WHAT TO CONSIDER WHEN CHOOSING DECAL ADHESIVES

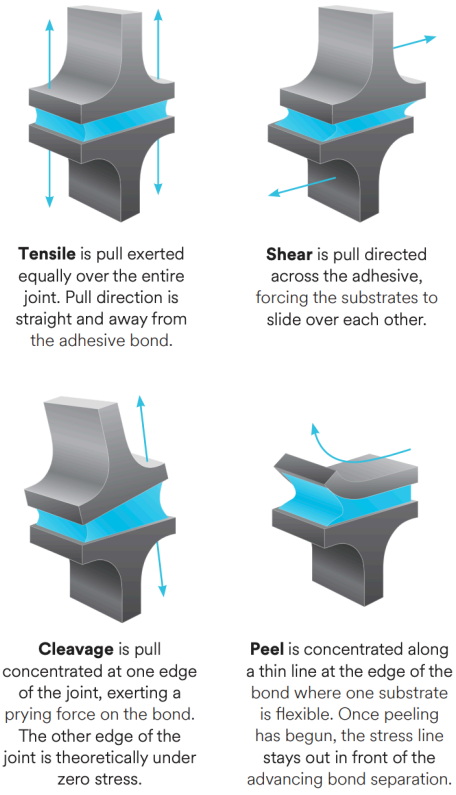
VISUAL MARKING SYSTEMS

When designing labels, decals, or overlays for your product identification on your industrial equipment, selecting the adhesive is as important a component as the base material. The following will help you learn about the differences in adhesives, the applications they support, and the questions your label supplier should ask about your decal application.

The Rules of Adhesion

1. Decals will not adhere to dirty, dusty, oily, waxy or unfinished surfaces.
2. When applied to a wet surface, decals will not adhere until moisture is dry and will require additional pressure at that time.
3. When applied to a painted surface, the paint must outgas before a marking is applied.
4. Generally, decals should not be applied to surfaces cooler than 50°F (10°C) or in high humidity settings.
5. Pressure must be applied to activate the adhesive.

Adhesives are rated by four characteristics: tensile, shear, cleavage and peel. Understanding how these properties relate to one another determines how an adhesive will perform.



Tensile is pull exerted equally over the entire joint. Pull direction is straight and away from the adhesive bond.

Shear is pull directed across the adhesive, forcing the substrates to slide over each other.

Cleavage is pull concentrated at one edge of the joint, exerting a prying force on the bond. The other edge of the joint is theoretically under zero stress.

Peel is concentrated along a thin line at the edge of the bond where one substrate is flexible. Once peeling has begun, the stress line stays out in front of the advancing bond separation.

Image: 3M Converter Markets Guide August 2021

QUESTIONS TO ASK WHEN SELECTING ADHESIVES

1. **What type of surface will the decal be applied to?** Is it rough, smooth, porous, riveted, painted, unfinished, etc.?
2. **What is the surface composition?** Does it have high or low surface energy?
3. **What are the temperature range and environment your product will experience?** Is it used indoors or outside, will it be exposed to high or low temperatures, chemicals, UV light, cleaners, dirt, moisture, etc.?
4. **What is its standard life expectancy?** Is it for long-term or short-term use?

The surface energy of the material a decal is applied to plays a major role in choosing the proper adhesive. Adhesion is the molecular force of attraction between unlike materials; surface energy is the strength of attraction between surface and adhesive. The higher the surface energy, the greater the molecular attraction. The lower the surface energy, the weaker the attractive forces. Surface energy is measured by dynes per centimeter. The dyne level is the actual reading of the critical surface tension.

Materials With High Surface Energy	
Metals	ABS
Acrylic	Alkyd Enamel
Epoxy Paint	Nylon
Phenolic	Polycarbonate
Polyester	PVC (Vinyl)

Materials With Low Surface Energy	
Acetal	EVA
Polyethylene	Polypropylene
Polystyrene	Powder-Coated Paints
PVA	Tedlar (PVF)
Teflon (PTFC)	

SELECTING THE PROPER ADHESIVE

Permanent adhesives: Permanent adhesives tend to continue to increase in bond strength with time, usually reaching ultimate adhesion in 72 hours to one week after application.

Removable adhesives: Removable adhesives reach ultimate adhesion in one to 24 hours after application. Their bond strength remains low for up to two years depending on the product. After this period, the adhesive will stiffen and become permanent. Although termed “removable” from most smooth surfaces, these adhesives may not be completely removable from some matte or textured surfaces. Testing their removability from painted surfaces is strongly recommended. Most suppliers carry removable adhesives on vinyl.

Repositionable adhesives: These pressure-activated adhesives have a low initial tack but high ultimate adhesion. They can be lifted and reapplied to a substrate during installation without stretching the film. During application, a squeegee is used to activate the adhesive. After 24 to 72 hours, adhesion builds and the film will be damaged if removal is attempted. This type of adhesive is excellent for fleet markings and in other applications where position is critical.

NEED HELP CHOOSING THE RIGHT DECAL ADHESIVE?

Reach out to talk with a friendly and knowledgeable VMS team member today.

CONTACT VMS

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