

Removal of Cured UV Adhesives and Resins

INTRODUCTION

It is occasionally necessary to remove a UV adhesive or coating in order to make a repair of a component or some part of an assembly, or simply to disassemble parts. However, cured UV adhesives and coatings are cross-linked, thermoset resins which do not melt and which may be difficult to remove from a substrate. The following information is offered in order to maximize ease of removal and to minimize possible damage to the part.

Generally, coatings are more commonly removed than adhesives. Specifically, conformal coatings on printed circuit boards may need to be removed to replace or repair a component. DYMAX provides detailed removal instructions for its conformal coatings in Lit204.

For general removal purposes, heat, cold, and chemical exposure are common means of weakening and then removing adhesive bonds or coatings. Review of the adhesive's or coating's Product Data Sheet may provide clues as to the best removal method. Properties such as thermal limits, and water or chemical resistance may indicate the most appropriate removal procedure. It is possible that the removal process may damage some part of the assembly. Therefore, after removal and repair, it is recommended that the part be re-tested to insure that it meets the lifetime use and durability requirements of the application.

SOFTENING AND DESTRUCTION OF ADHESIVE BONDS WITH HEAT

Depending on the substrates, adhesive, and configuration of the bond, the application of heat may be the best way of separating bonded parts or removing a coating. Heating the adhesive above its glass transition temperature (T_g) will soften it so that the application of force may be possible to separate the resin from the substrate. Exceeding the thermal limits of the adhesive will cause further weakening and may be necessary to destroy the bond. Consult the Product Data Sheet for the adhesive's thermal limit. After the separation of parts or a coating from the substrate, it will be easier to clean up any remaining exposed material by wiping or scraping, aided by the appropriate solvents.

The following procedure may be used to weaken a bond with heat:

1. *Determine the thermal limit of the assembly and of the adhesive.*
2. *Place parts in an oven and raise the temperature to the highest level where the adhesive will soften or degrade and the part will not be adversely affected.*
3. *Remove the heated part and immediately apply a peel or cleavage force to the bond or coating.*
4. *Once separated, wipe or scrape away any remaining materials (use of a solvent, such as those recommended in Table 1, will help to soften the remaining materials).*

EMBRITTEMENT OF ADHESIVE BONDS WITH COLD

Hard, rigid adhesives are often easier to shatter upon exposure to very cold temperatures than are more flexible ones. Dipping the part in liquid nitrogen, wrapping it in dry ice, or otherwise bringing its temperature below -60°C may embrittle an adhesive. Tapping of the cold part may shatter the bond and allow the parts to separate. Once separated, a solvent soak may still be necessary to remove residual material.

CHEMICAL REMOVAL OF ADHESIVE BONDS OR COATINGS

The greater the exposure of the adhesive or coating to the chemical stripper, the faster it will be removed. Coatings are therefore typically easier to strip chemically than thin adhesive bonds contained between impervious substrates. It is critical to determine the effect of the chemical on the part before attempting to destroy the adhesive bond. Water is usually not practical for chemical removal of adhesive as it is not an aggressive solvent and

requires long soaks to effect any degradation. Boiling water will soften an adhesive bond and thus may allow separation of parts. Common solvents used to degrade adhesive bonds include the following:

- Methylene chloride
- Chlorine bleach (dilute 10%)
- Strong base, NaOH or KOH solution with a pH>=12.
- MEK (methyl ethyl ketone) or acetone

These chemicals are available from standard chemical supply houses, such as Aldrich. Paint and coating strippers and oven cleaners are combinations of solvents that will generally attack adhesives, as well as paints, coatings, and other organic materials. These are available from various commercial and retail establishments. Several companies manufacture materials which dissolve or attack DYMAX conformal coatings. Below is a list of materials which have been shown to be effective for this purpose.

COMPANY	PRODUCT	TELEPHONE NUMBER
Savogran Corporation 259 Lenox Street Norwood, MA 02062	Kutzit or Strypeeze <i>Products are sold through local, paint, hardware and home centers.</i>	800-225-9872 www.savogran.com
Dynaloy, Inc 1535 E. Naomi Street Indianapolis, IN 46203	Dynasolve Uresolve Plus SG <i>Products are sold through authorized distributors.</i>	800-669-5709 317-788-5694 www.dynaloy.com
Tech-Spray 1001 N.W. 1 st Avenue P.O. Box 949 Amarillo, TX 79105 (for P.O. box) 79107 (for street address)	Fine-L-Kote Remover 2510 <i>Products are sold through authorized distributors.</i>	800-858-4043 www.techspray.com
Jasco, Inc 1008 N. Fuller Street Santa Ana, CA 92701	Jasco Premium Paint and Epoxy Remover <i>Products are sold through local paint, hardware, home centers and distribution.</i>	888-345-2726 www.jasco-help.com
3M	3M™ Safest Stripper™ Paint and Varnish Remover <i>Safest and slowest, overnight, based on dibasic esters (DBE)</i>	www.3m.com <i>then search "safest stripper"</i>

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CAUTION

Always consult your company's health and safety department to determine a safe adhesive removal process. Always follow the safety precautions of the manufacturer when using any of the chemical products referenced in this guide. As every application and all parts are different, DYMAX does not guarantee the effectiveness of any of the suggested removal methods mentioned in this bulletin. Thorough and complete evaluation of all methods mentioned in this guide on the individual part and processes must be made to assess hazard level to both the part and personnel and the facility, and to establish the appropriate precautions.

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Lit078 8/31/2005

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