

Bonding Plastics? Twenty One reasons you should use Adhesives

Techsil Ltd | March 2018 (Rev2)

With reference to Henkel's Plastic Bonding Guide | Vol 6, 2011



Advantages over Mechanical Fasteners

Mechanical fasteners are quick and easy to use, but have a number of significant drawbacks.

1. They create stresses in the plastic which may lead to distortion or cracking. Adhesives do not.
2. There are extra components which must be purchased and inventoried. Adhesives require no extra components.
3. They require altering the design of the product to include bosses and holes. Adhesives require no special features.
4. Their appearance often interferes with the styling of the product. Adhesives are invisible inside a bonded joint.
5. They concentrate all of the holding power at the fastener location, causing the applied load to be carried by a small area of plastic. Adhesives spread the load evenly over the entire joint area.

Advantages over Ultrasonic Welding

Ultrasonic welding can be an excellent method for certain types of assemblies. There are, however, a number of factors which limit its usefulness.

6. Ultrasonic welding is not usable for thermosets. Adhesives are.
7. Joining of plastics to metal, glass, or other materials is not feasible in most cases. Adhesives do this easily.
8. The design of joints is restricted to geometries which are favourable to the process. Ideally, they should have a small, uniform contact area to concentrate the ultrasonic energy. Adhesives can accommodate irregular bond lines.
9. The capability of joining different thermoplastics in the same assembly is limited to those which are chemically compatible and have similar melting points. Adhesives are not restricted in this way.
10. Ultrasonic welding requires investment in machinery as well as special tooling for each part. Most adhesives require no machinery or tooling.



Advantages over Solvent Welding

Solvent welding can be a useful, low-cost method of assembling plastics. However, its usefulness is limited by a number of disadvantages.

11. Solvent welding cannot be used with dissimilar materials such as metals or glass. Adhesives do the job.
12. Solvents will not work with thermoset plastics. Adhesives will.
13. Solvents are more likely to cause stress cracking than are adhesives.

14. The time between the application of the solvent and the joining of the parts is critical. The joints are weak if too much solvent remains in the bond area or if too much solvent has flashed off prior to assembly. Adhesives have a much less critical open time.

Advantages over Solvent Cements

Solvent cements are low cost materials which have been traditionally used to join plastics. Their primary advantage is low cost, yet their limitations are numerous.

15. They have poor resistance to heat and solvents.
16. They produce solvent fumes which may be toxic or flammable.
17. The open time of the bonded joint is critical.
18. They require an extensive drying time.
19. Solvent trapped inside the joint may lead to porosity or weakness.
20. Solvent cementing is not capable of joining parts with significant gaps between them. Adhesives can tolerate much larger gaps.
21. Solvent bonds can take weeks to achieve full strength. Adhesives can cure in seconds.

But How do I Choose Which Adhesive to Use?

Whilst the limitless variety of plastics available is an invaluable asset to a designer, it is the designer's biggest limitation when selecting an adhesive. The countless adhesives available, coupled with the virtually limitless grades of plastics available, make selecting the right adhesive like looking for a needle in a haystack. Moreover, every year new grades of plastic are created, and old grades of plastic are discontinued or reformulated, making the acquisition of comprehensive bond strength data on specific grades virtually impossible. We are constantly testing products for our customers and have a wealth of information on plastics bonding.



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