

Surviving Glue-Ups



A guide to stress-free gluing and clamping

BY GARY ROGOWSKI

No movie chase scene could provide as many heart-pounding thrills as gluing up a project in the workshop. After weeks of effort and preparation, all of your careful work comes down to 15 minutes of heart-palpitating frenzy. Few other things in life can compare to this, except perhaps getting to the airport late for your flight.

Just as there are strategies for milling lumber and cutting joinery, there are strategies for gluing that increase your chances of success. Organizing your tools beforehand, planning for contingencies, gluing up in stages, applying glue intelligently, and practicing assembly techniques will help you to avoid most of the stress of glue-ups. Notice that I did not say all

GLUE

Which type of adhesive to use depends on several factors: strength, open time, clamp time, and appearance. For 90% of my projects, yellow glue has proven to be great. However, it has a short open time so you must be prepared to work quickly once you wipe it on.



Essential clamps and supplies

Like everything else in woodworking, successful assembly depends a lot on having the right gear. This includes the right type and number of clamps, the right clamp pads and cauls, the right mallet, and the right gluing accessories.



LIGHT-DUTY CLAMPS

For simple assemblies, spring clamps will suffice. For slightly larger glue joints, small, sliding-arm bar clamps will work. Have an array of these from 6 in. to 18 in. in length.



HEAVY-DUTY CLAMPS

For bigger jobs like pulling together frames, carcasses, or panels, you'll need heavy-duty bar or pipe clamps of sufficient size and length. Use a threaded pipe coupler and pipe that is threaded at both ends to make two shorter bar clamps into a long one.



BAND CLAMPS

Use band clamps for glue-ups of everything from chairs to mitered picture frames.



C-CLAMPS

C-clamps put a lot of pressure in a small area, and work for both light- and heavy-duty clamping. Be sure to use clamping pads, as C-clamps can mar the work surface.

HAND SCREWS

Wooden hand screws won't mar the workpiece, but practice closing them before the glue-up. They can provide light to moderate pressure over a wide area.



DEADBLOW Mallet

Persuasion comes in many forms. Rather than using a framing hammer and a block of wood to protect the work surface, use a deadblow mallet. They pack a wallop without leaving marks.

CAULS

Clamps often need help to do their jobs properly. Clamping cauls vary from thin, protective pads to curved and angled pieces that redirect or distribute clamping pressure. Use cauls made of melamine or cover the cauls with tape so glue won't stick to them. Thin, flat strips of wood will protect your project, while thicker cauls will spread clamp pressure. Save your bandsawn offcuts to act as shaped cauls.



GLUE BOAT AND STICKS

To make the glue accessible, use a glue boat of some sort—a plastic lid, a folded-up piece of cardboard. To avoid getting glue on your fingers, spread it with wood sticks.



Case work

DOVETAILED CASES: APPLY GLUE SPARINGLY



Avoid squeeze-out inside the case. Apply glue to the cheeks of the pins and tails, but put only a dab on the outside edges of the end grain. Drive the joint home with a deadblow mallet, which won't mar the workpieces. Wipe away the squeeze-out before clamping.



of it. Most of these important factors come under the heading “preparation.”

Preparation is the key to success

The assembly of your project may be the most important job you face during its construction. Before you squeeze out any glue, check that your assembly tools are at the ready. This will save you precious time during glue-up. It also may send you to the store to get the right tools for the job.

A lamentable truth is that you will never have enough clamps. Get over it; it's true. Choose clamps appropriate for each job, and buy as many heavy-duty ones as you can afford. Before using clamps, unscrew them as much as possible so you have plenty of adjustment available, and arrange them so that the head and tail stops are at the proper distance.

Different clamps have different jaw depths. Put clamps on your project to check that you'll get pressure where you

need it. Make sure any caul or clamp pad you use is free of dried-up glue. Nothing dents wood as well as that hard old stuff.

This may seem simple, but number the parts clearly so there is no confusion when you are under the gun. There is no worse feeling than finishing your clamping only to discover that tenon A is in mortise C. Use big, bold letters or numbers. You won't have time in the midst of your gluing frenzy to look for neat little script.

In every case, do a dry run to make sure everything is in order beforehand. Check the parts to see that they are not twisted or bowed by the clamping pressure. Adjust the pressure to keep frames flat while still pulling them tight at the joints. This may mean changing the position of the clamp heads.

Just enough glue, just where you need it

The age-old question asked by most new woodworkers is: How much glue should

I use? The age-old answer is: Just enough. Unfortunately, experience is the best teacher. I used enough glue on my first large bookcase to glue three of them together. More glue is not usually better, and the cleanup can be time-consuming and difficult, especially if you are following with a finish (such as oil) that highlights glue residue.

A little bit of squeeze-out is what you're shooting for in most situations. Let the glue dry until it's reached a plastic state. Then it can be lifted from the surface of the wood with a sharp chisel or scraper. Do not wet a rag and smear the glue around unless you're painting the piece or you have no other choice. If the glue does dry completely, you'll have to get it off. Dried glue is hard, so in this case use your second-best chisel, one that you don't mind resharpening often.

The best glue joint is long grain to long grain, so don't worry about gluing



Use melamine cauls and check the diagonals. On dovetails, Rogowski keeps the long grain proud, which allows him to use flat cauls. Later, he planes the sides flush with the pins and tails. If the diagonals don't match, use a long clamp to draw the assembly square.

end-grain surfaces unless that's all you've got to work with.

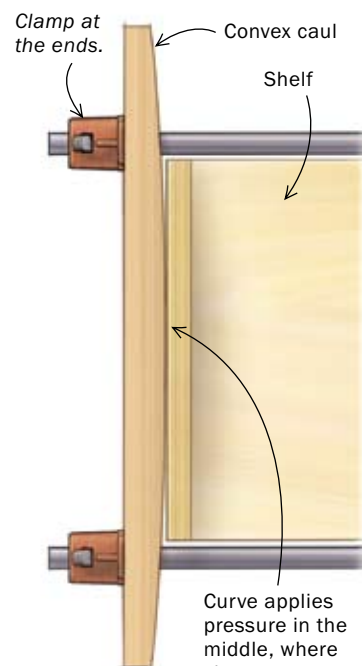
There are a variety of gluing situations, but I've drawn up a few of the more common scenarios that you'll run into. Advice on these specific glue-ups can be applied to many variations.

Dovetailed cases: Keep glue on the outside

Carcase dovetails usually need some clamping help to come together. I like to leave the long grain of the case just slightly proud of the end grain so I can put a flat caul right over the joint. If you leave the pins and tails proud, you'll have to use notched cauls for clamping. I also find it easier to plane the long grain flush than to work on the end grain of protruding pins and tails.

Dovetails can be a messy glue-up. Use melamine cauls or cover the cauls with tape so they won't become glued to the

PLYWOOD CASES: CURVED CAULS REACH ACROSS LONG SHELVES



Glue large cases in stages. Here the case is upside down, and the top panel is only dry-fit in its rabbet, while the other panels are glued. To apply pressure along the entire edge of the middle shelf, Rogowski uses a convex caul.

Miter joints

BAND CLAMPS HANDLE MOST PICTURE FRAMES

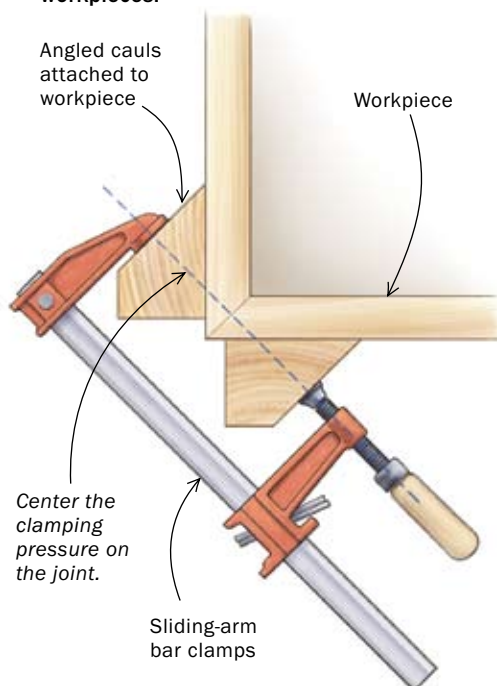
Size miters to avoid starved joints. Size is a preliminary coat of glue that seals the end grain. Scrape away any excess and wait a few minutes before applying glue again.



A band clamp makes tight miters. This one, from Jorgensen, is ratcheted tight with a small wrench.

BAR CLAMPS ARE A BETTER CHOICE FOR MITERED CASES

Use these with angled cauls to ensure that miters close completely and accurately. Cauls can be glued, taped, or clamped to workpieces.



Attach cauls onto large mitered cases. Angled cauls direct clamping pressure through the joints. If you glue on the cauls, make them out of a softer wood so they are easy to remove.

case. Put glue on all of the long-grain surfaces but only lightly touch the outer half of the end-grain surfaces with glue. Gluing the end grain doesn't help and causes a lot of squeeze-out inside the case.

Plywood cases: Curved cauls spread pressure

Everyone builds plywood boxes eventually. In some cases, you can use simple butt joints and biscuits to join the pieces. If the cabinet is going to be painted or if the sides won't be exposed, you can use screws or nails to hold the biscuit assembly together while the glue dries.

However, for maximum strength and clean looks, you probably will opt for rabbet and dado joints, and you'll need clamps for the glue-up. In that case, you'll have to plan the assembly more carefully.

For deep cases, use convex curved cauls, which will extend pressure to the center of interior panels. Curved cauls also can distribute pressure along a long edge, bailing you out if you don't have enough bar clamps. You can curve a caul with a few passes of your handplane or belt sander.

Put glue in the rabbet and dado joints, with just a touch along the end grain of the

Mortise-and-tenons

BLIND TENONS ARE STRAIGHTFORWARD



The mortises get the glue. Handle the pieces carefully so the glue doesn't drip out. To minimize squeeze-out, the tenon cheeks get just a touch of glue, and the shoulders get none.



Glue up table bases in stages. This allows you to check and adjust the flatness and squareness of subassemblies before the final assembly.

horizontals. Excess glue will squeeze out into tight corners, causing problems later. After clamping, check the diagonals and make any necessary adjustments.

Use glue size to avoid starved miters

Large, mitered solid-wood carcases will test your band-clamp supply. If you don't have enough, glue angled cauls directly onto the case and use small clamps to put pressure exactly where you need it. Attach the cauls with hot-melt glue, double-stick tape, or even a thin bead of yellow glue. If you use yellow glue, make sure the caul is a wood that's softer than your project stock. After the glue has cured, you can take a chisel and knock off the bulk of the cauls. Clean up any wood sticking to the carcass with a handplane or belt sander.

Miters soak up a lot of glue, so apply a preliminary coat of glue—called size—to close up all of the porous end grain.

I use band clamps to close up mitered picture-frame-type joints, but there are other good methods. One strategy I've used is to make thick cauls with V-cut notches in them at each end. Clamp these cauls to the two mating pieces, with the notches

THROUGH-TENONS SQUEEZE GLUE WHERE YOU DON'T WANT IT



Seal the end grain of through-tenons with shellac. The ends always wind up with glue on them, which soaks quickly into the grain, where it can interfere with the final finish. Use clamps to pull the tenon evenly and safely through the mortise. Wipe away the squeeze-out as soon as possible.



Sliding dovetails

A QUICK AND EASY METHOD FOR DRAWERS

To begin assembly, clamp the drawer face to the bench. Apply a good amount of glue to the female part of the joint but just a touch of glue to the male part.



positioned over the glue joint. Then clamp across the notches.

Blind mortise-and-tenons: Put more glue in the mortise

Different mortise-and-tenons require different gluing strategies. The two basic types involve through-tenons, which we'll deal with shortly, and blind tenons. A blind tenon ends inside the mortised piece. A good example is a standard table base.

Put glue in the mortises all the way to the bottom, with a little bit extra near the mouth. Then just kiss the tenon cheeks with glue right before pushing the joint together. Do not put any glue on the end-grain tenon shoulders or mortise ends because those surfaces won't do much holding, and you're just asking for more squeeze-out.

Make sure the rail, when assembled, is a bit higher than the ends of the legs. This way, the joinery will be easy to clean up using a handplane. Otherwise, you'll have to remove end-grain wood from the tops of the legs. Check that the legs don't twist when you apply clamping pressure.

Through-mortises and -tenons: Seal the end grain

Through-tenons squeeze their way through a glued mortise like a car through a car wash. They come out completely wet with glue. Almost inevitably, your carefully crafted tenon end will develop blotches



Use pipe clamps to drive the dovetail home. Have another one ready to finish where the first clamp leaves off. With steady, focused pressure, the joint won't bind. The small dovetailed strip taped to the drawer side protects it as it is driven fully home.



The drawer back also is dovetailed. Use two clamps to push the workpiece evenly downward. Note the small slip of wood used to align the slots for the drawer bottom.

Edge joints

STRAIGHT PIPE CLAMPS MAKE FOR FLAT PANELS



Run a bead of glue and spread it. Rogowski props the middle board against the bench to apply glue to both edges. Rubbing the edges together creates a good glue bond.

where the glue soaked in and prevented the finish from penetrating.

Plan ahead by prefinishing the tenon end and any other part of the tenon that will show. Apply several coats of thinned shellac to seal it completely, being careful to keep the finish off the gluing surfaces. Later, you can follow with any other finish. Wet down the entire tenon with glue, but put less in the mortise.

Sliding dovetails: Use steady clamping pressure

This joint makes for quick drawers (among many other uses), often with metal drawer slides placed in the extra space along the sides. But sliding dovetails can be a challenge to glue. I'm lying—they're much worse than that. If they fit properly, there's no way to get them home without applying steady, perfectly centered pressure. A clamp is better for this than a mallet, which can force the parts in crookedly, causing them to bind.

Pipe clamps offer a long screw length, which is important for keeping the joint moving steadily over a longer distance. Have two pipe clamps ready to go.

Spread glue into the female part of the joint, with just a touch on the male part, and start driving the joint home with a pipe clamp. Do not take any time to



Be sure the boards are seated on the pipes. Use C-clamps and pads to align any wayward edges. Cover black pipe at the glue joints with tape or clamp pads, so that it doesn't stain the wood.

scratch your nose; the joint will swell up and be tough to get moving again. When one clamp runs out of thread, grab another and keep that drawer side moving until it's in place. Breathe.

Panels: Check for flatness

Edge laminations should come out flat. But they will not if your assembly table is not flat, if your clamps are not straight, or if your wood isn't true. Check those things first. Have pipe clamps ready to go. To avoid staining the lumber, put tape on black pipe clamps where they contact the glue joints or use galvanized pipe.

Make sure all of the boards are numbered or the joints marked so you know how the pile of lumber goes back together.

Keep a deadblow mallet close by as you apply pressure to persuade the faces to line up. If they won't, a C-clamp on the ends will pull the faces into line. The right amount of clamp pressure for panel glue-ups is the maximum force you can apply



Let glue stiffen before removing it. Wait 15 or 20 minutes, and the gelled glue will peel off easily with a sharp paint scraper.

comfortably with your off hand (I'm right-handed, so everything is left-hand tight). Make sure the boards are sitting flat on the clamps. Bang them down if they're not.

If you are helping a friend glue up a project, you will marvel at how calm you remain while he or she is going nuts. And the reverse is also always true. So, to keep your blood pressure low, plan ahead. □

Gary Rogowski operates The Northwest Woodworking Studio, a school in Portland, Ore.