



3D TECH TIPS: GLUES

MATERIALS NOTE: Always read the instructions that come with the glue. This should always include the hazard and warning panels on the can, tube, or container. Enough attention is rarely paid to the dangers of all artist's materials which has resulted in serious illness in more than one case. Do not assume that the materials are only hazardous when one is constantly exposed and not when casual or occasional expose occurs. This does not mean that you should avoid dangerous materials if they will do the job that you desire but rather that you should take the necessary precautions, they do not take much time. **REVIEW ALL MATERIALS** in your Hazards Guides.

GENERAL GLUING TIPS:

- 1) If you are doing a job with a slow drying glue it is almost always a good idea to clamp, nail, screw, or otherwise put pressure on the joint. See the instructions on the specific product to determine proper clamping pressures.
- 2) It is a general rule that slow drying glues make for a better bond as this gives the glue a chance to soak or flow into the materials being joined.
- 3) The exception to the two above rules are generally the epoxy glues which, although you may wish to position them with clamps, do not necessarily bond better with pressure or extended drying times relative to other products.
- 4) When gluing always use enough glue to squeeze out of the seams (the exception being Cyanoacrylates) as this will insure that you have adequate coverage and no voids.
- 5) After the glue has come running out of the seam wipe it off as soon as possible to avoid it soaking into surfaces to later be finished or sanded. With glues that have a solvent (whether is is white glue with water or Super Glue with Acetone) use a effective solvent when wiping down the seam.
- 6) Rather than wiping down a seam when wet (which could force glue deeper into a porous surface) wait until the glue as fully dried and scrape off with a hooked blade.

7) With Cyanoacrylates never use too much glue as this will result in a weak bond. Also with these glues of the non thickened variety it is mandatory that you have a super fitting joint or seam. Do not move the parts until they are bonded. In the absence of thickened cement for porous materials one can "dust" the parts with talcum powder or flour prior to gluing.

8) Give the glue adequate time to bond as moving the parts before hand will weaken the bond and make it harder to reglue.

9) Apply glues to clean dry surfaces and be aware of the temperature requirements of the cement being used.

10) It is difficult to glue end grain of wood due to its porosity. A thin skim coat of glue to the end grain prior to the other parts followed by a second coat during final assembly should create a stronger joint.

11) Glues that dry rapidly (with the exceptions of epoxy and cyanoacrylates) do so because they have a volatile solvent. This means that the solvent will evaporate at a rapid rate. This also means that they will burn at a rapid rate and that the fumes can be explosive in addition to the fact that they are quite often hazardous to humans. Use good ventilation!

Be especially wary of glues (or anything) with solvents such as: Toluene, Trichloroethane, Acetone, Hexane, etc. Work in an open space not in your closet...

12) Use the right glue for the right job and you will be less frustrated.

13) Glue things together well before you need to move them (like bringing them to a critique) and you will be even less frustrated as they won't tend to fall apart!



GLUE TYPE	BRANDS/CHARACTERISTICS APPLICATION
WHITE GLUES:	Elmer's, Etc.; White colored water based, dries clear: Porous materials such as wood, cardboard, paper, etc.
ALIPHATIC RESINS	Wilhold, Elmer's Carpenters, Etc.; Yellow colored water based, dries clear or slightly yellow: Porous materials such as white glue but bonds faster, stronger, and is water resistant.
TWO PART WOOD GLUES:	Resorcinol, Elmer's, Weldwood, Etc. Resin/Catalyst two part system (paraformaldehyde/Ethanol/Resorcinol) Dark brown color when dry. For porous materials but is a traditional strong bond waterproof glue.
EPOXIES:	Devcon, Weldwood, West, Etc. Two Part Resin/Catalyst System dries clear. Solvent: can be cleaned with alcohol when still wet. For porous or textured materials. Comes in various viscosities and curing times for different applications. 5 minute cure: Fast and relatively strong bond is not waterproof but highly water resistant. 30 minute, 2 hour, 12 hour, and 24 hour cure: Same as above but waterproof. As a general rule the longer the cure time the stronger the bond. Laminating or Wetting Epoxies (i.e. West Systems) Various cure times dependent upon catalyst used (15 min. to 12 hour). Very "thin" when in liquid form creates a very strong bond by deep impregnation of porous materials. Generally used for high strength wood to wood bonds that are waterproof and for laminating of wood. Can be thickened with various fillers of differing strengths and densities. Filled Epoxies: Similar to adding fill to above. For special applications metal filled epoxies are available.
SILICONES:	Caulk and Adhesive available in clear, white, and black. Flexible bond with 1 hour set time and 12 hour dry. Mechanical Grade: Will bond nearly anything to anything although the bond is generally weak. Makes a good gasket or sealer. Is difficult to handle cleanly. Electrical Grade: Same as above with the added advantage of being a better insulator. Solvent: can be cleaned up with alcohol when wet.
PLASTIC RUBBER:	Duro, etc.: In black and white. Flexible bond with 1 hour set time and 12 hour dry time. Same properties as mechanical grade silicone.

PLASTIC "ANYTHING":	Plastic Metal, Plastic Aluminum, etc. General Purpose glue base with metal powder suspended in solution.
URETHANES: Type 1:	Urethane Bond (Dap, Dow-Corning, 3M Marine Adhesive); Dries clear with slight foaming action. Seems cloudy. Curing time: 24 hours.
Type 2:	Glues anything with a semi-flexible bond that is extremely strong. Urethane glues (Gorilla Glue, etc.) Starts brown but dries clear with less foaming action. Fills gaps well. Sands well. Is supposed to be waterproof.
CHINA AND GLASS CEMENT:	Elmer's: Generally a weak white glue.
MODEL WOOD CEMENT:	Testors Type A and Type B; Solvent based dries clear. Type "A": For light and porous woods traditionally used for wood models, excellent for cardboard, etc. Fast setting (10 to 20 seconds) and drying (6 hr. max. strength) Type "B": Same as above but slower cure resulting in a stronger bond.
DUCO CEMENT:	Similar to wood model cements. Good all around cement.
PLASTIC CEMENTS:	Plastic Model Cement: Testors, Praetra; Styrene type cements used on most plastic models and for model making (prototype). Acrylic Plastic Cements: Methylene Chloride, Ethylene Dichloride (MC & ED), etc. For gluing of acrylic plastic (also works on styrene plastics). Generally applied with a syringe or glue bottle via capillary action. Can also be used as a soaking agent for bonding. Thickened Acrylic Plastic Cement: The same as the above with plastic dust suspended in solution thickening the glue such that it may be applied in a normal fashion.
CYANOACRYLATE ADHESIVES:	Hot Stuff, Zap, Superglue, Eastman 910, etc. Super fast very strong glue (when applied correctly, low volume). Best for non porous materials as metal, rubber, plastic, etc. NOTE: will fog many plastics as acrylic, Uvex, etc. and some work better than others.
THICKENED CYANOACRYLATE:	Developed for gluing porous materials without surface preparation. Some variations are available for special Industrial applications.
CONTACT CEMENTS:	3M, Miracle, etc. Will glue almost any materials; non-positionable and fast. Similar to a super rubber cement. Best for laminating plastic laminates, veneers, etc. Both solvent and water based types are available. The water based types are not as fast but also not near as dangerous as solvent based contact cements.

HOT MELT GLUES:	<p>Polyethylene based hot melt glues apply with a special glue gun. Clear and white finish.</p> <p>Will stick to most porous or non porous surfaces, set quickly (less than one minute), and holds fairly well. Will sometimes let go after a period of time. Stays somewhat flexible.</p>
SPECIALIZED CEMENTS:	<p>Variations on many of the above types are available for special purposes. These include specific use Cyanoacrylate's, specialized Epoxies (i.e. for Aluminum), Bakelite Cement for Bakelite (a formaldehyde based early plastic of excellent insulating potential), etc.</p> <p>Information on many of these products can be obtained from local suppliers or research manufacturers as 3M.</p>
ADHESIVE "TAPES":	<p>Yes, TAPES. 3M produces a number of industrial strength tapes similar in concept to double sticky tape. The adhesive is carried by a "backer" that either stays with the adhesive or is designed to be removed (i.e. the backer foam on mounting tape stays with the adhesive). Some of these are very specialized and can be stronger than the bonded materials.</p>