

# First-Aid for Failing Joints

*How to tackle  
common furniture  
repairs*

by Jeff Jewitt



Well-executed joinery will last a long time, but even the best joints may not hold up to the abuses of feisty 2-year-olds and careless moving companies. After the ravages of time and use, most furniture will need some sort of repair.

Recutting original joinery or replacing an entire part may not be the right course if the furniture is a valuable antique. But if your furniture is not destined to become part of a museum collection, repairing a broken joint involves dismantling it and replacing worn or damaged pieces with wood from the same species (see the photos on pp. 70-71).

No joint repair can begin until the piece of furniture has been taken apart, and well-meaning novices and poorly trained professionals who worked on the piece earlier can make your life difficult. Nails, screws and metal brackets are often installed on loose joints in an effort to repair them. Glue is dribbled into partially opened joints, and hot-melt glue is used too often. Many production furniture pieces were pinned with small finishing nails to hold glued joints together until they set, eliminating the need for clamps, but making disassembly a chore.

## **Remove fasteners, and soften glue joints**

Fasteners need to be removed so the joint comes apart easily. To pry out small nails, regrind the outer jaws of pincers to grab nails set flush with the surface (see the photo at left on the facing page). I find that it's best to leave nails set below the surface rather than push them through. This will split the mating piece when the joint is pried apart, but that's easier to repair than the damage done to the visible surface of the wood.

With old flat-head screws,

make sure the tip of the screwdriver fits snugly in the slot to avoid stripping the head. I keep an old driver on hand that I regrind for a custom fit. For frozen screws, hold a screwdriver in the slot, and heat the shank of the screwdriver with a propane torch to transfer the heat to the screw (see the far right photo). After the screw cools, it should come out easily. A screw extractor is the last resort.

Prior to the mid-1940s, hot animal hide glue was the standard for furniture assembly. After that, polyvinyl acetate (PVA) glues took over. A simple test will tell you which glue was used. Place a drop of hot water on the glue, and wait several minutes. Hide glue will become sticky, and PVA glues will turn a milky white (see the bottom left photo).

One attractive characteristic of hide glue is that it is reversible. It can be softened with water and heat or crystallized with denatured alcohol for really stubborn joints (see the bottom right photo). And new hide glue will bond to old glue. This means that joints originally glued with hide glue do not have to be scraped to bare wood to get the new glue to stick.

PVA glues are very difficult to remove, but wetting a joint with hot vinegar often loosens it enough to wiggle it apart. PVA glue does not re-bond to itself, so you must scrape it off to the bare wood. Follow the hot vinegar with a brass bristle brush to clean off residue.

Because of previous attempts at repair, you may encounter other glues: epoxy, urea-resin or cyanoacrylate. None of them can be softened to aid in disassembly, but most will break at the glueline with a soft but sharp hammer blow delivered with a rubber mallet.

Besides diagnosing the kind of glue that was used, you need to know the type of joint



*Pincers ground flat, like those on the left, will grab nails set almost flush to the surface.*



*Heat a frozen screw by torching the shank of a screwdriver held in the slot of the head. Once the screw is cool, it's easy to remove.*

that needs repair. With few exceptions, it's probably one of the three most common joints used in furniture construction: mortise and tenon, dowel or dovetail.

### **Mortise and tenon**

Because a mortise and tenon joins wood with grain at right angles, expansion and shrinkage eventually cause the glue to fail, loosening the joint. Cabinetmakers have known this for centuries, so variations

of the standard joint have been devised. When a standard mortise-and-tenon joint fails, it is easy to disassemble by deactivating the glue and pulling the joint apart. When the joint is pegged or wedged, it will be loose, but it will still hold together. To disassemble these joints, the pins or wedges must be removed.

*Through, blind and offset pegs—Pegs that go completely through the joint and come out*

the other side can be tapped out. On old furniture, these pegs were usually tapered and driven into place from the show side, so tap from the back side. If the pegs can't be tapped out easily, then drill them out.

Pegs that don't go through to the other side must be drilled out if they can't be pulled out with pliers. Later, when replacing them, use pegs of the same species and hand-whittle them to duplicate



*A simple test identifies glue. Water turns PVA glue white and makes hide glue sticky. Knowing which type was used makes taking furniture apart much easier.*



*Alcohol crystallizes hide glue. The author wicks denatured alcohol into a dovetail joint, weakening the bond.*



*A broken tenon can be rebuilt by drilling out what's left and gluing in a new piece. Veneer can be used to build up the tenon to the correct thickness.*

original construction. It's worth repeating that on valuable pieces, this should only be done if the primary consideration is restoring structural integrity.

Pegs that are driven in offset holes in the tenon are impossible to distinguish from blind or through pegs unless the joint is taken apart. You will rarely have to repair this joint because it won't loosen enough to be a structural problem—unless the surrounding wood becomes weakened through rot or wood worm.



*Adding a new tail—To replace a broken tail, define the angle of the saw cut into the piece by following that of the original joint. The long V-shaped cut allows plenty of glue surface for a good grab.*

### **Wedged through tenons and blind tenons—If a**

through tenon does not pull apart easily when the glue is deactivated, the tenon may be wedged. In most cases, wedges will be of a contrasting or slightly dissimilar wood and should be easy to see. You can pull them out after drilling small holes into the wedges. In some cases, the wedges are made from the same wood and are difficult to spot. In this case, you'll need to drill two sets of holes with a  $\frac{3}{32}$ -in. drill bit at the top and bottom of each tenon. That should be enough to collapse the tenon as you pull it out of the mortise.

### **Rebuilding mortises and tenons**

If you scraped away a lot of wood to remove the glue, you may need to build up the cheeks of the tenon to get a good fit. Simply glue two pieces of veneer cut slightly oversized to the tenon cheeks, orienting the grain in the same way and using wood of a similar species. Don't add veneer to one side only: It will offset the tenon.

When a tenon is broken off, it must be rebuilt (see the photos above). Cut away the

broken parts flush to the shoulder, and drill a series of holes 1 in. to  $1\frac{1}{2}$  in. deep, using a drill bit of the same diameter as the width of the original tenon. Chop out the waste, and cut a new piece of wood to splice into the old one, using the original mortise to size the thickness.

Round tenons, often found on chairs, are another matter. Rarely does the design provide enough meat to accept a dowel of the same diameter as the tenon. To repair these joints, cut off the tenon, and glue on a new piece of oversized wood with a scarf joint. The new piece is then planed and spokeshaved to the original profile (see the photos at right).

### **Dowels often need to be replaced**

Since the mid-1850s, dowels have been used as replacements for mortise-and-tenon and dovetail joints. Though despised by purists, properly installed dowels create strong and durable joints. But contrary wood movement will sometimes loosen dowels until they need to be reglued or replaced. Some dowels will simply loosen because the grain of the dowel is at a right angle to the grain of the furniture component. If the joint is already loose, it can usually be tapped apart with a soft-faced mallet and then reglued.

If a dowel breaks, it must be drilled out and replaced. The new dowel must seat exactly like the old one to avoid misalignment of the joint. Here's how I do it: Cut the old dowel flush to the surface of the workpiece (held in a padded vise). Using a brad-point or Forstner bit slightly smaller than the diameter of the dowel, drill out the center. When the bit reaches the bottom of the dowel hole, you'll feel the bit slip a little,



and you can stop. Using a gouge with a sweep that matches the dowel's circumference, pare the excess dowel away from the sides of the hole. To remove the waste, run a drill bit of the same diameter as the new dowel backward into the hole. That keeps the bit from catching and ripping the hole apart.

To check the fit, don't use new dowels; they can seize in the joint and become difficult to remove. Use dowels that have been pared or sanded, so



## LEG REPAIR

*Repairs to a broken tenon on a rocker chair leg start with a no-going-back slice that removes the bottom of the leg (1). The cut is made at 30° or less. On a piece of wood of the same species, the author sketches out a replacement part (2), cuts it out and glues it to the end of the leg with a scarf joint. To shape the new tenon at the end of the leg, the author starts with a plug cutter (3). With the size of the tenon established, a fine-tooth saw (4) is used to make a light cut around the leg and define the tenon shoulder. A chisel pares the tenon down to its finished size (5). Careful staining and finishing will blend the new leg (6) with the rest of the rocker, making the repair virtually invisible.*

they're easier to remove after a test-fit. Replace those with full-sized dowels for final glue-up.

### **Dovetails: through, half-blind and sliding**

These classic joints form a mechanical lock in addition to the glue bond. Like the mortise and tenon, dovetails come in several variations. The most common versions found on furniture are through, half-blind and sliding. Through dovetails are found on carcasses and drawers. Half-blind

dovetails are the traditional favorite for drawer fronts; sliding dovetails are used for table legs and on chair crests.

The biggest problem with these joints is often a broken pin or tail. After disassembling the joint, a new piece is spliced in and then pared down until it fits with the mating joint (see the bottom left photo). With sliding dovetails, like those where legs join the column of a candle stand, the biggest problem occurs when a leg is racked until the guideline

cracks. Because there's rarely any structural damage to the wood, repairing the joint is easy, but getting it apart is not. Drilling small holes down the outermost points of the male portion of the joint and injecting alcohol or hot water into the holes will usually coax the joint apart.

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