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# Sign Builder

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## Sign Assembly:

# ADHESIVES

*How new structural adhesives solve read-through problems in signage.*

**T**he signage industry is all about image, and to be consistently successful in the business, the image must be perfect. Customer expectations are high, and the human eye can easily pick-up surface distortions of only a few thousandths-of-an-inch on a sign's painted, glossy surface.

This is not acceptable for an industry that prides itself on providing a "Class A" finished product.

One of the conditions that can mar a sign's surface is read-through that occurs when you can see an adhesive's bond through the substrate material on the Class A surface.

Signs assembled with thin-gauge materials and bonded with structural adhesives can be subject to surface distortions from the adhesive.

While structural adhesives offer the high-strength properties needed for a durable bond, their inherent stiffness and shrinkage during the curing process can contribute to read-through.

Recently new acrylic structural adhesives have been developed that offer low shrinkage and low exotherm properties, eliminating bond-line read-through.

### Materials and Attachments

The signage industry utilizes a unique type of substrate developed specifically for sign manufacturing—aluminum composite material (ACM), a material comprised of a highly finished, aluminum surface exterior with a core of polypropylene or polyethylene and another sheet of aluminum.

The resulting ACM "sandwich" panel lends itself well to the bending, folding, and manipulation needed to produce complex sign designs and channel letters, and for cladding applications.

However, the ACM panels' construction of soft aluminum and a soft plastic core forms an extremely soft material. This material is particularly susceptible to read-through if tradi-

tional structural adhesives are applied during the assembly process.

While most of the signage industry has adopted ACM usage (especially since the lighter weight material offers cost advantages), the thinness of the ACM exacerbates the read-through problem.

As a workaround to the read-through dilemma with adhesives, some signage manufacturers use mechanical fasteners to hold panels together.

Mechanical fasteners though tend to limit design flexibility since the end user typically does not want the fasteners to be visible on the surface of the sign. Consequently the sign designer is challenged to create solutions to hide mechanical fasteners.

Because mechanical fasteners require holes in the sign material, water penetration can develop at the points of attachment. Not only can the water penetration degrade the surface of the sign, it can also wreak havoc with electrical wiring in back-lit signage.

From an engineering perspective, signage manufacturers have implemented a “belt-and-suspenders” approach to obtaining a secure attachment. This usually entails using multiple methods of attachment, such as rivets and mechanical fasteners with some sealants and caulking, sometimes coupled with a limited number of structural adhesive attachment points.

Unfortunately this approach adds multiple steps to the signage manufacturing process and increases labor and material costs.

### Solving Read-Through

As a solution to the problem of read-through, new acrylic structural adhesives have been developed that offer no bond-line read-through on most substrates.

These structural adhesives are designed for bonding thinner gauge materials, such as ACMs, with little or no substrate preparation. The flexible adhesive formulation has low-exotherm and low-shrinkage properties, and it also bonds well to pre-painted surfaces.

Structural adhesives are engineered to be as strong as possible. They typically have high exotherms and tend to be very rigid.

Thin-gauge materials, such as ACMs, are designed to be very flexible. When two flexible, thin-gauge substrates are joined with a stiff adhesive, read-through occurs—a visible distortion of the metal or painted metal surface. Moreover, as the adhesives cure, they shrink, which further pulls-in or distorts the substrate’s surface.

Preserving the ACM’s surface finish is especially important in the sign industry.



ACMs are supplied with a pre-painted surface. Having pre-painted materials allows the smaller to mid-sized sign shop to eliminate the necessity for in-house painting operations and the ensuing concerns over environmental regulations. (Note: The larger materials manufacturers are better equipped to maintain VOC-regulated paint shops.)

Signage manufacturers, therefore, must carefully preserve the existing pre-painted finish and prevent read-through from occurring.

In signage industry applications where strength and aesthetics are important, acrylic adhesives are a good choice. The need for less surface preparation also provides savings in time and labor costs.

Fast cure times are another advantage

of acrylic adhesives. They have a handling time of as little as twenty minutes, and they are 90 percent cured in thirty minutes at room temperature.

The adhesives are environmentally resistant to dilute acids, alkalis, solvents, greases, oils, and moisture and are also resistant to UV-exposure and weathering.

### Making the Switch

As sign shops transition to using the new structural adhesives, there are a few important aspects they must stop and consider:

- ☛ Limiting read-through can be a challenge when using adhesives on thin-gauge materials.
- ☛ To limit read-through when adding

This adhesive, specially formulated to be more flexible and exotherm less, results in a clean, aesthetically pleasing surface.

Notice the significant surface distortion due to an underlying adhesive. This distortion is the result of bond-line-read-through of a very stiff adhesive that has significant exotherm and shrinkage during cure.





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attachment points to ACM panels, it is necessary to also limit the amount of adhesive that squeezes-out when applying the adhesive.

☞ Excess adhesive squeezed out and remaining around the attachment point of the ACM will intensify the read-through problem. Therefore minimizing squeeze-out will also minimize read-through.

☞ ACMs are made of lightweight, untempered aluminum with a soft, low-melting-point plastic core. During the curing process, traditional structural adhesives heat up (exotherm), softening the ACM panel's core. This softening, combined with adhesive shrinkage, pulls down the facing or painted surface. The result is read-through that mars the Class A finish and is visible on the surface.

☞ While many sign shops understand the advantages of switching to structural adhesives to construct signs, they must also understand how to convert their production facilities to using adhesives. Similarly signage design changes must be taken into consideration when adhesives are substituted for mechanical fasteners. A full-service adhesive supplier should not only provide the adhesive products and application devices but also offer training, production, and engineering support.

☞ Adhesive dispensing options are available for high- and low-volume applications. Hand-held applicators are ideal for the small- to mid-sized sign shops, and automated dispensing systems can be implemented for high-production operations.

Using new, low-read-through structural adhesives eliminates "trade-offs." The adhesives can be easily used on ACMs to achieve the aesthetically pleasing designs so crucial to the signage industry. [SBI](#)

*Steve Webb is Northeast regional sales manager at LORD Corporation (www.lord.com), a company that develops and manufactures high-performance adhesive products.*