

Using Glues for Mitered Joints

By James Miller, MCPF, GCF

*Using the right glue
with mechanical fasteners
will result in better joints.*

Production framing starts with neatly mitered corners, which are tightly joined and stay that way. No matter what kind of moulding is used, two elements are essential to achieve the desired result: glue and mechanical fasteners. Both serve important purposes.

Some framers think it is okay to skip the gluing, that fasteners alone can make tight corners. For a short time or for small enough frames that might be true, but fasteners do work loose over time. They have a relatively small area of contact with the moulding and are held in place only by the pressure of driving them into the moulding. Without glue, normal cycles of expansion and contraction can cause slight but constant movement between the mitered surfaces. In addition, the stresses of shipping and handling can create even more movement between un-bonded surfaces, causing the tight fit of fasteners to loosen over time, allowing corners to gradually open up and eventually come apart. It's always safer to glue joints.

Wood Moulding

Glue should be applied to the entire mitered surface; the more bonded area the better. All modern white or yellow wood glues are suitable, most of which are water-based polyaliphatic resin adhesives, which includes polyvinyl acetate (PVA). These are very strong and generally flexible enough to maintain a bond with the wood's fibers for many years, even with the typical stresses of expansion and contraction and handling. Wood glues are water-soluble when wet, so it is easy to clean up a little overflow that might ooze from freshly mitered corners. You can also use a soft toothbrush, moistened if necessary, to gently remove any wet glue



residue from the cracks and crevices of a profile.

Bonding begins as the glue soaks into the grain. Set-up is the first stage of drying, during which the glue starts to harden. A frame can withstand gentle handling at this point, but any movement or flexing of a glued joint itself

during this stage would permanently weaken the bond. After set-up, the glue continues to dry and slowly achieves its full strength, usually within a few hours or overnight.

Drying time varies among brands, so select one that is most compatible with your framing production. A glue's instructions for use will provide information on its drying time. While faster drying may seem better, this is not necessarily the case. Remember, it is important for a glued joint to remain undisturbed during the set-up period. If a fast-setting glue is used, handling may weaken the bond before the frame is fully assembled. When glued joints are weak, movement during set-up is often the culprit. Frames assembled with slow-setting glue may be handled for a few minutes before the glue dries to the point where handling would weaken the bond. It's okay to handle a freshly joined frame while the glue dries—so long as it's done with care.

For the strongest wood joints, pre-glue. That is, apply a thin wipe of glue on each surface and let it dry a moment, until it is only slightly tacky. Then proceed to glue and join the corner normally. This is especially helpful in joining very porous wood. Pre-gluing seals the grain and prevents having a "starved" joint, in which the wood absorbs so much moisture from the glue that there isn't enough left on the surfaces to create a strong bond.

Modern wood glues remain chemically stable and

| Adhesive | Category | Attributes | Limitations | Materials |
|-------------------------|----------|--|--|--------------------------------|
| Polyvinyl acetate (PVA) | Drying | Suitable for porous surfaces such as wood; usually yellow or milky-white; may be fast or slow drying; may be pH neutral; usually may be remoistened & reversible with water. | Exact formulations are proprietary and unknown; may be susceptible to freezing damage. | Wood and MDF |
| Polyaliphatic resin | Drying | Same as PVA | Same as PVA | Wood and MDF |
| Cyanoacrylate | Reactive | Bonds instantly; available in thin liquid or gel form; bonds permanently to most surfaces. | Dispensers troublesome; will adhere skin; costly. | Polystyrene. Also Wood and MDF |
| Polyurethane | Drying | Strong adhesive; bonds to most surfaces; expands to fill surface voids; non-migrating. | Permanent bond not easily removed; difficult to control flow. | Wood and MDF |

strong for a long time; they do not deteriorate or “dry out” as older glues did. When a properly glued and fastened corner loosens at some point in the future, it probably won’t be the fault of the glue. Stress usually causes that sort of failure, such as radical expansion/contraction cycles or severe impact, which forces a separation of the wood’s fibers. The glue bonds most of the fibers on the surface of the wood, but those glue-laden fibers may be pulled away from the rest of the wood. When looking at the glued surfaces of a failed joint, you can usually see wood fibers still securely attached to one or both of the glued surfaces. In these cases the glue did not fail; the wood fibers did.

MDF Moulding

MDF is a wood product and has many of the same characteristics as natural wood. While wood glues work well with MDF and the same general rules apply, MDF has a few unique issues. For example, it is heavy and dense, but moisture makes it swell up. This can weaken and even disintegrate its fibers. So, when water-based glue is applied, the mitered surfaces swell ever so slightly, generally soaking up more moisture than natural wood, making starved glue joints more common with MDF. Pre-gluing is best, as described above.

Polystyrene Moulding

As plastic picture frame mouldings continue to improve in quality and selection, so does their popularity. In some ways, extruded polystyrene is a better material than wood for picture framing, so framers should be acquainted with it. A variety of finishing techniques work well on polystyrene. It is inexpensive to manufacture, easy to cut and join, and its light weight minimizes shipping and handling costs. It is also unaffected by humidity and will not warp unless exposed to high heat.

Water-based glues commonly used for wood and MDF will not work on polystyrene moulding because it is not as porous. Gluing polystyrene is best done with cyanoacrylate, a.k.a. “Super Glue,” which creates a bond by melting the surfaces together. A framer needs to be careful to apply the glue only on mitered surfaces, and sparingly at that. A moulding’s finish can be immediately and permanently damaged by an accidental ooze or spot of glue—even if wiped off. Cyanoacrylate glues dry quickly and are available in several consistencies, such as “thin,” which is watery, and

“gap filling,” which is a thick gel. Once glued, the corners may not be disassembled, as the glued area is stronger than the plastic itself.

An All Purpose Adhesive?

Adhesives designed for the materials to be joined usually work best. But if you use wood, MDF, and polystyrene and want a single adhesive that works on all three, there are only two practical choices. Cyanoacrylate will bond almost anything and is reasonably easy to use on all kinds of mouldings—if you don’t mind accidentally ruining an occasional moulding finish. The other choice is polyurethane, a.k.a. “Gorilla Glue.” It works on almost any material, and its bond is stronger than the other adhesives. It’s also more difficult to use.

Moisture initiates polyurethane glue curing. That is, it takes longer to harden if a surface has a low moisture content and faster if the moisture content is high. Spraying water on one or both surfaces speeds up the curing time and makes it more predictable. But the set-up time is still long, and curing takes hours. As polyurethane glue cures, it also expands to about five times its original volume, which makes it difficult to determine the correct amount to apply. The glue bubbles up as it expands and may ooze from mitered joints. When this happens, it is difficult to remove the excess without damaging the moulding.

No matter which kind of moulding you join, glue is a partner of mechanical fasteners. In the first minutes after joining a frame, when movement could weaken the glue joint, fasteners hold the corners tight, allowing the frame to be gently handled during the glue’s set-up period. Mechanical fasteners also prevent catastrophic failure later in case a glue joint fails. Gluing is a simple process, and a little attention to using the right type of glue and applying it in a way that matches the moulding will result in better joints that will keep clients and end users happy. ■

James Miller, MCPF, GCF, founded his framing business, ArtFrame, Inc., in suburban Columbus, OH, in 1988, where he specializes in the preservation framing of art, heirlooms, and three-dimensional objects. He is also an accomplished calligrapher. Miller, who holds a Bachelor’s degree in Business Administration, has served as chairman of the PPA Certification Board, where he helped develop the MCPF exam, and has been chairman of the FACTS Education Committee. He also teaches at numerous industry venues and writes regularly for PFM.