



Troubleshooting: Adhesive is Not Curing (Plastic Assembly)

Uncured adhesive can lead to many complaints, including Class VI product failing biocompatibility, stress cracking, reduced bond strength, and adhesive odor. If adhesive is not curing properly, ask the following questions when troubleshooting:

- Did the problem begin simultaneously with a plastic lot number change or an adhesive lot number change?
- Has the lamp intensity been measured and monitored at the distance of the bond line?
- What is the exposure time? Has it changed?
- Has the viscosity grade changed? Check the viscosity grade against previous orders. If a lower viscosity is used, an adhesive may travel into shadowed areas, and if a thickened version is used, the adhesive may not cure as deep.
- If the part is being manually rotated or cured with a hand-held wand, is the rotation speed and the distance constant?
- Do you have two lot numbers of adhesive in house? If so, do both lots fail?

Solutions for Common Problems Encountered in Plastic Assembly

Problem #1 – Insufficient Bond Strength

May be due to:

- A) **Adhesive Failure:** Upon joint separation, adhesive remains on one substrate.
Solution: Increase adhesion to opposite substrate by surface treatment, primer, dwell time, or a different adhesive.
- B) **Cohesive Failure:** Adhesion is good. Upon bond failure, adhesive remains on both substrates.
Solution: An adhesive with higher tensile strength or a more flexible adhesive which may give instead of tear.
- C) **Substrate Failure:** Substrate fails prior to bond failure.
Solution: Strength of overall device may be increased with a more flexible adhesive to compensate for a less than optimum joint design.

Problem #2 – Surface Residue

All Light-Weld® Medical Grade adhesives will cure tack free upon exposure to high-intensity UV light with the exception of 189-M and to some degree 188-M. If an oily film or sticky surface remains after cure, essentially no amount of additional exposure to UV will harden the surface. This phenomenon is due to **oxygen inhibition** on the surface of the adhesive and does not interfere with cure below the surface. Low-intensity or pulsating cure (as in rotating a part quickly and exposing the

surface to UV for brief but repeated intervals) can allow oxygen inhibition to occur and create the tacky surface. To eliminate this effect, increase the intensity and cure the part during one exposure period. Although the exact composition of each surface is not known, it is safe to assume an oily residue indicates combinations of monomer which have not been polymerized. A sticky surface is indicative of low molecular weight polymer chains.

Problem #3 – Stress Cracking

Light Weld® adhesives contain no solvents, but in the uncured state have "solvating" action on some plastics. Upon cure, the adhesive has no "solvating" action and is like a plastic which has become interlocked or fused with the substrates it has bonded.

If cracks appear after the cure process, the adhesive may not be completely cured. Re-evaluate the cure process.

If cracks occur prior to the cure test, complete the "solvating" action on plastics by applying a bead adhesive to the unassembled plastic surface. After several minutes, wipe a section of adhesive off to see if adhesive has frosted the surface. Time how long it takes the adhesive to frost the surface. Determine how long adhesive remains on part of the uncured in process.

If the part was designed for solvent welding or adhesive joint is a tolerance fit, mere assembly of part may cause cracking.

Voiding can easily be mistaken for stress cracking. See Problem #4 – B) Joint Starvation.

Problem #4 – Leaks

A) Bond Failure

- Poor adhesion
- Insufficient moisture/resistance
- Poor wettability

B) Adhesive Joint Starvation

- Insufficient or inconsistent adhesive coverage

C) Voids

All UV light-curable adhesives shrink a small degree upon cure. As the adhesive cures, it pulls uncured adhesive toward it. The adhesive, which is illuminated with UV light last, or is shadowed, will be the adhesive which is pulled.

When using a dispensing tip with a steel cannula hub, the hub area may lose adhesive due to shrinkage and leave a void area which may leak.

Altering gap size, reflecting the UV, or adding an opposing light are all viable solutions to eliminating voids.



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