB™ Tapes are made of solid acrylic foam with pressure sensitive adhesive on two sides. While a screw or a rivet can join two substrates at a single point, specialty bonding tape permanently adheres one

substrate to another and spreads the stress load across the entire length of the joint. Once substrates are joined with 3M™ VHB™ Tape, a virtually indestructible “weld” is created. The bond occurs immediately on contact and builds to 90 percent bond strength in 24 hours. This unique combination offers benefits that screws, rivets, welds and other types of mechanical fasteners just can’t match.

3M™ Adhesive Sealants—Lasting, Cost Effective Bonding and Sealing



Like 3M™ VHB™ Tapes, 3M™ Adhesive Sealants create bond lines that bend and flex to hold tight. 3M™ Adhesive Sealants also seal panels tightly against corrosive elements, but not all adhesive sealants are created equal. For optimum performance, an adhesive sealant has to achieve a balance between three elements: fillers, catalyst and polymer. The balance of fillers and catalyst hinges on the polymer. Too much filler, poor quality fillers or

excess catalyst will throw off the triangle’s balance. 3M™ Adhesive Sealants offer the formula with the best balance of these elements to maintain integrity for a secure bond and reliable sealing.

Independent Testing Confirms the Trouble with Mechanical Fasteners

In a recent independent test at the Bosch Automotive Proving Grounds, a trailer assembled with rivets was put through a simulated hauling for 100,000 miles over various road conditions. After just 36,000 miles, 31 percent of the screws had come loose. In subsequent leakage testing, water leaked into the trailer when water was sprayed at less than 75 PSI (the pressure of a garden hose).

Outstanding Separately, and Even Better Together

By combining the advantages of 3M™ VHB™ Tapes and 3M™ Adhesive Sealants, manufacturers can gain the advantages of both an instant hold and a long-term seal. Simply apply 3M™ VHB™ Tape at select spots on the substrate, and fill in additional area with 3M™ Adhesive Sealant. This cost-effective approach allows manufacturers to optimize their use of both products to gain outstanding benefits:

- **Durability:** As discussed, mechanical fasteners can loosen over time due to vibrations, thermal expansion or contraction. 3M's combined system resists high and low temperatures, temperature cycling, UV light, moisture and solvents. Bonds do not loosen over time.
- **Aesthetics:** Substrates bonded together with 3M™ VHB™ Tape and 3M™ Adhesive Sealant have a clean, smooth appearance that is ideal for graphics. The lack of mechanical fasteners means that manufacturers do not have to worry about corrosion or scratched paint.
- **Elasticity:** The viscoelastic properties of 3M™ VHB™ Tape and 3M™ Adhesive Sealant allow bonds to flex under stress and then return to their original positions. Mechanical fasteners can only transfer stresses to other parts of the structure.
- **High performance in extreme weather conditions:** Independent testing has confirmed that both 3M™ VHB™ Tape and 3M™ Adhesive Sealant resist UV degradation, hot/cold temperatures, sleet, snow and rain.
- **Stress distribution:** The continuous bond created by the two products distributes stress over the entire length of the joined surfaces.
- **Sound reduction:** With panels bonded by 3M™ VHB™ Tape and 3M™ Adhesive Sealant, products are quieter when subject to vibration. 3M's combined system helps reduce the racket when compared to mechanical fasteners.
- **Waterproofing:** 3M™ VHB™ Tape and 3M™ Adhesive Sealant create a permanent seal against environmental elements.
- **Design flexibility:** The forgiving properties of 3M™ VHB™ Tape and the gap filling qualities of 3M™ Adhesive Sealant allow manufacturers greater flexibility in their product designs. Users can achieve an outstanding appearance and functionality, even when substrates are not perfectly parallel.

Benefits in Manufacturing

End users are not the only ones who benefit from the innovative and powerful system of 3M™ VHB™ Tape and 3M™ Adhesive Sealant. This combination of products also provides superior manufacturing attributes when compared to mechanical fasteners.

- **Reduction or elimination of finishing steps:** Many manufacturers are accustomed to the tedious process of applying sealant around every screw on a panel. When screws are eliminated, however, this process becomes a thing of the past. Additionally, for panels that utilize wrap graphics, eliminating screws reduces the time-consuming steps of smoothing the graphic and squeezing out air from screw holes.
- **Ability to use lighter weight panels:** The secure bond provided by 3M™ VHB™ Tape and 3M™ Adhesive Sealant can enable the use of thinner-gauge materials as compared to rivets and screws, adding up to significant savings in material costs. (For end users of commercial vehicles, lighter weight panels can also help increase fuel efficiency.)
- **Sound reduction:** Sustained plant noise can contribute to worker fatigue. With reduced metal-on-metal applications and less drilling or punching for installation of screws or rivets, manufacturers can achieve helpful reductions in sound levels at their facilities.

Making the Transition

3M understands that changing processes can seem daunting, but it doesn't have to be. 3M Technical Service experts help guide new customers through the process of selecting the right products and techniques for their combined system. With this customized approach, 3M guides customers through selection of the appropriate 3M™ VHB™ Tape and 3M™ Adhesive Sealant, as well as the proper surface preparation techniques.

Important considerations include:

- The surfaces to be bonded together
- The performance demands for the product
- Environmental conditions that the finished product will be subject to

3M Technical Services Engineers walk customers step-by-step through the process to review the product design and components and to ensure optimum results. For first-time implementations, 3M also offers a staff member to be on the manufacturer's site during construction of the first models to ensure proper training and application of 3M products. Once customers are up and running, 3M continues to provide ongoing support and consultation.

Configurations of 3M™ VHB™ Tape and 3M™ Adhesive Sealant

3M also works with customers to determine the most cost-effective combination of 3M™ VHB™ Tape and 3M™ Adhesive Sealant. The object is to determine the optimum amount of tape to use to hold panels in position until the liquid adhesive sealant cures. The two products can be used together in several different configurations depending on the project's needs.



Parallel application



Spot application



Field application

Applications for the 3M Combined System

The 3M Combined System is tailor-made for panel bonding, which has applications in many manufacturing areas:

- **Commercial vehicles**, including smooth-sided trailers, buses and RVs. With great aesthetics, durability and reduced interior vibration, specialty vehicles can look great, last longer and provide more comfort to occupants.
- **Other panel-to-frame applications:** The 3M Combined System has been successfully applied in a wide variety of manufacturing situations, including manufacturing of signs, architectural panels, and HVAC/Gen-sets.

In essence, 3M's Combined System is ideal for any sealant application where a "third hand" would increase throughput or simplify the manufacturing process.

For Sealant Users, Added Efficiency and Less Mess

Many manufacturers have already left mechanical fasteners behind in favor of bonding with adhesive sealants. But the combined system of 3M™ VHB™ Tape and 3M™ Adhesive Sealant can benefit these users as well. The addition of 3M™ VHB™ Tape enables faster throughput with its instant hold, so the wait for a full cure is eliminated. The combined system also creates less mess, increasing efficiency in the facility.

All the Experts, All in One Place

3M's continuum of seamless bonding products helps assure customers of a smooth process. As the **only** manufacturer to offer both 3M™ VHB™ Tape and 3M™ Adhesive Sealants, 3M gives its customers the simplest possible implementation—with technical expertise and guidance that are unmatched in the industry.

And with **both products under one roof**, 3M gives customers all the answers they need from one go-to source.

Every roll of tape and every tube of adhesive sealant is backed by the resources of 3M—known worldwide for its expertise in adhesives and innovation. Everywhere 3M customers build and service their products, they can find ready help from 3M representatives.

More than a tape or adhesive sealant manufacturer, 3M is a solutions provider—and is ready to help customers leverage this innovative 3M Combined System.

SEAL
MOUNT
S
ATTACH

WELD

MOUNT
ATTACH
FASTEN
BOND



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