

A section by section glance into the possible causes for an adhesion loss or total failure.

Each section contains questions to ask to help identify the problem.

Surface Applied To

What is the label being applied to?

Has this surface recently changed?

If so, what was it?

This is perhaps the most common change and the easiest to identify. For example, there has been a radical shift to powder coat paints for both economical and environmental reasons. These paints, however, can cause adhesion problems for a firm acrylic adhesive. Once identified, an adhesive change, or a change in application methods could be easily implemented. **Be sure to be specific. "Plastic," "painted," or "metal" is not specific enough. What type of plastic? What type of paint? What type of metal?**

Did the surface texture or finish change?

A change in surface texture or finish, particularly from smooth or slightly textured to a rough texture, can cause edge lifting, adhesion loss, or in some cases, it can result in the label "popping" completely off. **If there was a change, ask for samples of the new texture.**

In summary, it is important to emphasize that before any changes are made in the surface being applied to, the adhesion of any labels must be tested. The supplier should be contacted when an adhesive change appears warranted to recommend alternate adhesives for testing. If there has not been any change in the surface or texture, verify the adhesive choice with an engineer at Dura-Tech. Perhaps the original adhesive is the wrong choice for the application. **Adhesion to UV stabilized plastics, flame retardant grades, hybrids or blends, or plastics utilizing recycled resins may be difficult. Please test for adhesive performance.**

Contaminated Surface

Is the surface clean?

Is there any mold release agent, machining oil, wax, or other contaminants remaining on the surface?

It is imperative that the surface applied to be free of oils, and solvents and relatively clean. In fact, any adhesive supplier recommends that all surfaces be cleaned or "prepped" before any adhesive application. The prepping can be done with an isopropyl alcohol wipe and a clean dry cloth. If wax is present, a wipe with an aliphatic or aromatic solvent is necessary (i.e., Naphtha, Heptane). Unfortunately, most production settings do not allow for the extra time needed to prep a surface. Still, a standard acrylic adhesive will have a difficult time reaching its ultimate bond strength under the presence of contaminants. Therefore, the surface should come in clean from the supplier. **If necessary ask for a sample of the housing as it comes in from the supplier.**

If the label is applied to a painted surface, how long after the painting is the label being applied?

It is essential that the painted surface be fully cured. A label should not be applied before a minimum of 72 hours, unless otherwise specified by the paint supplier (powder coat paints can be applied to as soon as the surface cools). **Remember to be specific. Ask for the exact type of paint.**

In summary, surface contact is fundamental to adhesive performance. To maximize adhesive contact on a surface, it first must be dry and free of contaminants (the operator applying the adhesive may be contaminating the adhesive during application if their hands are dirty or oily from lotions or certain foods).

Application Methods

Has there been a change in the method of application, involving any of the following?

- *Amount of pressure or method for applying pressure*
The adhesives provided by DuraTech are **pressure sensitive**—consistent firm pressure needs to be applied over the entire surface during application, especially along the edges or near cutouts. Whether the pressure is applied manually or mechanically, it must be a standard operating procedure during the application of any label.
- *The time before the label is subjected to any handling*
Some firm adhesives need more time to “set up” as they bond to a surface. If the time frame was changed and the parts are immediately being handled after application, a label that was adhering fine may now be “popping” off or lifting along the edges. If additional pressure cannot be applied, or if a longer time period is not practical, an adhesive change to a more free flowing adhesive may be necessary. These adhesives will have a higher initial bond.
- *Is, or was temperature being used during application*
Increased temperature during application will strengthen the initial bond of any adhesive. If heat is no longer being used during application, a noticeable change in the immediate adhesive performance will be noticed.

In summary, firm pressure must be applied to increase the flow and contact of the adhesive with the substrate. Also, time and temperature will increase the surface contact and adhesion values.

Environment

At what temperature is the label being applied (pertinent during certain seasons and applications only)?

At what temperatures and humidity levels are the parts being stored?

How old are the parts?

Labels should be applied and stored at room temperature at 50% relative humidity. Once applied, temperature and humidity should have little effect on adhesive performance. However, application temperatures below 50 degrees F are not recommended and could cause total loss of adhesion properties. Excessively low or high storage temperatures and/or exposure to high humidity can also lead to a degradation of adhesion properties. If stored properly, an adhesive backed product will have a shelf life of at least two years.

In summary, once an adhesive has had a chance to bond securely to a surface (a minimum of 72 hours), temperature and humidity conditions should have little effect on the overall performance of an acrylic based adhesive (rubber based adhesives would be an exception). However, it is important that the labels be stored and applied in an environmentally controlled facility whenever possible.