



# Build Perfect Drawers

Nothing says craftsmanship like a well-made solid-wood drawer, one that's elegantly designed yet strong, rigid, and durable. It must also open and close with little effort, regardless of changing humidity. For me the test is being able to close the drawer smoothly by pushing on one corner

when it's open three-quarters of the way.

The margin of error is slim. Too loose and the drawers will look bad and jam sideways in their openings; too tight and they will stick fast in the summer. Success is the culmination of dozens of careful steps and informed decisions when making both case and drawer.

In *FWW* #241, I explained how I make the chest, with drawer pockets that will stay straight, flat, and uniform. Now it's time to build drawers that are just as solid and stable, made to fit each pocket precisely.

Some very good woodworkers build drawers to fit snugly from side to side, and then plane the sides for the gaps

they want. I go about the process a different way. For 25 years, I built period furniture almost exclusively, often with lipped drawers, where planing the sides was difficult to impossible. That led me to my current method, where the drawers are made to fit perfectly from the get-go, with fine gaps built in and no fitting after assembly. It's a quick, clean approach.

By the way, I make the drawer back exactly the same length as the front, for two reasons: The drawer is less prone to jamming, and the drawer bottom can do its job, bottoming out in the side grooves and holding the drawer square.

## Ageless construction

During the early 19th century, furniture makers in America settled on a standard anatomy for drawers, which has proven itself in countless antiques. I construct my drawers in a

**TIP**

**ACCURATE SURFACE PREP**



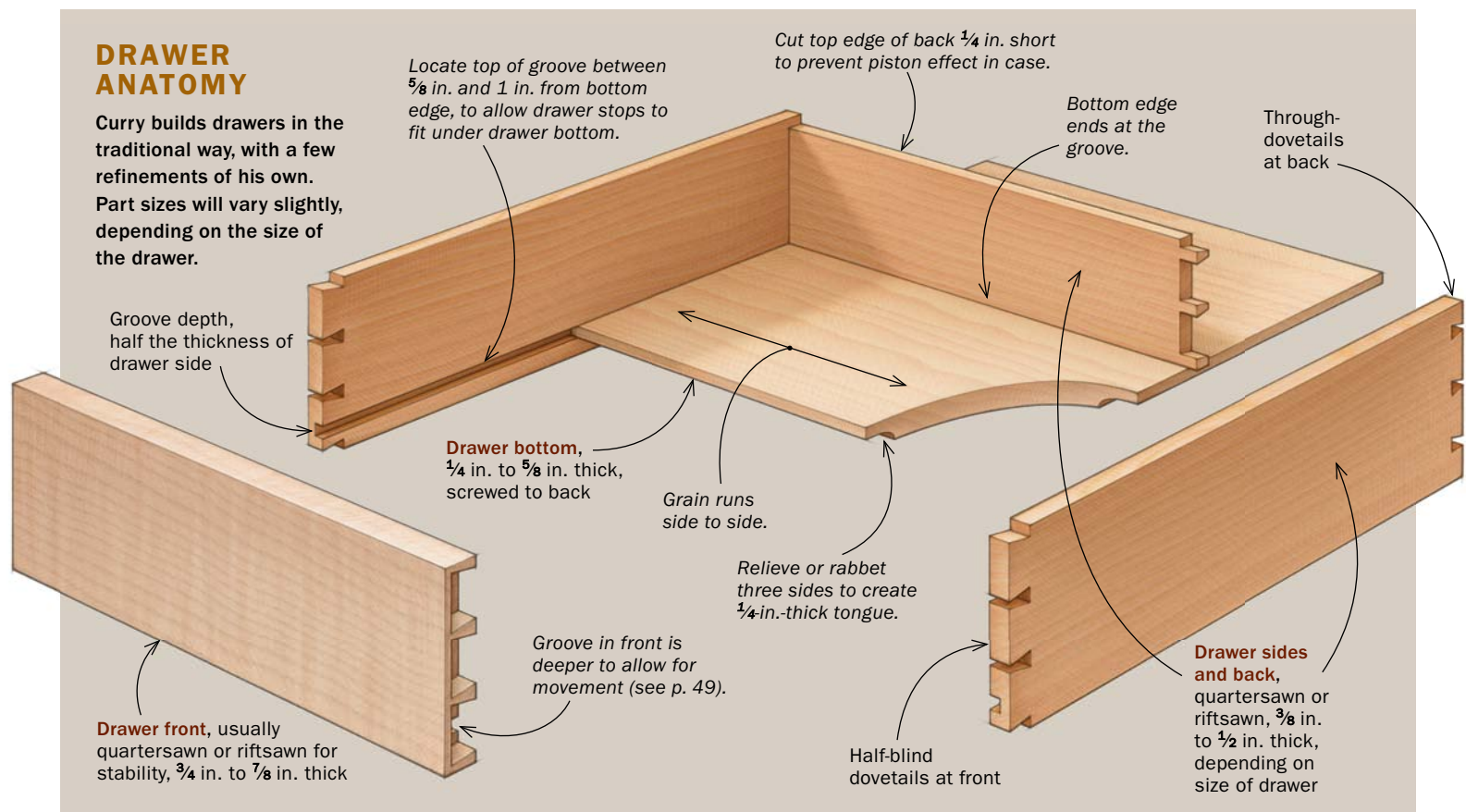
Curry's drawer-making method lets you put the final surface on all parts before assembly, but also relies on precision. To be sure the drawer parts stay uniformly thick for accurate dovetailing, handplane one face (left), and then run the piece through the planer (right) before lightly handplaning the freshly milled side.





BY GERALD  
CURRY

## Time-tested tips for making drawers that slide smoothly





# Start with the drawer front

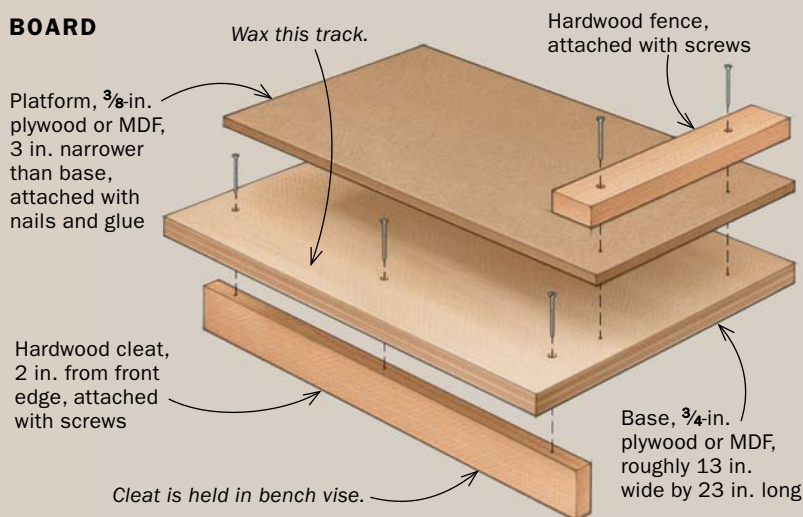
## 1 FIT ONE END



**Eyeball it.** After ripping the drawer front to fit the pocket snugly, top to bottom, crosscut one end square and slide it into place (above). A tapered gap (right) means you have work to do (below).

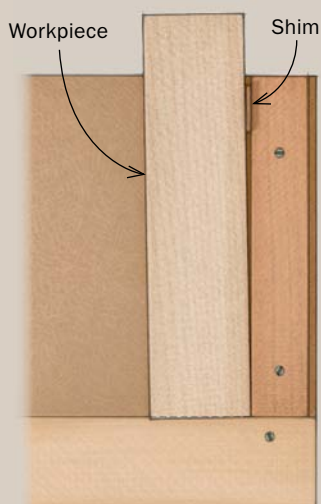
### SIMPLE SHOOTING BOARD

A shooting board can be cobbled together in 20 minutes from scraps. It's important that the fence is perfectly square. To help with that, use a square to align the fence as you screw it on.



**Shoot to fit.** A shooting board makes it easy to fit parts precisely. To change the angle to fit a crooked case, place a thin shim between the workpiece and fence. A light chamfer at the back edge of the workpiece prevents chipout.

### ANGLE ADJUSTMENT



similar way: half-blind dovetails at the front, through-dovetails at the back, and a solid-wood bottom that sits in grooves and is oriented so that it can shrink and swell without changing the shape of the drawer.

I make drawer sides as thin as I can without sacrificing strength, using  $\frac{3}{8}$ -in.- to  $\frac{7}{16}$ -in.-thick stock on most drawers, and going up to  $\frac{1}{2}$  in. maximum for the very largest ones. This is not just for aesthetics, although thick sides do look clunky, but also because unnecessarily thick sides could swell in thickness enough to cause the drawer to stick.

The drawer bottom is rabbeted to fit into  $\frac{1}{4}$ -in. grooves in the drawer front and sides, while the back is left short so the bottom can be slid in after assembly. Some people chamfer the edges of the bottom to fit the grooves, but I like the precision of a flat tongue.

A solid-wood bottom is a lot like a door panel. It's going to shrink and swell across its grain, and the drawer design



must allow that. For a start, the grain must run side to side, even on very narrow drawers, sending the wood movement from front to back. If the bottom expanded sideways, it would push out the sides and cause the drawer to jam. Some woodworkers glue the front edge of the bottom to the drawer front and force the movement toward the back, where they use screws with slotted holes to accommodate it. But I prefer the more traditional method.

I screw the bottom firmly to the underside of the drawer back, sending the movement toward a deep groove in the front. There is no glue applied to the panel anywhere. I prefer this method because it is faster; it lets you fasten the back edge of the bottom more securely, so it doesn't sag; and there is no glue, making it easy to remove the bottom if you have to. It also looks better if you happen to turn the drawer over.

### Wood matters, a lot

Here, maybe even more than with the case construction, wood selection is important. The more the drawer fronts and sides expand and contract—top to bottom across their grain—the larger the gap you'll have to leave at the top, and big gaps can get ugly.

Many of us realize that quartersawn grain shrinks and swells about half as much as flatsawn. But less well understood is how much shrinkage rates can vary from species to species. The shrinkage rate for quartersawn eastern white pine is an amazingly low 2.1% (from freshly cut to oven-dried), whereas the rate for quartersawn yellow birch is 7.3%, about  $3\frac{1}{2}$  times as much.

## 2 FIT THE OTHER END



**Make it snug.** Put the drawer front back in place to mark its length, and then crosscut it for a snug fit.



**Shoot the gap.** After checking the fit, use the shooting board to plane this second end for an even gap.



**The goal.** With the far end pushed tight against the opening, you should be able to fit in a matchbook cover at the near end. This is the total gap, which will be split between both ends.

So if you need a  $\frac{1}{16}$ -in. gap at the top of the drawer made with the pine, you'd need to leave almost a  $\frac{1}{4}$ -in. gap with the birch to allow for seasonal movement. And if you're considering using flatsawn white oak (10.5%), then you'd need to leave a gap that's five times as big: a whopping  $\frac{5}{16}$  in. So unless you live in an area with remarkably consistent humidity, wood selection is a big deal.

**Good choices for drawer fronts**—If you live in an area with large seasonal swings in humidity, like I do, you need to



## 3 TRIM TO WIDTH

**Make room for expansion.** If you are building drawers in any season other than summer, build in some room for expansion at the top of the drawer. Calculate the wood movement, and then rip that amount off the top edge of the drawer front, plus the fine gap you want there.



# Prep the other parts



**Trim the sides.** Rip the drawer sides to the same width as the drawer front. Curry marks the end of each piece to keep track of its mating part and orientation.



**Square the ends.** To make sure you don't build a twisted drawer, shoot the front ends of corresponding drawer sides, two at a time so they match. Re-label them if necessary.



**Match the back to the front.** After ripping the back narrower (see p. 43), lay the drawer front on it, lining up the top edges. Then scribe the ends of the drawer back to match—both length and angle—and use the tablesaw and shooting board to trim them precisely.

choose the wood for your drawer fronts (and case) carefully. I'm talking not only about species but also grain orientation. I nearly always use rift- or quartersawn stock for drawer fronts, not only for stability, but because I prefer its straight-grained look. When possible, I also choose a species that has a low shrinkage rate. Old favorites like walnut, cherry, and mahogany make great primary woods for the case and drawers. They're attractive, relatively easy to work, and well-mannered. Some less-common woods, such as butternut, sassafras, and red alder, also are easy to work and stable. And

softwoods such as baldcypress, Alaska yellow cedar, and fine-grained Douglas fir are stable and quite attractive, especially when quartersawn. There really are quite a few options, but you should investigate the shrinkage values before deciding.

It's hard to buy rift- or quartersawn wood in most species, so I often cut drawer fronts from the outer edges of wide boards (14 in. to 16 in.). The growth rings on that part of the board are usually about 45° to the face or steeper. I use the flatsawn piece left over in the middle for the drawer rails in the case. Since the edge of this piece is actually quartersawn, it matches up quite nicely with the straight grain and color of the drawer fronts.

**Smart choices for the rest of the drawer**—Traditionally, furniture makers have used a secondary wood for the drawer interior. This was mostly for economic reasons, but I think it also looks better. And it al-

lows you to choose a wood that might have more appropriate qualities for the role it will play.

My favorite wood for drawer interiors is butternut. It's very stable, easy to work, and attractive. My second choice is eastern white pine. It doesn't look quite as nice as butternut, but it is more stable. In general, softer woods like these tend to be the most stable. They're a bit soft for the sides of large drawers, but it's easy to add a thin piece of a harder wood to the bottom edge as a wear strip. That way you get the stability and workability of the softer wood and the wear-resistance and easier sliding of the harder. Avoid woods like elm, sycamore, and tupelo that have interlocked grain. They'll be difficult to handplane and are prone to warping. Also avoid woods with high shrinkage values like birch, beech, and hickory.

When cutting out the secondary wood for my drawer parts, I use the best-looking quartersawn or riftsawn sections for the sides. I want straight-grained, mild-mannered pieces that will plane smoothly. The next best pieces are used for the backs. If the bottom is big from front to back, I'll glue up quartersawn pieces to reduce movement; if not, I'll use flatsawn stock.

## Prepping drawer stock

Start by rough-cutting all of the pieces—fronts, sides, backs, and bottoms—slightly oversize in all directions. I leave at least 1 in. or 2 in. of extra length and about ¼ in. of extra width. Mill the wood, starting at the jointer and then thickness-planing the pieces about ⅛ in. heavy (a bit thicker with wider parts that might cup, like a flatsawn bottom). It's best to plane the same amount off of both faces when possible. This is part of the old adage about



# Keep joinery accurate, too

The key here is to aim for flush joints, or pins that are just a whisker proud, so you don't have to plane the drawer after assembly.



**Scribe for a flush fit.** Set a marking gauge to the exact thickness of the drawer sides (left), before scribing the drawer front (above). Curry cuts his dovetails by hand. Surfaces are already prepped, so he protects them with a piece of softwood when chopping (right), making sure to keep chips out from underneath.



## A few steps before assembly.

Take a few extra handplane passes on the bottom edge of the drawer front to keep it from dragging on the case later. Break most of the edges and corners now, too.

Slight gap at bottom



doing the same thing to both sides of a piece of wood. Often, there are moisture differences or drying stresses that will cause a piece to warp if uneven amounts are taken from opposite faces.

After this rough-milling stage, let the pieces sit for a few days on stickers before final jointing and planing. Always allow equal air circulation around each piece to let it acclimate

evenly. If you are resawing thick material, as I often do for drawer sides, it's best to do it well in advance and let it sit around on stickers for a week or more before jointing and planing to final thickness.

## Fit as you go

With my method, almost no fitting or cleanup is needed after the glue-up. You simply assemble the drawer and it

should fit perfectly every time. This means you can put the final surface on almost all the drawer parts before assembly, while they are easier to handle.

The key to the process is to fit the drawer front to the opening first, including very fine gaps on both sides, and then build the rest of the drawer to fit that piece.

After rough-milling the drawer front and letting it sit for a

few days, I rejoin one face and thickness-plane the piece down to final thickness, again taking the same amount off both sides. It's very important that the back of the drawer front have absolutely no twist. If it does, that twist will be magnified when the sides are attached, and the only fix—heavy planing on the bottom edges of the drawer—will be obvious in the finished result. If



# Assembly tips



**Glue the pins only.** Curry also chamfers the inner edges of the tails so they don't scrape the glue off. These steps prevent squeeze-out and minimize cleanup.



**Keep joints flush and unharmed.** Use a hammer to tap the joints home, using a block of soft wood to protect the surfaces and avoid overdriving the tails.



**Check for racking.** Put the drawer in its pocket immediately to see if the front is flush to its opening (above). If it isn't, give the drawer a diagonal squeeze (right) and recheck it before letting the glue set.

you're going to handplane either side of the drawer front, now's the time to do it. You can't plane the back after the dovetails have been cut without throwing off the fit.

Now you can fit the front to its opening. The squareness of the opening doesn't really matter. However, you must fit each drawer front individually, and a shooting board is the best tool for the job.

After fitting the fronts, lay out the drawer sides and decide where each will go and how it will be oriented. If your drawer sides are bowed at all along their length—and this is very important—make sure to put the bow facing in so the drawer bottom can push it out straight later.

**Set the gap—**To calculate the gap needed to accommodate the anticipated swelling of

the drawer front, you'll need to be able to predict the seasonal dimensional change for the drawer sides and fronts, across the grain, top to bottom. I covered that in the previous issue (A Closer Look, *FWW* #241). Calculate how big a gap you need at the top of the drawer, and remove that amount from the drawer front and sides.

The grooves are next, and some thought needs to be given to their placement. If the drawer is for a solid-sided case, the stops will need to be at the front of the case, glued to the drawer rails. This means that the bottom must be high enough to clear those stops. Another important consideration is that the groove should be contained within the lowest dovetail—not the pin—so it can't be seen on the side of the drawer.





# Finishing touches

If everything has gone well, this drawer won't need much more work. Just install the bottom and apply a coat of finish and some wax.



**Bottom slides in.** Once the dovetails are dry and set, slide in the bottom (left) and screw it to the back (above). It should bottom out in the side grooves, with room for expansion in the front one.



## No fitting, just finish

After assembly and maybe a little paring to trim the pins flush, the fit should be excellent. It is possible to plane the drawer sides to increase the side-to-side gap, but it will hardly ever be necessary.

My favorite finish for drawer interiors—that is everything but the front face of the drawer—is one very thin coat of shellac. It dries in minutes, and ends up quite hard and smooth after light sanding with P400-grit paper. The drawers slide much better with shellac than without it, yet the wood still almost looks unfinished, which is the traditional look for drawer interiors. Other finishes each have drawbacks: Oil stays gummy, varnish takes days to dry completely, and lacquer is toxic and difficult to apply by hand.

After applying the finish and waxing the rub surfaces, insert the drawer in its opening, work it back and forth a few times, and you're done. Furniture-making nirvana. □

*Gerald Curry has made furniture professionally for 40 years in Union, Maine.*

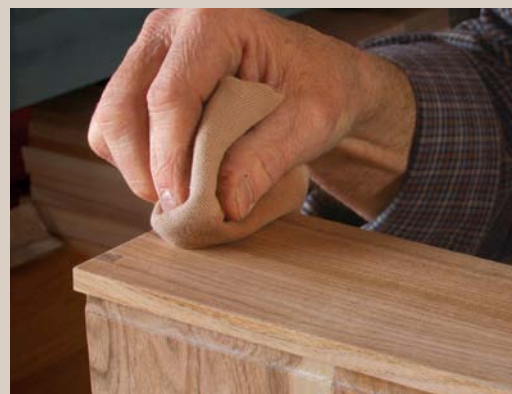
Attached with brass screws at back, sending all expansion toward the front



Groove is deeper in front for expansion of drawer bottom.



**Pare pins if necessary.** The chopping action often leaves the joinery a tiny bit proud. A wide chisel pares it flush.



**One coat of shellac.** Curry applies a thin coat, sanding it lightly and then wiping it with a rag dampened with alcohol, to smooth the surface.



**Wax the rub spots and finish the front.** Curry applies paraffin wax in just a few places: the bottom edges of the drawer sides, the back corners of the drawer box, and the guide surfaces inside the case. Then he applies finish to the outside of the case and to the drawer front.