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OCTOBER/NOVEMBER 2009
ISSUE #62



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From truing shoulders to thickening tenons, this hand plane does the lion's share of joinery fine-tuning.



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COVER STORY

8 Router Bit Cabinet

Store your router bits in style with this simple, yet elegant cabinet for your wood shop.



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vtesolin@canadianwoodworking.com

There is really no end to the amount of money you can spend on tooling your wood shop. These days there seems to be a tool for everything, which makes it very tempting to fill your shop with them. Many tools are very job-specific but do not offer much in the way of versatility. There are those of us who work in a 170 sqft shop for which every tool purchase, no matter how big or small, needs to be carefully considered. It seems that no matter what size your shop is, there is always a need to have more space. So, is there a tool out there that offers versatility, power and job-specific performance? Absolutely – enter the router. This modest power tool can handle anything from joinery to profiling to milling or dimensioning. While I'm the first person to insist on hand-cut dovetails, if I had a kitchen worth of drawers to do, I'd be reaching for a router. Routers get a lot of bad press because they tend to be too loud and spew dust all over your shop. But I can assure you, with the proper personal safety practices and an effective dust collection system, routers can become the focal point of your shop. I'm all about hand tools, but I can recognize when a machine will offer the speed and accuracy that a hand tool can't. In my shop I strike a balance that allows smoothing planes and routers to coexist in relative harmony. If there's one thing I have learned from being a woodworker, it's that versatility and an open mind are key ... and a healthy selection of router bits doesn't hurt. Work safe ... work proud.

Vic Tesolin



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Magazine Makeover

I believe the latest change to the newly titled *Canadian Woodworking & Home Improvement* is an intelligent move, as those of us who love working wood are naturally inclined to apply that skill set to our homes. I believe you will find great enthusiasm for this approach amongst your readership.

Over the years all the various improvements to the magazine have consistently been for the better and I must admit there has been tremendous change since the early days.

Peter M
Fonthill, ON

I just have to congratulate you on the new look of your *Canadian Woodworking & Home Improvement* magazine. It is truly world class. You've moved up to the top of the list of woodworking magazines, and best of all, it's Canadian. Another proud Canadian moment. Keep up the great work.

Your friend in woodworking,
Dave Wooland
TheSawShop.com

I'd Like to Sell Your Magazine

I was wondering what would be involved in selling your magazine at our two Hamilton locations. Our store copies get snagged up rather quickly, so I thought it a good idea to offer our customers a chance to purchase a copy for themselves.

Gabe Chaimovitz
Tegs Tools & Machinery
tegstools.com

Publisher's Note

More and more woodworkers are calling to ask where to pick us up, so adding new locations is always appreciated.

If you are a woodworker, please see our website for a complete list of stores where you can pick up a copy.

If you are a store owner, please call for details on how you can sell Canadian Woodworking to your customers.



Sash Fillister Plane

by Dan Barrett
dbarrettandsons.com
Barrie, ON

The sash fillister plane cuts a rabbet or tongue, on sash-bar used for doors and windows. The depth of cut is controlled by the depth stop assembly, which can be adjusted using the thumbscrew. The body, arms, and blade wedge are European steamed beech with a boxwood sole attached to the body using sliding dovetails. The arm and knicker wedges are African black wood. The blade and knicker are made from O1 tool steel. The mouldings are made using a combination of power tools and moulding planes. Every part of the plane is made in our shop.



Side Tables

by Jim Sinclair
Ottawa, ON

This pair of side tables is made from a combination of cherry and bird's eye maple. The base is solid cherry, and the box is bird's eye veneered Baltic birch with solid cherry accents. The top is solid bird's eye maple. The drawer is a basic solid maple dovetailed drawer fit to the box opening and a false front made from the box's missing face. The tops are just under an inch thick with a substantial hand planed under-bevel that gives them a light appearance. There is a maple detail in the cherry arches, on both front and back. It's actually just a couple of maple layers in the bent lamination used to create the arches.



Show your work to the world! Visit canadianwoodworking.com and join our forum!

Correction

Last month in the Raised Panel Door article (Issue #61, pg 10), we mentioned the use of Space Balls to keep the panel from rattling. We neglected to give you the Canadian source for this product. You can find them at Black Bridge Online and you can reach them by phone at 1-800-826-8912 or online at blackbridgeonline.com

Steve Maxwell has posted a video on his website to accompany the Hand Rail article in Issue #61, pg 32. Visit stevemaxwell.ca and click on 'Steve's Videos' to view the video clip.

“I need one of those.”



And one of those. And that. And that. And that. Oh, and both of those!



Skil Benchtop

Whatever you're looking for in Benchtop tools, Skil's got it. And features? Well, call them innovations. Like built-in LED lights to make your work area brighter. Lasers that guide you through precision cuts and perfectly drilled holes. Oversized knobs and one handle adjustments ensure everything is perfectly aligned and easy to set up. And of course, the quality that Skil's famous for. Build your perfect workshop and next project with Skil, because doing a job right isn't just a tag line, it's our passion. Go to www.skiltools.com for details on the complete line of Skil tools today.

SKIL
Do it right. Do it with Skil.™

Festool Lithium Ion Cordless Drills

Festool USA has announced the launch of two new lithium ion cordless drill/drivers, the T 12+3 and T 15+3. With sophisticated electronics, brushless motors and lithium ion batteries, they offer the most power and lightest weight in their class, backed by a three-year warranty.

The new brushless motors are electronically controlled with fewer wearing parts and less friction, to make more efficient use of energy. Each drill set has five different chucks that utilize Festool's tool-less FastFix and Centrotec interfaces for incredible flexibility and ease of use.



At just over 3 lbs, the T 12+3 packs 10.8 V and up to 1500 rpm, while the T 15+3 weighs just under 3.5 lbs, with 14.4 V and up to 1500 rpm. Each drill is available as a set, which contains the TRC 3 charger, two 2.6 Ah Lithium ion batteries, four FastFix and Centrotec keyless chucks (quick release, standard 1/2 inch, right angle, and eccentric), a Centrotec starter set, and the award-winning Systainer. For more information, visit festoolcanada.com.

Forrest ChopMaster



Forrest Manufacturing has introduced the first blade in its new Signature Line of saw blades. The new Signature Line Chop Master has 90 teeth and -5° hook to control feed rate. It is currently available in 10- and 12-inch diameters with 5/8- or one-inch center holes. Custom sizes are also available. The 10" blade sells for \$167.00 and is available at forrestblades.com.

Like all Forrest blades, the Signature Line Chop Master features super hard, corrosion-resistant C-4 micrograin carbide saw blade tips that provide up to 300 percent longer life between sharpening than other blades. Proprietary grinding techniques and hand straightening guarantee the finest cutting edges possible coupled with exceptional perimeter concentricity, perfect plate flatness, and side runout to +/- .001". For more info on the new Signature Line, visit forrestblades.com.

KMS Update

Since the recent acquisition of the former House of Tools locations, things have been quite busy at KMS. Besides the new locations, KMS has their main store in Coquitlam and has branches in Abbotsford, Kamloops, Kelowna, and Red Deer.

KMS will be holding their 4th Annual Wood Show & Tent Sale from October 16th-18th, 2009. The main woodworking show will be held at the Coquitlam store, with all other locations participating in the three-day sale. The Coquitlam show will include live interactive demos, great customer prizes, free smokies and pop, free admission, free parking, free delivery and hot deals on tools and accessories.

Customers can join the KMS Club, which will get them the KMS monthly flyer sent directly to their homes and discounts of up to 30% off regular prices. Registration is available online or in store.

Survey Winner!

Thanks for the Freud router! I have attached a photo of me, my new router, and my wife's favourite project to date, a cedar chest. I have been doing all types of woodworking for about 30 years. I have done many projects from urn boxes to the cedar chest in the picture. I have been working for a construction company for the last 22 years that specializes in restoration of historical buildings. Many awards have been given to the company for the work done.



Kevin Booth

WELCOME TO THE NEW STONE AGE.



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With other new features including a cabinet saw with a riving knife guard system and jointers with the largest, flattest fences available, you could say we've entered a new era of tool making.

Visit steelcitytoolworks.com to find your nearest distributor.





Router Bit CABINET

Without them your router is an expensive paperweight, so protect your investment in high quality bits by storing them in this elegant wall cabinet.

BY MICHAEL KAMPEN

This cabinet uses finger joints to join the case. A finger joint is very similar in construction to a dovetail joint, which makes it perfect for this project. The primary difference is that with dovetails, the sides of the fingers are angled, while with the finger joint the sides of the fingers are parallel to each other. Essentially, a finger joint is a series of equally sized and equally spaced fingers cut on the end of each of two boards, which then fit together to create an interlocking finished joint.

Build the Case

Begin by laying out the parts on your stock. Use a band saw to cut the slightly oversized side pieces (A) and the top and bottom (B) from the stock and then dress them to the thickness and width using a jointer and a thickness planer. Cut these pieces to length and cut finger joints into the two sides and the top and bottom pieces.

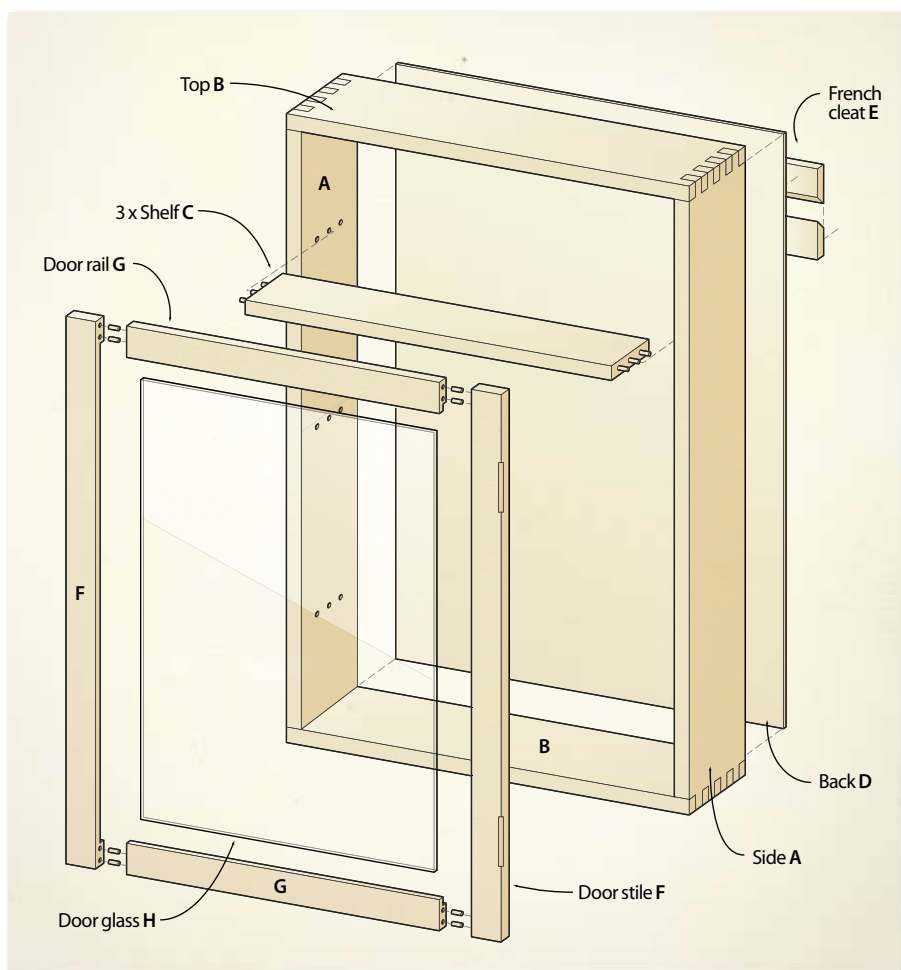
Cutting Finger Joints

When designing the appearance of the corner joints, there are several things to consider. The width of the fingers is determined by the size of the cutter you are using. The width of the piece you are cutting will be limited by the router table and size and style of your jig, but will also need to be divisible by the width of the cutter without a remainder. In this case I used a $\frac{3}{8}$ " carbide spiral bit to cut the fingers, which meant that the depth of the cabinet has to be a multiple of $\frac{3}{8}$ ". As I wanted the sides to fit between the top and bottom, I opted to have a full finger on each edge of the top and bottom. After adding in all of the other requirements for the back and inset door, I determined that a width of $5\frac{5}{8}$ " would allow for 15 fingers, including a full one on each end of the top and bottom, while providing enough depth to accommodate my largest bit, a Freud panel raiser.

Set-up

The secret to achieving a good fit with a finger joint is to set the correct bit height and to fine tune your jig using a couple of test pieces, milled to the same thickness as your project material. Using the simple jig described in the side bar, it is possible to cut perfect finger joints on the router table using a spiral bit. Follow the following simple steps to set up your jig.

Photos by: Michael Kampen Illustrations by: James Provost



Super strong – Finger joints provide a very strong corner connection for cabinets and boxes.



Make it proud – Using sheets of office paper, boost up the set-up height to ensure the fingers finish slightly proud.

Set the height of your bit to be just slightly greater than the thickness of your material. If you set the bit too high, you will need to sand a great deal of end grain, and if you set it too low, the fingers will be too short. Set five sheets of paper on your router table and place one of your test pieces on them. Place the second piece on top and cantilever it out over the bit. Move the pieces back and forth slightly and raise the bit until you feel it start to catch on the upper piece. Lock the router in place before making adjustments to the jig.

The indexing pin you use must match the diameter of the spiral bit exactly. With shop-made jigs as well as some commercial jigs, you need a separate face for each different bit size you plan on using. The Veritas Right Angle Sled has an innovative indexing pin that is adjustable and can accommodate a wide variety of bit sizes.

To fine tune the spacing of the fingers, adjust the jig so that the distance from the edge of the bit to the edge of

the indexing pin is exactly the same as the bit diameter. If you are using a spiral bit this can be a little tricky so mill some stock that fits exactly into a groove made by the cutter. Set a short length of this set-up material next to the bit and adjust the jig so that the indexing pin is set against the side of set-up material and fasten it in place.

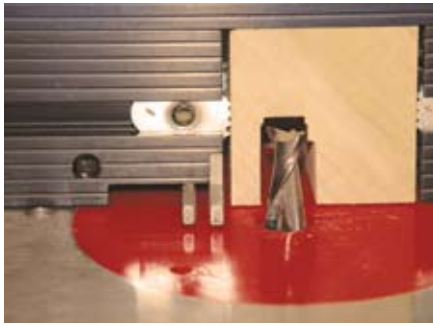
Set your board against the fence and bring the edge into contact with the indexing pin. Advance the material through the cutter to cut the first finger and then return it to the start position. In this case the bit need only penetrate into the body of the jig far enough to cut the full width through the entire cut. If you prefer to remove the board before returning the jig to the start position then run the bit through the jig until it is in the clear, remove the board and return the jig to the start position. This can sometimes be an advantage when the wood has shown a tendency to tear out easily during a cut.

Materials List

Part	Qty	T	W	L
A Sides	2	$\frac{7}{8}$	$5 \frac{5}{8}$	$33 \frac{1}{2}^*$
B Top & Bottom	2	$\frac{7}{8}$	$5 \frac{5}{8}$	$23 \frac{3}{4}^*$
C Shelves	3	$\frac{13}{16}$	$3 \frac{3}{4}$	22
D Back	1	$\frac{1}{4}^{**}$	$22 \frac{7}{8}$	$32 \frac{9}{16}$
E French Cleat	1	$\frac{5}{8}$	$3 \frac{3}{4}$	23
F Door Stiles	2	$\frac{13}{16}$	$1 \frac{3}{4}$	$31 \frac{1}{2}$
G Door Rails	2	$1 \frac{1}{16}$	$1 \frac{3}{4}$	$18 \frac{7}{16}$
H Door Glass/Polycarbonate	1			

* Finished length – allow $\frac{1}{32}$ " extra at each end to be able to sand the finger joints flush

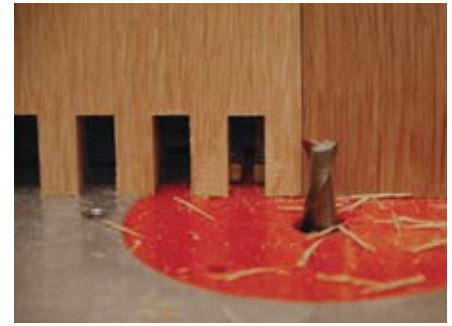
** Actual dimensions are slightly less than $\frac{1}{4}$ "



Adjustability is key – Veritas provides an adjustable pin for cutting finger joints.



Move on down – For subsequent cuts, place the gap over the pin to register the board.



Butt up – Keep the first board in place in order to ensure proper registration of the next board.

Place the first notch that you just cut over the indexing pin and cut the next finger. Keep doing this until you come to the end of the material.

To ensure the proper offset between the two adjoining pieces, after cutting the last notch in the first piece, set it over the indexing pin and then place the next piece up against it and cut the first notch in the second board. After the notch has been cut, set the first piece aside and continue cutting the remaining fingers for this corner. Repeat the above steps for the

remaining corners. When the finger joints have been cut, tilt the fence on your jointer over to 72 degrees and bevel the outer front edges.

Jigs

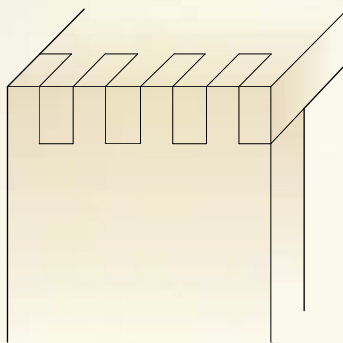
Jigs will vary in their design and use. The three systems I have used, a shop-made jig, the Woodline system and the Veritas Cross Sled, all work equally well. With the Woodline Spacer Fence, the material is run along the index key, which is mounted to the table. In the

case of the Veritas Cross Sled, the index pin moves with the wood you are routing. If you are using a commercial jig, always read and understand the instructions that came with your jig.

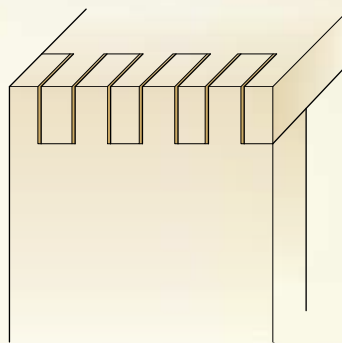
With the finger joints cut, assemble the four outer pieces and dry clamp them to confirm the fit of the joints and measure the actual length of the shelves. Clamp them firmly enough to close any gaps, but not so tightly as to distort and bow the sides, as this will give you a false measurement of the length of the shelves. Don't cut any of the shelf and door pieces until you have assembled the outer pieces. Measuring the actual project under construction will provide you with the exact dimensions you need. Use the material list as a rough guide only once you have begun construction. Mill the material for the shelves (C) to the correct cross sectional dimension and cut the pieces to length. I used a dowel jig to drill the dowel holes that hold the shelves in place.

Cut the rabbet for the back using a hand-held router and a rabbeting bit. With the case dry clamped, place it on your workbench or the floor and then rout a $\frac{3}{8}$ " by $\frac{7}{8}$ " rabbet around the back edge in several passes using a piloted rabbeting bit. Before disassembling the case, measure the opening for the back (D) and cut it to size on the table saw. The rabbeting bit will have left a rabbet with round corners and these will have to be squared with a chisel if the plywood is to fit. A much easier option, and the method I use, is to round the corners of the plywood back using a sander so it fits the round corners left by the router bit.

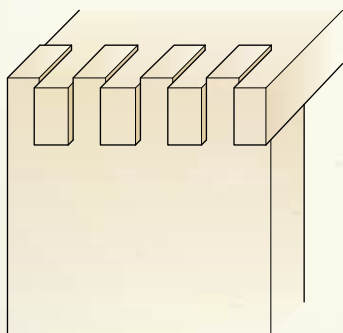
Before disassembling the case, mark the location for the hinge mortises on



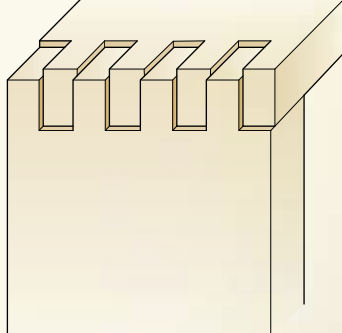
If this is too tight, the indexing pin is farther from the bit than the bit diameter.



Loose fitting joints indicate the indexing pin is closer to the bit than the bit diameter.



If your bit is set too high your fingers will be too long and will require additional work to level with the surrounding wood.



If your bit is set too shallow, the fingers will be too short to come up to the surrounding wood.

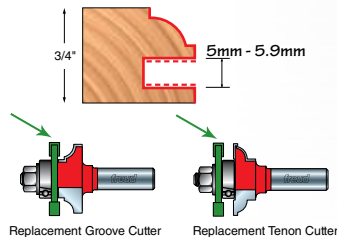
In Search of the Perfect Bit? Freud Has What You Need!

Check out these **NEW ROUTER BITS** specifically developed by Freud to answer your requests. Now your projects are easier than ever before!

Freud continues to expand its' wide router bit product line with bits designed to increase your productivity and quality of your projects. Make sure to ask your Freud dealer about these and other specialty bits today!

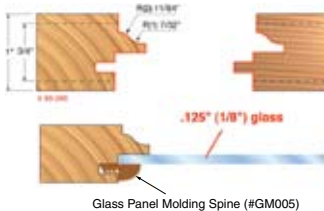


99-260 with Metric Groove Cutter installed



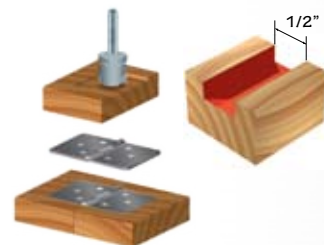
Adjustable Metric Plywood Groove Kit for Matched Rail & Stile Bits (54-260):

This is a bit set many of you have long asked for! Freud now offers optional replacement groove & tenon cutters for all Freud Matched Rail & Stile Bit Sets (#99-260, 99-261, 99-263 & 99-264). This kit adjusts from 5 - 5.9mm allowing you to create a perfect fit for cabinet doors using metric plywood panels.



Glass Panel Cabinet Door Bit Set (99-286):

This specialty bit creates top quality, tight fitting glass panel door joints with ease and accuracy. The extra strong rail & stile joints offer significantly more gluing surface and features a unique locking mechanism – no other set on the market provides this feature. Also look for our Glass Panel Molding Spine (#GM005) for a professional and secure look.



Hinge Mortising Bit & Flush 1/2" Dado Bit (16-560):

Not only is this the perfect replacement bit for the Porter Cable Hinge Butt Template Kit (model #59381) it can also be used as a 1/2" flush dado cutter. Simply replace the bearing with a new flush trim ball bearing and you can easily cut 1/2" dados and grooves. This optional ball bearing (#62-103) will soon be included with the bit at no extra charge. Another added bonus from Freud!

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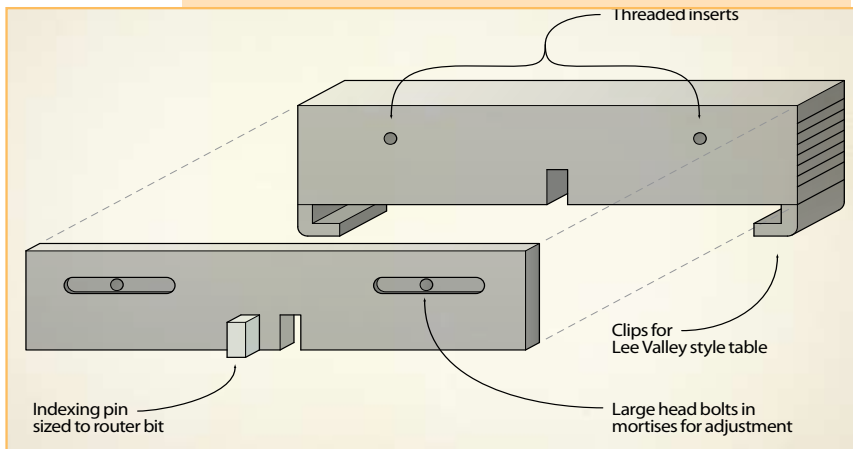
the side piece, 4 $\frac{3}{8}$ " in from the top and bottom pieces. Use a guide and a trim router with a $\frac{1}{4}$ " carbide spiral to cut the mortise for the hinge before assembling the piece. After assembly, the shelves will only allow you to rout half the mortise; the rest would then need to be done with a chisel.

Break up the finishing

I prefer to finish most of my projects before assembly as this ensures that I never have any problems with excess glue or poor sanding ruining a finish. With most projects that use dowels or mortise and tenon joinery it is a simple matter; mask off the joinery, apply the finish and assemble the project. In this case, the finger joints need to be sanded after gluing so it isn't possible to finish the pieces beforehand. On the other hand, when the finger joints are assembled, the glue will tend to be pushed into the inside corner where it will squeeze out into the interior surfaces. These corners would make it very difficult to

Shop-Made Jig

Use Baltic birch plywood to build an 'L' or box-shaped fence. If your router table has slots in it, attach some runners and use these to



guide the fence; otherwise, attach guides that will run along the edge of the router table. Be sure that the jig moves freely on the router table and use wax to reduce any friction. Mount a couple of $\frac{1}{4}$ x 20TPI threaded inserts into the face of the fence to receive the mounting bolts for the individual faces. Cut some plywood for the faces and use a pair of router bits to cut a stepped through mortise for the two large head bolts that will hold the faces to the fence. Use the router bit for which the face is to be sized to cut a groove in the bottom edge, just to the left of the center. Use a set of digital callipers to measure the opening and then use a thickness planer to mill a piece of hardwood for the indexing pin in order to fit it exactly. The thickness of the index pin must match the width of the cutter exactly. Glue a section into the opening cut in the face. Mount the face to the fence with the large head bolts and use them to adjust the gap between the bit and the indexing pin. You will need to make a separate face for each cutter or finger size that you will need and then attach it to the fence on this jig.



Set the bevel – Tilt the fence of your jointer to 72 degrees to bevel the case sides.



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clean up excess glue afterwards and to sand the surface for a perfect finish. In order to avoid potential finishing problems, some parts of this project must be finished before assembly and the rest afterwards. Sand and finish the inside surfaces and the front edges of the sides, top and bottom before beginning assembly. I used a couple of coats of Watco Danish oil followed by a couple of coats of Les Anciens Ébénistes Natural Liquid Wax (waxine.com). This finish can be easily renewed to keep the piece looking new and fresh forever.

Gather all of your clamps, glue and dowels and go through a dry run without the glue to ensure that there will be no surprises when the glue hits the wood. With the piece assembled, apply some wax to the inside corners where the glue will inevitably be forced out of the joint to prevent any squeeze-out from adhering to the wood. Because I used the maximum number of dowels for each shelf, five at each end, I broke the assembly into two stages to make it more manageable. To begin the process I glued all of the dowels into the ends of the shelves ahead of time. When doing this, be sure that the dowels are seated completely and that they don't gradually raise out of the holes before the glue locks them in place. Even with the dowels inserted in the shelves, there is still no time to waste during the final assembly. The wood glue I use has an open time of five minutes, which requires an organized, efficient approach. You can reduce stress by selecting glue with a longer open time. Deposit a small amount of glue in each of the dowel holes on the sides and then use a glue spreader or plumber's flux brush to apply glue to the finger joints.

Assemble the pieces and clamp the cabinet up. Check the diagonals to be sure that the assembly is square. After 30-45 minutes, use a scraper to gently remove the semi-hardened glue from the waxed corners. It should pop off cleanly without any residue. Set the cabinet aside and allow the glue to fully cure.

Cabinet Back

The back panel of the cabinet is made of 1/4" Baltic birch plywood and is finished with milk paint. You won't

find this paint in stores, you'll have to order it from the only Canadian manufacturer, Homestead House Paint Company in Toronto (homestead-house.ca). Milk paint is a finish that has been used for hundreds of years and is a natural combination of lime, casein (milk protein) and vegetable or mineral dyes (for more on milk paint see 'Milk Paint' Aug/Sep '09, Issue #61). To protect the surface from water, apply a couple of coats of the liquid wax on top of the milk paint.

When the glue has cured, unclamp the cabinet and sand the outside edges. The hardness of the end grain of the finger joints will be somewhat difficult to sand evenly with a random orbit sander but the new small belt sander from Porter Cable (Model #371) makes it possible to level the finger joints quickly with maximum control. After levelling the finger joints, use a random orbit sander to finish-sand the outer surfaces. Apply a couple of coats of oil to the cabinet and follow this up with a couple of coats of wax for the entire cabinet.

To mount the back, turn the cabinet over onto a blanket and place the back in the rabbet. Use a small drill bit to drill pilot holes for the #6 screws and screw the back in place. Mill a piece of material for the French cleat (E) and cut it to length. Tilt your table saw blade over to 45 degrees and rip the piece in half. Fit one of the pieces to the top of the back of the cabinet with the point facing down and away from the back of the cabinet. Fasten it in place with glue and some screws or use a finish nailer. Mount the other piece to the wall and hang the cabinet.

Make the Doors

With the cabinet finished, cut the rough stock for the door rails (F) and stiles (G) (see Aug/Sep '09, Issue #61 for more on raised panel door construction). If you use mortise and tenon construction or a rail and stile set, be sure to adjust the length of the pieces as required. Because this is a large door and the rails and stiles are rather small in cross section, be sure to choose straight grained wood without any knots, as they will likely cause the pieces to bow slightly, making it difficult to get an even fit



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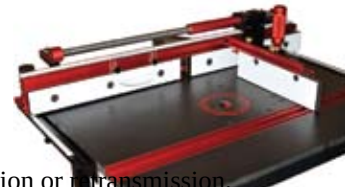


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Simple yet strong – Using dowels to locate the shelves is a strong and convenient way to attach them.

with the door. With the rails and stiles cut to length, I used a dowel jig to drill a couple of dowel holes in each of the four corners. To cut the rabbet on the router table, install a $\frac{3}{8}$ " spiral bit in the router table with a fence. Rout the rabbet the full length of the rails and then dry assemble the door. Mark the length of the rabbet in the stiles on the face with a pencil line and place a line on the fence at either edge of the spiral bit. Line the first mark up with the start of the cut and run the stile along the fence until the mark at the other end lines up



It's all in the details – The bevel on the case side provides a point of interest on the cabinet.



Keep track – Mark the locations of your shelves so there will be no confusion when it comes time to assemble.

with the line on the fence and then pull the piece away from the fence. With the rabbet cut, assemble the door with glue and clamp it up. Check the diagonals to be sure the door is square and also check to see that it is sitting level within the clamps, or the door will be twisted. After the glue has set, sand and finish the door the same way as the cabinet.

Shim the door into the opening so there is an even gap all the way around it and mark the location of the hinge mortises. Use the router table to cut the mortises and then drill the holes for the hinge mounting screws to avoid the soft brass screws snapping off in the hard white oak. Take the door to a glass shop and have them cut the glass for it. They can easily sand the corners to match the routed rabbet. You have two options to mount the glass; either run a bead of clear silicone around the inside edge of the rabbet or mill some material and use three #4 flat-head wood screws to hold each piece in place. Drill pilot and clearance holes to avoid splitting the material.

Mount the knob so that the screw at the rear of the door lines up with the edge of the middle shelf. Recess a rare earth magnet into the face of the shelf using a rare earth magnet cup and washer set (#99K33.15, leevalley.com) to act as a catch to keep the door closed.

Keeping your router bits close at hand and organized will only improve your efficiency in the shop. Why keep your prized collection in a plywood box when you can give them a luxurious home that dresses up your shop?

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Installing Crown Moulding

PART ONE



Of all the trim work in a house, there is probably nothing that makes such an impact as the look of crown moulding around a room.

BY ROGER KNAPP

Crowns add to the quality and value of the home and bring an element of elegance. The placing of crown moulding ties the ceiling and the wall together, not by blending them but by highlighting their different features.

In this three-part series, my intention is to assist all woodworkers out there

who may have considered crowns in the past but were unsure about how to cut numerous compound angles correctly. I will walk you through the measuring, cutting and installation process, and give you tips and solutions to overcome problems you may run into. This is definitely a rewarding home improvement project.

In this first part, I will list the tools you will need for the job and go through the process of installing crown around

Tool Up

Most serious woodworkers will already have the required tools. You will need:

- 10" mitre saw or compound mitre saw for crowns up to 4 1/4" wide
- Brad nailer (2", 18 gauge) with a portable compressor
- Adjustable protractor or angle finder
- Sliding bevel square
- Tri-square
- Large protractor
- Good quality tape measure
- Stud finder
- Block plane
- Two adjustable stands to support the moulding when being cut
- Shop-built or store bought jig to support the moulding 'in position' on the saw.

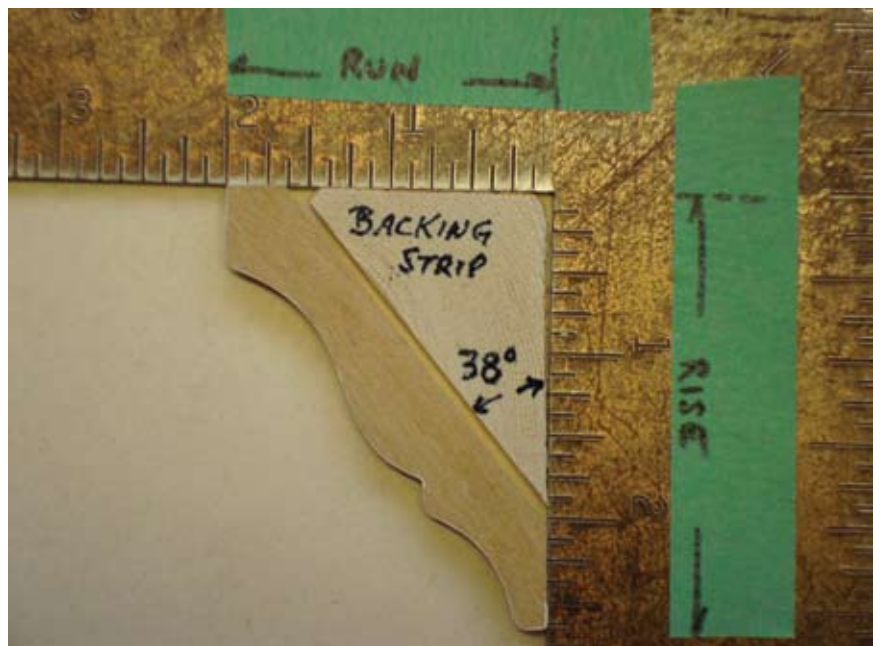
a room with horizontal ceilings. The second part will guide you through installing crown with a sloped or vaulted shape ceiling. I will also discuss combining crowns with other profiles to create the look of custom millwork. The last segment will be devoted to readers who have a curved wall for crowning. The techniques can also be used to make curved hardwood crown moulding for cabinets.

You will need to cut a set of patterns, which will reduce the chance of making a wrong cut, and another set of longer patterns to fit crowns in the corners. All my cuts were performed in position with the mitre saw. This meant that the bevel was set at 0 degrees (no compound angles to calculate). Cutting the moulding in the jig greatly reduces the chance of cutting the mitre incorrectly and you only have to concern yourself with one angle setting per cut. If you own a compound mitre saw and you wish to make the cuts on the flat, a chart for the correct bevel and mitre angles are available from your saw manufacturer's website.

The material list should include Spackle drywall filler, Dap paintable caulking, a sanding block, wood glue, brad nails, screws



Solid surface – Nailing strips give you a dependable nailing surface onto which the crown can be secured.



Spring angle – This is the angle from the wall to the back of the moulding.

As Seen on TV...

Canadian Woodworking's editor Vic Tesolin was recently featured on Canada AM, a national news morning show on CTV. Vic presented DIY solutions to typical household problems, including: Fixing a Loose Chair; Adjusting a Sticking Door/Drawer; Repairing a Torn Screen; Replacing a Door Knob; and Taking Care of Your Furniture.



The shows ran live July 21-24, but can still be viewed by going to ctv.ca and entering 'Vic Tesolin' into the search bar. Then, sit back and enjoy a little R&R, while Vic, Seamus and Marci do a little DIY.

for large backing strip and good quality trim paint.

Crown moulding is available in popular hardwoods like oak and maple, and primed softwood and MDF. Oak or maple crowns can be stained and finished to match existing kitchen cabinets.

I chose MDF over finger joint wood moulding because I needed to bend the moulding on a curved wall, and I believe the bending would strain any finger joint to the point of cracking. MDF is a good product to work with. It is light, uniform in shape, is smooth and takes paint well. You will want to choose the size of moulding that looks

best for your house. The crown needs to be as wide as or wider than the baseboards or other trims in the room for a balanced look. Also the height of the walls should be considered in your decision.

The first step is to calculate how much material to buy. Walk through the house and roughly measure the rooms, then add 10% to this estimate. Once home you will need to acclimatize the wood for a couple days by placing it in a warm, dry area. You will also want to paint all the mouldings with one coat of quality trim paint. While the moulding is drying there is a lot of prep to do.



Crown stop – You can buy or make this stop, which will help simplify the compound mitre cuts.

The preparation

It is important to familiarize yourself with the terminology given to crown moulding.

Which way is up? This is a simple but often overlooked question. Generally, the part of the moulding that has the largest cove profile is the top. Typically the crown will cover more wall than the ceiling.

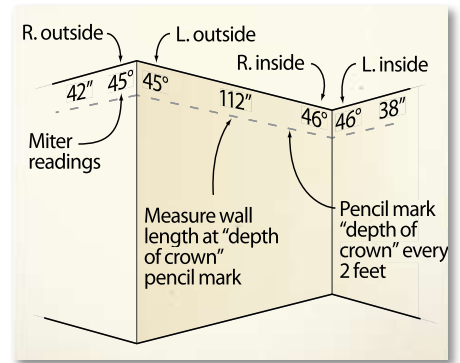
The spring angle is the angle from the wall to the back of the moulding. The spring angle was measured with the angle finder protractor. Most crown mouldings have a spring angle of 38 or 45 degrees; this is referred to as 38/52 or 45/45. You need to know which moulding you have before you can cut it and install it correctly. The spring angle needs to be maintained during crown moulding installation to ensure a proper fit at the corners of the room.

You will notice that I have placed the moulding on the inside edge of the framing square and the upper and lower flange are contacting the square. You should read and record the run and the rise of your moulding. The moulding I used was 2" and 2 5/8".

Make a jig (called a crown stop) that can be clamped or attached to your mitre saw so that the moulding can be cut in position. The jig is simply a 3/4" plywood, five inches wide and 30 inches long. I fastened the plywood to my Delta saw through two ready-made

holes in the base. Plastic crown stops are available at tool stores such as Lee Valley and Busy Bee.

This crown stop jig allows you to cut the moulding 'in position' but it has to be placed on the saw upside-down. With



this crown stop you will not have to adjust the bevel angle (set at 0 degrees); only the mitre angle will be changed for different cuts. Set the crown stop the distance of the run from the fence, in this case 2". Having installed the crown stop jig to your saw, and ensuring that the bevel angle is set at 0 degrees, you are ready to make your first cuts. Remember that the moulding must be placed upside down on the saw with the bottom flange against the fence and the top flange against the jig.

You should start off by making the cut patterns. Having these patterns located



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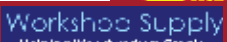










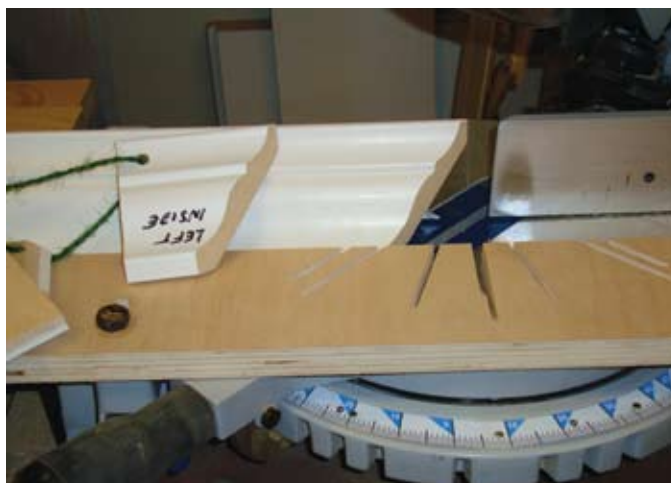


at the saw to use as a reference will almost prevent cutting the moulding in the wrong angle. Make them about 4" long and label them 'right outside,' 'left outside,' 'right inside' and 'left inside.' While you are at it, cut four longer crown pieces with the same angles as the 'cut patterns,' making them 12" long. They will serve as invaluable tools to fit your moulding to the corners.

Backing strips

Because I used 3 1/4" crown, I was able to use 3/4" x 7/8" strips that I ripped from some plywood I had. This strip allowed for a 1/16" to 1/8" gap between it and the back of the moulding. Ensure that the backing strip does not contact the back of the crown as this will prevent the flanges from contacting the wall and ceiling. Attach the strips to the length of the wall with long brad nails ending about six inches from the corners. If you are using wider crown moulding, you will have to rip triangle shaped strips (same angle as the spring angle) from 2x4 or 2x6 material and fasten them to the wall top plate with screws or nails.

The use of backing strips provides for a secure nailing surface for the crown moulding. You will not have to search for studs and you can also use shorter nails through the crown. Do not rely on cross-nailing into the drywall and gluing with DAP. Such crown moulding will always be loose and pull away from the ceiling.



Cutting with the crown stop – The moulding must be placed upside down on the saw with the bottom flange against the fence and the top flange against the jig.



Mark the depth – The use of a depth block will make it easy to mark the crown location. Avoid chalk lines because they can be quite messy.

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Lay-out and measuring

Make a small depth block to mark the bottom flange location on the walls. Make it 3/4 x 2" x height of the rise less 1/16". The reason for making the block shorter than the rise dimension is because you need to take into account the thickness of the drywall filler in the ceiling joint.

Take the depth block and hold it to the corner of the ceiling and mark the wall with a sharp pencil. Do this every two to three feet along the wall. Do not mark the corners at this time. If you are mounting a wide crown, place the marks at the studs to which you will be nailing. Do not use a chalk line for this as it is not required and it is messy to clean up. To mark the flange location at the corners, take a pair of the 12" crown patterns you cut earlier and place them to the corner making sure that the mitre joint is closed tightly. Holding the patterns tightly to the ceiling and ensuring the mitre joint is closed, mark the wall where the lower flange contacts. Take note of any poor fit at the corners due to dry-wall



Cut patterns – These simple reference pieces will almost eliminate incorrect cuts at the saw.

filler build-up. Performing this step will ensure that the crown moulding will be installed at the correct spring angle and only slight adjustment will be required to close the mitre joints. The wall length and the corner angles should be measured at the lower flange pencil marks as the dimensions will be different closer to the ceiling because of the build-up of the dry-wall filler.

Now take your angle finder and measure the corner (inside or outside) angles. Due to the uneven wall surfaces, it is important that you use an angle finder that has legs at least one-foot long. Record this angle accurately and write it on the wall where it will be covered by the crown. The mitre cut will be half of the measured angle. It is normal for the corners to be out of square so make the measurements accurately.

Next, measure and mark the length of all the walls in the room. Write this measurement on the walls for quick reference. If there is a wall that is longer than the 16' piece, then make your measurements for a scarf joint over a wall stud.

With the walls measured and the mitre angles recorded and the

backing strips nailed in place, you are ready to cut and install. Cut and fit only a couple of mouldings at a time, as you are working with irregular walls and corners. Make the cuts about $\frac{1}{16}$ " longer than measured as you may find that the measured length varies from the cut length. Better a little too long and then trim than to have it cut too short.

If the room has an outside corner, I would recommend you start there and work your way around the room. Outside corners can be the most difficult to fit and the most satisfying when the mitre closes up tight.

Following these instructions and tips, combined with a little practice, will give you great results that will improve the look of any room. In the next issue, I will guide you through installing crown with a sloped or vaulted shape ceiling and combining crowns with other profiles to create the look of custom millwork.

ROGER KNAPP
rknapp@shaw.ca



Installation tips:

- When measuring to an inside corner, instead of bending the tape, measure out 10" and place a mark on the wall. Now measure the wall to this mark and add 10" for an accurate reading.
- Support the moulding along its length while cutting, as any sag at the saw will change the angles.
- During installation of the crowns, make use of the 12" long test pieces at all corners to ensure the best mitre fit possible.
- Apply wood glue to all outside corner joints.
- Use the block plane to remove material from the lower flange to allow the crown to conform to the walls at the corners. There will be times when planing the top edge and the back of the crown, to allow it to fit better along an irregular wall and at a corner, will be required to maintain the spring angle.
- Lay the crown moulding on the wall, aligning the lower flange with most of the pencil marks you put on the wall. Do not expect all marks to be contacted as this is an average only.
- Nail the center of the crown first and work towards the ends. Do not nail closer than two feet from the end until the adjoining moulding is fitted to the corner. This will allow you to twist the crown so the mitre will close along its joint. (If the mitre joint is open at the top or bottom, it is because the spring angle is not maintained and you will have to twist either or both crowns to close the joint).
- Start with the rooms with the longest walls at first so that you will gain experience and confidence. By the time you tackle the washrooms, which generally have much shorter walls and many inside and outside corners, you will be a pro.
- Use a scarf joint when joining crowns. Cut the joint with the crown on its edge against the fence and the mitre set to 30 or 45 degrees. This will result in a shorter joint making it less visible. Also place the overlap half towards the light source or away from the most viewed position. Always glue the joint to ensure it does not separate, and locate it over a stud for added strength.
- Use a drywall filler or smooth Spackle filler for all the nail holes and the outside corners as it will not shrink like Dap. Use Dap paintable caulking for all inside corners and along the length of the upper and lower edges of the crown to create a gap-free finish.
- Perform some final sanding and touch up at the corners and scarf joints and apply a final coat of trim paint.

Craftex
CT015N
busybeetools.ca



Delta 28-206
deltaportercable.com

14" BAND SAWS

Whether you are in the market for a bandsaw or just want to know more about them, here is an overview of features for some of the major bandsaw manufacturers.



**General
International**
90-150 M1
general.ca



Ridgid
14653
ridgid.com



Laguna
LT14SE
lagunatools.com

BY GRAHAM MCCULLOCH

The 14" bandsaw has remained basically unchanged since it was first produced back in the 1930s. It quickly became as much of a woodshop staple as the table saw, lathe, drill press and scroll saw. The tool featured two rubber-tired wheels stacked vertically with the lower one being the drive wheel. The drive wheel was powered by a belt and pulley connected to the electric motor. A flexible steel band with teeth of various configurations cut into it was the cutting blade. The blade fit tightly over the two wheels

rotating in a clock-wise motion. The blade was kept in line through the use of guide blocks that kept the blade vertical and laterally stable.

The wheel housing was made of sheet steel with removable covers. The base of the saw was also made of sheet steel sitting on four steel legs. The motor was mounted externally on top of the base. In some band saws this configuration has not changed, which proves the worth of the original designs from 70 years ago.

The tool is called a 14" bandsaw because of the diameter of the wheels, although there are many other sizes available (some as large as six feet or

more). The 14" has proven to be the standard and most flexible for both the professional woodworker and amateur alike.

What Does It Do?

The bandsaw has the flexibility to be able to cut circles, arcs and other odd shapes due to the varying widths of blades available for the machine. A $\frac{1}{8}$ " blade is about the narrowest that the 14" bandsaw will handle, and this blade will cut very intricate designs. In fact, the $\frac{1}{8}$ " blade can safely cut a $\frac{1}{4}$ " radius.

Through the use of a rip fence, the bandsaw can also rip boards but the



Steel City 50130
steelcitytoolworks.com



King
KC-1433FXR
kingcanada.com

width of these boards will be limited to the throat capacity of the saw and, in the case of a 14" tool, that would be around the 13" mark depending on the manufacturer. The bandsaw, however, won't give as smooth a cut as a circular saw.

The bandsaw may also be used to resaw thick lumber into thinner boards. Some saws offer a riser block to extend the height of the saw throat to 12" or more. This allows wider stock to be resawn.

Some 14" band saws offer a choice of FPM speeds (feet per minute). The lower speeds are used for the cutting of non-ferrous metal such as aluminum and mild steel. Craftex and King offer the user a choice of three speeds, while the Delta and General International offer two speeds.

The 14" bandsaw is less intimidating than a table saw and therefore the

woodworker is able to cut smaller projects on it. This does not mean, however, that the operator should be blasé about its use. The bandsaw can still cause serious harm if misused.

The Newer Band saws

With over seven decades under its belt the bandsaw has received some subtle changes, mostly in the area of convenience, although changes have been made in the materials being used to manufacture them. Notably, Steel City Tool Works makes the table of their 14" bandsaw as well as the drive wheel from granite. Steel City says that granite pretty much guarantees that there will be no warping or twisting and the drive wheel will be perfectly balanced.

One of the best improvements over the years has been the addition of the quick blade tension release, a lever on

Features	Craftex
Model Number	CT015N ①
Motor Size/Type	1HP
Voltage	110
Speed(s)	3, 750-1290-2800
Cutting Height	6"
Six-Inch Riser Available	Yes
Blade Width	1/8" - 1"
Table Size	14" x 14"
Table Type	Cast Iron
Table Tilt -L/R	0°/45°
Throat Capacity (Width)	14 1/2"
Ball Bearing Blade Guides	Yes
Quick Blade Tension Release	No
Base Type	Steel Frame
Rip Fence Included	Yes
Mitre Gauge Included	Yes
Dust Port - Size	Yes - 3"
Blade Length	97 1/4"
On/Off Switch Type	Push Button
Weight	214lbs
Warranty	2 Years
Mfr's Suggested Retail Price	\$675.00

top of the bandsaw wheel housing. This allows the user to find the correct blade tension for the blade type they are using and then quickly release that tension when they are through using the saw. This releases the stress on the blade and extends its life and prevents flat spots on the wheel's rubber tires.

The standard type of blade guides used are ball bearing wheels and they are found in most of the listed machines. Laguna uses a specially designed 10-point ceramic block system, as noted on the comparison chart.

Rip fences are now a standard on most of the models that we compared and that addition has the advantage of being able to rip a straight line over the length of a long board. The fences are also removable to allow maximum space for curved cuts. King Canada includes a resaw guide that has a short dowel-like tube attached to one side of the fence. These rip fences may be used on either side of the blade. Laguna's rip fence may be used in a high or low position. The high position is for re-sawing, while the lower position is used for cutting finer materials.

All of the listed band saws have a 3/4" slot on the table top to facilitate a mitre gauge, although the gauge itself is an optional extra on two of them. The standard slot size

Delta	General International	King	Laguna	Ridgid	Steel City
28-206	90-150 M1 ^⑤	KC-1433FXR	LT14 SE	14653	50130
1HP	1HP	1 HP	2HP	¾HP TEFC	1 ½HP
120/240	110/220	110/220	220 ^⑨	120/240	115/230
(2) 2900 - 3300	(2) 2959-2315 FPM	(3) 735-1470-2350	(1)	(1)	(1)
6 ¼"	8"	6"	12"	6"	12"
Yes	No	Yes	No	No	Included
⅛" - ¾"	⅛" - ¾"	⅛" - ¾"	⅛" - 1" ^⑩	⅛" - ¾"	⅛" - ¾"
16" x 16"	14" x 19" ^⑧	14" x 14"	15" x 15"	14" x 14"	16" x 16"
Cast Iron	Cast Iron	Cast Iron	Cast Iron	Cast Iron	Granite
3°/45°	0°/45°	0°/45°	15° - 45°	10°/45°	10°/48°
13"	13 ⅛"	13 ⅝"	13 ¼"	13 ⅝"	13 ¾"
Yes	Yes	Yes	No ^⑪	Yes	Yes
Yes	Yes	No	No	No	Yes
Cabinet	Steel Frame	Cabinet	Open Cabinet	Steel Frame	Cabinet ^②
No	Yes	Yes ^④	Yes ^⑫	No	Yes
No	Yes	Yes	No	No	Yes
Yes - 4"	Yes - 4" ^⑥	Yes - 2" ^③	Yes - 4"	Yes - NA ^③	Yes - 4" ^③
93 ½"	97 ½"	93"	112"	93 ½"	105"
Paddle	Push Button	Push Button	Magnetic	Paddle	Paddle
201lbs	183lbs	210lbs	264lbs	178lbs	297lbs
5 years	2 Years	2 Years	12 Months	3 Years ^⑦	5 Years
\$1,200.00	\$1,490.00	\$749.00	\$1,550.00	\$469.00	\$1,429.00

① The Craftex is a 15" Band Saw

② The Steel City Bandsaw Includes a Mobile Base

③ These include Lower Wheel Brushes

④ King Includes a Re-Saw Attachment

⑤ General International includes a Laser Line

⑥ General International Has a Built-in Dust Collection System

⑦ Ridgid Has a Lifetime Service Agreement

⑧ Includes 5" Extension Wing

⑨ 110 volt model available on request

⑩ Optional cool blocks required for blades less than ⅛"

⑪ Laguna uses 10-point cool blocks

⑫ Laguna includes a High/low Rip Fence System

Note: The retail price is a guide only as most dealers offer discounts.

allows you to use a mitre gauge from a table saw.

Three of the manufacturers use a large paddle-type on/off switch that may be preferred. All but Craftex and Laguna have dual voltage motors that provide users with the option of using 110/120V or 220/240V circuitry. The manufacturers wire their tools at 110/120volts and provide schematics for the voltage change if preferred. Laguna offers the choice of a 110v or 220v motor at the same price.

All but Ridgid and Laguna have the motors mounted within the stand. The Craftex, General International and Laguna have partially open stands. Delta, King, and Steel City have fully enclosed cabinet type stands, while Ridgid has a fully open steel stand.

Band saws have, in the past, been notorious for their vibration that may affect the cutting accuracy. All of the listed band saws seem to be heavy enough to prevent this problem. The Steel City bandsaw is the heaviest on our list. Delta and Steel City have the largest table size at 16" x 16".

Some of the listed band saws have additional features, such as lower drive wheel brushes that help clean the tires of sawdust to prevent the dust from compacting on the tires. General International is the only bandsaw in this category to offer a cut line laser to help straight-line ripping.

Warranties on the listed band saws vary from 12 months to five years. Ridgid is the only manufacturer that offers a lifetime service contract. In all cases the tool must be taken to your

nearest service depot for warranty service.

There is slightly more than a \$1,000 spread between the lowest and highest priced tools, but it should be noted that companies like Craftex and Laguna do not have a dealer network. Craftex is a store brand for Busy Bee Tools and Laguna sells their products directly to the end user. Ridgid sells their products exclusively through The Home Depot. Delta, General International and Steel City have exclusive retail dealer networks that sell their products and the manufacturer's suggested retail price is more usually than not,

GRAHAM MCCULLOCH





Streamlined WORKBENCH

A good workbench is one of the most important tools in a workshop.

BY CARL DUGUAY

After recently downsizing to a 350 sq ft shop, I realized that I could easily do with a smaller workbench, and save some precious floor space. My old workbench was quite large, better suited for making cabinets than furniture. I didn't want to spend a lot of money on the bench, nor did I want to invest a lot of time building it. After looking through a number of books (see Reading List) I finally decided on a simple design, with the legs aligned

flush to the top, a tail vise, front vise, and a single row of round bench dog holes. Rather than a conventional shoulder for the tail vise I opted for a housed tail vise (or wagon vise), somewhat similar to the Powel design featured in 'The Workbench Book'.

I chose to make the bench out of kiln-dried Douglas fir. It's dimensionally stable, has high stiffness and crushing strengths, and typically comes in long straight grained, knot free lengths. Best of all, I had a source of it for under \$3 a board foot – too good a deal to turn away.

While this is a fairly small bench, measuring 32" high, and just over 20" wide and 68" long, I've found it very stable in use for the kind of work I now do. My guess is that the bench weighs about 300 pounds. You can easily modify the design to suit your particular requirements – none of the dimensions are overly critical. Make it longer, wider or higher; add an extra row of dog holes, a tool well, or cabinet below the top. Keep the bench utilitarian or embellish it with dovetail joinery or inlays using exotic wood.

Supply Checklist

- 8 – $\frac{3}{8}$ " x 5" lag bolts and flat washers (for legs)
- 10 – $\frac{3}{8}$ " x 4" lag bolts and flat washers
- 10 – $\frac{1}{2}$ " x 3" dowels
- 1 – Regular front vise, Lee Valley #70G08.01
- 1 – Shoulder vise, Lee Valley #70G01.51
- 2 – Vise handles, Lee Valley #05G12.03

Start With the Base

The top rails (B) and the lower rails (G), are joined to the legs (E) with a lap joint, cut on the table saw. I placed the lower rails about 4" above the floor to provide enough height to vacuum underneath the bench. If you sweep rather than vacuum consider placing the lower rails a bit higher, around 6" above the floor. On this bench the top rails also serve as the sides for the bench top, so they need to sit $1 \frac{7}{8}$ " above the top of the legs – $1 \frac{3}{4}$ " for the thickness of the top plus $\frac{1}{8}$ " so the rails can be planed level with the top after assembly.

Materials List (measurements in inches)

Part	Qty	T	W	L
A Top	1	1 ½	17 ¾	64 ½
B Top rails	2	1 ¼	5	64 ½
C End caps	2	2	5	20 ¼
D Cap supports	2	1 ¾	4	17 ¼
E Legs	4	3	4	30
F Side rails	4	1 ¾	4	14 ⅛
G Lower rails	2	1 ¾	4	42
H Feet	4	½	3	4
I Front vise face	1	1 ¾	5	12
J End vise block	1	3 ¼	3 ¼	5 ⅝
K Guides	2	¼	1 ¾	2 ⅛
L Slider top	2	¼	¾	9 ½
M Slider bottom	2	½	1	9 ½
N Batten	2	¾	1	38
O Shelf boards	-	¾	to fit	16 ⅝

[illegible]



Start With the Base – Drill the holes to receive the lag bolts that hold things together.



Tough Joinery – Lower rails are lapped and bolted in position to create a strong connection point that will resist racking.

At this stage I measured the location for the front vise, and drilled the access holes for the guide rods and the guide screw on the drill press. Mounting the front vise is straightforward as the instructions provided for the Lee Valley vise are easy to follow. You will also need to cut a piece of wood for the front vise face (I) and drill the matching access holes.



Large Top Rails – With the base bolted together and the top rails in place, you can see the heft of this workbench.

Once the base was assembled I rounded off all sharp corners with a block plane (except the inside edge of the top rails), and applied half a dozen coats of wiping varnish – Varathane Interior Polyurethane thinned 30% with mineral spirits. Now is a good time to install the shelf (O) at the bottom of the base, held in place with a couple of battens (N), to store power tools and the like. It's easier to install it now than when the top is on. You

could use a sheet of plywood, but it would act as a reservoir for dust and shavings. Alternately, you could install a cabinet below the top.

Move On to the Top

The top (A) has a 3 1/4" x 11" cavity on the right to accommodate the end vise block (J). While you could cut the cavity out after assembling the top, it is a whole lot easier to leave room for the vise block during assembly. I wanted to keep the vise block as close to the front of the bench as possible. I find it easier planing stock close to the edge rather than having to lean over the top. Just be sure to leave enough room to accommodate the two sliders (L, M) that are screwed underneath the top and on the left side of the end block vise.

Biscuits will help you align the boards during glue up. The stock I had was just shy of 2" thick. After gluing up I had the top thickness sanded on both sides, which took it down to just over 1 3/4" thick. You could also hand plane the top level, or go at it with a belt sander. Before cutting the glued-up top to size, measure the opening between the top rails (B). Then cut the top just slightly wider, about 1/32". You can then fine tune the final width with a hand plane for a perfect fit. I also cut the top



Follow Directions – The Lee Valley vise comes with excellent instructions for the installation of the front vise – a hand plane is the best way to flush up the vise pad.



Wagon Vise – All the pieces for the housed vise are ready for installation. The wagon vise is an alternative to the more common tail vise.



Under the Top – This view gives some insight into how the vise travels in its captured space.

overlong and trimmed it to size with a circular saw after installing it on the base.

The top is glued to the side rails, and then further secured with 1/2" x 3" dowels. The end caps (C) are attached to the top and side rails by 3/8" x 4" lag screws. This goes against conventional wisdom, which says that the bench top will expand and contract with humidity changes, and that the end caps will constrain the movement of the top, causing it to split or warp. However, I always maintain a consistent temperature and

humidity level in my shop, and in the eight months that I've been using this bench the top has remained stress-free. If you don't like the stark look of a butt joint for the top rails and end caps you could use dovetails or box joints.

Before attaching the end caps, remember to drill the hole for the end vise screw and cut a mortise for the shoulder on the inside of the right end cap. I also screwed cap support blocks (D) into the end caps to provide a bit of extra load-bearing support for the ends of the bench top. If you install the support blocks you'll need to cut out a small notch on the right side block to accommodate the end-vise screw.

The end-vise block (J) 'floats' in the notch built into the top. It is supported by a 1/4" plywood guide (K) dadoed into each side. The guides ride on a plywood slider (L, M) that is screwed into the bottom of the benchtop. You will also need to cut a small notch on the underside of the vise block tongue to accommodate the end guide for the shoulder vise screw.

With the top in place, plane the top rails, end caps, front vise face, and end vise block flush with the workbench top. You can use a belt sander for this job, but it is just as easy to use a fore plane.

Round over any sharp edges and then drill 3/4" dog holes. I like the holes pretty close together, and space them 3 3/4" on center. To drill the holes relatively square to the top, drill a 3/4" hole through a piece of 2" scrap, and then use this as a guide with your power drill. I only drilled a single row of holes; I'll add additional holes as the need arises.

Once the dog holes are drilled remove the bolts that hold the top in place, and remove it from the base. The top is pretty heavy, you might want to have someone help you lift it. Turn the top over and apply five or six coats of a wiping varnish. Right-side-up the top again, and finish the top side as well.

Making a workbench is a lot easier than you might imagine; but the real enjoyment comes in using it on a daily basis.



CARL DUGUAY
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Reading List

Sam Allan, 'Making Workbenches', ISBN: 1402741936
Mark Corke, 'Build Your Own Custom Workbench', ISBN: 15587806781
Scott Landis, 'The Workbench Book', ISBN: 1561582700
Lon Schleining, 'The Workbench', ISBN: 1561585946
Christopher Schwartz, 'Workbenches', ISBN: 1558708405

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Refinishing Wood Floors

Make your wood floors look like new with these four steps to achieve a furniture-grade urethane finish.

BY STEVE MAXWELL

If you're used to finishing furniture projects, the prospect of urethaning an entire wood floor can feel daunting. But success is easier than it looks, and doing the work yourself can save you a bundle, beginning with the first of four essential steps.

Understanding Sanding

Are you finishing a new wood floor? Completely refinishing an old one? Unless your floor is smaller than about 100 sq ft, start with a rented floor sander that you walk behind. Belt-style machines are less likely to create a divot in your floors than drum-style models. A vibrating pad sander is also easy to use safely, though it's less aggressive than a belt sander.

A walk-behind sander will only get you so close to corners and obstructions,

and to smooth these areas you need to turn to smaller sanders of the sort that woodworkers everywhere use. A hand-held belt sander spinning an 80-grit abrasive is perfect for levelling board-to-board mismatch. You'll find that a random orbit sander spinning a 100- or 120-grit disk is perfect for a second pass in tight areas. Just be sure to use light hand pressure, as random orbit sanders will leave behind swirl marks that will not be obvious until the stain goes down.

Pre-Finish Cleaning

Your floor must be absolutely dust-free before applying any stain or urethane, and a broom cannot do a good enough job. You'll need some kind of a vacuum, and while a workshop vacuum is the best tool for this application, there are some things you need to watch out for.

Plastic shop vacuum attachments can leave large black marks behind on

the wood, so work with a light hand until you know for sure how the wood behaves.

Another critical issue is lighting. You'll never vacuum all the dust off under ordinary, overhead lighting because you can't see it well enough. That's why a 500 watt, quartz halogen flood light is so useful for floor finishing. The entire fixture costs less than \$20 and it sits directly on the floor, shining light across the surface at a shallow angle. Dust, dirt and debris can't hide.

Product Choice and Application

To stain or not to stain? That is a question that goes beyond aesthetics. Adding colour to floors before sealing the surface with urethane brings out wonderful wood grain patterns, but it also makes the floor finish more vulnerable to damage later on. Dents and scratches that go



Sanding options – You can choose from a drum sander (left), vibrating pad sander (right) or a belt sander to get the job done.

through the stain show up as light marks surrounded by darker wood. Stain is great as long as you understand what is involved.

Solvent-based or water-based urethane? This is your next choice, and both offer different strengths. Water-based offers low odour, water cleanup and very fast dry times. Solvent-based urethanes, on the other hand, are somewhat easier to apply because they typically dry more slowly, allowing brush strokes to flow out before hardening.

Need to get your floor finished fast? Look for quick-drying urethanes that are

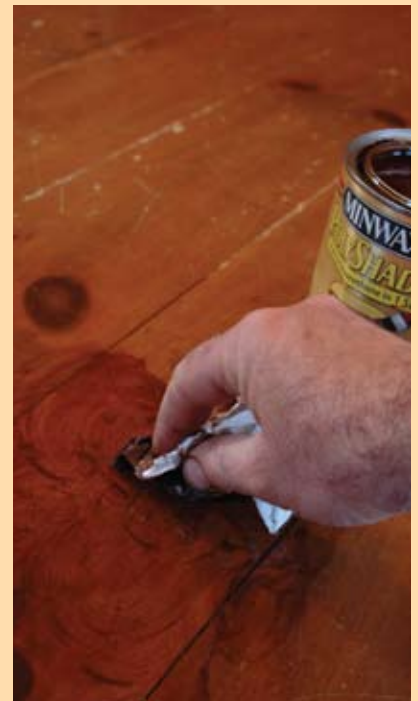


Light touch – When using a random orbital sander for some of the tighter areas, ensure that you use light pressure to avoid swirl marks.

designed to go down quickly, one coat within hours of applying the previous one. This allows three or four coats to be applied in one day, leaving your floor ready for real life the next day.

Have you opted to stain before urethane application? Here's a trick for applying stain to floors with minimum

Dust Free Floor Renewal



Most Canadian floors include some kind of clear, protective top coat, but regardless of how tough this finish is, eventually it will start to get worn, dented and scratched. However, fixing this problem does not necessarily require sanding back to bare wood and starting from scratch. There are ways to make that tired floor look better without the hassles of sanding. And depending on the floor you have and the products you choose, the process may be surprisingly fast and effective.

Clear-coated wood floors that haven't been stained are the simplest to renew because there is no colour to restore. Just re-establish a protective layer in dented and high-traffic areas and you're done. No major sanding needed, though areas of discoloured wood will benefit from a little hand sanding before resealing. Minwax Floor Reviver is a unique, wipe-on product that is easy to use when the surface layer is lightly scuffed. It offers up to six months of renewed good looks. Got a stained floor to renew? The best way to re-establish colour in worn floor areas is with a stain and sealer combination. To see this process in action, check out the how-to video at stevemaxwell.ca.



Light your way – Using a bright halogen light at a low-angle will help you to see all the debris left behind on the sanded floor.



Breath in new life – There are products available to revive a floor's finish without sanding down to bare wood.

waste. Use a 3" or 4"-wide brush to apply a generous squiggle of stain to the floor in one area. No need for full coverage with the brush, just get some liquid on the floor in a zigzag pattern over a four- or five-sq ft area. Next, use a clean, lint-free rag or shop towel to spread the stain evenly over the wood, wiping in the direction of wood grain. Wipe all stain off the surface, leaving

behind only the stain that has soaked into the wood. You might have to apply more stain if some areas in your work zone are too dry.

Eventually, as you continue the process of brushing and wiping, your rag will get too wet to remove stain properly. Rather than throw it out (along with all that good stain), use the too-wet rag to apply stain to bare areas of the floor, instead of a brush, before wiping the floor with a fresh, dry rag. You'll still have to slosh on fresh stain with a brush now and then, but not as often; the wet rag will do much of that work. Let your stain dry completely before applying any urethane. I like to leave it for a full day.

Although you can apply urethane to floors with a pad applicator, a wide brush is easiest for beginners to master. Use a natural bristle brush with solvent-based urethane and a synthetic brush with water-based stain. Either kind can be applied over solvent-based or water-based stains as long as it is fully dry.

Now is the time to get out that flood-light again. While it was easy to see

where the stain went down because of its colour, urethane is different. Being clear, it is easy to overlook areas you have missed. Strong light at a shallow angle is your best friend here, making it easy to achieve complete coverage.

Some urethane formulations are specifically made to go down without sanding between coats. Choose this option if you need to complete your urethane job in one day. For the smoothest possible results, consider sanding between coats using some 220-grit paper in a quarter-sheet finishing sander. Go over the surface lightly, just as you would any other woodworking project. Vacuum the floor when you're done, then coat again. Sand after three coats have dried, apply a fourth, then stand back and admire a floor that will look great for a long, long time.

STEVE MAXWELL
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- 10.8 Lithium-ion Cordless Drill and Impact Combo
- 124 pc. Impact Driver Accessory Kit
- AW/FM Jobsite Radio
- Tool Bag on Wheels



Bench Dog Router Station

by Vic Tesolin ★★★★★

Bench Dog has done a great job at bringing a very functional router table and lift to the woodworker who has limited space in their shop. The ProMax cast iron table bolts to most standard table saw tables, replacing the left-hand wing. The beauty of this is that you don't need a separate router cabinet to take up valuable floor space in the space-challenged shop. At 100 lbs, make sure that you have a helper around when you bolt the ProMax to your table saw. The table comes equipped with two tracks to allow the use of feather boards, mitre gauges and any shop-made router jigs you can dream up.



Sitting in the middle of the ProMax table is the ProLift. The ProLift uses 12 levelling screws inserted in the bottom of the ProMax table to ensure that the ProLift is completely level and flush. Now, as you can imagine, levelling a dozen separate levelling screws takes some time, but once you get it done you won't have to worry about it again. The only component on the ProLift that I wasn't sold on was the round inserts used to close up the gap in the center. These inserts have six small Phillips-head screws that take far too much time to remove every time you need to change a bit or change the size of the insert.

The best part of the ProLift is the actual router lift hanging from the bottom. When I first took this component from the box, I was immediately impressed with its mass and weight. The ProLift is the most robust lift I have ever used. Its most notable feature is the ACME direct drive screw that raises and lowers the router. With no belts or gears to slip or strip, it seems that derailing this lift would be practically impossible. There is no perceivable backlash, which ensures positive adjustment every time. The index disk at the end of the custom-designed chrome-plated speed wrench allows you to dial-in adjustments .001" at a time.

The ProFence 32 is a full-service fence that is a cinch to use. It comes equipped with adjustable MDF sub-fences that are easily reproduced to allow you to bury a bit and not worry about ruining the sub-fences. The fence also comes with a built-in T-track to attach feather boards and a 2 1/2" dust extraction port to keep the dust to a minimum. When not in use, the fence stores under the table on two hooks to keep it out of the way and safe from knocks and drops.

Together, all of these components create a pretty impressive router station that will do anything you want it to. Not only is it fully functional, but it takes up no more room in your shop. In my 170 sq ft shop, that is the best feature of them all.



Rockler Taper Jig

by Vic Tesolin ★★★★★

the edge of the jig, ensuring accuracy specific to your saw. The taper jig comes with adhesive-backed measuring tapes to attach to the front and back of the jig in order to measure out the amount of taper you want. It also has a quick indexing system that allows you to dial-in a specific taper measured in degrees. Of course you can choose to simply mark the taper on your piece and lay it down on the jig, lining up the marks on the jigs edge. The fence on the taper jig is fully adjustable and features a handy adjustable stop at the bottom to ensure that the board being tapered does not slide back. On the topic of holding power, the taper jig features fully adjustable hold-down clamps that, with the addition of some adhesive-backed sandpaper strips on the deck of the jig, hold the work piece completely still for the tapering process. The hold-down clamps also have rubber slip-ons that protect the surface of your work piece from being dented or marred.

I'm typically not a big user of commercial jigs in my woodworking, but this one has proved its usefulness in my shop. It's simple to use, solidly built and has three ways to set it up depending on how you prefer to work.

The Rockler Taper Jig sells for US\$69.99 and is available at rockler.com.

In the past, if I needed to taper a table leg, I would build a quick jig out of scraps to use on the table saw or band saw and then discard it when I was done. This taper jig from Rockler has changed that process for me. This jig provides repeatable accuracy and the versatility to do virtually any tapering task.

The ease of using this jig starts with its construction. Right out of the box, it is very simple to put together. The jig is designed to be used in the mitre slots of your table saw and it is very intuitive to use. The jigs deck comes slightly oversized so that it can be trimmed down during its first use. This trimming ensures that the blade is running along



Keepsake Box

People love to hold on to little items with sentimental value. This project is perfect for keeping your most precious objects safe and sound.

BY ALLAN CUSWORTH

This project is an exercise in turning with a four-jaw scroll chuck and uses some special tools and techniques. To make it more interesting I have chosen to alternate dark and light woods for the inlaying process in order to create a layered pattern. The dark wood is black walnut and the light wood is maple. Any dry hardwoods can be used. It is important that the woods used are of similar hardness so that the different expansion coefficients will not crack the glue joints over time. Do not use a combination of hardwood and softwood.

Basic Design

The overall dimensions of this project are approximately 4 1/2" in diameter by 2

1/4" high. The shape has a low profile and the bottom has a concave foot to raise the box slightly off the table, which makes it look lighter. The lid will fit into a recessed lip and will be a lift-off style so that the box can be used with one hand.

The components of this keepsake box must be made in the specified order so as to facilitate assembly. We will start by making the lid. The first piece will be the dark wood knob, the second piece will be the light wood insert and the third piece will be the lid itself. These pieces will be made and assembled before the box body is started. The box body will then be hollowed out and the lip cut to fit the lid.

The Knob

Prepare a small end grain block of dark wood about 1" square by 2" long. Clamp the block into 25mm (1") jaws

Suggested Tools and Materials

The dimensions noted here are for a Teknatool Supernova chuck. Yours will probably be different if you are using a different make or model.

- Four-jaw chuck, 25mm (1") and 50mm (2") jaws, 100 mm (4") jaws
- Woodworm screw
- Live tailstock center
- Four-prong or spring-loaded spur center
- 1/2" spindle gouge
- 1/4" spindle gouge
- 1/2" bowl gouge
- 1/4" bowl gouge
- Swan neck hollowing tool
- 3/4" round end scraper
- 1/2" square end scraper or Bedan
- Diamond parting tool
- 1/16" narrow parting tool
- 3/4" skew
- Dividers
- Callipers
- Jacobs Chuck
- 1/2" Forstner bit
- Sanding media
- Wipe-on polyurethane finish
- Paper towels

Lead Photo by Vic Tesolin . All others by Allan Cusworth.



Easy sizing – Using an open end wrench is the quickest way to accurately size the tenon.

in a four-jaw chuck, making sure it is seated firmly against the base of the chuck. True it up with a $\frac{1}{2}$ " spindle gouge. Form the rounded end of the knob. Make a $\frac{1}{2}$ " x $\frac{1}{8}$ " spigot at the base of the knob for gluing it into the lid insert. I use a $\frac{1}{2}$ " open end wrench to size the spigot. This is much quicker than using callipers and just as accurate. The gluing of the end grain to the cross grain of the insert should not be a problem since the pieces are so small and the dimple from the drill bit tip will create a stronger bond surface for the joint.

Rough sand the knob to remove tool marks. Finish sanding will be done later when the lid parts are all assembled. Part the knob off using a $\frac{1}{16}$ " narrow parting tool. Set the knob aside where it won't get lost in the shavings.

The Lid Insert

Make a 2" diameter x $1\frac{1}{2}$ " thick light wood disk. Clamp the 2" disk into 50mm (2") jaws in a four-jaw chuck, making sure it is seated firmly against the base of the chuck. True up the disk. Mark the $1\frac{3}{4}$ " outside diameter of the disk with a set of dividers. Using a diamond parting tool, a square end scraper or a bedan, and working from the face of the piece, create a $1\frac{3}{4}$ " diameter x $\frac{3}{8}$ " thick tenon. This will become the insert disk piece. Turn a slight oval shape on the face surface.

Place a Jacobs chuck in the tailstock of the lathe and, with a slow lathe speed, drill a $\frac{1}{8}$ " hole into the center of the piece using a $\frac{1}{2}$ " Forstner bit. Fit the knob piece into this hole and glue it in with PVA glue. Place the live center, without the sharp point, in the tailstock. Bring it up to clamp the glue joint. You can place a piece of craft foam between the tail stock live center and the knob to prevent marking it, but I let the sharp ring of the live center make a decorative ring on the top of the knob. At this point, you have to wait for the glue to dry before you can continue.

Part the insert piece off with a $\frac{1}{16}$ " narrow parting tool. The lid insert should be about $\frac{1}{8}$ " thick as it will be an inlay feature and does not need to be very thick. The underside of this piece must be flat so it will fit flat in the lid recess.

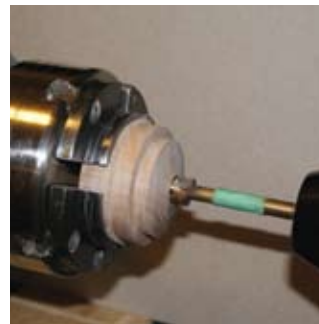
The Lid

Make a $3\frac{1}{2}$ " diameter by $\frac{3}{4}$ " thick dark wood disk and attach a glue block of the side that will become the bottom of the finished lid. If your dark wood is thick enough you can make a $1\frac{1}{4}$ " to $1\frac{1}{2}$ " thick disk instead of using the glue block. Place a four-prong or spring-loaded spur center in the headstock of the lathe and clamp the $3\frac{1}{2}$ " disk between the centers with the glue block on the tailstock side. Turn a spigot to fit the 50 mm (2") jaws of your four-jaw chuck.

Mount the disk in the chuck and true up the face. Mark the $3\frac{1}{4}$ " lid outside diameter on the face of the blank with a set of dividers. Create the lid about $\frac{3}{8}$ " thick with a parting tool or a square end scraper. Some extra thickness/depth is needed to part the lid off later. Turn a slight oval shape on the surface of the lid, keeping the shape complimentary to the lid insert.

Cut a recess in the lid with a parting tool or a skew and fit the lid insert so it is flush with the lid surface. Glue in the insert, making sure that the grain directions line up. Clamp the assembled lid with tailstock, as before, and wait for the glue to dry before continuing.

You may need to refine the shape of the lid with a sharp $\frac{1}{4}$ " spindle gouge. Sand the lid through the grits, starting with 150 grit, to at least 800 grit. Each successive grit size used should not increase more than 50% from the previous grit size. As you sand the edge of the lid, make sure you do not round the corners unless by design. Apply at least three coats of wipe-on polyurethane with a paper towel to the top and edge of the lid. I use friction heat from rubbing the paper towel on the surface to dry all but the last coat. Allow the finish to dry thoroughly.



Drill the hole for the knob – Use a Forstner bit with the lathe spinning slowly.



Glue the knob in – Bring up the live center to clamp the knob into place.



Mark the insert – Using a set of dividers, mark the outside diameter or the disk.



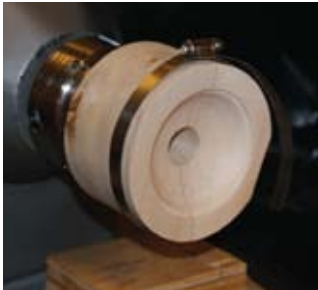
Lid recess – Cut a recess in the lid with a parting tool or a skew to receive the lid insert.



Finished lid – Use friction to dry all but the last coat of the wipe-on polyurethane.



Shaping the body – Define the body's shape and mark the lid size.



Make the jam chuck – This will allow you to hold the lid to complete the underside.



Hollow out – Using a swan neck chisel, undercut the inside of the top shoulder section.

Part the lid off about $\frac{1}{4}$ " thick to allow $\frac{1}{16}$ " to complete the bottom surface.

In order to complete the bottom surface the lid must be reversed in a chuck. I made a jam chuck with a saw cut split in the center and a hose clamp with a wide rubber band protective cover. Tightening the clamp held the $3\frac{1}{4}$ " lid to complete its bottom side. There are many other options, such as a set of Cole Jaws with the rubber buttons in the appropriate locations, a vacuum chuck, or padded 100 mm (4") jaws. With some of these options, make sure the jaws do not damage the knob and/or the insert.

Take light cuts with a sharp $\frac{1}{4}$ " spindle gouge and carefully turn the lid thickness down to $\frac{3}{16}$ ". I like to put some concentric rings on the bottom of the lid for decoration. Sand and finish the lid bottom as before.

The Box Body

Prepare a 5" diameter disk x 2" thick piece of dry light-coloured hardwood for the box body. I used maple for this project. Drill a $\frac{5}{16}$ " diameter x $\frac{3}{4}$ " deep hole into the center of the side of the blank that will be the top of the box and mount on a Woodworm screw installed in the chuck. Make sure the blank is tight against the face of the chuck jaws to make a firm connection to shape the outside of the box. True up the blank. Turn a spigot to fit your chuck jaws. The 50mm (2") jaws of the Supernova chuck require a spigot approximately $2\frac{1}{4}$ " in diameter.

Remove the blank from the Woodworm screw, and mount it in the chuck jaws. True up the blank. Mark the size of the lid's actual outside diameter, less about a $\frac{1}{16}$ " on the face surface of the top of the box with a set of dividers. Make another

mark $\frac{3}{8}$ " smaller to mark the diameter for the $\frac{3}{16}$ " lip for the lid to sit on.

Shape the outside of the box. Here's where you create the profile shape of the box. I made a short foot about $\frac{1}{2}$ of the diameter of the box to give it a lighter, more airy look.

At this point you can establish the inside bottom of the box before starting to hollow it out by drilling a hole to the required depth in the center of the blank.

Start hollowing out the inside of the box from the inside ring mark with a $\frac{1}{2}$ " bowl gouge. Since the blank is cross-grain, make small cuts towards the center so you are cutting with the grain. The wood fibres are then supported, reducing the tendency for tear-out. Make the walls about $\frac{1}{4}$ " thick with a little more thickness at the bottom for stability. Measure the walls often with outside callipers to make sure they are of consistent thickness. I suggest leaving the top lip area a little thicker so the lid will have good support.

To undercut the inside of the top shoulder section, you will need to use some type of hollowing tool. I used a swan neck tool made by Robert Sorby, but there are many tools on the market that will accomplish this. As with all scrapers cutting inside profiles, make sure that the cutting edge is very sharp and cutting at, slightly above center. Cutting below center on an inside profile risks a serious catch. Smooth the bottom with a $\frac{3}{4}$ " round end scraper.

Using a square end scraper or a skew, fit the lid into the recess with a loose fit. I like to leave the lid slightly proud of the box to make any slight discrepancy in the lid thickness imperceptible. It also adds a little character, in my opinion.

Sand the outside and the inside of the box through the grits the same way as the lid was done, taking care not to destroy the edge dimensions of the lip. Apply at least three coats of wipe-on polyurethane finish to the inside and outside of the box the same way as the lid was done. The finish for the bottom of the box will be blended in later.

After the finish has dried, remove the box from the lathe to reverse it for completion. An easy way to reverse the box body is to place a $\frac{3}{4}$ " wide strip of craft foam around the 50mm (2") jaws of the scroll chuck and expand it to gently hold the box on the chuck jaws. Make sure the top edge of the box is firmly seated against the base of the jaws. Do not over-tighten the jaws or you will split the box walls. Using light cuts with a freshly sharpened $\frac{1}{2}$ " spindle gouge, remove the tenon and complete the small foot. Make the bottom of the foot slightly concave to prevent the box from rocking on the table surface. I like to make some decorative rings on the bottom.

Apply at least three coats of wipe-on polyurethane and blend in with the finish on the outside walls.

All that needs to be done now is to add your signature. You have just created a keepsake box that will become an heirloom that will last for many years in the hands of its proud owner.

ALLAN CUSWORTH

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<http://turnedcreations.showyourwood.com>





Photos by: Brian Hargreaves

The Shoulder Plane

No other plane performs as well as a shoulder plane when hand-fitting joints.

BY TED BROWN

I think all woodworkers need a basic set of three planes: a smoothing plane, a low angle block plane and a shoulder plane. The shoulder plane is another in the series of bevel-up planes and we use it predominantly to clean up joinery to obtain that perfect fit.

As with the block plane, the shoulder plane does not incorporate a chip breaker. The bed angle is relatively low, at about 15 degrees. Together with a primary bevel of 25 degrees, we end up with an attack angle (the angle at which the blade enters the wood), of about 40 degrees. In reality, we will add a couple of degrees of bevel when we hone the iron creating the micro-bevel; for those who like numbers, we end up at 42 degrees.

The plane will see most of its use cutting across the grain for fitting joinery, but at 42 degrees, the attack angle is high enough that we don't suffer excessively when cutting with the grain. The plane should have a small mouth opening to reduce tear-out. If you purchase a plane with a one-piece casting, make sure the effective mouth size is small, that is, with the iron extended just enough to begin cutting. Some two-piece planes feature an adjustable toe section, which makes mouth adjustment easy. Simply unlock the toe-locking screw on the top, and then adjust the toe adjustment screw at the front of the plane. Veritas goes one step further by adding guide screws as lateral stops for precise blade positioning and repeatability.

As with all planes, look for a plane that suits the scale of work that you will do most often. Choose a plane that fits well in your hand, and a tool that suits your eye. I enjoy tuning and just looking at the engineering of my tools, so looks are a factor for me, as well as feel and functionality. I have used large shoulder planes, but much prefer lighter tools for ease of handling while trimming joints. My preference is a plane with a sole width that does not exceed $\frac{3}{4}$ ". The feel of the tool in my hand is of utmost importance.

Blade Preparation

Blade preparation is rather easy on shoulder planes due to the small size

of the paddle-shaped blade. We polish the entire backside of the blade using a 4000–8000 grit water stone, until it is mirror-smooth.

To apply a micro-bevel, flip the blade and place it with the primary 25-degree bevel sitting flat on the stone. Since the blade is tiny, and fine water stones are relatively soft, I prefer to use a pull stroke for shoulder plane blade honing.

With the blade placed at the far end of the stone, lift the rear of the blade slightly to add about two degrees of micro bevel. Maintain the angle to the stone as you draw the blade toward you over the length of the stone. Take about five passes and then inspect the edge. We want the smallest, mirror-smooth micro bevel possible, which is continuous across the entire width of the blade. Additional honing at this point will not improve your edge so stop as soon as you observe that brilliant line going completely across the leading edge of the blade. To test your edge for sharpness, attempt to cut fine shavings on end grain. If the cut results in dust, keep polishing the back and/or honing the micro bevel until ultra-thin shavings are possible.

Adjusting the Plane

The designers purposely make the blade of a shoulder plane wider than the sole. The blade protrudes laterally beyond the machined outer cheek of the plane casting, allowing for a clean cut into the corner of a tenon shoulder or into the corner of a rabbet. As with all planes, I look for a plane with a stout iron in order to reduce flexing of the blade during cutting, thus reducing chatter.

Advance the blade using the depth adjustment knob at the rear of the tool.



Create a micro bevel – This technique will ensure that you get a consistent edge across the front of your iron.



Different designs for the same job – Despite their different looks, they all carry out the same function.

A lever cap assembly holds the blade against the bed. The lever cap pressure point should be well forward on the blade so as to keep chatter in check. Reduce the pressure on the lever cap while advancing the blade. Remember to make a clockwise adjustment to advance the blade as your final adjustment. This eliminates the effect of backlash in the depth of cut adjustment, and ensures positive support for the blade so that it will not retract during use. Once the cut depth is set, apply a moderate amount of lever cap pressure.

The fine adjustments cannot be seen by sighting down the sole of the plane, so use a test cut on wood to determine if your cut depth is correct. If you are setting up to cut a shoulder, try a test cut on the end grain of a scrap of wood of the same or similar species. Look for a shaving that is of the same thickness across the cut. If skew is present in the blade setup, the shaving will vary in thickness from side-to-side, and the shaving will tend to curl toward one side. Reduce the lever cap pressure, and manually move the blade sideways to eliminate skew. A note here – when grinding these blades to re-establish the primary bevel, it is important to maintain a square leading edge on the blade.

Trimming a Shoulder

Trimming a shoulder is a delicate process, the goal of which is to achieve a square shoulder with a minimum amount of material removed. This is one of those jobs where you may find yourself chasing around the shoulder only to find that the shoulder is not at the same

height on all four sides. Take the time to carefully inspect the four shoulders with a square, and then remove the high spots.

To make a clean shoulder cut, set the blade so that it is just proud of the machined cheek of the plane body, such that the blade cuts all the way into the intersection of the shoulder and tenon.

Set the depth of cut for a very tiny cut; remember that this is a finesse cut on end grain. What we want to do is to make several light passes avoiding chatter. Keep checking with your square until you have created a clean-cut shoulder



Survey the shoulders – Use a square to check that the shoulders line up all around the joint.



Clean up the shoulders – Remove the least amount of wood possible when truing-up the joint.



Tenon test – The tenon should hold against the forces of gravity in the mortise when picked up.

on all four sides, with all surfaces at the same height.

On the long shoulder of a tenon, it is best to attack the cut from one end, and then the other, avoiding shooting right through and splintering the wood at the end of the cut. I prefer to get the long shoulders square, and at the same height, and then address the short shoulders. In most cases, it is more practical to make the cut on the short shoulder with a chisel, since there is not enough bearing surface to balance the plane. In practice, I actually leave the short shoulders *very* slightly higher than the long shoulders. When you draw the joint together later with a clamp, the proud short shoulder digs into the mating part, making a wonderfully tight joint.

A strong mortise and tenon joint

Keep in mind that the strength of a mortise and tenon joint comes from the glue joint between the sides of the tenon to the inside of the mortise. Many woodworkers think that they have a good joint when the tenon is difficult to insert into the mortise. If the friction is created by a pinch on the width of the tenon, but not the thickness of the tenon, the joint must be repaired. The thickness fit of the tenon is most important. A good way to ensure that tenon thickness is correct is



Thickness the tenon – Use the shoulder plane to fine tune the fit.



Open with care – Tap the joint apart at 90 degrees to avoid damaging the parts.

to push one corner of the tenon into the mortise at about 45 degrees.

Firstly, fit the thickness of the tenon, and then the width. You should be able to lift the tenon up and have the part with the mortise hold onto the tenon with moderate friction. To adjust your fit, plane the thickness of the tenon with your shoulder plane.

Adjusting the Tenon Thickness

Again, set the depth of cut to a very fine cut. Use a sweeping motion across the face of the tenon while traversing along the length of the tenon. Flip the joint over, and repeat the process on the opposite face. Test for a fit that requires light pressure to insert the tenon at a 45 degree angle into the mortise. Once you have the correct tenon thickness, trim the tenon width with a chisel to allow the tenon to slide into the mortise. The length of the tenon should be $\frac{1}{16}$ " shorter than the depth of the mortise so that the joint will pull in tight without

bottoming out.

If you have hand-chopped the mortise, the bottom of the pocket will be rough. In this situation, I make the tenon a full $\frac{1}{8}$ " shorter than the mortise depth to ensure fully seated shoulders when the joint is drawn together with a clamp.

When testing your joint, you may get the tenon stuck in the mortise and have significant trouble extracting the apron from the leg. Many new woodworkers will try to wiggle the joint apart, leading to shoulder damage on the joint. The safest way to take the joint apart is to place the part with the tenon into your vise, and then gently tap on the part with the mortise, or vice versa. While tapping the wood, use a scrap block against the part to avoid denting the wood.

It is important to extract the parts at 90 degrees to avoid joint damage.

What happens if the tenon ends up loose? One simple fix is to add thickness to the tenon. Use a piece of commercial veneer, cut it to match the size of the tenon, and then glue it to one face of the tenon. Use a flat block to distribute the pressure on the veneer while gluing to keep the clamping pressure even. It is a good idea to wrap your clamping block with painter's tape so that it does not adhere to the joint. Once the glue is dried (overnight), proceed to fit the tenon once again by trimming the thickness with your shoulder plane.

As with any metal hand tool, remember to keep a light coating of non-silicon based oil, or wax on your tools to keep them from rusting. Happy planing!

TED BROWN

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Simple CHERRY FINISH

Don't fret over this crucial last phase of the build. This simple cherry finish will make your hard work shine through.

BY MARTY SCHLOSSER

You're hesitant. You have invested a number of hours in designing and crafting that one-of-a-kind piece of furniture in cherry and there it sits in your workshop, awaiting the finish. You know how important it is to get this final step just right, but so far your finishes

have kept your pieces from being everything they deserve to be. Runs, lacking in depth, too glossy, brush marks, fumes permeating the shop; all those and more will be a thing of the past when you use my simple cherry finish.

Preparation

A terrific finish starts with careful preparation. In fact, it even starts

earlier than that, as careful attention during assembly will save you a lot of time in terms of having to scrape off glue squeeze-outs. That same focus and attention to detail needs to be invested while scraping or sanding all surfaces. Scrape or sand with the grain all the way down in stages to 300 grit, stopping only after every surface is level, smooth and free of any machining or tool marks.

Photos by: Brian Hargreaves



Flood the surface – Don't be shy with the oil and make sure the surface stays saturated for at least 15 minutes.



Wipe it down – After the surface has been flooded, wipe off the excess oil.

Dying for Effect

If you wish to impart a different colour or tone to the piece, or darken any sapwood sections, rather than use oil-based stains, my easy cherry finish calls for aniline dyes. These water-soluble dyes are available in a host of colours and are really easy to prepare, apply and quick to dry. For best results, using a misting bottle filled with water, lightly pre-wet the surface to be dyed and then allow it to dry thoroughly. Sand the surface, with the grain, lightly with 300-grit sandpaper. This gets rid of any 'whiskers' that would otherwise rise when the water-soluble dye is applied. Now go ahead and apply your dye. If a second coat is required to darken the piece, ensure the first coat is thoroughly dry first. There is no need to sand between these coats.

Oil

The first of the two secret ingredients in my simple cherry finish is oil. My favourite is hempseed oil, but if you are having difficulty finding a local supplier, you can substitute tung oil. I get hempseed oil from Homestead House Paint Company (homesteadhouse.ca). These 100% natural products are easy to apply and clean up just as easily. Simply flood the area with



Last step – Apply a light coat of wax with some 0000 steel wool after the oil has dried and buff to complete the finish.

a liberal coat and allow it to soak for 15–30 minutes before removing any excess with a lint-free cloth. Wait another five minutes then rub down the surface, going with the grain, using a second cloth. The colour imparted by either of these oils is dramatic. Allow this first coat to dry overnight and then repeat the procedure three more times, applying less oil every time. By then the surface will be developing a patina that has to be seen to be appreciated. Ensure that when you are finished with the oil-soaked rags you hang them to dry and dispose of them when they are completely dry.

Wax

Although some finishers stop once the last of the oil has been applied, I have found that something else was needed to provide maximum protection and a nicer sheen. The last of the two secret ingredients in my simple cherry finish is beeswax. Apply the wax sparingly and allow it to dry thoroughly (about 90 minutes) before buffing the finish to a lovely sheen. Go ahead and apply a few more light coats and you're done.

This environmentally safe finish can be renewed very easily. First apply more oil, this time using 0000 steel wool in lieu of the cloth, rubbing with the grain. Steel wool helps bond the new coats to the old, but is only required for applying the first coat. Once applied, dried and then buffed, go ahead and apply a second coat. Let the wood tell you by its appearance if additional coats are needed. Once the oil has been allowed to dry overnight, go ahead and apply beeswax as before.

And there you have it: my simple cherry finish. Isn't it nice to use 100% environmentally safe products in lieu of oil-based products for a change?

MARTY SCHLOSSER
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Reversible Mortise Jig

There is still hope for those of us who don't have a commercial jig for cutting a mortise and tenon joint.

BY DAN BARRETT

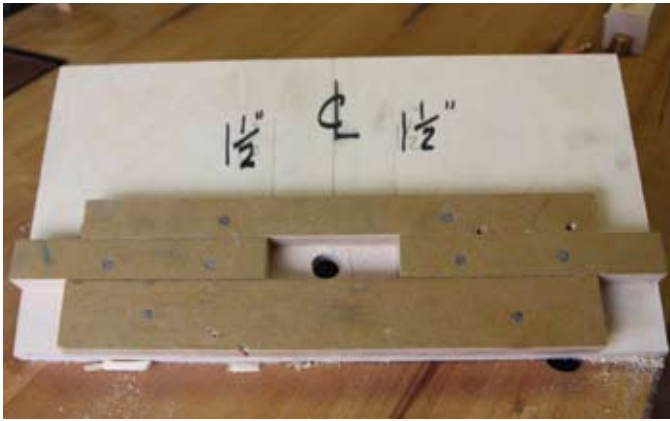
There are countless different ways to cut a mortise. You can cut them by hand, using only chisels (my preferred method), you can drill out the mortise and then clean it up with chisels, and of course you can cut them out using

a router. Once this shop-made jig is set up, this method is very quick and repeatable.

Having used routers for everything imaginable, and some things unimaginable, I would recommend keeping it simple. The more complicated you make something, the greater the potential is for failure. This jig is suitable for

making a connection between a leg and an apron on a table or simple chair. The jig is reversible, which makes it possible to cut on the left and right sides of a leg.

I prefer to use either ½" plywood or MDF for the deck of the jig. Either material is strong and thick enough to make a jig that will produce many mortises. Using ¾" material will limit the



Accuracy is key – Ensure that you mark out the jig precisely to ensure accurate results.

Assembly – The jig does not have many pieces but they need to be assembled with care.

depth of cut because of the extra thickness of the board.

Let's start by preparing the $\frac{1}{2}$ " plywood deck. We will be cutting a mortise in a small table leg, with the dimensions of the mortise being $\frac{3}{8}$ " wide x $\frac{3}{4}$ " deep x $2\frac{3}{8}$ " long. The jig is based on the use of a 1" outside diameter guide collar, and a $\frac{3}{8}$ " straight bit. We need to cut an opening in the deck that has a final dimension of 1" x 3". When you factor in the difference in size between the guide collar and the $\frac{3}{8}$ " bit, there is a $\frac{5}{16}$ " offset all around.

You will have to decide the amount of offset you need the mortise to be on the leg. This will be worked out for your specific needs. I will set the offset at $\frac{3}{8}$ ", which will provide the distance needed for the tenon shoulders to rest on and still leave a $\frac{1}{4}$ " reveal on the front of the stretchers to the front of the leg.

Start by laying out a center line on the deck, then measure left and right of center $1\frac{1}{2}$ " and strike parallel lines to the center line. Mark the center of the $1\frac{5}{8}$ " plywood batten. Place this batten on the deck aligning the center mark with the center line previously marked

on the deck board. Be sure that the edge of the batten is flush with the edge of the deck. Temporarily fasten it to the deck using common nails or screws. Be sure the nail or screw you use is not too long and doesn't break through the other side of the deck.

Next, take one of the 1" wide battens and cut it in half. Place the two halves on each of the $1\frac{1}{2}$ " lines and tight to the $1\frac{5}{8}$ " batten. Again using either screws or nails and ensuring that the fasteners of choice are not long enough to break through the deck, temporarily fasten the two battens to the deck.

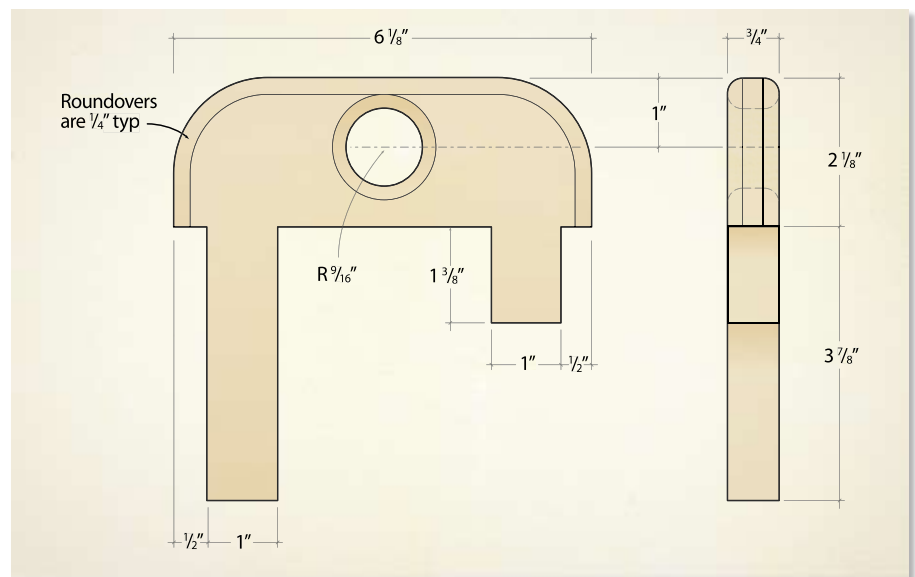
The last batten will be centered on the assembly and temporarily fastened with screws or nails. Again make sure that the batten is tight to the previous battens, to ensure an accurate mortise in the leg.

With a $\frac{5}{8}$ " Forstner bit, drill a hole through the plywood in the cavity that

has just been created. This will provide clearance for a $\frac{1}{2}$ " bottom-bearing bit to rout the opening in the deck to the final size 1" x 3". Flip the deck over and rout the opening. When you are done, flip the deck back over and remove the temporary battens.

Now take the 6" x 6" plywood and layout the reversible stop. Carefully and accurately cut out the described size and shape. To create a finger pull, drill a hole in the stop. This allows you to remove and flip it when needed. I like to rout the edges with a small round-over bit.

The last thing to do before assembly is to cut two $\frac{3}{4}$ " x 1" gains, which are through cuts that you make in the pine to hold and guide the reversible stop perpendicular to the edge of the jig. Once again, mark the center of the pine piece and measure out from the center line $1\frac{9}{16}$ " each way. Strike these



List of Materials

- Either plywood or MDF $\frac{1}{2}$ " x 8" x 15"
- Pine $1\frac{1}{2}$ " x $3\frac{1}{2}$ " x 12" approx. (height and length can change but not thickness)
- Plywood $\frac{3}{4}$ " x 6" x 6"
- Two plywood battens $\frac{3}{4}$ " x 1" x 12"
- One plywood batten $\frac{3}{4}$ " x $1\frac{5}{8}$ " x 12"



Start cutting – Clamp the jig securely to the work piece. This will ensure that the mortise is cut in the correct spot.

lines and then measure a further 1" on each side. Cut these two gains carefully and dry fit the stop piece into the gains. Adjust the fit if necessary to ensure a smooth snug fit.

It is now time to assemble the jig. Match up the center lines of the plywood deck and the pine. Glue and place the pine flush with the edge of the deck and screw it into place.

By now, you probably have about an hour or two invested in the jig, so why not put it to work? Place a leg blank in the vise or clamp it to the bench. Be sure to leave enough room for the



Round mortise – This method produces round mortises. You can choose to either round your tenons or square-up your mortises to make it all fit.

jig to fit on the leg. Unless grain orientation is important, the side you place in the jig first is inconsequential. Securely clamp the jig to the leg and set the depth stop to allow a $\frac{3}{4}$ " deep cut. Place the guide collar in the slot, start the router and begin removing the material from the mortise. Do not remove all of the material in one cut. Plunge the bit gradually, moving from side to side each time until you reach the depth set on the router.

Now that you have cut the first mortise, take the jig off and pull out the reversible stop, rotate it 180 degrees and put it back in. Rotate the leg to the appropriate orientation, clamp the two together and proceed with routing the second mortise.

This jig provides you with a great low-cost option for routing mortises. While mortising by hand is a great experience, doing many can get quite laborious. This jig will speed things up while giving you the accuracy you need.



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Coming Events

WOODWORKING MACHINERY & SUPPLY EXPO (WMS) TRADE SHOW

September 24, 25, 26, 2009
International Centre
Mississauga, ON
www.WoodworkingExpo.ca/index.html

THE WOODSTOCK WOODSHOW

October 2, 3, 4, 2009
Woodstock Fairgrounds
Woodstock, ON
www.WoodstockWoodShow.ca

TOOLS OF THE TRADES

October 4, 2009
Pickering Recreation Complex
Pickering, ON

VANCOUVER & THE VALLEY WOODWORKING TOOL SHOW & SALE

October 16, 17, 18, 2009
Tradex Centre
Abbotsford, BC
www.WoodandToolShow.com

WOODCARVING SHOW AND COMPETITION

October 17, 18, 2009
Kingsville, ON
www.WindsorWoodcarvingMuseum.ca

LA FOIRE DU BOIS 2009

October 16, 17, 18, 2009
Centre des Congrès de l'Hôtel des Seigneurs
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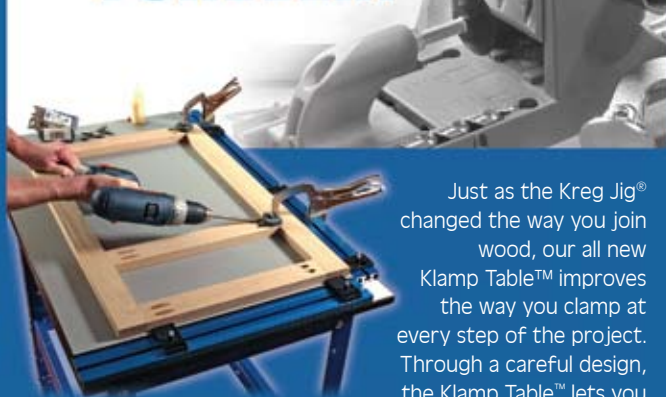
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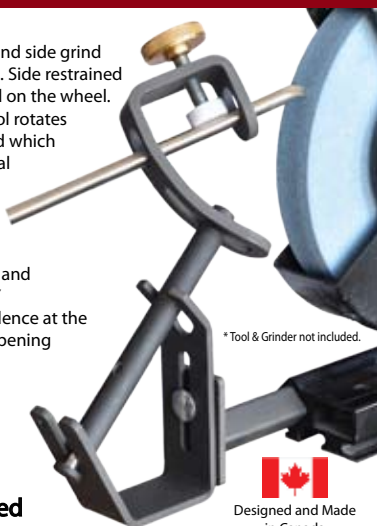
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A bird, a daughter & a garbage can

Welcome back to the ongoing saga of how I became a woodcarver.

BY DON WILKINSON



Like most carvers, I have gone through a number of phases in my carving career. Admittedly, my totem pole calling only lasted for a single project but other aspects have continued long enough to fill box loads, the occasional woodstove load, and every closet, shelf and cabinet in the house and shop with ducks, songbirds, whales, people and a large number of objects that can only be described as 'objects.'

And an elephant! Thankfully, not full size.

To be truthful, each new phase produced a large number of unidentifiable objects until I became proficient at carving whatever it was I was attempting. Like many carvers, I began carving ducks and geese, primarily because there are more books about duck carving than any other subject known to man.

My worst flaw (as a carver, I mean) is that I don't like to start with the beginners' projects like normal people, but with the most intricate carvings at the end of the books. You know the ones I mean, the carvings that take 'Best of Show' or 'Best Woodcarving Ever in the Whole World Including Anything Ever Done By Michelangelo.'

Those are the carvings I strive to emulate. And then fail miserably and get

mad and start at the beginning where I should have gone in the first place.

A few years ago, I sorted through 25 years of those failed carvings and heaps of woodworking stuff that seems to accumulate. It all needed sorting, packing or discarding in preparation for a move to a new house. Heck, it was a move to a whole new world (those who have lived in Western Canada and then moved to Ontario will know what I mean).

Deep in a box beneath years of dust, shavings and woodchips was a carving of the first chickadee I had ever carved. Admittedly not a great carving, this little guy looked enough like a chickadee that almost anyone could tell what it was if given a broad enough hint. Something along the lines of, "It's a chickadee, dummy!"

The little bird was the right size and shape but appeared to suffer from some horrible lumpy disease; something like the mumps but all over his body. I held that little carving in my hands and turned it over and over, trying to figure out what I had been striving for. Nowadays, I have a hard enough time figuring out why I'm climbing into bed let alone why I did something 25 years ago, so after a short ponder I tossed the bird into the garbage where he belonged, never to be seen again.

Unfortunately, I hadn't counted on Dyana, my *Emergency Backup Daughter*, or her penchant for rescuing anything she deems to be sad and/or lonely. This can include ugly wooden birds or the last piece of paper in a notepad. Her heart is good, her taste is bad, and her common sense is non-existent!

Try as I might, I could not convince her that the little chickadee did not feel hurt and abandoned just because I had thrown it away. Nor would it be sad and lonely in the garbage can. (I almost made the mistake of telling her all the other carvings in the garbage bin would keep it company but she would have cried her little heart out at my cruelty. And then she'd sneak back and rescue them all).

I finally agreed to let her keep the little bird, thinking I could always throw it away once she had forgotten about it.

Eighteen years later and she still has that stupid, ugly little misfit of a chickadee. Today, she lives in Africa and if her last e-mail is any indication, she's busy collecting herself a new husband. Hopefully he's not as lumpy and ugly as that stupid little bird.

DON WILKINSON
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