

The **Secret** to Making Perfect Joints

Trim hidden areas to quickly produce a flawless fit

BY STUART LIPP



It is a common misconception that fitting a joint means methodically paring the entire area until all the surfaces match perfectly, but in many cases, wood needs to be removed only from hidden surfaces to allow a joint to close completely. I call this technique undercutting.

Do not mistake undercutting as taking the easy way out; undercutting is part of being a conscientious and concerned woodworker. The secret is knowing when to employ the technique. First, dry-fit a joint. Then decide if undercutting is the best option, or the entire joint needs trimming.

Undercutting can mean a few different things, but it usually involves angled relief cuts on surfaces that are not essential for glue strength. For example, when fitting a mortise and tenon, rather than planing the entire shoulder just chisel out the inner surfaces. By the way, if you undercut a joint and it still needs trimming at the edges, you have less material to remove.

I'll show you ways to apply undercutting to a wide variety of joints and situations. Over the past few years I have noticed myself employing this method more frequently, and in every situation the result is improved quality in far less time.

Stuart Lipp lives and works in New York City, where he oversees the construction of custom and limited-edition pianos at Steinway & Sons.

TRIM SHOULDERS ON MORTISES AND TENONS



Gap-free table legs. Undercutting is an efficient method for improving the fit of a mortise-and-tenon joint.

Mortise-and-tenon joints employ two forms of undercutting. The most well known is to make the depth of the mortise greater than the length of the tenon, giving excess glue a place to go and allowing the joint to close. But what if the tenon shoulder still does not fit well? You can spend a lot of time with a chisel or shoulder plane trying to pare a perfect 90° shoulder, or you can quickly undercut it.

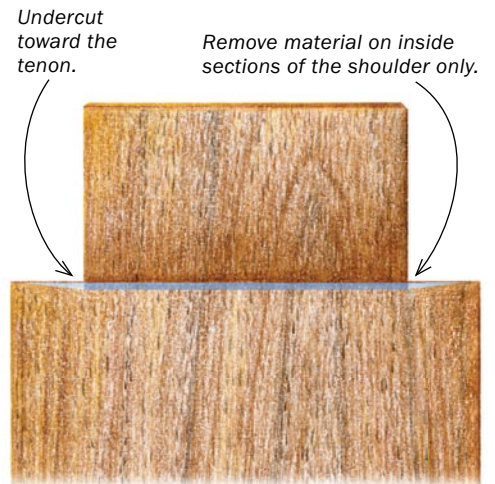
Put the workpiece in a vise, tenon up, and use a chisel to pare the end grain in from the edge of the shoulder to the tenon. Remember to keep the outermost edge crisp. Undercut enough material for the shoulder to fit, but be careful not to take too much; a 1/32-in. bevel should be more than enough. Do this all the way around the shoulder and you will improve the fit of the joint. The technique is not magic—you still may need to pare the visible edges—but undercutting leaves less area to fit.



Undercut tenon shoulders. Use a chisel to cut a slight downward bevel (no more than 1/32 in.) on the tenon shoulder.



Carry the bevel around the shoulder. Work your way around the perimeter of the tenon, leaving the outermost edge intact.



BACK-BEVEL DRAWER PULLS



Flush-mount. Pulls should sit flush against a drawer front.

Turning your own drawer pulls can elevate the look of a piece of furniture, but not if the pulls don't fit tightly to the drawer front. A very quick and easy way to accomplish this is to turn a slight hollow in the back side of the shoulder, leaving the outer edge untouched. You will be ensured a nice, tight joint.



Undercut toward the screw hole.



Undercut toward the tenon.

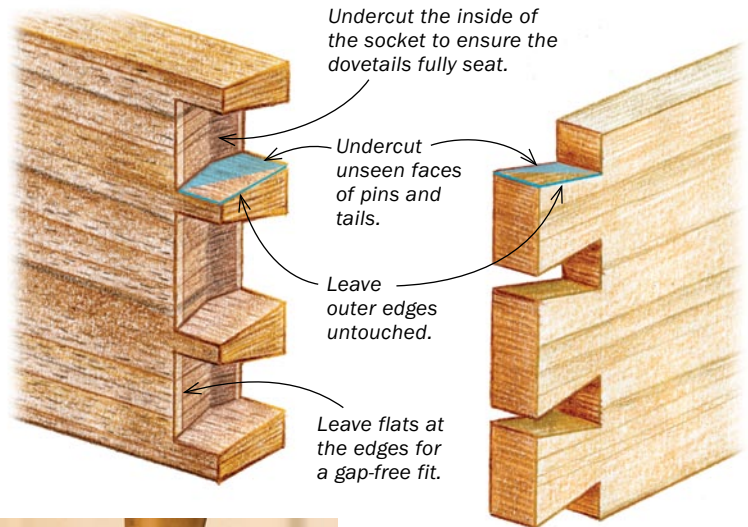


One-touch technique. Use a skew chisel to undercut a pull while it is still on the lathe.

UNDERCUT DOVETAILS

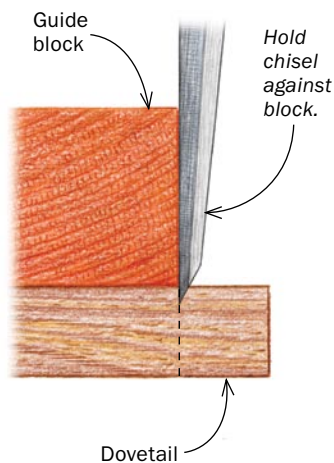


Good fit where it counts. As long as the outer edges of the tails and pins are kept clean and tight, the dovetail is aesthetically correct.



1

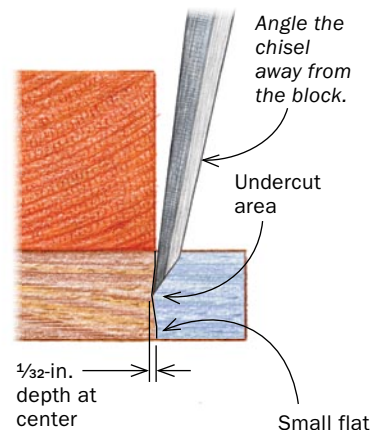
START WITH A VERTICAL CUT
Clamp a guide block to the baseline. Make the first chop with the chisel against the block to establish a flat at the edge.



2

ANGLE THE CHISEL SLIGHTLY TO UNDERCUT THE JOINT

Angle the chisel away from the block for subsequent chops. At the halfway point, flip the board and repeat on the other side.



Hand-cut dovetails can be a measure of a craftsman's skill; they also can frustrate and overwhelm. Undercutting dovetails allows for more precise joinery with much less fussing.

Not every face of a dovetail or pin is visible, so the most important edges are the outer ones. First, the bottoms of sockets can be undercut while simultaneously being chopped (see drawing). When doing your final fitting, you can always take a larger shaving from the bottom side of a dovetail or pin. Doing this creates a slight wedge, and as you hit the joint home you will see it getting tighter and tighter. Don't worry about joint failure or lack of strength. The joint will have great contact, plenty of glue surface, and the inherent mechanical strength of the dovetail.

Focus on hidden sections.
The key to paring dovetails? If you won't see it, undercut it.



ANGLE MOLDINGS

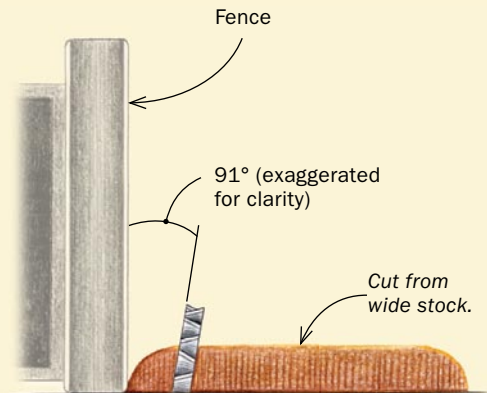


Easy-fit molding. Cutting edges at 91° and chamfering the back corner allow for a flawless fit on molding details.

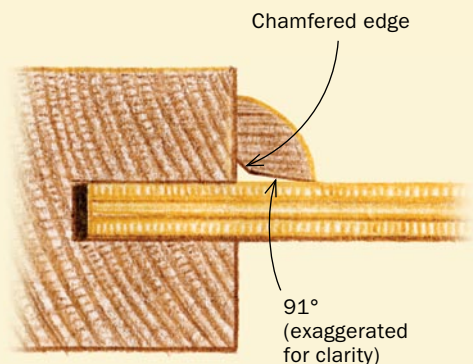
I was making some cabinet doors recently that had flat panels and an added detail of quarter-round molding glued into the step between the panel and the frame. When I milled the molding, I cut the edges intended for the step at 91° instead of the standard 90°. This technique not only guaranteed a nice tight joint at the two visible edges, it also created a recess on the inside that trapped extra glue, thus reducing squeeze-out and minimizing cleanup. I also used a block plane to put a slight chamfer on the molding's inner corner for additional clearance.



After the profile is cut, rip the molding to thickness with the blade set at 91°.



Chamfering the molding's back edge creates additional clearance for a good fit and for hiding glue.



CHAMFER GLUE BLOCKS



Glue blocks are great for adding strength to joints. They can be used to support drawer or chest bottoms, to strengthen bracket feet and mitered joints, and to attach tabletops. However, if there is dried glue squeeze-out in a corner, you won't be able to press the glue block against both sides of the joint. Put a slight chamfer on the inner corner of the glue block, providing clearance for glue or debris.

No clamps needed. A simple rub joint works to adhere glue blocks. Apply the glue and rub the block back and forth until it sticks where you want it.



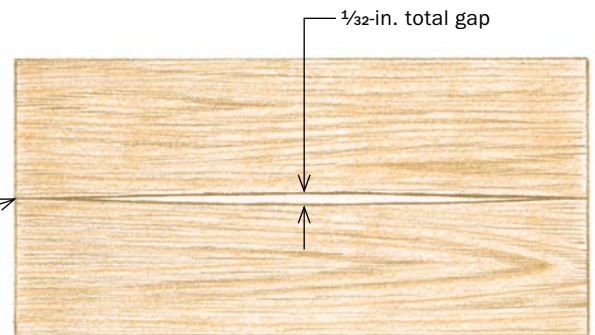
Create a chamfer. Using a block plane is the easiest way to chamfer a glue block.

SPRING LONG EDGE JOINTS

The most common place for an edge joint to fail is at the ends. The rate of shrinkage is greater there than in the middle; this means more stress is put on the glue joint at the ends. A way to solve this is to undercut the center section, leaving a little extra wood at the ends to accommodate the shrinkage, so the tension that would usually be put on the glue joint is now absorbed by that extra material. Known as springing a joint, this technique also helps ensure that the ends of the boards stay tight during glue-up. You can spring any size joint, but unless it is over 18 in. long, the benefits are negligible.

To spring a joint, start with machine-jointed edges; that way you know you are dealing with straight, square surfaces. Next, put the boards horizontally in a vise, and break up the distance into five equally spaced sections. With a handplane, take three light passes: the first over the center section, the second over the middle three sections, and the last over the entire length of the boards. It is crucial that you get a complete shaving on the last pass because any snipe or chatter will compromise the fit of the joint. When you put the boards together with the ends touching, there should be a small gap in the middle, often almost invisible, never more than $\frac{1}{32}$ in.

"Springing" a joint helps ensure that the ends of the boards stay tight.



Bombproof joint. A nearly imperceptible gap, $\frac{1}{32}$ in. at most, toward the center of an edge joint ensures a tight fit for decades.



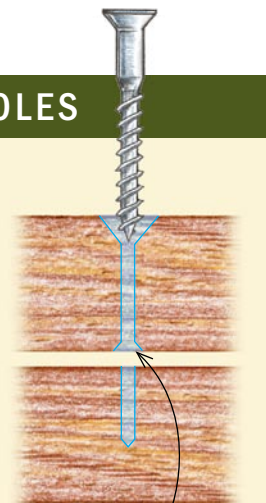
Lay out a visual guide. Separate the boards into five equal sections. Plane the middle section, the middle three, and then the entire edge.



Plane both mating edges at once. This will help compensate for any misalignment in the planing angle.

CHAMFER BACKS OF HOLES

When drilling clearance holes for screws, I find that even with a sharp bit I often get some type of tearout or fuzz on the exit hole. When screwing the piece down, there is a good chance that the little fibers of wood will prevent the joint from closing completely. The remedy is pretty simple: Just kiss each exit hole with a countersink. That removes the fibers and creates the slightest hollow, ensuring a tight fit.



A kiss with a countersink removes tearout and ensures a tight fit.