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Canadian Woodworking

FEBRUARY/MARCH 2008
Issue # 52

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LINDA FULCHER

Often the groundwork for a successful project is laid long before you make the first cut. Here are some suggestions for ensuring both the quality of the project and your enjoyment in making it.

Prepare a clear workspace by moving or storing other projects you have made, or have in the works. If there is a project you want to come back to, then put it in a safe place out of the way. If you don't do this you might find the wood repair article on page 24 very useful.

Put your tools back in place so that when you really get into the swing of making your next project, you can remain focused on the making of it, and not on looking for the handtool you were using a day or two ago. Building the versatile hand tool display rack will assist you with this (see page 12). Also, before you put them away, do yourself a huge favour and sharpen them (see page 43).

Check over your lumber very carefully and set aside any that is cupped, bowed, crooked or twisted. If you have a jointer and a thickness planer, check out the skill builder for preparing your own lumber on page 4.

Think through each of the building steps to ensure you have what you need and finally, before you start, measure twice! See the digital caliper article on page 38, which includes a handy fraction/decimal conversion chart. After all this preparation, you are sure to enjoy both the process and the results.

lfulcher@canadianwoodworking.com



PAUL FULCHER

I enjoy watching woodworkers, as they stroll by my booth at the woodworking shows across Canada. I especially like when the passers-by recognize me, and give me their particular version of a greeting.

Sometimes it's a wink, sometimes it's a nod. Sometimes it's a brief comment, like "Love the magazine!" or "How's Linda?". But of all the greetings and expressions, the one that I find most entertaining is the one that is blurted out, almost unconsciously, and it goes something like: "Hey, you're that guy!"

The people who make such exclamations then usually walk over, shake my hand, and explain that, although they receive an eNewsletter from me every month, and see my photo in that newsletter, they hadn't considered running into me at a show – hence the involuntary exclamation.

After we talk a bit about the newsletter, and woodworking in general, they are usually back on their way, and answering their spouse's question of "Who was that guy?"

So if you are receiving our free monthly eNewsletter, don't be surprised if you run into me at an upcoming woodshow (see complete list of shows on page 50).

If you are not currently receiving our eNewsletter, please visit our website and sign up now.

If you don't recognize the photo of the person sending you the eNewsletter... I'm that guy!

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CORRECTIONS: Dec/Jan '08, Issue #51

Page 5 text to read: I milled the mortises 15/16" deep.

Page 13 Materials List to read: Bottom base $\frac{3}{16}$ " x $2\frac{5}{16}$ " x $2\frac{1}{16}$ ";
Bottom rail $\frac{3}{8}$ " x $\frac{7}{16}$ " x $2\frac{5}{16}$ ";
Bottom supports $\frac{1}{8}$ " x $\frac{1}{4}$ " x $\frac{5}{16}$ ";
Top rail $\frac{3}{8}$ " x $\frac{1}{4}$ " x 2".

Page 20 to read: Enlarge lid top template 200% and lid base template 205%.

Page 21 to read: Enlarge leg template 189%.

Page 37 photo to read: Stanley Carpenters' tape and Lee Valley Woodworkers' tape



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Setting up New Shop

I was delighted to get your Oct/Nov'07 issue (#50). It was especially timely as my old drill was having problems with the batteries. After reading your article on the 14.4 Volt Drill/Drivers I went out and picked up a new Hitachi DS14DL. It sure is a power house!

I recently put up a 12' X 20' shed to be used as my workshop. Not too hard to do with some help from family and good friends. I've still some work to skirt it in, but it's nice to be above ground for once.

My first setback came when



I started to hook up the dust collection system. I got to the point where I stopped trying to adapt, and instead installed a new system. Conclusion – the dust collection system is not that expensive, but hooking it all together is.

My current problem is how to get all of my machines into the available space. But I guess we all need a good challenge once in awhile.

General comment on your magazine – WOW have you ever made some great changes and improvements. It is truly a great read, and Canadian! – Lyn S., Coaldale, AB

• Glad to hear you got a new drill – you're going to need it in your new shop. Regarding your dust collection and space problems, you definitely aren't the only one with those challenges. We're hearing the same types of problems from quite a few of our readers, so watch for upcoming coverage on 'Dust Collection Systems'; and 'Setting Up Your Shop'.

Missing eNewsletter Photos

I love your eNewsletter! I especially like all of the links that take you to the manufacturers' websites, and show you their new tools. The only thing that I don't like is that

Continued on page 47



Busy Bee Tools

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The Well Dressed Board

One of the biggest frustrations faced by novice woodworkers is the acquisition and preparation of lumber for their projects. *Where* you purchase your stock will determine how much work you will need to do before your material is ready to use. *How* you prepare your stock will have an impact on the quality of work that you do.

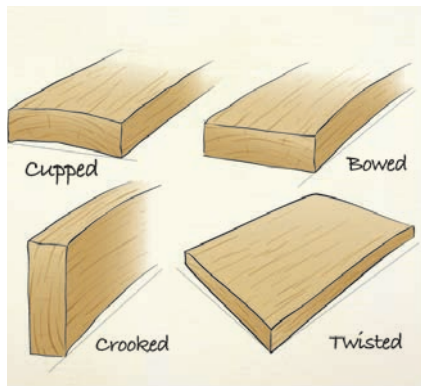


Buy Lumber Dressed or Rough

Woodworkers typically purchase lumber rough or dressed. Dressed boards have been surfaced on two sides (S2S) and sometimes four sides (S4S). They are typically available in $\frac{3}{4}$ " thicknesses and in limited widths and lengths. This can be a good solution if you lack a jointer and thickness planer to dress rough stock. Unfortunately, this also means that you will need to work with the material as you purchased it.

Wood is hygroscopic, which means that the ambient environmental conditions will cause it to move with changes in temperature and humidity. Even though dressed lumber will have left the mill kiln dried, straight and flat, it will still have plenty of opportunities to do the twist before it finally becomes part of your project. It's not unusual to have lumber cup, bow, crook or twist within

a few days of entering your shop. Once the lumber has adjusted to the relative humidity in your shop it will need further milling to make it straight and flat again, further reducing its initial dimensions. A moisture meter will help you determine when your wood is ready to work.



Types of warpage

Rough lumber is typically available in thicknesses from 1" (referred to as 4/4) to 4" (referred to as 16/4). This wide range of thicknesses gives you considerably more control over the final appearance of the wood you will use. As with dressed lumber, rough boards will have been kiln dried, and will likely undergo some movement by the time they are acclimatized in your shop.

The large nationwide building supply outlets typically carry dressed softwood lumber with an emphasis on construction grade stock. You'll find little in the way of hardwood, and what is available is usually highly priced. Local or regional building supply outlets often seem to carry a wider range of lumber, though in fairly limited grades, species and sizes.

Purchasing your lumber from a lumber dealer gives you access to a much wider range of species, grades

and stock sizes. Typically prices will be much lower. Even if there are no lumber dealers in your vicinity, many dealers will ship the lumber to you. The cost of shipping lumber is not as high as you might think, in many cases adding no more than a dollar per board foot to your bill.

You can, of course, purchase lumber from a local sawmill, or mill your own lumber to custom sizes. This will provide you with ultimate control over your stock, giving your work a look that sets it apart. In either case, you will need to stack and air dry the lumber until it dries – usually about one year per inch of thickness. You'll also want to purchase a metal detector and check the lumber for imbedded metal objects.

Ensure Your Machines Are Accurately Aligned

Precise joinery is directly dependant on your initial stock preparation. Following a specific order of operations is critical if you want to end up with stock that is square, flat and the correct thickness. Before you begin preparing stock for a new project take the time to check your machines to be sure they are set up properly. This will include your jointer, thickness planer and table saw. Here is a quick checklist that we run through in our shop before beginning each project. Note that this doesn't replace a regular schedule of cleaning and aligning shop machinery.

- Use a try square to check that the fence on the jointer is square to the table.
- Use a straightedge to check that the outfeed table is even with the top of the cutterhead knives.
- Use a straightedge to ensure that the infeed and outfeed tables on the thickness planer are flush to the bed.
- Use a try square to check that the table saw blade is aligned square to the top.

- Visually inspect the blades on the jointer, planer and table saw to determine whether they need to be honed or re-sharpened.

The following sequence of steps takes you through the milling process in a logical manner.

Step 1 Flatten one face on the jointer.

Step 2 Flatten the other face in the thickness planer.

Step 3 Square one edge on the jointer.

Step 4 Rip the other edge square on the table saw.

Step 5 Cut the ends square on the table saw.

Flatten One Face

To select the correct face to flatten on the jointer, take a look at the board from one end. In almost every case it will exhibit a curve from one edge to the other. This is commonly referred to as cupping. To keep the board stable on the jointer and to minimize waste, joint the concave side first. As with all woodworking, grain direction also plays an important part when jointing a board. Wood fibres are best cut when they are under tension so place the board on the jointer so that the grain leaves the edge of the board in the same direction as the knives are cutting. A board whose fibres are being cut under tension will have a smooth purring sound when feeding the board; milling against the grain direction will result in a harsh sound as if the knives were being hammered into the wood. On some boards it may be difficult to determine the grain orientation, particularly with heavily figured lumber. In such cases run the boards in alternate directions to determine the best direction of cut.

While it does take a little longer, we prefer to make several light passes on the jointer, taking off no more than $\frac{1}{16}$ ", rather than a few heavy ones. It takes a little longer but it provides you with feedback as you progress. If there is a

In the Good Old Days

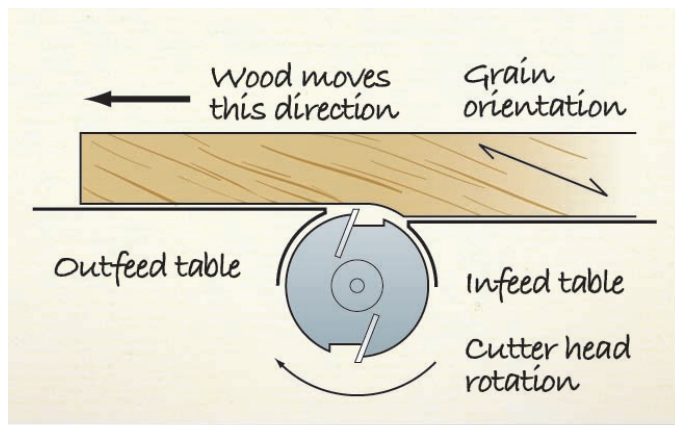
Almost every piece of machinery in a woodworking shop is designed to work with lumber that is straight, flat and square. Before power tools became commonplace in home shops, lumber was dressed with a succession of specialized hand planes. Almost every woodworker these days will opt to dress his or her lumber with a powered jointer and thickness planer. Try dressing 50 board feet of 4/4 cherry for a project using hand tools alone, and the reason will become clear in short order. However, once lumber is dressed you will still need to remove the milling marks – those tiny ridges left by the jointer and planer. Here, of course, is where hand planes shine, and the enjoyment of hand planing truly begins.

fair bit of tear out, reverse the board for subsequent passes. Continue jointing the face of the board until all rough sections have been planed smooth. For the final pass reduce the depth of cut to $\frac{1}{32}$ ".

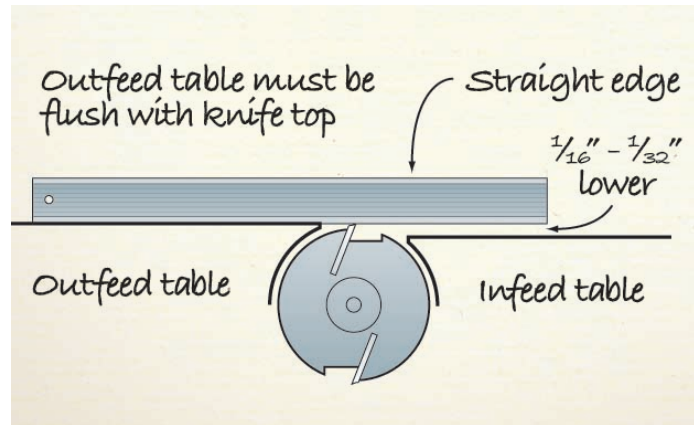
If you are jointing boards longer than about 4', particularly on a bench top jointer or a stationary jointer with a short outfeed table, it is good practice to use an outfeed roller stand.

Flatten the Other Face

The second step is to flatten the other face by running the board through the thickness planer. Many woodworkers often think that a thickness planer can serve both as a jointer and as a thickness planer; this is a mistake that can lead to much frustration later when cutting joinery. To flatten a board, the jointer uses an infeed table that is offset in height from the knives and outfeed table; a thickness



Correct grain orientation when jointing lumber



Jointer outfeed table alignment

planer has a fixed table underneath a set of knives in a cutterhead assembly that is raised and lowered. This assembly exerts enough downward force on the stock so that it will flatten out any bowed or cupped board and dress the one side. After the board comes out of the planer, the downward pressure from the cutter head is removed and the board springs back into its previous shape, albeit with one smooth side. Always flatten one face of your material on the jointer first before heading to the thickness planer. Run the stock through the planer until you have arrived at your desired thickness. If the board is narrow enough you can feed it into the planer at an angle. This helps reduce tear-out on highly figured lumber.

Square One Edge

At this stage you will have a board that is flat and has a consistent thickness from one end to the other. The next step is to head back to the jointer to dress one edge of the board. Determine which direction the grain is running and then run the board over the jointer with one of the finished faces up against the jointer fence. If you have set your fence correctly, when you have milled away the rough edge you should be left with a smooth edge that is exactly 90° to the first two faces.



Check that jointer fence is square



3. Square one edge on jointer

Square the Other Edge

Now head over to the band saw or table saw and rip the boards to width. Check the settings on your saw and be sure that your blade is set to 90° and is parallel to the fence to prevent burning or kickback. Use a good quality blade and rip the pieces to width. You can rip the pieces about 1/16" wider than their final dimensions, and then run these pieces through the thickness planer standing on edge to remove any saw marks. This will also ensure that every piece is exactly the same width as the next. For stock that is less than 1/2" wide run several pieces through the planer side-by-side.

Square the Ends

The last step is to trim the ends square and the boards to length. For this you can either use the mitre gauge or crosscut fence on the table saw, a cross cut sled, or the mitre saw. Depending on what you will be using the wood for, this may be sufficient preparation.

There are, of course, some variations and enhancements to this process. Some woodworkers rough cut lumber to within 1/4" of finished dimension on the band saw before milling the lumber. This reduces the amount of stock that needs to be jointed and thickness planed, and hence reduces the volume of sawdust generated, and lessens the wear on knives.

When milling rough lumber it is good



1. Flatten one face on jointer



4. Rip other edge square on band saw

practice to joint and thickness your stock to within 1/8" or so of finished dimension, sticker it, and then let it acclimatize to the relative humidity level in your shop. This usually takes at least a week. Once the lumber is stable you can then mill it to final dimensions.

Straight, square and flat stock is the foundation that the rest of your project is built on so time spent dressing your stock properly will pay off later during construction and assembly.

Photos taken at Rosewood Studio, www.RosewoodStudio.com, with the help of Vic Tesolin, www.VicTesolin.ca

THE EDITORS

SOURCES

www.BCWLumberandPlywood.com
www.HomeHardware.ca
www.WoodShedLumber.com

RESOURCES

"Choosing Lumber",
 Aug/Sept '06, Issue #43
 "Lumber Measurement",
 Oct/Nov '05, Issue #38



2. Flatten other face on planer



5. Cut ends square on table saw

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Small Stickley Table

Small tables are sensible around the house. They fit unobtrusively in almost any space, and they are easily moved about. This small table is based on the Stickley #658 table from the 1912 Gustav Stickley Craftsman Furniture Catalogue. While it is often referred to as a child's table, it will do just as nicely beside your favorite easy chair, or as a hall table.

To maintain the connection with the Stickley heritage, I made the table out of white oak, but cherry, walnut, or mahogany would look just as nice. The half lap and mortise and tenon joints are not overly difficult and will make for good practice for the novice and intermediate woodworker. I used 5/4" stock for my material. If you choose to use 3/4" stock you will have to make some adjustment to the dimensions in the materials list.

Prepare the Stock

- Choose your widest and best-grained boards and mark them for the top (A), and then select stock for the legs (B), and stretcher (C).
- Rough cut all pieces to about 2" longer and 1/2" wider than finished dimensions.
- Joint and thickness plane the stock to just over 1/8" final thickness.
- Stack and sticker all of the stock for about one week. This will acclimatize the freshly milled lumber to the shop environment and prevent the wood from cupping.

- Once the stock has stabilized mill it to within 1/32" of finished thickness. This will leave room for final smoothing of the surfaces.

Begin at the Top

Mill and glue the stock for the top (A). A top looks more balanced if the boards are all approximately the same width. Match the grain as close as possible and use a 'cabinet-maker's triangle' to note the sequence of the boards. Take a practice run clamping the top up to make sure everything fits well. It is always better to discover problems now as opposed to when the glue is starting to set.

- Once the glue has dried place the tabletop face down on your bench. Mark the center with a pencil.
- Hammer a 3/4" nail through a scrap piece of 2" x 12" plywood. Drill a hole just big enough for a pencil lead about 9 3/4" from the nail. This will give a tabletop diameter of 19 1/2".
- Tap the nail into the pencil mark on the tabletop and draw a circle.

- Cut out the top with the band saw or a jig saw, making sure to stay about 1/16" from the line.
- Smooth the edge. I used a Stanley #113 circular plane and a low angle block plane to clean up the cut. You could also use a belt or disc sander or a circle cutting jig and a router with a straight bit.

Mill and Assemble the Legs

In order to get four matching faces on the legs, I used a technique called quadrilinear construction. This entails taking four slats, ripping the sides at 45°, and gluing them back together. For this operation you'll get best results using a high hook angle, alternate top bevel 40 tooth or higher blade, such as the Freud Premier Fusion. For safety use a push block and feather boards. If you are uncomfortable cutting the leg slats on a table saw, mill them on a router table using a lock mitre bit.

- Use pencil or chalk to mark all of the 'good'

faces on the leg slats (B). You will need sixteen slats plus a few extras for test cuts.

- Tilt the table saw blade to 45°. You only need to extend the saw blade 1 ½" or so above the table top. Set the rip fence so you will remove only the smallest amount of waste. Rip an edge off two of the test slats. Fold them together to form a 90° corner. If you see any daylight around the square at all, readjust the angle of the blade until the corner is perfectly square.

- Rip one edge on all 16 of the leg slats.

- Measure 2 ¼" across the good face of a test piece. With a sharp pencil mark a 45° angle across the end of the board. Use this mark to establish the fence position on your table saw for the width of the leg slats.

- Rip the second edge on all 16 leg slats.

- Lightly clean up the sawn edges with a hand plane or on a jointer.

- On your bench, place sticky side up, two pieces of ¾" x 16" masking tape. The pieces of tape should be about 12" apart.

- Brush glue on the bevels of the first leg slat. I like to use a slower setting glue, like Titebond III, as assembly takes a bit of time.

- Lay the slat on the tape, perpendicular to it, with about 2" of the tape ends showing on the left side of the leg.

- Spread glue on three other leg slats.

- Butt them side-by-side on the tape.

- Roll the slats together to form the leg.

- Wrap the leg tightly four or five more times with additional masking tape, making sure that the corners are square. Using the masking tape is great because there is no need for any

clamps. I don't use splines or biscuits because a long grain glue joint is stronger than the wood. As well, if you butt the slats up tightly, alignment is not an issue. You could also use surgical tubing available from Lee Valley to clamp the legs.

- Repeat this for the other three sets of slats to form four table legs. Allow the legs to dry overnight, and then remove the tape.

Mill the Stretchers

- Rip the stretchers (C) to width. I like to clean up all of the sawn edges with a hand plane.

- Crosscut the stretchers to finish length.

- Mill a half lap joint centered on the stretchers. I cut the sides of the joint on the table saw, and then use a mallet and chisel to cut out the waste. Take your time cutting the half lap joint, as you want the pairs of stretchers to fit together snugly. If the top edges of the two stretchers are at different heights (the top stretcher is higher), chisel the bottom of each lap slightly until they are flush. If the top stretcher is lower, insert a thin shim to bring them flush. Set them aside for the time being.

Cut the Through Mortises First and Then the Tenons

When doing any type of mortise and tenon joint, I find it best to start with the mortises. You can always trim a tenon to fit a mortise, but it is a pain to try to fit a mortise to a tenon.

- Crosscut the legs to final length.

- Mark out the mortises on both the face and back of each leg. The mortises are ½" x 1 ½".

You can use a mortise gauge or a ruler and marking knife to lay out the mortises. A knifed line will register a chisel much better than a pencil line.

- Cut out the mortises. I don't have a mortise machine, so I used a combination of drill press and chisels for the job. I drilled out the majority of the mortise at the drill press, drilling from both sides so that I didn't blow out the grain on the opposite face. I then used a wide chisel (for the sides of the mortise), and a ½" chisel (to square up the ends).

- Use a mortise gauge or a marking gauge to lay out the tenons on the ends of the stretchers. The tenons are ½" x 2 ½".

- Using your preferred method (table saw, band saw, or hand saw) cut out the tenons. I like to cut them slightly 'fat' so that I can do some hand fitting with a rabbet or shoulder plane to give them a perfect fit. They should fit into the mortises with moderate hand pressure.

- After all of the tenons have been fitted, mark a line ⅛" from the very end of the tenon all the way around. Use a chisel or disc sander to cut a decorative chamfer on the end of each tenon.

Saw Blades That Make a Difference

There are dozens of different kinds of table saw blades on the market. While the professional woodworker may need to have half a dozen or more



Freud Premier Fusion blade

diverse types of blades on hand, the home hobbyist or woodworking enthusiast can get by with one or two blades. The most practical blade for the home workshop is a combination

blade – it does double duty ripping and crosscutting stock. If your woodworking budget is a bit more flexible, then consider purchasing a second combination blade, such as the Freud Premier Fusion, with a Hi-ATB tooth configuration and a high hook angle, and use it for your finishing cuts. These blades give a superior crosscut finish and a noticeably better rip finish. They also significantly reduce chipping on sheet stock and veneers. The teeth on a Hi-ATB blade have a high bevel angle that increases the knife-like action at the edge of the blade, while a high hook angle allows for a fast feed rate, particularly when ripping wood along the grain. Having two combo blades means you'll go a longer time between sharpening, and your finish cuts will look much better.

Finishing and Assembly

It is usually much easier to apply your finish on as much of the project as possible before assembly. This reduces the likelihood of vertical runs and eliminates hard-to-reach corners.

- Sand or plane the legs and top smooth.
- Use a block plane or 180 grit sandpaper to break all of the edges. As well, put a ⅛" chamfer on the bottom of the legs. This will keep them from splintering if the table gets dragged across the floor.

- Tape off the tenons except for the first ½", which will be exposed on the outside of the leg mortises.

- Apply a stain if you want to use one. I used a combination of roofing tar and mineral spirits to stain the table. I think it really brings out the grain of the white oak.

- Apply a topcoat. For Mission style projects other than dining or kitchen tables, I like to use orange shellac as a



topcoat. I lay on about 12 coats while lightly scuff sanding with 320 grit between coats. Shellac dries very quickly so don't linger too long in one spot. Any marks will be dissolved with the next coat

- Join the two pairs of stretchers together.
- Put a light skim of glue on the tenon only. Do not put any glue on the first 1/2" of the tenon.
- Place two legs on opposite ends of the stretchers and pull them together. If any resistance is met, use clamps to pull the legs onto the tenons. Repeat the process for the other two legs.
- Fasten the top to the upper stretchers with figure eight fasteners (available from Lee Valley). They will allow the top to expand and contract with seasonal changes.

When all of the assembly is done, I like to give my furniture a coat of wax. It brings out the depth, protects from small scratches, and makes dusting easier. Now that the table is done, sit back with a cup of tea and your latest copy of Canadian Woodworking Magazine and admire your craftsmanship.



DERRECK BRYANS
derreckbryans@yahoo.ca

SUPPLY CHECKLIST

- 13 BF 5/4 hardwood

SOURCES

LUMBER

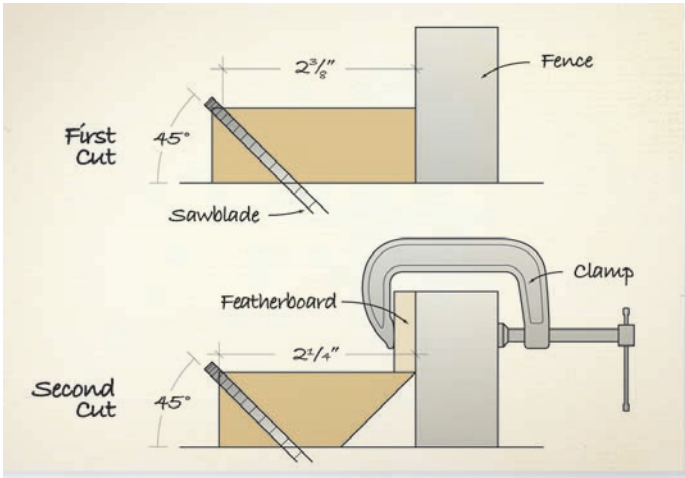
www.BCWLumberandPlywood.com
www.WelbeckSawmill.com
www.WoodShedLumber.com

FASTENERS

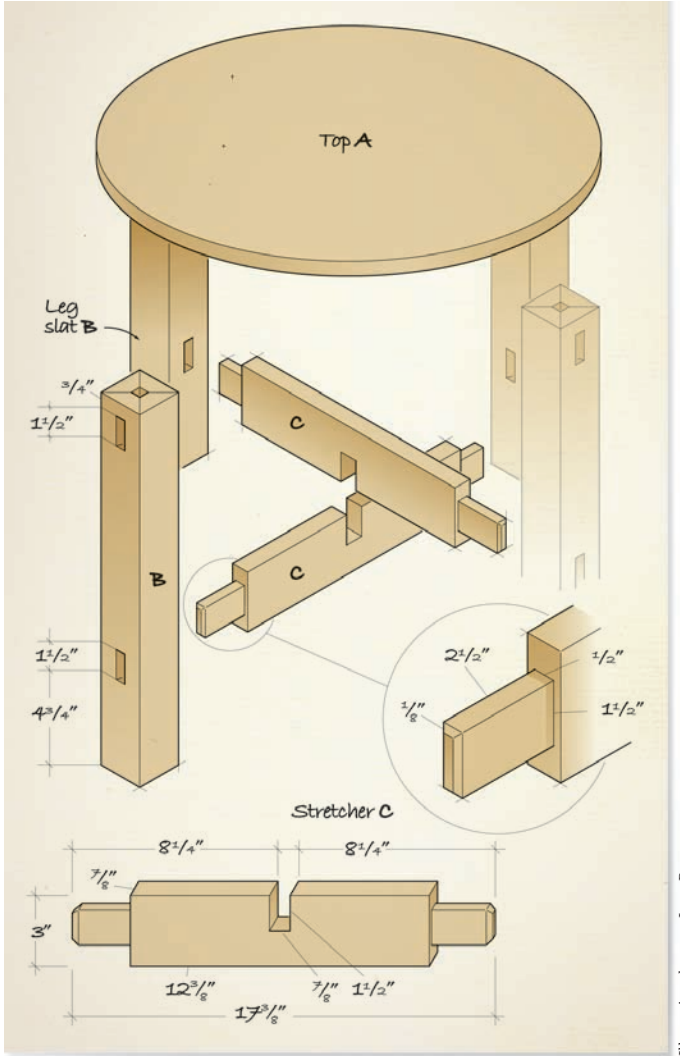
www.LeeValley.com
FREUD SAW BLADES
www.HouseOfTools.com

RESOURCES

Router Trammel Jig, Aug/Sep '07, Issue #49
Wood Finishing: Shellac, Feb/Mar '04, Issue #28

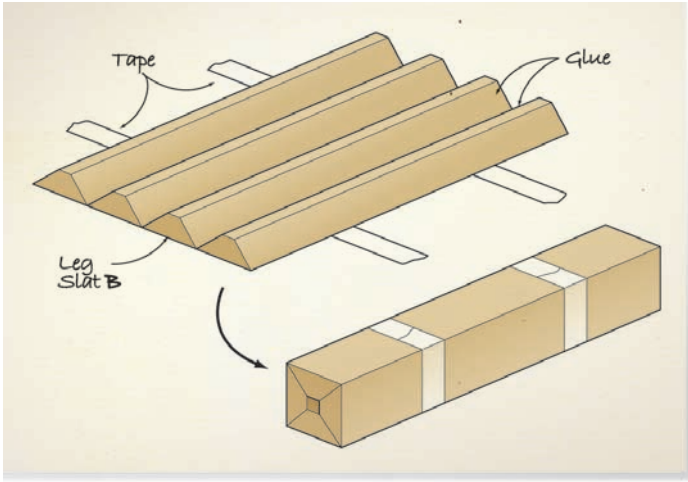


Slat cutting sequence



Illustrations by www.JamesProvost.com

MATERIALS LIST (All dimensions are in inches)				
Part	Qty	T	W	L
A Top	1	7/8	19 1/2	19 1/2
B Leg slats	16	7/8	2 1/4	18 3/4
C Stretchers	4	7/8	3	17 3/8



Leg assembly



Remark**able**.

Dur**able**.

Port**able**.

Able
to do it all.



Smart Guard System
Modular blade guard, riving knife and anti-kickback pawls



Digital Measuring Display
Precision LCD gauge accurate to 1/32" or 0.5mm



Gravity Rise™ Stand
Sets up and breaks down in seconds



SquareLock™ Rip Fence
Engineered for maximum trueness



Integrated Sub-Base
Handles rugged jobsite abuse to extend tool life

The All-New 4100 Series Portable Jobsite Table Saw:
Cutting-Edge Precision – Anywhere you Want It.
Workshop Performance For Jobsite Demands.



BOSCH
Invented for life

Versatile Hand Tool Display



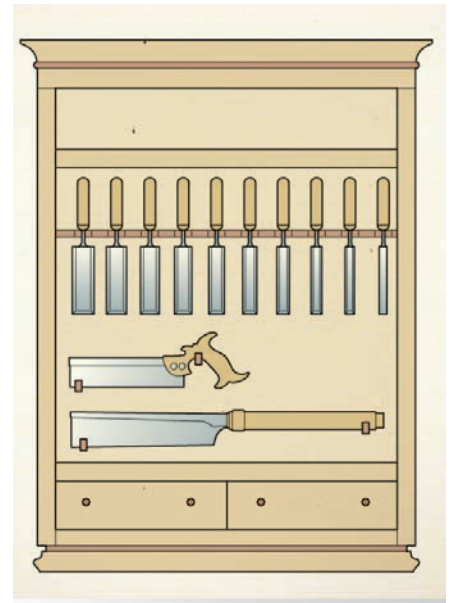
Some tools are best kept tucked away – they work, but they are hardly things of beauty. Other tools cry out to be displayed, as they are far too elegant or beautiful to be concealed in boxes and drawers.

I built this particular tool rack, not only to store, but to display those hand planes that I use on a regular basis in my shop. The design can be easily modified to display chisels, hand saws, or other hand tools that you wish to display. The rack is essentially a frame with five shelves, and a back. I dressed up the sides of the frame and the front of the shelves with some moulding. There are two boxes on the bottom shelf for assorted small parts and accessories. A shiplap back adds structural integrity to the frame and gives it a finished look. Two cleats on the back hold the rack

securely to the wall. I finished the various pieces of the tool rack with a durable, easy-to-apply Paste Varnish from Circa 1850 before assembly. Following this up with a coat of wax gives the entire project a soft, hand rubbed sheen.

Placement of the shelves depends on the assortment of hand planes that you'll store on the rack. You might not want the shelves exactly where I located them, so arrange your planes on a work table, measure the amount of space you'll need between each shelf, and then transfer the measurements to the rack sides.

A number of the pieces in this project are joined with dowels. I strongly recommend that you use a dowelling jig to ensure accuracy in drilling the dowel holes. I used the Dowelmax jig, but you



could just as easily use another model, such as the Veritas Dowelling Jig. There are a number of possible joinery options for the frame, drawers and back on this project; choose one based on the tools you have.

Start With the Shelves

Begin by milling the stock for the top and bottom (A), sides (B), and shelves (C), as they are of the same thickness and approximate width. Mill the boards to their final thickness and width, but leave a little extra length that you can trim to fit later.

- Clamp the five shelf pieces together so that all the front edges are exposed, secure them in your work bench vise, and hand plane or sand them flush with each other. If you don't have a vise, clamp them to the fence on your table saw for stability. This helps keep the shelves level and square while you're working on them.

- With the front edges flush, set up a $\frac{1}{4}$ " slot cutter in the router table and cut a $\frac{3}{8}$ " deep centered groove along the front edge of all the five shelf pieces to receive the beaded trim (O).

- Using a dowelling jig, drill two holes in the end of each shelf. Later drill matching holes in the sides, and use dowels to attach the shelves to the sides.

To keep the planes from accidentally being knocked off the rack there is a small raised lip at the front of each shelf that is $\frac{1}{8}$ " high and $\frac{3}{16}$ " wide. Simply attaching a small strip of wood to the front of each shelf would have left a visible joint. I decided to cut a wide rabbet on the top of each shelf, leaving a narrow lip at the front.

- Set your jointer fence to make a $3 \frac{5}{16}$ " wide cut at $\frac{1}{8}$ " depth. Because the lip is very narrow, you need to cut the rabbet in one pass at full depth. Use a piece of scrap wood to test the width and depth of the cut.

- Now run the top face of each shelf

The day I started this project the new Leigh Super Jig arrived. I couldn't resist using it to cut the dovetails that join the sides to the top and base. The Leigh jig allows variable spacing of the pins and tails so that they can be laid out on any width of stock. Keep in mind that some jigs with fixed spacing will require you to adjust the width of the stock for evenly spaced through dovetails. The Leigh Super Jig is surprisingly easy to use and quite affordable.

In the next issue we will be looking at dovetail jigs in greater detail.



Routing dovetails

on the jointer, removing $\frac{1}{8}$ " of material. The jointer will likely leave behind some fine milling marks – gently sand the top of each shelf with 180 grit sandpaper to remove the marks. A $\frac{1}{4}$ sheet sander works well here, as it can get flush up against the lip.

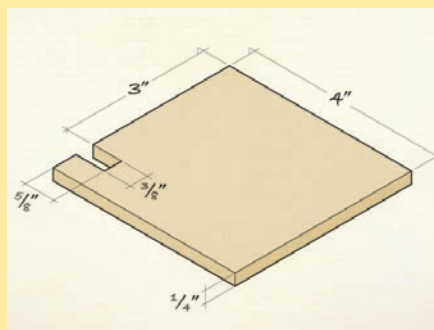
- At this time also drill a series of $\frac{1}{4}$ " dowel holes spaced about 3" apart, across the bottom of the top (A) and the back of the bottom shelf (one of the C pieces). Later you will attach the upper cleat (P) to the top piece, and lower cleat (Q) to the bottom shelf. Off set the holes on the bottom shelf so that there is room for the back to rest against the bottom shelf.

Join the Sides to the Top and Bottom

I joined the top, bottom and side pieces that make up the frame with dovetails. If

The Marking Jig

To transfer the location of the groove in the front edge of the shelf to the sides accurately, make a simple jig out of a piece of $\frac{1}{4}$ " Baltic birch plywood about 4" x 5". Cut a notch on one end and place it over the side of the rack until the edge slips into the groove on the shelf. Use a pencil to transfer the location of the groove to the outside face of the sides.



What type of finish should I use for my latest project? There are just too many options at the hardware store.

Choosing the best finish is often a matter of personal preference. Although some woodworkers have favorite finishes, the same finish is not always appropriate for each project. The best way to narrow down your choices is to evaluate the specific project based on the **look and feel** you'd like to achieve, as well as figuring out how much **protection** it will require.

Oils are penetrating finishes that produce a soft, natural look. They bring out the nuances of the wood grain, while keeping it from drying out.



Oils are easy to apply, but offer less protection than varnishes.

Varnishes and polyurethanes



create a very hard, durable finish, and come in a variety of lustres. As they provide the best protection, they are ideal for most high-traffic projects. However, they can give the look and feel of a coating.

FOR MORE INFORMATION ON FINISHING, CONSULT THE EXPERTS ON OUR INTERACTIVE FORUM AT WWW.CIRCA1850.COM

you don't have a dovetail jig, or aren't proficient cutting dovetails by hand, choose a different joinery method. An easy and simple way is to dowel the top, bottom and sides together. Miller Dowels are stepped dowels that offer considerable holding power and come in a variety of wood species. You could also use a dowel of a contrasting colour for a decorative effect on the rack sides. A milled corner joint can be cut on the table saw, while you can cut the mitre lock joint on a table mounted router with the mitre lock bit. Choose a method that suits your skill level and the tools you have available. If you choose a different method you will need to modify the length of the top and bottom pieces.

- Once you have decided on the type of joinery method, use the table or mitre saw to trim top and bottom pieces to final length, then mill the joints.
- Dry assemble the frame, applying clamps to bring joints tight together.
- Measure the inside opening and trim the five shelf pieces for a perfect fit.
- Mark out on the side pieces where you want the shelves to be located. Using a drill press or a dowelling jig drill the dowel holes in the sides.
- You need to rout a stopped $\frac{1}{2}$ " x $\frac{3}{8}$ " rabbet on the inside back of each side piece (B). Place pencil marks $2\frac{1}{2}$ " in from each end of the sides, and trace the marks across the outside faces. You'll rout the space *in between* these two marks, and then square up the corners with a chisel. Clamp a stop block on the router table fence to limit the cut. Exercise care when you lower the side pieces onto the router bit, and when you reach the stop block, brace against it and raise the piece.
- Dry assemble the frame and check to see that everything lines up.

Rout Grooves for the Side Inlay

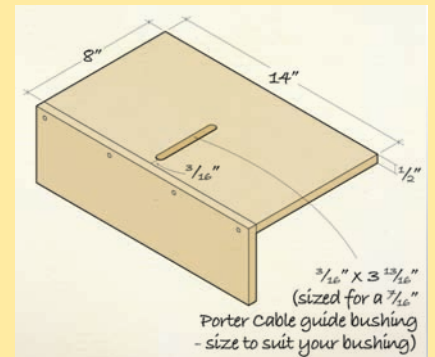
The beaded walnut pieces (U) on the sides give this project a unique look. They are not necessary, but if you have a bland piece of wood like the maple I chose, it dresses it up. These are not large pieces so working with them safely requires using several jigs, which are quick and easy to assemble, and make the job safer and more accurate.

- With the frame still assembled, use the marking jig to transfer the location of the groove that you cut on the front of each shelf to the outside face of both side pieces. Use a sharp pencil and transfer both sides of the groove.



The Dado Jig

Routing a dado across a board requires complete control over the router. Because the bit will be cutting on all sides, it will tend to want to pull in one direction. The best way to control this cut is to use a guide bushing in a jig that confines the movement of the router to the area being cut. When you make the jig, it is critical that the fence be square to the guide-way so follow these instructions carefully. In order to be able to rout the dado square to the fence in the middle of this jig base I found it easier to cut the base into three pieces, mill the dado, and then re-assemble the base.



- Cut a piece of $\frac{1}{2}$ " x 8" x 14" Baltic birch plywood into two 8" x $5\frac{1}{2}$ " and one 8" x $2\frac{3}{4}$ " pieces.
- Select a router bit with the same diameter as the guide bushing you will use and install it up in a router table. Set a fence with end stops and cut the guide path in the smaller center piece. If you have a large router table top you may find it easier to cut the top piece of the jig into three parts, mill the slot, and then join the three pieces back together. Biscuits or dowels will aid in rejoining the pieces.
- Use a dowelling jig to drill dowel holes to join the three pieces into one again. Drill dowel holes across the front edge of the two side pieces.
- Mill a piece of hardwood for the fence and cut it to the same length as the three assembled sections. Drill dowel holes and attach it to the base.



- Disassemble the frame, clamp the side pieces to your workbench, and then place the dado jig over the side. Line it up visually so that the pencil lines are centered in the guide way.

- With a $\frac{7}{16}$ " guide bushing installed on router base, put a $\frac{1}{4}$ " spiral bit in plunge router, set the depth to allow for a $\frac{1}{4}$ " deep groove, and rout the dado. Repeat this for the other nine grooves.

Shiplap Back

The back of this cabinet is made of individual boards re-sawn from 4/4 stock on the band saw and milled to a thickness of $\frac{3}{8}$ ". The shiplap configuration of these boards allows for seasonal expansion and contraction. This is similar to what you would achieve with a tongue and groove set for the router, but in this case the stock is too thin so a different approach is needed.

- Mill the narrow back boards (D) and wide back boards (E) to size.
- Place boards on your bench and arrange in order for the best appearance.
- Install a rabbeting bit in your router table and set the bit and fence to cut a $\frac{3}{16}$ " by $\frac{3}{16}$ " rabbet. Once you have set the depth of the cut, increase it by $\frac{1}{64}$ "; this will insure that there is a slight gap between the rabbets when assembled.
- Cut a rabbet on front of board on one side and then flip the board over and



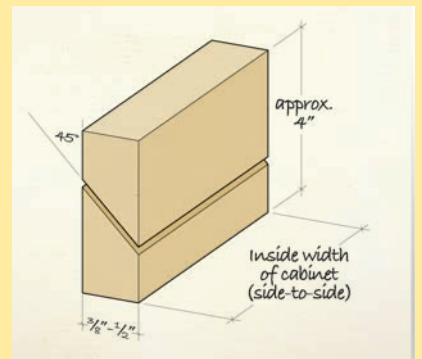
Marking jig in use



Dado on shelf edge

French Cleats

I wanted to attach this rack to the wall in a manner that would enable me to easily remove it in the future, and I didn't want any screws to be visible from the inside of the rack. Recessed keyhole hangers are one option, but nothing can beat using a French cleat for simplicity. A recessed and housed cleat such as the one I used here will positively lock a heavy cabinet in place and make it impossible to accidentally knock it from the wall. French cleats can be made in any size to suit the dimensions of the project at hand and installation and levelling them during installation is a breeze.



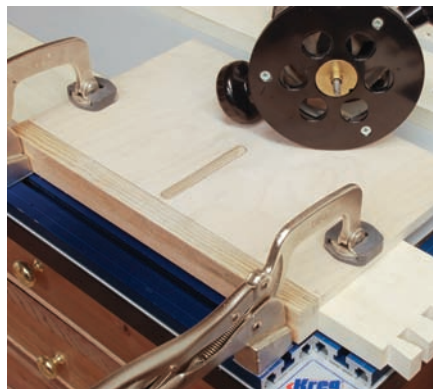
- Mill a strip of wood to thickness, length and width. Cleats are typically between $\frac{3}{8}$ " and $\frac{1}{2}$ " thick.
- Tilt your saw blade to 45° and rip the piece in half lengthwise.
- Fasten one piece to the back of the cabinet with the bevel facing down and towards the cabinet back.
- Countersink a couple of screw holes to line up with the location of the studs where the cabinet will hang and fasten the other half of the cleat to the wall with the bevel up and facing the wall.
- To hang the cabinet, place it over the wall mounted cleat.

rout another rabbet on the back side.

- To dress up the edges to look like a tongue and groove joint, install a sign cutting V-groove bit in the router table. Set the projection of the bit from the table and fence to cut a slight chamfer on both sides of the front face. Normally this would be done with a chamfer bit

and this would work on one edge, but this bit would not be able to chamfer the area next to the rabbet. If you don't have a sign cutting bit you can use a hand plane to form the edges.

- Confirm the exact measurements of the top shelf rear panel (F), mill the stock to size, and cut it to length.



Dado jig in use to rout dados on sides



Completed dado on side



Top and bottom cleats



Back shelf ready to receive bottom cleat

- Sand the pieces and finish them with Circa 1850 Paste Varnish.

The Ornamental Bits

The moulding is milled in sections and then applied in sequence to complete the final look. Building up complex moulding profiles from individual pieces allows greater creativity than dedicated bits. This method also allows you to use common bits that you already have instead of purchasing expensive ones you may only use infrequently. Because you'll be working with small pieces it's a good idea to use feather boards and a push block.

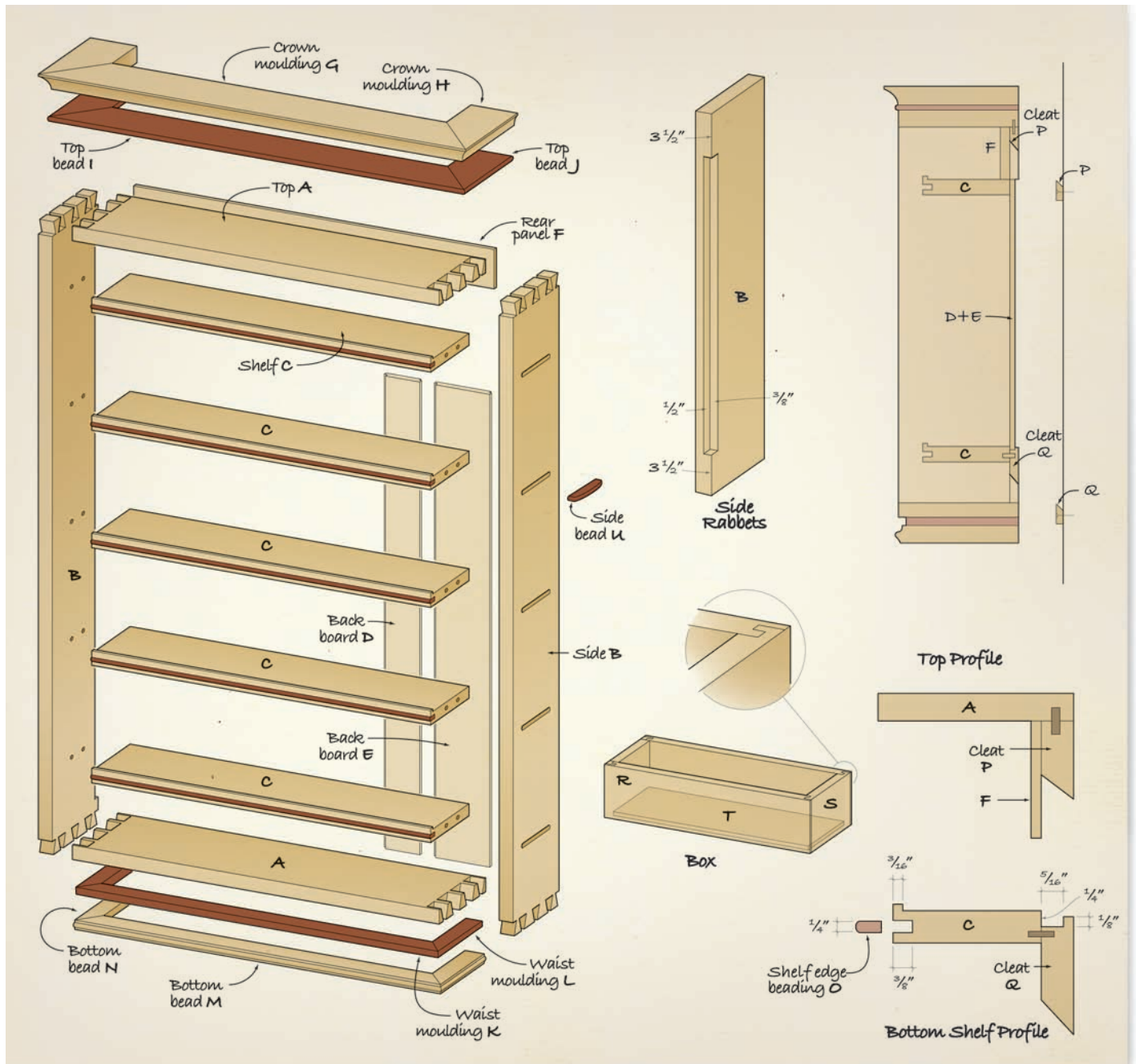
- Mill extra long blanks for the crown moulding (G, H), top bead moulding (I, J), waist moulding (K, L) and the bottom bead moulding (M, N) and then cut them into sections before installation.

- For the crown moulding, install a $\frac{3}{4}$ " cove bit in the router table with a fence. Set the fence for a full width cut, but only raise the bit about one third of the way and make the first cut. Look at the finish of the cut and adjust your bit speed and feed rate to provide a perfect surface. Raise the bit a little more and make another pass with the new setting. Look at the results and adjust again if necessary. Leave just a small cut for the last pass and you will not have any

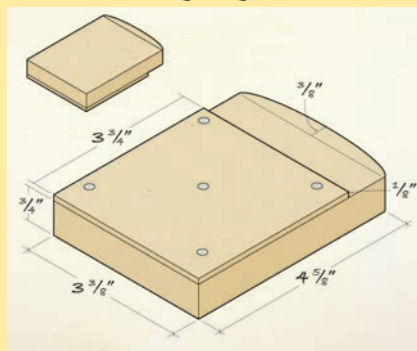
sanding to do. Cherry and maple burn very easily and this is a simple way to produce a perfect cut and eliminate the tedious sanding.

- To cut both the top and bottom bead moulding, set up a canoe bit in the router table. Walnut machines beautifully and the piece can be cut in one pass, but if you expect any problems with the maple, make the first cut just shy of full depth. Follow up with a final light pass.

- I decided to embellish the waist moulding by dimpling the surface with a Beebe micro scorp. Clamping the moulding to the workbench and casting a raking light across the surface of the piece makes the carving process easier



The Routing Jig



Routing small pieces can be dangerous if done without proper precautions. This simple jig will make it easy to rout the side bead pieces (U). The pieces are held on the jig with two-sided tape. To provide sufficient surface for the tape to hold the pieces while shaping them on the router, we leave pieces a bit wider and then trim them to their final size later on the trimming jig.

- To ensure a perfect fit in the groove, use a digital caliper to measure the length of the grooves cut in the sides; use this measurement as the width of the top piece of the jig (in my case it was exactly 3 5/8").

- Cut two pieces of Baltic birch; one 3/4" x 3 5/16" x 4 5/8" and one 1/4" x 3 3/4" x 3 5/8".

- Use a band saw or scroll saw to cut a 3/8" deep arc across the top of the piece and smooth the curve on a disc sander.

- Use some #6 FHWS to attach the smaller piece to the bottom of the larger piece, centered on the width.



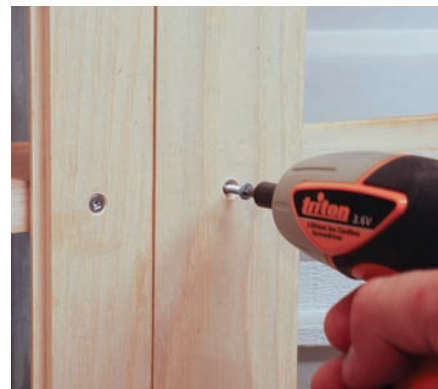
Back cleat installed



Trimming jig in use



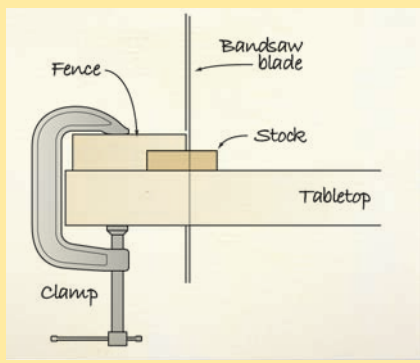
Routing profile on walnut moulding



Back being installed

The Trimming Jig

Once you've routed the side bead pieces, you need to trim them to their final width. To make this procedure safe, cut a 1/4" deep, 3/8" wide rabbet on the bottom edge of a 2" x 2" x 14" sacrificial fence for the band saw. Clamp this to the band saw table and seat the blade into the edge of the fence so it is flush with the edge. Run the pieces through the jig using a push stick with the waste to be cut off in the rabbet.



MATERIALS LIST (All measurements in inches)

Part	Qty	T	W	L
A Top/bottom	2	3/4	4 3/16	21 1/4
B Sides	2	3/4	4 3/16	33
C Shelves	5	3/4	3 1/2	21 5/8
D Narrow back boards (a)	5	5/16	1 7/8	25 3/4
E Wide back boards (a)	6	5/16	2 7/8	23 3/4
F Top shelf rear panel (a)	1	1/4	2 1/8	21 5/8
G Crown moulding front	1	7/8	2 1/2	24 1/2
H Crown moulding sides	2	7/8	2 1/2	4 3/4
I Top bead front (w)	1	1/4	2 1/8	23 13/16
J Top bead sides (w)	2	1/4	2 1/8	4 3/8
K Waist moulding front (w)	1	1/2	7/8	22 3/4
L Waist moulding sides (w)	2	1/2	7/8	3 15/16
M Bottom bead front	1	3/8	1 1/8	23 1/8
N Bottom bead sides	2	3/8	1 1/8	4 1/8
O Shelf edge beading (w)	5	1/4	7/8	21 5/16
P Upper cleat	1	1/2	2 5/8	21 1/16
Q Lower cleat	1	1/2	2 1/8	21 1/16
R Box fronts/back (a)	4	3/8	2 1/8	10 3/4
S Box sides	4	3/8	2 1/8	2 3/4
T Box bottoms (bb)	2	1/4	2 1/2	10 5/16
U Side bead pieces (w)	10	1/4	7/8	3 3/4

All stock is maple except: (a) ash; (w) walnut; (bb) Baltic birch ply

on the eyes. Optionally you can leave the waist moulding surface flat.

- Mill the stock for the shelf edge beading (O) to size leaving it a little long and rout a 1/4" bead on one edge. Trim these pieces to the proper width, sand them, and apply varnish.

- Mill the blanks for the upper (P) and lower (Q) cleats. Using dowel centers or your dowelling jig, drill a row of dowel holes across the top edge of the upper cleat to correspond with the holes in the underside of the top. Drill a series of dowel holes in the front of the lower cleat, along the upper edge, to correspond with the holes in the bottom shelf. Use the table saw to cut a shallow rabbet on the upper edge of the lower cleat to hold the back boards.

The Boxes

The two boxes on the bottom shelf are simple to make using a router table, a small drawer lock bit, and a piloted drawer bottom bit.

- Mill the material for the front/back (R) and sides (S) to thickness, cut the pieces to length and then install a small drawer lock bit in the router table and cut the corner joints.

- When the joints for the corners have been cut, set up a piloted drawer bottom bit and clamp the drawer together. Run the piloted drawer bottom bit around the inside of the box to create the groove for the bottom.

- Cut the piece for the bottom (T) and round over the corners so it will fit easily into the groove. Fit the box together and if everything is ok, apply glue and clamp it up.

- When the glue has cured, remove the clamps and sand the outside of the

boxes. Drill two holes in each box for the knobs and then apply a couple of coats of varnish to the exterior. When the varnish is dry, install the knobs.

Finish and Assemble the Frame

The paste varnish that I used on this project is easy to apply, but the trick is to apply the finish to various areas before you assemble the project. Begin by taping off any areas that will be glued. Paste varnish is easy to apply and dries fairly quickly. Once the first coat is dry apply a second coat.

Set up the clamps you will need ahead of time and have everything you need prepared. Because there are many areas that are to be glued, choose a glue like Elmer's ProBond with more open time to allow a less rushed assembly. You will need twenty 3/8" x 1 1/2" dowels for the shelves and twelve 1/4" x 1 1/2" dowels for the cleats.

- Apply glue to the dowel holes and insert the dowels in the shelf pieces. Use a clamp across the length of the shelf to force the dowels completely into the holes; if they lock in place before being completely seated, you will be unable to assemble the shelf.

- When all of the shelves have been prepared, apply glue to the dowel holes in one side. Insert the shelves into the holes and seat them properly.

- Glue the frame pieces together. If needed, use a scrap of wood and a dead blow mallet to drive the pieces home and then clamp them and check the diagonals for square.

Final Assembly

- Remove the clamps from the glued-up

section and scrape off any excess glue. Sand the outside of the shelves and the front edges, and then apply a couple of coats of varnish.

- Cut the front section of the top bead to length using a 45° cross cut sled on the table saw. Leave the side pieces a little long for now.

- Use a brad nailer to fasten the front piece in place and then fit each side piece in turn. Use a marking knife to mark the back edge of the cabinet on the side pieces and cut them to length on the table saw. Fasten these in place with brad nails.

- Repeat these steps for the crown and the waist moulding.

- Use some painters tape to protect the surface of the shelf and apply glue to the dowel holes in the bottom shelf and the cleat. Insert the dowels and clamp the cleat to the back of the shelf.

- Turn the shelf upside down and apply glue to the dowel holes in the underside of the top as well as the holes in the upper cleat. Clamp this until the glue sets.

- Mark the center of the shelf on the lower cleat; also mark the center of the middle back board. Set the back board in place and line up the two marks; drill countersunk pilot holes through the board and into the second and fourth shelves and use two #6 flat head wood screws (FHWS) to attach each board.

- Add additional boards to either side until the entire back is covered. Trim the two outer boards to width on the table



SUPPLY CHECKLIST

- 10 BF Maple
- 7 BF Ash
- 3 BF Walnut
- 1/4" Baltic birch
- Drawer knobs
- 1/4" and 3/8" dowels
- varnish, wax
- #6 flat head wood screws

SOURCES

www.Circa1850.com
www.Dowelmax.com
www.Elmers.com
www.HomeHardware.ca
www.LeeValley.com

RESOURCES

Dowelling Jig Review,
Feb/Mar '02, Issue #16

saw to fit the remaining space.

- Mill the 1/4" bead on the front edge of the shelf bead pieces, cut them to length and install them on the shelves.

The Side Bead Pieces

- Prepare the blank stock for the side bead pieces (U) in one long strip and cut the strip into ten sections 1/8" wider than the routing jig.

- Apply some double-sided tape to each strip and press a section onto the jig. Then use a band saw or a scroll saw to cut the section to the profile of the arc on the jig, staying about 1/8" away from the jig.

- Install a piloted 1/4" bead bit in the router table and rout the bead on the two ends and the front of the side bead pieces. The blank piece fits to the front of the jig and the piloted beading bit follows the curve on the front edge of the jig. The blank overhangs the jig on three sides and these are the sides that are routed.

- Place the trimming jig on the band saw and trim the pieces to 1/2" wide, 1/4" to be housed in the dado and the 3/8" curved projection. Sand and finish these pieces before gluing them into the grooves. Repeat this for all ten sections.

Give the entire project a coat of wax and then hang it beside your bench. You'll have your planes displayed in an elegant way right where you will need them and your workmanship will be on display for visitors to enjoy.



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Video Game Holder

Illustration by Mike Del Rizzo

Here is an easy to build and smart looking unit. It will store all those messy game boxes lying around the living room, stuffed into various drawers, or scattered on bookshelves.

I used cherry for the uprights and the top, mahogany plywood for the bases, and walnut for the base trim and the separator in the uprights. I own an XBOX, so the measurements that I used are for that size storage box; adjust yours to suit.

A Thick Top Gives Visual Weight

- Mill a piece of 1" cherry for the top (A). This will give visual weight to the project. If you don't have 1" stock you can glue together $\frac{3}{4}$ " and $\frac{1}{4}$ " pieces.
- Cut mortises in the bottom side of the top to accommodate the uprights (B). The mortises are $\frac{1}{4}$ " x $\frac{1}{2}$ " x $2\frac{1}{4}$ ". You can chop them out by hand, rout them, or use a mortiser.
- Install a 45° chamfer bit in the router table and cut a chamfer first on the ends and then on the sides of the top piece. Any chipping on the end grain will be removed when you rout the sides. I used a $1\frac{3}{64}$ " chamfer bit; select any bit that gives a pleasing edge profile.

Laminated Uprights Add Visual Interest

- Mill the four pieces for the uprights (B) and the separator strips (D), making sure to leave enough material for the tenons at either end.
- Mark the location of the slots for the games on the stock. The first slot is $1\frac{1}{4}$ " from the bottom so that the bottom game will not hit the base. This allows for a total of 13 slots spaced $\frac{1}{16}$ " apart. The separator strips will keep the game boxes from pushing each other out the opposite side.
- Install a dado blade on the table saw to cut $\frac{5}{8}$ " dados on the uprights.
- Set the mitre gauge to 10° and cut the slots for the games to sit in.
- Glue and clamp the uprights and separators together taking care that the slots are aligned.
- Once the glue has dried install a $\frac{3}{8}$ " round over bit in the router table and round over the outer corners of each upright.

- Cut $\frac{1}{4}$ " x $\frac{1}{2}$ " x $2\frac{1}{4}$ " tenons on the end of each upright.

A Rotating Base Makes For Easy Access

- Mill two pieces of $\frac{3}{4}$ " mahogany plywood for the bases (C).
- Cut $\frac{1}{4}$ " x $\frac{1}{2}$ " x $2\frac{1}{4}$ " mortises in one of the bases to accommodate the uprights (B). To make the holder look a bit more interesting I cut the mortises on the diagonal.
- Glue the walnut edging (E) to the bases.
- Round over the upper edges using the same round over bit as on the uprights.

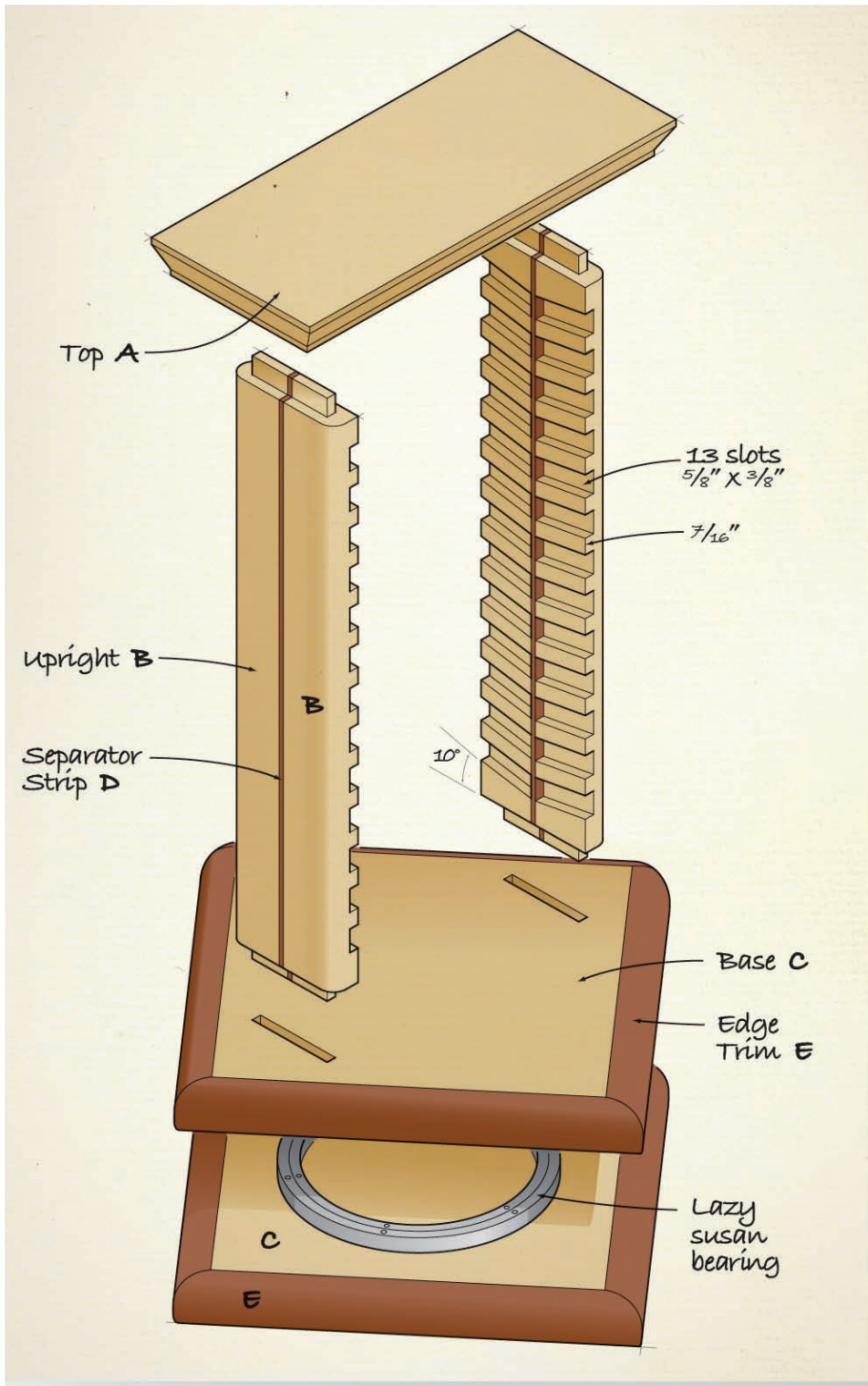
Finish Before Assembly

- Sand everything down to 220 grit.
- Apply your chosen finish. I used a water based finish, letting the first coat dry a couple of hours, lightly sanding it, and then applying another coat. I applied three coats in this manner. Take care not to get any finish in the mortises or on the tenons, as this

MATERIALS LIST (All measurements in inches)

Part	Qty	T	W	L
A Top	1	1	4 3/4	11
B Uprights	4	3/4	1 1/2	15 3/4
C Bases (mp)	2	3/4	8 1/2	8 1/2
D Separator strip (w)	2	1/8	3/4	15 3/4
E Edge trim (w)	1	3/4	3/8	48

All wood is cherry except: (mp) mahogany plywood; (w) walnut



will interfere with the glue-up. You can plug the mortises with a scrap of wood and wrap the tenons with masking tape.

- Apply glue to the mortises and tenons, and then clamp the top, bottom and uprights together. Make sure that the assembly remains square.

- After the glue has dried, mount the lazy susan bearing to the lower base and then to the upper base. Make sure to keep the two bases aligned when attaching the lazy susan so they will be centered when you're done.

This is a simple project to build, yet it has worked wonders, cleaning up the litter of games around the TV and game console. You might consider using woods that more closely match existing furniture in your TV room or adjusting the height of the uprights for the number of games you own.



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SUPPLY CHECKLIST

- One 6" x 43" piece of 3/4" solid cherry
- One 9" x 18" piece of 3/4" mahogany ply
- One 6' piece of 3/8" x 3/4" walnut
- 6" lazy susan bearing
- Finish

SOURCES

www.HomeHardware.ca
www.LeeValley.com
www.WorkshopSupply.com

Illustration by www.JamesProvost.com

Fireplace Surrounds

Enhance the look of your living room with a spectacular fireplace surround. It's easier to build and install than you might have imagined.

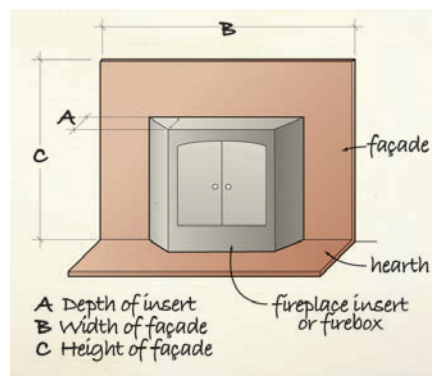


© Photographer: John Wollwerth | Agency: Dreamstime.com

Gas and electric fireplaces are quite popular in new home construction, and in older homes a lot of wood burning fireplaces are upgraded with gas or electric fireplace inserts. Most fireplaces have some kind of mantle (shelf) that sits over the top. Less common are fireplace surrounds – columns on either side of the mantel. However, you can easily create a whole new look to the living room by remodelling, or adding, a fireplace surround. It's a great way to showcase your woodworking skills, and the added market value on your house isn't too hard a pill to swallow. Home improvement stores and fireplace equipment outlets will have a variety of pre-fabricated fireplace surrounds available in various sizes and price ranges, and most cabinet shops will custom build them for you. But, building a fireplace surround is well within the scope of any woodworker with intermediate level skills. It's really no more difficult than building a bookcase.

If you have a masonry fireplace there may be a mantle hanging over it. The mantle is either attached to the wall studding (if there is drywall

above the fireplace) or on blocking inset into the masonry. A fireplace surround consists of columns attached to either side of the mantle. A 'flat style' is set flush to the wall, a 'column style' is set out from the wall, and a 'cabinet style' is a column surround that serves double duty as a storage unit (think bookcase/display cabinet). Right in front of the fireplace there is usually a hearth, typically made of fire resistant material, such as ceramic



Measurements you need to know

tile, stone, brick. If you plan to replace the hearth, or none exists, install it before you install the fireplace surround.

Surrounds come in a myriad of styles and sizes. You'll need to measure the depth of your fireplace insert or firebox, the width of the façade, and the height of the façade. Use these measurements to size your fireplace surround. Things to keep in mind when designing your surround include the size of your hearth, the heating source (gas, electricity, wood) and safety clearances required (check your local building code for these clearances), the existing woodwork and furniture in your living room, and the room size and configuration.

A surround consists of three basic constructs – two columns (legs or pilasters), a header (breastplate or frieze) and a mantel (shelf). In rooms with very high ceilings you sometimes see a framed panel, the over-mantel, above the mantel. This is often capped with a crown moulding. Corbels and moulding of all kinds can be used to enhance the look of the surround.

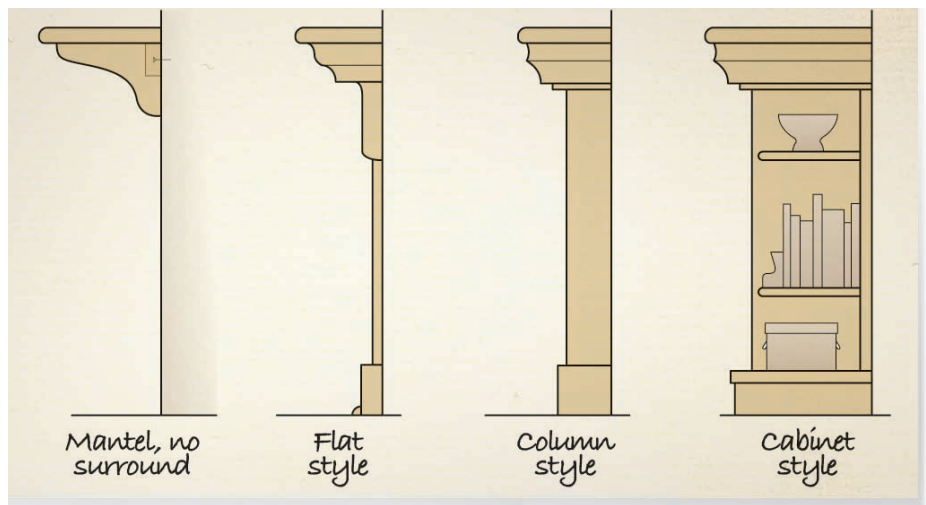
The least expensive, and probably easiest approach to building a surround is to use a frame and panel design with MDF as the core building material. If you want to paint the surround, then this is a good way to go. You'll find it easiest to build and install the surround in three sections (columns, header and mantel). The columns can be simple hollow boxes, and you can assemble the boxes with glue and nails or screws, pocket hole screws or biscuits. On the front face of the boxes apply $\frac{1}{2}$ " or $\frac{3}{4}$ " paint grade hardwood (alder, poplar) or softwood (pine) trim to get the 'frame and panel' look. Optionally you can use a router to add a decorative edge treatment to the trim pieces. I like to glue the trim to the box, and use a 23 gauge pin nailer to hold things together. Cover the nail holes with wood filler.

Depending on the depth of the surround (which will be determined by the depth of the fireplace insert), you can use a box for the header, or build it up from one or more layers of MDF. As with the columns, you can apply a frame to the surface of the MDF and a bit of crown moulding above the frame and under the mantel. For a more durable mantel use a paint grade hardwood or softwood. A square edge on the mantel doesn't look all that great; minimally round over the edges, or better, rout a decorative edge on it. Some baseboard and shoe moulding on the bottom of the columns will give it a more finished look.

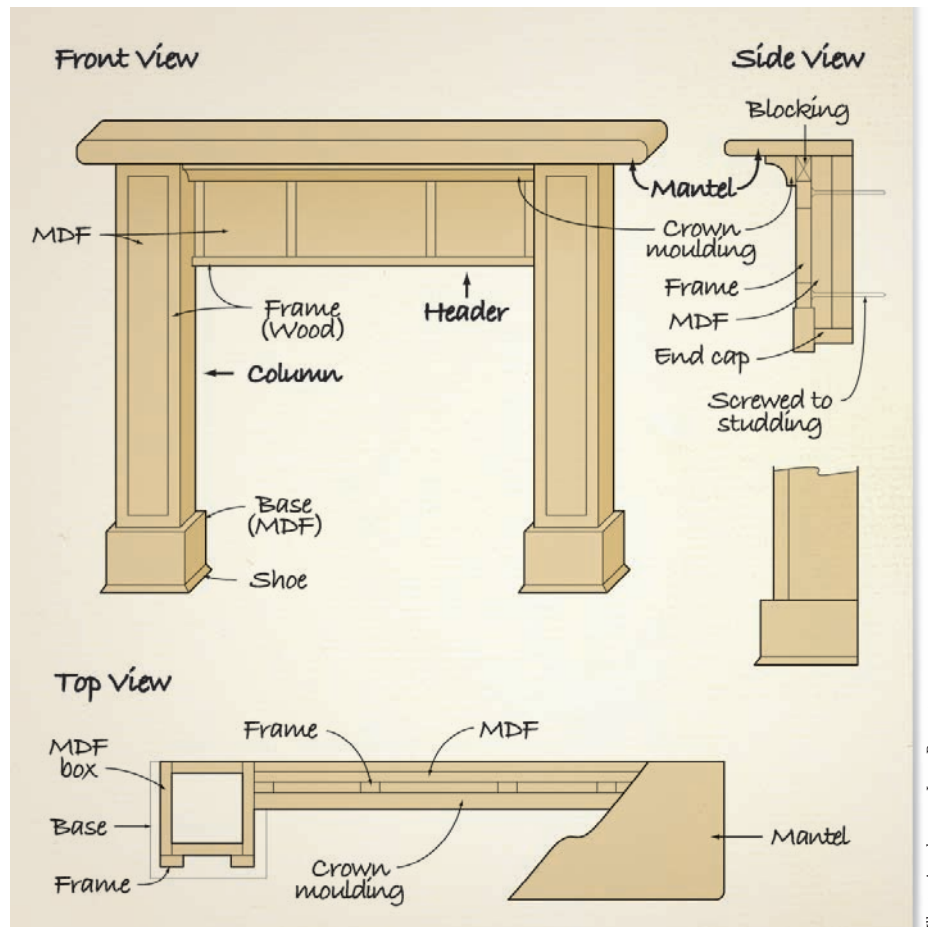
As with most woodworking projects it is best to apply as much of the finish as you can before you assemble everything. I like to use a latex semi-gloss enamel paint – it's easy to apply, looks great and is very durable. First apply a coat of primer on all surfaces. You may have to apply an extra coat or two on edges. A light sanding will remove any raised grain. Next apply a single coat of paint. Once the pieces have thoroughly dried install the surround – first the columns, then the header, and finally the mantel. Countersunk screws and construction adhesive will do the trick here. Before you apply the final coat of paint caulk any gaps with a paintable latex caulking.

Perhaps MDF isn't for you. Alternatively you could use an architectural grade hardwood veneer plywood with solid wood trim, or build the surround entirely out of hardwood. Whatever materials you choose or construction techniques you use, installing a new or upgraded fireplace surround is sure to be a satisfying way to enhance your living environment.

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Fireplace styles



Column style surround

RESOURCES

'Building Fireplace Mantels: Distinctive Projects for Any Style Home',

Mario Rodriguez, ISBN: 1561583855

'Constructing a Fireplace Mantel: Step-By-Step from Plywood and Stock Moldings',

Steve Penberthy, ISBN: 0764324578

Wood Repair

Tips for Dealing with Small Imperfections

No one is perfect, but we can appear to be, or at least come close to it on our woodworking projects – once we touch up those few imperfections with a little wood shop ingenuity.

We've all been there: the shop is too small, your project rather large, and at some point you damage a visible surface with a ding, dent or gouge. Or you notice a crevice on a stile that appeared out of the blue *after* assembling a door frame. It is maddening, but it seems all too common, and knowing how to repair the damage can mean the difference between salvaging the work you've done up to this point or making a replacement piece.

When choosing a method to repair the damage, you will need to take into consideration a number of factors such as the degree of the damage, the nature of the damage and the final finish to be used on the piece. If you are faced with a simple ding or dent that has crushed some fibres you might be able to use a damp cloth and iron to steam the damaged area.

Wood Fillers are Workshop Essentials

If steam doesn't do the trick, then it's time for some stronger medicine. Commercial wood fillers are available in many different formulations and your final success will require that you choose the right product for the job. When selecting filler you will have to choose between a lacquer base, an oil base or a latex (water) based product.

Lacquer based fillers offer a quick drying

time and are compatible with most finishes, but they dry hard and have a tendency to shrink and crack. Oil based fillers often do not dry completely and can cause problems when subsequent film finishes are applied. Always be sure to check that the filler you plan on using is compatible with the finishing products that you plan to use.

Latex based fillers offer fast drying times without the disadvantages associated with lacquer and oil based fillers. The new stainable fillers are compatible with a wider range of finishes. If the area is deep, clean away any loose material and smooth it with some sandpaper. Apply the filler in several thinner coats and leave it for the required drying time between coats. Applying the filler in one thick coat will make it almost impossible for it to dry, and as it dries it will shrink and crack in the center. After each coat has dried, sand it smooth and repeat until the original profile has been regained.

Most commercial latex fillers on the market are either stainable or are available in pre-tinted colours. The Elmer line of fillers is available in eight colours ranging from maple to walnut, making it possible to come close to matching wood colour. However, you can blend filler colours to get an even closer match. The un-tinted stainable fillers contain wood as the binder that helps to absorb the stain.

Use Epoxy for Large Voids

Larger voids and damaged areas can be repaired using a two-part epoxy mixture. The epoxy will dry hard without the risk of cracking or shrinking and it can be machined like wood. When mixed, epoxy dries to a clear finish, which can be

Repairing a Dent With Steam

You can repair small dents on an unfinished surface using a clothes iron and a wet cloth. Soak a towel in water and wring it out - it should be wet but not dripping. Clamp the piece to your bench in a convenient location. Set the iron to the highest setting and let it heat up. When the iron is hot, place the damp cloth on the damaged area, a single layer thick and press the iron to the cloth. Let it steam for a second or two and remove the iron. The water will have soaked into the surface of the wood and as the iron converts it to steam, the crushed cells will expand. Often this will eliminate the need for wood filler. After the piece is steamed it will need to be sanded again because the steaming will have raised the grain in the area.

unappealing on a finished piece that will be stained. To avoid this the epoxy can be mixed with tints and pigments from an art supply house or well-stocked paint store. Mix up enough of the epoxy for the repair and add any tint that is required, then carefully apply the epoxy to the area with a knife or wooden stick. Using epoxy is messy and difficult to clean up, so work accordingly.

Sawdust as Filler

Combining sawdust and glue is one of the most common ways of filling an imperfection. Use coarse sandpaper (50 grit) or a fine toothed rasp to make enough sawdust from the same type of wood you are repairing. Then add glue to the sawdust and mix until it is the consistency of putty. Press the wood filler into the void. A toothpick works well for narrow spaces. Let the filler dry for a couple of hours, sand lightly, and then apply your finish. Glue and sawdust filler works best when used for very small imperfections or if the finishing application will be a solid colour.

Alternatively, sawdust and a finishing product can be used to hide some imperfections.

For very narrow crevices, or hairline cracks no wider than the thickness of a piece of paper, pour a small amount of the finish on a piece of 100 grit sandpaper and sand the piece. The sawdust and finish

will mix as you sand and push the slurry into the space. If the space is larger, try mixing the finish with the sawdust, then fill the space. You may have to dilute the finish before mixing it with the sawdust. Since sawdust consists of broken wood fibres, it will absorb the finish more readily than the solid wood. The filled space will be darker and more noticeable. This method works best on softer darker coloured woods.

For Narrow Crevices Use Splinters

If you have a narrow, wedge shaped crevice, try filling it with a wood splinter. Shave or split thin splinters from a scrap piece of wood from your project. Squeeze wood glue into the crevice and insert the splinter. Then use a flat head screwdriver or other relatively dull tool to push the splinter firmly in place. Try not to break the wood fibres, as they will accept the finish in a manner more consistent with the adjacent wood. This method works best with larger gaps, harder wood, and lighter coloured wood.

Tips on Using Fillers

Installing finished cabinetry is a delicate process and in spite of the best precautions, you may still end up with a minor scratch or two to touch up afterward. Attaching the final trim pieces with brad nails will leave holes to be filled, and even the holes

Caulking as Filler

Most trim in houses is painted white, and as woodworkers we have the ability to use a table saw and router table to make any form of trim we desire using MDF. It doesn't matter if the trim in your house is the plain variety or something a little more elaborate, chances are there will be gaps along the drywall and in the mitres around doors. Use painter's tape to mask the area off and then run a small bead of white paintable latex caulking along the joint. Use your finger to create a smooth transition between the two surfaces. Closed joints can make the difference between a mediocre trim job in a house and a great one.

made by fine 23-gauge pin nailers can sometimes benefit from a touch of filler. In this situation, because you will be dealing with finished cabinets, it is advisable to test the filler on a sample of stained wood to be sure that the two are compatible before committing to the visible surfaces. Some fillers can act as a solvent when in contact with certain finishes and may soften the finish in that area.

Over the years life will leave its mark behind on doors, baseboards, and furniture (such as table and chair legs) in the form



Gouged workpiece



Filler applied



Filler dried and sanded



Chipout in dovetail



Filler applied



Filler dried and sanded

of dings and gouges. As most trim and older doors are painted, these blemishes are easily repaired using paintable carpenter's wood filler. Sand the area to be filled to remove any rough and loose material; this also provides a key for the filler to adhere to. Use a putty knife to apply filler to the damaged area in shallow increments, allowing each layer to dry completely before sanding it and applying the next. When the surface has been levelled and the filler has dried completely, feather it in with the surrounding area and paint it. On wood furniture try the Tinted Wood Fillers, which are sandable, stainable and come in six colours.

When you are filling finishing nail holes and minor scratches on finished cabinetry often a simple crayon shaped stick of filler is all that is needed. Rub the tip of the stick into the defect to deposit some filler and then smooth it out with your finger.

When working with a damaged area, it is best to try and limit any additional damage that the filler, or its application may cause to the surrounding area. If you are working with an open grain wood such as oak and you get filler in open pores, you will find it almost impossible to remove without sanding or planing to fresh wood. To avoid damaging the surrounding area, cut a hole the size and shape of the defect in a piece of packing tape or painter's tape. Packing tape is thinner

but can be a bear to work with; painter's tape is easier to work with but its rough surface is thicker. Place the hole over the defect and allow the tape to protect the adjacent areas; apply additional pieces if required. Use a putty knife to apply the filler to the defect and when the repair has been completed, remove the tape and sand the surface to a final finish.

The human eye very easily detects regular shapes such as squares and circles when set in a natural environment. The development of camouflage techniques has reflected this with irregular shapes used to blur the sharp outlines of an object such as a vehicle. Use this technique when repairing defects in your wood. Filling a defect that has a round shape or straight lines will be far more noticeable to the eye afterward than a repair in the shape of an oval (or a biscuit).

There are times that you will be faced with the need to repair a special piece of wood that contains a range of colours. This can be a challenge if the scratch crosses several colours; commercial fillers are of one colour and mixing fillers of different colours in a small repair can be tricky. In this case, choose the filler that most closely resembles the main colour in the piece and fill the damaged area as outlined above. When the filler has dried and has been sanded for finishing, use some artist

pencils that match the colours to draw in a grain pattern to fool the eye before applying the final finish.

The key to using a shop-made wood filler is experimentation and experience. Test your filler on a scrap piece of wood first. Remember to record what you did and what worked best. Then share it with your fellow woodworkers – we can all use a tip or two in our quest for perfection.



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www.HomeHardware.ca
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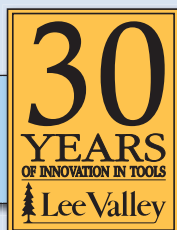
RESOURCES

"Wood Finishing: Filling Pores",
Oct/Nov '03, Issue #26
"Wood Science: Wood Movement",
Aug/Sep '03, Issue #25

Electronic Hearing Protectors w/FM Radio & Input Jack

These triple-duty hearing protectors have a built-in FM radio receiver, a stereo input jack (complete with 3' cable) for use with CD and MP3 players, and electronic sound reduction that lets you balance the level of external sound you want to hear as well as blocks all sound over 82db. Separate control knobs let you use the features independently or balance them for use simultaneously. Passive noise reduction rating is 25db. The unit weighs 15½ ounces and requires two AA batteries (not included). Replacement pad set also available (includes two ear cushions and two damping pads). Good value in a combined audio headset and hearing protector. **Electronic Hearing Protectors 22R12.80 \$45.00**

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Custom Woodworker II
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The Mighty Mallet

Roughing out a large carving, or even a medium-sized one, can be a very laborious process. In the interest of saving time and energy, many carvers opt for 'power'.



This approach usually takes the form of a chain saw or some kind of toothed device mounted on an angle grinder. Fortunately, for those who choose to pursue the purists' path and avoid the use of power, there is a tool that one can argue is safer, more effective and, with practice, just as efficient. That tool is the mighty mallet.

A carver's mallet is more than a funny shaped hammer used to drive a big gouge. Consider these key features: mallets come in various sizes and weights thus enabling a custom fit

for every individual; mallets don't have sharp edges that could cause inadvertent damage through an errant blow to your masterpiece; good handle design enables lengthy periods of effortless progress (more on this characteristic later); plus, no smelly fuel or noise.

Of course, a mallet is of little use by itself. For a mallet to be used effectively, one must have gouges that are appropriate for mallet work. The primary requirement for a mallet-driven gouge is to have a robust shoulder. Without a shoulder, the gouge would be

driven back and would inevitably split the handle. Some gouges lack a shoulder but have a ferrule – a band of metal around the base of the handle. Although this design effectively prevents splitting the handle, the metal band can damage either the carving or the carver's hand.

To use a mallet safely, it is essential that the carver grip the gouge properly while striking it with the mallet. It might seem logical to grasp the handle of the gouge; however, when the cutting edge of the gouge passes through the wood, the force of the mallet blow



A robust shoulder is preferred



WRONG way to hold gouge



RIGHT way to hold gouge

can drive the gouge through your fingers and onto the floor. To prevent such loss of control, the gouge shank should be grasped (i.e. between the handle and the cutting edge). This technique provides maximum control of the cutting edge and prevents the gouge being driven from one's grasp.

Many carvers are discouraged from using a mallet because it is thought to be hard work. With a mallet weighted to your individual preference, this expectation could not be further from the truth. In addition, most people grip a mallet too firmly. (In fact, the prolonged squeezing of the handle, not the striking, is the cause of tennis elbow.) A good mallet has a slightly narrower neck where the handle joins the head. To avoid squeezing, the carver should grasp the handle lightly with the thumb and forefinger encircling that neck. When striking with the mallet, the head can be accelerated with a flick of the wrist thus achieving much greater striking force with less effort. With a little practice, a carver using this technique can work effortlessly for extended periods.

Not all mallets are intended for bulk wood removal. A detail mallet is generally much smaller than a standard woodworker's mallet, and is usually made

of a heavy material to provide adequate striking power. The one I use has a brass head. It would be more reasonable to describe the use of a detail mallet as 'tapping' rather than 'hitting' or 'striking'. To provide the necessary accurate control, one should hold the gouge near the cutting edge as if working by hand alone. The detail mallet is held with the handle in the palm and the head of the mallet between thumb and fingers and tapped against the butt of the gouge handle.

As you can imagine, the size of the gouge directly affects the amount of wood being removed and the level of effort required. If one were to use a #2/35 gouge (fairly flat curve and over an inch wide), there would be a considerable amount of cutting edge in contact with the wood and more force required. To expedite the removal of wood, I first use a fairly curved gouge (e.g. #9/15) to create furrows, then use, a large gouge (e.g. #7/35) to remove the wood between the furrows.

A further deterrent for many carvers is the generally accepted view that gouges should be sharpened at a more robust angle if they are to be used with a mallet. Over time, I have come to the

conclusion that this is a myth. I use the same gouges for all purposes and for all types of wood with and without a mallet. So far, I haven't experienced any broken gouges or abnormally rapid dulling.

To get the best results from your mallet, the key is good technique.

- Hold the gouge securely.
- Don't pry or scrape with the gouge.
- Strike the gouge firmly.

With practice, any carver with a good mallet can learn to remove large masses of wood with precision and far more efficiently than one might expect.



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www.dbj.ca

SOURCES

www.BusyBeeTools.com
www.ChippingAway.com
www.EuropeanHandTools.com
www.HouseOfTools.com
www.LeeValley.com



A good mallet has a narrow neck



Hold neck with thumb and forefinger



Cradle detail gouge in your palm



A wide flat gouge requires effort



Step 1 – make furrows with #9/15 gouge



Step 2 – remove bulk with #7/35 gouge



Part V Routing Basics Joinery Bits

Without a bit, the router is just a fancy paperweight; but when you slip one of these joinery bits into the collet you unlock the potential of creating a multitude of strong and attractive joinery options for your projects.

The router excels at cutting joinery with a precision and speed that are hard to match. The bit does the cutting and determines the nature of the joint, while the guide system determines how precise the joint will be. In this article we take a look at some of the joinery bits woodworkers can choose from, and in future articles we will take a closer look at guide systems. As with all tools, time spent setting up the cut and defining the range of motion for the router will reward you with accurate and precise results. Most of these joinery bits are used on a router table. Before using any bit ensure that you understand how it functions.

Dovetail

Dovetail bits will likely be the first joinery bit to come to mind, and there are many to choose from. These bits are available in a

range of lengths, with the cutting sides angled from 7° to 20°. The bits are typically used in conjunction with a dovetail jig, of which there are several high quality models to choose from, including the Leigh Super Jig, Akeda BC24, and Porter Cable OmniJig. Each of these jigs operates in a slightly different manner, but they are simply guides for the router and bit. Not all dovetail bits are the same and it is important to note that various dovetail jigs require specific dovetail bits. Some jigs use a guide bushing to control the path of the router while others use a bearing. If in doubt, consult your manual or contact the manufacturer for the specific bits to fit your jig.

Dovetail bits can also be used to create sliding dovetails, for example to join a shelf to a cabinet side. When cutting sliding dovetails, the bit is completely buried in the wood and must work very hard to cut the

groove to house the tail. To achieve the best possible quality of cut, it is a good practice to make the initial pass over the stock with a straight bit. This will clean out the majority of the waste and the dovetail bit will only need to cut the angled sides of the channel. You can mill the groove with a hand held router and an edge guide, or on a router table. However, you should always mill the tail across the edge of the board on a router table. Maintain firm pressure on the board and make a shallow climb cut along the sides. If you simply were to rout the edge in one pass in the traditional direction, as the cutter exits the material the fibres are not supported and will tend to break out or leave a fuzzy edge.

Lock Mitre

The lock mitre bit is the answer when you need to make a strong corner joint with



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- ▶ AUTOMOTIVE SEMI-TRANSPARENT POWDER COAT FINISH
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- ▶ ROMAN OGEE STYLE
- ▶ CUTTING DIAMETER: 1 5/8"
- ▶ CUTTING LENGTH: 11/16"
- ▶ RADIUS: 1/4"
- ▶ OVERALL LENGTH: 3"
- ▶ SHANK: 1/2"

\$79⁹⁸

MODEL 857413C1

LOCK MITRE BIT



C3 Tungsten carbide tipped cutter increases mechanical strength of joint. Perfect alignments every time. For use with router tables.



- ▶ CUTTING DIAMETER: 2 3/4"
- ▶ CUTTING LENGTH: 1 1/4"
- ▶ ANGLE: 45 DEGREE
- ▶ SHANK DIA: 1/2"
- ▶ TOTAL LENGTH: 3 1/16"

\$58⁹⁸

MODEL 807699A

RAISED PANEL W/UNDERCUTTER



Heavy duty cutter produces flush panels. Cut both sides of the panel with one cutter. For use with 3 HP routers.



- ▶ CUTTING DIAMETER: 3 1/8"
- ▶ CUTTING LENGTH: 1 3/16"
- ▶ RADIUS: 3/4"
- ▶ SHANK DIA: 1/2"
- ▶ TOTAL LENGTH: 3 3/8"

\$62⁹⁸

MODEL 847794B

4PC ROUNDROVER BIT SET

Four roundovers finish decorative edges & also provide excellent moulding.

Sizes include: 2 1/4", 3 1/8", 1/4" & 1/8"

Diameter: 1/8", 1/4", 3/8" & 1/2".

Available in 1/2" or 1/4" shank



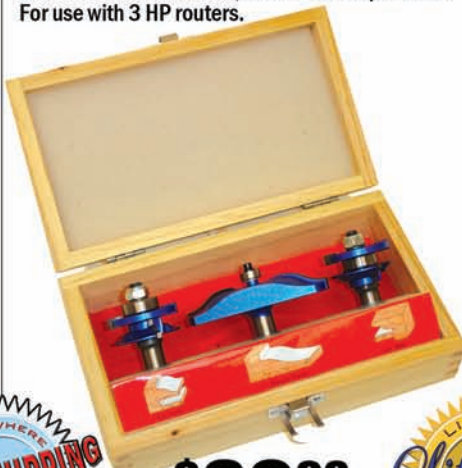
SHANK: 1/4"
MODEL R920

SHANK: 1/2"
MODEL R902

\$31⁹⁸
EACH

3PC RAISED PANEL BIT SET

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MODEL R917

5PC KITCHEN DOOR & DRAWER SET

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MODEL R919

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plenty of glue surface. It's ideal for assembling frames, boxes, boxed posts and columns. The lock mitre bit creates a symmetrical 45° cut on both pieces with one bit, and you don't have to change the bit set-up. One side of the joint is cut with the piece laying flat on the router table and the other side is cut with the piece on-end, running along the fence.

This bit must be used in a router table with a fence, and setting the proper projection from the fence and the proper bit height can be a little finicky. The most complete and comprehensive instructions I have come across for using these bits is included when you purchase one of these bits from Lee Valley. The instruction sheet is also available on their website. Fine tuning this bit is a matter of setting the proper projection from the fence first and then dialing in the final height setting. Prepare some test pieces – you will need to make several test cuts as you sneak up on the perfect setting. Each thickness of wood will require a different setting, once you have achieved a perfect fit, make a cut on an extra piece of wood, which you can save as a quick set-up guide. Use the guide to align the bit for wood of the same thicknesses in the future. It will save you both time and frustration.

Lock mitre bits are available in several different sizes and it pays to check the specifications to be sure you have one that will accommodate the thickness of wood

The Hand Cut Dovetail Look

One of the main complaints about router cut dovetails is that they look like they were done with a router. When cutting dovetails by hand, the narrow end of the pin can be as narrow as the kerf left behind by the dovetail saw. The kerf left by the Adria dovetail saw (www.adriatools.com) for example, is in the area of .022 inches wide, but as you can well imagine this would be impossible for a router; a bit with such a narrow section would break the first time it touched the wood. Jigs such as the Akeda and the Wood Rat use special proprietary router bits that, while not as narrow as the dovetail saw, are considerably narrower than the standard dovetail bits. The price to pay for this look will be the occasional bit that breaks off if it is pushed too hard. These specialized narrow bits are typically made of High Speed Steel to allow for the narrow profile. There is simply not enough space to solder on carbide edges, so they won't hold an edge as long as carbide, but they seem to cut a little easier than carbide bits when new. The Leigh D4R and the new Leigh Super Jig allow you to mill variably spaced dovetails, which help emulate the look of hand cut dovetails.



you will be using. This was one of the first router bits I ever bought, and I made the mistake of ordering it through a catalogue from a dealer that didn't know any more about the bit than I did at the time. The bit that I ended up purchasing was not only huge and expensive, it was the wrong size for the single speed router and 3/4" stock I intended to use it with. The two sizes sold by Lee Valley Tools will cover any stock thickness you are likely to

encounter. A similar bit with a 22 1/2° mitre will produce a box with eight sides.

Drawer Lock

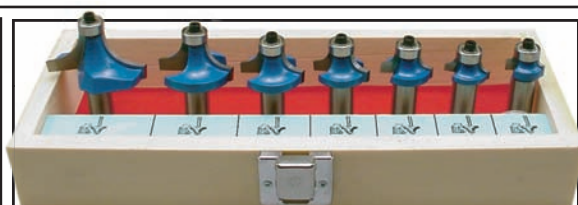
A variation on the lock mitre bit is the drawer lock bit. As the name implies, this bit is used to cut the corner joints for drawer boxes. Like the lock mitre joint, this bit increases the glue surface resulting in a stronger joint. The geometry of this bit also



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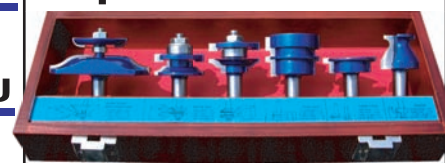
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provides another advantage; as you tighten the clamps during the glue-up, the joint draws itself tightly together. Like the lock mitre bit, this bit comes in a couple of sizes, one for $\frac{3}{4}$ " thick stock and one for stock less than $\frac{1}{2}$ " thick. These bits work equally well in plywood or solid wood and are a fast and efficient way to make boxes and drawers.

Like the lock mitre bit the drawer lock bit uses one setup to cut both sides of the joint, with one piece passing through the bit horizontally and the other vertically. Setting up this bit is much easier than the lock mitre, but you will still need to rout some test pieces and don't forget to make a set-up piece once your settings are perfect.

Slot Cutter

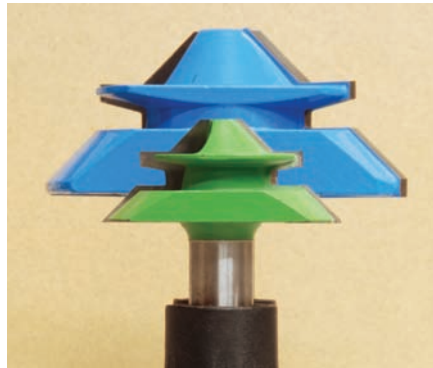
The slot cutter is one of the most widely used joinery bits. It excels at cutting slots in stock for cabinet backs and drawer bottoms and provides a much cleaner result than using a table saw. If you use splines when gluing up panels, then using a slot cutter to cut the panel grooves is fast and simple. I find it much easier to mill splines of the exact size I need using a thickness planer, than trying to mill grooves to the exact width of pre-cut splines.

These bits consist of a cutter mounted on a shaft with or without a bearing on top. There is a nut on the top of the shaft and some washers acting as spacers to hold everything together. Slot cutters are sold as complete units or you

can purchase the pieces separately. Buying the pieces separately allows you to purchase one bearing and one shaft and then a

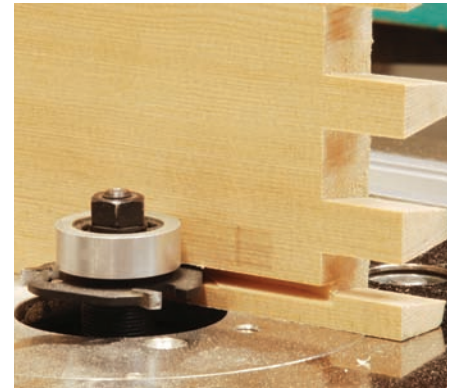


Lee Valley small drawer lock bit

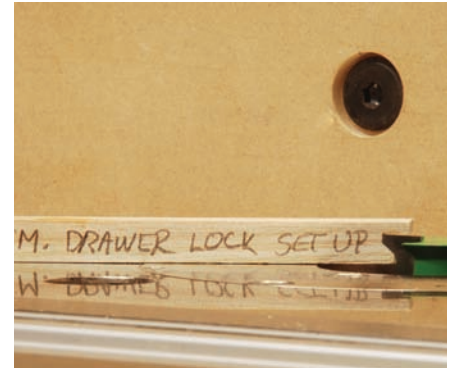


Similar bits, different sizes

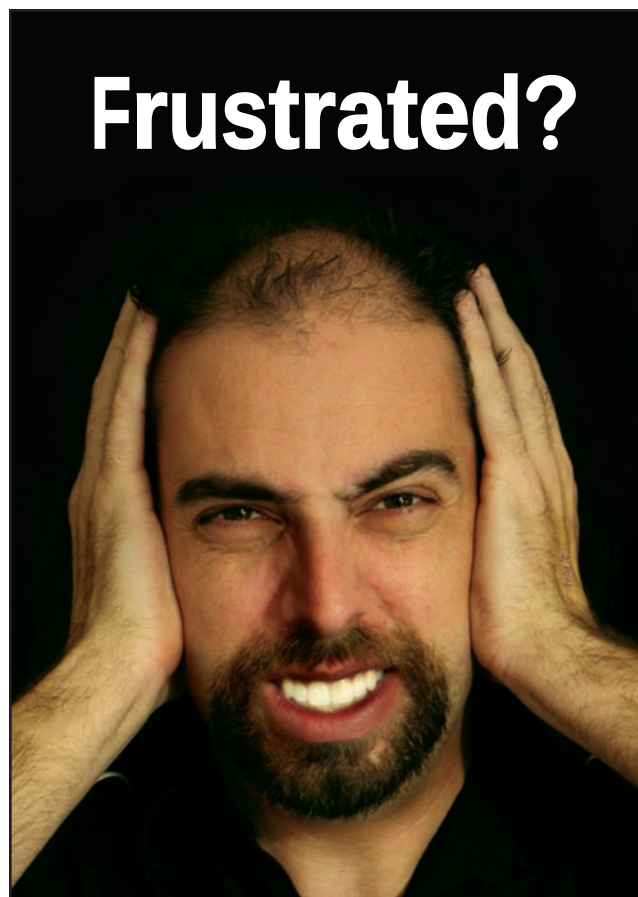
number of different slot cutter heads of various widths. While this can save you some money, the inconvenience and the need to



Slot cutter bit



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reconfigure the bits for cuts of different thicknesses may seem to make the slight savings per bit less than worthwhile. These cutters are available in two, three and four wing versions. The four wing version will provide a smoother cut than the three wing version. These bits can be used with a hand held router or table mounted.

Tongue and Groove

The tongue and groove (T&G) bit has many uses from flooring to frame and panel construction. They are ideal when you need to cover a wide surface with wood paneling or siding. The T&G configuration enables you to leave a slight gap between boards before fastening each pair with a single nail in the center. This will accommodate any seasonal expansion. A variation of the T&G cutter, the V-Panel bit adds a bevelled cut to the edges of

the panel that forms a 'V' where two pieces meet.

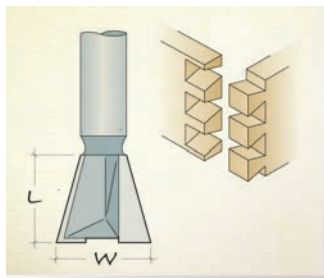
Like rail and stile bits, T&G bits are available in single unit form with reversible cutters or as a matched set, and both styles of bits must be used on a router table. With the reversible cutter, a nut on top of the shaft holds the cutters and spacer shims in place during the cut. After cutting the first profile, the nut is removed and the cutters reassembled to cut the matching profile. The reversible sets are less expensive than a matched set but they can be tricky to set up for a perfect fit if any shims are needed. The matched cutters are a little more expensive but they provide accurate joints without the additional set-up time.

Rail and Stile

Rail and stile (R&S) bits are available in many different profiles in either a reversible

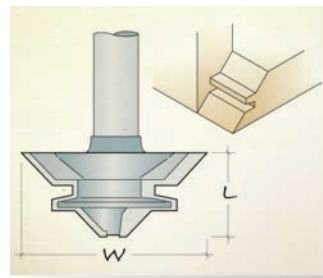
set or as a matched pair, and they make the construction of cabinet doors a breeze. These bits are only for use on a router table and must be used with a fence when cutting the long edges of the rails and stiles, and some form of a cross cut sled when cutting the ends of the rails. Setting up a rail and stile bit in the router table is much easier than setting up some of the other joinery bits such as the lock mitre bit. Most rail and stile sets come with a bearing mounted on the shaft above the cutting edges. Mount the router bit in the router table and set it to the correct height for the stock you will be using. When you set up the fence, place a ruler or a straight piece of stock on the bearing and slide the fence forward until the ruler indicates it is level with the bearing and then fasten the fence down. Run a piece of stock through the bit and look at the edge to see if it has been set up

Dovetail



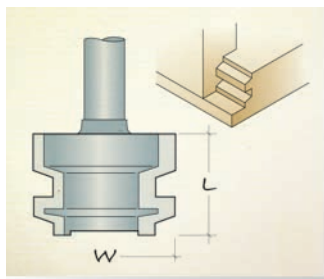
Uses: Dovetail joints, sliding dovetails
Cutter widths: $\frac{5}{16}$ " – $\frac{1}{4}$ "
Cutter lengths: $\frac{1}{4}$ " – $1\frac{1}{16}$ "
Bit angle: 7° – 18°
Available as: 2 flute no bearing, 2 flute with upper bearing
Similar bit: Butterfly (spline joint)

Lock Mitre



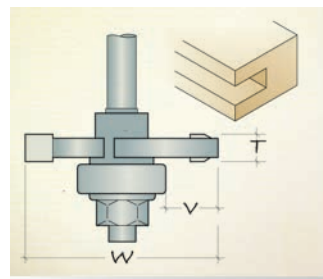
Uses: 45° mitre joints
Cutter widths: $1\frac{3}{8}$ " – $2\frac{3}{4}$ "
Cutter lengths: $\frac{1}{2}$ " – $1\frac{3}{16}$ "
Similar bit: 22 ½° lock mitre, glue joint, birds mouth (multi-sided glue joint)

Drawer Lock



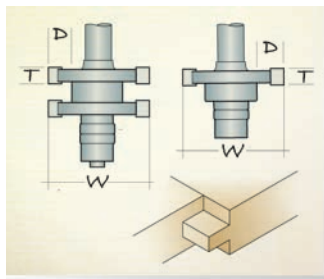
Uses: Drawer joints
Cutter widths: $\frac{3}{4}$ " – $1\frac{1}{16}$ "
Cutter lengths: $\frac{1}{2}$ " – $\frac{3}{4}$ "

Slot Cutter



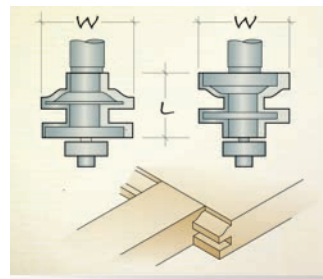
Uses: Spline joints
Cutter widths: $1\frac{1}{4}$ " – $1\frac{15}{16}$ "
Groove thickness: $\frac{1}{16}$ " – $\frac{1}{4}$ "
Groove depth: varies with the width of the bearing used
Available as: 2, 3 and 4 wings with bearing, stackable slot cutter, adjustable dial slot cutter
Similar bits: Box joint, finger joint

Tongue & Groove



Uses: Frames, panels, flooring (available in a range of profiles)
Cutter widths: $1\frac{11}{64}$ " – 2"
Groove thickness: $\frac{1}{4}$ "
Groove Depth: $\frac{3}{8}$ "
Available as: : Single bit with stacked cutters or two bit pair, both in square joint or V-joint
Similar bits: V-Panel, C-Panel

Rail and Stile



Uses: Frames, panels (Available in a wide range of profiles)
Cutter widths: $1\frac{3}{8}$ " – $1\frac{5}{8}$ "
Cutter lengths: $\frac{3}{16}$ " – 1"
Available as: Single bit with stacked cutters or two bit pair
Similar bits: Window sash and rail, glass door rail and stile

Legend: L= Length; W= Width; D= Depth; T= Thickness; V=Depth of cut varies with size of bearing

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correctly; if the bit is a little proud of the fence you will get a little snipe at the beginning and end of each piece, if it is recessed too far into the

fence then the groove will not be cut to the full depth. Remember to make a set-up guide that you can store with your bits for future use.

SOURCES

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www.Freud.ca
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www.RT1000.com
www.Samona.com

Routing the long edges on the fence does not present a problem and using a feather board to hold the bit against the fence is a good idea. Another feather board used to keep the material firmly on the table is a good idea as well. Using two properly set up feather boards will only allow the material to move in one direction – past the cutter.

When routing the short ends of the rails you will need some sort of a cross slide. The Jessem router fence has a very smooth and elegant cross slide but you can also make a cross slide from a simple piece of plywood cut square on the table saw and with a handle fastened to it. While some router tables such as the Kreg Precision Router Table have mitre tracks built into them, you will find it far easier to reference the cross slide off the fence, rather than use the track. As the slide is squared to the fence you need not worry about squaring the fence to the table. If you make a set-up guide you can use it to accurately set the correct projection from the fence. Now all that's left is to place the square piece of wood to be used as the cross slide on the table with the work piece on the front end and slide the assembly along the fence. To avoid having the piece shift as it passes the cutter, close up the sacrificial wooden fences so that there is no space around the cutter, effectively creating a zero clearance insert.

THE EDITORS



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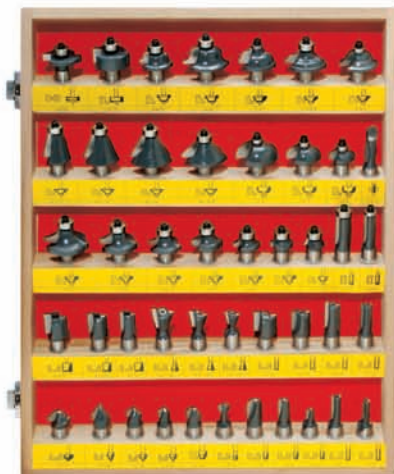


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XL SLED - #1465

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Digital Calipers

Dial calipers were once the domain of the machinist who needed to measure parts down to a resolution of 1/1000 of an inch. Woodworkers have been slow to adapt to these precision measuring tools. However, with the widespread use of digital electronics in manufacturing, there is no reason not to add an easy to use and inexpensive digital caliper to your tool arsenal.

A good quality dial or electronic caliper can be one of the best investments you can make. This multifunction tool can measure things as diverse as the inside measurement of a mortise, outside diameter of a dowel and the depth of a recess. It really shines when used to lay out your joinery and do your machine set ups; the days of guesstimating will be over.

Using the calipers for most woodworking tasks is simple and straightforward, but learning to think in measurement terms based on the decimal system can often be more challenging. As your woodworking progresses and you strive for greater accuracy you will find it easier to work in

decimals than in fractional units. This is especially true when working with wood you have milled to non-standard thicknesses and are then adding and subtracting the measurements. When woodworking, the natural tendency is to think of fractional values when using inches and the change from inches to decimals can take some getting used to. You'll find it handy to tape a decimal-to-imperial conversion chart to your shop wall.

Dial Calipers

Most quality dial calipers are made of hardened stainless steel for long-term accuracy, although inexpensive versions made of plastic are available. It stands to reason that as the price goes up, the quality of the tool increases as well, and with calipers this old adage holds true. An inexpensive plastic caliper is still better than none, but it can't compare to the mid or high-end models. Fortunately, the operating specifications of dial calipers made by the major manufacturers are comparable; it is the features and ease of use that sets the various models apart. Budget models have rougher movements, and can lack a thumbwheel adjuster or a reliable lock. Premium models offer silky smooth operation with a comfortable thumbwheel making adjustments down to .001" absurdly easy.

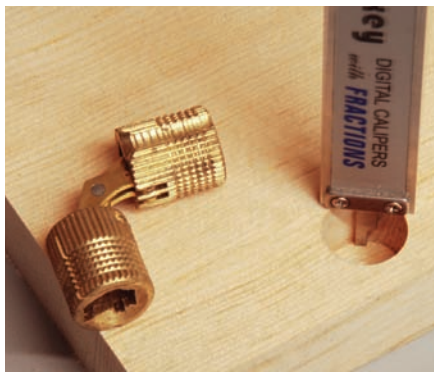
Precision Tools Need Precise Care

Calipers are precision measuring instruments

and should be kept clean and free from grit and dirt; they usually ship with a case and should be stored there when not in use. When you take the caliper out, check it over and remove any dirt from the jaws, blade or depth rod and then slide the jaws to the left and close the jaws completely. Check to see if the dial is calibrated. If the indicator is centered on the 0 point then it is set correctly. If not, loosen the bezel clamp screw and adjust the dial so it is set properly and tighten the screw. As you move the jaw to the right the indicator will travel around the dial. Each inch is divided into tenths on the beam, and the distance between each of these 1/10th inch marks is then further divided into 100 divisions that are shown on the dial. To arrive at a measurement, read the hatch marks on the beam to the last full one and then read the dial value and add these two numbers.

Electronic Calipers

Like all things, modern electronics have changed dial calipers forever. Electronic units are even easier to use than the dial counterpart. The need to interpret a dial to arrive at the measurement is gone and the value is presented directly on the digital display. When using these units, close the jaws completely and turn the unit on. This sets the display to zero and you are ready to measure. The 8" Mitutoyo Digimatic has the ability to switch at will between displaying values in inches or millimetres. The most recent generation of calipers, like the Wixey, allows you to display the values in fractional terms as well.



Making a depth measurement

The mechanism inside the caliper still operates as before but when the value on the display is within .002 of a fractional value, an additional display indicates the fractional equivalent of



Measuring an outside width

the decimal reading.

Once you've begun to use calipers you'll find all sorts of things to do with them. Here are some uses that we've found.



Measuring an inside width

- The Freud dial-a-width dado set is adjusted using a dial where every click on the adjuster makes a .004" adjustment. After setting up the correct number of chippers, make a test cut in some scrap. Measure the thickness of your stock, zero the caliper, and then measure the width of the dado you have cut. Divide the result by .004 for the number of clicks to make on the dado set to obtain a perfect fit.

- The caliper can be used for simple comparisons as well, even without the display. If you mill your own lumber using a thickness planer and need to match the specific thickness of some existing part, then just measure the part and use the caliper as a simple 'go/no-go' gauge.

- If you use a variable spacing dovetail jig, like the Leigh D4 or the new Super Jig, a caliper makes symmetrical and custom spacing lay out a breeze. Setting the bit projection with the calipers makes it unnecessary to rout test cuts.

- When cutting a groove or dado on the router table make a test cut and then measure the depth with the caliper's depth rod. Use the dial on the router lift, or the above the table adjuster, to easily dial in the difference as marked on the scale.

When using these tools for your layout work and machine set-up you will need to abandon the humble pencil in favour of a marking knife. The lines left by the pencil are simply too wide to use with a caliper without introducing errors. When buying a set of digital calipers, invest in a Veritas Striking knife and an engineer's square as well.

Using the new digital calipers when measuring and laying out your joinery will bring a new level of accuracy and precision to your work, and instead of complicating the process, it will actually simplify and speed up your work.

THE EDITORS

SOURCES

CALIPERS

www.BusyBeeTools.com
www.HouseOfTools.com
www.LeeValley.com

IMPERIAL (FRACTION & DECIMAL) TO METRIC

Fraction	Decimal	Metric		Fraction	Decimal	Metric
1/64	0.0156	0.3970		33/64	0.5156	13.0970
1/32	0.0313	0.7940		17/32	0.5313	13.4940
3/64	0.0469	1.1910		35/64	0.5469	13.8910
1/16	0.0625	1.5880		9/16	0.5625	14.2880
5/64	0.0781	1.9840		37/64	0.5781	14.6840
3/32	0.0938	2.3810		19/32	0.5938	15.0810
7/64	0.1094	2.7780		39/64	0.6094	15.4780
1/8	0.1250	3.1750		5/8	0.6250	15.8750
9/64	0.1406	3.5720		41/64	0.6406	16.2720
5/32	0.1563	3.9690		21/32	0.6563	16.6690
11/64	0.1719	4.3660		43/64	0.6719	17.0660
3/16	0.1875	4.7620		11/16	0.6875	17.4620
13/64	0.2031	5.1590		45/64	0.7031	17.8590
7/32	0.2188	5.5560		23/32	0.7188	18.2560
15/64	0.2344	5.9530		47/64	0.7344	18.6530
1/4	0.2500	6.3500		3/4	0.7500	19.0500
17/64	0.2656	6.7470		49/64	0.7656	19.4470
9/32	0.2813	7.1440		25/32	0.7813	19.8440
19/64	0.2969	7.5410		51/64	0.7969	20.2410
5/16	0.3125	7.9380		13/16	0.8125	20.6380
21/64	0.3281	8.3340		53/64	0.8281	21.0340
11/32	0.3438	8.7310		27/32	0.8438	21.4310
23/64	0.3594	9.1280		55/64	0.8594	21.8280
3/8	0.3750	9.5250		7/8	0.8750	22.2250
25/64	0.3906	9.9220		57/64	0.8906	22.6220
13/32	0.4063	10.3190		29/32	0.9063	23.0190
27/64	0.4219	10.7160		59/64	0.9219	23.4160
7/16	0.4375	11.1120		15/16	0.9375	23.8130
29/64	0.4531	11.5090		61/64	0.9531	24.2090
15/32	0.4688	11.9060		31/32	0.9688	24.6060
31/64	0.4844	12.3030		63/64	0.9844	25.0030
1/2	0.5000	12.7000		1	1.0000	25.4000



1/4 Sheet Finishing Sanders

There are two aspects of woodworking that most people just cannot seem to get enthusiastic about – one is finishing and the other is sanding. Unfortunately, if you don't do a thorough job sanding your project, the results of your finishing efforts may be less than stellar.

Man learned early that having the right tools makes the job easier (if not enjoyable) and throughout our history we've invented countless machines to make our tedious chores less onerous for ourselves. Go into any woodworking tool store and this is soon made abundantly clear by all of the tempting tools on display. If you are looking for something to ease your sanding woes, there are many products that will help make the job easier. On the 'portable' side they range from small detail sanders for fine sanding in tight spaces to large, heavy and aggressive belt sanders for serious stock removal. On the 'stationary' side are cantilevered and closed frame belt sanders that can be as small as an oven or

larger than the average home workshop.

In most woodworking shops you're likely to find a belt sander and a random orbital sander (ROS). Both are eminently useful tools to have on hand, when used for the purpose for which they were intended. A belt sander is ideal for rapid stock removal, while the ROS is unbeatable as an all-purpose finish sander. One major drawback for the ROS is that it has a round sanding base. In corners it's practically useless. Which is where the sheet sander shines.

Sheet sanders come in three sizes, 1/4 sheet, 1/3 sheet and 1/2 sheet; as you would assume, the name comes from the amount of a standard sheet of

sandpaper that is needed to cover the sanding pad. The 1/4 sheet sander is perhaps the most basic of all sanders, save for a block of wood wrapped with sandpaper. It has several advantages over an ROS – it's lighter, easier to control with one hand, and sands less aggressively. While these sanders are fairly basic tools, there can be a wide range of variations in performance and ergonomics among the different models; choosing one that is uncomfortable to hold and hard to control will make sanding a tiresome chore that can leave your arm numb. Where possible you want to get your hands on several different models to see which one feels best 'in-hand'.

Easy on the Wallet

Quarter sheet sanders are not expensive tools. The models we've surveyed here range from a low of \$20 for the King to a high of \$120 for the Makita model, with a mid-price of around \$75. Like everything else in life, the expensive versions are more refined and have features that make them more user-friendly. While these features may be minor, some can make the difference between a sander you like to use and a sander that will be left to gather dust rather than make it.

These sanders all have the same basic parts; a motor with an on/off switch that powers a rubber pad onto which a quarter sheet of sandpaper is fixed, a clamping mechanism that holds the paper in place, a power cord, and a handle. Some sanders include accessories such as sandpaper and carrying cases, but these differences shouldn't play much of a role in deciding which unit to purchase. The sander is what does the work, and this is what you should base your buying decision on.

About half the sanders ship with a couple of sheets of sandpaper as part of the package to get you started. It should come as no surprise that with one or two exceptions this is not a high quality abrasive paper. Besides, a couple of sheets won't get you far with your sanding. At the same time you purchase your sander pick up some Norton 3X paper in various grits as well. The Norton 3X paper will cut more efficiently and leave a finer and more even scratch pattern on your work than the paper that ships with the sander. To cut the paper for the sander, place it upside down on a piece of plywood, divide the sheet into four quarters and use a utility knife and a steel ruler, or your shop scissors, to cut the sheet.

Paper Clamping

The sandpaper must be securely held in place on the sanding pad using some form of clamping mechanism. Most models use a section of wire with a lever; release the lever at either side of the sander and it lifts the wire from the edge of the pad. Slip the paper under the wire, re-attach the lever and then pull the sheet tight, and attach it at the other side. If the paper is too loose it has a tendency to tear easily. Bosch has recognized that this can be a bit of a chore and has designed the innovative Sheet Loc™ system. While it functions pretty much like a conventional lever system, the hold-down arm extends below the surface of the sander when it's disengaged, making it easy to get the other end of the paper into the clamping mechanism. When the lever is released it automatically pulls the sandpaper tight against the pad. Two sanders (Bosch, Craftsman) offer the option of using PSA (stick-on) paper, while the Makita is the only one that enables you to use hook and loop paper.

Dust Collection

Sanding creates fine dust and it is this fine dust that is most dangerous to our health. These units all provide on-board dust collection and all except the Craftsman and Hitachi include a paper punch to form the holes that allow the sander to collect the dust as it is created. After the paper has been attached to the sander, press the sander onto the paper punch and it will punch the holes required to collect the dust. This is a less expensive option than buying individual sheets that have been pre-punched.

There are different kinds of dust receptacles – a cloth dust bag (King, Makita, Milwaukee, Ryobi), a high capacity dust bag (Craftsman, DeWalt, Hitachi, Ridgid), canister (Black & Decker, Porter Cable) and micro filter canister (Bosch, Skil). Canisters can be a little more awkward when working inside cabinets than a flexible cloth collection bag. Even though most of the canisters

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	Bosch 1297DK – \$79.99 www.BoschTools.com 800-387-8304
	Craftsman 225402 – \$79.99 www.Sears.ca
	DeWalt D26441 – \$69.00 www.DeWalt.com 800-544-6986
	Hitachi SV12SG – \$69.99 www.HitachiPowerTools.ca 800-970-2299
	King 8351 – \$19.99 www.KingCanada.com
	Makita B04555K – \$120.00 www.Makita.ca 800-263-3734
	Milwaukee 6017-6 – \$113.00 www.MilwaukeeTool.com 800-268-4015
	Porter Cable 342 – \$64.00 www.DeltaPorterCable.com 800-463-3582
	Ridgid R2500 – \$59.95 www.Ridgid.com 800-474-3443
	Ryobi S652DK – \$39.00 www.RyobiTools.com 800-525-2579
	Skil 7290-01 – \$39.99 www.SkilTools.com 800-387-8304

To find the name of your local retailer visit the suppliers' web site or contact them by phone. Go to www.CanadianWoodworking.com/data for more detailed product specifications.

would be located under your forearm, a cloth bag won't risk scratching an adjacent surface, as it will simply fold out of the way in case of accidental contact. While all these sanders catch dust and are effective to varying degrees, we prefer the micro filter canister as it seems to capture and hold more of the dust. Nonetheless you should still supplement the on-board dust collection with some personal protective gear. Wearing a respirator will keep all dust out of your lungs and keep you breathing easy. An ambient air cleaner and a down draft sanding table can help keep your shop virtually dust free as you work.

Four models (Porter Cable, DeWalt, King, Ridgid) have adapters to connect to a shop vacuum, while you



Dust sealed on/off switch



Wire lever paper clamp



Light and versatile

have to purchase an adapter for the Bosch. If you attach a vacuum hose to a sander you run the risk of pulling the hose across your work, and thereby marring the surface. Also, the weight of the hose can make sanding more strenuous.

Power and Speed

Unlike a belt sander, these sanders do not require a lot of power. Motors range from 1.5 to 2.4 amps generating an average 14,000 orbits per minute. The pads spin in an orbit that ranges from $\frac{1}{32}$ " to $\frac{5}{64}$ ", with most having a $\frac{1}{16}$ " orbit. Because they only have such a small orbit, any irregularity in the grit of the paper will leave small pigtail-like swirl marks on the surface. You'll find that $\frac{1}{4}$ sanders are the least aggressive of all the models and remove material at a much slower rate than their random orbit cousins and this allows more control over fine work.

Power Cord

The power cords that come with these sanders are all reasonable, ranging in length from six feet (King) to a generous twelve feet (Black & Decker, Ridgid). Longer cords are very handy if you don't have an outlet next to your sanding station. In practice you will find that a longer cord gives you better control as the tension on the cord won't be interfering with the movements of the sander. A practice we have found to be useful is to hang the power cord from above the work as this removes any influence of the cord on the motion of the sander.

Practical Considerations

Quarter sheet sanders are all held and manoeuvred with one hand and the size, shape and the material used on the grip area will play a major role in its ergonomics. The sander should fit in your hand comfortably and be easy to hold. If your hand is too small and the grip is a bit too big you will quickly tire of trying to hang on to it, so find a model that fits comfortably in your hand. There are several options for the grips on these units. Most of the models have some kind of rubber coating on the areas your hands will hold. Only the King, Makita and Milwaukee models have grips made of the same plastic as the rest of the sander. Rubber grips reduce the transfer of vibrations to your hands making the unit easier to grip, and the rubber is not as slick as the plastic.

Vibration is a factor with all sanders and the best ones use different mecha-

nisms to deal with it. The Bosch, for example, features a three point counter-balance system. Others (Hitachi, Makita) simply specify a 'low vibration design'. Optimally you'd want to try a unit out before you purchase it. Unfortunately, most tool dealers are not equipped for 'test drives', so it is best to consult other users first if you want to avoid a return trip to the dealer. A question posted on the Canadian Woodworking Magazine Forum (www.CanadianWoodworking.com) about the model you are interested in will usually provide some insight in relatively short order from any users of the same model. If you do a lot of sanding, then consider purchasing anti-vibration gloves, such as those available through Lee Valley Tools. They do a good job of making long sanding jobs less fatiguing.

An on/off switch is the only control that these tools have. Look for one with a switch that is large enough to be easily used and that it is placed so that it can be reached with your hand on the sander. There are two positions for the switches: either on the front of the unit so that it is activated using your index finger, or on the left side where your thumb rests. Either of these locations works well in practice and it is the style and size of the switch that is more critical than the location.

These switches are of three major styles: slider, pushbutton and rocker. Look for one that can be easily manipulated. If it is too small, recessed too deeply, or too close to your palm, it can be difficult for users with larger hands and fingers to manipulate.

For ease of control and maximum flexibility in tight spaces, you'll find a quarter sheet sander a welcome addition to your finishing arsenal.

THE EDITORS

SOURCES

www.BusyBeeTools.com
www.HomeHardware.ca
www.HouseOfTools.com
www.KMSTools.com
www.MorleyMillerMachinery.com
www.TegsTools.com
www.WelbeckSawmill.com

Hollow & Flat Grinding

The method you choose to sharpen an edge tool, such as a plane iron or chisel, will result in either a hollow ground or flat tool face. If you sharpen a chisel against the edge of a rotating wheel on a bench grinder, the resulting surface will take on a concave shape – referred to as *hollow ground*. For decades sharpening with grinders was the only option for woodworkers. Over the past decade or so platter style grinding systems, like the Work Sharp or the Veritas Mk.II, have become popular. Because the platter that holds the abrasive is flat, the resulting surface will be *flat ground*.

Regardless of which method you use, once the blade is sharpened, the edge must be honed on a waterstone or similar flat abrasive surface. This removes any burr on the edge, smooths the surface and polishes it. On a hollow ground blade you hone only two contact points. Subsequent honings will eventually remove the hollow,

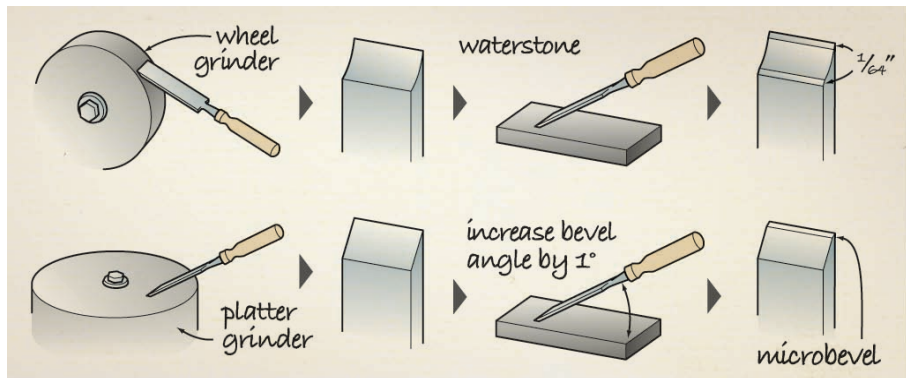


Illustration by www.JamesProvost.com

so that the blade will need to be hollow ground again. Rather than hone all of the bevel surface of a flat ground blade you create a micro bevel by simply increasing the bevel angle of the blade by about 1°, effectively honing just the tip. The quickest and surest way to hone either a hollow or

flat ground blade is with a honing guide. This micro bevel is very easy to maintain. Our experience shows that either method will produce a super sharp blade.

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Custom Tool Handle

Once in a while a tool handle breaks, maybe from excessive blows with a mallet. Or, perhaps you have purchased a tool, but the original handle just doesn't feel right. Whatever the reason, making a new tool handle is an enjoyable process that provides you with the opportunity to further develop your design skills.

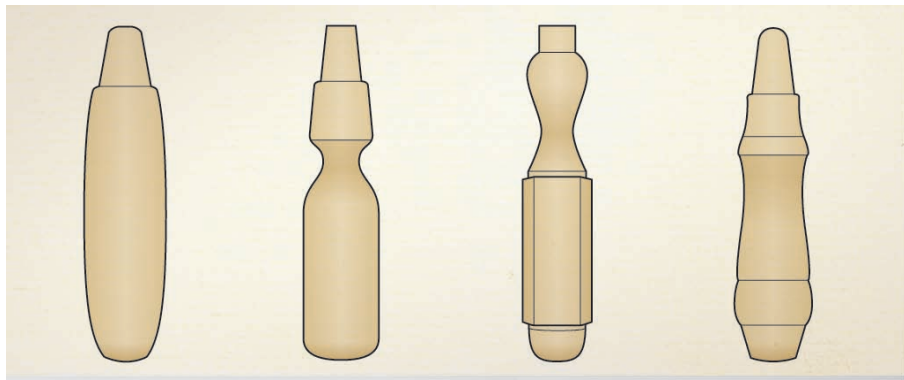


Illustration by www.JamesProvost.com

Common handle styles

I chose to replace the handle of a small bench chisel. The chisel has a sleeve style fitting as opposed to a tang that is inserted into the handle. I decided to use Jatoba (a.k.a. Brazilian cherry), a very hard and dense timber from South America. The colours range from medium brown to an amazing rich orange and red colour, sometimes with fine black lines running through the wood. It's a splendid wood for turning, carving or furniture projects, though it seems largely used as flooring.

You can complete this spindle turning project using three of the four common spindle turning tools: the roughing out gouge, the skew (a turner's best friend) and the parting tool. The one tool that is not used, but could be, is the spindle gouge.

There is no magical formula for the length and thickness (diameter) of the handle. You'll want to turn one that suits your particular hand size, and that

feels comfortable for you to use. For this project I started with a piece of wood 1 1/4" square and about 6" long.

- Using a roughing out gouge turn your blank into a cylinder. There will be a fair bit of resistance coming from the square blank of wood. To compensate for this I begin by presenting a very minimal amount of tool to the wood by using the middle of the gouge (on either side of the tool). Once I feel the resistance gone I can present more of the metal on the gouge to the wood. Remember that the flute should always trail the cut. This means that if the tool is traveling to the right, the flute should face the left, and if it is going left, the flute is facing right.

- To obtain a nice clean end on the handle use the skew tool. A parting tool will square the end but not cleanly. Use the toe, or long point of the skew, lifting the handle so that the toe is falling into the wood. The skew does this so well that no sanding is required.

- Before shaping the handle you need to size and turn the exterior tenon on the handle that will fit into the sleeve of the chisel. This is done using a pair of calipers and a parting tool. Begin by sizing the thicker end first and then the smaller end. When these have been calibrated, use a roughing out gouge to bring the remaining wood down to size. Make sure you frequently check the fit to the chisel so that you end up with a snug fit.

- Using the skew, rough shape the handle and then make a clean finishing cut. The skew is an amazing tool in that it can be used to cut in any direction, and on any part of the tool. It cuts equally well using the heel or short end, and it is in this position that I would normally make a planning cut.

- There should be little, if any, sanding required after using the skew. To complete the handle, I put the tenon in a chuck and, holding the body, just nip off the end using the skew. You can leave the handle unfinished, or apply a finish of your choice; mine is Mylands Friction Polish.

Now you have a new handle for a favourite chisel. Of course, once you see how much better a self-made handle is, you'll want to turn new handles for all your tools.

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Begin roughing with middle of gouge



Then turn gouge on its side



Use skew for a clean end cut



Size thick end of tenon with parting tool



Shape handle with skew chisel



Round over chamfer on handle with skew chisel



Little or no sanding is required



Use skew to nip off end of handle



Illustration: Marcus Cutler

Whitehorse

Whitehorse, the capital of the Yukon (and home to about 70% of the territory's residents) is located on the banks of the wild Yukon River, and lies within the shadow of the imposing Coast Mountains.

It's one of the most beautiful capital cities, rightfully referred to as the 'wilderness capital'. Whitehorse, which developed during the Klondike Gold Rush as a transportation hub, gets its name from the

White Horse rapids (lost to the Whitehorse dam in 1958). The Yukon is part of the boreal forest ecosystem, with the Subalpine fir (aka Rocky Mountain fir) recognized as the territorial tree. It's a medium sized tree that grows up to 60' with a trunk diameter of up to 3'.

Our scroll saw pattern incorporates the Yukon coat of arms at the top (minus the Malamute that normally surmounts the shield) with a vista of the Coast Mountain range and the City of Whitehorse at the bottom. The cross at the top of the shield, which pays homage to our historical link to England, sits astride a heraldic pattern that represents the Yukon's fur resource base. The lower part of the shield represents the Yukon's mountains. The circles (which

would be gold, not black) represent the Yukon's mineral resource base and its link to the Klondike Gold Rush. The two wavy lines in the middle represent the Yukon's great rivers.

Scroll cutting tips

Photo-enlarge the pattern to the size you want. Cover your substrate (such as 1/4" Baltic birch ply) with masking tape, and then spray glue the pattern to the substrate. Using a #5 13 tpi blade, cut out the shaded areas on the template. Start cutting out the smallest areas first, moving on to the next larger areas. Once the pattern is cut out remove the masking tape, lightly sand as required, and then apply your chosen finish.

Projects featured in the woodworkers gallery are chosen by our woodworking forum members.

Kerry Cox, from Fort Saskatchewan, AB made this bowed front jewellery box.

This black walnut box features a red oak lid panel, sides trimmed with maple stringing and a maple and African blackwood compass rose inlaid in the lid. The finish is simply boiled linseed oil, shellac, and wax.

Kerry tells us that several problems presented themselves in making this project, and that he learned a lot in overcoming them.

The key feature is the bow front, made from steam bent $\frac{3}{8}$ " shop-sawn walnut laminations, and formed in a simple template made from pressed hardboard.

The bridle joints for the lid were cut on the table saw with the pieces

held in a shop-built tenoning jig. Kerry glued a paper copy of the compass rose pattern on the blackwood and maple, and cut the pieces out with an Xacto knife.

The inlay itself was used as a pattern to trace the shape onto the lid, and the recess was cut with a knife and chisels. Kerry hand planed the stringing from $\frac{3}{32}$ " maple strips and used a scratch stock to create the straight parts of the groove and a knife to cut the curved corners. After the glue dried a block plane brought the protruding stringing down close to the surface and then a cabinet scraper set it flush.

The inside bottom is lined with adhesive backed felt, dividers were cut from strips of $\frac{1}{4}$ " walnut, and a small walnut and maple tray completes the interior.

Visit CanadianWoodworking.com and join our woodworking forum. That way,



you'll be able to show your work to the world, and vote for our next featured project.

BRENT SMITH

bsmith@canadianwoodworking.com

Continued from page 2

none of the photos in your newsletter come through on my computer. Instead of seeing the photos, I see only a red 'x'. Is this something that can be fixed on your end or mine? – Vincent C., Richibucto, NB

• I'm glad that you are enjoying all of the new tool info in our free monthly eNewsletter. The reason you are not seeing the photos is that your e-mail filter is blocking them.

To see all of the tool photos you can do one of two things:

1) Depending on your e-mail program, you will see a message above the eNewsletter that says: "Click here to download pictures. To help protect your privacy, Outlook prevented automatic download of some pictures in this message.", or, "To protect your privacy, some pictures in this message were not downloaded." (Entourage)

Click on that message to view photos.

2) At the top of every eNewsletter, regardless of your e-mail program, you

will see a message that says: "Have problems viewing this newsletter? Click here to view it on our web site."

Simply click on that message, and you will be taken to CanadianWoodworking.com and view the complete eNewsletter on-line.

For those readers who have not yet signed up for their free monthly eNewsletter, you can do so at: www.canadianwoodworking.com

If you like to find out about new tools for your woodworking shop, you'll love our eNewsletter!

Whale of a Project

I made the 'Haida Inspired Whale Mirror' that was on the front cover of your magazine (Dec/Jan'07, Issue #45), and am attaching a picture of my finished project. It is made from cedar using the different colours in cedar. I then used Watco Danish natural oil to bring



out the colours, and finished it off with a coat of varnish. Loved doing the project.

Thanks to Garnet for the great pattern!

– Ross D., Kelowna, BC

How Fast Was That?

I recently placed an ad on the Free Classified section of your website. I placed my ad at 12:12 PM Monday, Nov. 19th, and received the first reply at 1:57 PM the same day. A second reply came at 3:10 PM, and a third at 3:26 PM. Then at 4:04 PM and 4:28 PM I received two more.

How fast was that!

I have received 9 requests so far and, there are two people set to come to our place this weekend to look at the lumber that I listed!

What a great site.

– Marlene L., Ottawa, ON

• I'm glad that our free classified ads were so helpful. I was on the site today and saw similar activity for such items as: 20" band saw, 10' sliding table saw, thickness planer, radial arm saw, and 20" jointer.

Elm

(*Ulmus americana*)

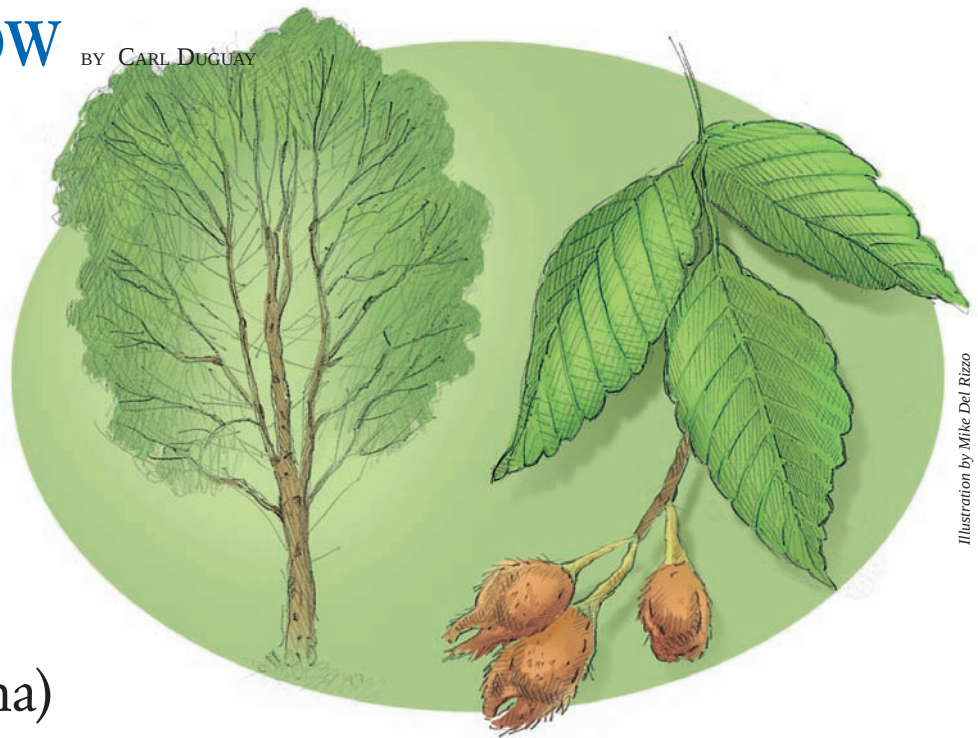


Illustration by Mike Del Rizzo

Of the three species of elm that grow in Canada, white elm (our southern cousins call it American or gray elm) is the most ubiquitous, stretching from the eastern-most part of Saskatchewan all the way to Cape Breton Island. It's one of the largest trees in Eastern Canada, with heights of up to 125' and diameters of up to 7'. This easily recognized tree has a distinctive double toothed leaf. The tree flowers, which contain both sexes, appear before the leaves open up. Sometime in the 1930s a fungal infection began to infect elm trees, and over the ensuing decades Dutch elm disease destroyed vast tracts of elm.

Characteristics

Elm heartwood is typically reddish-brown in color and the sapwood is light-coloured. While the grain can be fairly straight it is often interlocked with a coarse texture. In appearance it most closely resembles oak, also a ring porous wood.

Working Properties

Elm works well with hand tools or machinery as long as blades are sharp. Dull cutting tools tend to produce fuzzy surfaces. Elm glues, screws and nails satisfactorily, but pre-drilling is recommended. It accepts stains and all finishes reasonably well.

Physical Properties

Elm is moderately heavy, hard, stiff, has excellent steam bending characteristics, and moderate dimensional stability. However it is difficult to split because of its interlocked grain. At 12% moisture content it has a specific gravity of .50 and a weight of around 35 pounds per cubic foot. The wood has no characteristic odour or taste.

Uses

For such a beautiful wood, elm has long been relegated to the less glamorous woodworking uses – boxes, baskets, caskets, crates, hockey sticks and other sporting items, flooring, cabinetry, millwork, plywood veneers, and pulp and paper manufacturing. It is, however, a splendid furniture wood, and its bending properties make it eminently suitable for chairs and other bent forms. Surprisingly, even though vast tracts of elm have been killed by Dutch elm disease, elm lumber is readily available, and at around \$4.50 per board foot for 4/4 stock, is competitively priced.



Elm

Shrinkage

Moisture Content	0%	6%	20%
Tangential	9.5	7.6	3.2
Radial	4.2	3.4	1.4
Volumetric	14.6	11.7	4.9

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Smokin' In the Woodshop

Every once in a while you come across someone who takes their enthusiasm to the extreme, no matter how incompetent they may be.

As I have mentioned in previous articles, I once owned a 'do-it-yourself-with-a-lot-of-help-from-me' woodworking shop in the far north. That doesn't mean north of Barrie, for you Ontarians – I'm talking about the Yukon here.

Often, the people who used my shop were rank amateurs (read 'clueless') when it comes to woodworking, but most were well aware of their shortcomings. Some however, were either completely unaware of their ineptitude, or knew it, but thought that maybe I would never catch on. This type of attitude can be harmful in a woodworking shop. When working around rapidly spinning steel knives and blades that are hell-bent on maiming or dismembering you, it is oft-times best to know what you are doing. At least a little bit!

One week a young man came into the shop for a look around. He eventually let it slip out that he wanted to make a set of bookshelves or a dresser, that he wanted to use either pine or oak, maybe mahogany, and that he wanted it to be either three feet high and six feet wide or eight feet high and three feet wide. This lad clearly hadn't a clue. But he certainly was enthusiastic. He claimed that although he hadn't done any woodworking since high school, he had built an entire dining-room suite for his mom, complete with a dresser type thingy and a neat table that sort of pulled out and either three or eight chairs depend-

ing on how hard he thought about it. He got the best mark in the class, too!

The following Saturday he arrived at the shop with a stack of lumber. It was birch! He had decided to build the bookshelf but didn't have any plans. I helped figure things out while he began preparing the wood. He first wanted to rip the wood into four inch strips and then glue it all back together again as his shop teacher had taught him, long ago. I carefully explained that kind of thinking had gone out of favour decades ago and was a complete waste of time. Why take flawless, 12 inch wide boards and cut them down just to glue them back into 12 inch boards that now had ugly joints down the length of them? I had a heck of a time convincing him that if you're a good enough woodworker, there is no need for such foolishness. He was sceptical, but finally agreed with me.

As the day passed, he got better and more confident until I could leave him alone for up to minutes at a time without worrying about what bone-headed stunt he would pull next. By the afternoon he was ready to start dadoing the sides, and after assuring me that he knew what he was doing, I left him alone and went to help another client.

I heard the table saw start up and after listening for a scream and hearing nothing, I assumed all was going well. I finished with my other client and sat down for a well deserved coffee and a smoke. After

my smoke was done I carried my coffee cup to the shop and opened the door to a blinding, acrid pall of billowing smoke. From the depths of the roiling clouds I could hear the saw whining at such an ear-piercing pitch that I thought the coffee mug would shatter in my hand.

I yelled at him to shut the saw off and eventually the nerve grating screech died out. Feeling my way through the smoke, I finally got to the saw and tried to figure out what the problem was. I soon discovered that he had installed the Dado blade set backwards. I quietly pointed this out to him and showed him the brilliant red glow of my now ruined, four hundred dollar dado set. "I thought there might be something wrong," he said.

After bringing into question his parentage, I calmly asked him to leave the shop and not return. He decided he no longer wanted his shelves after all and left the shop in a great hurry. I never saw him again.

A year or two afterwards I found his material while cleaning the shop. I finished the shelves myself and have put them to good use for these past 12 years with nary a warp, twist or cup. I figure they were partial payment for my ruined blades.

DON WILKINSON
yukoners@rogers.com



Illustration by Mike Del Rizzo

COMING EVENTS

THE CHATHAM WOOD SHOW

FEBRUARY 1, 2, 3

Kinsmen Auditorium
Chatham, ON

www.woodworkingshows.com

THE LONDON WOODWORKING SHOW

FEBRUARY 8, 9, 10

Western Fairgrounds
London, ON

www.woodshows.com

SPIRIT OF WOOD FESTIVAL

FEBRUARY 16, 17

Pitt Meadows & Maple Ridge, BC
www.spiritofwoodfestival.com

KITCHENER-WATERLOO WOODSHOW

MARCH 14, 15, 16

Bingemans Centre
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BY MEL SEVINDIK

ACROSS

- 1 type of warping that causes boards to curl in more than one direction from end to end
- 3 tendency of blades and cutters to throw back material being milled
- 7 a daring undertaking
- 8 profile, which resembles a board rounded over at each face of one edge
- 9 45° angle milled into the edge or end of a board
- 12 lightly scuffing a slick or shiny finish to promote adhesion of another finish or topcoat
- 15 cut a groove running in the same direction as the grain of the wood
- 16 ___ saw, handsaw with a rectangular blade with a reinforcing rib along the back for stability
- 19 projection extending from the end or edge of a board usually specially cut to fit a mortise
- 20 strip of wood or metal separating and holding panes of glass in a window or door
- 25 part of a bit that fits into a tool's collet or chuck
- 26 crossed wood, iron plate, or bars
- 27 state of being in the true horizontal plane
- 28 ___ fit Assembling the pieces of a project to check their fit before gluing
- 29 concave cut or dimple left at the tail end of a work piece passed through a jointer

DOWN

- 2 missing wood or untrimmed bark along the edge or corner of the piece
- 4 portion of a branch or limb that is embedded in the wood
- 5 structural member loaded on its narrow face
- 6 barrier that prevents entry of the operator's hands or fingers into the point of operation
- 7 edge, rim, margin, brim, brink, limit
- 9 warp along the edge line; also known as crown
- 10 a substance that is capable of bonding material together by surface attachment
- 11 the distance of something from bottom to top
- 13 wood cut from the portion of a tree between the heartwood and bark
- 14 the craft of making cabinets
- 17 shape of a piece of trim as viewed from an end
- 18 ___ steel, extremely hard, long wearing steel used in high quality cutters, blades, bits and knives
- 21 principal post at the foot of a staircase
- 22 angle at which the leading edge of the teeth are cut on a saw blade
- 23 thick protrusions of a dovetail joint
- 24 upright beam in a building framework



Word scramble: A key ingredient in wax: _ _ _ _ _

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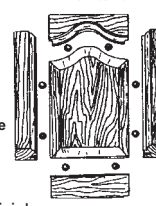
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Zero Clearance Inserts



The throat insert that comes as standard equipment on a table saw is meant to provide sufficient *clearance* around the blade as it moves through its full range of motion. While this is convenient, it does little to *support* stock close to the side of the blade, which often results in chip-out (particularly on sheet goods) and can also result in thin pieces of waste material jamming between the throat insert and the saw blade.

A Zero Clearance Insert (ZCI) is a replacement for the throat insert that came with your table saw. While you can buy a ZCI, as you'll see, they are very easy to make. Once you install the ZCI on your table saw you'll cut the opening for the saw blade so that it's the exact width of the saw blade kerf. It's a good idea to make a 'master' ZCI that you then use to make a new insert any time the need arises. But don't throw your original throat insert out – you'll still need to use it whenever you cut bevelled angles with your table saw.

Make the Master ZCI

Begin with a piece of $\frac{1}{4}$ " or $\frac{1}{2}$ " (which ever is closest to the thickness of your insert) Baltic birch ply or a similar rigid ply that is a couple of inches longer than the length of the throat opening on your table saw. Using a ruler or calipers, measure the width of the throat opening, set the table saw rip fence to this measurement, and cut the ply blank. Be sure that both edges are parallel and straight. Remove the throat insert from the table saw. Put a couple of strips of double sided tape on the insert, and place the blank over the insert, ensuring that the sides are flush. Trim the excess at the corners of the blank with your band saw, staying about

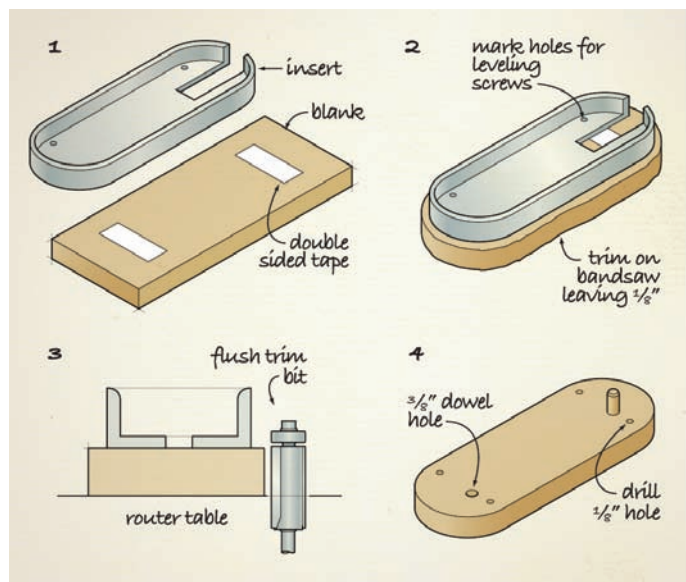
$\frac{1}{8}$ " away from the insert. Install a flush trim bit in a table-mounted router and rout the blank to size.

Before separating the insert and the blank, mark the four holes for the levelling screws on the blank. Separate the insert and the blank and test that the blank fits snugly in the table saw throat – you may have to fine tune with a bit of sandpaper for the perfect fit. Using a drill press drill $\frac{1}{8}$ " holes on the marks for the levelling screws, and drill two $\frac{3}{8}$ " holes $1\frac{1}{4}$ " from the left edge of the insert. You now have a master ZCI that you can use to make working ZCIs.

Make Working ZCIs

You'll need several ZCIs: one for standard $\frac{1}{8}$ " thick blades, one for thin kerf blades, and one for dado blades. Cut a blank for a new insert just slightly larger than the master. Place dowel centers in the two dowel holes and press the master onto the blank. Drill out the holes, insert dowels into the master and place the blank on the master. Remove the excess material at the ends with a band saw and then use a flush trim bit in a router table to create an exact copy of the master. Before separating the two pieces use an awl to mark the locations for the levelling screws; this will be the bottom side of the ZCI. Now separate the two pieces.

Install #4 flat head wood screws as levelling feet on the bottom side of the ZCI, and then level the top of the insert to the top of the saw table. Add a screw to the rear of the insert to catch on the recess under the table; this is to keep the ZCI in the opening when the saw is turned on. Lower your table saw blade all the way down, and put the ZCI in place (if the blade is too high for the ZCI to seat properly, install a smaller diameter blade on your saw). Move the rip fence so that it covers as much of the insert as it can without the risk of being damaged by the saw blade. Ensure that the blade is set to 90° and gently raise the blade through the insert. When using the ZCI for cuts with the blade at 90° it is advisable to add a splitter as well. The one we like is the Micro Jig splitter. Now you're ready to make a ZCI for your thin kerf and dado blades.



THE EDITORS

SUPPLY CHECKLIST

- $\frac{1}{2}$ " Baltic birch
- double sided tape
- $\frac{3}{8}$ " dowels
- four #4 flat head screws

SOURCES

MICRO JIG SPLITTER AND DOWEL CENTERS
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