

Choosing the Right Adhesive

James Miller, MCPPE, GCF

Using the best glue for non-mounting applications can make the difference between just getting the job done and doing it right



A color marker can make joined frame corners look better, but be careful not to color the miter area being glued. The oil-based ink would weaken the glue bond.

Framers often discuss adhesives for mounting because it directly involves a customer's property and is the riskiest part of the framing process. Permanence, reversibility, chemical stability, and ease of use are all important factors. But these same considerations are also important when choosing adhesives for a wide variety of applications beyond mounting.

Decorative Framing

The adhesives used on corners, stacking matboard, and many other aspects of framing deserve a close look. For decorative framing, in which chemistry is not important, adhesives can be selected according to bonding strength, durability, ease of use, and availability. For most structural applications in a non-preservation frame, PVA glue may be the best overall choice because it is handy, easy to use, and sets up quickly. Other adhesives may be preferable for certain applications.

Preservation

In preservation framing, the choice of adhesive is more important because stable chemistry is essential. The formulations of most ordinary adhesives include binders, colorants, preservatives, and other components that could off-gas and react chemically, causing color shift, acid burn, embrittlement, or other deterioration of framing materials and the items framed. Most adhesive formulations are proprietary, so some of their chemical

components are unknown. As a result, the best strategy is to use adhesives that have been evaluated by conservation specialists. Preservation adhesives have chemistry known to be stable and inert, and they are available from suppliers of conservation materials, such as Conservation Resources, Talas, Test Fabrics, University Products, and others.

Polyvinyl Acetate (PVA)

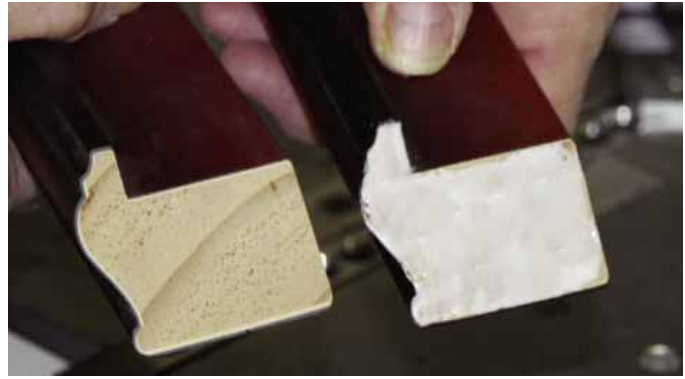
For joining frame corners, liquid PVA wood glues are the most commonly used, including CornerWeld, Maxim, TiteBond, Elmer's, and other wood glues available from framing distributors. When PVA wood glue is properly used and fully dried, which usually takes overnight, it offers durable bonds that may actually be stronger than the wood. They are slightly flexible and resistant to the stresses and minor impacts expected in normal handling and display. PVA glues are also considered permanent, although most of them will soften if soaked in water. Dried PVA glue usually can be removed from a frame finish by wiping with a damp microfiber cloth or brushing lightly with a dampened toothbrush.

White and yellow wood glues are available in several varieties to suit all sorts of woodworking applications. White glues are most commonly used by framers and

Gluing Corners

Joining frame corners is one of the most fundamental tasks in framing, but many framers have difficulty with that, as evidenced by questions such as, "How can I get stronger miter joints?" or "What is the strongest frame glue?" Usually, weak frame corners are due to issues other than the adhesive. Here are some useful tips:

1. Make sure the frame corners fit together with no gaps. Incorrect miter angles may result from improperly adjusted cutting tools.
2. Sand away burn marks, which typically are caused by dull saw blades, especially on hardwoods. Burn marks seal the surface and impede absorption of the glue into the end-grain.
3. Miter surfaces need to be clean and have no residue of sawdust, cutting lubricant, skin oil, hand lotion, or other contaminants. If you use markers to color the edges of miters, avoid coloring any of the area to be glued, since the glue would not bond as well to the colored surface.
4. Apply a thin film of glue over the entire surface of a miter. Do not place a spot of glue in the center and expect that it will spread across the whole surface when clamped because that usually won't happen. A 20 percent reduction of glued miter area can significantly weaken the strength of the bond. If a small amount of glue oozes out, use a damp cloth, paper towel, or toothbrush to remove it before it dries. Nearly all modern frame finishes will easily withstand this gentle cleaning process.
5. Complete the joining process within the glue's open time and, once the corners are joined, allow the glue to set up undisturbed. Any movement of the surfaces during the set-up time can weaken the bond. Most frame glues require at least half an hour to achieve workable bonding strength and several hours to dry fully.



Apply a thin film of glue over the entire area of the miter. Applying only a spot of glue in the center of the miter usually is inadequate, as the glue may not flow over the whole surface when clamped.



When clamped, a small amount of glue usually oozes from the miter joint, which is easy to remove using a dampened cloth, paper towel, or toothbrush while it is still wet.

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surface, let it dry, then activate the bond using heat from a drymount press or an iron. If the fabric is heavy, perhaps it could be applied while the glue is wet or just beginning to set up. Since fabric adhesives are thicker than frame glue, they have fewer tendencies to soak through. Fabric glues are also suitable for attaching dust-cover paper to a frame back, and most could be used for frame miters, as well.

Ethylene Vinyl Acetate (EVA)

Several variations of EVA adhesives are available from suppliers of conservation materials. They are suitable for joining miters and for most of the other uses of PVA in framing. EVA glues are generally water soluble and, since they are usually formulated for preservation applications, they generally contain fewer additives that could be chemically unstable or reactive. When water-solubility (reversibility) or chemical stability is important, such as inside preservation framing, use EVA instead of PVA.

Cyanoacrylate

The brand name Super Glue has become a generic term for cyanoacrylate, also known as CA adhesive. This type



To bond layers of mats, use dots of glue, such as the acrylic gel shown here, in addition to a few small spots of ATG (circled for clarity). The dots of hard-setting glue hold better, cost less, and the layers can be separated easily in the future. ATG alone can flow and fail, since activating the bond by pressure or burnishing through the mat layer would be difficult. This same technique works for shadowbox mat-walls.

of acrylic resin adhesive polymerizes in the presence of moisture, so its curing time is affected by humidity in the air and moisture content of the materials being bonded. Since the wood and paperboards used in framing contain some moisture, CA glue bonds quickly in framing applications. CA glue creates very strong bonds, but some care is required in its use. If any of the glue oozes out of a corner during frame joining, it would

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ruin most frame finishes. Cyanoacrylate glue has not been marketed as frame joining glue in the past, but Framebond, a new formulation of CA for frame joining, is being introduced as of the WCAF Expo.

Acrylic Medium

Acrylic medium is commonly used by artists to condition acrylic paints, and it comes in several versions of liquid and gel. Similar to PVA and EVA, acrylic mediums are water-borne polymers that dry quickly when used to bond porous surfaces. However, acrylic medium is free of invasive chemistry, so it is suitable for preservation framing. It can also be heat-activated after drying, which makes it a suitable adhesive for fabrics as well as for paper and other porous materials.

Wheat or Rice Starch Paste

The same adhesive used for preservation hinge mounting—starch powder cooked in water—can also be used for purposes unrelated to mounting, such as bonding paper surfaces throughout the inside of the frame. Especially for preservation framing, freshly cooked starch paste is suitable to attach multiple mat layers

together, which may be necessary to make 8-ply, 12-ply, or thicker mats. Starch paste can also be used to attach float-mount spacers to a backing board or to assemble matboard and foamboard layers into shadowbox walls. Its main advantage is chemical stability, which results in very durable, long-term bonding. Since the adhesive consists only of natural cellulose, its bonding strength is limited, so starch paste is not suitable for anything under significant weight or stress, such as frame miters.

Hot-melt Glue

Hot-melt glues are most suited to applications where immediate hardening is desired. For example, when embedding metal formed-rod mounts in a fluted polypropylene mounting board, hot-melt glue enables the adhesive to harden while the mount is manually held in the correct position. Hot-melt glue can also be used for shadowbox mat walls and mount spacers, but waiting for the gun to heat up might take longer than for a liquid glue to set-up.

Silicone

Silicone sealants and glues are suitable for non-preserva-


Adhesives for Non-Mounting Framing Applications

	Okay for preservation?	Type of Adhesive	Bonding Attributes	Comments
Acrylic Medium	Yes	Water-borne polymer; liquid or gel	Permanent; porous materials	Can be used as a heat-activated adhesive
Cyanoacrylate (CA)	No	Reactive liquid; can off-gas	Permanent; quick-bond; Plastic frames and most other materials	Aka Super Glue; Dispensers troublesome; bonds skin
Epoxy	Yes, when fully cured	Reactive; various viscosities; Mix two parts	Permanent; most materials; cures solid	Time-consuming; Cannot be removed
Ethylene Vinyl Acetate (EVA) Polyvinyl Acetate (PVA) Fabric Glue (PVA)	Yes, if formulated for conservation	Water-borne polymer; Liquid; various viscosities	Permanent; water-resistant; Porous and textured surfaces	Convenient to use; dries translucent
Hot-Melt	No	Heat-activated	Permanent; Most materials; cools to solidify	Difficult to control application; Heat can harm some materials
Polyurethane	No	Reactive liquid; can off-gas	Permanent; reacts to moisture; dries solid; Most materials	Aka Gorilla Glue; Foams as it cures
Silicone	No	Silicone; various viscosities	Permanent; most materials; water-proof	Off-gasses until fully cured; no removal from most surfaces
Starch Paste	Yes	Starch powder from wheat or rice; cook with water	Natural cellulose; bonds paper and other porous materials	Good for non-mounting uses Simplest adhesive; Chemically inert



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tion framing applications when bonding non-porous surfaces, such as glass or metal. Silicone is also useful when a transparent adhesive is needed for structural supports inside a frame. Because silicone glues off-gas during curing and for some time thereafter, they are generally not suitable for preservation framing.

Epoxy

For specialty applications in a frame, epoxy adhesives can be useful. They usually require mixing two reactive parts immediately before use and have a definite open-time for applying and handling. The main advantages of epoxy adhesives are bond strength, hardness of the cured adhesive, and the ability to mix for either fast or slow set-up time. Other adhesives often will work without requiring special mixing and handling, but framers may prefer epoxy for applications like encapsulating screws in hollowed-out, oversized screw holes in old wooden frames. An epoxy might also be the best adhesive for permanently attaching metal hanging hardware to the back of a metal or ceramic decorative object. As for preservation, epoxy adhesives off-gas during curing but are inert once fully cured. So avoid fitting a preservation frame until after the epoxy has fully cured.

Polyurethane

Polyurethane adhesive (a.k.a. Gorilla Glue) is a reactive adhesive that dries very hard. It can be used for some specialty bonding applications and, unlike epoxy, does not require mixing. Polyurethane's applications in framing are limited due to the unpredictable foaming action of the glue during curing. This foaming can fill voids between the surfaces to be bonded, which makes this type of glue desirable for highly textured surfaces like brick or concrete block. Polyurethane glue foams more in humid conditions or when bonding materials have high moisture content. For example, if frame corners were joined using polyurethane glue, some of the foaming adhesive can ooze out onto the frame finish, depending on the humidity and the moisture in the wood. The foam residue could be chipped off after completely cured, but the frame's finish would probably be ruined.

Cost

While material cost is always a consideration, saving a

few pennies per frame by using a less suitable adhesive could be false economy. The cost of an adhesive is rarely a determining factor, since the adhesive costs are a small part of material costs. In some cases, such as using a drying-type glue instead of ATG for dustcovers, using better adhesive can save money.

Storage Conditions and Shelf Life

Most adhesives last a long time under normal conditions. However, water-borne adhesives react to extremes. If a frame glue seems to dry slowly in winter, when the moulding pieces have been stored in cold conditions or the joining room is uncomfortably cool, don't be alarmed. Temperature affects drying time, but the adhesive will eventually dry with normal strength. To maintain quick set-up times, keep frame glues in a comfortably warm room. Conversely, an environment that is too warm can accelerate drying, which can partially dry the glue in the bottle.

If a water-borne adhesive becomes frozen, throw it away. It may turn watery or separated, or it may appear unaffected, but freezing generally ruins the bonding strength. That's why most suppliers won't

ship frame glue in freezing weather.

Even under ideal conditions, liquid adhesives have a finite shelf life, though most containers don't have expiration dates. It's a good idea to write the date of purchase on glue containers and rotate your stock to avoid having to use old glue. Generally, buy only as much liquid glue as

you can use in a few months. Some types, such as polyurethane, dry in the bottle within a few months, so buying a large bottle can be a waste of money. Also store bottles of liquid glue with their dispensing

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nozzles down to eliminate air, which can cause accelerated hardening.

If you're tempted to stock only a few adhesives or use a substitute because you don't have the right

one on hand, consider the immediate issues, such as ease of use, drying time, and cleaning up accidental residue. Remember, even when preservation is not an issue, using the wrong adhesive can have long-

term consequences. Especially in preservation framing, use only adhesives known to be suitable and are available from suppliers of conservation materials. ■

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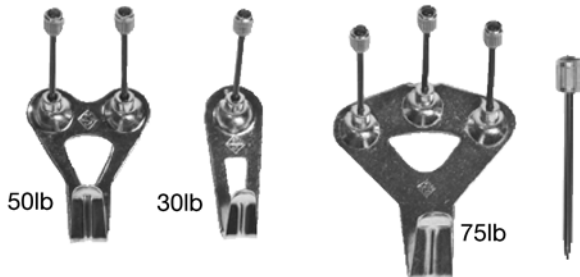


James Miller, MCPF, GCF, founded his framing business, ArtFrame, Inc., in suburban Columbus, OH, in 1988, where he specializes in the preservation framing

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