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Vol. 22 Issue 127

Inexpensive and built to last

Heavy-Duty Workbench

Secret Weapons
For Smooth Surfaces

Router Workshop
Small Bits, Big Results

Make The Perfect Cut
Our Top Table Saw Tips

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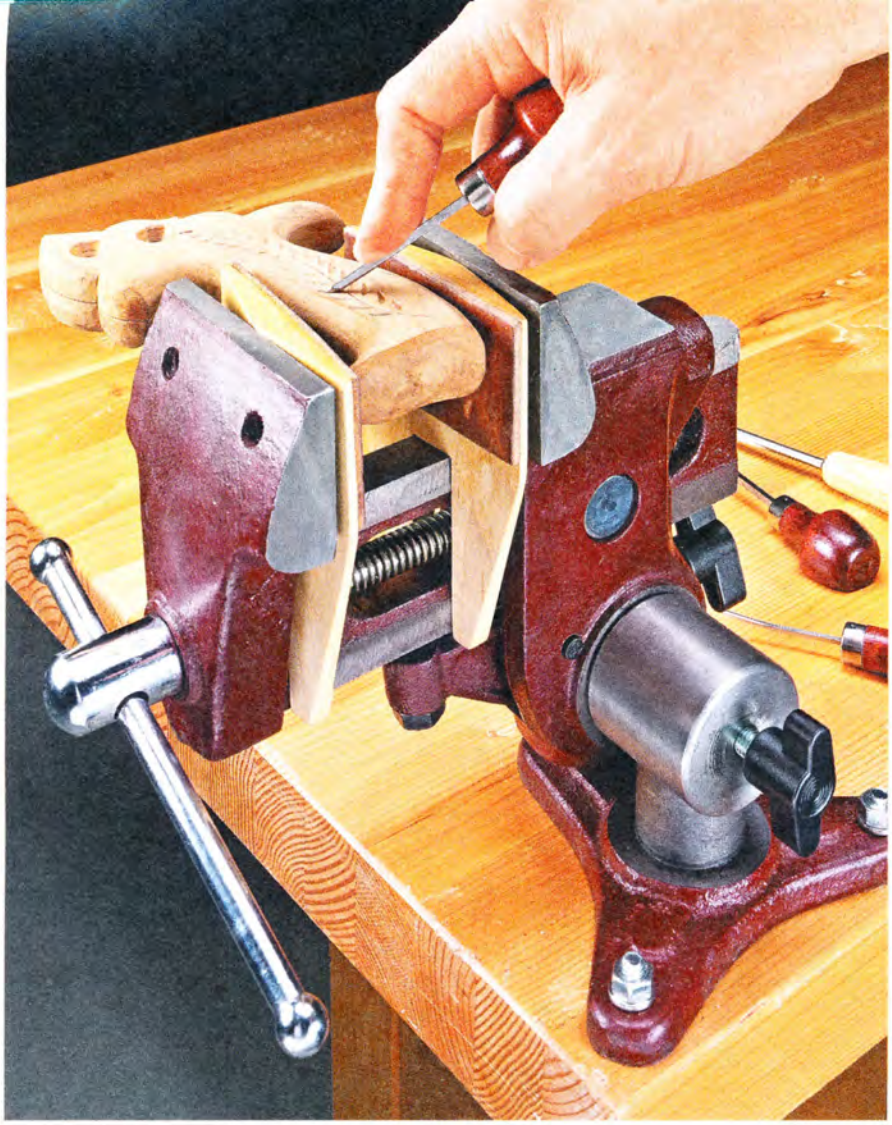

Versatile Shop Vises *page 48*

Cutoffs

Some time ago, I was walking past the office of Kent Welsh (one of our designers) when I noticed a very striking piece of wood sitting next to his desk. It had seemlingly interwoven strands of dark and light wood, unlike anything I had ever seen. I asked Kent about it and he explained that it was a tropical hardwood harvested from the root of a banana tree. Sensing my curiousity, Kent told me that the wood even retained a faint odor of banana. As I lifted the board to my nose to give it a sniff, I noticed a grin spreading across Kent's face. I suddenly realized that I'd been had.

It turned out that the "wood" in question was actually something Kent had made from a laminated strand beam known as *TimberStrand*. He took the beam, cut it into narrow strips, and then turned the strips on edge and glued them together. The result was a very unique look.

Since the beam is an engineered lumber, it's stable, flat, and fairly dense. And it's also affordable. So when we began designing the weekend workbench shown on the cover of this issue, it seemed like the perfect choice for the benchtop. Take a look at the article on page 14 and I think you'll agree.

And if you decide to build the bench, just think about the bragging rights you'll have. You'll be one of the few woodworkers that can claim to have a workbench with a top made of "genuine" banana wood.

Bryan

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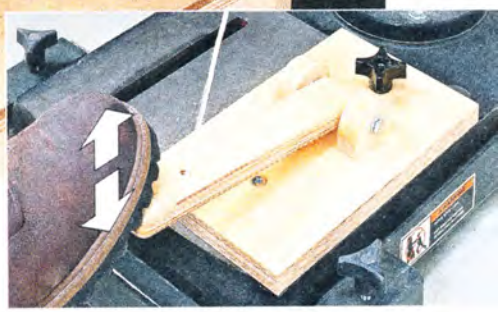
from our Readers

Tips for Your Shop

Spindle Sander

I don't have room in my shop or budget for a dedicated oscillating spindle sander. But I figured out a way to get similar functionality from my drill press with some simple hardware.

As you can see in the photos and drawings, I secured a thin rope from the depth stop adjustment to a shop-made foot pedal. When the pedal is depressed, the sanding drum lowers into the auxiliary table shown below. Continuous up-and-down pedal motion mimics the action of an oscillating spindle sander and makes more even use out of the drum.



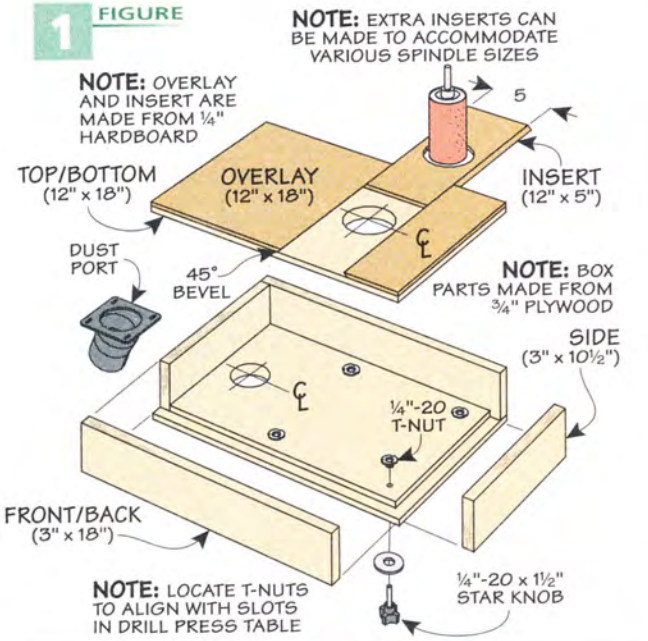
▲ ***Pedal Action.*** *A light press on the pedal lowers the drill press spindle and sanding drum.*

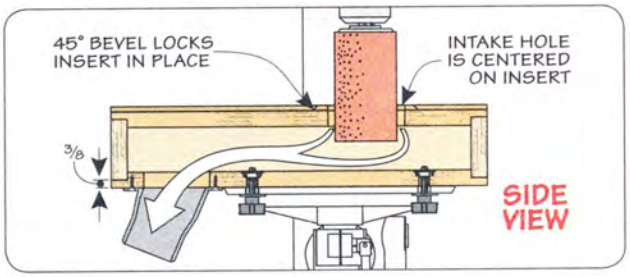
Assembly. The drawings show how the assembly goes together. You can find most of the items at the hardware store.

With everything in place, use the oscillating feature by raising the table until the bottom of the drum is at the table surface.

Chris Fitch
Lorimor, Iowa

1 FIGURE





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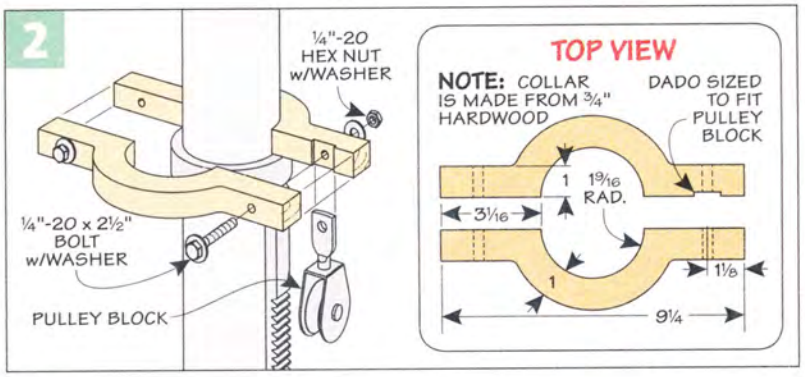

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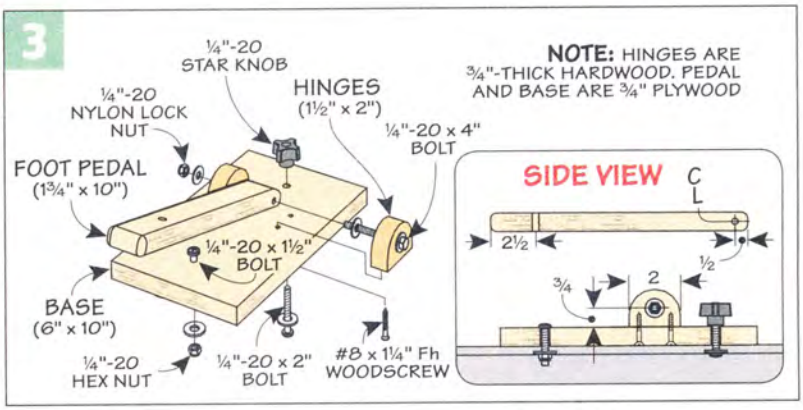


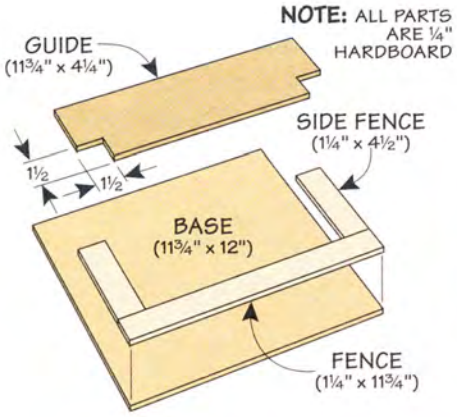
Sandpaper Jig

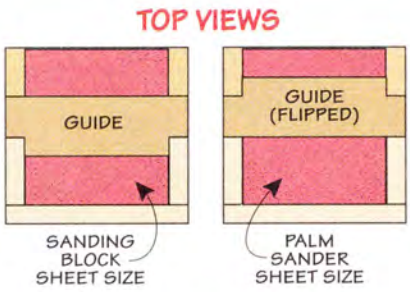
I use a rubber sanding block and palm sander for final sanding of project parts. But cutting full sheets of sandpaper to the proper size for each one was little more than guesswork.

To make this a foolproof task, I built the cutting jig you see here. It consists of a base and a three-sided fence. The cutting guide is sized to fit against the side fences. The guide is reversible for cutting either ⅓- or ½-size sheets. The detail drawings below show how it works.

To use it, slip the paper against the fences, fit the guide against the fence, then cut along the edge.

Len Urban
Rancho Mirage, California





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SUBMIT A TIP

There, you'll be able to describe your tip in detail and upload photos or drawings. Or you can mail your tip to the editorial address shown in the right margin. We will pay up to $200 if we publish your tip. And if your tip is selected as the top tip, you'll also receive the *Porter-Cable* compact router kit shown on the right.

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Micro-Adjust Sled for Small Parts

THE WINNER!

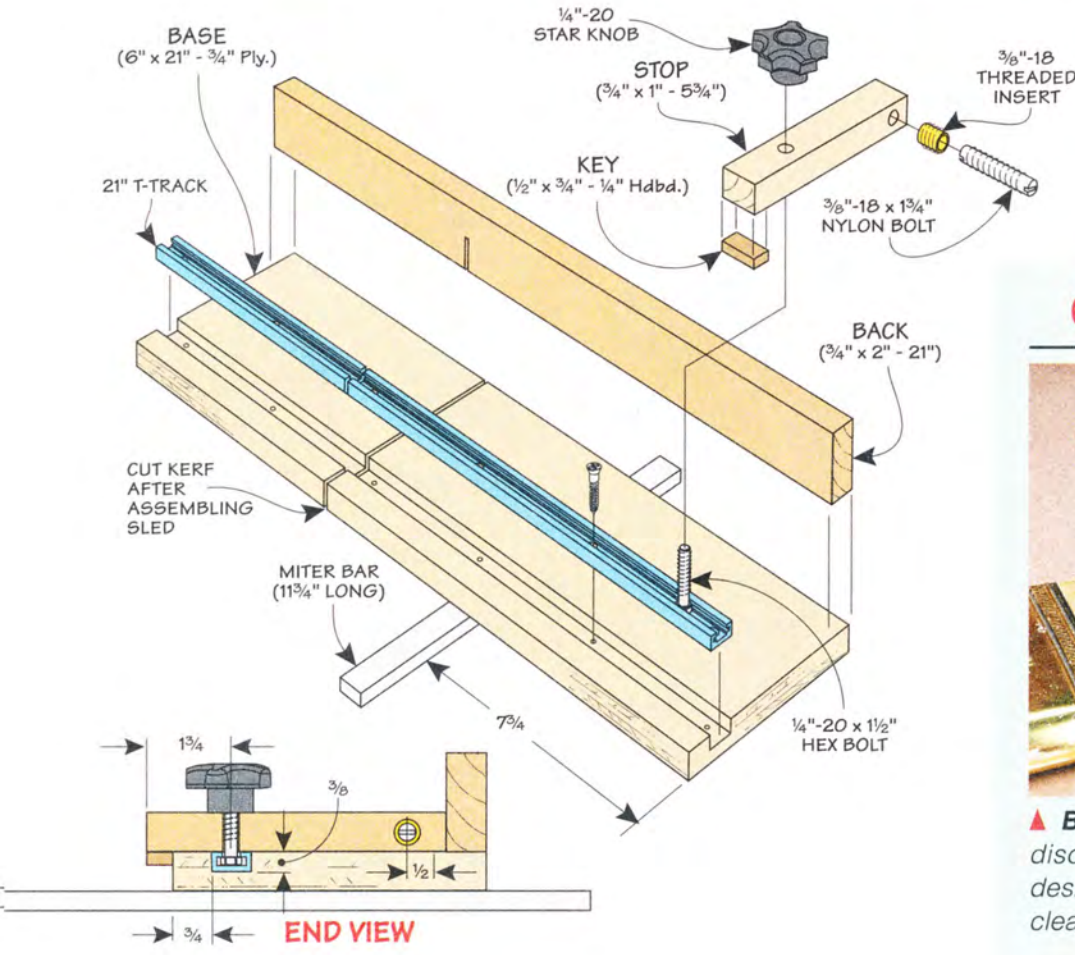
I build a lot of small projects where precise joinery is a must. But cutting small parts to length safely and accurately with a stock miter gauge is a challenge. The small sled you see above solves the problem and offers a lot of practical features.

The sled features a T-track mounted in the base. A hardwood stop allows you to make repetitive cuts with precision. And you can tweak the final cut location with the built-in micro-adjuster. The stop has a small key at the front edge to help ensure that it remains square to the fence. It also allows you to cut workpieces wider than the base using the front edge of the sled.

The drawing below provides the specifics for building your own sled. It's critical that the miter bar is square to the front edge of the sled. And the fence needs to be square to the blade. Otherwise, the construction is pretty straightforward.

I started by making the base and then adding the fence, T-track, and miter bar. The hardwood stop requires a hole for the flange bolt and threaded insert. Glue on the key and sand the sides of the stop smooth before adding the nylon set screw for the micro-adjustment. Finally, install the stop with a plastic knob.

Bill Wells
Olympia, Washington



Quick Tips

▲ ***Brian Fischer*** *of Clovis, California, discovered that a de-shedding comb designed for pets makes a great tool for cleaning paint brushes.*

Versatile Router Base

The router I use in my router table serves double-duty as a handheld router as well. To make this transition simple, I mounted an oversized, clear acrylic plastic base to it, as you can see at right.

This has a number of advantages. The ⅜"-thick acrylic doesn't sag under the weight of my 2¼-hp router when it's installed in my router table. And because the base is clear, I can see the progress of my work when using the router at the workbench. The large baseplate has the additional benefit of supporting the router flat on the workpiece. You can see what I mean in the lower photo at right.

Mounting. To mount the plastic base to the router, use your router's base as a guide for marking the through-holes for the screws. Since the base is so thick, I drilled counterbored screw holes about ¼" deep.

Depending on the size of base you decide to make, you may need to increase the size of the opening in your router table. I cut the opening ¾" smaller than the plate in both directions. This is so a ⅜"-wide rabbet would support the base. The depth of the rabbet should equal the thickness of the router base plate.

Blank Insert. When I need an extra worksurface in the shop, I install a blank plate in the opening of the router table (photo above). I used ½" MDF. I cut a rabbet around the bottom edge so that the blank plate would sit flush with the top of the router table when installed. It makes for a quick worksurface when using the router by hand or when assembling a project.

Chuck Robertson
Camano Island, Washington

▲ *Applying a finish to small items can be messy, but* ***Bill Potter*** *of Mystic, Connecticut, uses double-sided tape to hold them in place.*

▲ ***Edward Stiles*** *of Lawton, Oklahoma, built a handy storage box for his saw blades. Labeled hardboard dividers keep them separated and organized so it's easy to find the right one.*

choosing the Best Bits for Small Projects

These small router bits give you big results when building boxes, bowls, and more.

The appeal of building small projects is that you can get great-looking results without a large amount of material. Since projects like these get close attention, you want the details to be perfect. For a lot of those features, I rely on my router and a few special bits that you can see here. (Turn to page 51 for sources.)

▲ ***Small Dovetail Bit.*** *In the router table, this bit makes quick work of cutting tails with a handmade look.*

DOVETAIL BIT

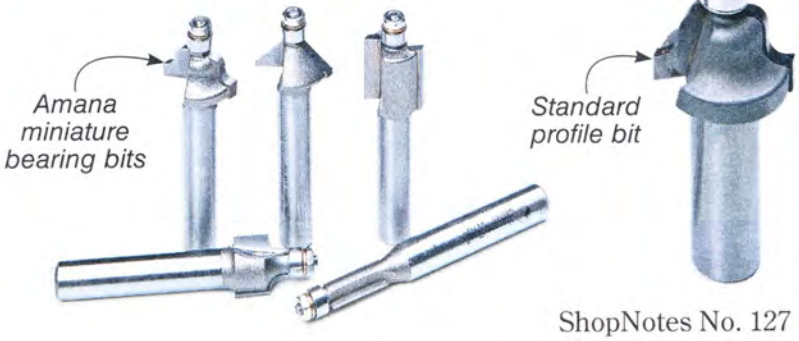
Basic joinery like dadoes, rabbets, and miters are easy to scale down to match the project using standard bits. But dovetails are another matter. Most of the typical dovetail bits are designed for use with a jig to make half-blind joints for drawers. The relatively steep 14° angles can look out of place on smaller projects.

Hand-Cut Look. That doesn't mean you need to break out a hand saw and chisels. Instead, you can use a gently tapered 8° dovetail bit like the one shown in the left photo. This angle, combined with a narrower ¼"-wide cut, is more suited to thinner materials and results in a joint that looks more traditional. I want to offer a word of caution, though. This bit has a narrow "neck" that can snap if you push against it too hard.

SMALL PROFILES

As I said earlier, details matter on small projects. That's especially true when it comes to profiles. Furniture-scale profile bits can overwhelm smaller projects.

Finding small-scale profile bits isn't too difficult. The trouble



is that these bits typically don't have bearings to guide them. Instead, many use a solid pilot point that spins along with the bit. This can result in burnished or burned edges that stick out like a sore thumb and can be just as difficult to conceal.

Tiny Bearings. To prevent this problem, *Amana Tool* combined a small, 3/16"-dia. ball bearing with a series of pint-sized bits. Besides eliminating the marks caused by pilot points, the small bearing makes it easy to rout smooth profiles along edges with tight curves. The photo on the bottom of the previous page shows a few of the bits available.

STRAIGHT BITS

Routing dovetails and profiles aren't the only ways to dress up small projects. Another traditional option is to apply an inlay. That could be a marquetry pattern, banding, or stringing. The key to success here is cutting an accurate recess to hold the inlay.

Small, Versatile Bits. Common straight bits do a good job of removing material quickly. But even a 1/4"-dia. bit can't get into all the nooks and crannies. That's why I keep a few small-diameter straight bits to handle these situations.

You can see one example in the photos below. A 1/8"-dia. bit is just the right size for routing a channel to accept a thin stringing detail. You can find straight bits down to 1/16" in diameter.

Like any other straight bit, small straight bits will tackle joinery tasks, too. You'll find that small dadoes and grooves are easy to cut on a router table.

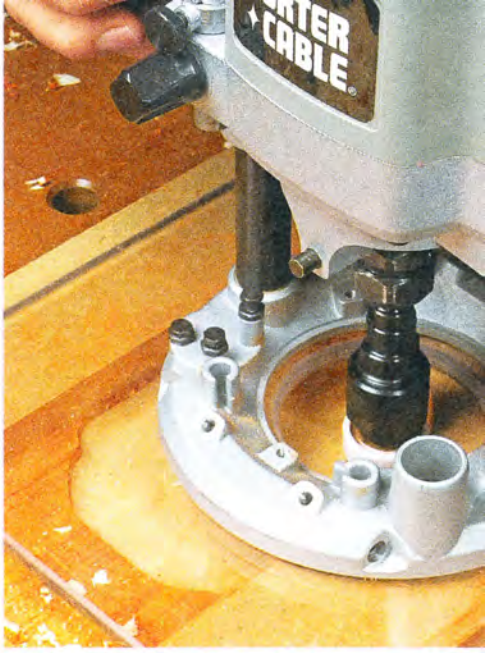
BOX SLOTTING

Speaking of grooves, cutting the groove for the bottom of a box can be tricky. In boxes joined with dovetails or box joints, a portion of the groove will be visible.

Invisible Groove. In the past, I'd fill the resulting gaps with a plug. But I ran across box-slotting bits that are designed for the job. They look like miniature slot cutters. The photo below shows how the bit works. Clamp the box together (no glue) and rout the groove around the inside edge. Then you can cut the box bottom to size and round the corners to match the groove.

The box above highlights one other bit that I use on small projects. With a small investment in one or more of these router bits, you can get more from your router and make better projects.

a big bit for Bowls & Trays

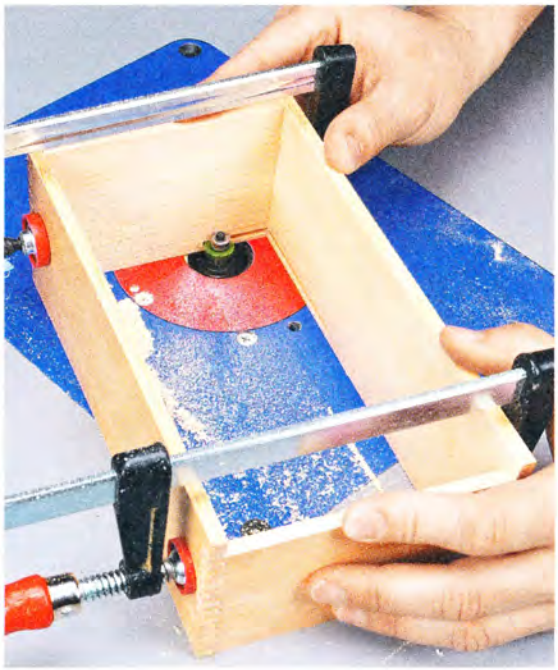


Just because you're working on a small project doesn't mean the bit needs to be small. For example, you can use a router to "carve" out wood to create unique bowls, boxes, and trays.

Doing this means you'll be removing a lot of waste. The best bit for the job is a large bowl and tray bit like you see in the margin photo. A shank-mounted bearing allows it to follow a template to create a perfect shape. The 1 1/4"-dia. bit has cutting edges that are radiused (1/4") to leave a surprisingly smooth and gently curved transition from the sides to the bottom of the bowl.

Bowl & tray bit

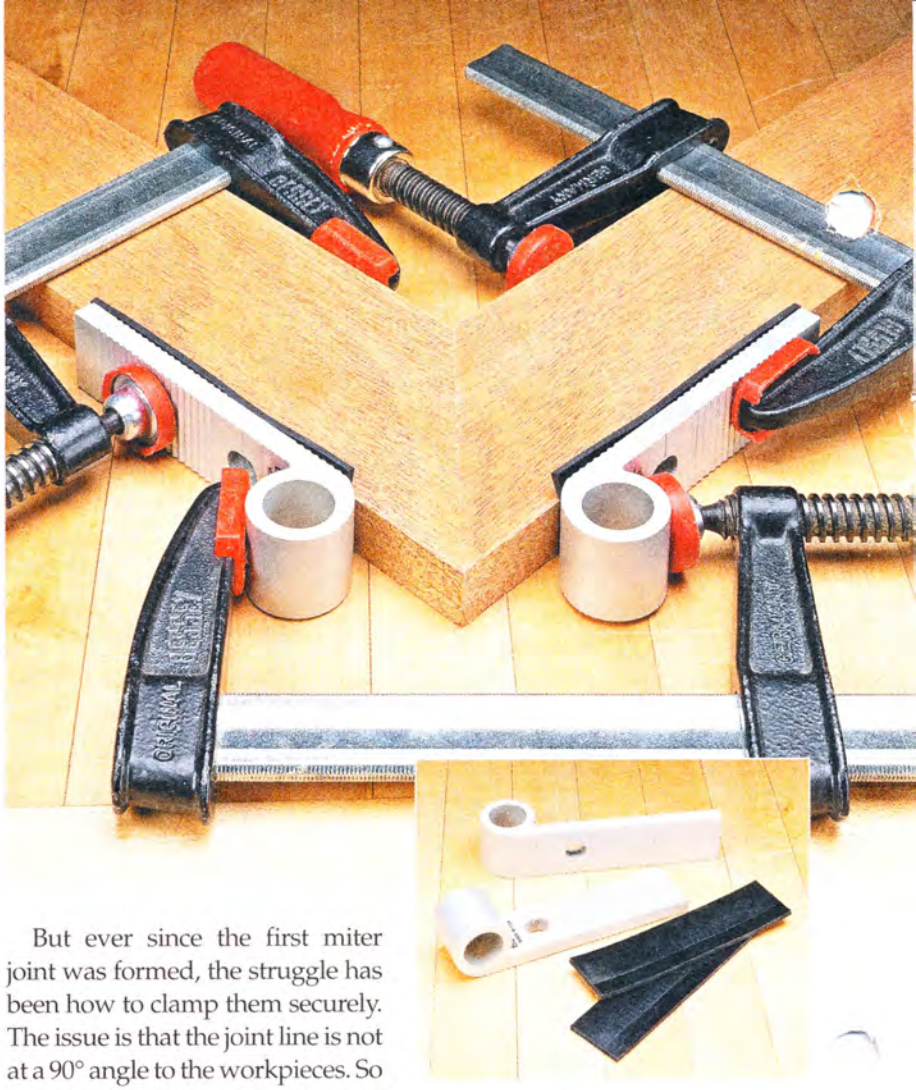
▲ ***Inlay Grooves.*** *A 1/8"-dia. bit and an edge guide let you rout a groove to add a string inlay detail to any project.*



◀ ***Box-Slotting Bit.*** *Dry clamp the box parts together to rout a bottom groove that won't be visible from the outside.*

clamping Miters

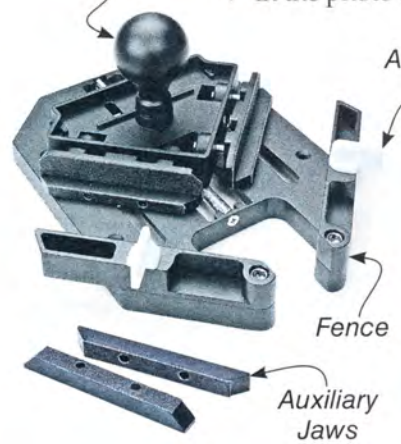
Tight miters are just a twist, turn, or squeeze away with the help of these handy clamps.

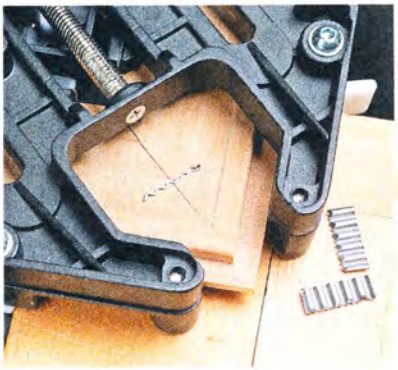


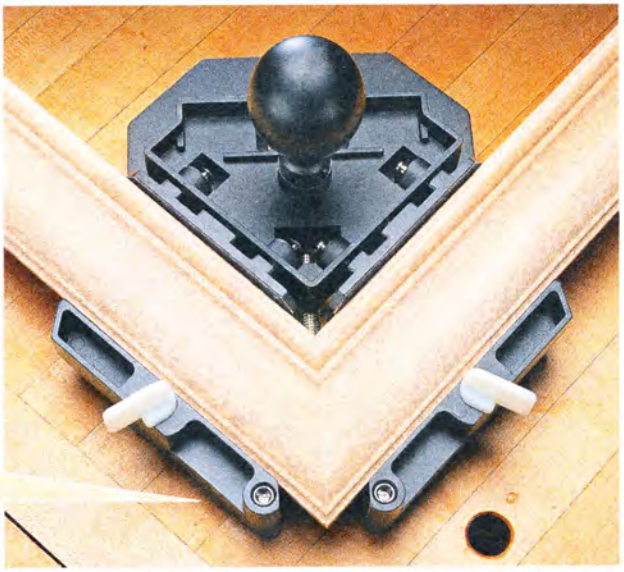
Most woodworkers have worked with miter joints. The beautiful thing about them is that they're the perfect joint when the goal is mating two profiled workpieces at a corner. A great example of this is the picture frame you see in the photo below.

But ever since the first miter joint was formed, the struggle has been how to clamp them securely. The issue is that the joint line is not at a 90° angle to the workpieces. So it can be difficult to secure the two pieces together while applying pressure at the joint line. And this is important when adding glue.

Fortunately, there are a few clamps available to solve this problem (see Sources on page 51).







▲ **Picture Perfect.** *This clamp from Rockler holds miter joints at a perfect 90° angle. A space at the bottom lets you add fasteners if desired (left).*

CLAMPING BLOCKS

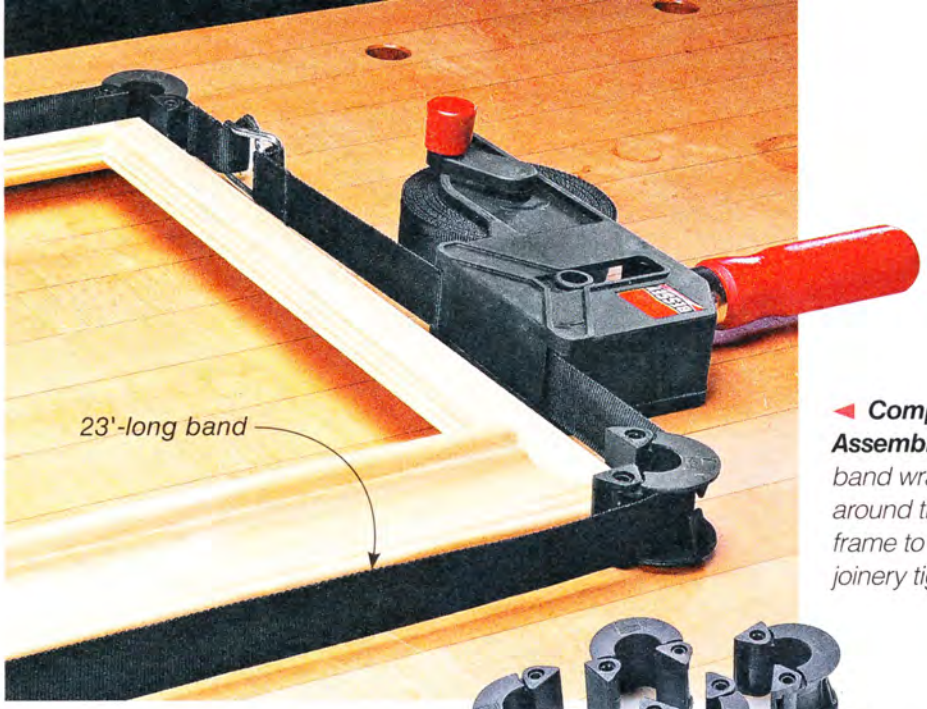
The *Universal Clamping Blocks* from *BLOKKZ* are a simple solution that offers a lot of versatility. The main photo above shows how they work in conjunction with your own clamps to apply pressure to the joint.

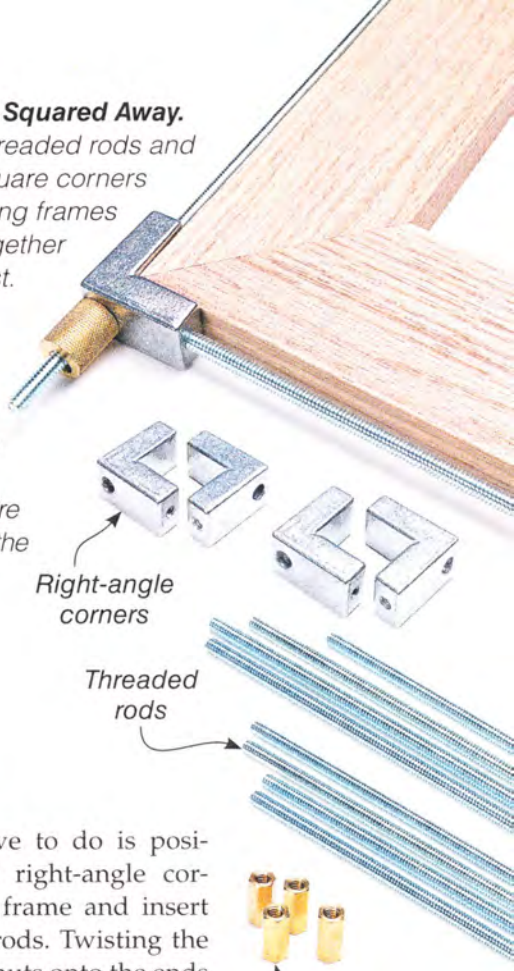
The blocks are sold in pairs and are made from anodized aluminum. Thin, neoprene pads placed between the blocks and the workpiece help reduce slipping and protect the wood from damage (inset photo above).

Using the blocks on any angle or size of miter is as simple as clamping one block near the end of each workpiece, then bringing the joint together with a third clamp. This allows you to apply as much pressure as you need at the joint line.

PICTURE FRAME CLAMP

Another option for clamping single miters is the *Miter Tight Picture*





Squared Away. *Threaded rods and square corners bring frames together fast.*

Complete Assembly. *The band wraps around the entire frame to bring the joinery tight.*

Frame Clamp from *Rockler* (lower left photos, page 10). This all-in-one solution works great on 45° miters with stock up to 2⅞" wide, which covers most commonly used picture frame stock. This clamp has two fences set at a 90° angle to help align the workpieces and a sliding clamp mechanism that holds the workpieces in place.

A few features make this clamp different from similar clamps. First, there are small levers on each fence that allow you to adjust the angle of the fences slightly for a perfect fit. And the jaws on the clamp are spring loaded with textured faces that bring the joint together as the clamp is tightened. An open area on the bottom side of the clamp provides room for adding joint fasteners.

BAND CLAMP

Assembling an entire frame at once can be a real challenge. One of my favorite clamps for this task is a band clamp. The one shown in the left photo above is the *Variable Angle Strap Clamp* from *Bessey*. As the name of the product suggests, the clamp will work on any angle, for a frame with any number of sides.

After positioning each piece of the frame, simply adjust the band around the perimeter of the frame. A crank-style handle on the clamp quickly tightens the band, and a few twists of the main handle allow you to fine-tune the pressure.

CORNER FRAMING CLAMP

If you need to clamp a standard frame with four 90° corners, the *Quick-Release Corner Framing Clamp Kit* from *Rockler* may be the way to go. The kit comes with everything you need to clamp a frame up to 45½" square.

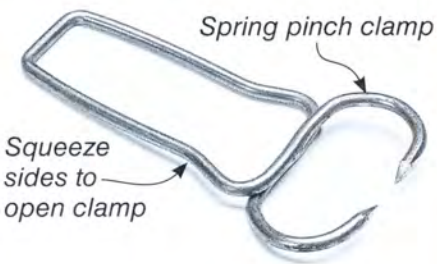
All you have to do is position the four right-angle corners on your frame and insert the threaded rods. Twisting the quick-release nuts onto the ends of the rods brings the corners closer together and secures the entire frame in place.

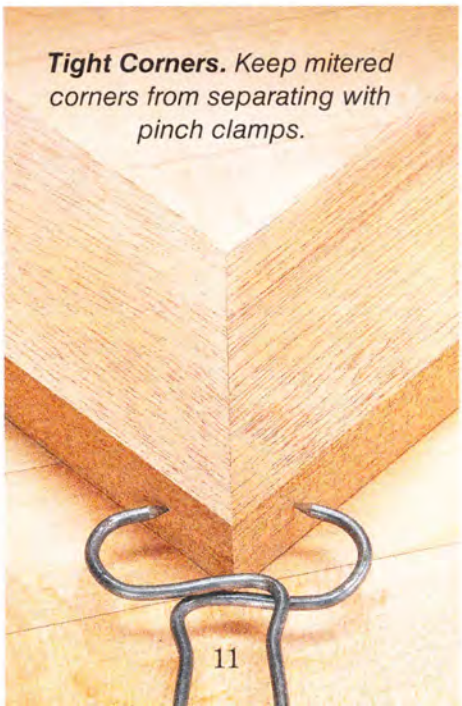
Give these clamps a try the next time you're working with miters. You'll get better results with fewer frustrations.

spring steel Pinch Clamps

Some miters just need a little help being held together while the glue dries. A simple solution for this is the *Spring Pinch Clamp* from *Ulmia*.

As you can see in the photos here, this simple clamp has two "teeth" that hold the joint together. And while they do pierce the surface of the wood, the sharp points don't tear the wood fibers. So it's easy to hide the small marks with a little wood filler.





Tight Corners. *Keep mitered corners from separating with pinch clamps.*

5 adjustable Shelf Standards

Add versatile, adjustable shelving to your storage projects with these easy-to-install shelf standards.

When building a project designed for storage, nothing beats the flexibility of adjustable shelving. It allows you to move the shelves as your storage needs change.

One of the quickest ways to incorporate adjustable shelving into your projects is to install shelf standards. These are long strips that you install in the sides of your cabinet to hold adjustable brackets. I want to mention a few that are worth a look. You can find out where to buy them in Sources on page 51.

Surface- or Flush-Mount. As I said, shelf standards are installed inside the cabinet. Most of them can be surface-mounted. For a cleaner look, you can install them in a groove cut into the cabinet sides. You just need to size the groove for a snug fit.

And that brings me to my next point. If you're going to cut grooves for the standards, you'll need to plan ahead and cut them before you assemble the cabinet.

Metal Strips. As a youngster, I remember my dad making built-in bookshelves. To add adjustable shelving, he used the traditional steel shelf standards you see in the lower left photo. They're quick to install with just a few screws. The shelf clips simply snap in place yet offer plenty of strength for heavy loads.

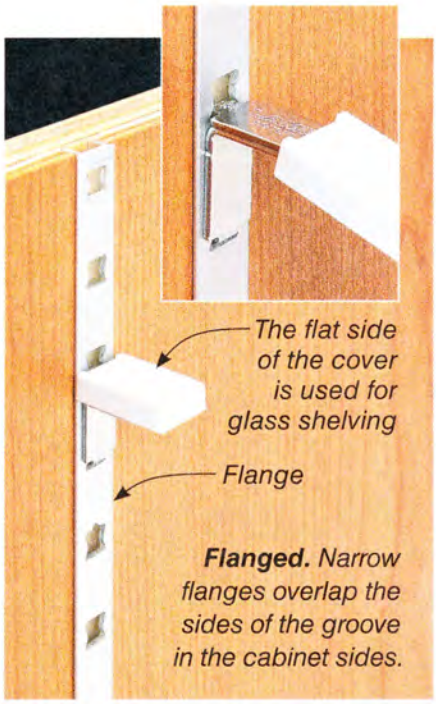
Speedy Shelf Supports. One of the more interesting styles of shelf standard is made from plastic (near left photo). Despite their plastic construction, they can handle as much loading as their metal counterparts.

This design allows you to "snap" a shelf into position. When you lift up on the shelf, it presses the rest back into the standard (inset photo at left).

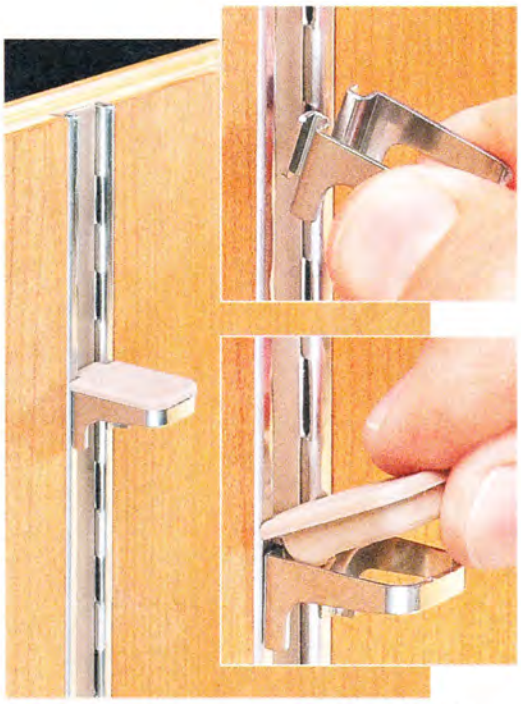
Traditional. *These standards can be surface-mounted or installed in a groove. Then the shelf clips snap in place (inset photo).*

Speedy. *Adjusting a shelf is easy with the retractable rests (inset photo).*

Thin Profile. *Installed in a groove or surface-mounted, these standards are strong and sleek.*



Flanged. *Narrow flanges overlap the sides of the groove in the cabinet sides.*



▲ **Low-Profile.** *These stainless steel standards offer plenty of strength.*

There are no clips or pins to lose. These are ideal for a quick and inexpensive storage solution.

Thin Profile. The next set of shelf standards are made from aluminum and available in two styles. The first style can either be surface-mounted or flush-mounted in a groove (left photo above). The other style, shown in the center photo above, is designed to be press-fit or glued into a groove. Once installed, a thin flange along each side hides the edge of the groove.

A pair of hooks on the metal shelf clips lock in place securely (left inset photo above). Then you can slip on a dual-purpose plastic cover (center inset photo above). One side of the cover has a raised nib to engage a slot cut on the bottom side of the shelf. This prevents the shelf from being pulled out accidentally. The flat side of the cover is used primarily for supporting glass shelving.

Covered Supports. For a sleek, modern look, check out the stainless steel standards in the photos on the upper right. They offer a couple of unique features. First, there's a thin, plastic strip that slips into the standard behind the clips to hide the mounting screws. It also helps the standard blend into the cabinetry and adds a decorative touch. The strips are optional and are available in white or brown.

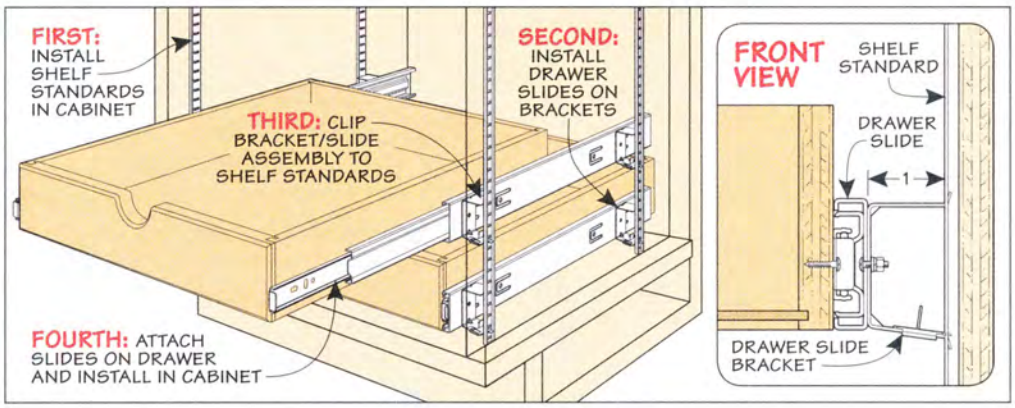
The other feature I want to point out is how the shelf clips are installed. As you can see in the upper right inset above, you simply squeeze the sides of the clip and insert it into the standard. Release the clip so that the tabs on the clip's sides engage the slots in the standard. Then you snap in a plastic cap over the clip. Like the colored strips, these caps are available in white or brown.

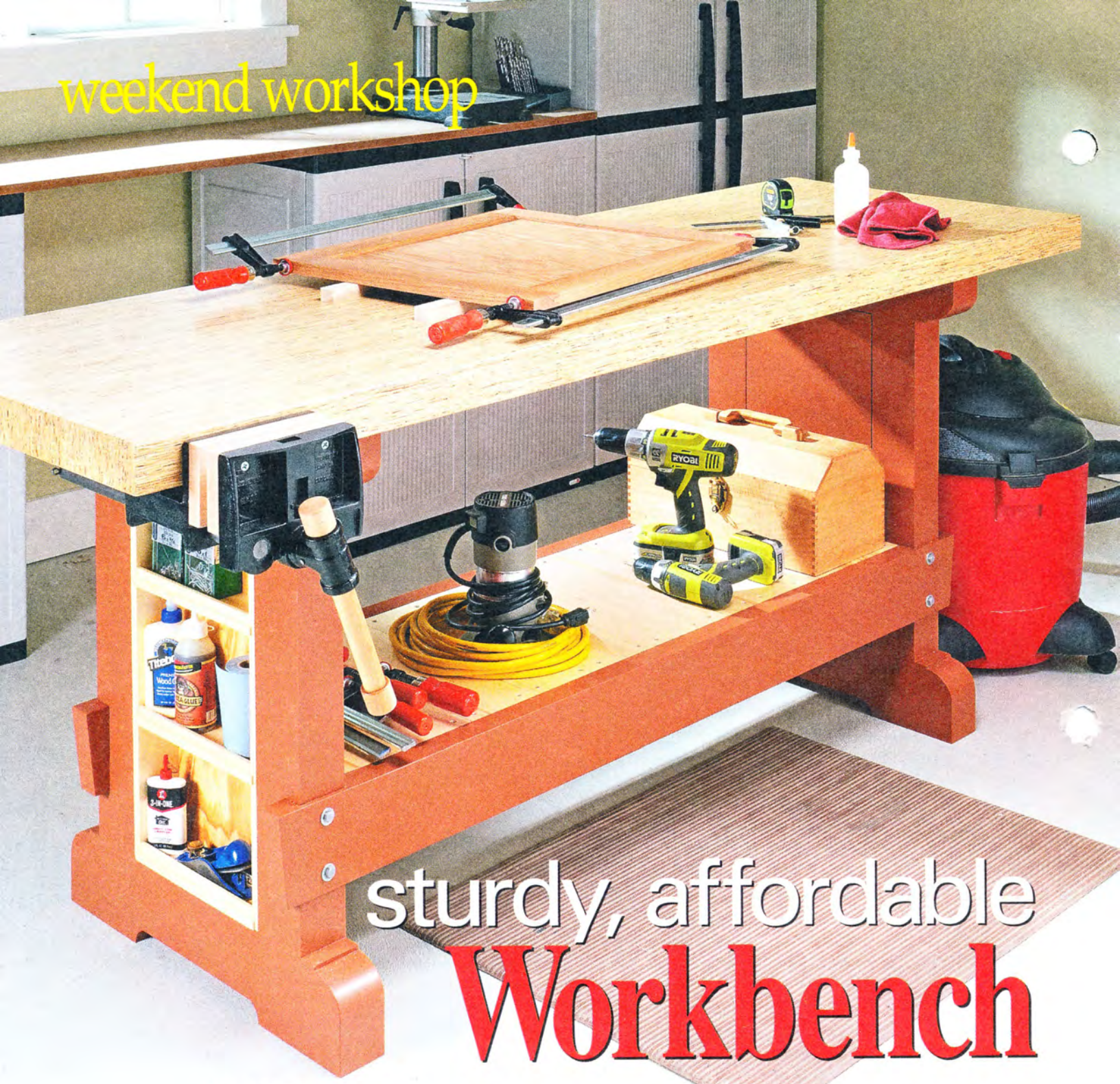
Quick & Easy. As you can see, adding adjustable shelving to your projects is easy. Using shelf standards, you can add functionality *and* good looks.

accuride
Drawer Brackets

If you're looking for an easy way to add drawers or pull-out trays to a cabinet, try the brackets shown at right. The brackets fasten into the traditional shelf standards shown in the lower left corner of the opposite page.

The drawings below show how they work. Attach the cabinet portion of the drawer slide to the bracket and then fasten the assembly to the shelf standards. Finally, fasten the drawer portion to the drawer and install.





sturdy, affordable Workbench

Building a versatile bench that will hold up to years of use doesn't have to break the bank.

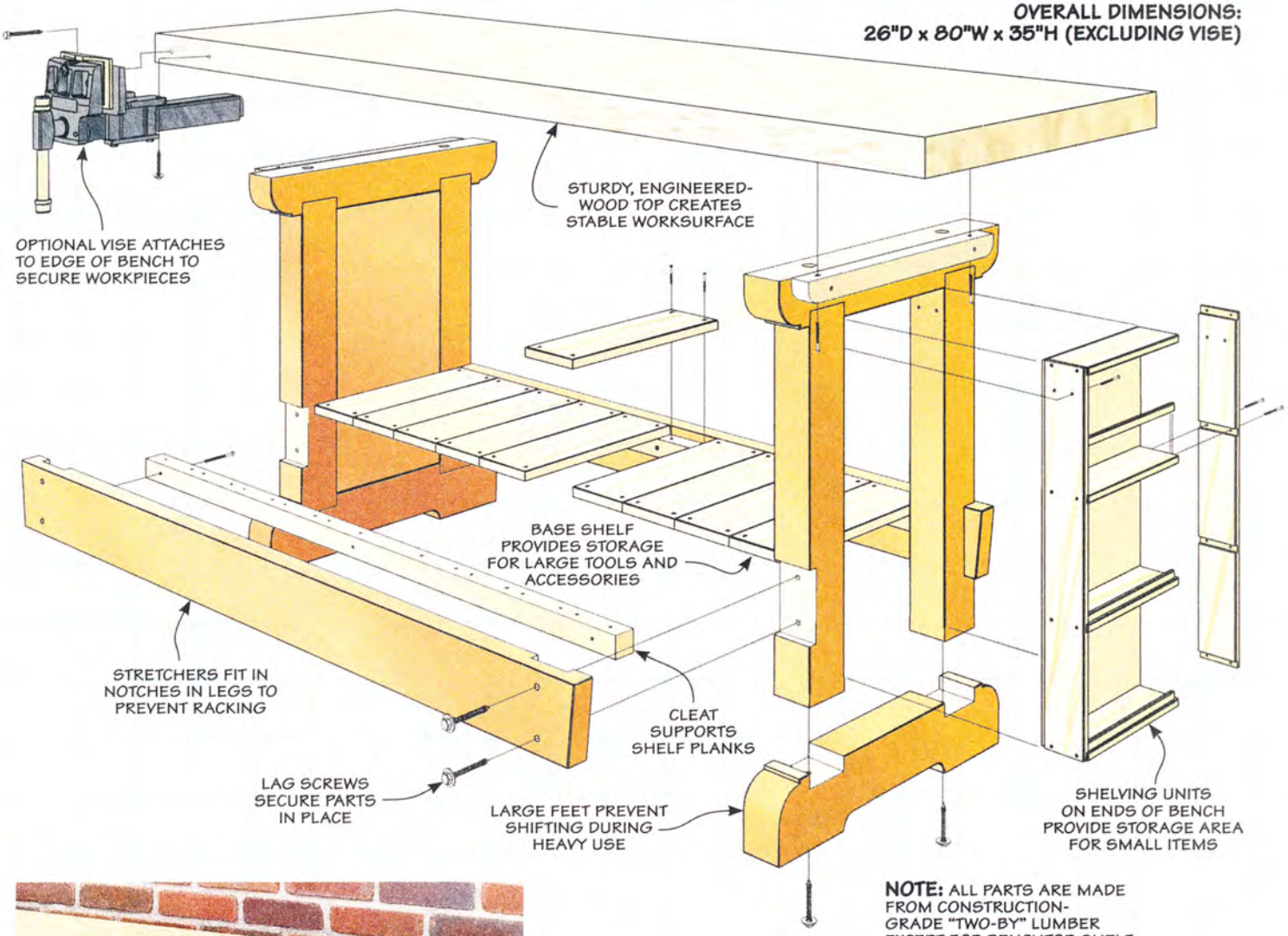
The centerpiece of most shops is the workbench. This multi-purpose fixture is used for cutting, routing, and sanding project parts. It even provides a flat surface for final assembly. But a quality bench can be expensive to buy. And building your own can be costly and time-consuming.

That's why we designed the bench you see above. The base is built from construction-grade lumber. The top is assembled from an engineered wood product called *TimberStrand*, available at your local lumber supplier. You can see an unpainted version of the bench on the opposite page.

This combination of low-cost materials results in a solid workbench that won't cost an arm and a leg. The simple construction means you can complete this project in just one weekend.

Exploded View Details

OVERALL DIMENSIONS:
26"D x 80"W x 35"H (EXCLUDING VISE)



NOTE: ALL PARTS ARE MADE FROM CONSTRUCTION-GRADE "TWO-BY" LUMBER EXCEPT FOR BENCHTOP, SHELF PLANKS, AND SHELVING

◀ ***Unpainted.*** *Even without paint, the inexpensive lumber used on the bench looks great.*

ShopNotes GO ONLINE EXTRAS

To download a free cutting diagram for the Workbench, go to: ShopNotes.com

Materials & Hardware

BASE

A	Arms (2)	3 x 3½ - 24
B	Feet (2)	3 x 5 - 24
C	Legs (4)	3 x 3½ - 26
D	Stretchers (2)	1½ x 5 - 59
E	Shelf Cleats (2)	1½ x 1½ - 50
F	Base Shelf Planks (10)	¾ x 5 - 15½

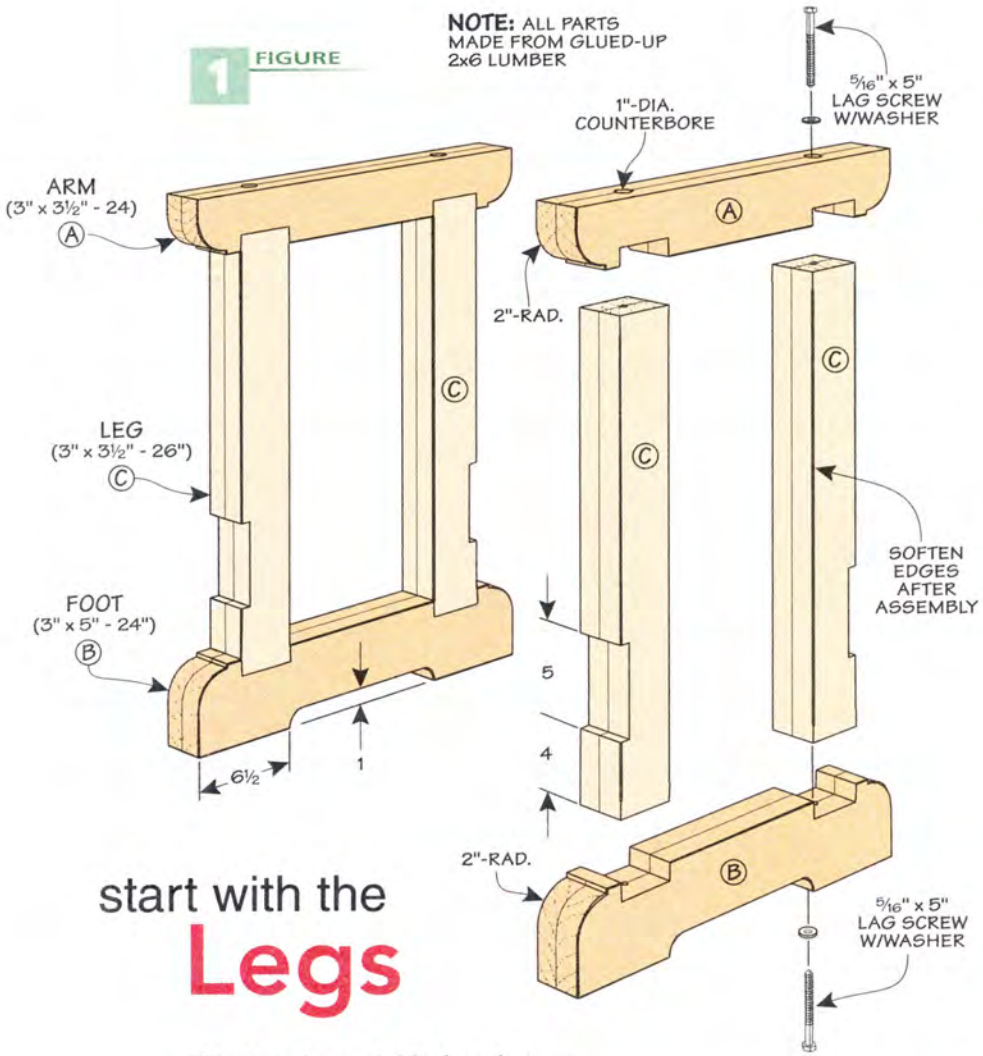
SHELVING UNITS

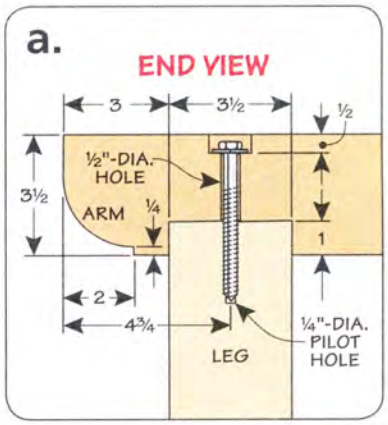
G	Sides (4)	½ x 2¾ - 24
H	Shelves (8)	½ x 2⅞ - 10½
I	Keeper Strips (6)	¼ x ½ - 10
J	Backs (2)	11 x 24 - ¼ Ply.

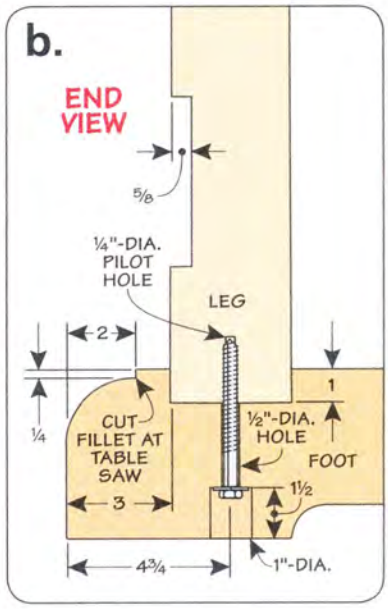
TOP

K	Benchtop (1)	2½ x 26 - 80
L	Top Cleats (2)	1½ x 1½ - 22

- (8) 5/16" x 3½" Lag Screws
- (8) 5/16" x 5" Lag Screws
- (4) ¼" x 3½" Lag Screws
- (16) 5/16" Washers
- (4) ¼" Washers
- (10) #8 x 2½" Fh Woodscrews
- (40) #8 x 1½" Fh Woodscrews
- (40) #6 x 1¼" Fh Woodscrews





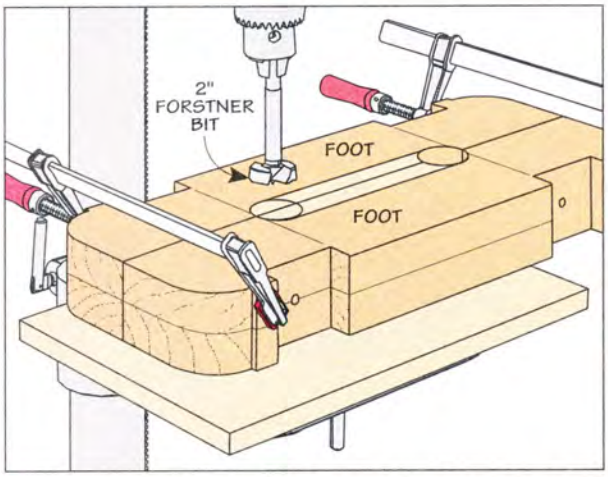


start with the

Legs

The key to a stable bench is a sturdy frame. So it makes sense to start there. This bench has a pair of wide feet for a stable stance and arms that secure the top in place. Two leg assemblies at each end of the bench ensure a comfortable height for the worksurface. Stretchers attached to the legs bring it all together and provide support for a shelf to store your tools and supplies.

Clamp & Drill



▲ ***Curved Notches.*** *Clamp both feet together and use a Forstner bit to make the curves. The rest of the waste is removed using a dado blade.*

END ASSEMBLIES

Making the the feet and arms is a similar process, so I started with them first. And in order to get the final thickness for these workpieces, you begin by gluing up a pair of 2x6 blanks for both the arms and the feet. You can see how these are put together in Figure 1. I find it easier to cut each piece to rough size before the glue-up, then cut them to final length and width once the glue dries.

The notches in the tops of the feet and bottoms of the arms fit over the legs. These can be cut with a dado blade. Figure 1 above gives all the details.

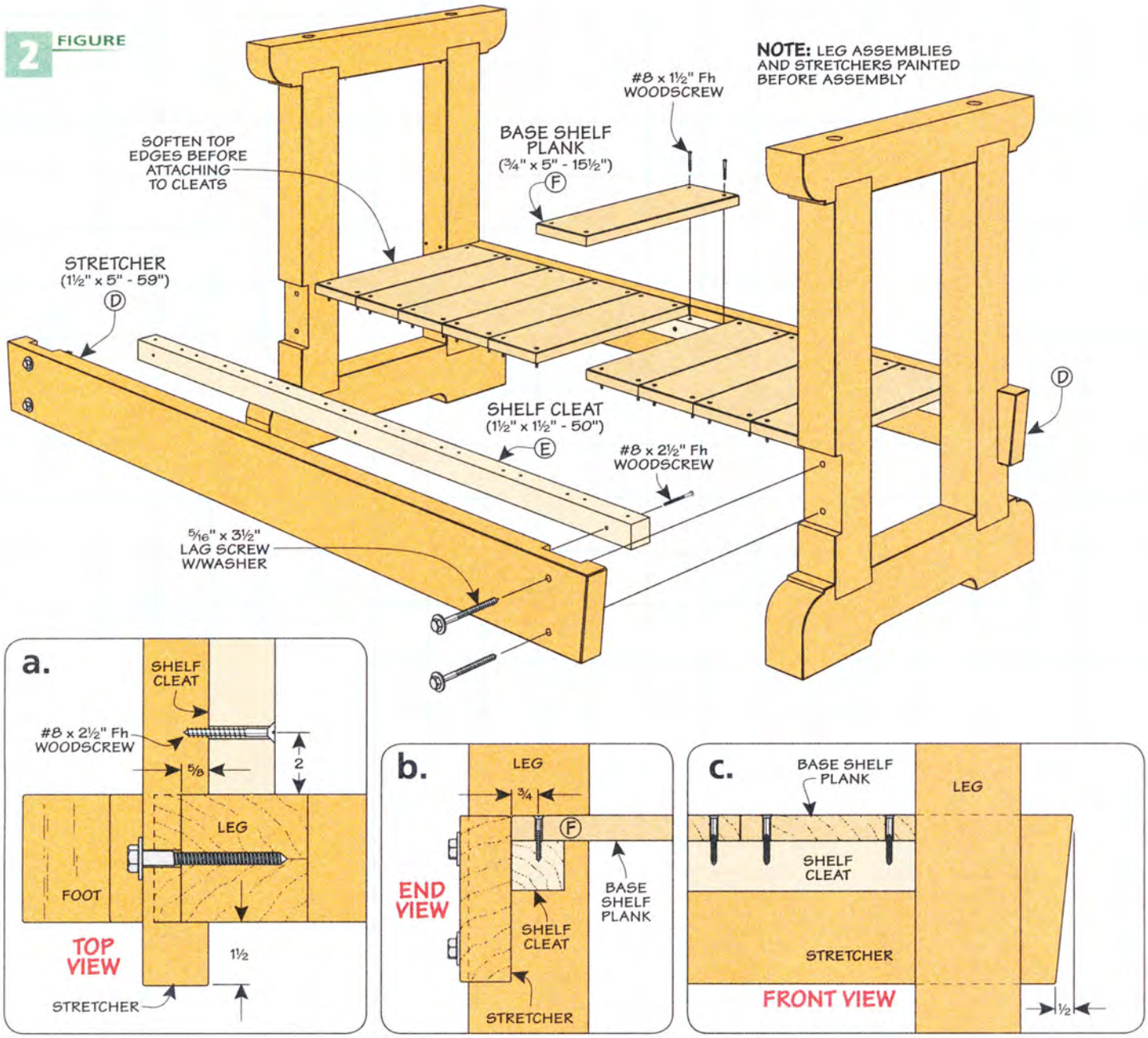
Profiles. The profiles at the ends of each workpiece are simple enough to cut at the band saw. But before you cut the curve, use a crosscut blade in your table saw to cut the fillet in the profile as shown in Figures 1a and 1b. This creates a crisp, clean edge that can be difficult to cut at the band saw. With the profile completed, drill counterbored holes in each workpiece for attaching the legs (Figures 1a and 1b).

The curved notch on the bottom edge of each foot adds visual interest, but also helps keep the bench stable on floors that aren't perfectly flat. Have a look at the drawing to the left for a tip on creating consistent cutouts.

Legs. The legs are also made from glued-up 2x6 material. After cutting them to final size, cut the notches for the stretchers with a dado blade.

Use the holes in the feet and arms to locate holes in the ends of each leg. Then you're ready to

FIGURE 2



attach the arms and feet to the legs using glue and lag screws.

CONNECTING THE ENDS

The 2x6 stretchers are straightforward to make. Once cut to size, make the beveled cuts on the ends with a jig saw (Figure 2c). Clean up the saw marks with sandpaper as necessary to create a smooth end.

Notches. The notches in the stretchers are cut to fit into the leg notches. Once again, I cut these with a dado blade. But since the stretchers are quite long, I used an extra-long auxiliary fence on my miter gauge for support. I also added a sawhorse and support to the left side of my table saw to keep the workpiece resting flat on the saw.

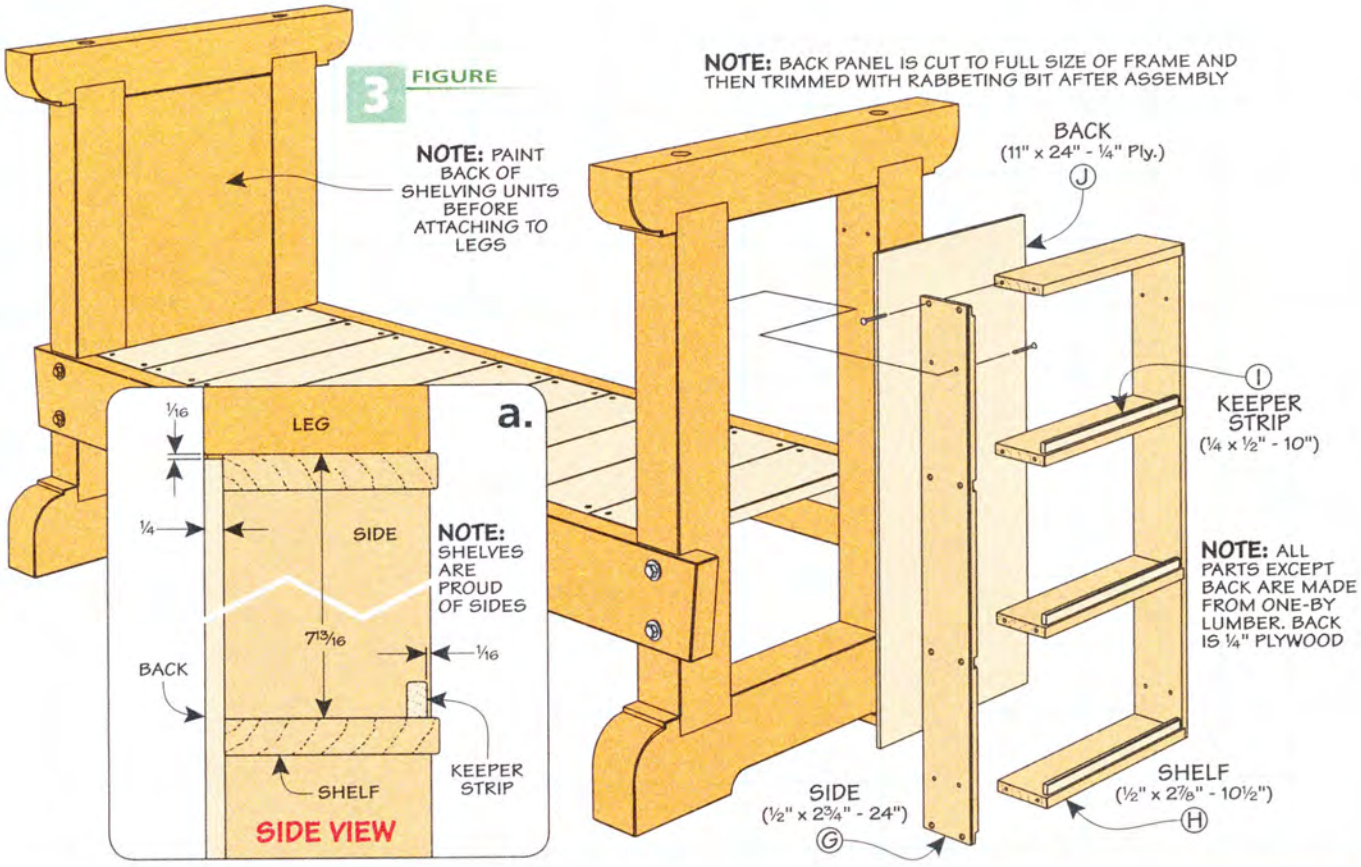
The stretchers are attached to the legs with lag screws. You'll need to drill pilot holes first. I fit the stretchers in the legs and drilled holes in both parts at the same time to ensure the holes lined up. Then you can install the lag screws to secure the entire assembly.

Shelf. I added a shelf to the bench to store some of my tools and to reduce clutter on the bench top. As you can see in Figure 2 above, the shelf is just a series of trimmed 1x6 boards screwed to a pair of cleats.

The cleats are ripped from "two-by" material and attached to the stretchers between the leg assemblies. The drawings above show how these parts fit together.

Keep your material in mind when cutting the individual pieces that make up the shelf to width. Construction-grade lumber often has a high moisture content and will tend to shrink in width over time.

For this reason, I sized the pieces for a tight fit and screwed them in place. If your material is fully seasoned, adjust the width of each workpiece to create a 1/16" gap between each piece before securing them in place.



finish it with

Shelves & a Top

Most woodworkers know that you can never have enough storage space. That's why I took advantage of the opening at each end of the bench to add a pair of shelving units. They're a simple case construction with fixed shelves for storing small items. Finally, you'll complete the bench by adding a solid top made from engineered wood.

▼ ***Laminated Strand Lumber.*** *This engineered wood product is strong, straight, and stable.*

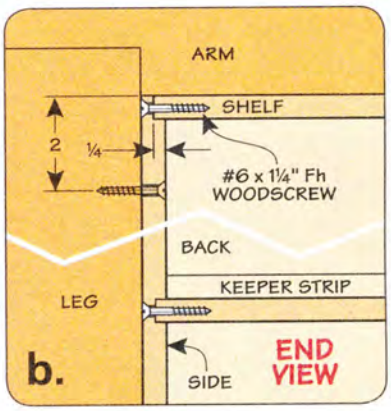
SHELVING UNITS

The shelving units help fill out the base of the bench and aren't difficult to build. But as I mentioned, they're designed to fit snugly in the space between the legs. So take that into consideration when cutting the parts to size.

Side & Shelves. A good place to start building the shelving units is with the frame for the case. Begin by cutting the sides to size. I cut the dadoes for the shelves next and then drilled the pilot holes in each side.

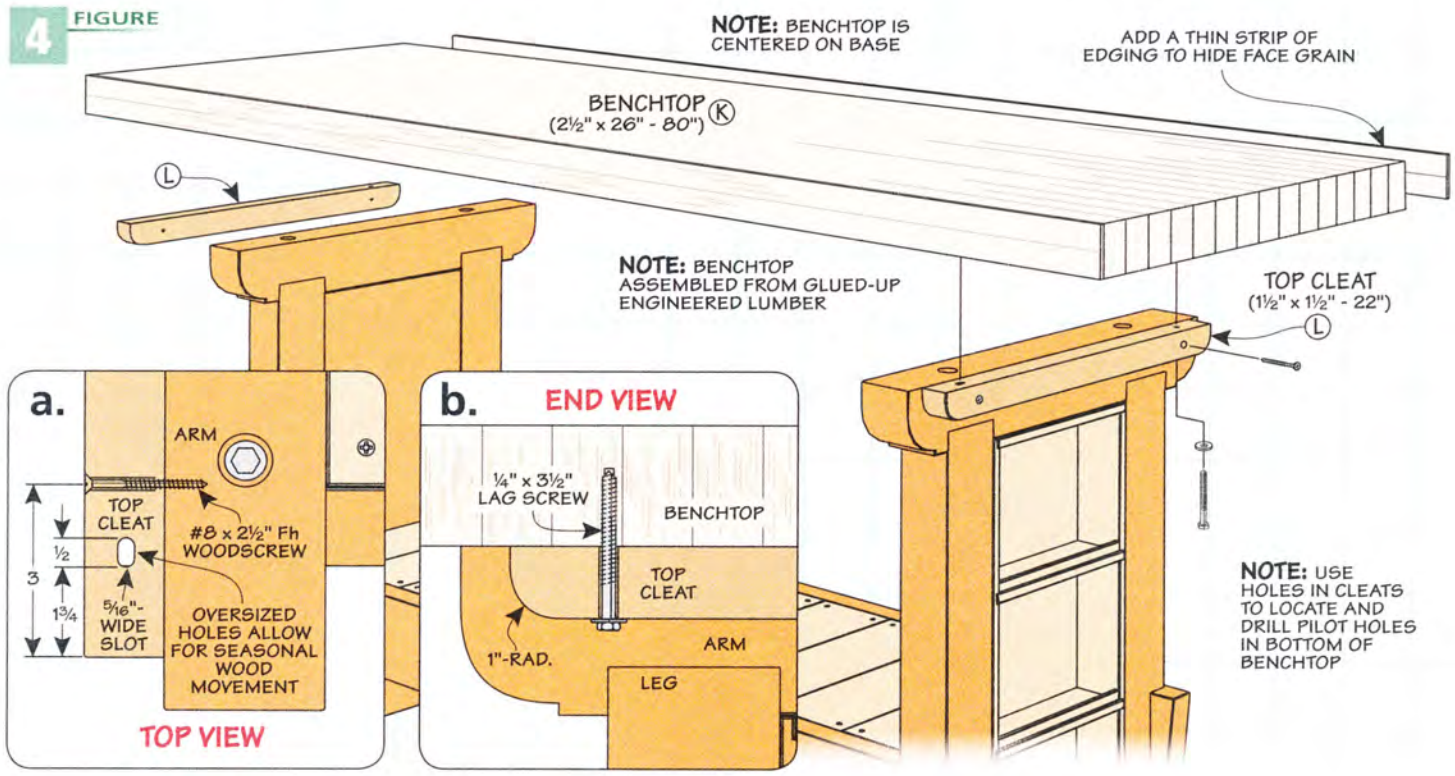
The four pieces that make up the shelves and the top of the case are all identical and establish the width of the case. So cut them to size while testing for a snug fit between the legs. Then you're ready to attach the shelves to the sides with screws.

Too many of my tools and supplies have a tendency to roll off shelves. To keep that from happening on these shelves, I added a small keeper strip to the front edge of each shelf. These are just glued in place as shown in Figure 3a above.



Back. You may notice in Figure 3a above that the back panel has a 1/16" relief around its perimeter where it attaches to the frame. This will create a visual separation between the legs and shelving unit when installed.

But rather than trying to position a slightly smaller back on the frame, it's easiest to start by cutting the panel to full size. Once you attach the back to the frame, cut a 1/16" rabbet around the edges of the panel to create the shadow-line relief. Then you can attach the entire assembly to the legs with screws through the frame sides.



BENCHTOP

Without a heavy-duty top, a workbench is just a table. That's why I chose to use *TimberStrand LSL*. This laminated strand lumber is straighter, more stable, and less expensive than hardwoods typically used on benchtops. Check your local lumber supplier to find this product or have a look at Sources on page 51.

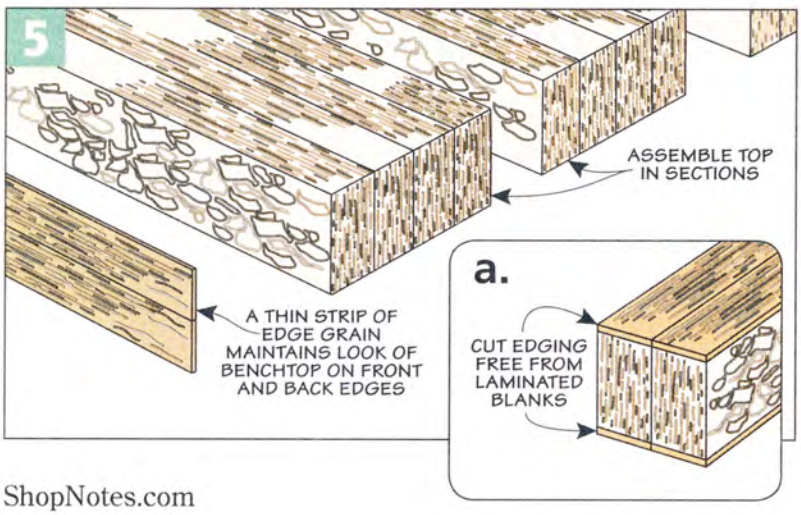
The photo on the opposite page shows what the product looks like when purchased. Quite frankly, the "face grain" of the material isn't going to win any beauty contests. But the random linear pattern on the material's edges creates an interesting effect when multiple pieces are laminated together. And that's just what I did for this benchtop.

Glue-up. If you look at Figure 5 below, you'll see that I ripped the 2x6 beams in half and turned the pieces on edge. I then glued the top together in sections. You'll want to limit the width of each section to the capacity of your planer.

Edging. As I mentioned, I'm not a big fan of the pattern on the face of this material. So, to hide the face grain on the front and back of the top, I cut two thin strips of edge grain from a pair of boards I glued together (Figure 5a). These strips were glued to the front and back of the two outside sections of the top. Figure 5 shows what I mean.

Each section can then be run though the planer until the final thickness is reached. Then you're ready to glue up all the sections into one solid top.

I softened the edges of the top with a ⅛" roundover and attached it to the legs with cleats as shown above. The end result is an inexpensive, yet rock-solid workbench that will last for years to come.



Add a Vise

▲ ***Optional Vise.*** *A vise attached to the front edge of the bench is a valuable addition.*

dream shop project

▲ **Folded Up.** *When not in use, you can fold up the wings and slide them inside the cabinet.*

folding Miter Saw Station

Give your miter saw the home it deserves on this dedicated and versatile workstation.

A miter saw is handy for cutting long stock to length, but it's one tool that's hard to find a home for. You need to have plenty of room on either side for the stock you're cutting. Then there's the problem of how to contain all of the sawdust that gets thrown about.

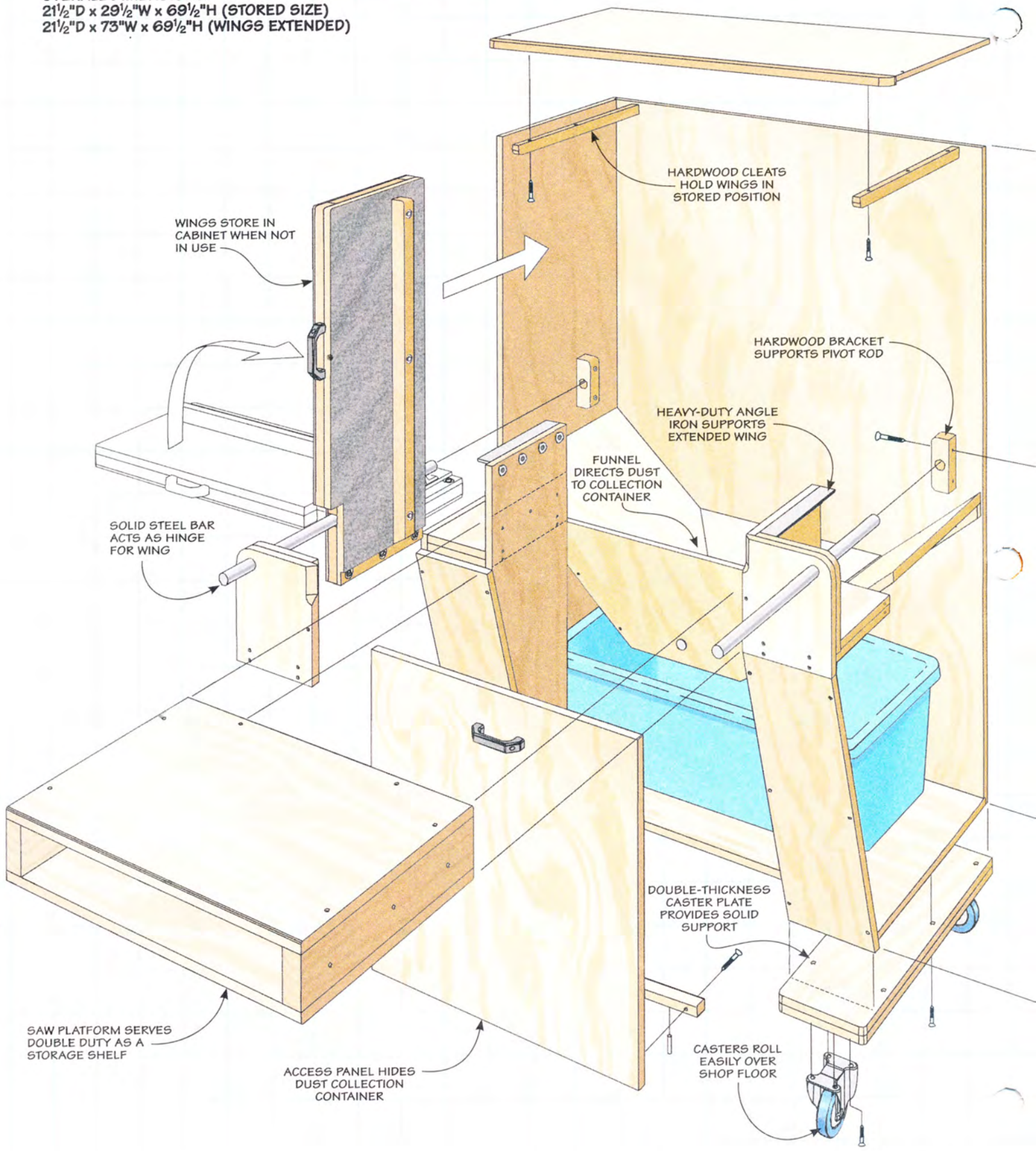
The workstation you see here is designed to help with both of these problems. When extended, the folding wings are high enough to clear your workbench, router table, or other nearby worksurfaces. This means you can tuck the workstation just about anywhere along a wall. And when the wings aren't needed, they store neatly inside the cabinet.

As for controlling the sawdust, I opted for a "passive" approach. Most of the chips are thrown back into the overhead hood and funneled into a plastic container hidden underneath.

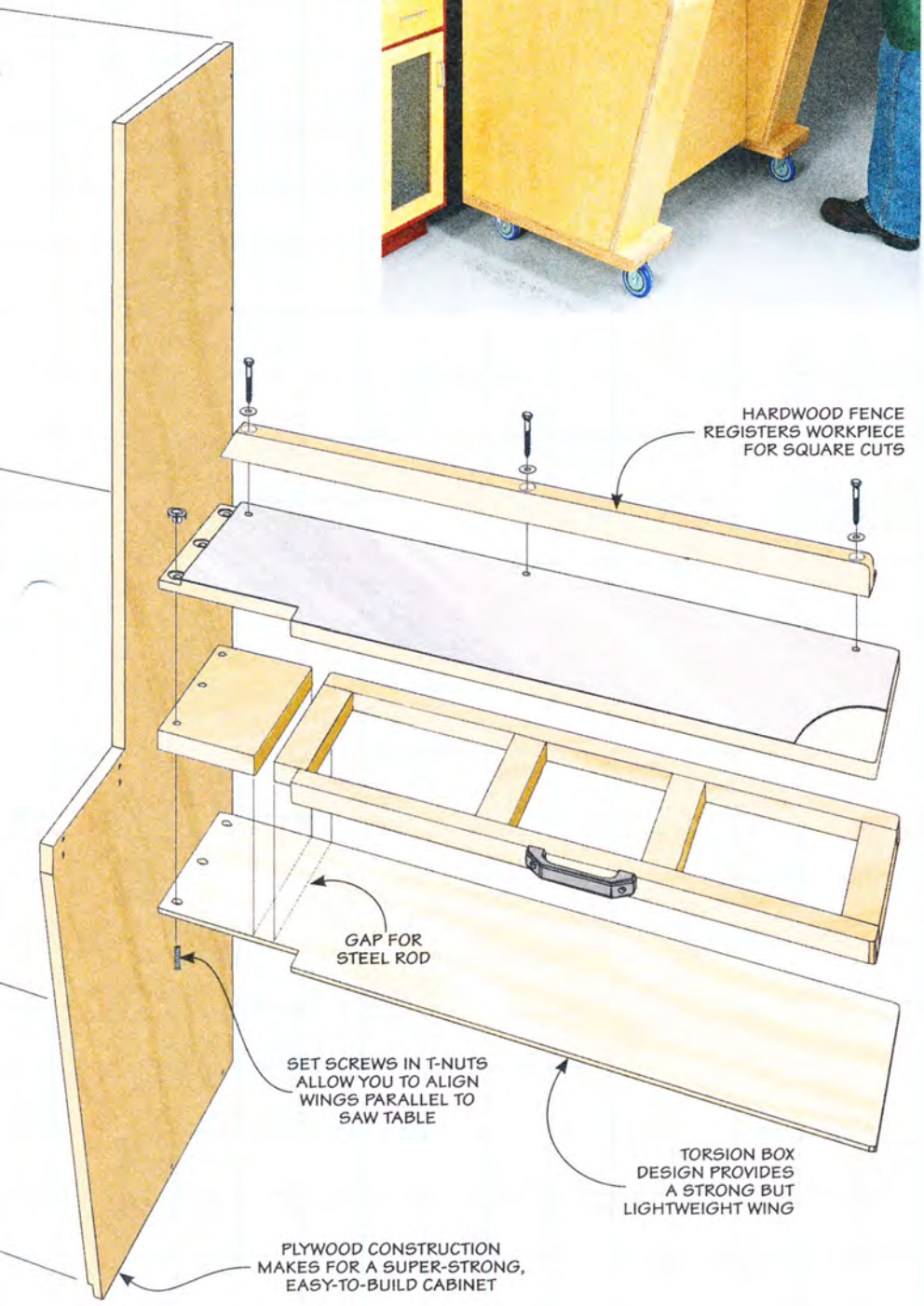
This workstation is designed to provide years of service. It's made from a few sheets of durable ¾" birch plywood. Each wing pivots on a 1"-dia. solid steel rod with a heavy-duty angle iron stop. In short, building this workstation will be one of the best investments you can make for your shop.

Exploded View Details

OVERALL DIMENSIONS:
21½"D x 29½"W x 69½"H (STORED SIZE)
21½"D x 73"W x 69½"H (WINGS EXTENDED)



► **Mobile.** *With its large, sturdy casters, the miter saw station maneuvers easily around the shop.*



Materials & Hardware

CASE

A	Sides (2)	31¼ x 63½ - ¾ Ply.
B	Top (1)	20 x 43 - ¾ Ply.
C	Bottom (1)	23³⁄₁₆ x 42 - ¾ Ply.
D	Back (1)	42 x 63½ - ¾ Ply.
E	Edging (1)	¾ x 1¼ - 43
F	Caster Plates (2)	8¼ x 26½ - 1½ Ply.
G	Post Caps (2)	6¾ x 11¼ - 1½ Ply.
H	Post Sides (2)	11¼ x 36½ - ¾ Ply.
I	Post Face (2)	8¼ x 28⅛ - ¾ Ply.
J	Rear Pivot Bracket (2)	7½ x 8 - ¾ Ply.
K	Front Pivot Bracket (2)	8¼ x 9⅝ - ¾ Ply.
L	Front Dust Plate (1)	10¼ x 36¼ - ¾ Ply.
M	Cleats (2)	¾ x 1 - 19⅜
N	Side Dust Plates (2)	20 x 18½ - ¾ Ply.
O	Kicker Plates (2)	7 x 20¹¹⁄₁₆ - ¼ Ply.
P	Platform Top/Bot. (2)	16 x 26½ - ¾ Ply.
Q	Platform Back (1)	1½ x 3½ - 23½
R	Platform Sides (2)	1½ x 3½ - 16
S	Access Panel (1)	26⅜ x 27 - ¾ Ply.
T	Panel Cleat (1)	¾ x 1 - 26⅜

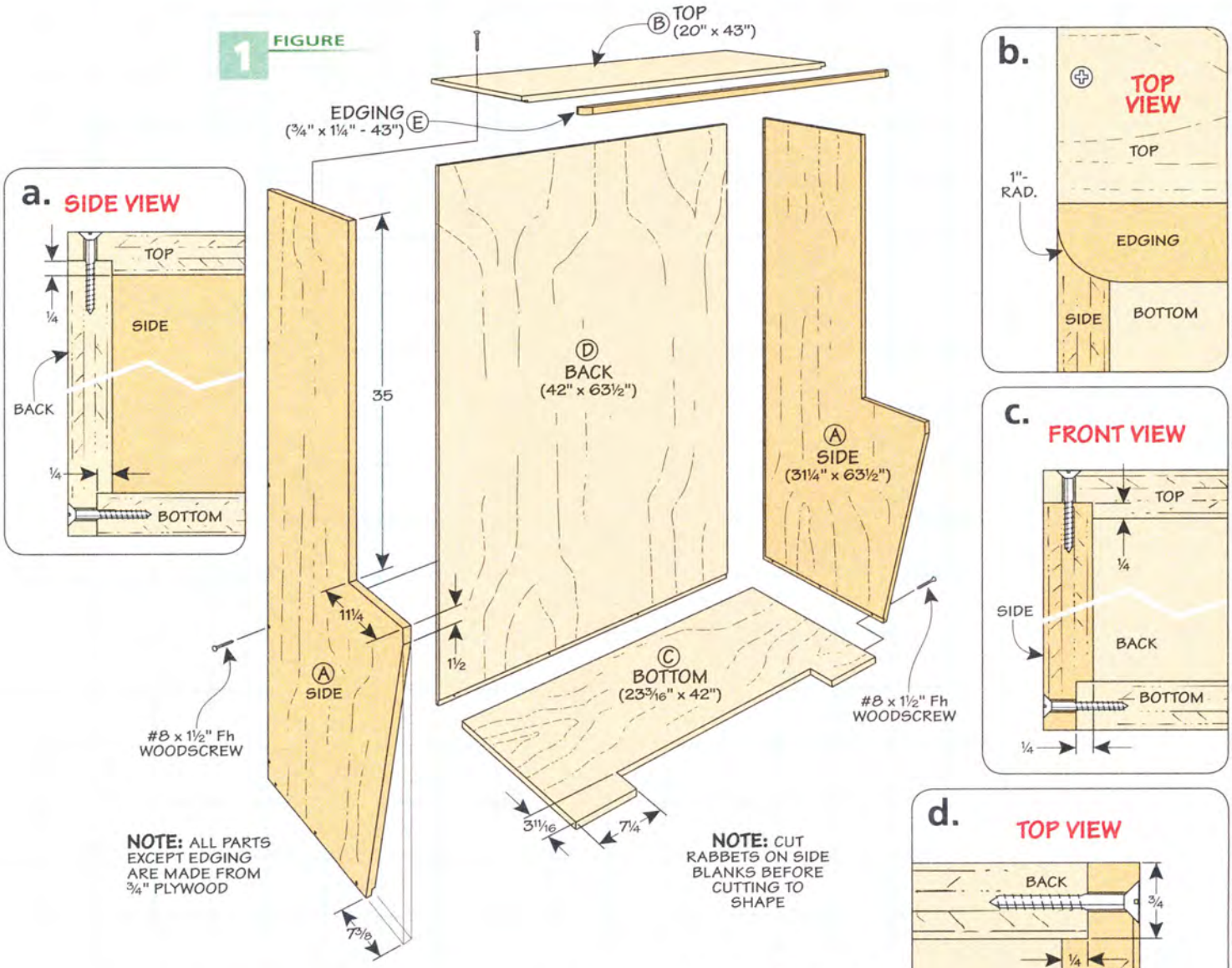
WINGS

U	Rod Brackets (2)	1½ x 1¾ - 5
V	Wing Tops (2)	12 x 33¼ - ¾ Ply.
W	Wing Laminate (2)	12 x 33¼ Plastic Lam.
X	Wing Bottoms (2)	12 x 33¼ - ¼ Ply.
Y	Wing Fronts (2)	1 x 1½ - 26
Z	Wing Backs (2)	1 x 1½ - 27¼
AA	Wide Fillers (2)	1 x 5 - 10½
BB	Narrow Fillers (8)	1 x 1½ - 9
CC	Wing Guides (2)	¾ x 1 - 20½
DD	Fences (2)	1 x 1½ - 31

- (116) #8 x 1½" Fh Woodscrews
- (8) #8 x 2" Fh Woodscrews
- (2) 4" Locking Swivel Casters
- (2) 4" Fixed Casters
- (6) ¼"-20 x 3" Hex Head Bolts
- (12) ¼"-20 Nuts
- (6) ¼" x 2" Lag Screws
- (6) ¼" Washers
- (1) ½"-dia. Rare-Earth Magnet w/Cup & Washer
- (2) ⅜"-dia. x 1" Dowels
- (3) 3¾" Handles
- (2) 1½" x ¼" - 10" Angle Iron
- (2) 1"-dia. x 25½" Steel Rod
- (6) ⅜"-16 T-Nuts
- (6) ⅜"-16 x ¾" Allen Head Set Screws
- (8) ⁵⁄₁₆"-18 T-Nuts
- (8) ⁵⁄₁₆"-18 x 1" Fh Machine Screws
- (1) Plastic Storage Bin (33¾"W x 19⅜"D x 13⅜"H)
- (16) #10 x 1¼" Sheet Metal Screws

ShopNotes GO ONLINE EXTRAS

To download a cutting diagram for the miter saw station, go to: ShopNotes.com



begin with the Case

The case for the miter saw station is made from large pieces of plywood. You may want to enlist some help to maneuver the sheets as you cut the parts down to size and cut the joinery.

The sides, top, bottom, and back panels are joined with rabbets and screws (Figure 1). I started with the side panels, cutting them to overall width and length. While the pieces are rectangular, cut rabbets along the bottom and back edges before cutting them to shape.

Cut & Trim. To create their final shape, carefully lay out the profile, rough out the waste with a jig saw, then flush-trim the edges smooth. Shop Short Cuts on page 31 shows how I trimmed the edges with a pattern bit.

Top & Bottom. Making the top panel involves nothing more than cutting it to size and rabbeting the ends and back edge. These rabbets register the sides and back of the cabinet during assembly (Figure 1c).

The bottom panel is cut to overall size. A long notch along the front edge forms the foundation for the two posts that support the wings and a recess for dust collection. Again, I created the notch with a jig saw and trimmed it smooth using a straightedge guide.

Assembly. Before going ahead with assembly, it's a good idea to cut the back panel to size. The only other thing to do here is cut a rabbet along the bottom edge. This fits over the back edge of the bottom panel (Figure 1a).

With all these parts at hand, you can assemble them with glue and screws. While you're waiting for the glue to dry, you can add the hardwood edging for the top.

Casters. Adding the casters next allows you to set the cabinet upright. This will make the rest of the assembly process easier.

The casters are attached to two double-thickness plates that are in turn screwed to the bottom of the cabinet. The details are illustrated in Figure 2.

Posts. As I mentioned, the tapered sides of the cabinet help form posts that support the

folding wings. Your next task is to add the post caps and sides.

As you can see in Figure 2, the post caps are made from two layers of plywood. They're cut to size and then fastened to the cabinet sides with glue and screws.

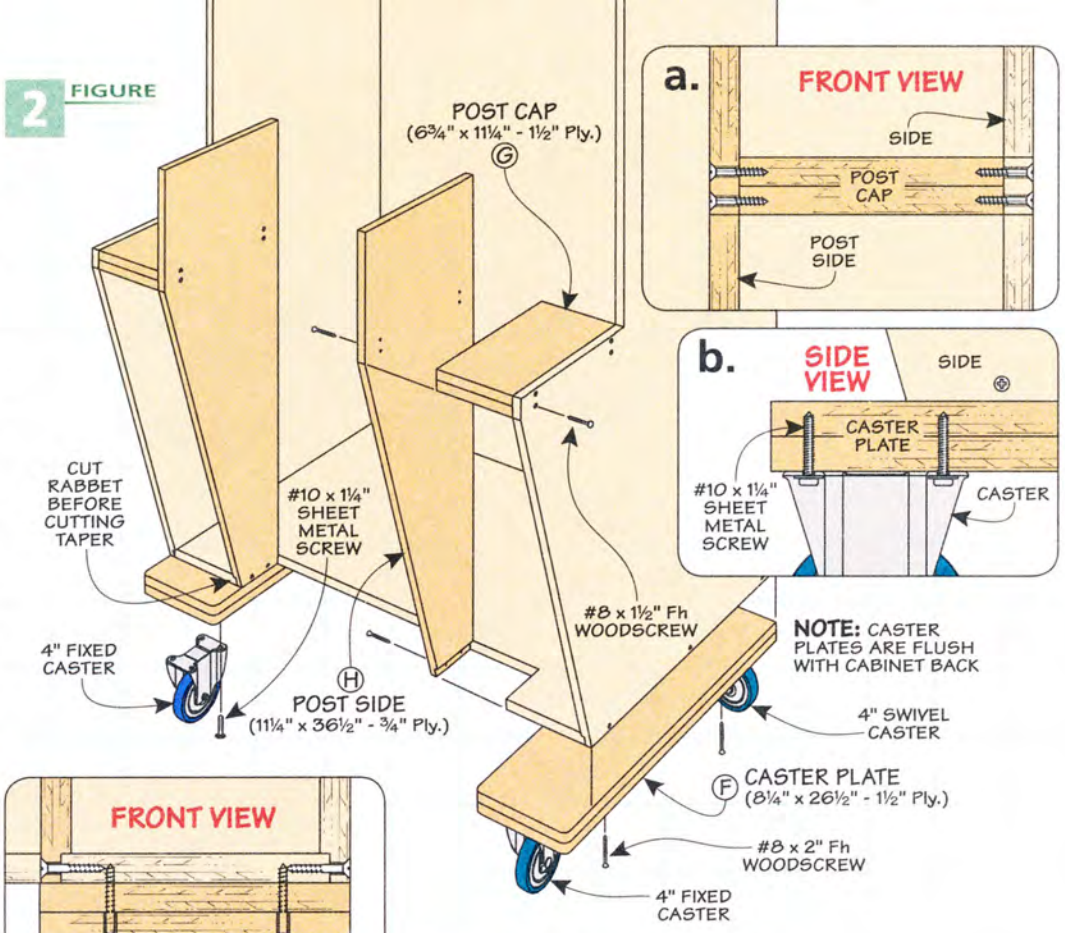
The inner sides of the posts mirror the tapered cabinet sides. Cutting the rabbet on the bottom edge is easier to do before cutting the tapered shape. These parts extend above the post caps to support the pivot brackets you'll add later. They're fastened to the cap and bottom.

Post Face. Figure 3 shows you how to complete the post assemblies, starting with the faces. The only catch here is that the bottom and top edges are beveled. The bottom bevel allows the post face to sit flush on the caster plate. The top bevel mates with a matching bevel on the front pivot bracket, as you can see in Figure 3b.

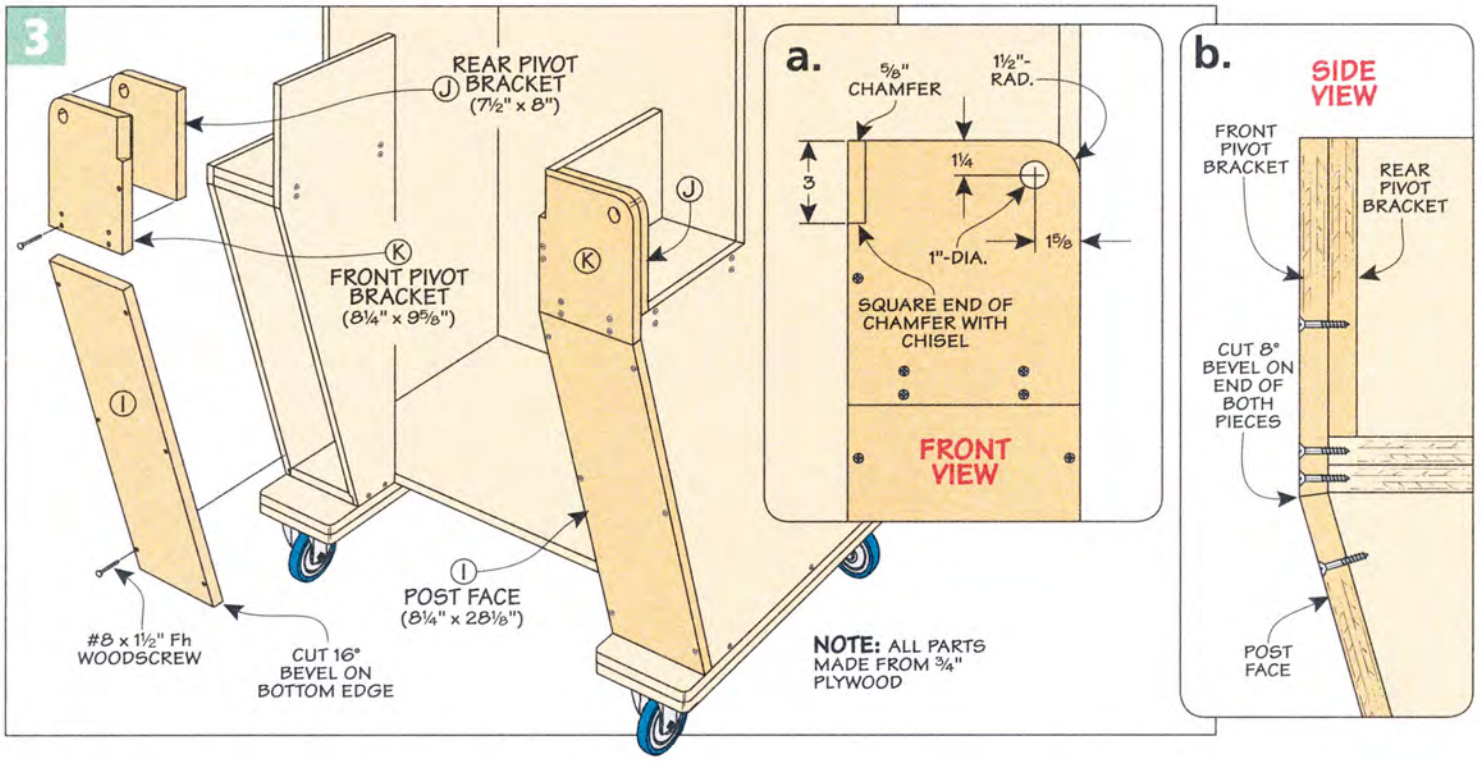
Pivot Brackets. After attaching the faces, the pivot brackets come next. These assemblies serve a vital role in supporting the wings. Start by cutting the rear bracket to size and checking the fit between the post side and cap. I cut the rounded corner at the band saw. Hold off drilling the 1"-dia. pivot hole until the front bracket is attached.

I cut the front bracket to width but left it a little long. Cut the bevel along the bottom edge to mate with the post face. Then clamp both brackets in place and trace the top outline from the rear bracket. Cut it to rough shape, glue the two brackets together, and then flush-trim the front one. After drilling the pivot hole and cutting a stopped chamfer, attach them to the post.

FIGURE 2



3



finishing the Cabinet

The basic structure of the cabinet is complete. Next, you'll work on the dust funnel that channels sawdust to a container below. After that, you'll build and install the platform for your miter saw and finish up with an access panel that hides a plastic dust collection container.

DUST FUNNEL

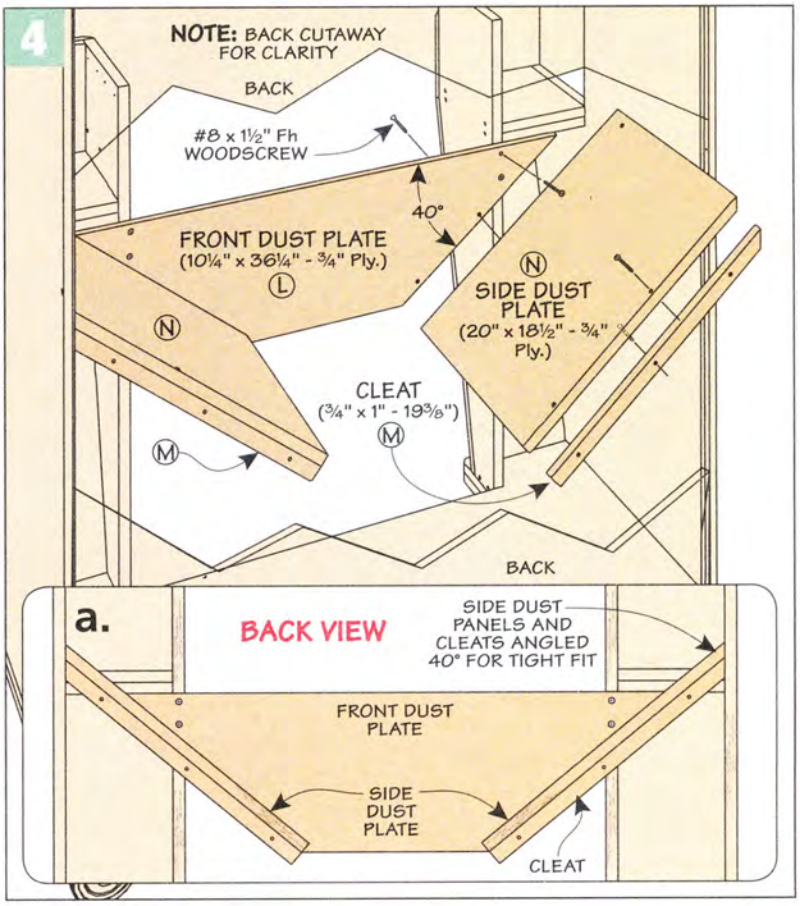
There are a total of seven parts that make up the dust funnel. It starts with the front dust plate. A pair of side plates are supported on cleats. Finally, thin plywood "kickers" complete the assembly. Figures 4 and 5 help break the process down into simple steps.

Dust Plate. The first order of business is to make and attach the front dust plate. Its trapezoidal shape determines the location of the side dust plates. It's attached with screws (no glue) to the back side of the two posts.

Side Plates. Using the tapered sides of the front dust plate as a reference, you can locate the cleats on the back of the cabinet. These help support the pair of side dust plates (Figure 4a).

I started by cutting the side dust plates to size. The top edge is beveled to fit tight against the cabinet. A few screws through the front dust plate and into the cleats at the rear help hold the side plates in place.

Dust Bin. *A large plastic bin is perfect for collecting sawdust.*

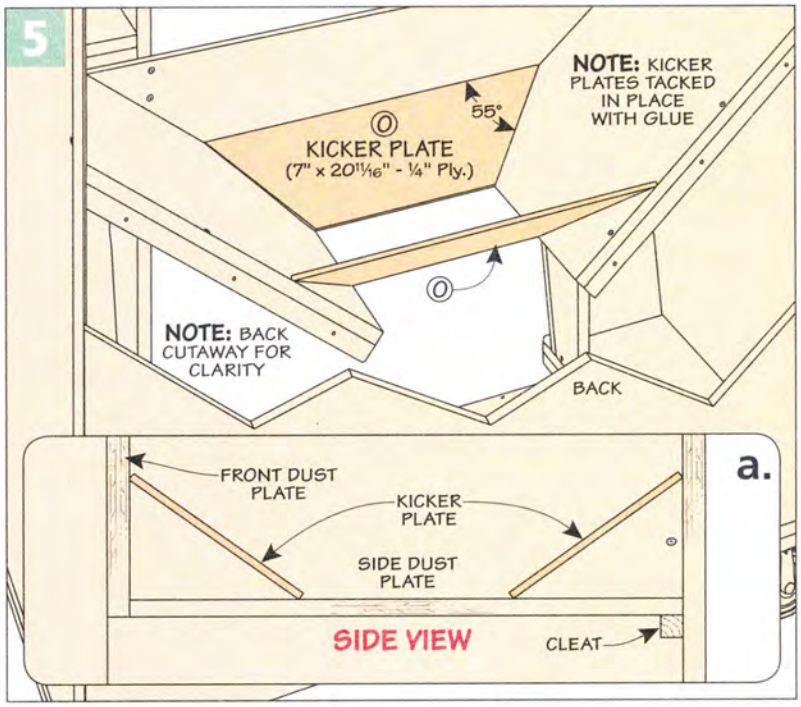


Kickers. The final parts of the dust funnel assembly are a pair of kickers. These ¼" plywood plates help direct the sawdust away from the front and rear of the cabinet. After cutting them to shape, you can simply set them in place with a few dots of glue.

SAW PLATFORM

It goes without saying that the most important part of the miter saw workstation is the saw platform. It's an open-front box that sits between the two posts.

Top & Bottom. The pieces that form the top and bottom of the



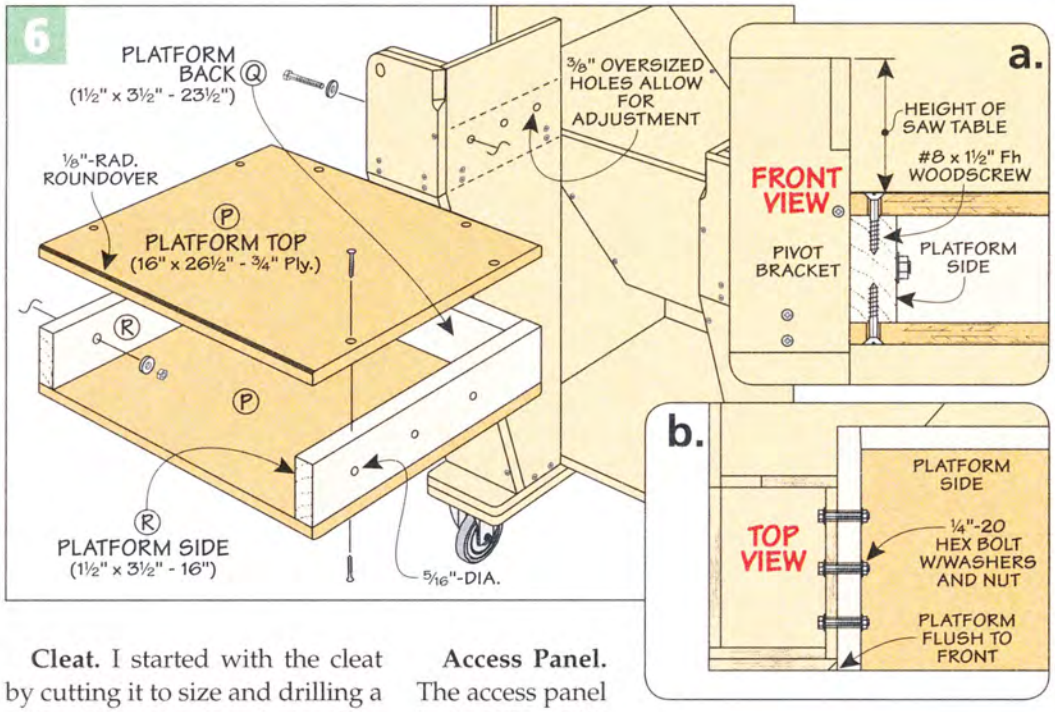
platform are identical. They're sized to fit between the two posts of the cabinet. These parts sandwich the hardwood sides and back of the platform to form an open box, as shown in Figure 6.

Location. When it comes time to install the platform between the posts, there's one thing to take into consideration. And that's the overall height of your miter saw's table. I used a combination square to determine this height and then used the square to strike a line on the inside of the posts. In the end, the goal is for the saw's table to be flush with the top of the posts.

After marking the platform's location, I drilled oversized holes through the post and platform sides. These allow for minor adjustment when installing the fasteners that hold the platform in place (Figure 6b).

ACCESS PANEL

To help corral the sawdust and hide the dust container inside the cabinet, I added a simple access panel. In Figure 7, you can see how it's held in place with a cleat and pins at the bottom. A rare-earth magnet at the top keeps the panel securely closed.

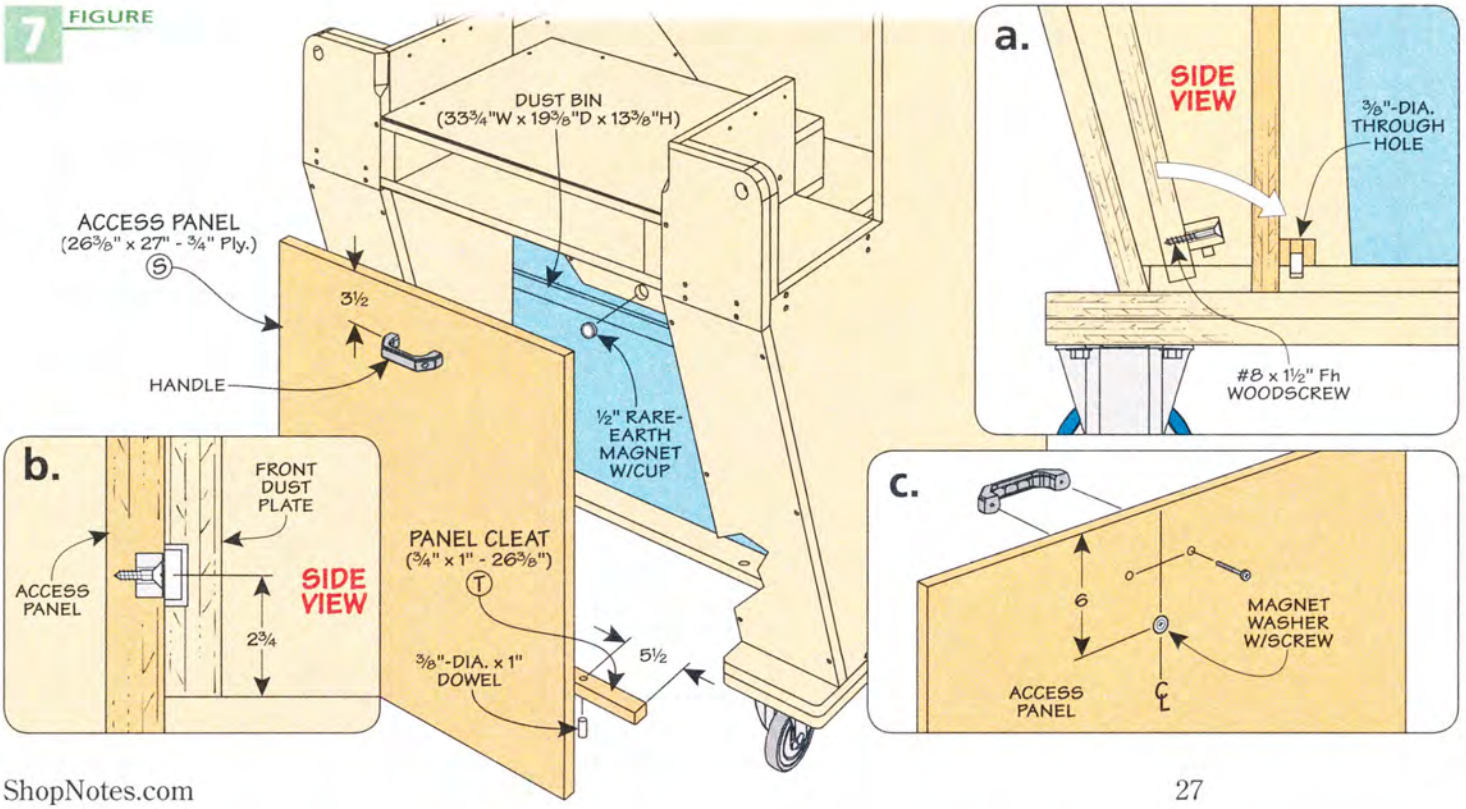


Cleat. I started with the cleat by cutting it to size and drilling a pair of holes for dowel pins. You can use the cleat as a guide to drill matching holes in the cabinet bottom, as illustrated in Figure 7a. These two holes register the dowel pins in the cleat to hold the bottom of the panel. This simple system also makes it easy to remove the panel to empty the dust container when it's full.

After gluing the dowel pins into the cleat, you can turn your attention to making the access panel and adding a handle.

Access Panel. The access panel is sized in width to fit between the posts. Its height is determined by measuring the distance from the bottom of the platform to the lower edge of the notch in the cabinet bottom.

Figure 7c shows the location for the magnet washer. The magnet cup and magnet are installed on the front dust plate (Figure 7b). The final step to complete the access panel is to attach the handle and slip the panel into position in the cabinet.



add the folding
Wings

What makes the miter saw station unique is the pair of folding wings that support extra-long workpieces. They pivot on a heavy-duty steel rod. A length of angle iron serves as a stop when lowering the wing. Set screws in T-nuts allow you to fine-tune the wings to level them with the miter saw's table.

Angle Iron. The first thing you'll need to do is cut the two pieces of angle iron to length and smooth the cut edges with a file. To provide clearance for the pivoting wings, I used flat-head machine screws to fasten the angle iron to the post sides (Figure 8b). So the next step is to drill countersunk screw holes in one leg of the angle iron. To do this, I drilled the through hole first, followed by a countersink.

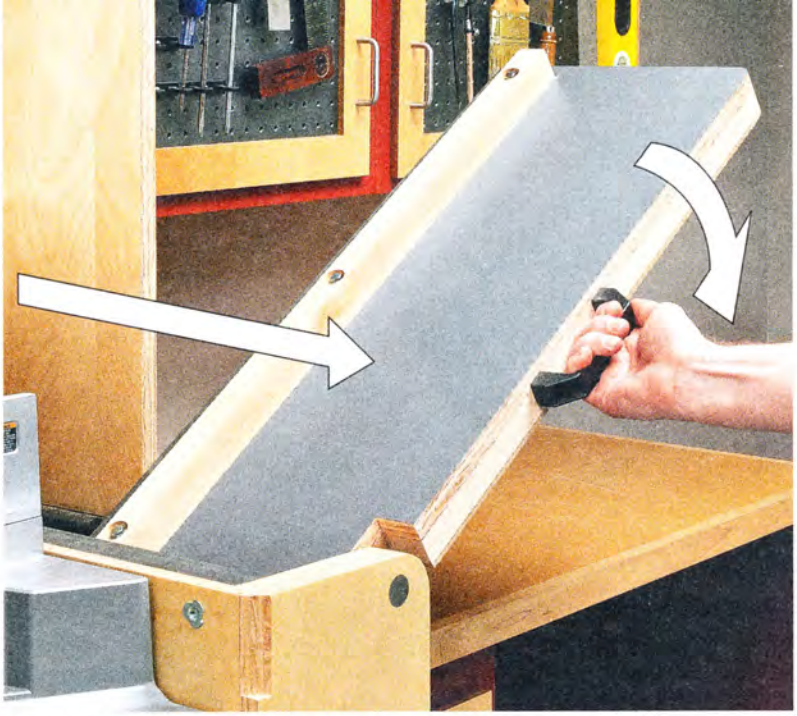
I clamped the angle iron to the post sides with the top face flush with the post. This way, you can use the holes in the angle as a guide to drill holes for the T-nuts. Then you secure the angle iron with machine screws.

Rod & Brackets. The 1"-dia. steel rods and brackets are next. The rods slide through the holes in the pivot blocks and are held level with the rod brackets.

I cut the brackets to size, drilled the countersunk screw holes, and rounded over the outside corners. Just hold off drilling the holes for the rods for now.

To support and level the rods, clamp a length of 2x4 to the inside of the case side, making sure it's square with the front of the case. Then you can use the rod to mark the hole location in each of the rod brackets. After drilling the 1" holes in the brackets, attach them to the cabinet sides with a pair of screws into counterbored holes.

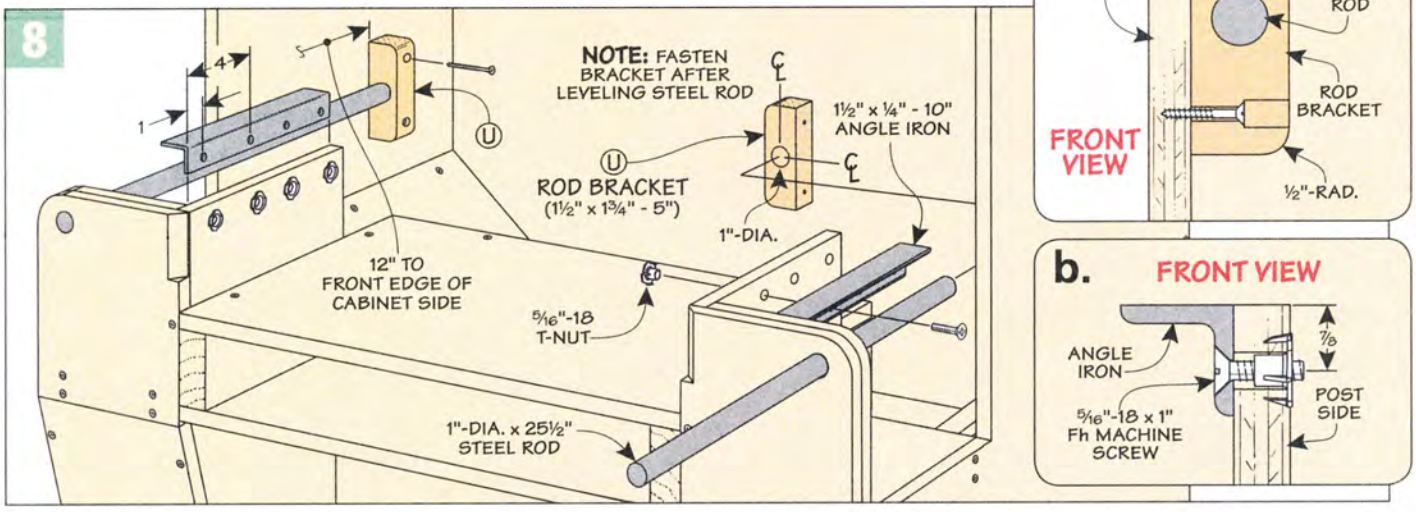
Cord Hole. Before moving on to making the wings, figure out a good location for routing your saw's power cord and then drill an access hole. Make sure the cord won't interfere with operating the saw or the wings.



▲ ***Folding Wings.*** *The wings are stored in the cabinet but slide out on the steel rod and fold down to support long workpieces.*

Torsion Box Wings. Everything you need to know to build the pair of wings is illustrated in Figure 9. Their torsion box construction features an internal frame with two "skins" that form the top and bottom. The top is made from ¾" plywood with a plastic laminate surface. The bottom is made from ¼" plywood.

Top & Bottom. You can start by cutting the top and bottom to overall size and gluing the plastic laminate to the top.



After trimming the laminate, cut the notches that provide clearance for the pivot brackets when folding the wings (Figure 9b).

The next task is to cut a shallow rabbet along the narrow end of the top. This accommodates the leg of the angle iron when the wing is extended.

Internal Frame. The inside of the wings consists of a number of hardwood blocks. The two end blocks are spaced to create a gap and serve as the pivot point for the steel rod. I cut and glued each piece to fit the top. Then I glued on the bottom panel before adding the handle.

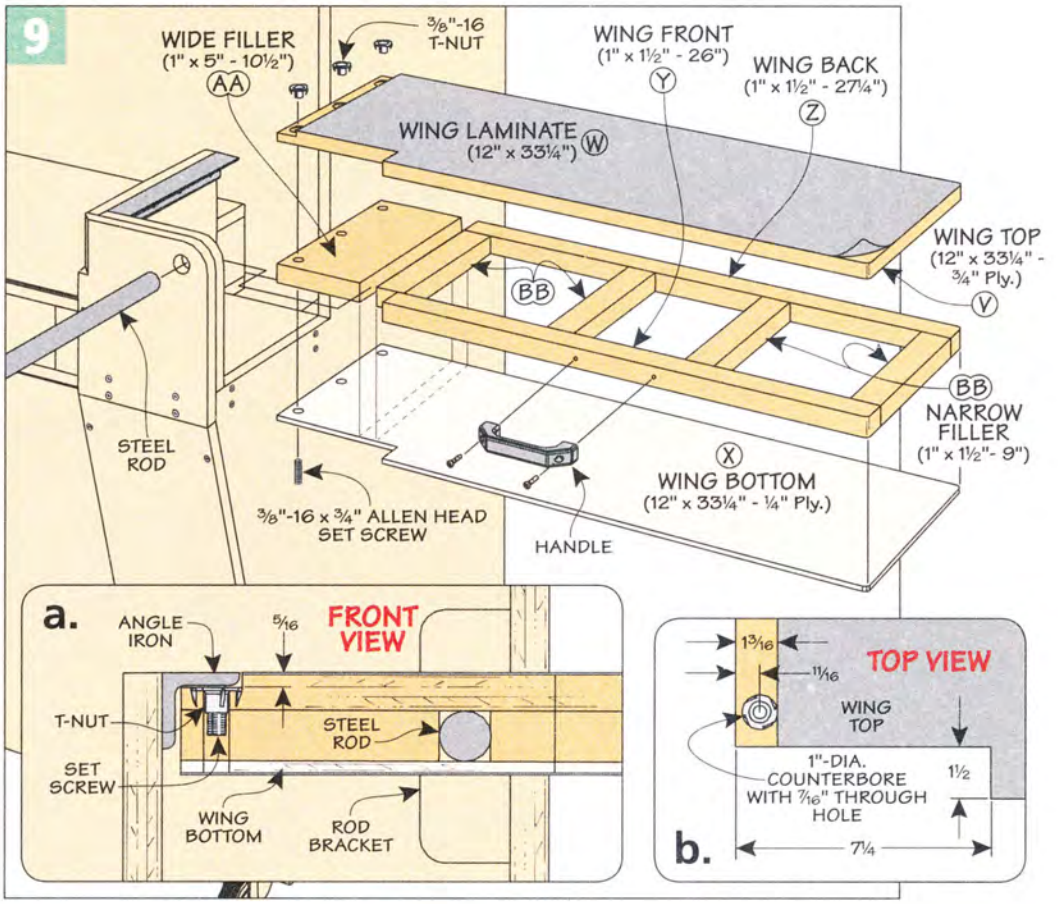
Adjustment Screws. Figure 9a shows how T-nuts and set screws are used to adjust the resting position of the wings. I installed the T-nuts into holes with shallow counterbores (Figure 9b).

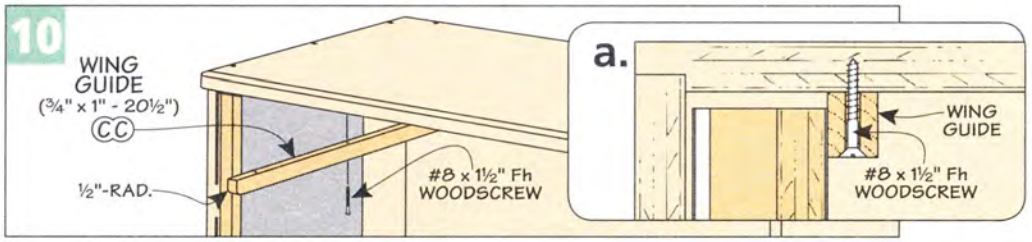
Wings. Finally, you're ready to install the pair of wings. You may want to enlist a helper for this task. You'll need to slip the steel rod through the pivot block, wing, and mounting block. The front of the rod should be flush with the front of the pivot block. With the wings upright, you can install the two guides (Figure 10).

Wing Adjustment. To level the wings, use a long straightedge placed across the saw's table extending along the wing. Adjust the set screws until the wing is parallel to the saw table.

Fences. Keep that straightedge handy as you make and install the fences. After cutting the fences to size and drilling counterbored screw holes, align them with the fence on your saw. The box below shows how to do this. Use the fence as a guide to drill pilot holes for the lag screws to secure them to the wings.

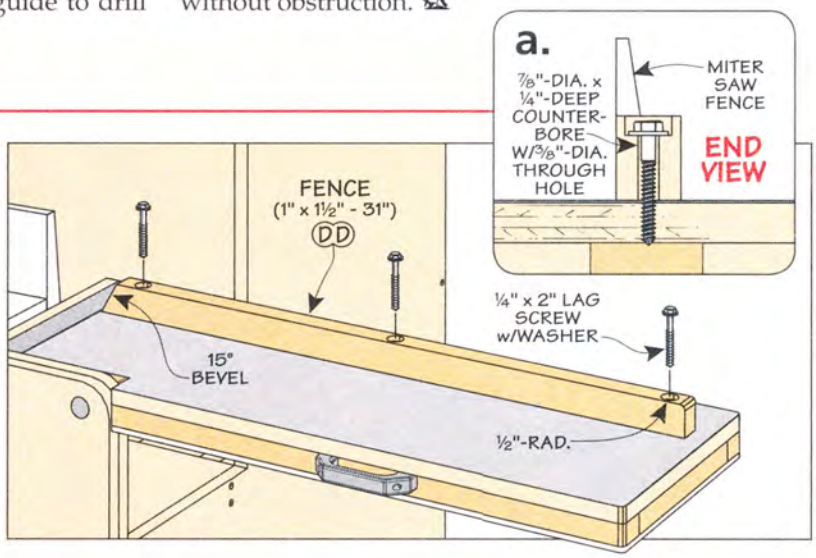
Finding a location for the miter saw station is your final task. Just make sure the wings can fold out without obstruction.





Installing the Fences

▲ ***Alignment.*** *Use a straightedge to align the fences with the fence on your miter saw. The holes in the fences serve as guides to drill pilot holes for screws.*



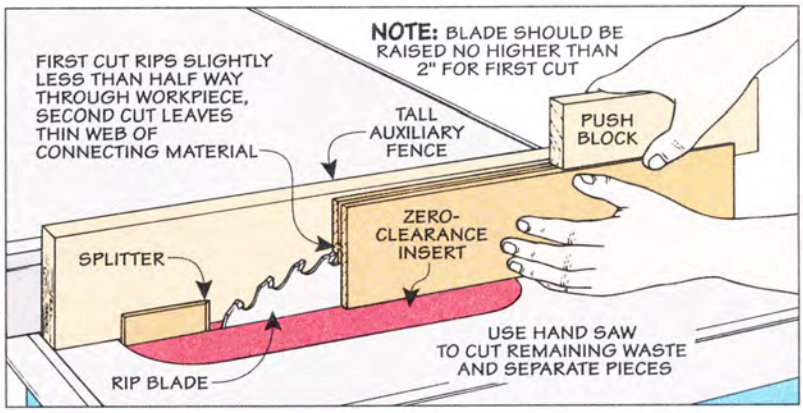
TIPS FROM
Our Shop

Shop Short Cuts

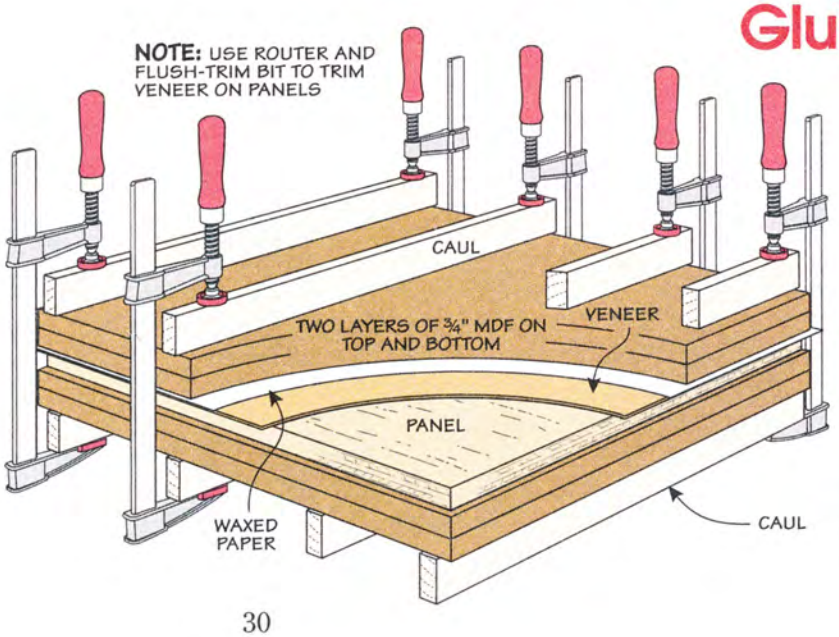
Working with Custom Veneer

Creating the thick veneer pieces you need for the tool chest on page 32 is a straightforward task on the table saw. Resawing your own veneer is also a great way to get the most mileage out of a prized piece of wood. Although it's called resawing, it's basically a ripping operation.

For the post veneer and the upper two drawer fronts, you can simply rip the strips from a board in a single pass. The wider pieces require a slightly different technique. You can see the setup in the drawing. You make one pass along one edge of the board, then flip it around (keeping the same face against the fence) and make a second cut (photo above). Finally, use a hand saw to cut through the web and free the piece.



Gluing a Veneered Panel



The plywood panels for the sides and back of the tool chest on page 32 are covered with purchased veneer. The key here is making sure the veneer is flat and smooth. My solution is to use the clamping arrangement shown in the left drawing.

It's a good idea to cut the pieces of veneer slightly larger than the plywood parts (cut to size). This way, you don't need to worry about aligning the edges.

The MDF panels and hardwood cauls do a great job of distributing pressure without using every clamp in your shop. Take note of the sheet of waxed paper in the drawing. It's there to prevent any glue that bleeds through from gluing your panel to the pieces of MDF. Once the clamps come off, you can trim the veneer flush with a router and flush-trim bit.

Straight Edges on Large Workpieces

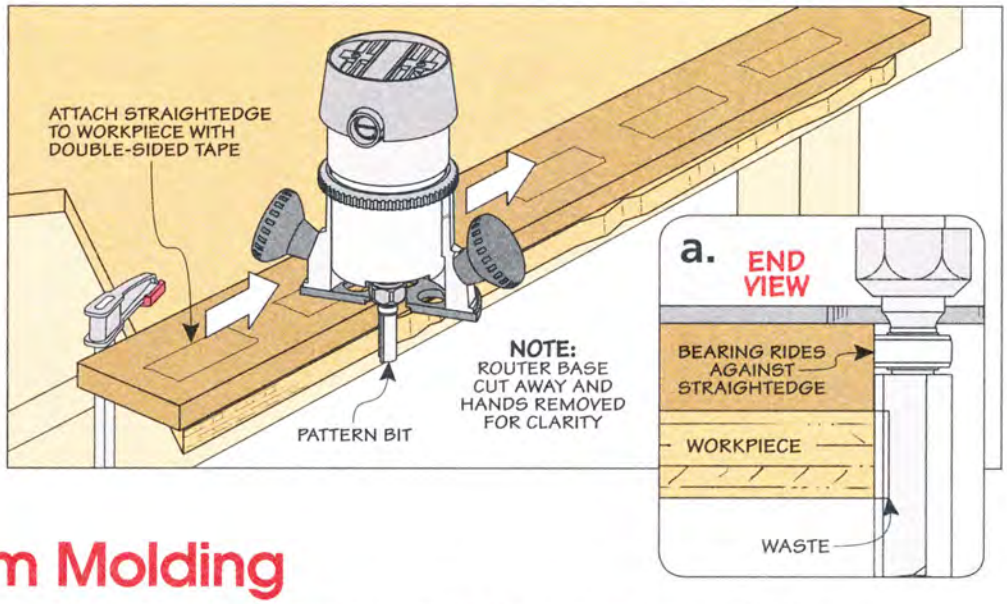
Cutting the notches and tapered edges of the large plywood components of the miter saw station (page 20) is awkward at best. The solution I came up with is a two-step process — first rough cut, then trim the cut smooth.

Rough Cut. The first thing to do is mark the cut line with a long straightedge. With a jig saw, cut to the waste side of the line, leaving about 1/16" to 1/8". You'll trim the waste in the next step.

Flush Trimming. To make a clean, straight edge, you'll need to attach a wide edge guide to the workpiece along your original layout line. I prefer MDF or plywood since it's flat and smooth. You can use double-sided tape to fasten the guide to the workpiece.

The next thing to do is install a pattern bit (bearing on the shank) in your hand-held router. The detail drawing below shows what this looks like. The bearing on the bit rides against the edge guide. Adjust the bit depth to cut through the thickness of the plywood while making sure the bearing contacts the edge guide.

Finally, rout the edge of the workpiece smooth, moving the router from left to right, as shown in the main drawing below. The only thing to remember is to keep the router base flat and stable on the edge guide with the bearing riding against it.



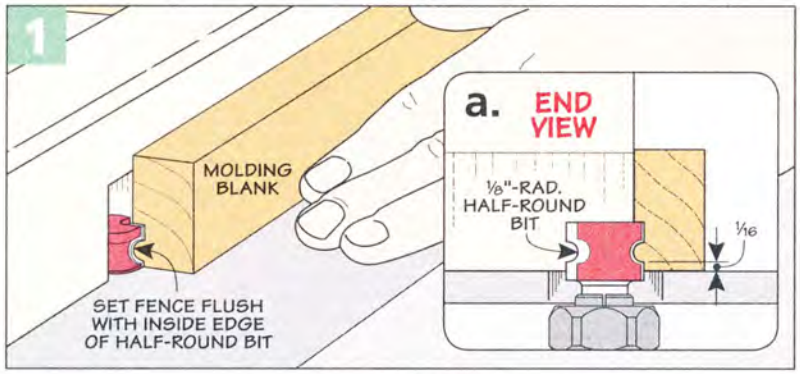
Routing Custom Molding

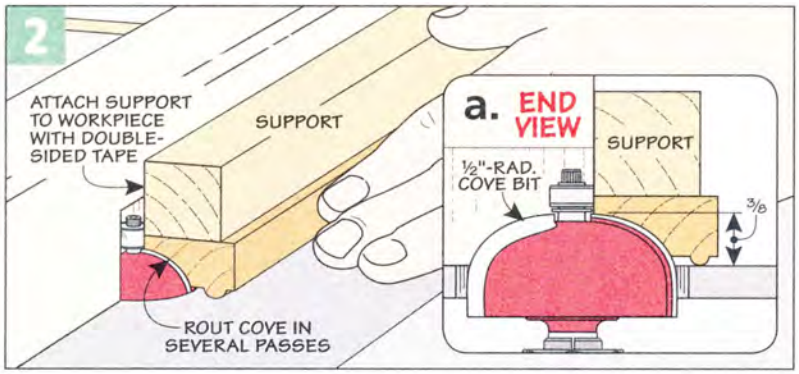
One way to add a unique touch to a project is to create your own custom moldings rather than rely on a single, standard profile bit. To do that, I like to combine the details of one or more basic bits to create something new.

For the tool chest on page 32, I used a 1/8"-rad. half-round bit and a 1/2"-rad. cove bit, as shown in the lower right photo. To find sources for the half-round bit, turn to page 51.

You can see the two-step process in the drawings. I cut long molding blanks to final width and thickness. The first step is to rout the bead. The key here is establishing the fillet on the lower edge, as in Figure 1a.

Routing the cove detail requires a couple extra steps. I taped a support to the molding blank to create a wider bearing surface. The other thing you need to do is rout the cove in a series of shallow passes. This lets you sneak up on the final shape.





Two Bits. *A cove bit and a half-round bit combine to create a custom profile.*

dream shop project

heirloom Tool Chest

This compact and handsome storage project creates the perfect place for your small hand tools.

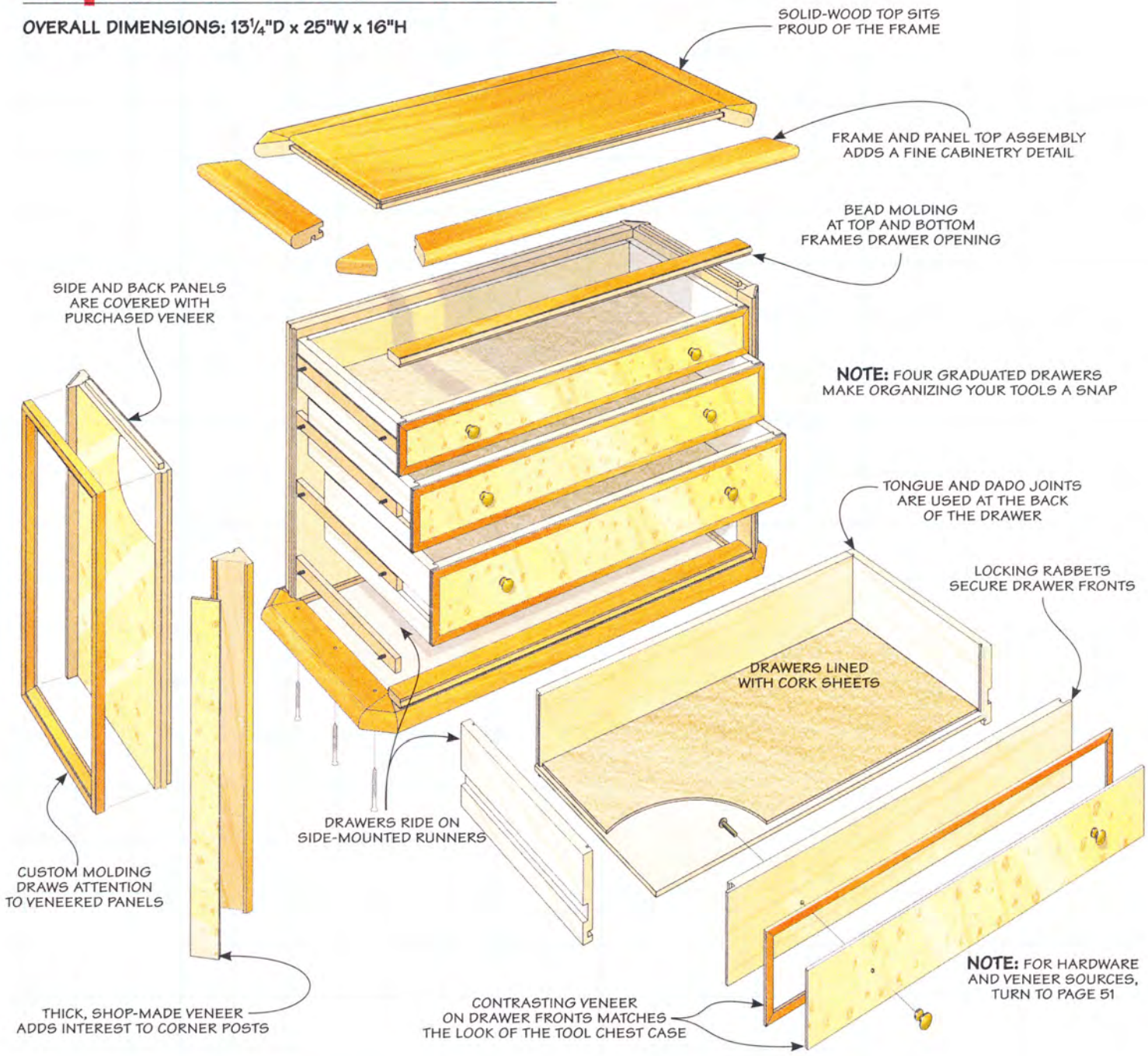
Building a tool chest that looks like the one above may seem over the top to some. But I think it's a good way to hone skills that you can use in furniture projects.

In the process of building this relatively small project, you'll learn about working with veneer, cutting small parts accurately, and building smooth-sliding drawers.

The payoff is a project that serves as a fitting home for the hand tools you rely on most. More than that, it's an inspiration every time you step into your shop.

Exploded View Details

OVERALL DIMENSIONS: 13¼"D x 25"W x 16"H



Materials & Hardware

A	Posts (4)	1¼ x 1¼ - 14 3/16
B	Post Veneers (4)	⅛ x 1 5/32 - 14 3/16
C	Sides (2)	9¾ x 14 7/16 - ¾ Ply.
D	Side Veneers (2)	1/32 x 14 7/16 - 9¾
E	Back (1)	14 3/16 x 21¾ - ¾ Ply.
F	Back Veneer (1)	1/32 x 14 3/16 - 21¾
G	Frame Sides (4)	¾ x 2 - 22 5/16
H	Frame Ends (4)	¾ x 2 - 10 5/16
I	Corner Wedges (8)	¾ x 1⅞ - 1 15/16
J	Top (1)	¾ x 9 7/16 - 21 7/16
K	Bottom (1)	9½ x 21½ - ¼ Ply.
L	Panel Molding (1)	½ x ⅞ - 180 rgh.
M	Front Moldings (2)	7/16 x 1⅛ - 21½
N	Drawer Runners (8)	5/16 x 1 1/16 - 10⅜
O	Small Drawer Front (1)	½ x 2½ - 21⅜
P	Small Drawer Sides (2)	½ x 2½ - 10⅜
Q	Small Drawer Back (1)	½ x 2½ - 20⅝
R	Drawer Bottoms (4)	10 x 20⅞ - ¼ Ply.
S	Medium Drawer Front (1)	½ x 3 - 21⅜
T	Medium Drawer Sides (2)	½ x 3 - 10⅜
U	Medium Drawer Back (1)	½ x 3 - 20⅝
V	Large Drawer Front (1)	½ x 3½ - 21⅜
W	Large Drawer Sides (2)	½ x 3½ - 10⅜
X	Large Drawer Back (1)	½ x 3½ - 20⅝
Y	Bottom Drawer Front (1)	½ x 4 - 21⅜
Z	Bottom Drawer Sides (2)	½ x 4 - 10⅜
AA	Bottom Drawer Back (1)	½ x 4 - 20⅝
BB	Small Drawer Veneer (1)	⅛ x 2½ - 21⅜
CC	Medium Drawer Veneer (1)	⅛ x 3 - 21⅜
DD	Large Drawer Veneer (1)	⅛ x 3½ - 21⅜
EE	Bottom Drawer Veneer (1)	⅛ x 4 - 21⅜
FF	Drawer Trim (1)	⅛ x ⅜ - 210 rgh.

- (9) #8 x 1½" Fh Woodscrews
- (16) #6 x 1" Fh Woodscrews
- (8) 16mm Brass Knobs w/Screws
- (4) 9⅛" x 20⅜" - ⅛" Cork Liner

start with the

Posts & Panels

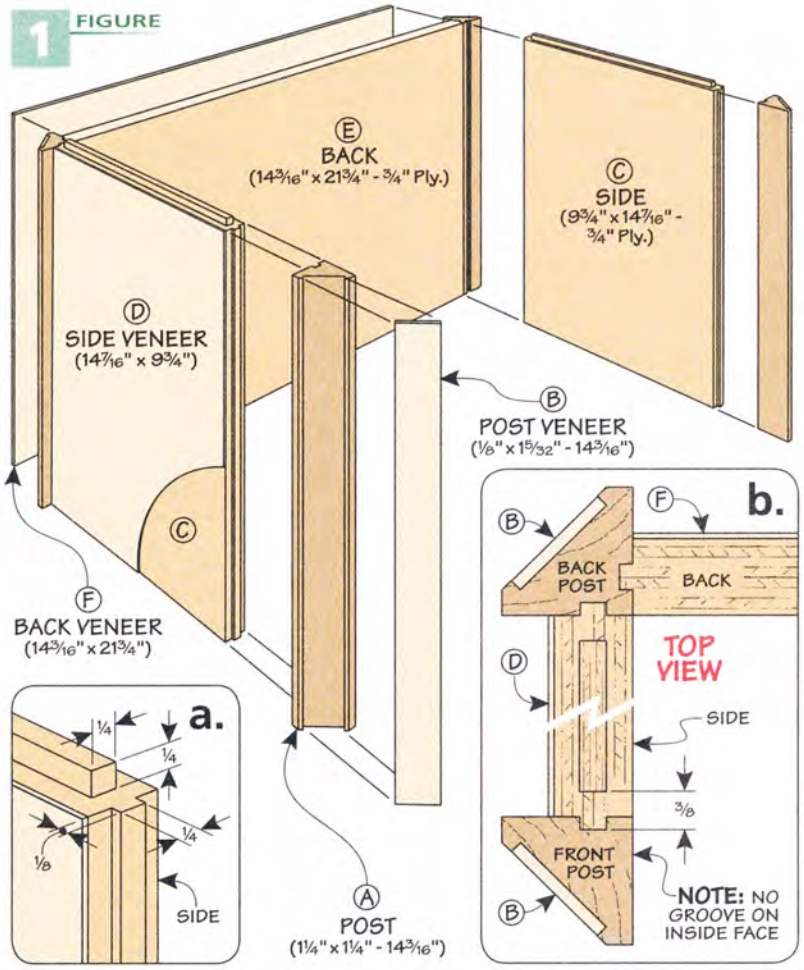
In order to create the look I was aiming for in this tool chest required a combination of materials: bird's eye maple veneer and solid mahogany. The darker colored mahogany highlights and frames the maple veneer. As you go along, you'll see several examples of how this works.

The case of the tool chest consists of three assemblies. The first is a three-sided box made up of panels joined with sturdy corner posts. The other components are frame and panel assemblies used for the case top and bottom.

Corner Posts. The three-sided case comes first. You can see the components in Figure 1. I started by making thick posts with a beveled corner. A recess in the wide, beveled face holds a strip of veneer. The box below gives you a run down on making the posts.

For the inlaid veneer strips, I cut my own ⅛"-thick veneer from solid stock. Shop Short Cuts on page 30 walks you through the process of sawing your own veneer pieces at the table saw.

FIGURE 1



Veneered Panels. Speaking of veneer, you can set the corner posts aside for now to work on the panels. For a seamless look, I bought sheets of veneer wide enough to cover each plywood panel with a single piece. Here again, page 30 shows the technique I use to glue up a flat and smooth panel.

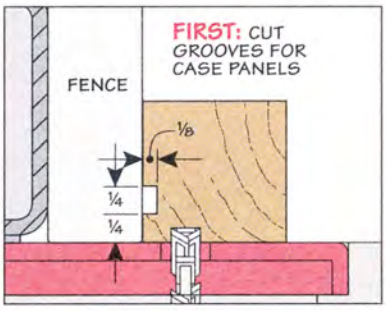
Simple Joinery. The panels are connected to the posts by a centered tongue cut along each side, as illustrated in Figure 1a.

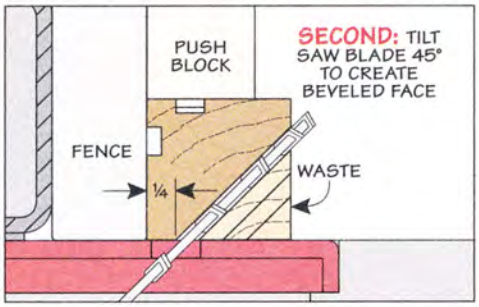
Beveled Corner Posts

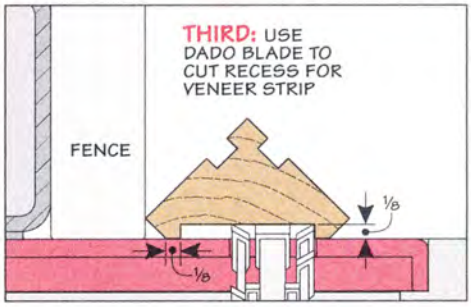
Creating the angled corner posts consists of making a series of three table saw cuts.

A dado blade is used to make the first cuts. These create grooves to accept the case panels (right drawing). Note in Figure 1b that the front posts only have one groove.

The second step is to bevel the front face. It's best to do this in several passes to sneak up on a final size (left drawing below). Reinstall a dado blade for the final cuts to create a channel for the veneer (lower right drawing).







The tongues mate with the grooves in the posts.

The detail also shows that the side panels have an additional tongue cut on the top edge. This creates a way to register and attach the upper frame assembly.

Initial Assembly. At this point, you can do a little assembly. Glue the panels into the posts. To keep the front of the case aligned and square, I cut a couple of spacers to fit the opening and clamped across them.

Frames. Enclosing the top and bottom of the case is the next thing to do. The corners of the identical frames are angled to match the beveled faces on the posts. While this seems tricky, I found the secret to success lies in a methodical process.

Start by ripping two sets of strips for the frame stock. One set is 2" wide and becomes the long side pieces and the shorter ends.

The other set of strips is for making the wedge-shaped corner pieces. These strips are cut slightly narrower at 1⅞" wide.

Each strip needs a centered groove cut on the inside edge to capture a panel. The next step is to miter the sides, and ends to length, as shown in Figure 2.

Before moving on, I cut a groove in the bottom face of the end pieces that will be used in the upper frame. These grooves will mate with the tongues on the top of the side panels (Figure 2b).

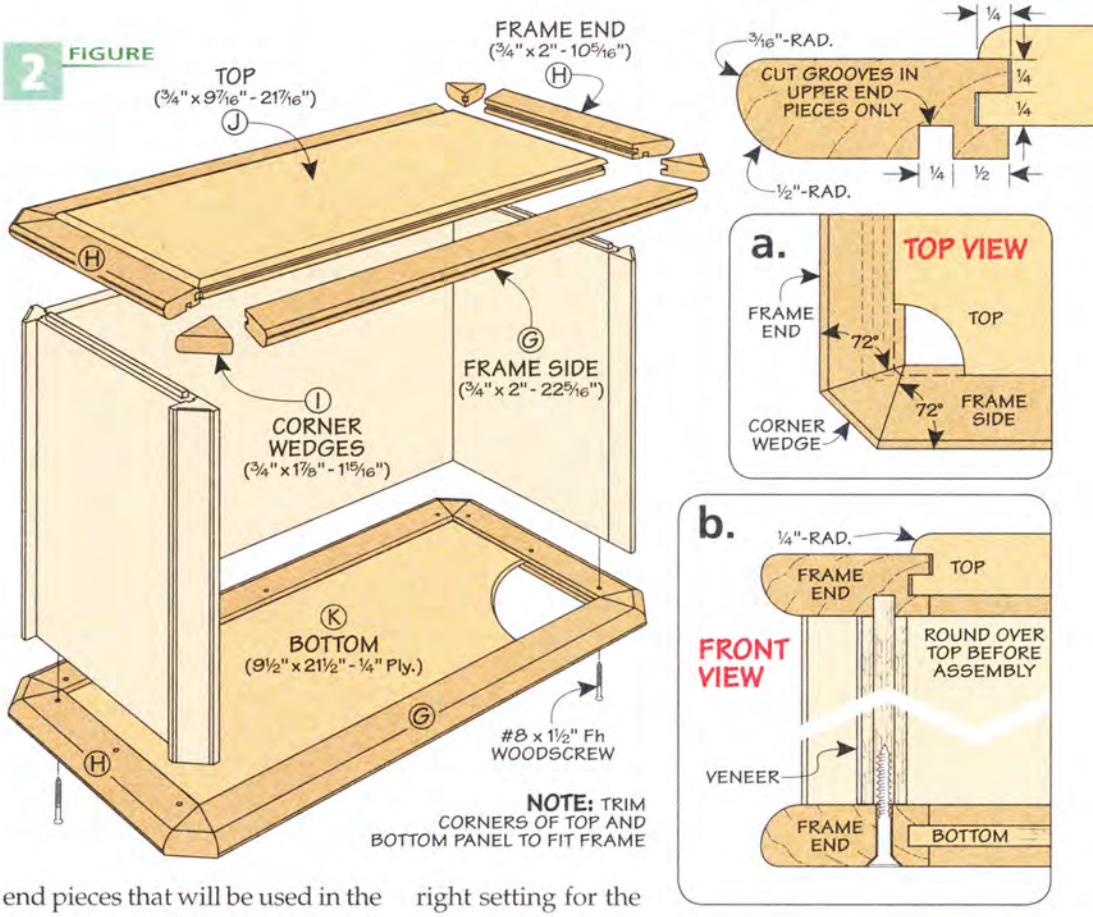
Cutting the corner wedges to size takes a little more finesse. The starting point is cutting a complementary miter on each end of several blanks. You can see the setup I use in the box below. It's a good idea to make a few test cuts to sneak up on the right setting for the stop block. Your aim is to make the parts come to a point without changing the overall width (1⅞").

Panels. The frame pieces wrap around a panel on both the top and bottom. But the panels aren't the same. The top has a solid wood panel with a gentle roundover on the top edge. To mate with the groove in the frame, I formed a tongue by cutting a centered groove in the panel. The lower panel is a piece of plywood.

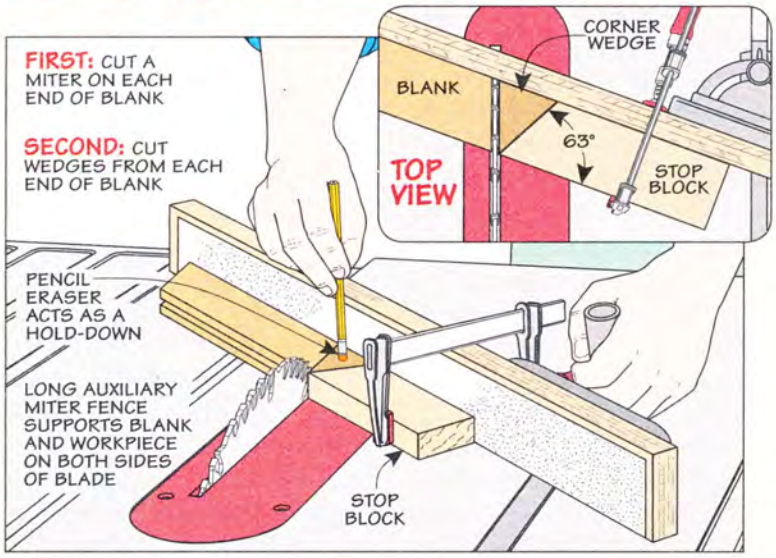
Assembly. At this point, you can glue up the frames around the panels. Focus your attention on keeping the frame pieces flush. You can glue the plywood panel in place, but not the upper panel.

After the glue dries, rout roundovers around the edges of the frames. The details are shown in the upper right corner of Figure 2. When you're finished, the frames can be attached to the case. The upper frame is glued in place with the tongues on the sides mating with the grooves in the upper frame. The lower frame is glued and screwed in place from below.

FIGURE 2



Cutting the Corner Blocks



now for the

Trim & Drawers

▲ ***Profiles.*** *For tips on routing the molding profiles, see Shop Short Cuts on page 31.*

By this point, you've wrapped up the construction of the case that houses the drawers. But before building the drawers, there are a few details left to cross off the list. These include two types of decorative molding and the side-mounted runners that support the drawers in use.

Custom Moldings. I like to think of the moldings added to the tool chest as frames to highlight what's inside. It's a similar idea to the top of the chest where the profiled frame pieces show off the top panel.

You can see a sample of the molding profiles I used in the left margin. The upper profile wraps the side and back panels. The molding frames the veneer and provides a good transition between the posts and panels.

Panel Molding. The molding is made with two router bits. I combined a half-round bit and a cove bit to create a unique look. If you turn to Shop Short Cuts on page 31, you can see the process for routing this profile.

It's a good idea to make a few extra molding blanks while you're at it. This will save the headache of recreating the molding if you miscut a piece.

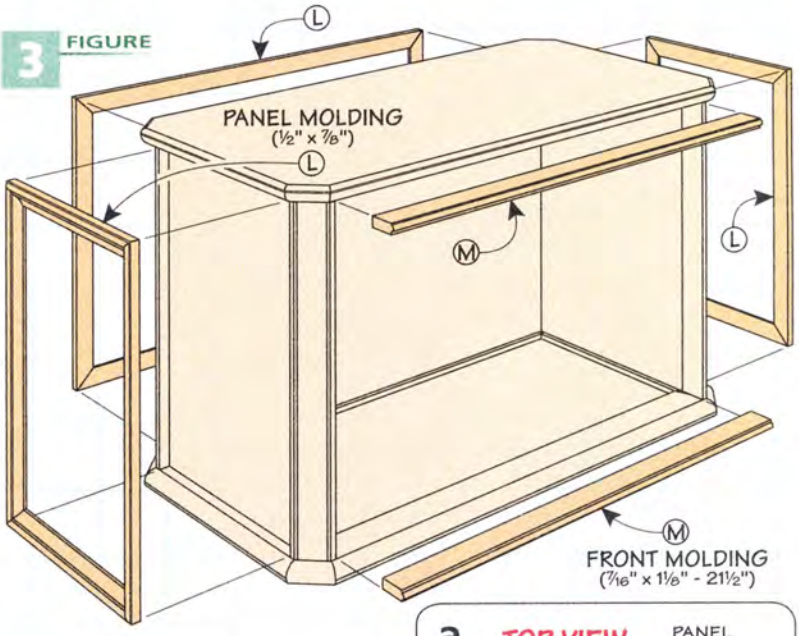
Take your time as you miter the blanks to length. Your goal is to get a tight-fitting miter in each corner with the profile wrapping seamlessly. I cut the long pieces first and glued them in place. Then I cut the shorter pieces to fit, as in Figures 3 and 3a.

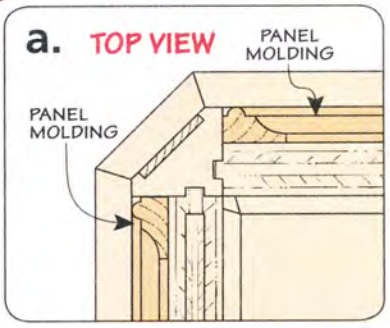
Front Molding. The other molding profile I made is shown in the lower margin photo. It "frames" the top and bottom of the drawer compartment, as you can see in Figure 3.

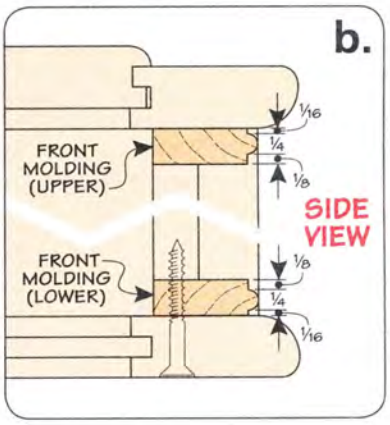
This profile uses the same half-round bit used on the panel molding. It's used to form a bead on the edge of a relatively wide molding blank. As you can see in Figure 3b, the bead isn't centered on the thickness of the workpiece. It's offset to create shadow lines between the molding and top and bottom assemblies.

Here again, it's a good idea to rout the profile on long blanks. Then you can cut the pieces to fit snugly between the posts and glue them in place. The leading edge of the bead is aligned flush with the front edge of the corner posts. This is shown in Figure 3b.

3 FIGURE





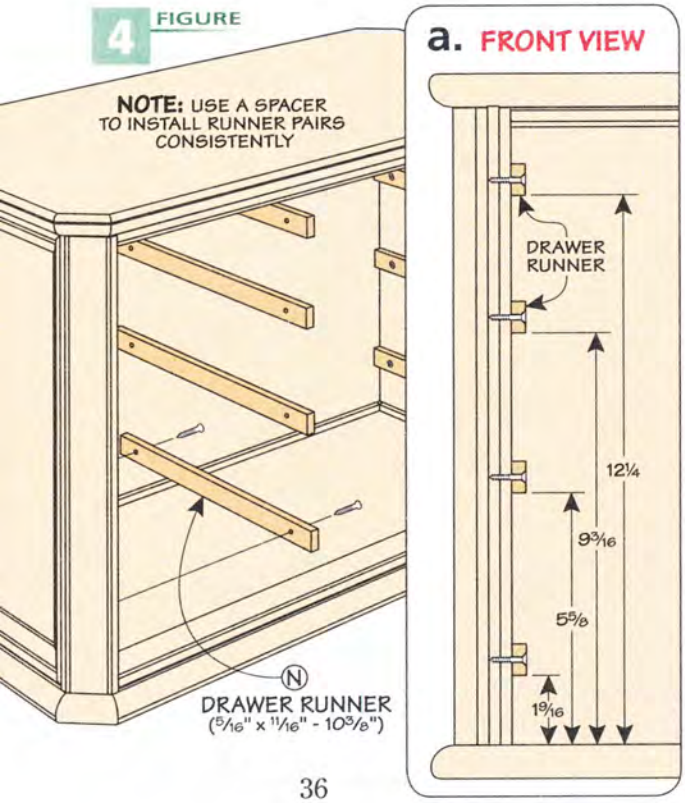


Drawer Runners. The molding completes the work on the outside of the tool chest. Now you can turn your attention to the inside of the case.

The first thing to do is make and attach runners for the drawers, as in Figure 4. These are just thin hardwood strips that are ripped to size and screwed to the side panels of the tool chest.

Consistency is the name of the game when attaching the runners to the case. For the drawers to sit level and operate smoothly, each pair of runners needs to be installed

4 FIGURE



perfectly parallel and level. To do this, I made a spacer from a piece of MDF. The height of the spacer matches the location for the upper set of drawer runners, as shown in Figure 4a.

Using the spacer is straightforward. Clamp it to one side of the case. Then you can set the runner in place and screw it to the case. (The runners are set flush with the back of the case.) Simply cut the spacer down to match the next pairs of runners.

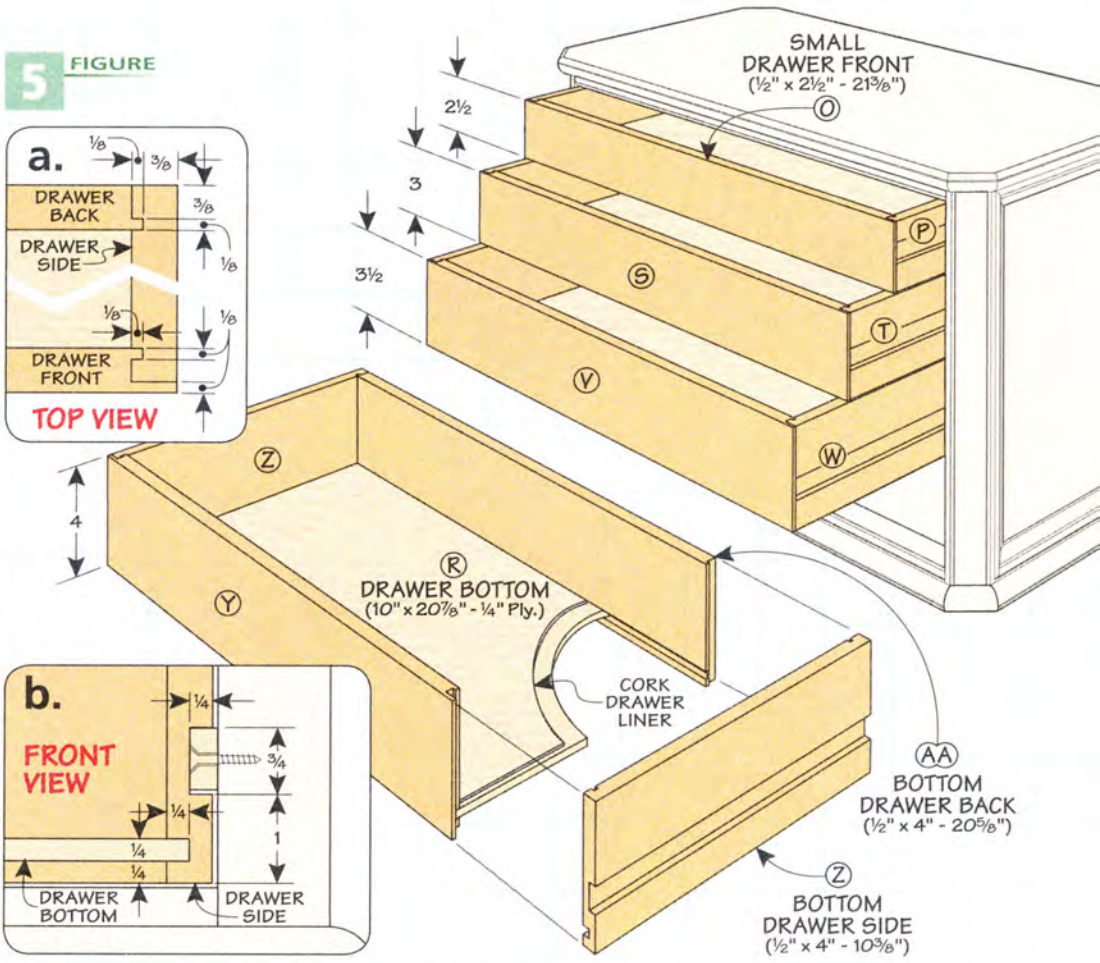
Drawers. Building the four drawers completes the tool chest. The front of each drawer is veneered and then wrapped with trim to match the look of the rest of the case.

The drawers are all different sizes for maximum flexibility. However, the construction details are the same. The front corners are joined with locking rabbets. A tongue and dado joins the back, as in Figure 5a.

The drawer sides have a groove cut on the outside face that slips over the runners in the case. I sized the groove to be just a hair wider than the runners for smooth operation. The groove is located in the same position on all four drawers. So once you have the dado blade sized and rip fence positioned, you can cut grooves for all the drawers at the same time. The drawers can then be glued together. The next step is to add the veneer work to the front of each drawer (box below).

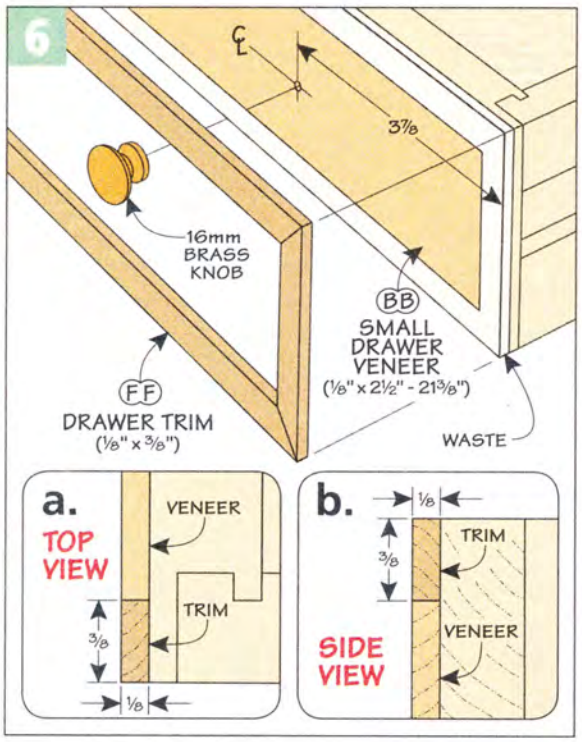
For the finish, I wiped on a coat of oil to bring out warm tones in the mahogany and the maple. Then I applied a few coats of lacquer for added protection and a bit of sheen. The last addition is to line the drawers with cork.

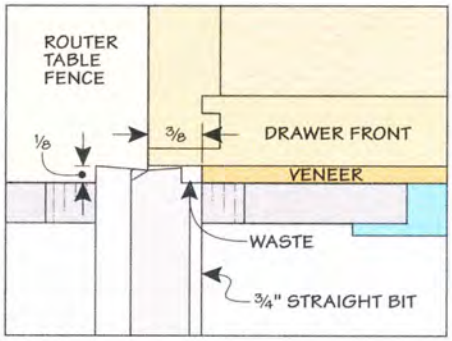
FIGURE 5



veneering the Drawer Fronts

The veneer for the drawer fronts is resawn from a thicker board and then glued to the completed drawer. At the router table, you can use a straight bit to cut a shallow rabbet around all four edges that matches the thickness of the veneer (drawing below). The trim can then be ripped to fit the rabbet and mitered to wrap around the front.





► ***Veneer.*** *Bird's eye maple veneer is wrapped with mahogany trim to create a framed look to match the tool chest.*

glass-smooth Epoxy Surface

Versatile epoxy fills pores and creates a smooth, durable moisture barrier for a fine furniture finish.

One of the hallmarks of fine furniture is a finished surface that's smooth to the touch and reflects light evenly without any noticeable surface variations.

Achieving a glass-smooth surface like this can be difficult, however. The issue is that many wood species have open pores that draw the finish below the surface of the wood. This can result in a finish that may be smooth, but appears to have "texture."

The key is to fill the pores before applying a finish coat. I have used various paste-type pore fillers over the years. And while they work great at filling the pores, it can be difficult to match the color of the filler to the wood. The result can be an unnatural finished appearance.

One solution I started using in my shop is epoxy. This durable, crystal-clear alternative makes it simple to produce a perfectly smooth surface on your projects without any color variation. And it's compatible with most topcoats.

Results. The margin photo to the left shows the end result. An additional benefit to using epoxy as a pore filler is that it can help protect your finished project by providing an excellent barrier against moisture. There are a few important considerations to pay attention to for a successful result. So I'll walk you through the process I use.

◀ ***Smooth Finish.*** *Pores were filled with epoxy on the right half of the board before a coat of varnish was applied across the entire surface.*

SURFACE PREPARATION

As with most finishing procedures, success starts with surface preparation. Epoxy needs to create a mechanical bond with the wood surface in order to adhere to it. This means sanding the surface of the wood to no more than 120-grit, depending on the species of wood.

And when working with oily woods like cocobolo or rosewood, be sure to remove the surface oil by wiping the wood with acetone or lacquer thinner shortly before applying the epoxy.

Temperature. Another point that shouldn't be overlooked is the temperature of the wood relative to the ambient temperature of your shop. It's important that the wood acclimate to the shop temperature before applying the epoxy.

And once the epoxy has been applied, try to limit any substantial increases in the temperature of the shop before the epoxy has fully cured. The concern here is that when the temperature of the wood increases,

▲ ***Weigh Out Resin & Hardener.*** *Very little epoxy is needed for pore filling, so it's easiest to use a scale to ensure you get the right proportion of resin and hardener.*

▲ ***Squeegee from the Center.*** *Spread the epoxy over the surface of the wood to get a thin, even coat. Work at a 45° angle to the grain to force the epoxy into the pores.*

there is the possibility of the wood out-gassing. This could result in bubbles or pinholes in the finished surface.

MIXING THE EPOXY

I use *West System* epoxy in my shop. This requires mixing the epoxy resin with a hardener before each application. Their *207 Special Clear* hardener is the one you want for this technique. See Sources on page 51 for purchasing information.

You'll be surprised at how little epoxy is needed to fill the pores. That's why I use a scale to mix very small batches of epoxy by weight (photo above).

After mixing the two parts, you'll have approximately 20 minutes to cover the surface of your project before the epoxy starts to harden.

APPLICATION

Applying the epoxy isn't difficult. You start by pouring a small amount in the center of your project, like in the main photo on the opposite page. With a rubber squeegee, spread the epoxy across the surface at a 45° angle to the grain. You'll want to use light pressure until the entire surface is covered. Then increase pressure to create a very thin coat, cleaning the excess epoxy off the squeegee with a rag.

After the first coat has dried for about 10 hours, sand lightly with 320-grit paper. Apply and sand additional coats in the same manner until the pores are completely filled, and you have a smooth surface. The mahogany shown here took two coats. Finally, use an ultra-fine abrasive pad to smooth the entire surface before applying a final topcoat of varnish or other finish (photo above). The end result is sure to impress.

▲ ***Final Sanding.*** *Use an ultra-fine abrasive pad after the final coat has cured. This prepares the surface for adding a topcoat.*

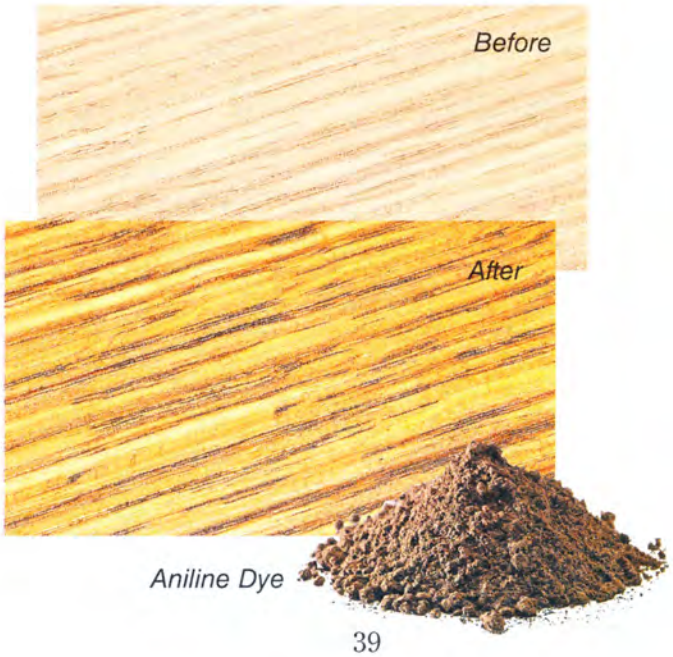
epoxy Tinting

Applying epoxy to your project completely seals the wood surface. So if you intend to stain the wood, you'll need to do it before adding the epoxy.

Another option is to add aniline dye stain powder directly to the epoxy mixture. Alcohol-soluble dyes dissolve better than water-soluble versions, but either can be used. And you'll want to experiment with the amount of dye to add so that you get the right color. These powders are generally highly concentrated, though, so you won't need to add much.

When using dyes, it's best to add the powder after the resin and hardener have been thoroughly mixed. This helps ensure that the epoxy will cure properly.

The quarter-sawn white oak in the photos to the right show the effect of adding dye stain to the epoxy. Give it a try in your shop and see how it can work for you.



best glue for Flawless Veneer

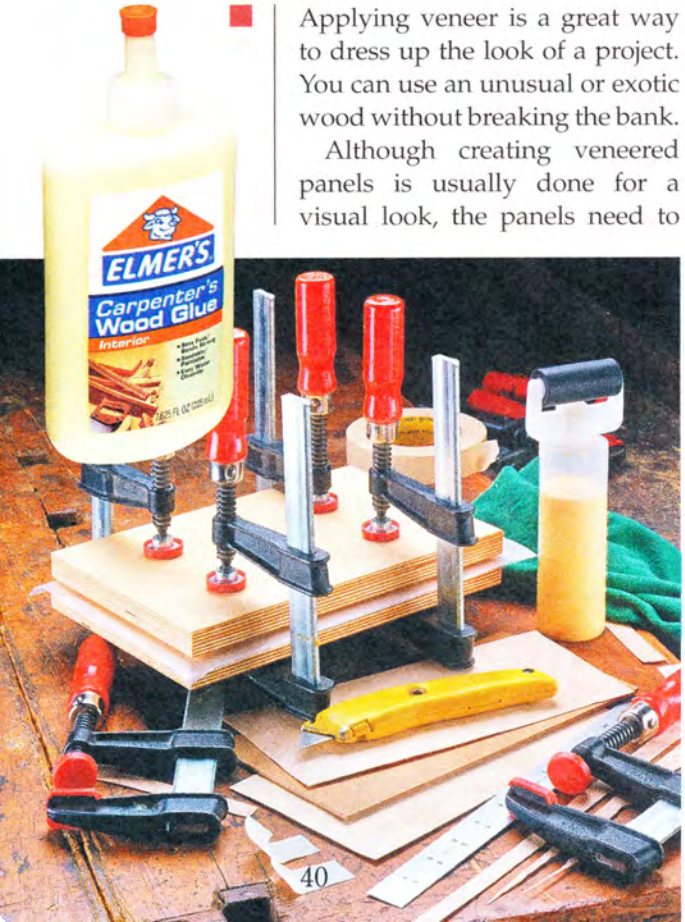
Choose one of these easy-to-use glues to create custom veneered panels.

Applying veneer is a great way to dress up the look of a project. You can use an unusual or exotic wood without breaking the bank.

Although creating veneered panels is usually done for a visual look, the panels need to be durable as well. The veneer needs to stay attached to the substrate without peeling, bubbling, or lifting with humidity changes.

Large, commercial woodworking shops use specialized equipment to apply veneer. And the glue for this equipment can be toxic, difficult to work with, and may require heat to bond effectively. Not something an average woodworker is likely to use.

Thankfully, you have several small-shop-friendly options that are inexpensive to choose from.



WOOD GLUE

The wood glue you already have in your shop seems like a natural choice for gluing veneer to a substrate. After all, veneer is wood, right? It's true. Wood glue has a lot going for it. It's readily available, inexpensive, and creates a strong bond.

However, wood glue has some limitations that determine the best way to use it to make veneered panels. Wood glue has a thin consistency that can seep through traditional veneer and leave noticeable "highlights" in the finished product.

A short working time limits how big of a panel you can glue up before the glue sets. Perhaps the biggest issue is that wood

◄ ***Wood Glue.*** *Ordinary wood glue works great for veneering small, flat panels.*

► ***Cold Press Glue.*** *A thick consistency makes this glue less likely to bleed.*

glue doesn't create a rigid bond. So over time, the joint can creep allowing the veneer to pull away from the substrate — especially on curved surfaces.

For these reasons, I find that wood glue works best on small panels with paper-backed veneer. Another good application is gluing thicker, shop-sawn veneer like the veneer used on the tool chest on page 32.

COLD PRESS GLUE

A close cousin to wood glue is a glue designed specifically for veneer. It's called cold press glue. The term means that the glue doesn't require heat to activate before reaching its full strength.

That makes it ideal for applying veneer with clamps or using a small vacuum bag like the one shown in the main photo on the previous page.

There are three characteristics that make this glue ideal for veneer work. First, it has a thick consistency so it won't bleed through thin veneer sheets. Second, this glue provides a longer open time than ordinary wood glue, which means you can work with large panels without worry.

Finally, the glue bond is rigid and won't creep. In short, if you plan to use veneer regularly, I recommend keeping a bottle of cold press glue on hand.

Liquid Hide Glue. *You have at least 30 minutes of working time with liquid hide glue.*

LIQUID HIDE GLUE

In the old days, hot hide glue was used to apply veneer. Hide glue is quickly brushed onto both surfaces and the veneer pressed into place. A veneer hammer is used to rub the veneer down to create a tight bond as the glue hardens.

While hot hide glue isn't used much now, you can use a room-temperature, liquid version. Instead of heating the glue, you simply spread it on the mating surfaces and clamp the panel between two pieces of MDF, using cauls to apply even pressure across the whole assembly.

The color of hide glue blends well with most wood tones. And it accepts stain and finish better than standard wood glue so any bleed through isn't as noticeable. I think it works great for traditional or reproduction construction or if you need to repair an older piece of furniture.

The only real downsides are that hide glue isn't waterproof and dries slowly. The box below highlights another veneer glue that dries much quicker.

Using veneer in your woodworking projects doesn't require a big investment in equipment or supplies. All it takes is a bottle of one of these glues. Then you can add a special detail to help your projects look better.

instant-bond Contact Cement

If speed is what you're looking for, you may want to consider contact cement. In a nutshell, you apply cement to the mating surfaces, wait for the glue to dry, then stick the two pieces together. After going over the veneer with a roller, that's it.

If you use spray adhesive (shown here), the wait time is about a minute. That speed advantage comes at a cost. Once the pieces touch, the bond is instant. So repositioning the veneer is almost impossible. In addition, contact cement needs a smooth surface to create a solid bond. So that means you need to use paper-backed or engineered veneer. Contact cement also remains rubbery and can creep over time.

Spray It On. *Use an overlapping pattern to apply the glue to both the veneer and substrate.*

Card Scrapers

secret weapons for Smooth Surfaces

Keeping a few low-cost, low-tech scrapers in your tool chest allows you to handle tricky situations.

▲ ***Flat or Curved.*** *Profiled scrapers allow you to smooth and refine convex and concave shapes.*

It's a fact that very few woodworkers enjoy sanding. So any tool that can shorten sanding time is worth a look.

One solution turns out to be a category of hand tool that works almost by magic — scrapers. Don't confuse these scrapers with a common paint scraper — even if a couple look similar. Instead of scratching at the wood, scrapers work more like handplanes, shaving a workpiece to leave a smooth surface behind.

The first two types of scrapers (card scraper and carbide scraper) are must-haves in my book. As you'll see, they offer a big upside in versatility and results. And you don't need to spend a lot of money to get them. (For sources, turn to page 51.)

Card Scraper. The moment I used a card scraper for the first time, I was sold. This unassuming piece of thin steel cleared away the planer marks from a board in a couple swipes. Its secret is a subtle hook along the edge. The hook cuts at a high angle, so it

Easy Cleanup. *A carbide scraper makes quick work of removing glue squeeze out.*

Carbide Scrapers

leaves a smooth surface even on hard or figured wood.

Besides eliminating a lot of sanding, a card scraper has some other important benefits. For example, I use it to quickly scrape hardwood edging level with a plywood panel, as shown in the main photo on the previous page. You can also flex the scraper to zero in on tearout.

I also use a card scraper to clean up glue smudges that have seeped into the wood, so the finish will be consistent.

A rectangular scraper is the most common and most useful in my book. But you'll find them with curved profiles too, as shown in the upper right photos on the facing page.

Carbide Scraper. The next essentail scraper on the list is a carbide scraper. This one bears a striking resemblance to an ordinary paint scraper. However, the similarities end there. Instead of a thin, flexible blade, a stout carbide cutter forms the business end. The thicker blade means it won't chatter. And the carbide blade will stay sharp for years. The blade is double-sided, too. When one side gets dull, simply flip it around for a fresh edge.

You can see in the lower right photo on the facing page that carbide scrapers come in several sizes. The large version is the one I like best. It has a knob above the blade to give you more leverage.

I originally bought one to scrape away glue squeeze-out on panels. But I end up using it for so much more. A carbide scraper works great for cleaning beads of dried glue or drips of finish from my workbench or auxiliary worksurface. Scraping paint, surface rust, and grime are other obvious tasks for this handy tool.

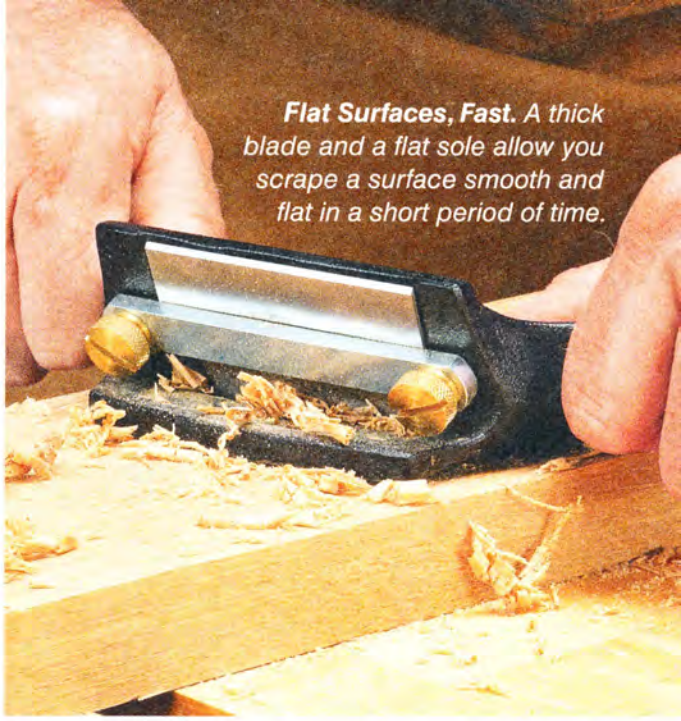
Cabinet Scraper. The big brother of my card scraper is the cabinet scraper. Essentially, it's a body for a thick card scraper.

The holder means your hands (especially your thumbs) won't tire after a few minutes of use. Besides making it easier to use for long periods, there are some other key benefits. First, the addition of the sole makes it easier to keep surfaces flat. It works like a high-angle smoothing plane that can tackle figured wood and reversing grain with ease.

Second, the thicker blade holds an edge longer. The result is you can take a heavier cut with a cabinet scraper and keep working without having to stop to sharpen as often.

Chairmaker's Scraper. The last scraper is a chairmaker's scraper. I like to think of it as a combination of a carbide scraper and card scraper. This long-handled tool works on a pull stroke to make fine, smooth cuts in wood. The steel blade is sharpened with a hook (like a card scraper). This scraper comes with several blades in concave and convex profiles to work on flat or curved surfaces, as shown in the photos below.

Scrapers perform well in a variety of roles from scraping glue to creating smooth, even surfaces. You're sure to find that one or more of these deserve a place in your tool chest.



Flat Surfaces, Fast. *A thick blade and a flat sole allow you scrape a surface smooth and flat in a short period of time.*

Cabinet Scraper

▲ ***Create Smoother Profiles.*** *The handle and knob on a chairmaker's scraper make it more comfortable to shape and smooth curved surfaces without causing fatigue.*

Chairmaker's Scraper

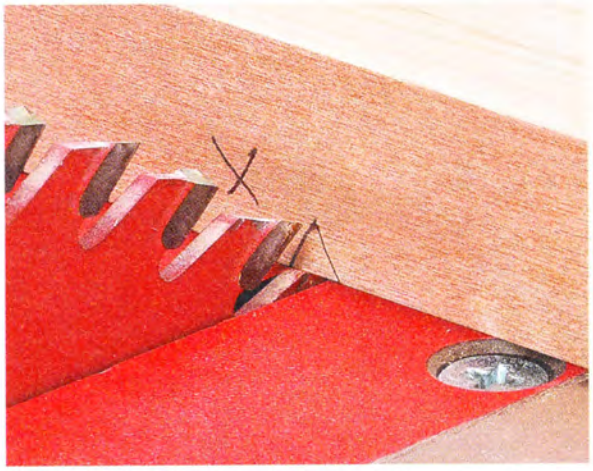
MASTERING THE
Table Saw

set up for Perfect Cuts

Making trouble-free cuts at the table saw boils down to a careful setup and precise measuring.

When I bought my first table saw, I quickly became frustrated with the quality and accuracy of the cut workpieces. Some were a bit too short or too long. Or I had burn marks and rough cuts that needed a lot of sanding. But I realized that rather than blame my saw, what I needed to do was step back and incorporate some fundamental techniques.

As I gained more experience, cutting accurate workpieces for gap-free joinery became old hat.



▲ ***Aligning the Workpiece.*** *Take the time to position the workpiece by aligning your mark with the teeth of the saw blade.*

PRELIMINARY STEPS

Quality cuts at the table saw start with careful preparation. But before you grab your tape measure and pencil, there are a couple of things you need to do.

Saw Setup. It goes without saying that your saw should be tuned up and ready to go. It pays to check and adjust the rip fence, miter gauge, and blade alignment if necessary. I try to do this at least twice a year. Your saw's manual is a good resource for making these adjustments.

Blade Selection. When in the middle of a project, it's tempting to skip the process of changing blades. While a combination blade is suitable for a lot of tasks, it may not be ideal when you're looking for the best possible cut on a workpiece.

So the optimal solution is to use a quality crosscut blade where glass-smooth cuts are desired on endgrain. Likewise, for ripping, glue-line rip blades yield edges that are ready for glue-up. Whichever blade you use, inspect it to make sure it's clean and sharp.

CAREFUL LAYOUT

With most of the preliminaries out of the way, you're almost ready to lay out and cut your workpieces. But the first thing you'll need to do is establish a reference edge. By that I mean a straight, square edge.

Straight Edge. The reference edge you create rides against the rip fence or miter gauge during the cut. This usually involves ripping or jointing one edge of your workpiece before you can begin laying out the cuts.

Trim Cut. The next thing to do is make a square, trim cut. Don't make the assumption that the end is square. When crosscutting parts to length, first make a square cut on one end. This gives you a smooth end on which to register the rule or tape measure.

Measure & Mark. Finally, you're ready to mark your workpiece. One of the most important tools in measuring is a sharp pencil. Dull pencils leave a thick line that's hard to register. I like to use a mechanical pencil.

When measuring, I prefer a steel rule for pieces less than 2' long. The rule is less awkward than a tape measure. When measuring from the end of a workpiece, a hook rule makes this task quick and easy, as shown in the main photo, opposite page. Another great alternative is an *Incra* rule (box at right).

For most of us, the tendency is to make a mark using a straight line. The problem is, it's difficult to make the mark square to the edge of the workpiece.

Instead, I use a two-stroke "V" mark, as you can see in the main photo. I start with the pencil lead at the mark on the rule and angle a short stroke out to each side, forming an arrow with a defined point. This makes aligning the blade for a precise cut easier, (lower photo, opposite page). While you're at it, mark an "X" on the waste side of the mark.

Test Cuts. For most joinery, careful layout sometimes isn't enough. In these cases, nothing beats making a few test cuts.

The left two photos below show how you can test the width and depth of a dado. I check the width of a dado with the thickness of the mating workpiece. To check the depth, I use a steel rule. Because some dado blades leave a rough surface on the bottom, I hold the rule so both edges contact the sides of the dado. This spans across all of the peaks and valleys so that you can obtain an accurate depth measurement.

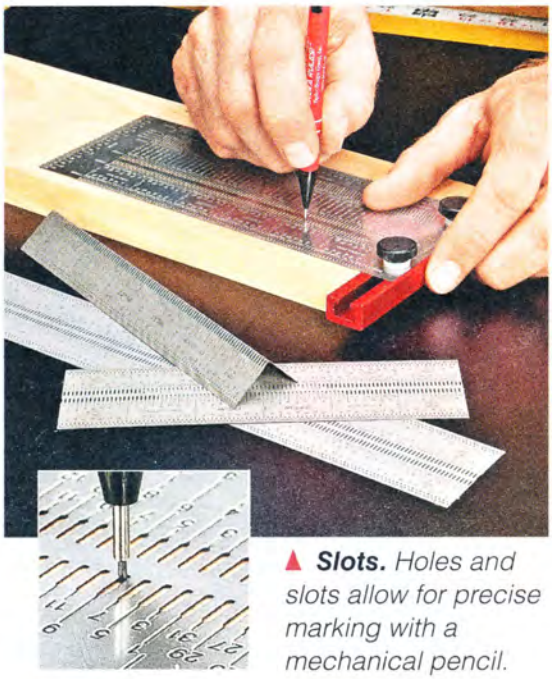
Using a Workpiece. The right photo and inset below show how I use a workpiece as a setup guide for making a cut. For this example, I'm using the thickness of the tongue workpiece (a drawer front or back) to locate the dado on a drawer side. This eliminates the need to measure and ensures an accurate cut every time.

Turn the page to find more tips for making accurate, repeatable cuts.

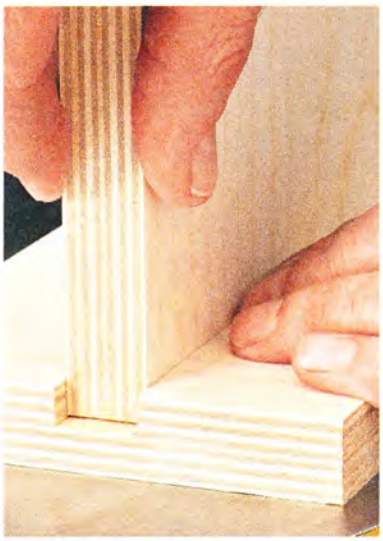
precision rules INCRA

INCRA rules by *Taylor Design Group* are the gold standard in precision layout and marking tools for woodworkers. Their wide assortment of rules and protractors all feature thin, flexible steel with easy-to-read etched markings. But what makes them unique are the tiny slots and holes.

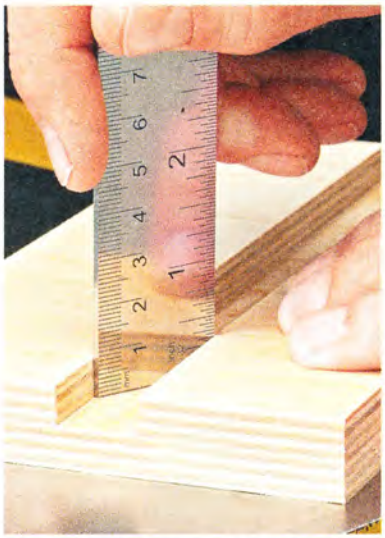
The slots and holes are sized for a 0.5mm mechanical pencil lead. You can see in the photos at right how foolproof and accurate this system is. Just slip the pencil into the appropriate opening and make your mark.



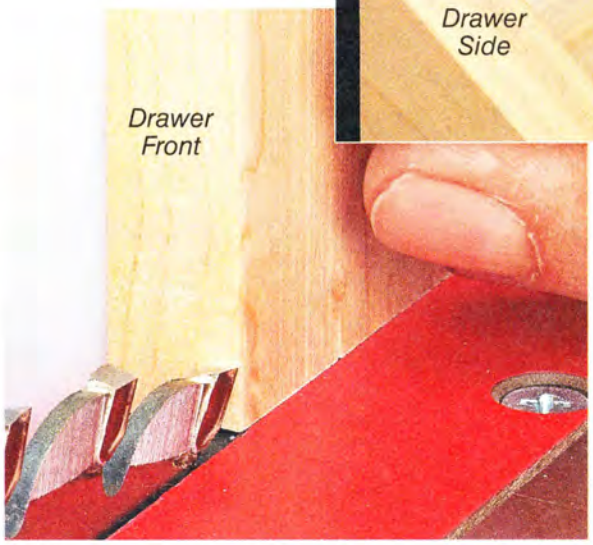
▲ ***Slots.*** *Holes and slots allow for precise marking with a mechanical pencil.*



▲ ***Test the Fit.*** *Sometimes, no amount of measuring takes the place of making sample cuts.*

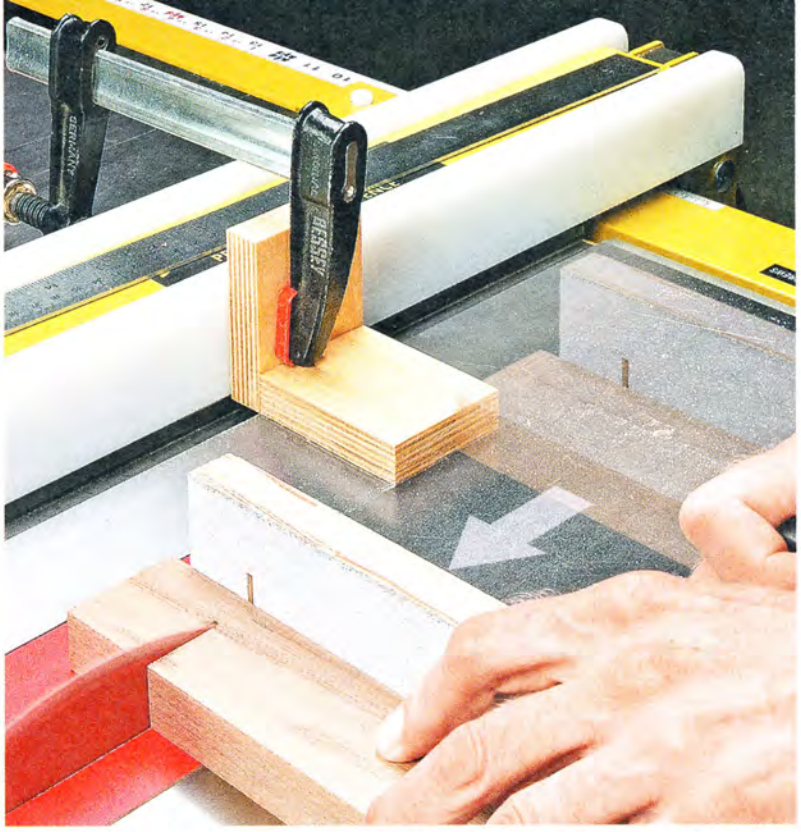


▲ ***Dado Depth.*** *Rotate a rule across the width of a dado for an accurate depth measurement.*



▲ ***Simple Setup.*** *For joinery, use a mating workpiece for setup. Here, I'm using a drawer front to locate the dado cut in the drawer side.*

▲ **Positioning.** *After aligning the stop block with the blade and clamping it in place, adjust the rip fence to set the distance from the blade.*



▲ **Make the Cut.** *Slide the stop block back ahead of the blade before making the cuts for identical workpieces.*

Using Stop Blocks

You can use the tips on the previous pages when cutting a single workpiece to a precise length. But what if you need multiple pieces cut to the same length? Let me share a couple of tips.

L-Shaped Stop Block. One method for making identical parts is shown above. An L-shaped stop block clamped to the rip fence provides a reference for registering each workpiece before the cut. The stop block provides clearance for the cut-off workpiece to prevent binding between the blade and fence. This method works particularly well for small parts.

First, temporarily clamp the stop block adjacent to the blade (left photo above). This way, you can measure and adjust the rip fence to the desired length of cut and lock the fence in position.

Next, you'll need to move the stop block ahead of the blade, as shown in the right photo above. The goal is for the workpiece to clear the stop block before contacting the blade to prevent any chance of binding.

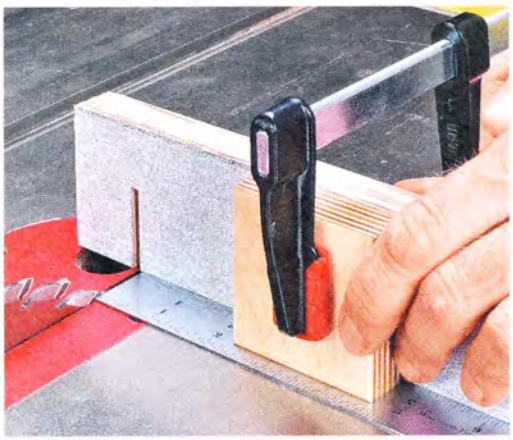
To start the cut, slide the workpiece along the miter gauge until it contacts the stop block, then complete the cut. Repeat the process for identical lengths.

Fence-Mounted Block. One other common method for cutting pieces to identical length is shown on the lower left. It's a stop block clamped to an auxiliary miter gauge fence. With this method, the length of the workpiece is limited only by the length of the auxiliary fence.

To set it up, I slide the miter gauge close to the blade. Butt the end of a steel rule against a tooth on the blade. Align the stop block at the desired distance on the rule and clamp it in place.

You'll also want to make sure the block is square to the saw table. A quick check with your square is all you need before tightening the clamp.

To cut parts to the same length, slide the workpiece against the stop and hold it against the auxiliary fence while making the cut. Just repeat the process for subsequent workpieces.



▲ **Measure.** *Use a steel rule to position the stop block. Measure from the edge of one of the teeth on the blade.*

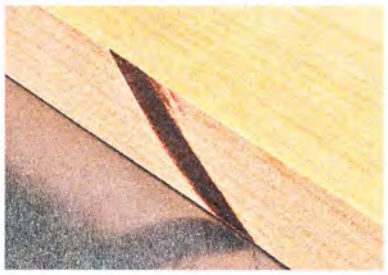
▲ **Square the Block.** *The last thing to do before making cuts is to make sure the stop block is square to the table.*

troubleshooting
Tips & Tricks

SAW MARKS

Rough cuts that result in saw marks are often the result of using the wrong blade. Use a dedicated blade designed for ripping or crosscutting, depending on the task at hand.

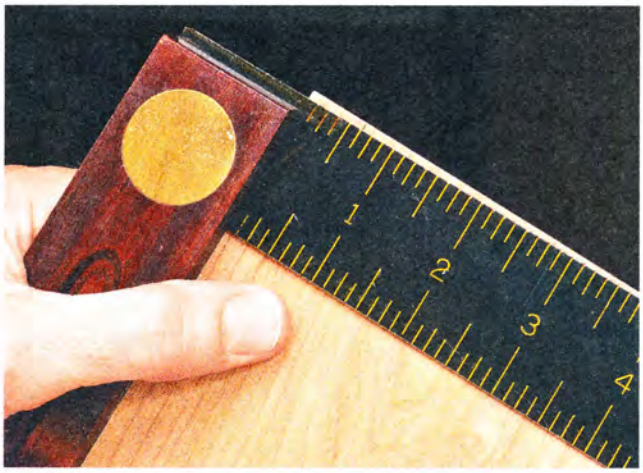
Other causes of saw marks include a dull or dirty blade and feeding the workpiece into the blade too quickly. Start with a clean blade and feed the workpiece into the blade at a steady rate. If the blade isn't running true, it's time to buy a new one.



BURN MARKS

Some woods, like cherry, are prone to burning, but it can happen with any workpiece. A likely cause is often a rip fence that's not aligned with the blade. The solution is to make sure that both the fence and blade are parallel to the miter slots.

If the saw blade is clean and sharp, the next thing to check is the feed rate. Feeding a workpiece too slowly can result in burning. For best results, keep the workpiece moving.



OUT-OF-SQUARE CUTS

One lesson I've learned is to check that the miter gauge and blade are set up square before making a cut. This way, you're guaranteed to end up with square cuts that make assembly go much smoother later on.

A large drafting triangle comes in handy to square the miter gauge to the plate of the saw blade. Use a combination square or digital angle gauge to make a quick check of the blade angle before starting your project.

TEAROUT

The most common cause of chipping and tearout is not backing up the cut. What I mean is the wood fibers must be supported where the teeth of the spinning blade exit the workpiece along the bottom and back edges.

The easiest fix for eliminating tearout is to use a zero-clearance insert in your saw plus an auxiliary miter gauge fence. The zero-clearance insert helps ensure a clean cut along the bottom face of the workpiece. Likewise, the auxiliary miter gauge fence results in a clean cut on the back edge of the workpiece.

ROUGH CUT

As I mentioned above when discussing saw marks, the blade may be the cause of rough cuts. Trying to make a crosscut with a rip blade is a common cause for the problem. For crosscuts, it pays to switch to a crosscut blade or at a minimum, a good combination blade. The teeth are specially ground to slice through the fibers for a glass-smooth cut.

Another cause for rough cuts might be a result of feeding the workpiece too quickly into the blade. Again, a smooth, consistent feed rate results in the best surface quality after the cut.

INCONSISTENT DEPTH

When cutting dadoes, grooves, and rabbets, a consistent depth can sometimes be elusive. The workpiece may be bowed or twisted, making it difficult to keep the face of the workpiece on the saw's table while making the cut.

The solution is to ensure the workpiece stays flat. There are a couple of ways to do this. One is to use push pads to apply pressure directly over the blade as you feed the workpiece. Another handy solution is to use a featherboard attached to an auxiliary rip fence. This helps keep the workpiece flat on the table.

versatile Vises

Add a third hand to your workbench with one of these unique shop vises.

▲ **Hardware.** *A bit, tap, and knob allow you to modify the vise for more versatility.*

I get a lot of use out of the face vise and tail vise on my workbench. But there are some tasks that are outside their capabilities. Like holding a tapered or odd-shaped workpiece, for example.

For specialized tasks like these, there are a couple of solutions. One is the *Ultimate Versatile Vise* by *Garrett Wade* shown in the photos on this page. And another handy option is the *Pipe Vise* by *Lee Valley*, as you can see in the photos on the opposite page.

ULTIMATE VERSATILE VISE

The *Garrett Wade* vise may look similar to the *Parrot* vise sold by other vendors. But *Garrett Wade* includes an additional post and knob assembly. This allows the vise to pivot around both the vertical and horizontal axis (photos below). This capability lets you swivel the vise into a convenient position. Remove this post to orient the jaws vertically, as in the right photo below.

And if you ask for it, they'll throw in an optional kit to allow you to add a knob that locks the vise onto the post. The kit includes a drill bit, thread tap, and a knob, as shown in the margin photo at left.

As a side note, without the optional knob, the vise locks

ShopNotes GO ONLINE EXTRAS

To download a free plan for the auxiliary vise jaws, go to: ShopNotes.com

▲ **Versatility.** *The head of the vise rotates on two posts for a variety of clamping positions.*

▲ **Solid Clamping.** *Without the optional knob, the vise locks onto the post only when the jaws are tightened.*

▲ **Sideways.** *Remove the horizontal post to mount the vise so the jaws are oriented in a vertical position.*

onto the post only when the jaws are tightened.

To help when gripping odd-shaped parts, I made a pair of auxiliary wood jaws with leather faces. You can find details online at *ShopNotes.com*.

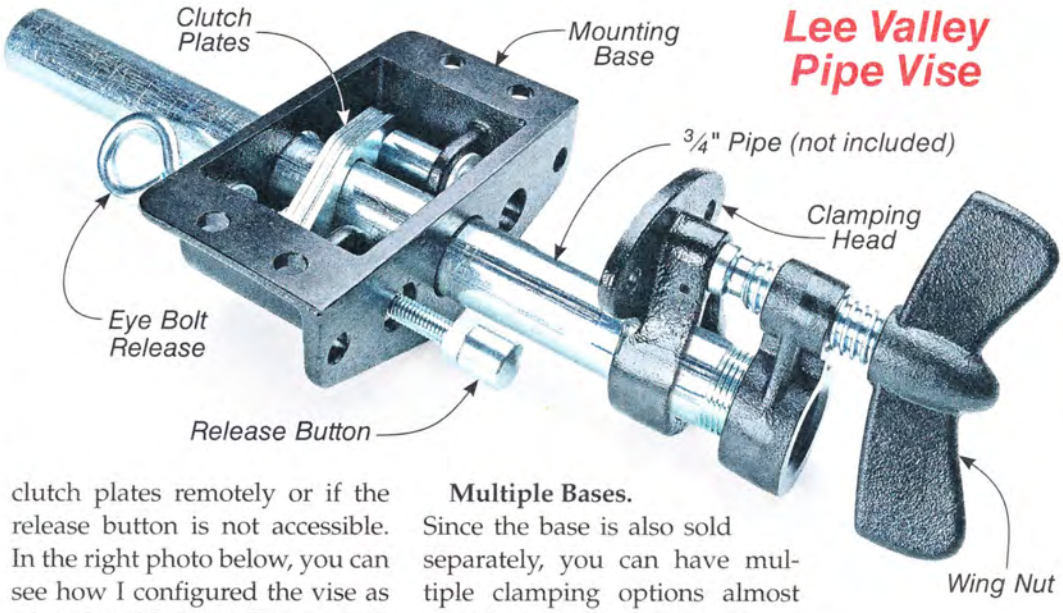
LEE VALLEY PIPE VISE

The *Pipe Vise* you see at right is a design based on a pipe clamp mechanism. The clamping head threads onto a ¾" pipe that you supply. The base contains the clutch plate mechanism that locks the pipe in place when tightening the large wing nut.

Clutch Release. Like a pipe clamp, you release the jaw by disengaging a series of metal clutch plates. The *Pipe Vise* incorporates two ways to do this.

As shown above, there's a spring-loaded release button at the front of the base. It's connected to an eye bolt at the rear of the base. The eye bolt can be connected to a cable to release the clutch plates remotely or if the release button is not accessible. In the right photo below, you can see how I configured the vise as a bench hold-down. The eye bolt releases the pipe.

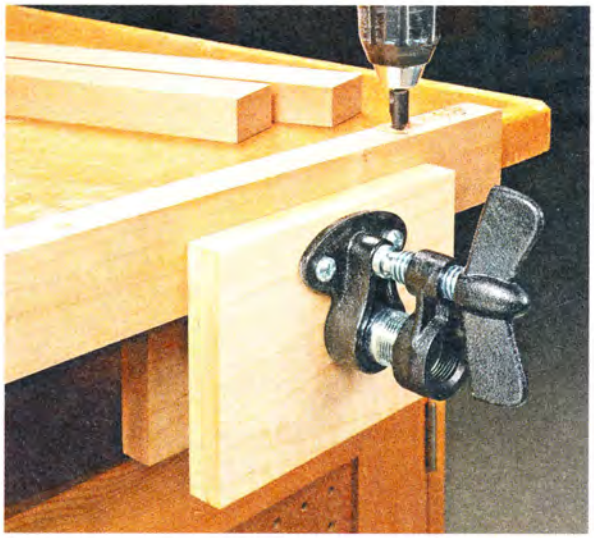
Portable. One advantage the *Pipe Vise* has over a standard bench vise is its portability. The photos below show how I installed it on a shop cart. The included instructions provide the details for mounting the base as well as plans for making the auxiliary jaw faces.



Multiple Bases. Since the base is also sold separately, you can have multiple clamping options almost anywhere in the shop or on the job site. All you need to do is move the pipe with the clamping head to another base.

Worthwhile Choices. If you find your current shop vises aren't meeting your clamping needs, these two unique options are worth a closer look. You can find out where to get them in Sources on page 51.

◀ ***Release.*** *Push the button on the front of the base to release the pipe jaw.*



◀ ***Face Vise.*** *A large auxiliary jaw face turns the pipe vise into a handy face vise.*

▲ ***Hold-Down.*** *To turn the pipe vise into a hold-down, you'll need to drill a 1¼"-dia. hole in the worksurface. Release the pipe using the eye bolt.*

questions from
Our Readers

choosing Straight Bits

Is there much difference between straight, shear, and spiral bits?

Paul Batcher
San Diego, CA

Some of the most frequently used router bits in our shop are straight bits. Or more accurately, bits that cut a straight profile. These versatile bits are used for a number of tasks, such as making dadoes and grooves, cutting mortises, and even flush trimming the edge of a workpiece. But there are a handful of bit options available, and determining which is the right one to use can be confusing.

The short answer is that any of them can be used for these tasks and more. But the cutting angle of each bit is different, so the results can vary. And the cost of the bits differ drastically. Let's have a look at each bit separately.

Straight Bit. The simplest of these bits is the standard straight bit shown in the top margin photo. These bits are the least expensive of the group and, as a result, are the most common. But when a clean edge on your workpiece is critical, a straight bit may not be your best bet.

That's because the cutting edge of these bits is at a 90° angle to the workpiece. This results in a chopping action where the bit contacts the wood and can result in "fuzzy" edges or even tearout.

Shear Bit. Though slightly more expensive, a better option is a shear bit. You can see in the margin photo that the cutting edge of this bit is at a slight angle relative to the shank of the bit. So the cutter contacts the workpiece at a lower angle. The result is a less-aggressive, slicing action that helps leave a cleaner edge.

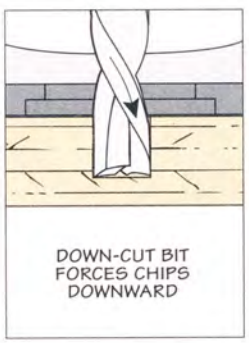
Spiral Bits. For the ultimate in cutting performance, choose a spiral bit. The decreased cutting angle of these bits leaves a crisp, chip-free edge.

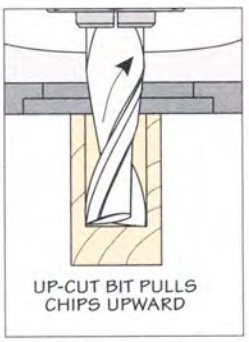
You'll typically find two types of spiral bits: up-cut and down-cut. The difference is with the spiral direction of the cutting flutes.

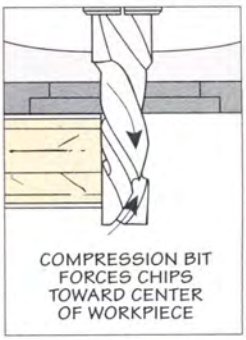
Down-cut bits are generally used for cutting dadoes or grooves where the downward, slicing action of the bit minimizes chipout at the edge of the cut. Up-cut bits are perfect for clearing out waste when cutting deep mortises. See the drawings below for details.

A compression bit combines both configurations with an up-cut orientation at the tip of the bit and a down-cut action near the shank. This comes in handy when you need to flush trim a workpiece with laminate or veneer on both faces.

Spiral bits can be costly, however, and cannot be resharpened like straight and shear bits can. So I use them only when minimizing tearout is the priority.







ShopNotes

ultimate versatile vise
Auxiliary Jaws

Build this pair of jaws to make your vise more functional.

The *Ultimate Versatile Vise* sold by *Garrett Wade* provides a solution to a lot of unique clamping problems. But to make it even more versatile, I made a pair of auxiliary jaws, as you can see in the photo at right.

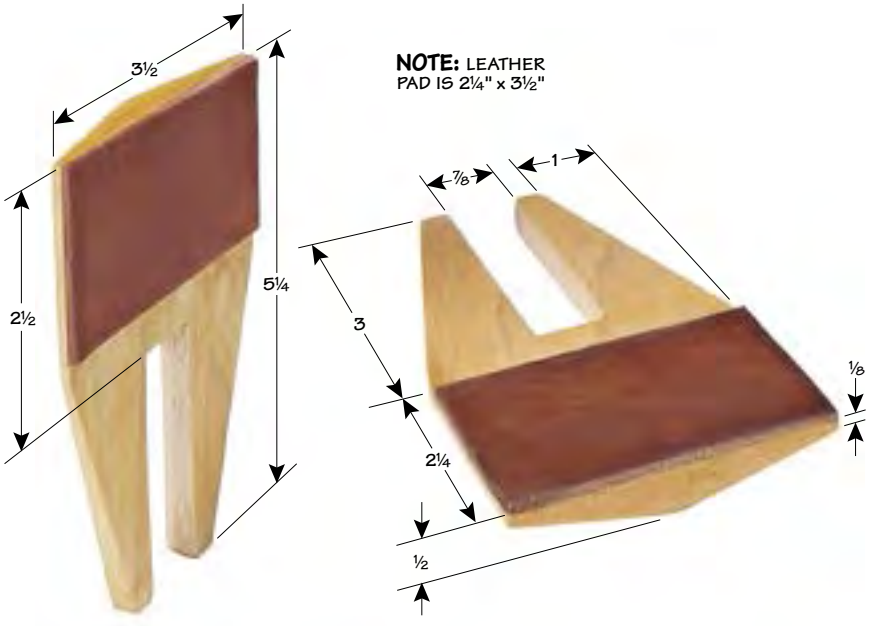
The auxiliary jaws are shaped to allow them to pivot slightly when clamping odd-shaped parts. The photos below show you how they're made.

Rip the Bevels. I started with ½"-thick maple blanks cut to overall size. The double bevel on the back side provides the pivoting action. To cut these bevels at the table saw, I set the blade height to half the width of the blank (about 1¾" high). Set the rip fence ⅛" away from the blade. Now tilt the blade away from the rip fence until the top of the blade is ½" from the fence. Make a pass on each side to create a pivot line down the middle of the blank.

Saw to Shape. The rest of the shaping I did at the band saw after a little layout work. The slot is sized to fit loosely over the bar of the vise to allow the jaw to pivot.

After sanding all the edges smooth, you can add leather faces. I used wood glue to fasten them to the jaws. The leather helps grip the workpiece and cushions it to prevent damage to your work. Applying a couple coats of finish to the wood will make it easier to keep the jaws clean.

To use the jaws, simply slip them over the vise bar as shown in the main photo above.



ShopNotes

miter saw Station

Materials List

CASE

A	Sides (2)	31¼ x 63½ - ¾ Ply.
B	Top (1)	20 x 43 - ¾ Ply.
C	Bottom (1)	23³⁄₁₆ x 42 - ¾ Ply.
D	Back (1)	42 x 63½ - ¾ Ply.
E	Edging (1)	¾ x 1¼ - 43
F	Caster Plates (2)	8¼ x 26½ - 1½ Ply.
G	Post Caps (2)	6¾ x 11¼ - 1½ Ply.
H	Post Sides (2)	11¼ x 36½ - ¾ Ply.
I	Post Faces (2)	8¼ x 28⅛ - ¾ Ply.
J	Rear Pivot Brackets (2)	7½ x 8 - ¾ Ply.
K	Front Pivot Brackets (2)	8¼ x 9⅝ - ¾ Ply.
L	Front Dust Plate (1)	10¼ x 36¼ - ¾ Ply.
M	Cleats (2)	¾ x 1 - 19⅜
N	Side Dust Plates (2)	20 x 18½ - ¾ Ply.
O	Kicker Plates (2)	7 x 20¹¹⁄₁₆ - ¼ Ply.
P	Platform Top/Bot. (2)	16 x 26½ - ¾ Ply.
Q	Platform Back (1)	1½ x 3½ - 23½
R	Platform Sides (2)	1½ x 3½ - 16
S	Access Panel (1)	26⅜ x 27 - ¾ Ply.
T	Panel Cleat (1)	¾ x 1 - 26⅜

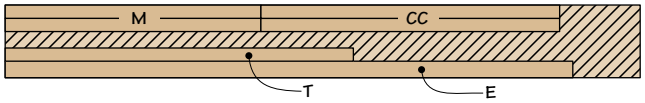
WINGS

U	Rod Brackets (2)	1½ x 1¾ - 5
V	Wing Tops (2)	12 x 33¼ - ¾ Ply.
W	Wing Laminate (2)	12 x 33¼ Plastic Lam.
X	Wing Bottoms (2)	12 x 33¼ - ¼ Ply.
Y	Wing Fronts (2)	1 x 1½ - 26
Z	Wing Backs (2)	1 x 1½ - 27¼
AA	Wide Fillers (2)	1 x 5 - 10½
BB	Narrow Fillers (8)	1 x 1½ - 9
CC	Wing Guides (2)	¾ x 1 - 20½
DD	Fences (2)	1 x 1½ - 31

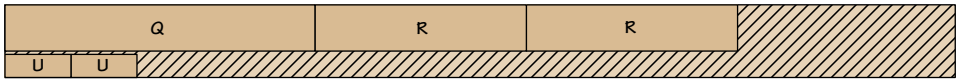
- (116) #8 x 1½" Fh Woodscrews
- (8) #8 x 2" Fh Woodscrews
- (2) 4" Locking Swivel Casters
- (2) 4" Fixed Casters
- (6) ¼"-20 x 3" Hex Head Bolts
- (12) ¼"-20 Nuts
- (6) ¼" x 2" Lag Screws
- (6) ¼" Washers
- (1) ½"-dia. Rare-Earth Magnet w/Cup & Washer
- (2) ⅜"-dia. x 1" Dowels
- (3) 3¾" Handles
- (2) 1½" x ¼" - 10" Angle Iron
- (2) 1"-dia. x 25½" Steel Rod
- (6) ⅜"-16 T-Nuts
- (6) ⅜"-16 x ¾" Allen Head Set Screws
- (8) ⁵⁄₁₆"-18 T-Nuts
- (8) ⁵⁄₁₆"-18 x 1" Fh Machine Screws
- (1) Plastic Storage Bin (33¾"W x 19⅜"D x 13⅜"H)
- (16) #10 x 1¼" Sheet Metal Screws

Cutting Diagram

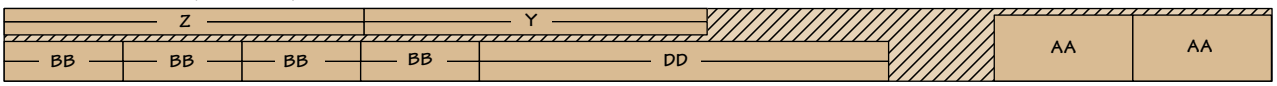
¾" x 5½" - 48" MAPLE (1.8 Bd. Ft.)



1½" x 5½" - 72" MAPLE (5.5 Bd. Ft.)

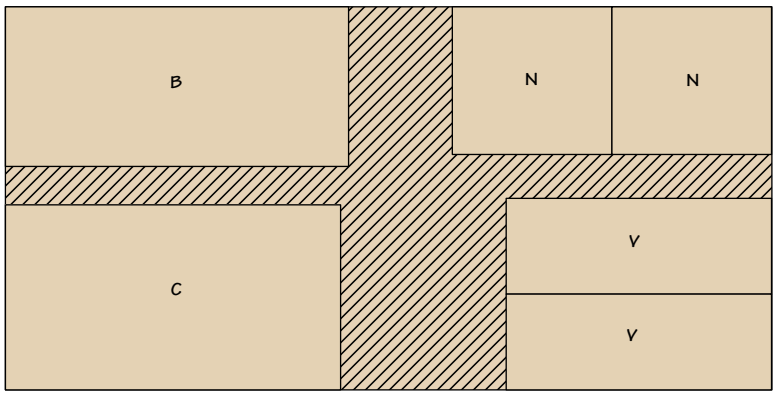


1" x 5½" - 96" MAPLE (4.6 Bd. Ft.)

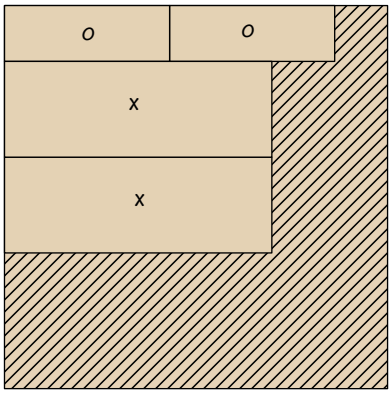


Cutting Diagram cont.

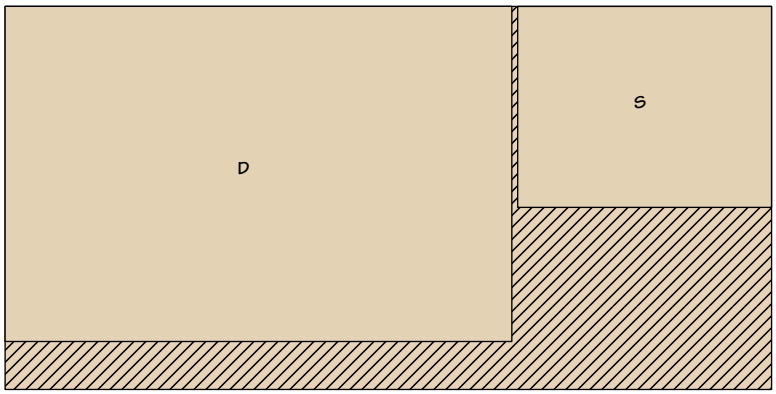
48" x 96" - ¾" BIRCH PLYWOOD



48" x 48" - ¼" BIRCH PLYWOOD

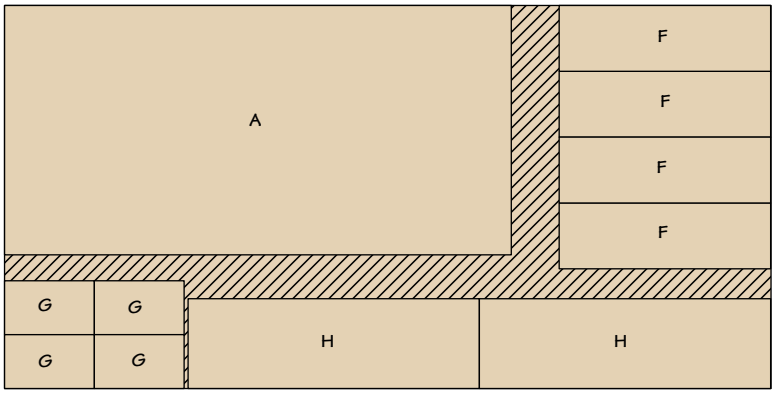


48" x 96" - ¾" BIRCH PLYWOOD

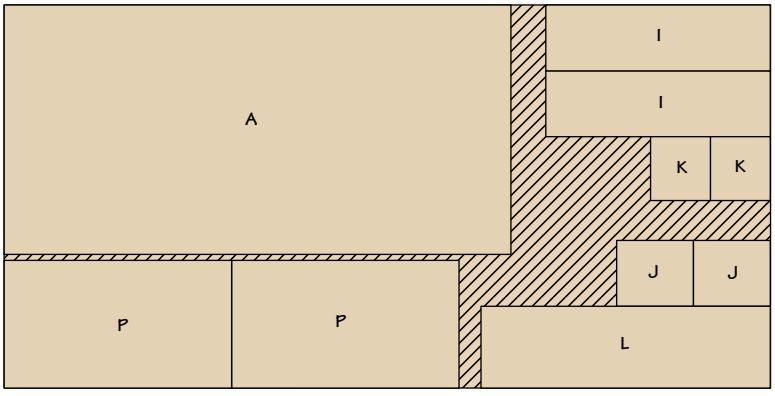


ALSO NEEDED:
25" x 36" SHEET OF
PLASTIC LAMINATE

48" x 96" - ¾" BIRCH PLYWOOD



48" x 96" - ¾" BIRCH PLYWOOD



ShopNotes

sturdy, affordable Workbench

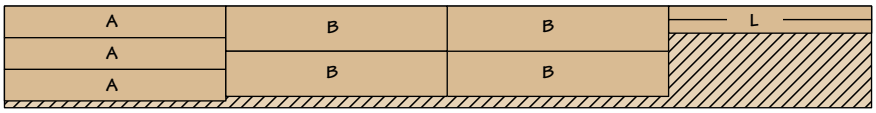
Materials List

BASE		
A	Arms (2)	3 x 3½ - 24
B	Feet (2)	3 x 5 - 24
C	Legs (4)	3 x 3½ - 26
D	Stretchers (2)	1½ x 5 - 59
E	Shelf Cleats (2)	1½ x 1½ - 50
F	Base Shelf Planks (10)	¾ x 5 - 15½
SHELVING UNITS		
G	Sides (4)	½ x 2¾ - 24
H	Shelves (8)	½ x 2⅞ - 10½
I	Keeper Strips (6)	¼ x ½ - 10
J	Backs (2)	11 x 24 - ¼ Ply.
TOP		
K	Benchtop (1)	2½ x 26 - 80
L	Top Cleats (2)	1½ x 1½ - 22

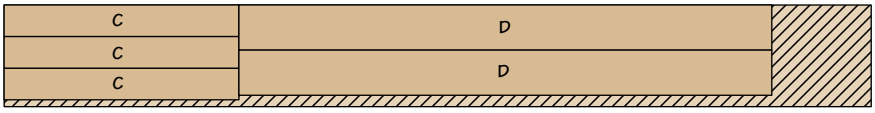
- (8) 5/16" x 3½" Lag Screws
- (8) 5/16" x 5" Lag Screws
- (4) ¼" x 3½" Lag Screws
- (16) 5/16" Washers
- (4) ¼" Washers
- (10) #8 x 2½" Fh Woodscrews
- (40) #8 x 1½" Fh Woodscrews
- (40) #6 x 1¼" Fh Woodscrews

Cutting Diagram

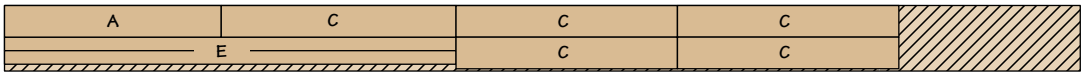
2" x 12" - 8' DOUGLAS FIR



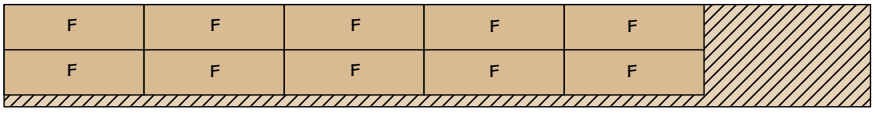
2" x 12" - 8' DOUGLAS FIR



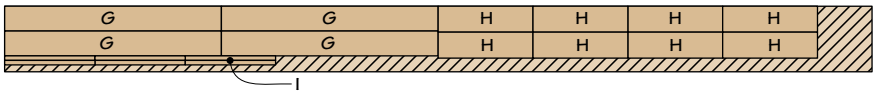
2" x 8" - 10' DOUGLAS FIR



1" x 12" - 8' PONDEROSA PINE

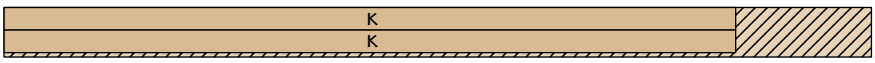


1" x 8" - 8' PONDEROSA PINE

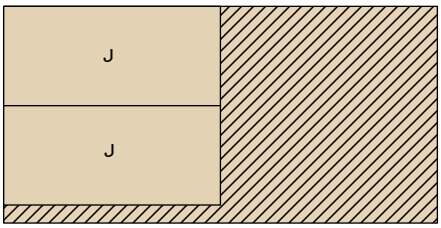


NOTE: PARTS G, H, AND I ARE PLANED DOWN TO ½"

2" x 6" - 8' ENGINEERED LUMBER (10 Boards)



24" x 48" - ¼" FIR PLYWOOD



Sources

Most of the materials and supplies you'll need to build the projects are available at hardware stores or home centers. For specific products, take a look at the sources listed here.

The *Woodsmith Store* in Des Moines, Iowa is an authorized *Rockler* dealer. Their customer service representatives are available from 8am – 5pm Central Time, Monday through Friday.

SMALL ROUTER BITS *(p.8)*

- **Lee Valley**
  Box Slotting Bits . . . . . Varies
- **Craftsman Gallery**
  ¼" Dovetail Bit 18-325
- **Carbide.com**
  Amana Router Bits. . . . . Varies
- **Woodcraft**
  Bowl & Tray Bit 823066

MITER CLAMPS *(p.10)*

- **Blokkz**
  Clamping Blocks. UCB5R20
- **Rockler**
  Miter Tight 30108
  Bessey Strap Clamp 33861
  Corner Framing Clamp . . . 62674
- **Amazon**
  Spring Clamp B000M3G5EU

SHELF STANDARDS *(p.12)*

- **Lee Valley**
  Pilaster Strips . . . . . varies
- **Woodworker's Supply**
  Thin Surface-Mount 161-588
  Thin Mortise-In 161-591
  Stainless Supports 161-621
  Speedy Shelf Supports . . . . varies
- **Rockler**
  Slide Bracket 35693

WORKBENCH *(p.14)*

The *Timberstrand LSL* used for the benchtop is made by *Weyerhaeuser*. Check with your lumber dealer or find a distributor at *woodbywy.com*. The base was painted with *Benjamin-Moore's Aura* matte finish *Warmed Cognac* (AF-235).

- **Woodcraft**
  Bench Vise. 16T51

MITER SAW STATION *(p.20)*

- **Reid Supply**
  Pulls KHO-10
- **Lee Valley**
  4" Swivel Casters 00K21.41
  4" Fixed Casters 00K21.40
- **McMaster-Carr**
  1" Steel Rod 6628K383
  1½" x ¼" Angle Iron. . . 9017K67
- **Amazon.com**
  106-qt. Bin B003UMIG9W

TOOL CHEST *(p.32)*

- **Certainly Wood**
  Bird's Eye Veneer . . . . . Varies
- **Woodcraft**
  Freud Beading Bit. 830674
- **Lee Valley**
  Brass Knobs 01A02.16

EPOXY FINISH *(p.38)*

- **Amazon.com**
  105 Epoxy Resin. . . B003T0UG98
  207 Hardener B0007XLTL4
  320 Scale B002IZ9FNS

SCRAPERS *(p.42)*

- **Lee Valley**
  Chairmaker's Scraper. . 05P33.80
  Cabinet Scraper 05P32.05
- **Highland Woodworking**
  Carbide Scrapers . . . . . Varies
  Card Scrapers . . . . . Varies

GREAT GEAR *(p.48)*

- **Garrett Wade**
  Versatile Vise. 05R10.10
- **Lee Valley**
  Pipe Vise 15G01.03
  Pipe Vise Base 15G01.01

MAIL ORDER SOURCES

Woodsmith Store
800-444-7527

Rockler
800-279-4441
rockler.com

Amazon
Amazon.com

Blokkz
714-267-8440
blokkz.com

Carbide.com
888-701-9278
carbide.com

Certainly Wood
716-655-0206
certainlywood.com

The Craftsman Gallery
513-233-9019
chipsfly.com

Garrett Wade
800-221-2942
garrettwade.com

Highland Woodworking
800-241-6748
highlandwoodworking.com

Lee Valley
800-871-8158
leevalley.com

McMaster-Carr
630-600-3600
mcmaster.com

Reid Supply
800-253-0421
reidsupply.com

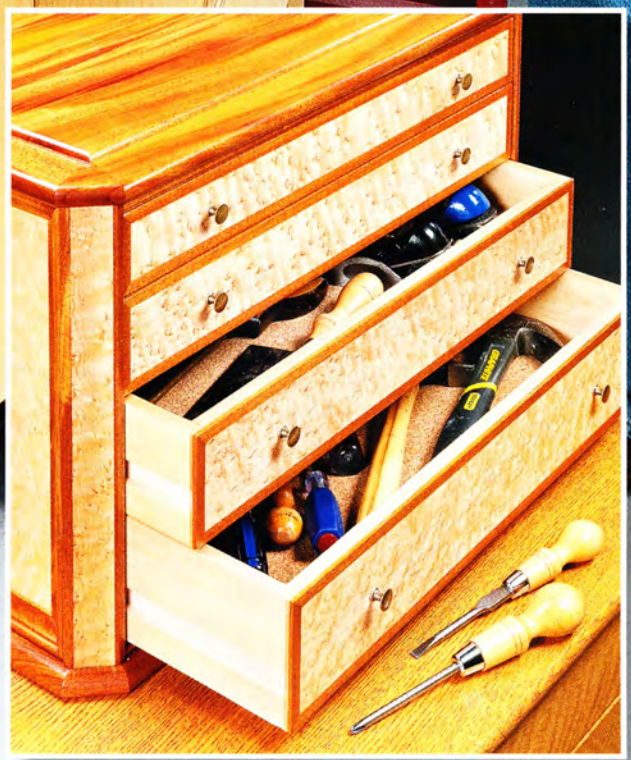
Weyerhaeuser
888-453-8358
woodbywy.com

Woodcraft
800-225-1153
woodcraft.com

Woodworker's Supply
800-645-9292
woodworker.com

Scenes from the Shop

A pair of heavy-duty wings on this miter saw station offer plenty of support for long workpieces. When you're done, the wings fold up and stow away inside the cabinet. You'll find complete plans starting on page 20.



This attractive tool box is sure to become the focal point of any shop. It's just the right size to store an assortment of your most-often used tools. We'll walk you through every step, starting on page 32.