

Anatomy of a Chest of Drawers

TOP

The solid-wood top is usually molded on three sides and is attached to the upper molding frame.

UPPER MOLDING FRAME

This molding frame will not move seasonally, but it allows the top and carcass to do so.

DOVETAILED CARCASE

The heart of a long-lasting case piece is a solid-wood, dovetailed carcass. Note the secondary wood species used in the top and bottom panels.

LOWER MOLDING FRAME

The lower molding frame allows the case to move seasonally and accommodates a variety of bases or feet attached below.

DRAWER-DIVIDER FRAMES

Three common styles offer a variety of looks and different degrees of mechanical strength and ease of construction.

BASE

Whether horizontal-grain bracket (shown here) or vertical-grain feet, the base is attached solidly to the lower molding frame.

DRESSING UP A BASIC BOX

A seemingly complex chest of drawers simply is a stack of components. By varying moldings, feet, drawers and drawer dividers—not to mention proportions and materials—an endless array of case pieces is possible.

Start with a dovetailed box, then choose among options for drawers, moldings and base

BY WILL NEPTUNE

Case furniture based on a dovetailed box is found in a wide range of styles and periods. While the details vary, many pieces can be built using similar construction solutions. When I build a case, I work from a firm set of ideas—both traditional and modern—that I've found to be reliable and efficient.

The techniques required to make a chest of drawers are mostly common knowledge: dovetails, dadoes, miters, mortises and tenons. The complex appearance is the result of a straightforward sequence of simple steps. At its most basic level, a chest of drawers is a stack of separate assemblies. However, based on moldings (or lack thereof), leg treatments, drawer styles, proportions and materials, a wide variety of case pieces is possible. Like my past articles "Engineering a Table with Drawers" (*FWW* #130, pp. 40-45) and "Sideboard Strategies" (*FWW* #138, pp. 42-49), this one

describes a basic, proven construction approach. The execution is up to you.

Start with a dovetailed case

When preparing your primary stock for the sides of the case, put aside strips to be used later to edge the top and bottom case panels as well as the drawer dividers. Using

wood from the same board will give a uniform look to the case.

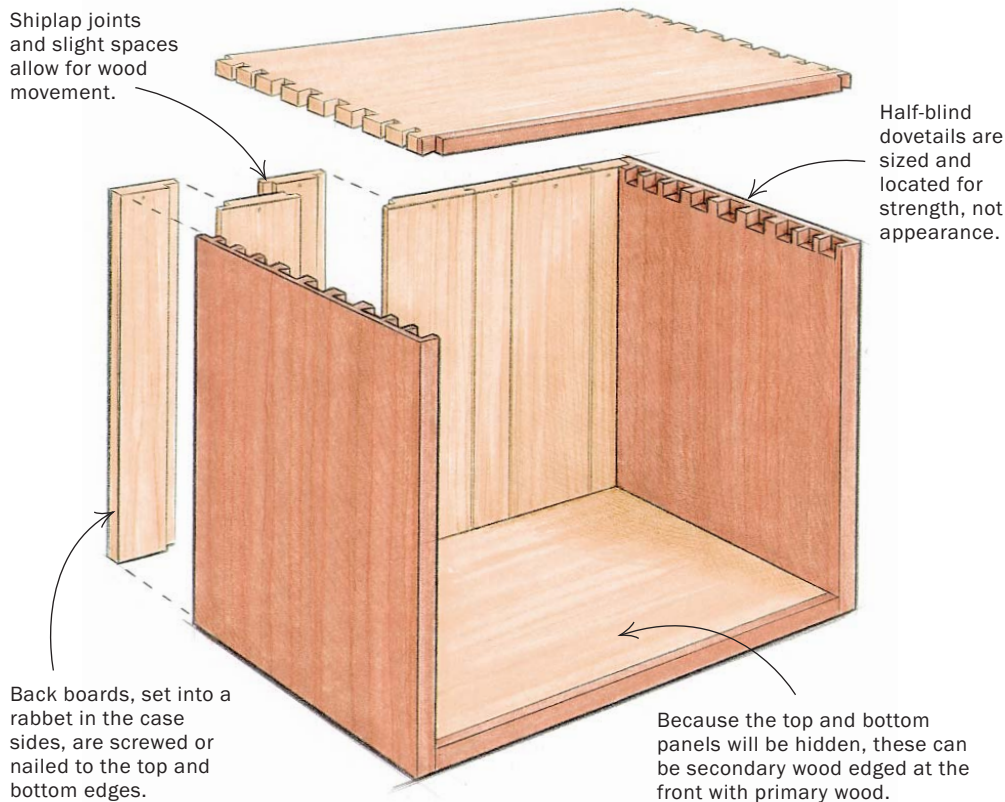
A chest of drawers begins with four panels: top, bottom and two sides. The strips of primary wood that edge the top and bottom can be glued onto the secondary-wood panels after rough-milling. Match the grain direction of all parts during glue-up so they can be finish-milled as one piece.

The case is joined with half-blind dovetails, so lay them out for strength, not appearance. You may want extra tails near the edges, especially the front, to resist loads that could pop the front shoulder.

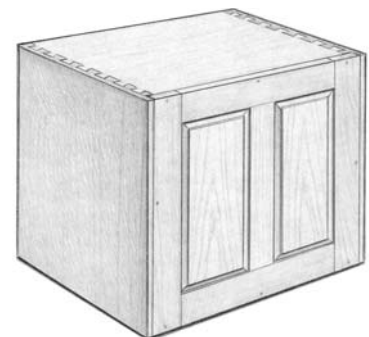
Another trick makes the joinery for the back a little easier. Run the rabbets for the back boards all the way up the sides without stopping. Then rip the top and bottom panels to be flush with this rabbet; the back boards will extend all the way up to the top and bottom of the case but be hidden by the true top, which goes on later. The back

CARCASE AND BACK CONSTRUCTION

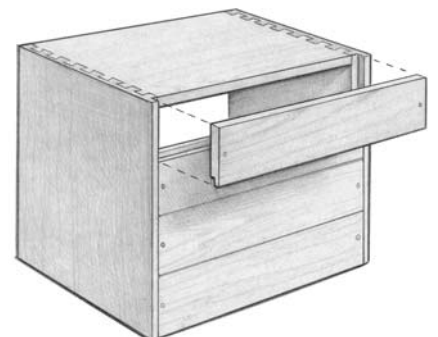
The case is joined with half-blind dovetails, which are hidden from view. Traditionally, the back consists of shiplapped boards.



BACK-PANEL OPTIONS



A more attractive frame and panel can be fit into the rabbet.



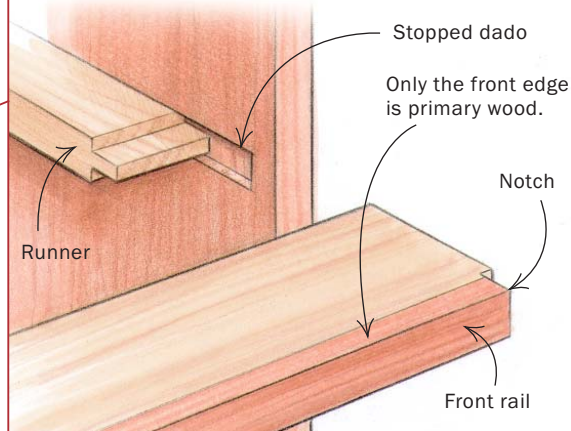
Horizontal shiplapped back boards help prevent tall sides from bowing outward.

DRAWER-DIVIDER FRAMES

Only the front 3 in. or 4 in. are glued to the case, allowing the case sides to move. Choose a frame type based on the desired look and the need for strength.

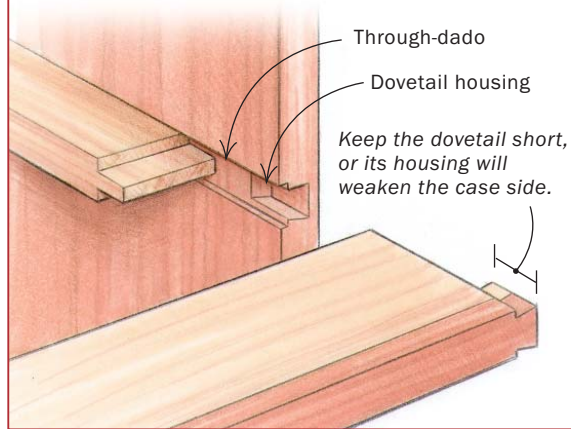
STOPPED DADOES

Basic stopped dadoes offer a clean, contemporary look and the easiest construction.



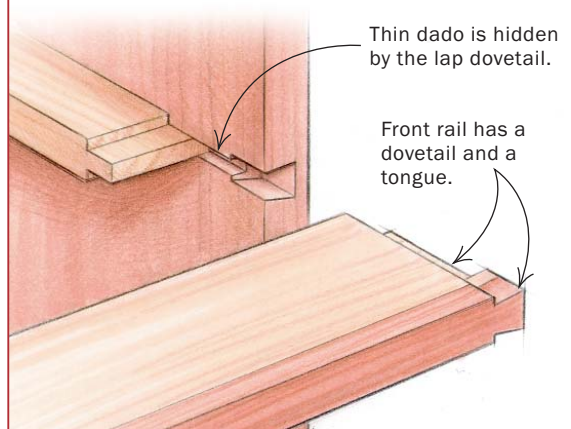
STEPPED DOVETAILS

Stepped dovetails offer a more traditional look and a mechanical connection between the case sides.



DOVETAILS WITH HIDDEN DADOES

Dovetails with hidden dadoes not only tie the case sides together but also offer a clean look.



boards, lapped in some way to allow for wood movement, are screwed to the case.

Drawer dividers: three options

Once the case dovetails have been cut, fitted and dry-clamped, it's time to work on the system of drawer dividers and supports. For function and appearance, the divider frames must stay flat. Again, secondary wood can be used for all but the front edges. Choose the inner secondary wood for stability. Avoid secondary wood that was significantly bowed in the rough, and make the front divider wide for extra stiffness. I make the fronts 3½ in. to 4 in. wide, and the less-critical back dividers 2½ in. to 3 in. The runners can be narrower, about 2 in., because they are held in dados. Leave the parts a bit thick to allow for leveling the frame after gluing.

Although there are other divider systems, typically I use one of the three shown at left. For all three types, I prefer to glue up the mortise-and-tenoned frame first and fit the unit to the case dados. But you also can fit and glue the pieces together in the case, using the dados to align the parts. One last note: The right time to glue up the case is after the dados have been cut but before building and fitting the divider frames.

Stopped dadoes—This simple approach offers a streamlined look and straightforward joinery. The main liability is the lack of sound glue surfaces between the frame

NOTCHING THE DIVIDER



A divider in a stopped dado is inserted from the back. The front rail must be notched to reach the front of the case.

and the case. Usually this isn't a problem, but for a tall case or one with unstable wood, you may want one of the other frame systems that use lap dovetails to tie the ends of the case together. The other types also offer the traditional look of exposed joinery.

Start by laying out and cutting the dados, which are about 1/4 in. deep. I do the layout while the case is dry-clamped, using a story stick to avoid measuring errors. The goal is to get the pairs of dados at equal height and parallel to the inside faces of the top and bottom. Square up the front ends of the stopped dados at an equal distance from the front edges of the case (about 1/2 in.). The front of the frame should be flush to the case edge, but the back should be inset about 3/8 in. from the rabbets to allow the sides to shrink. Gauge the length of the dividers from the bottom of the dados, and cut them about 1/32 in. undersize to make the frames easier to fit.

To join the divider frames, I use mortises with open ends; then the runners need only tenons. When clamping and gluing up the frames, take diagonal measurements to check for squareness, and be sure that the frames are flat. A good tip is to level the joints on the top of the frame first. Then, as you test the frame and slide it into the dados, you can do all of your fitting from the bottom. The front 3 in. to 4 in. of the frame should be snug, but the rest can be eased to make it slide in the dados with less drag.



DRAWERS

The two common drawer styles are flush and lipped. On the lipped style, the drawer front covers the gap for a more refined look.



Match the divider to the drawer. The dovetail with hidden dado offers a clean look for flush drawers (above), while lipped drawers look better with the stepped dovetail (below).



You still need to cut a shoulder in the front of the frame so it can extend past the stopped dados to the front of the case.

Stepped dovetails—Adding lap dovetails to the front of the frame gives it a strong mechanical connection to the case sides.

The front rail will resist forces pushing the case sides outward, and it can be used to pull in bowed sides slightly. This traditional solution is called a stepped dovetail because both the dado and dovetail are visible at the front. I like this joint with lipped drawers, where the side lip matches

Scribe for a perfect fit

DOVETAILING THE CASE SIDE



Slide the divider to the front of the dado and scribe the shoulder. Then cut the notch in the rail.



Dovetailed dividers go in from the front. The dado is cut first; the dovetail housing is cut second.



Slide in the dadoed section as far as possible. Then transfer the layout of the dovetail onto the case side.

MOLDINGS AND CASE TOP

The trick is to find a way to attach moldings across the grain of the case sides and the top. Molding frames are the key.

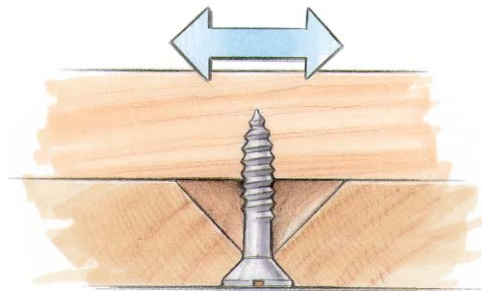
Elongated screw holes along the sides and back edge of the molding frame allow the top to move seasonally.

Elongated holes for the screws that attach the case to the molding frame allow the case to move.

Round holes along the front edge of the case and molding frame keep all three aligned where it counts most.



Elongated screw holes are the answer. These are elongated along the bottom side only, allowing the pieces to shift against each other without coming apart.



the dado depth. Be prepared to spend extra time on these joints, though, because there are many surfaces that must fit at the front edge, and gaps will be obvious.

This joint uses a shallow (about $\frac{3}{16}$ in. deep) through-dado, with a lap dovetail at the front extending into the case side.

Start by penciling in the lap location on the case sides. This gives the length of the front rail. Before gluing up the frame, notch the front rail to leave the stubs for the dovetails. Now build the rest of the frame and shape the dovetails on the front stubs. This joint will show any gaps, so work carefully and test the dovetail fit as you pare. When you install the frame, rub the rear part of the dado with paraffin wax so that any glue that drags back won't keep it from floating.

Lap dovetail with hidden dado—The third frame type uses a narrower through-dado that is hidden at the front by the lap dovetail. This dovetailed frame gives the same mechanical strength as the stepped version but has a cleaner look. When used with flush drawers, it has a neat, logical appearance. This system has another advantage over the stepped dovetail. Because the dovetail fully covers the dado, there are fewer surfaces that must close up. Use a standard dado size that is $\frac{1}{16}$ in. or so smaller than the base of the tail, and make the dados about $\frac{1}{4}$ in. deep.

Once the frame has been made, you



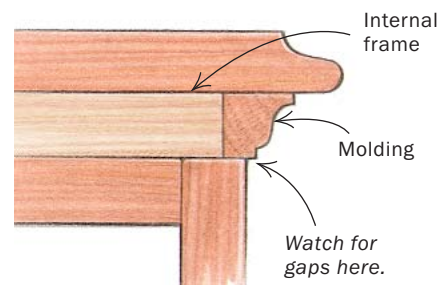
The correct sequence. First, attach the molding frame to the top (above) and then to the case using the elongated holes only. Last, screw all three parts along the front edge (right).



FLAT VS. RABBETED MOLDING FRAME

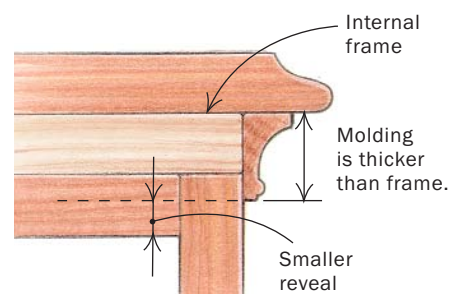
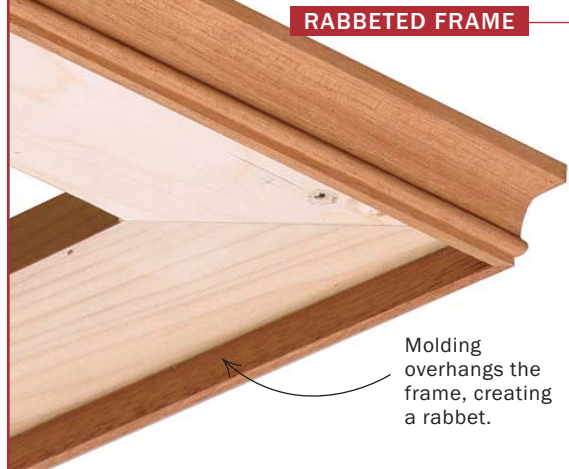
The type of molding frame will determine how much of the top or bottom edge of the carcass is visible.

FLAT FRAME



A flat frame is easier to build and fit. But it shows the entire case edge and must lie perfectly flat.

RABBETED FRAME



Rabbeted frame leaves the carcass reveal up to you. Also, if the frame doesn't lie perfectly flat, the gap won't show.

need to form the tongues, stopping them at the front and leaving extra wood for the tails. Because the tongues and dados will be hidden, only the shoulders for the dovetails need to be tight, and the tongues don't need to bottom out in the dados; however, the tongues should be snug in thickness, especially at the front.

A few tips for the drawers

Once the frames have been fitted and glued in, you may build and fit the drawers by any method you're comfortable with. Drawer fronts, of course, have a lot to do with the appearance of a chest, so look over the wood and plan the overall grain pattern before you begin.

This article presents two options: a flush drawer and a lipped drawer (see the top photo on p. 43). Both types need stops (the fragile lip molding is there only to cover the clearance gaps). One reason why I locate the stop blocks on the rear dividers is

that it's easy to clamp them in place while testing the drawer. Just remember to size your drawers to make room for the stops. But the great trick here is that putting the stops on a floating frame keeps the drawers flush at the front even as the case changes depth through the seasons.

Ease the transitions with moldings

Visually, top and bottom moldings have a powerful effect. They frame the case with their strong horizontal lines and play of light. Their projection at the bottom gives the base a sense of stability and strength. An upper molding provides a transition to the overhang of the top and also balances the bottom molding.

Many times you'll see old work with moldings attached to the case itself, but these tend to fail over time as the case shrinks. Using separate frames for the moldings will give the same appearance while allowing for case movement.

These top and bottom frames can be built using either of two methods (above). Both can use secondary wood for the inner part of the frame. The first is a simple mitered frame with a molded edge. A more complex, rabbeted frame system wraps over the sides and front edge of the case. With this system you can choose how much of the front case edge shows, giving a wider range of effects.

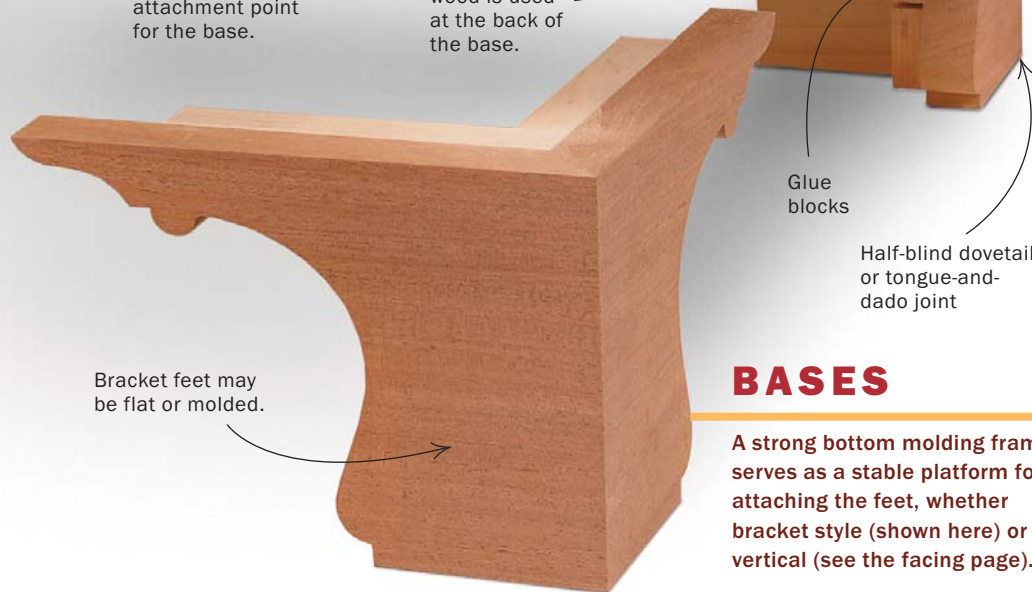
Both frame systems should overhang the back to allow for expansion of the case. Fasten the frames to the case with screws, tight along the front but with elongated holes along the sides and back to allow the case to move.

Flat frame is quicker to build—The first step for the flat frame is to know the exact dimensions of the molding you want, its projection from the piece and the width of the primary wood. The next step is to glue the primary-wood strips onto the



Molding frame serves as the attachment point for the base.

Secondary wood is used at the back of the base.



Glue blocks

Half-blind dovetail or tongue-and-dado joint

Bracket feet may be flat or molded.

BASES

A strong bottom molding frame serves as a stable platform for attaching the feet, whether bracket style (shown here) or vertical (see the facing page).

Miter joint at front corners

inner-frame stock and then mill the blanks to thickness.

Get the front miters fitting correctly before mortising in the flat, unmolded rear rail. Join the mitered corners with biscuits or stopped splines. Last, mold the desired profile on the outside edge.

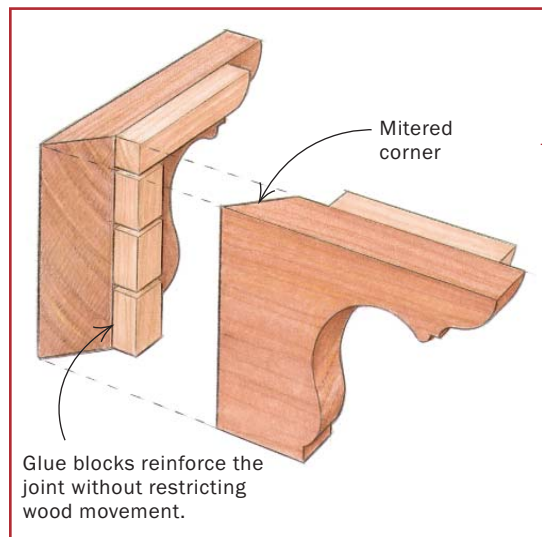
Build the rabbeted frame in two parts—The second frame system is built in two stages. The inner, secondary-wood frame is thinner than the molding, based on how much of the case edge you want covered. I build the frame first, slightly oversize, then trim it to fit the case exactly. Let the back edge overhang to hide seasonal case expansion.

Now form the rabbet with the three thicker molding blanks. Dry-fit the parts carefully, making sure the miters come together exactly at the corners of the case, keeping the end pieces long at first to allow room for adjustment. Then glue the blanks to the edges of the frame and mold the profile. The frame is held with screws as before, with slotted holes to allow for movement.

Attach the top

The top of the case is often molded on three edges and usually has an overhanging back to hide shrinkage and to avoid a large gap between the case and the wall.

If a molding is used below the top, it's important to let the case, the molding frame and the top move independently. All three parts are held tight with screws along the front edge to keep the miters and reveals constant. But along the sides and back, use elongated screw holes between the frame and top, as well as the case and frame. People commonly lift cases by the

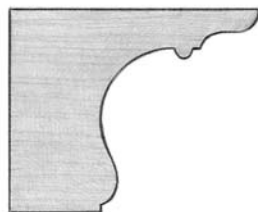


Mitered corner

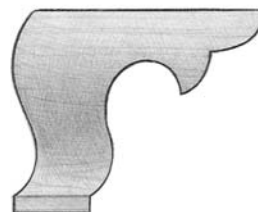
Glue blocks reinforce the joint without restricting wood movement.

BRACKET FEET

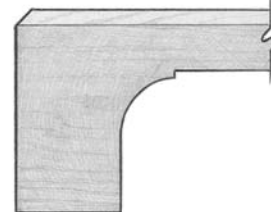
Molded or unmolded, with a wide variety of cutouts, bracket feet are used in many periods and styles. They are glued to the base molding frame (or attached to the case).



FLAT BRACKET FOOT



OGEE BRACKET FOOT



FLAT BRACKET BASE



Period or contemporary? The choice of moldings, drawers, feet and hardware offers a wide range of design possibilities.



Details define the style

This construction system will produce a wide variety of case pieces, depending on the combination of the individual elements. An 18th-century piece (top) combines moldings, drawers and feet common to that period. Lipped drawers soften the line of the front. A wide base molding and classic ball-and-claw feet give the piece a broad stance. The top is carefully dimensioned and molded to relate to the rest of the piece.

The bottom chest of drawers offers a more contemporary look with harder lines and surfaces, including a flush front. The curved, tapered legs flare outward, broadening the stance of the piece without looking heavy. The base and top moldings are beveled to complement the style. And the top is chamfered to make it appear thinner and to match the other elements.

These two examples are the tip of the iceberg. You could make the case taller than it is wide, or use a different array of drawers. And consider the effect of other wood species or figured wood for the drawers.

top edge, so all of these connections should be very strong.

Choose a base

The final bit of woodworking is to prepare a base. For this article I built the two most common systems, each adaptable to many leg styles. Bracket feet are cut from blanks with horizontal grain and are mitered at the front. The other leg style has vertical grain, which usually features narrower legs, often braced by flanking side pieces.

Bracket feet—Start the flat bracket feet with one long board about $\frac{3}{4}$ in. thick. The six blanks should be taken out of a single board, if possible, so the grain pattern wraps around the base, matching at the

miters. It's also nice to use the same board here as you did for the base molding to help hide the joint between the base frame and the feet.

The rear feet are braced with secondary wood. The joint at this back corner can be half-blind dovetails or, more simply, a tongue and dado. The miters for the front parts can be reinforced with a spline, but usually it's enough just to butt them.

Cut and dry-fit the joints before cutting the foot profile. The assembled feet are glued to the base frame. All of the foot and base joints should be reinforced with glue blocks. A single vertical block can cause the foot to crack, so I use three short blocks with $\frac{1}{8}$ in. of space between them.

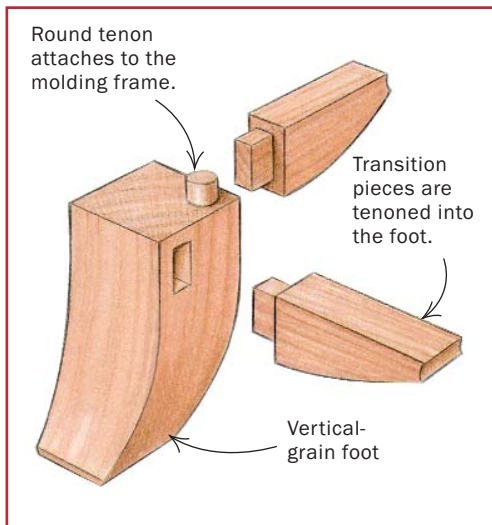
Vertical feet with support pieces—The second construction system is seen in the

saber leg with flanking transition pieces. Its main advantage over bracket feet is that the vertical grain direction allows a strong foot of a much smaller size.

Generally, a round or square tenon is cut in the top of the foot blanks to match a hole or mortise cut through the base frame. The mortise should be located away from the corner of the frame so that the miter joint isn't weakened. The transition pieces are tenoned into the foot. As before, these assemblies are glued to the base frame.

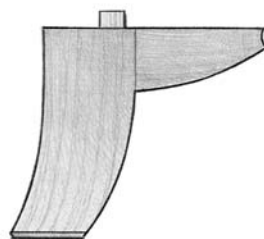
This sums up the approach I rely on for fine-quality casework, but many variations are possible. The great thing about this is that 10 people will use this information to build 10 very different chests, each one a record of that maker's taste and skills. □

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VERTICAL-GRAIN FEET

Vertical-grain feet come in a wide array of styles, from turned bun feet to 18th-century ball-and-claw feet to more contemporary saber feet. Most have flanking transition pieces.



SABER FOOT



BALL-AND-CLAW FOOT



TURNT FOOT