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Canadian Woodworking

FEBRUARY/MARCH 2007
Issue # 46

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Canadian Woodworking

ISSUE #46

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BY MICHAEL KAMPEN



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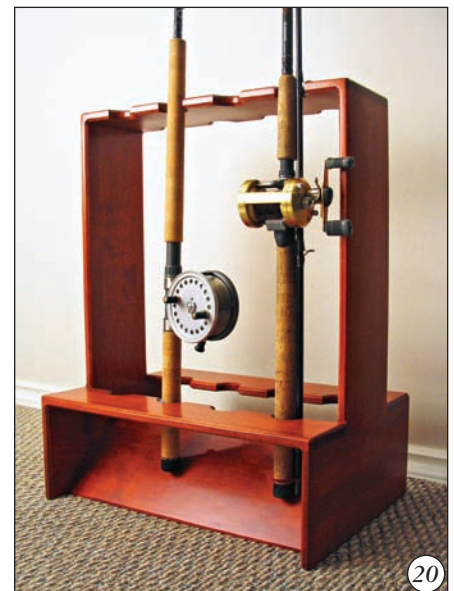
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LINDA FULCHER

It could be that I am just hungry, but the woods and finishes in this issue's projects sound simply delicious to me. I know I have joked about biscuits in the past, and woodworkers have been really clear that we are not making rabbit stew, but I am sure that I could put a menu together to suit anyone's taste in wood, just from the references in this issue alone.

If you are a meat and potatoes kind of woodworker, I would like to start you off with solid wood: a full course of quarter-sawn white oak with a distinctive ray, fleck pattern, and a coat of oil to the plane for finishing, followed by a couple of coats of paste wax, for a warm, traditional finish.

Perhaps you are celebrating, and feel like something a little more rich? Try the figured cherry, with butternut, and beaded walnut accents, topped with several coats of lavender beeswax to highlight the rich, warm colour.

Too rich? Then stick with the tried and true: hard, Canadian maple with traditional milk paint for subtle depth and colour... in say, a mustard colour? Ah yes, and for your partner? Let's see - what about something a little more exotic?

I recommend the fiddleback makore and the silky smooth bubinga, or the purple heart, paired with the osage orange, prepared using a set of rubber bungs off the jumbo jaws. And for dessert: the bee's wing eucalyptus.

Even the tips have me thinking of baking: "Save the very fine wood dust or wood flour.....Sprinkle some of the flour on your spill and it will instantly soak it up....If your fingers are covered with finish, use the flour (sawdust works equally well) to give yourself a quick dry scrub."

I kid you not. You will find each and every one of these references in the pages to come. I know it is common for woodworkers to drool over tools, but to me, the woods and finishes have the same appeal.



PAUL FULCHER

While at the woodworking shows, meeting woodworkers, and introducing them to our magazine, I was surprised at how many people flip through magazines from back to front. It seemed backwards, as I assumed that people would flip through the pages as they would read them - front to back.

At first, I thought that it had to do with handedness. But, upon further scrutiny, it seems to have no correlation whether the person is right or left handed. Then, as I thought about it more, I realized that I do the same thing, I just hadn't noticed.

All this flippin' thinking got me looking at how we put our magazine together. I reasoned, 'if so many people peruse the pages from the back to the front, why not start off with something of great benefit to our readers, and their workshops. With that in mind, we looked at what that offering might be, and decided that we would offer a huge collection of jigs (one at a time of course).

We chose jigs, because what could be more helpful and beneficial than a good set of jigs. Workshop jigs not only make great projects, they help you to improve the efficiency and safety for all of your future projects.

Therefore, I am very happy to introduce a brand new series on jigs. Be sure to follow (and build) along, as we cover a variety of woodworking jigs that are sure to improve the quality, and the enjoyment, of your woodworking.

PS I've just realized that you will probably already know about our new jig page, if you are one of those who started at the back!

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lettersto

Hey Paul:

It was good to see you at the Moncton Woodworking Show. That was my first show in my new position as sales manager for Steel City Tools. Steel City had a very successful show in Moncton.

Being a new company, and showing your products for the first time has its challenges, but Canadian Woodworking's article on Bench Top Mortisers (Issue #45), which included our model



25200, actually brought customers into the show to make a purchase.

The sales of Steel City's bench top mortiser exceeded the stock on hand, and we ended up having to take orders.

Thanks for the great coverage.
Terry Ross, Sales Manager/Ontario Region
Steel City Tool Works
www.steelcitytoolworks.com

David Bruce Johnson:

I read about you recently, and was in awe of the work you do. I was inspired to know that you retired from the military.

I am a Sgt in 1 RCR, currently serving in Afghanistan. Prior to departing home, I knew what my job would be and took

steps to have every thing I needed to stay busy during my down time, that being carving supplies sent to me. I have been carving for a little less than a year now, and it has become my passion. Every free moment I have I spend carving. Most of the carving I do is relief. I am not yet ready to try carving in the round.

I just completed a piece that I think you may be interested to know about. It is a dedication to the members of our Battle Group that were/are KIA or WIA, during the tour. I was able to get some purple heart over here, and thought it would be the perfect choice of wood. The carving is an 11" maple leaf and shows the county of

continued on page 42

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Hand Tool Cabinet

This tool cabinet is a practical, attractive way to store and protect a collection of hand tools.

Those who are new to woodworking may not yet own many hand tools. Often, when woodworkers first set up their shop, and start purchasing the requisite tools, the emphasis tends to be solely on power tools. The perception is that power tools are faster, give better results, and are easier to use.

Those same woodworkers, when they have been at it long enough, come to realize how integral hand tools are for a complete shop. As each woodworker

progresses in their craft, they see that there are things that hand tools can do that power tools just can't do. Consider, too, that hand tools offer a more quiet, peaceful way to work with wood, and you begin to understand why most seasoned woodworkers have a variety of hand tools at their disposal.

Whether you are one of those seasoned woodworkers that needs a place for your hand tools, or you are new to woodworking and looking to build up your hand tool

collection, this hand tool cabinet is sure to serve your purpose.

The Design

This tool cabinet introduces a new series in which we will not only build the cabinet but also a selection of hand tools to put in it. You may choose to build some, or all, of the tools in the series, but you will certainly have tools of your own you will want to store in this cabinet. In order to leave you room to incorporate your own

collection, we will concentrate on the construction of the cabinet itself, leaving the fitting of the interior to you.

This cabinet should be hung close to your workbench and is a great way to show off some figured wood and your skill as a craftsman. I made this cabinet of figured cherry with walnut accents. The doors each have one glass panel at the top above a panel veneered with fiddleback makore. The doors are hung using brass offset knife hinges. The five lower drawers are red oak, the faces veneered with bee's wing eucalyptus. If you think this cabinet is too challenging and difficult, you'd only be half right. It is challenging, but it's not difficult. With some simple tricks along the way, any woodworker could build this piece.

Cherry is one of the most pleasant woods to work with. It smells wonderful when cut and machines beautifully. It can also be one of the most frustrating woods to use as well. Pitch pockets can appear in the middle of an otherwise perfect board; dull and poorly aligned bits and blades can easily leave black burn marks that are almost impossible to sand out; and trying to match boards for colour and grain when laying out your parts can be difficult. However, the results are worth it. Regardless of the wood you decide to use, select it carefully at the lumberyard and buy enough extra to allow some flexibility in your parts layout.

I built this cabinet to hold my personal collection of hand tools. Feel free to change the design to suit the tools you have. After all, it will be hanging on the wall of your shop, not mine.

The Cabinet

- The cabinet is made of six glued up cherry panels. If you can find material wide enough and have the tools to work it, they could be made from one solid piece. The most visible parts of the cabinet are the sides (A), so choose your wood carefully and try to hide the glue line. Remember, both sides (A) will be seen from both sides. The next most visible

surfaces will be the underside of the top (B) and the upper side of the top shelf (C) so these should also be laid out with an eye to colour and grain matching. All other faces, including the bottom (D) will be hidden so appearance is not an issue. In addition to matching the faces of the panel, the front edges on these parts will also be very prominent. In order to achieve a match with the sides, I had to edge band the front of each of the horizontal members with a $\frac{1}{4}$ " strip of cherry cut from another board.

- Cut the glued up boards for the cabinet to their final dimensions. I used a dovetail jig to cut half blind dovetails to hold the top, bottom and sides together. This makes assembly easier later. In order to do this, the top and bottom had to be $\frac{1}{8}$ " longer than the shelves. Adjust the length of the top and bottom based on your method. Dowels would work equally well while still providing alignment during assembly.

- The two shelves are held in stopped dados. Cut these using a router guided by two fences and an end stop. Use this same method to rout the stopped dados for horizontal dividers (E).

- To fit the shelves, cut a $\frac{3}{8}$ " deep, $\frac{3}{4}$ " long notch into each leading corner of each shelf to allow it to slide past the stopped dado and sit flush with the front edge of the sides. Cut the plywood pieces for the three dividers.

- Assemble the pieces to be sure everything fits perfectly before proceeding. If everything comes together properly, clamp the pieces together and lay it face down on your workbench. Use a marking gauge to scribe a line $1\frac{1}{8}$ " in from the back around the perimeter. Mark this area with chalk so it is readily identifiable as the rabbet for the back after the pieces are taken apart.

- Lay out the mortises for the two hinges on the underside of the top, and the top side of the upper shelf. Lay out the mortise precisely using a ruler and a marking gauge, or lay everything out using pieces of wood, a drill bit and a depth gauge. (See sidebar: *Laying Out Hinges*, next page)

- Install a $\frac{3}{8}$ " spiral cutter in your router table for a cut equal to the thickness of the hinge leaf.

- Set up a fence and use the spacer to set the distance between the cutter and the fence. Keeping the face edge against the



Veneering with the Thin Air Press

Prepare the plywood by sanding it to 150-grit. Fill any imperfections, as they will telegraph through the veneer. Using the Thin Air Press Kit, a product made by the Roarocket Skateboard Company in Toronto, and available through Lee Valley Tools, veneering these panels is a piece of cake. Collect the pieces of the Thin Air Press kit, the plywood and the veneer. When everything is ready, use a roller to spread an even layer of glue on the plywood. The open time of regular wood glue is insufficient; select glue like Titebond III instead. Lay the veneer over the plywood and press it down carefully. It will likely want to curl, so wrap a couple of elastic bands around the panel. Slip the panel inside the breather / netting bag and then place this bag in the vacuum bag. After sealing the bag, use the pump to suck the remaining air out. After the glue has cured, remove the panel from the bag and repeat on the other side.

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fence at all times will ensure the proper setback on both the cabinet and door mortises.

- Set a stop to limit the length of the mortises and rout all four now; this is the only chance. You will need to move the stop to the other side of the bit to do two of the mortises.

- Using the same $\frac{3}{8}$ " spiral bit in a router table, use a fence and end stops and rout a $1\frac{1}{8}$ " inch wide by $\frac{3}{8}$ " deep stopped rabbet on top bottom and sides to receive the back.

- Assemble the cabinet again and fit the two shelves so they are flush at the front. Mark the depth of the rabbet on each shelf and remove the waste with a table saw. With the pieces assembled, measure for the back (F) and cut it to fit snugly in the rabbet.

- At this stage, if everything fits, take the pieces apart in preparation for finishing. Because there are many areas of this project that would be difficult, if not impossible, to finish properly later, it is best to do the finishing before various sections are assembled.

- Sand the back to 150-grit in preparation for the finish.

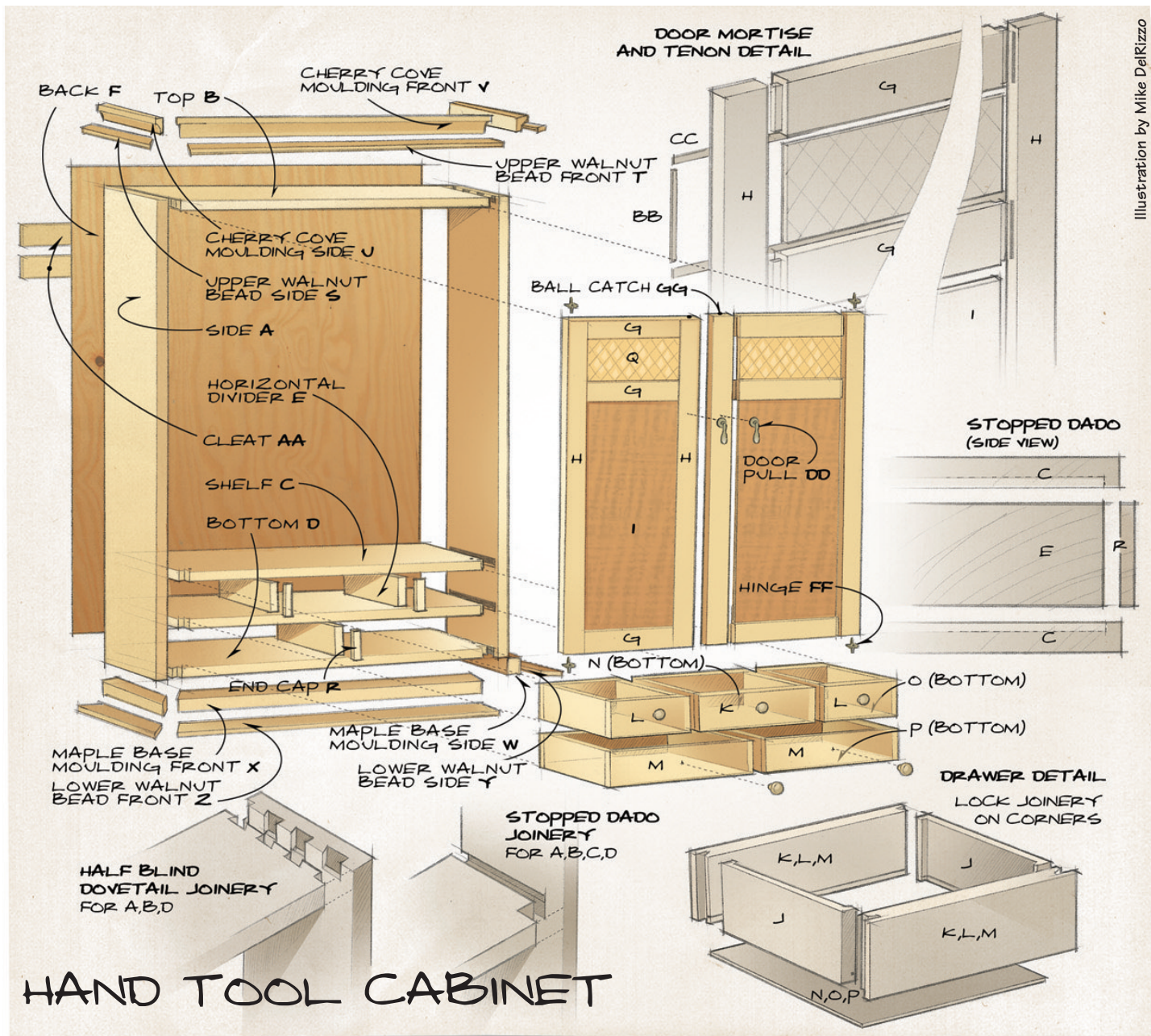
- Milk paint is an ideal finish for the back; it's a traditional finish that's been made the same way for hundreds of years and imparts a subtle depth and shading that modern paints can't match. It is so easy to use and you get perfect results every time. I used a 'mustard' colour.

- Mix the paint powder with water and brush it on. It will dry very quickly, in about 15 minutes. It will need a second coat for even colour coverage and when

this is dry, rub it down with 000 steel wool. At this point I like to put on a couple of more quick coats. That seems to help make the colours a little more rich and increases the depth of the finish.

- After the final coat of milk paint, use steel wool to burnish the entire surface and then seal it with a coat of Watco Natural.

- Sand the six cherry panels through to 220-grit for finishing. Don't sand the upper side of the top, the underside of the bottom and the outsides of the sides. Also, don't sand the front and rear edges. If you like, use a cabinet scraper to remove the traces left behind by the sander. This final step will enhance the depth and clarity of the cherry. Apply a coat of Watco Natural finish to all inside surfaces, being careful not to get any on the areas to receive glue during assembly.



• When you've rubbed off and buffed the finish, assemble the clamps you will need to glue up the cabinet. Set the two shelves aside, and apply glue to the ends of the top, bottom and sides. Assemble the cabinet and loosely apply some clamps. Before tightening the clamps, apply glue to the dado and slide the two shelves in. Gradually tighten the clamps; keep an eye on the front edges to be sure they are all flush. Measure the diagonals to be sure everything is square.

The Doors

• When selecting stock for the doors bear in mind that using highly figured grain for the rails (G) and stiles (H) could be very distracting.

• Mill the material for the doors. Be sure that the pieces are straight and square; there is no adjustment available with knife hinges.

• Lay out the mortises and tenons on the door members and cut them using the tools you have available.

• Using a 1/4" bit in a router table, rout the grooves for the lower door panel.

• Cut a piece of plywood for panels (I).

• If you have solid wood to use for the doors, remember to leave enough space for seasonal expansion. In this case the panels are veneered with fiddleback makore. Use a Thin Air Press Kit (see sidebar: *Veneering with a Thin Air Press*, page 5). Optionally you can veneer the panels by clamping them between layers of plywood.

Laying Out Hinges

The hinge mounts flush with the edge of the door, so the length of the mortise for the cabinet section will have to allow for the gap. The gap at the edge of the door will be the same as the thickness of the washer on the lower hinge member. Coincidentally, this happens to be the same thickness as some textured laminate samples I have that I use as shims for this purpose. Place a shim against the side to represent the width of the gap. Find the largest drill bit that will fit into the hole on the door half of the hinge. Hold the hinge in place pushing it up against the shim and back until the drill bit contacts the edge of the panel. Trace the outline of the hinge. Prepare a spacer the same width as the piece of wood that will be left at the front edge after the hinge mortise is routed. This should be at least 8" long.

MATERIALS LIST (All measurements in inches)

	Part	Qty	T	W	L
A	Sides	2	3/4	9 1/8	31 5/8
B	Top	1	3/4	9 1/8	23
C	Shelves	2	3/4	9 1/8	22 7/8
D	Bottom	1	3/4	9 1/8	23
E	Horizontal dividers	3	1/2	2 3/4	8
F	Back	1	1/2	22 7/8	30 7/8
G	Rails	6	3/4	2	8 5/8
H	Stiles	4	3/4	2	24 1/8
I	Door panels	2	1/4	7 13/16	15 1/8
J	Drawer sides (TC)	10	3/8	2 1/4	7 5/8
K	Drawer front and back (TC)	2	3/8	2 1/4	8 5/8
L	Drawer fronts and backs (TO)	4	3/8	2 1/4	6 1/4
M	Drawer fronts and backs (B)	4	3/8	2 1/4	10 13/16
N	Drawer bottom (TC)	1	1/4	8 1/16	7 7/16
O	Drawers bottoms (TO)	2	1/4	15 13/16	7 7/16
P	Drawers bottoms (B)	2	1/4	10 5/16	7 7/16
Q	Glass panels	2	1/8	7 13/16	4 5/8
R	End caps	3	3/4	1/2	2 1/4
S	Upper bead sides (w)	2	1/4	1 5/8	9 1/2
T	Upper bead front (w)	1	1/4	1 5/8	24 1/8
U	Cove moulding sides	2	7/8	1 3/4	9 7/8
V	Cove moulding front	1	7/8	1 3/4	25
W	Base moulding sides (m)	2	1/2	1 5/8	9
X	Base moulding front (m)	1	1/2	1 5/8	23 1/4
Y	Lower bead sides (w)	2	1/4	1 5/8	9 1/8
Z	Lower bead front (w)	1	1/4	1 5/8	23 1/2
AA	Rear cleat	1	5/8	3 1/2	22 7/8
BB	Window strips	4	1/4	3/8	3 7/8
CC	Window strips	4	1/4	3/8	7 13/16
DD	Door pulls	2			
EE	Drawer pulls	5			
FF	Hinges	2 pair			
GG	Brasso ball catches	4			

Notes:

All parts are cherry except as noted: (w) walnut; (m) maple
Drawer locations: (TC) Top Center; (TO) Top Outside; (B) Bottom

Milk Paint and Claphams Lavender Beeswax available from:
Homestead House Paint Company, www.homesteadhouse.com



- This cabinet is finished with an oil to highlight the grain, followed by several coats of beeswax for a warm glow. If the door panel were finished with the rest of the cabinet, it would be impossible to get an even finish in the corners. Prepare the panel with sandpaper and a scraper; finish it with oil and then several coats of beeswax.

- Sand the doorframe pieces, being careful not to round any joint areas. Apply a coat of oil to the inside edges of the door panel opening. The solvents in the finish will remove the beeswax if it gets on there during application later. Assemble the door with the panel and check the diagonals for square.

The Drawers

- Cut the drawers sides (J) and the drawer fronts (K,L,M). Ensure that you confirm precise measurements directly off your cabinet. I made the drawers using a small drawer lock bit available through Lee Valley Tools; if you use another method adjust the material sizes accordingly.

- Cut the corner joints on the router table.
- Use a box-slotting bit in the router table to cut the slot for the bottom.

- Cut the drawer bottoms (N,O,P).
- Sand and finish the inside faces and the bottom and apply a coat of oil. Assemble the boxes with glue and clamp. Do not over clamp; the sides of the drawer boxes are thin and excessive pressure will bow the sides making them difficult to fit later.

- When the glue has set, remove the

clamps and sand the outer surfaces. The front of the drawer boxes are veneered with bee's wing eucalyptus. To provide continuous grain across the width of the cabinet try to cut all of the pieces from one strip. Apply glue to the drawer face and place the veneer. Use a piece of melamine as a caul and clamp it to the face of the drawer to sandwich the veneer and apply pressure. Any glue that squeezes through the veneer won't stick to the melamine.

- Sand and scrape the drawer fronts and sand the other outside surfaces.

Mortise the Doors

- Using the same set up and method used to mortise the shelf components cut the mortises in the doors for the hinges. Remember to use the spacer and keep the face against the fence for the proper setback. Square up the mortise with a sharp chisel.

- After routing the hinge mortises, use a bearing guided rabbeting bit in the router table to cut a $\frac{3}{8}$ " x $\frac{3}{8}$ " rabbet in the upper opening to receive the glass panel (Q).

Back of the Cabinet

- Mill the end caps for the horizontal dividers (R).

- Sand these and apply a finish to the front and sides.

- Use a five-minute epoxy to glue these pieces in place on the plywood dividers. Sand the front edges of the cabinet as well as the sides.

- Using more of the same shims that were used to set the door gap, trim the doors to fit into the opening. When both doors can sit in the opening with the shims, (don't forget one in between the doors), remove the doors and drill one clearance hole in each hinge section and use one screw to fasten each hinge section. To hang the door, remove the screw from the upper hinge and place the hinge on the post and slide the door onto the hinge. If everything has gone well, the doors should be perfectly hung. If not, by only using one screw, the other could go into unused wood should you have to make a minor adjustment.

- Perform any final fitting necessary on the drawers and finish sanding all of the outside surfaces in preparation for finishing.

The Final Bits

The base and crown moulding on the cabinet is built up using two different pieces of wood using common bits and milled on a router table. Prepare the stock for the crown moulding (S,T,U,V)) and base moulding (W,X,Y,Z). Use a $\frac{1}{4}$ " bead bit in the router table to profile the front edge of the walnut trim for both the base

and the crown. Use a 3/4" cove bit to mill the top cove pieces in cherry.

- Mill the stock for the cleat (AA) at this time. Set the blade on your table saw to 45° and rip the piece in half. One half is mounted to the cabinet, which in turn interlocks with the other half, that is mounted to the wall. Drill counter sunk holes for the screws on the piece that mounts to the cabinet.

- Mill a piece of cherry to a thickness of 3/8" for the keepers (BB & CC) that hold the glass in place. Use the table saw to rip strips off this board to accommodate the glass you are using. Drill holes in one inch from each end for the #4 screws that will hold them in. The screws should pass through the piece without catching.

The Finish

- Once the doors and drawers have been fitted remove the hardware and proceed with the final finishing of all the parts. Apply a coat of oil to the cabinet itself. Also, sand and oil the pieces for the moulding. When applying finish to the doors, be careful not to get any on the waxed panels, it will strip the wax. Apply at least two coats, more if required and after wiping off the excess, buff the wood and let the finish cure thoroughly.

- To bring out the rich warmth of the cherry and to highlight the colour and figure use a beeswax finish. The only downside is that it takes elbow grease to put on, but it is a finish anyone can master and it is easily repaired in the future. It will take several coats to bring up a nice even sheen but the effort is worth it. Wax the cabinet doors and drawers now as well as the individual trim pieces; doing so now avoids wax build-up in the moulding after it is built. Do not wax the milk painted back. Wax could put a glare on the surface that would be distracting.

- When everything has been waxed and buffed, install the back using pan head screws. Drill pilot holes in the cherry or the wood will split.

Bring It All Together

- Installation of the moulding is simple. Cut the beaded walnut section for the crown moulding to length with mitred corners as needed. Place this on top of the cabinet and fasten it in place with several screws. Drill proper countersunk clearance holes so the screws pass through the walnut and the heads sit below the surface. Cherry is a hard wood and to avoid snapping off any screws or splitting the wood, drill holes for the shaft of the screw. These screws do not need to be super tight; they're only holding the moulding. Cut the cherry cove to size and layer this on top of

the walnut bead. Again, drill and countersink the holes and fasten with screws as before. Note the location of the previous screws so you don't accidentally drill into one.

- The base moulding is done the same way. Cut the maple sections to size and install them as the others. Follow this with the beaded walnut pieces. When installing the walnut bead, bear in mind that most people will look underneath out of curiosity. For that extra detail and touch of class, use brass screws here. When installing brass screws, follow the same procedure as above, and install steel screws first. When finished, back them out one at a time and replace them with brass screws. Doing this reduces the chance of snapping off the softer brass screws in the hard cherry.

- Cut a piece of glass for the door. Textured and coloured glass is readily available at any stained glass shop. Install the glass and use #4 screws to hold the keepers in place.

- Carefully locate the center of the holes for the ball catches. Use a 1/4" Forstner bit to drill these holes and check the depth often. They must be exact for the catch to project the proper amount. Reference all of your measurements from the front edge of the cabinet. Install the catches in the cabinet. Cut a scrap of wood to set the proper setback for the doors over the catches. Use the ball catch setback to set the marking gauge and then open the doors one at a time, transfer this measurement to the edge of the door using the same front edge of the cabinet as a reference. This ensures proper alignment regardless of door setback and any variations in thickness that may have occurred during sanding. Transfer this mark around the corner and with the door closed visually mark the distance in from the side of the door to the center of the catch. Drill this with the Forstner bit as well. Glue the catches in place.

- Mount the cleat to the rear of the cabinet. To hang the cabinet, mount the other half on the wall using appropriate fasteners for the wall and the load, being sure to go into two studs.

Fitting the interior is largely dependant on your tools and the work you do, so we'll leave that part up to you. If you are just starting out, then be sure to leave enough room for the handtools that you will surely be adding to your shop.



MICHAEL KAMPEN
kampen@canadianwoodworking.com

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Krenov Style Hand Plane

Wooden planes have been used for thousands of years. In fact, from Roman times, until the industrial age, when planes made of cast iron became widely available, wooden planes were the only option. Now, woodworkers have a wide selection of planes, of various materials, available to them.

Even with the wide range of planes on the market today, many woodworkers still enjoy making their own wooden planes. And why not? It's a near perfect project: building the very tool with which you do your future woodworking. What could be more enjoyable and fulfilling?

This Krenov style plane, named after James Krenov, is quite easy to make. And, when fitted with a Hock iron, it is sure to cut every bit as nicely as a high-end bronze low-angle plane.

This plane's style was originally popularized by James Krenov, a great exponent of hand planing. The Hock iron, named after its maker, Ron Hock, is a much thicker iron than what is commonly mass produced. The thickness helps to significantly reduce plane chatter.

Select Your Stock

This is a great project to experiment with an exotic wood. For the amount you will need, the cost outlay will be minimal, and, as an added bonus, most exotics are heavier and denser, so they are ideal for the task.

These two planes are made from a single piece of bubinga. Bubinga has a heavy feel, and a surface that is both silky smooth and cool to the touch. It makes for a most enjoyable tool. When choosing the wood for your project, try to imagine what a plane-sized piece would feel like in your hands.

Why make two planes? Aside from the fact that both have different irons (one straight and one curved), it has to do with how I make them. I use a jointer and a thickness planer to prepare the material for

these planes, and although it is possible to run short pieces through them, it is much safer to run a 24" piece through these machines than a shorter 12" piece.

Prepare the Stock

Preparing the stock for the plane is basic. You'll need two pieces for the sides (A) and one piece for the center block (B). How you go about this will depend on the material you have chosen. Because the center block will be cut in two and glued between the sides, it is important to prepare it as one piece first and then cut it to avoid working with pieces of unequal thickness during the glue-up. If you wish to make this from one solid block of wood, you will need to find stock thick enough to be resawn into the three components. The thickness depends on whether you will be using a band saw or a table saw for resawing. Once you re-saw the blank, use



downloaded from www.cro-wood.com

LoneWolf

a jointer and thickness planer to prepare the two sides and center block. If you can't find stock thick enough, simply glue up the center block from thinner stock. When the glue has set, bring the parts to the final dimensions using the jointer and thickness planer.

Prepare the Center Block

- To create the cavity that holds the plane iron, wedge and cross pin, the center block has to be cut twice.

- Make the first cut at 45°, cutting the center block in two parts.

- Set aside the smaller of the two pieces, this will become the rear section of the center block. You can use the middle piece for the wedge.

- Make a 15° cut to remove the center wedge from the other piece which will become the front half of the center block. Save this piece for use later.

- Set up a $\frac{3}{8}$ " spiral cutter in a router table. To make a clearance groove, for the screw that fastens the chip breaker to the iron, you will need to rout a stopped groove in the rear half of the sloped face of the center block. Use a fence and an end stop, and rout this in two passes on the router table.

- Use a table saw and a cross-cut sled to take the sharp point off the trailing edge of the front section. Making this section a little more vertical ensures that the opening will not get overly large as the sole wears during use.

Bring the Pieces Together

- The next step is to bring the four pieces that form the body together and to index them with dowels to be sure they can be accurately reassembled during the glue-up stage.

- On a flat surface, such as the top of a table saw or the infeed bed of a jointer, set the four parts down and lightly clamp them together.

- To set the proper opening for the iron, move the two center pieces together until the opening is just ever so slightly too narrow for the iron to go through.

- Clamp everything together, ensuring that all four sections are sitting flat on the surface.

- Drill four dowel holes in each side - four dowels in each section. Locate these holes in the area at the top of the stock, which will be removed when the plane is sawn to shape.

- Before drilling, test the bit/dowel combination in a piece of the same wood. I found that a 5/16 brad point bit was too loose with a 5/16 dowel to give a perfect fit during glue-up. Using a 19/64 bit gave

me a nice tight fit. Unfortunately, it also meant that the dowels could not be removed, and needed to be drilled out later in preparation for gluing, but the added accuracy was worth the effort.

- Drive dowels into the holes to hold everything tightly in place.

The Cross Pin

- With the pieces held together with dowels, it is time to lay out and drill the holes for the cross pin (C).

- Cut a $\frac{1}{2}$ " thick spacer the same size as the iron.

- Place the iron in the plane, and place the spacer on the iron.

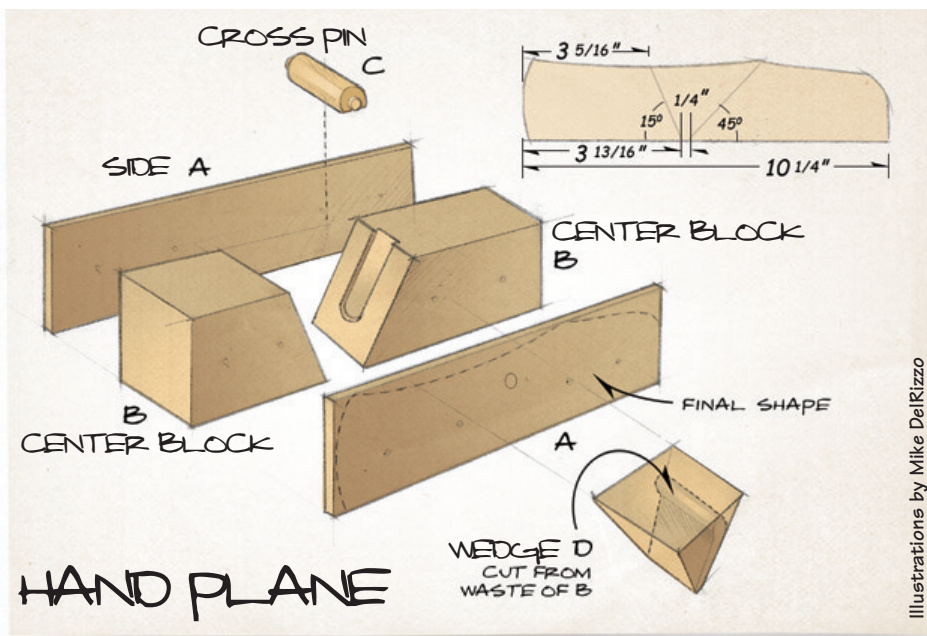
- Trace a line along the top edge of the spacer along the inside of both side pieces. This is the centerline of the cross pin hole, as measured from the iron. The cross pin centerline should also be about $\frac{1}{4}$ " up from the sole of the plane.

- Draw a line along the center section of both sides, on the outside, $\frac{1}{4}$ " up from the base. Where these lines intersect is the center of the cross pin hole. To transfer the inside measurement to the outside, close the jaws of a dial caliper on the side and when both the inside and outside tips are on the lines you've drawn, mark this point on the outside line.

- Adjust your drill press so the bit is square to the table, and using a 3/8 brad point bit, drill through the first side and keep going until you have gone through both sides.

- Cut a blank for the spacer (C) sized to the dimensions shown in the materials list. For maximum strength, consider using stock with grain that runs the full length of the piece, in this case, I used quarter-sawn white oak.

- Cut the tenons to fit the holes in the sides in two steps. First, set your table saw



Illustrations by Mike DeRizzo

blade to project 1/8" above the top. Next, mark off the shoulders. Measure in the thickness of the side for the first shoulder, then another 1 1/4" from that point to the next. Using a cross-cut sled, cut the tenons up to the shoulders on both ends with multiple passes.

- Clamp the cross pin in a bench vise and use the shank of a 3/8" drill bit centered on the square tenon to trace a pattern for a perfectly centered round tenon.

- Use a sharp chisel to underscore the areas to be removed and then work down along the outline of the tenon to remove the waste. Test fit the tenon into the corresponding hole often until you achieve a snug fit that still allows rotary movement.

- Shape the upper sides of the cross pin into a rounded, more streamlined shape.

Putting It Together

- Take the plane apart. If the dowels won't remove easily, it is best not to force them.

- Select a brad point drill bit just slightly smaller than the dowel and drill it out. Be careful not to alter the original hole. The remaining dowel pieces will either pop out with the drill bit or can be pulled out of the hole.

- Lay out all of the pieces in the order they will be assembled. Be sure to have fresh dowels ready.

- Rub a little paraffin wax on the edges of the cross pin tenons and insert them into one of the sides.

- The plane can be glued using either Titebond III or a two-part epoxy. If you are using a five-minute epoxy, be sure to be well organized. Apply the epoxy to one side of both center pieces. Place these face down on the corresponding side, turn the pieces over and drive the dowels into the holes. Apply epoxy to the other sides and locate the second side with the dowels. Be sure the cross pin is in place.

- Use clamps to draw everything tight and let the adhesive cure.

Shape the Plane

- When the epoxy or adhesive has cured, remove the clamps.

- Flatten any irregularity in the sole of the plane on a stationary belt sander. If you don't have one, take a sanding belt from a belt sander, cut it open and clamp it to the in-feed bed of your jointer and level the sole manually. Be careful at this stage. It is possible to make the opening too big

quickly if the leading edge of the back of the opening is sloped upward.

- Trace the outline of the plane on the side and use a band saw to cut it out.

- Sand the sawn area to remove any saw marks and blend the curves into one smooth, flowing form.

- Sand the sides. If you plan on using the plane with a shooting board, be sure the sides of the plane are at 90° to the sole.

The Wedge

- The iron is held in place by a wedge (D) that is placed between the cross pin and the iron.

- Cut out the general shape using a band saw, but be careful as the part is small and could be hard to hold. Alternatively, consider using rasps and a sander.

- Refine the shape of the wedge gradually and test it in the plane often. Keep going until you have a wedge that fits and holds the iron firmly in place

- Apply a coat of oil to the plane to bring out the grain and follow that with a couple of coats of a paste wax for protection. Install the iron and wedge and you'll be creating paper-thin shavings in no time.



Sole



Throat and cross pin

MATERIALS LIST (All measurements in inches)

	Part	Qty	T	W	L
A	Sides	2	5/8	3	11
B	Center block	1	1 5/8*	3	11
C	Cross pin	1	5/8	5/8	2 3/8
D	Wedge	1	3/4	1 3/4	2 - 2 1/2

Notes:

* Center must be 1/8" wider than the blade – confirm actual dimensions with the hardware at hand.

Hock plane iron available at Lee Valley Tools.



James Krenov

There was a time when wood bodied hand planes were the de facto plane of choice in the workshop. Changing times and technologies largely replaced wood bodied planes with all-metal planes. By the time this occurred most woodworking was highly mechanized, with most furniture being produced in large factories. Even small woodworking shops strived to emulate the efficiencies and production rationale of the furniture factories. In 1975 a little known woodworker by the name of James Krenov published "A Cabinetmakers Notebook", followed by "The Fine Art of Cabinetmaking" in 1977. These two books had an enormous impact on the woodworking community, particularly among furniture makers. Krenov's approach to woodworking, and his heavy reliance on hand tools, precipitated the 'studio furniture' revival in North America. In 1981 he founded the College of the Redwoods' Fine Woodworking School, where he taught and worked until his retirement a few years ago. The style of wood bodied hand plane that Krenov popularized has been affectionately named after him.

- CWM

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BY TOOL GUYS. FOR TOOL GUYS.



Arts & Crafts Hat and Coat Shelf

This hat and coat shelf has clean lines and ample storage. It is equally at home in a formal entry, or a back door. The three coat hooks provide plenty of hanging space for your jackets, and the shelf is a great place to set your hats and gloves.

In keeping with the Arts & Crafts tradition, this project is constructed out of quarter-sawn white oak. Choose your wood wisely, and highlight the distinctive medullary rays of this species. Of course, if you prefer wood other than white oak, any hardwood would be suitable.

This is a straightforward project that doesn't rely on fancy joinery. It is great for both the beginner and the more experienced woodworker.

When selecting material for this project, keep in mind that the horizontal slats will be the only ones that face forward. Try to

select material with prominent ray flecks for a traditional Arts & Crafts look. The boards that make up the uprights and the top are not as prominent, so less distinctive boards could be used for those parts. Some of the parts are $\frac{3}{4}$ " thick and others are $\frac{7}{8}$ " thick. If your lumber dealer doesn't have stock that can be dressed to $\frac{7}{8}$ ", then simply reduce the thickness accordingly. When you get your lumber back to the shop, let it acclimatize for a few days before beginning construction.

Making the Parts

- Mill all of the stock to $\frac{7}{8}$ " thick, using a thickness planer and jointer.

- With the stock now flat and straight, the grain will be more visible than when rough.

- Have another look at the boards you have chosen; the process of milling them down may have revealed previously unseen figure on some of the boards. Set aside the boards with the most distinctive ray fleck pattern for the horizontals (A, B, C, D) and mill them to a final thickness of $\frac{3}{4}$ ".

- Unless your lumber dealer happens to have some 9" wide boards and you have an extra large jointer, you will have to glue up the shelf (E) from narrower stock. When gluing up the shelf, keep in mind that once

the rack is hung, it will be the bottom of the shelf that is most visible. Quarter-sawn white oak is a great species for gluing up panels. The long straight grain makes it easy to hide the glue lines.

- When the glue has set, remove the clamps and scrape off any glue squeeze-out. If you are using carpenter's glue, remove the clamps within a couple of hours. The glue will scrape off easily in a long string. If you wait until it has hardened completely it will be much harder to scrape, and can easily tear out chunks of wood.

- To give the top a lighter look, the front and sides of the shelf are bevelled slightly. You can do this on a router table, on a table saw or on a jointer. Choose a method that suits the equipment you have available.

Tip

When milling lumber with decorative figure, keep in mind that every pass through the thickness planer will change the look slightly. When you have a look that you are pleased with, flip the board over and remove any remaining stock from the rear of the board until you achieve the final thickness. The ray flecks in white oak can be very thin and have a tendency of chipping out, so proceed carefully.

A combination of the jointer and table saw is the easiest by far. Set the fence on your jointer to bevel the front. The knives on the jointer will leave you with a smooth surface that only needs a light sanding. Use the edge milled on the jointer to set the angle on your table saw's blade. Then, using a cross cut sled, bevel the ends of the shelf. The top wraps around the uprights, so cut the mortises to house the uprights now.

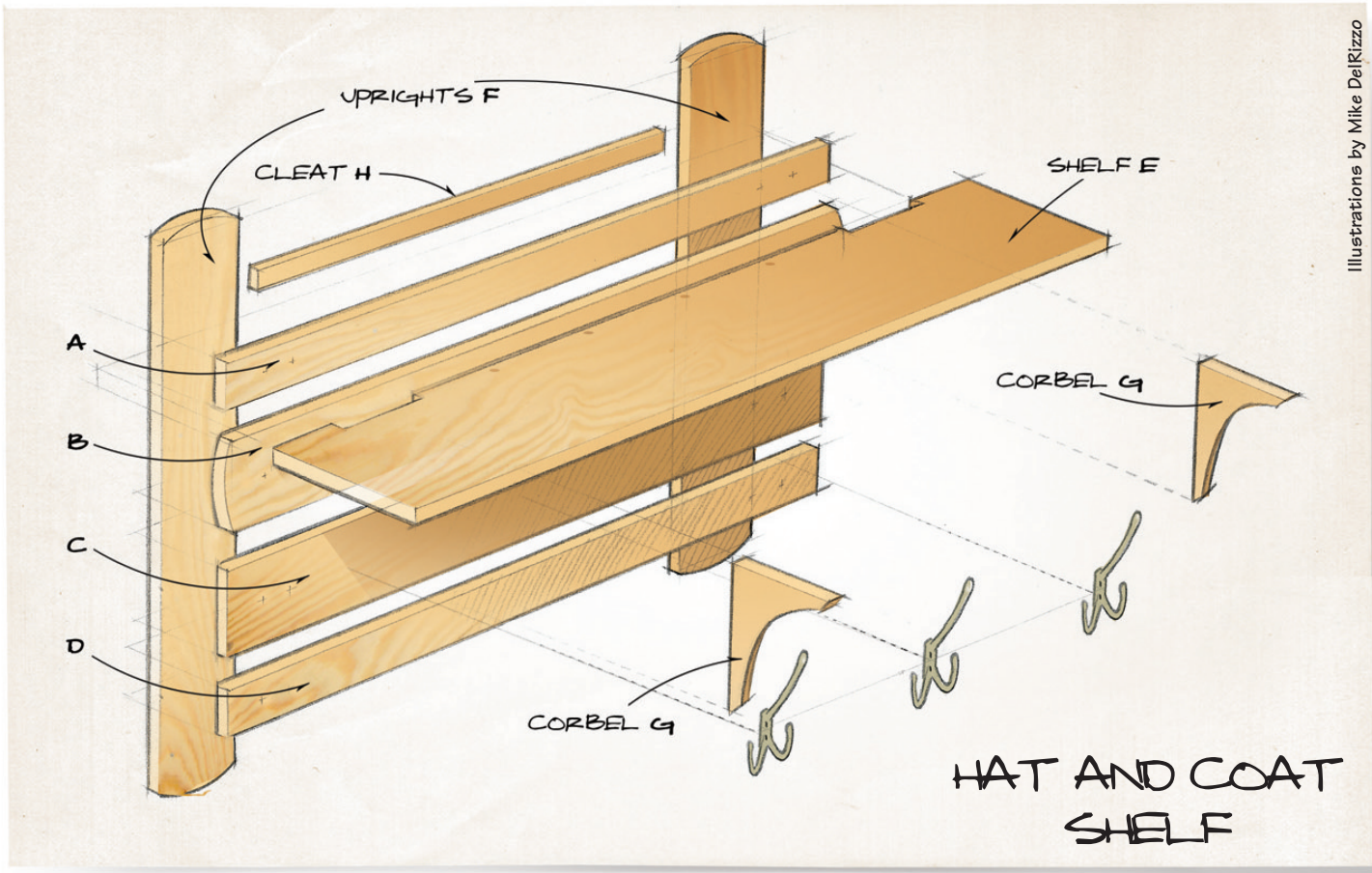
- With the top prepared, move on to the uprights (F). Trim these to length and lay out the curve on the ends. The easiest way to do this is to place a mark at the center of the upright and another on each side, 1/2" down from the end. Lay a thin flexible piece of wood across the upright and use it to draw a curve joining the three marks.

Cut the curve on the end of one upright and use as a pattern to mark the curves on the second upright. When these are cut, use one of them to mark the second curve on the first upright. This is a quick and foolproof way of ensuring all four curves are identical. Cut out all of the curves and use a sander to remove any saw marks and achieve a fair curve.

- The horizontal slats are all sized differently. Using the stock milled earlier, rip the individual slats to width and then cut them to length. After all of the slats have been cut to the final size, use one of the uprights to trace a curve onto each end of the longer slat. Cut and sand these ends.

- When choosing wood for the corbels (G), bear in mind that the direction of the

MATERIALS LIST (All measurements in inches)					
	Part	Qty	T	W	L
A	Horizontal	1	3/4	1 3/4	39
B	Horizontal	1	3/4	3 1/6	40 3/8
C	Horizontal	1	3/4	3 1/6	39
D	Horizontal	1	3/4	1 1/4	39
E	Shelf	1	3/4	9	45
F	Uprights	2	7/8	3 1/6	17
G	Corbel	2	7/8	5	7



Illustrations by Mike DeRizzo



grain and the direction of the ray flecks can either enhance or detract from the finished piece. If possible, choose a piece of oak in which both the grain and ray flecks follow and complement the shape of the corbel, rather than work against it. Lay out the corbel on the stock and cut out the shape using a band saw, jigsaw, or scroll saw. Sand the edges and smooth the inside curve using the end of a stationary belt sander. When you've finished sanding the curve, use the sander to bevel the top and bottom ends of the corbel. The bevel is only about $\frac{1}{2}$ of the bevel on the top, but it does two things. The bevel at the top of the corbel echoes the bevel on the shelf, and the bevel on the bottom of the corbel provides another facet when viewed straight on from the front. Small details like this help to elevate a simple project from the ordinary to something a little more visually sophisticated.

Applying the Finish

- With all of the parts now shaped, sand everything in preparation for finishing. Start with 100 grit and give everything a thorough sanding. Follow this up with 150 grit. Because white oak sands so beautifully, it is unlikely that you will need to go any further. When this project is assembled, there are many small areas and corners that would be hard to finish properly, so it is best to do all of your finishing before assembly.

- To really bring out the look of the ray flecks, finish this project using a two-step

process. After sanding, apply a coat of Watco Natural Oil to each piece. The wood will absorb the natural stain and some of the figure will begin to reveal itself. After wiping off the excess, follow this with an application of Watco cherry stain. Wipe off this stain soon after you apply it. The rays, being composed of harder material, will not readily absorb any of the pigment, while the wood will absorb some of the darker pigments. This will darken the wood, effectively bringing the lighter ray flecks to the fore.

- After staining, protect the finish against moisture and dirt with a topcoat of some sort. I chose a paste wax for a warm traditional look. If you want more protection, a polyurethane base product would serve well.

Assembling the Rack

- Assembly is straightforward. You'll need a drill, countersinks, screws, and some clamps. I prefer a clean look, without visible fasteners on the front of a project, so I install all screws from the back, or through the top from above.

- Begin by cutting a couple of $\frac{1}{2}$ " spacers to use between the horizontal slats. Lay the top horizontal slat on your workbench, face down, and clamp the uprights in place on top of the slat. Use a drill and countersink to drill a proper hole for the type of screw you are using and screw the uprights to the slat. Repeat this for the remaining slats using the spacers to maintain an even spacing.

- When placing the screws for the upper slats, keep in mind that the corbels must also be fastened in place, so keep the screws for the slats off center. With all of the slats in place, drill countersunk holes for the corbels. These screws will have to be longer, as they are going through two pieces of wood before entering the corbel. With the corbels fastened in place, fasten the top in place using the same method. Mount the coat hooks so that there is approximately the same open space on either side of the hook.

- The easiest way to mount this would be to drill a couple of holes through the uprights and then screw the rack to a couple of studs in the wall. Unfortunately, this would limit where you could hang the rack, as you would be limited to the location of the studs, making it almost impossible to center on a wall, unless the studs happened to line up.

- Instead, use a cleat behind the top horizontal slat. The cleat is screwed to the wall, and then the shelf is attached to the cleat via several angled holes through the top. In this way, all of the hardware used to assemble the project is hidden. And, because the cleat is long enough to straddle two studs, you are much more flexible in locating the coat rack on a wall, or centering it in an entry hall.



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Mallet

Traditionally, carver's mallets were turned using lignum vitae, which is one of the hardest and heaviest of all woods. Lignum vitae is also used for bearings and bushings, often in an underwater application, because of its durability and natural lubricants. The source of lignum vitae is the West Indies, Central America and northern South America. Its name is Latin for "long life", from which comes one of its common names, Tree of Life.

However, when designing this particular carver's mallet, I decided to incorporate some other woods. I chose purple heart for the handle, and osage orange for the head. Both of these woods are very hard and, when used together, they create a wonderful contrast. Hence, in spite of this particular mallet's simple style, it carries a touch of excitement with its colour.

Begin with the Head

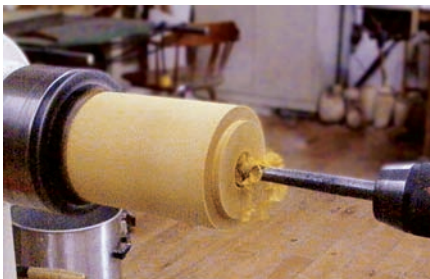
Mount a 3" x 3" x 5" square piece of osage orange between centers. Use a 1¼"

roughing out gouge, and remove the corners in a few back and forth passes. Do this with the flute of the gouge in an upward position, and the handle square to the wood. First feel the wood with the bevel, and then lift the gouge just until the tool starts to cut. Be careful because if you lift too much, you will scrape the wood instead of cutting it. So, to achieve a cutting action, it is very important to RUB the bevel. Once most of the corners, or resistance, have been removed, then turn the gouge on its side to produce a finer cut.

Either side of the gouge can be used - remember that there are two sides to a gouge - so use them both!

Cut the Tenon

Now that the head has been brought to round, cut a tenon so that it can be held in a chuck. This facilitates drilling the hole that the handle will fit into. Cut the tenon with a ⅜" parting tool, using a set of calipers to size the tenon.



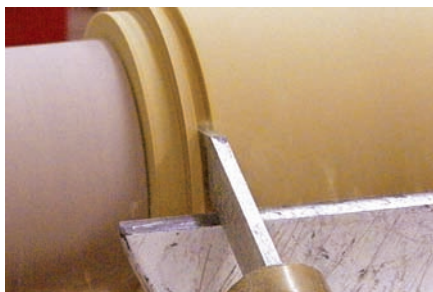
Drill hole for handle



Jam plug



Taper piece



Parting ends



Size tenon



Turn transition from head to handle



Turn bead at end of handle



Finish head



Finish handle

Drill a Hole for the Handle

Use a $\frac{3}{4}$ " saw tooth bit, held in a Jacobs chuck in the tailstock, to drill the hole for the handle. Hold the body of wood in a stronghold chuck. Remember to only drill two thirds of the way through, as you do not want to hit the chuck with the drill bit. Make a jam plug, then reverse the head onto the plug, and drill the other third of the hole. Don't force the head onto the jam plug - it just needs to be a little snug but not so tight as to split the wood. Remember also that the tailstock will be in place to hold the wood.

Turn the Head

With the head in place take a light cut, tapering it down slightly. Then part the ends. The parting tool is really only good at removing wood, not at making a superb cut. The skew, on the other hand, is not really that keen on removing a lot of wood at a time, but superior at making fine finishing cuts where no sanding is required.

Turn the Handle

• Put the head of the mallet aside now, and concentrate on the handle. For this I used a piece of 1" x 1" x 10" purple heart. Mount it between centers, and turn to a cylinder. To fit the handle to the head turn it exactly $\frac{3}{4}$ " diameter at the far end of the spindle, occasionally checking until the fit is perfect. Then 5" along the piece make another part at a $\frac{3}{4}$ " diameter. Remove the

bulk in the middle of these two parts, and then plane with a skew to make an exact fit. Next, glue the handle into the head and allow it to dry.

• Cut the transition from the head to the handle with a $\frac{1}{2}$ " spindle gouge, ensuring that the gouge travels downhill always. Next, shape the handle so that it pleases your eye. Finally, turn a bead at the end. At this point I sanded and finished using Mylands friction polish.

Turn the Ends

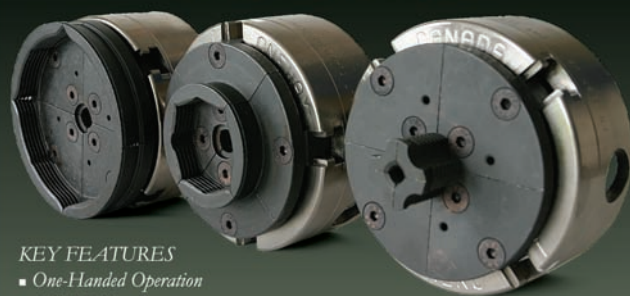
Lastly, turn and finish the ends. To accomplish this, hold either end with the Stronghold chuck, using a set of rubber bungs off the jumbo jaws. At this point it is important that you do not take a very heavy cut, noting that about 98% of this cut is done with the tailstock in place. Cut both ends, then sand and finish.

And there you have your mallet. It is a simple, yet practical turning with a very pleasing look.

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This mallet is just one of the many tools that we will be making in the coming months. The mallet, along with the hand plane (also featured in this issue) are wonderful additions to any shop.

Fishing Rod Stand

If the thought of going fishing brings to mind rooting around your basement or garage, untangling your hooks and lines, then this fishing rod stand might be just the lure that you need to get your fishing equipment organized.

When this project is completed you will have a rod stand that stores up to eight rods with reels attached, all in a vertical position, occupying a minimal amount of floor space. The plans can be modified to accept more rods if necessary. You can even use this stand to store your billiard cues.

By chamfering the edges heavily, this stand takes on an 'Art Deco' design. By making the stand esthetically pleasing, your rods can come out from the dark corner of the basement or garage, and be put on display almost anywhere in your home.

Make the stand out of the wood of your choice. You will need seven board feet of lumber. I used 14 linear feet of 1x6 lumber. All of the wood should be finished to $\frac{3}{4}$ ".

Upper and Lower Supports

- The upper support (A) and lower supports (B) are cut from a single glued-up panel (see "Horizontal Parts Panel" in the illustration).

- Glue up a panel about 13" x 21".
 - Using a table saw, square the panel ends and trim it to 12 $\frac{1}{4}$ " x 20".
 - Sand both sides of the panel to 150 grit.
 - Transfer the layout lines from the Horizontal Parts Panel onto the panel.
 - Using a drill press and a Forstner or saw tooth drill bit, drill the eight 1 $\frac{1}{4}$ " holes.
- If you have a steady hand you could also use a portable drill. Be sure to drill the holes 3 $\frac{3}{8}$ " from the edges.

- Cut the upper and lower supports from this panel. The 12 $\frac{1}{4}$ " width of the panel takes into account the material removed when the parts are sawn on a table saw with a $\frac{1}{8}$ " blade. Set the table saw rip fence to 3 $\frac{1}{2}$ " and cut the panel through the centers of the holes.

Sides and Feet

- Cut stock for the sides (C) and feet (D).
- Sand both sides of all pieces to 150 grit.
- Attach the sides to the feet with glue and biscuits or dowels, as butt-gluing the pieces end grain to edge grain would not create a strong enough joint. When completed, the sides should form a 'T' with the dimensions of 12" x 27".

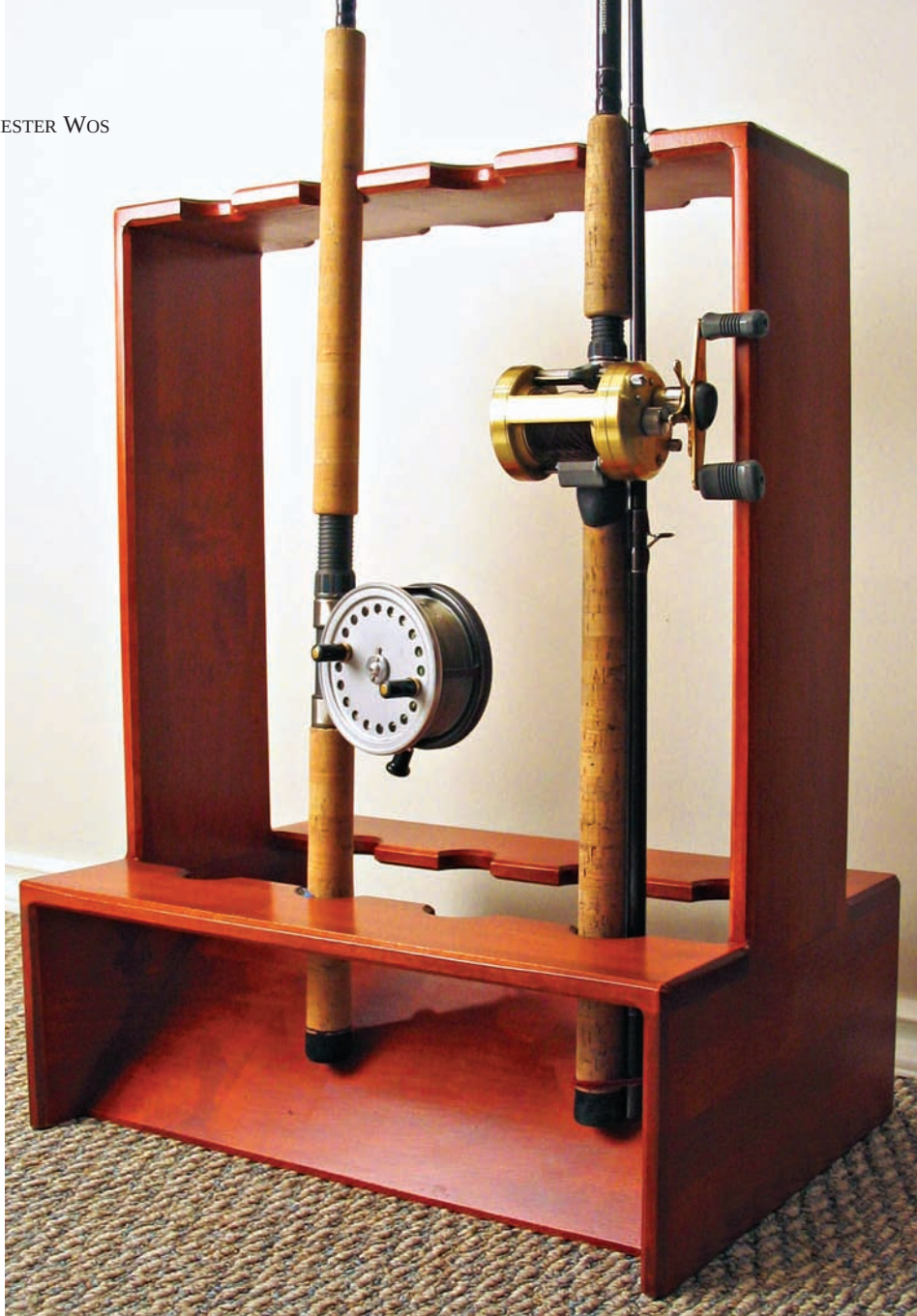
Stretcher

- Cut stock for the stretcher (E).
- Sand both sides of the two pieces to 150 grit.
- Glue the two pieces together to form an 'L'. You can miter or butt-glue these pieces, optionally reinforcing them with biscuits or dowels.

- Once the glue has dried, rip the two outside edges of the stretcher to 45° on your table saw to a width of 5 $\frac{1}{16}$ ".

Assembly

- Lay the side/foot assembly on your workbench with the inner side facing up.
- Hold the stretcher in position over the foot, and then trace with a pencil the upper edges of the stretcher. The tracing leaves guidelines to mark out where your biscuits or dowels go.
- Cut biscuit slots or drill dowel holes in both of the feet, ensuring that the stretcher is accurately aligned in both of the feet and in both ends of the stretcher to gain proper alignment.
- Cut biscuit slots or dowel holes in the top end grain of each side, and the underside of the upper support.



The Art Deco Look

You can dramatically enhance the appearance of the rod holder by giving it an Art Deco look.

The Art Deco style is added to the stand by chamfering the edges in a router table with a 45° chamfer bit fitted with a bearing at its narrow end. Router the edges BEFORE the final glue-up assembly. Some edges should be routed through to the ends, some edges should be routed to the tip of the corner, and some edges should stop $\frac{3}{4}$ " short of the corner. Additional routing after assembly will be necessary as well.

Chamfering should be carefully considered so as not to rout in areas where removal of the wood would create an unnecessary 'V' (or cavity) after the unit is assembled. Pay particular attention to those areas where the wood of one edge joins another. Chamfers of two intersecting edges should meet at a single point, contributing to the style of the piece. Remember to chamfer the apex of the diagonal stretcher.

If the Art Deco appearance is omitted, simply round all edges with sandpaper to the desired radius.

- CWM

- Glue up the rod holder. This requires only two or three steps, a minimal amount of clamps, and best of all, the unit is self-squaring - because the stretcher is about 4" in height it acts to square the unit. Apply glue to the biscuits or dowels and place them into the sides. Add glue to the ends of the stretcher and press the three parts together, using one clamp to squeeze the apex of the stretcher to the sides. Two more clamps should be used to squeeze the sides to the bottom edges of the stretcher.

- Wait for about 30 minutes until the glue sets, then remove any squeeze-out with a sharp chisel.

- Glue the lower supports in place. There is no need to use biscuits or dowels, as the upper support will be glued to the sides using biscuits or dowels.

Finishing Touches

- Round over all router accessible areas with the exception of the bottom edge.

If there are any pre-assembly areas that are in need of refinement and are router accessible, this is the time to clean them up. Note that after the router bearing rides along a previously routed edge, a corner facet is created, adding to the Art Deco style (*see sidebar*). During the final sanding, keep these corner facets crisp.

- Finish sand the stand to 180 grit.

- You can leave the stand unfinished, or you can apply your favourite finish.

Now, instead of having your trusty fishing poles tucked away in a tangled mess, they are out in the open, readily available, and perhaps a little more likely to see some action.

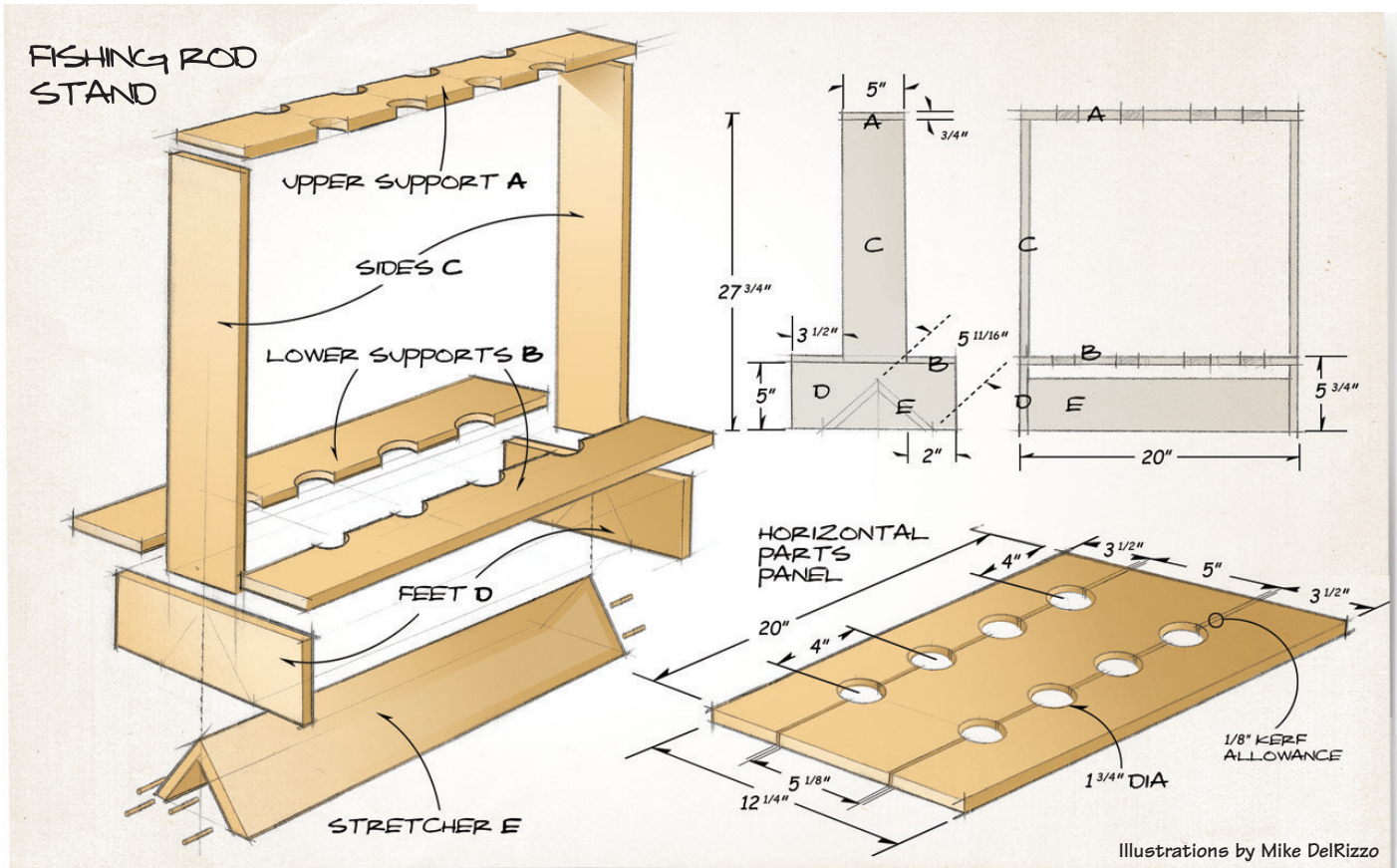
Also, by being more visible, your faithful poles are sure to inspire a good fishing story or two.



CHESTER WOS
chester_wos@telus.net

MATERIALS LIST (All measurements in inches)

	Part	Qty	T	W	L
A	Upper support	1	$\frac{3}{4}$ "	5	20
B	Lower supports	2	$\frac{3}{4}$ "	$3\frac{1}{2}$	20
C	Sides	2	$\frac{3}{4}$ "	5	22
D	Feet	2	$\frac{3}{4}$ "	5	12
E	Stretcher	2	$\frac{3}{4}$ "	$5\frac{11}{16}$	$18\frac{1}{2}$



Illustrations by Mike DelRizzo

Tricks of the Trade

Where To Get Wood

The types of wood that I use to carve with are basswood, willow, butternut, and black walnut. Rather than buying kiln-dried wood, I go as directly to the source as possible. I approach all the tree service businesses in my area; tell them about my interest in carving; and ask them to let me know when there may be a tree being removed that I might use.

Fortunately, the types of wood I carve are not good firewood. Consequently, the tree

people are usually quite willing to give it to me - most often for free, but sometimes with a little compensation, far below the cost of kiln-dried wood.

Of course, unlike kiln-dried, wood from such sources is usually fresh cut and green (i.e. having a high water content). That doesn't bother me though, because I prefer to carve green wood. I will tell you more about carving green wood in an upcoming article.



Does It Take Long To Sand a Sculpture?

I have always disliked sanding, because it creates a lot of fine dust, and it can consume a lot of time. When you do have to sand, use a dust mask to protect your lungs, and be sure to clean the dust from your workspace.

However, I have found a two-part solution to this distasteful task. The first half of the secret is a wood scraper. Major ridges can be removed very quickly with a scraper, as they act essentially like a hand plane. When you have shaped your carving as carefully as you desire with your gouges and knives, use a scraper to smooth the surface. It is imperative that you scrape with the grain.

After scraping, I use strips of cloth-backed sandpaper. Press the sandpaper against the wood with one thumb. Using your other hand, pull the sandpaper across the wood under your thumb. It is important to sand with the grain and in only one direction. This technique eliminates the 'fuzzing' that always occurs when you rub sandpaper back and forth across wood grain. Sanding this way is very fast. When you sand in only one direction (with the grain), the task can be completed in minutes instead of hours.



Wood scraper



A carved surface has many facets



Scrape in direction of grain



Use strips of cloth-backed sandpaper



Apply pressure with your thumb



Pull in one direction



A deep crevice is sharp

How To Carve Deep Crevices?

When carving a deep crevice, many people have difficulty removing the deepest chips of wood. The solution is all in the angles of cuts... and a little patience. First, it is necessary to make a strong vertical cut that will provide an edge from which wood will be removed. Then, use a curved tip knife to cut away the wood beside the vertical cut. The bent tip creates a slightly less acute angle deep in the crack.

It is most important that you make a good effort to remove the wood chip. Often, a carver will shave off several new slices of wood when trying to remove a piece that is already detached. To extract difficult slices, a dental tool can be quite useful. Many dentists will give you the tools they are discarding.



Establish a strong stop cut



Curved tip knife



This is how the two knives meet



Dental tool for removing chips

How to Carve a Hole?

There are many situations where you need to carve a hole, either to start a pass through for further expansion, or to create a hole for itself. In many instances, a power drill or a brace and bit will work. In other cases, however, it is simply easier to use a gouge. Here, I have used a #7 gouge.

A well-made gouge will inscribe a perfect circle. Begin by inscribing a circle where you want the hole. Be sure to keep the beveled edge of the gouge vertical. Remove the wood inside the circle using the same gouge. Repeat the process as many times as necessary, always keeping the beveled edge of the gouge vertical.

Care is necessary when the exit side of the hole is reached. Twist the gouge as you cut your way out of the wood in order to prevent splintering the exit side. If you are careful, your gouge-drilled hole can be as accurate as anything you would get with a drill.



A good gouge inscribes a circle



Keep beveled edge vertical



Use same gouge for wood removal



Twist gouge for exit cuts



A perfectly gouged hole

More Tricks?

We all know that the techniques described in this article aren't actually tricks, because anyone can do them. They are merely the result of experimentation, aimed at achieving desired results.

Perhaps you have other challenges for which you would like to know the trick. If so, please send your question(s) to me via e-mail: david@dbj.ca



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Tool Tote

This classic wooden tool tote is a great way to keep your tools organized and protected, whether you are working at your bench, or away from your shop.

The Beginning

- The body of the tote is made with $\frac{3}{4}$ " solid wood, the bottoms with $\frac{1}{4}$ " plywood and the handle, 1" dowel.
- Cut the ends (B) to width and length.
- Use a pencil to mark a centerline on the insides of the ends. Fold some paper the same size as the end in half.
- Make a template of the ends on some card stock, and trace the lines for the shoulder sections onto the ends. Alternatively, you could experiment with different slopes by folding some paper the same size as the end in half, and making one angled cut. Open it up and you will have a symmetrical template. When you have an end shape you like, transfer the pattern to the wood.
- Use a band saw or jigsaw to cut up to the line. Then use a belt sander to achieve a straight, smooth edge.
- Cut the material for the sides (A) to

width and length. As well, cut the bottom (C), tray bottom (D) and handle (E).

- Use your table saw to rip a couple of $\frac{1}{4}$ " strips off the edge of a $\frac{3}{4}$ " board for the tray's runners (F).

The Finish

- Sand all of parts through to 150 grit.
- Apply a coat of Watco Natural Oil to all of the pieces now. This helps avoid glue-related finishing issues later.

The Middle

- Cutting the grooves and dados for the bottom as well as the biscuit slots that hold the tote together after the finish is on will expose fresh wood for the glue to adhere to.
- Cut the dado for the bottom, and the recess for the handle. The dado for the bottom is stopped, and as such, can't be cut on the table saw. Mount a $\frac{1}{4}$ " spiral bit in

your router table and use a fence in combination with end stops to cut the dado. Make several shallow passes instead of one full-depth cut.

- Locate the centerpoint of the handle. Then, using a Forstner bit in a drill press, drill a $\frac{3}{8}$ " deep recess for the handle.

- Use the table saw to cut a groove, $\frac{1}{4}$ " wide and $\frac{1}{4}$ " up from the bottom, on the inside edge of each side with a couple of passes over a regular blade. The ends are concealed, so a perfectly flat bottom is not required.

- Use the same procedure to run another groove $\frac{1}{4}$ " down from the top on the inside edge of each side. These will receive the runners that support the tray.

- Cut the grooves and biscuit slots. Setting the sides in $\frac{1}{8}$ " from the edges gives a more refined look than flush sides would.

The End

- Using plywood for the bottom overcomes any seasonal expansion problems that solid wood bottoms would cause. It also allows the bottoms to be glued tightly in place, contributing to the overall strength of the box.
- Test fit everything and once you are satisfied with the fit, disassemble the tote and lay the parts out in preparation for gluing.
- Apply glue to the biscuit slots as well as

- the dado and groove for the bottom.
- Assemble the parts, apply clamps and check the diagonals to be sure the assembly is square.
 - When the glue has set, remove the clamps and glue the tray runners (F) into place in the upper grooves.

To Top It Off

- The addition of a tray and what size to make it are very much a matter of personal preference. A tray that covers about half

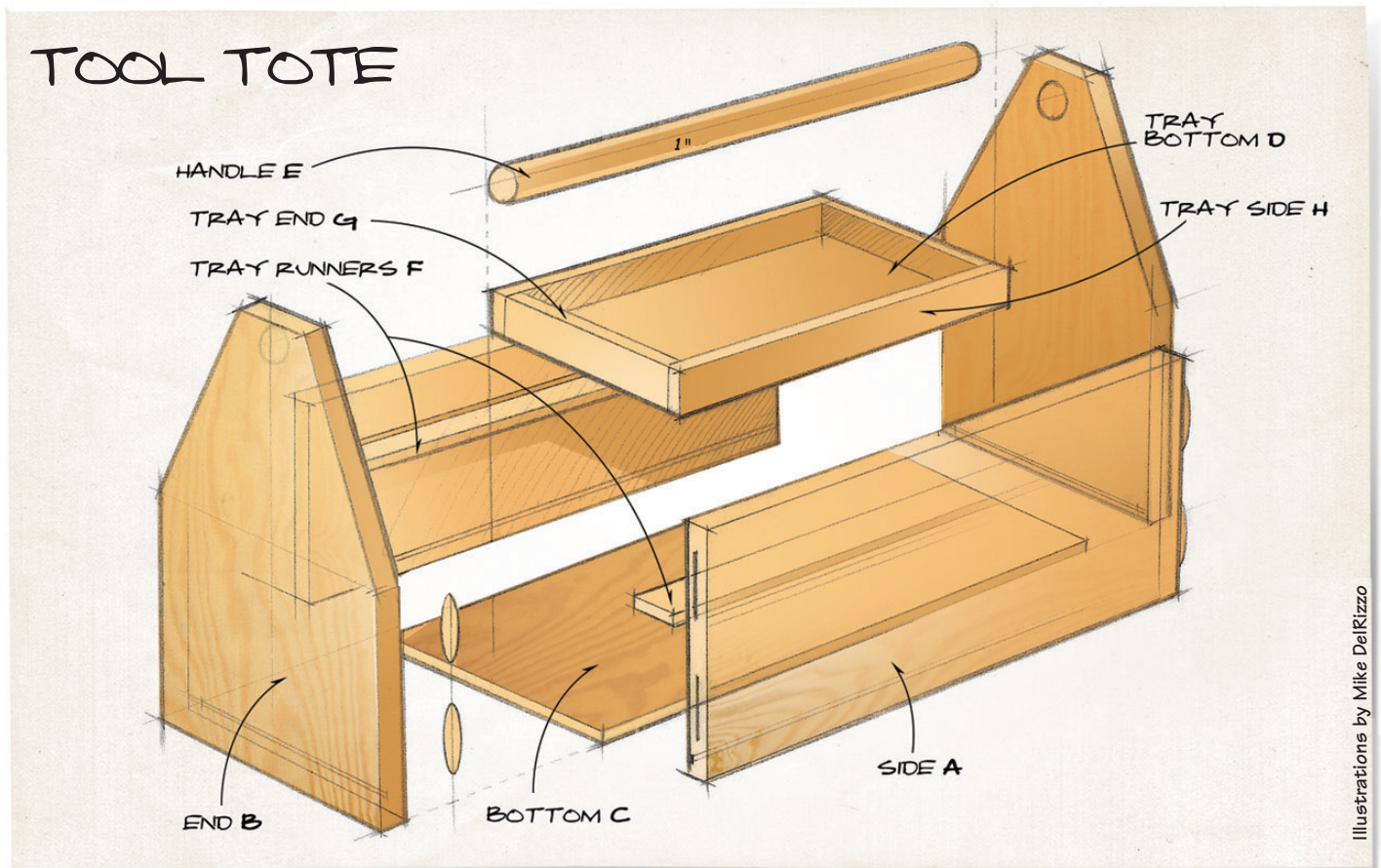
- of the tote provides additional storage while still allowing access to tools below.
- Mill some lumber into 5/8" thick strips for the ends (G) and sides (H) of the tray perimeter.
 - Cut these to length and screw them to the tray bottom from below.
 - Add any additional dividers that you may require.
 - Give everything a final wipe with a coat of Watco Oil and then a protective layer of wax. Fill it with your hand tools and you're ready for your next project.

Here's how to achieve foolproof alignment for these parts:

- Mark out the centerline of each of the eight biscuits on the sides and the ends. Then, place the sides on your table saw top, face down and cut the biscuit slots as you normally would.
- To cut the slots in the ends, begin by clamping the end to your table saw fence with the outer edge against the top. Place a piece of 1/2" hardboard on the table top under the biscuit joiner to establish the proper setback, and cut the biscuit slots.
- Repeat this for all four corners.

MATERIALS LIST (All measurements in inches)					
	Part	Qty	T	W	L
A	Sides (a)	2	3/4	7 3/8	11 3/4
B	Ends (w)	2	3/4	5 5/8	15 3/4
C	Bottom (tote) (bb)	1	1/4	6 3/8	16 1/2
D	Bottom (tray) (bb)	1	1/4	5 5/8	8
E	Handle (dowel) (wo)	1	1	1	16 1/2
F	Tray runners	2	1/4	3/4	15 3/4
G	Tray ends	2	5/8	1 3/8	5 5/8
H	Tray sides	2	5/8	1 3/8	6 3/4

Notes:
Stock is red oak except: (a) alder; (w) walnut; (bb) Baltic birch ply (wo) white oak
For a variation on this classic tote, See October/November 2004, Issue #32.



Illustrations by Mike DeRizzo



Workbench Accessories

We have seen a lot of woodworking shops, and we have found that each shop is as unique as the person who works in them.

Whether the person builds large scale furniture, or small intricate jewellery boxes, they have at least two things in common: a love for making handcrafted items out of wood, and the fact that at least some of the work will be done at a workbench.

Whether it is a classic hardwood workbench fitted out in the traditional way, or a simple plywood top on a couple of sawhorses, there are workbench accessories available that will make the time you spend at the workbench safer, more accurate and more enjoyable. It would be impossible to cover the entire list of accessories, so we will try to cover some general categories that would apply to most woodworkers.

Most workshops are set up in whatever space is available, which usually means a corner of the basement, a shed, or a

garage. If you are one of the lucky ones, you may have a separate stand-alone shop dedicated to your woodworking, but most of us will have to make the best of the space we have.

When working at a bench you will need lighting that is appropriate to the tasks you will be performing. There are two types of lighting to consider: area lighting, and task specific lighting. To light up general areas there are several options. Fluorescent fixtures are very popular because they are inexpensive, provide a decent, shadow free light, and are easily installed. Depending on the height of the ceiling in your shop, you have the option of permanently mounting them to the ceiling, or hanging them from chains above your bench, which enables you to move them out of the way if you are handling large pieces.

General area lighting is fine for most tasks, but there will be times when you will find yourself requiring task specific light. Adjustable task lighting is one of the best additions you can make to your bench. An articulating desk lamp is perfect for all of those detail operations where a little extra light is required. Such lighting can be found new for around \$10. Most of them come with a plastic adaptor that you clamp to the edge of a desk to hold the lamp. Discard this piece and build a compact heavy base that will support the fixture, and allow you to move it to where it is needed. Another option is to replace the plastic holder with a shop made version that fits into your bench dog holes.

Before you can start working on a piece of wood you'll need some way of holding it fast to the bench. There are a countless numbers of work holding devices, from face and tail vises made in the traditional

manner to new innovative hold-downs made of modern materials. The ever-popular bench vise is available in a variety of styles, sizes and materials. There is likely one to fit almost every budget and need, from the clamp-on vise to the permanently mounted version.

A vise will hold small to medium-sized parts that fit in its jaws, but to hold large panels horizontally for sanding or carving you will need dog holes. Dog holes are rows of holes placed in the right location on the bench top. These holes, used in conjunction with wooden bench dogs and a vise (with a pop-up dog) is the easiest way to secure large parts to your work bench while still allowing the entire surface of the material to be unobstructed. Bench dogs are available from several manufacturers for either round or square holes, but can just as easily be made in the shop from scraps. The fixed bench dog becomes one end of a long clamp, the movable dog on the jaw of the vise the other end.

Thousands of years ago when a hunter needed to sharpen a spear, he found some suitable rocks and wedged the stick into a cleft in the rocks to hold it while he put a point on the business end. The bench hooks and bird's mouth style methods of holding work are a direct evolution of this. Bench hooks are quick and easy to make and provides a solid support for sawing, sanding and other shaping operations. If you are working with longer parts, two or more identical hooks will easily support long stock.

There are many commercially available hold down solutions out there, with one for almost every application. Have a close look at the methods they employ to hold the work, and you will realize that most of these have several variations that can be shop made, using readily available parts to suit your individual needs and budget.

Measuring and marking are another set of tasks common to bench work. It stands to reason that your joinery will only be as accurate as your measuring and layout tools allow. A carpenter's pencil and a rusty tape measure are fine for framing work, but would leave something to be desired at the bench. A basic kit containing a few items is an important part of your bench. To be accurate with a pencil you'll need to keep it sharp, so invest in a proper sharpener of some sort – knives are great tools, but lousy pencil sharpeners for layout work. Keep a few different grades of pencils handy to use on various types of woods. A good basic pencil is the standard HB that uses a lead that is of average

hardness. Pencils harder than this (i.e. H, 2H) are too hard and will easily damage the surface. I keep a softer 2B pencil at the bench as well, because the lead is much softer and leaves a dark line behind without scoring the wood.

For measuring parts smaller than three feet, a quality stainless steel ruler is indispensable. They are far more accurate in use than a tape measure and can be used to draw straight edges as well as shallow arcs. A set of four in various sizes is a great addition to your bench. For larger parts, select a good quality tape measure and use it only for your shop projects. Buy a cheap one for other construction use, or if you are like me, buy a dozen of them, misplace eleven, and hope that you can find the twelfth one when you need it!

For the ultimate in marking accuracy at the bench, choose a marking knife. Several manufacturers make specialty knives for this, and my favourite is the Veritas Striking Knife. Using a knife, you can be far more accurate laying out joinery and cuts that you can ever be with a pencil. The lines left behind by a marking knife can be tricky to see (especially as we get older) so use the 2B pencil to highlight the score line. You'll end up with two pencil lines, with the score line clearly highlighted between them.

Most of the cutting and trimming done at the bench isn't of the heavy-duty variety, usually being limited to joinery and fitting operations, so a few basic cutting tools should be part of your workbench essentials. The type of work you do will influence the cutting tools you'll find most useful at the bench, but a good rip saw and a good crosscut saw are useful. Look for a well-made saw that is comfortable in your hand over time.

When cutting joinery at the bench, a good set of chisels is indispensable. They are equally useful whether you use power or hand tools. You don't need an expensive set of chisels for your bench – my favourite set for everyday use is an inexpensive set of three. After spending a little time dressing and honing them, they function every bit as well as chisels costing much more.

A utility knife is another indispensable addition to your bench. There are many choices in utility knives, but not all are created equal. The newly redesigned Irwin Pro Touch Blue Blade utility knife is the safest and most comfortable one I have found. Look for one with a retractable and unbreakable blade.

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Keep a sharpening stone and a leather strop charged with honing compound handy so that you can quickly (and regularly) dress your edge tools. This reduces the frequency of major sharpening and means you'll always have a sharp tool at hand.

There are times when you are working at the bench when the only thing that will fix a problem is a good whack with a 'persuader'. Keep a few striking tools such as hammers and mallets handy at the bench. A basic hammer for driving nails can be found in almost every toolbox, but bench work often requires a few other variations of this common tool.

A dead blow hammer is useful when assembling or disassembling pieces. The head on such a hammer is hollow and filled with lead shot in oil. This material in the head keeps the hammer from bouncing back after it strikes the surface. With a rubber or plastic covered head, they allow you to deliver a solid blow without risking damage to the piece.

Wooden mallets have been used in furniture construction for a long time. These are easily made in the workshop and can be as basic or as fancy as you want to make them. Making a few in different sizes means you will always have one suitable for the job at hand.

How about a block of wood as a workbench accessory? Sure, why not – it can be indispensable. Keep a few handy when using clamps or striking implements to protect the surface of your parts by spreading the force of the impact over a larger area.

For those of you without ready access to running water and cleanup facilities in your shop, the next time you empty the dust collection for your electric sander, save the very fine wood dust or wood flour. Keep it in a sealed container and reach for it if you should spill something on your bench. Sprinkle some of the flour on your spill and it will instantly soak it up; it works equally well on finishes and coffee. Where this really shines though is if you are applying a finish to your project. If your fingers are covered with finish, use the flour (sawdust works equally well) to give yourself a quick dry scrub. Just as on the bench, the wood flour will absorb all of the wet finish from your hands.

It's a fact of life that every horizontal surface in the shop will fill up with tools. Make it easier to maintain working space on your bench by providing some sort of tool storage space that is convenient and practical enough that it will actually be used. In most cases this takes the form of a recessed tray somewhere on the top, either in the middle or along one side. Keeping your tools in these troughs gives you more working room on the bench and keeps your tools safe from damage that might be caused if they roll off the bench.

No matter where your shop is located, your bench must be comfortable to work at. The two most important factors affecting this is the height of the top, and the floor you are standing on. If you are making your own bench, build it to suit your own work habits and height. Don't worry about what is a standard height or dimension; build it to suit your specific requirements. I've seen the massive shaker benches, as well as diminutive benches the size of footstools, and the one thing they

all have in common is that they suit the work habits of the person using them.

Standing at a bench for hours can be very hard on your feet and spine if you don't have the right floor. A concrete floor is what is most commonly found in workshops and these are as hard on you as they are on any tool that rolls off the bench and falls on it. A wooden floor, even one put together inexpensively using plywood and 1x4 sleepers, is a massive improvement for you and your tools. Another option is commercially available anti-fatigue mats although these can be expensive.

Most bench work, by its very nature, involves primarily hand tools, but making provisions for electrical power and air at your bench is a wise idea. A power bar fastened to the underside of the bench will provide enough power for your portable power tools, without having extension cords all over the place. The same is true for air. Compressed air at the workbench can be very useful when assembling projects with a brad nailer or one of the newer 23-gauge pinners. When sanding, carving or chopping out mortises, having a blowgun at the bench can quickly remove loose debris from your workspace. Always use proper safety equipment when working with air.

Everybody will have a different list of workbench accessories based on personal work habits and interests. Such accessories can be either commercially produced or made in the shop as needed, but they all have one thing in common - they all make the time you spend at your bench more productive and enjoyable. - CWM

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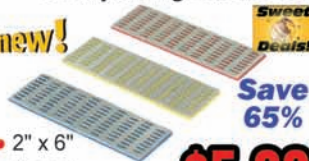
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Gluing Techniques

Gluing is critical to a project's success. Sloppy gluing can lead to open joints, out-of-square corners, and lots more. At the very least, it will lead to poor staining and finishing results - so learning proper gluing techniques is sure to pay off.

If I could offer only one suggestion, it would be to prepare well for every glue-up. That means gathering up all your supplies in advance, such as clamps, glue, glue brush, rags, clamping cauls, dowels and so on. You might even run through the entire glue-up without glue to be sure you have everything you need and know what you're doing. You don't want to be half way through glue-up and realize that you don't even own enough clamps, let alone have them at your finger tips.

Let's take a look at three of the most common types of glue-ups.

Edge-Gluing a Solid Wood Panel

• To make a solid wood panel (for example, a table top), you need to edge-glue several boards together. Mill the boards and joint the edges. Then mill up several

hardwood clamping cauls between which you'll sandwich the boards to keep them flush. Make the cauls out of oak, maple, beech or any dense hardwood. They should be about 1" or more thick, 2" or more wide, and long enough to stretch across the panel. You'll place them on edge over your boards in pairs: one on top and one on the bottom. One pair on each end of the panel is critical, but a third pair in the middle is wise for longer panels. In order to avoid gluing the cauls to your panel, coat the cauls with packing or duct tape.

• First, apply glue to the edges of your boards. Putting glue on just one side of each joint is sufficient if you bring the mating parts together quickly. If you have only three or four boards, you may want to apply the glue with a small brush or roller. If you have eight or ten boards, you can stack them together and apply glue on all edges at the same time.

• As soon as you've applied the glue, push the boards together into their final arrangement. Then immediately place your pairs of clamping cauls across the panel. Force the cauls tightly onto the panel using F-clamps or C-clamps. Your panel should be sitting on sawhorses, or a couple of thick boards on a gluing table, so you can easily place the cauls and the clamps into position.

• Tighten the clamps as tightly as you can before you clamp the boards together. For that job, I use #50 Pony clamps (pipe clamps). You can also use parallel jaw clamps, such as the Bessy K-body clamps. These are so strong that they easily overpower the cauls and F-clamps and draw the boards tightly together. In most cases, use clamps every eight inches or so for edge-gluing. If the boards are only 2" wide (or less), use even more.

• It is important to place clamps in the middle of the panel first, and fully tighten them before adding clamps out towards the ends. I'll start off with one clamp to the left of the center clamps, then another to the right, slowly adding clamps until I've reached both ends of the panel. I will also

In his first article on gluing ("Glues", issue #40, Feb/Mar '06) Hendrik profiled some of the more common types of woodworking glues; in his second article ("Easy Steps to Gluing", issue #42, Jun/Jly 06) he outlined some basic gluing tips and techniques to help you make the task of gluing quicker and easier. In this article Hendrik talks about three of the most common types of glue-ups in the shop.

alternate which side of the panel the pipe clamp is placed on. One is placed with the pipe above the panel and the next below, and so on.

- It is also important to remember that each pipe clamp provides the most direct pressure centered on the threaded rod in the crank handle. Placing the pipes directly on the panel often puts the most clamping pressure away from the center of the panel's edges, leading to a tight joint on one side only, and a slightly open joint on the other. While alternating clamps from one side of the panel to the other helps resolve this problem, I prefer to position the clamps with their pipes raised from the panel in order to center the pressure on the edges. This is easily done 'by eye' with a little practice.

- The next step is to remove excess glue by picking it up onto a putty knife and wiping it on a rag. Do not wipe excess glue off with a rag. Doing so causes staining and finishing problems.

- Allow the panel to dry overnight if possible.

Gluing Dowel Joinery

- Dowel joints are an absolute joy to glue up, because the joint's design only allows it to move in one direction – together. Unlike biscuits, dowels won't allow the mating parts to move vertically or laterally during the glue-up. Provided that you drilled your dowel holes accurately, there is no need for 'wiggle room', which is often discussed in articles about biscuit joinery.

- Drill your dowel holes deeper than the length of the dowels by at least $\frac{1}{16}$ " on each side. This space is required for excess glue. Because you can't compress a liquid, too much glue, with no space to go, will either prevent the joint from closing, or cause an absolute mess when the glue spills out around the joint.

- If the dowels fit their holes snugly, as they should, then any glue placed on the dowels themselves will be scraped outwards along the dowels when you insert them. For this reason, you should apply glue only in the dowel holes. I like to squeeze glue directly out of the tip of my glue bottle (a round tip is essential) onto the inside perimeter of each hole. The glue will slowly seep down the walls of the hole in an irregular pattern. I then use a thin rod, and swirl the glue around the entire inside of the hole. If I've applied too much glue I'll pull some back out on the rod, wiping it on a rag. Then insert the dowels one by one.

- If by some chance the dowel holes aren't of equal depth on the two mating pieces, be sure to tap the dowels in just far enough to leave $\frac{1}{16}$ " of space (and glue) at the bottom. Hammering the dowels down all the way will force excess glue out of the joint while reducing the amount of dowel length for the other side of the joint.

- Close the joint by hand if possible, or use a rubber mallet to coax it home. On wider joints where you might easily have four or five closely spaced dowels, be sure to close the joint evenly. Tapping on one side of the joint ahead of the other will cause a wedging action that makes the joint tighter than it should be.

- There are too many possible dowel joints to mention specifically, but for most standard joints like rail-to-leg or rail-to-stile, you'll likely need only a single clamp. Once again, a pipe clamp has much more power than most other clamp types. Use a pipe clamp, as long as the clamp's threaded rod can be centered over the joint. If the pipe clamp doesn't have enough reach for a particular situation, you may need a clamp with a greater throat depth, such as an F-clamp or parallel jaw clamp. Don't forget about clamp pads to protect the wood, as this kind of joinery glue-up is generally done after final sanding.

The techniques outlined above will result in no squeeze-out of any kind.

Gluing Mortise and Tenon Joinery

- In many ways, gluing a mortise and tenon joint is not much different from gluing a dowel joint. Make the mortise at least $\frac{1}{16}$ " deeper than the length of the tenon. If it's a loose tenon joint, then you need that amount of space in both mortises, just like a dowel joint.

- Remember that the tenon is supposed to fit the mortise almost perfectly, especially if you're using white or yellow carpenter's glue (which requires a zero thickness glue-line for maximum strength). The tenon should fit into the mortise under nothing but firm hand pressure, not requiring even a rubber mallet.

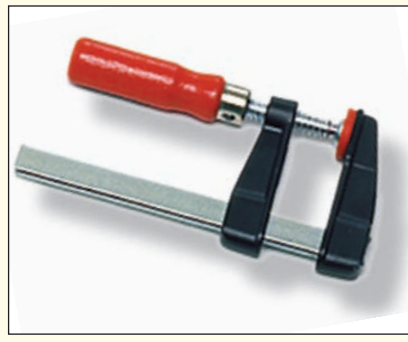
Caul

A piece of wood about $1\frac{1}{2}$ " by $2\frac{1}{2}$ " and as long as required, with a slight crown on one edge, used in pairs for applying even pressure across wide work pieces during clamping and gluing operations.

F-Clamp

(Fast Action Clamp)

Similar to the bar clamp, but can be adjusted and applied with one hand.



Dowel glue-up



Mortise and tenon glue-up

• At the very least, a proper fit would mean that you can pick up the mortised piece and not have the tenoned piece fall out when turned upside down. Normally, it is tight enough to require a rubber mallet for removal, even if you didn't need it for assembly.

• If you are at all fearful that you might apply too much glue and have a mess on your hands, you can chisel a tiny chamfer around the perimeter of the mortise. This offers a tiny reservoir area should excess glue squeeze up the tenon to the shoulder area. The same can be done with a dowel

joint by using a countersink bit to create a small chamfer at the entry of each hole. You really shouldn't have to use these tricks though, if you make your holes or mortises $\frac{1}{16}$ " deeper than the length of the tenon. Doing so is plenty of insurance against squeeze-out. If you're still making a mess, you might want to use less glue.

• As with dowel joinery, I apply glue on the walls of the mortise only, not on the tenon. I use the tip of my after-market glue bottle to apply a bead of glue around the inside perimeter of the mortise. As it drips down the walls, I can use a rod or a thin

piece of wood to coat the walls more evenly. Any glue on the bottom of the mortise can be scraped away, as it would be completely wasted.

• There is no need for glue between the end of the tenon and the bottom of the mortise (although this will always happen) because there is so little gluing strength between end grain and long grain. Similarly, adding glue under the tenon shoulders is only going to create a finishing nightmare, without any corresponding strength advantage.

• Notice that I didn't mention spreading any glue on the end grain of one of the parts in the dowel joinery example above. That is because all of the strength of a dowel joint comes from dowel-to-dowel-hole contact, not from end grain contact of the parts.

• As with dowel joinery, often a single clamp is all you need, with its main pressure point centered on the joint. Once tenon shoulders are tightly mated with the mortised piece, there is no point in cranking up the clamping pressure only to see your tenoned piece start to bend. When the joint is closed, it's closed. Any weakness in the joint will be caused by a sloppy fit between tenon and mortise, not by too little clamping pressure.

Other Situations

• Without getting into specifics, you'll come across all kinds of other joinery types, each requiring the proper amount of glue. Once again, use common sense to analyze where glue travels when two parts are pushed together in a certain way. The goal is to coat the mating parts with no squeeze-out at all. It is quite easy to achieve this with some types of joinery, such as dado joints, but much harder with rabbets or other open-faced joinery.

• One of the hardest gluing tasks is controlling the inevitable squeeze-out that occurs with joinery like hand-cut dovetails, finger joints and mitre joints. In time, though, you'll realize that even when zero squeeze-out is not possible, it is usually possible to apply the glue and close the joint in such a way that squeeze-out occurs in a particular direction. It is better to have squeeze-out on the outside of a box, where you need to trim the joinery anyway, than on the inside where you can hardly get a chisel into tight quarters. Think hard, analyze why things happen and teach yourself how to prevent, or at least control, issues involving glue squeeze-out.



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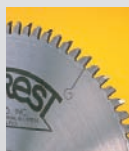
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Shop Vacuums

Whether you use an official dust collection system in your workshop or not, you are bound to need a shop vacuum. While these units won't keep up with large volumes of wood shavings from machines like jointers and planers, they might provide adequate dust collection for smaller machines like routers, sanders or even bandsaws. More importantly, a shop vacuum is an indispensable clean-up tool. I have two in my workshop. One is a larger unit I use to vacuum up messes at certain workstations, or simply to vacuum the floor before embarking on finishing work. The second vacuum is much smaller and nice to take to a client's home for one of those slightly messy installations. It is lightweight, easy to carry and barely takes up any room in my workshop.

Hose Diameter and Accessories

Most shop vacuums come with at least one piece of hose around seven feet in length. Annoyingly, only a few models

come with wands, nozzles and other attachments. Many brands consider these items to be accessories, even though most people I know use them. In any event, look for a wide range of available accessories, even if you have to buy them separately. And if the vacuum has on-board storage for some of them, that certainly helps simplify organization.

Hose diameters vary quite a bit from one model to another. I've seen hoses as little as 1" up to 2½" and at least a couple of sizes in between. Small sizes are suitable for fine dust. Larger sizes work better for larger wood shavings or even larger objects like bits of drywall or wood. My smaller vacuum has a small diameter and it's really annoying when I try to vacuum up hand plane shavings, only to have the pipe clog up constantly in the ribbed hose.

Some brands also offer a positive locking tab on the hose, which is very handy. One

tends to pull these things around by the hose quite often, so a hose that stays locked to the vacuum is appreciated.

Power and Air Flow

I've frequently mentioned in other articles that horsepower ratings can be very misleading because manufacturers calculate them in different ways. It is very common to see shop vacuums with ratings like "6.5 peak horsepower", even though a 120 volt plug isn't likely to deliver more than about 2 hp. The number of horsepower measured at complete stall just doesn't interest me. Compare the amperage rating of each vacuum to determine which is most powerful. Some draw only seven or eight amps, while others draw 11 or more.

You should also ask the manufacturer for the number of cubic feet of air per minute (CFM) that can be drawn by the vacuum. Be careful to ask for the CFM rating when the machine has all filters in, as some

brands might state the CFM with filters removed (a misleading way to measure it). Whatever number of CFM the vacuum will draw with clean filters installed, will drop even further as the filters become clogged.

Filters

Find out what kinds of filters are available for the vacuum you are considering. Most vacuums come with some sort of a filter bag and sometimes a cartridge filter as well (sort of like an automotive air filter). But many models now have small micron filters installed or available for purchase. Some micro-filters will filter down to 0.3 microns, whereas the regular ones will be most effective on particles from about 3 to 5 microns. Still other vacuums give the option of HEPA filters, helping to clear the air of even bacteria, mould and pollen.

Some shop vacuums even have filter cleaning features, like electro-magnetic pulses that shake the filter clean. Very handy indeed. I can't tell you how quickly my shop vacuum loses suction, requiring me to clean the filters constantly. And if you open up the vacuum in your workshop to bang on the filters, it won't be long before you realize that you're creating more dust than you're collecting!

Noise

I often joke with students that the loudest tool in my entire workshop is my smaller shop vacuum, but I think it is actually true! I wear ear protection regularly, but especially when using one of these vacuums. Most vacuum manufacturers can give you a decibel rating for each model. Be careful, though, about how that is measured as well. In other words, was the decibel rating measured three feet from the machine, or six feet? The closer you are, the louder the vacuum will be. So be sure to compare apples with apples.

Vacuum manufacturers have come a long way to providing lower noise levels in several models, though they tend to be more expensive machines. One other factor is that vacuums with lower noise ratings don't always have a blower port. The noise level is sometimes reduced by exhausting air in a more diffuse way around the vacuum's housing, rather than out of a single port. If having a blower option is important to you, check on it before making a purchasing decision.

Wet and Dry Capacity

More often than not, shop vacuums are sold with both wet and dry functions. This allows you to vacuum up dry waste, but

still have another option when your washing machine unexpectedly overflows. Usually, a squeegee attachment is provided, or available, for wet pick-up. A drain valve allows you to empty the tank easily as well, since many gallons of water weigh a lot. Some manufacturers provide specs on "static water lift" to give you an idea of how effectively it can pump water.

You also need to know how many litres or gallons of waste the vacuum can hold. Some smaller shop vacuums might hold only four or five gallons, while others might hold 16 gallons or more. Remember that vacuums tend to have far less suction once the tank is over half full. So buying a larger size sometimes pays dividends in terms of suction, as well as not having to empty the unit too often.

Automatic Tool Switch/Outlet

One really nice feature you'll find on some models is an outlet on the top of the vacuum into which you can plug a tool. When you turn on the tool, the vacuum turns on automatically. This feature will generally be found only on more expensive models, but it is really handy. Often, people forget to turn the vacuum on before starting up their tool. Or every time you turn off the tool you have to walk several feet to turn off the loud vacuum. Annoyances like that really wear you down and waste time. They also make you less likely to use the vacuum.

Amperage Control

Bosch's new model 3931A includes an ingenious new feature they call their Power Broker™ system. With the turn of a dial, you can decide on how many amps

you want the vacuum to use. So let's say you have the vacuum plugged into a 20 amp circuit and you've plugged a 12 amp tool into the vacuum's tool activation port. You dial the vacuum down to just eight amps and you manage to run both the vacuum and the power tool on the same outlet without tripping a circuit breaker. If the power tool uses less amperage, you can dial up the vacuum to its maximum level of 11 amps.

Other Handy Features

There are many other handy features to consider when buying a shop vacuum. One is whether the unit has a handle to move it around easily. This is particularly useful for some of the larger shop vacuums. A large tank capacity can mean a lot of weight when full, particularly when used as a wet vacuum.

Take a look at the wheel sizes as well. Most shop vacuums have small casters. But some have a couple of small casters on the front and larger wheels at the back. This can help you navigate the vacuum over bits of debris, power cords or simply rough concrete floors. Rubber tires are a real bonus. Once again, this sort of feature just makes the tool more convenient and enjoyable to use. Look at other issues like the power cord length. As far as I'm concerned, the longer the better. And weight is something to consider too if you frequently carry your shop vacuum to the job site.



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Dust Collection

You don't necessarily need a large dust collection system if you have a small shop and primarily use hand or portable power tools. The Shop-Vac Sawdust Collection System (801-75) uses 2" rigid piping connected by a series of mini blast gates, elbows and "T" fittings, all connected to your shop vacuum. The Shop-Vac system consists of eight clear 3' pipes (24 linear feet), five couplings to join the pipes, four "T" connectors, six blast gates, two 90° elbows and three 45° elbows, ten mounting clamps, along with sufficient wall plugs and screws to mount the system to your shop walls. No glue required – the pipes assemble with a snug friction fit. Which means you can easily move it around if you re-arrange your shop or move to a new one. The system is a breeze to install and works surprisingly well. An excellent alternative to a commercial dust collector and easy on the wallet at \$99.99. You can purchase additional components to expand the system as needed. Available at most building supply stores.

- CWM



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Ridgid WD1450 Pro Vac

- \$149.99
 - 11 amps, 11.6 gal, wet/dry 179 cfm, n.a. swl, 84 db
 - 2½" hose dia, 7' hose length
 - 20' power cord
 - 3 layer MicrobanR treated fine dust filter, washable; scroll noise reduction system; accessory kit
 - 26 lbs, lifetime warranty (material defects & workmanship)
 - 3 other models: 3-16 gal
- www.ridgid.com



Sears 29620

- \$149.99
 - 11 amps, 13.3 gal, wet/dry 175 cfm, 51" swl, 83 db
 - 2½" hose dia, 7' hose length
 - 20' power cord
 - General purpose pleated paper washable filter; positive locking swivel hose, accessory kit
 - 22.5 lbs, 1 yr warranty
 - 8 other models: 7.5 - 13.3 gal
- www.sears.ca



General 10-300M1

- \$329
 - 10 amps, 10 gal, wet/dry 92 cfm, 72" swl, 75-80 db
 - 2" hose dia, 6' hose length
 - 32½' power cord
 - 2 speeds, accessory kit
 - 40 lbs, 2 yr warranty
 - M10-315M1 model is 15 gal
- www.general.ca



Shop-Vac 962-31

- \$189
 - 11.5 amps, 13 gal + 2 gal wet/dry
 - 310 cfm, 59" swl, 80-83 db
 - 2½" hose dia, 8' hose length
 - 1½" hose dia, 4' hose length
 - 18' power cord
 - Accessory kit
 - 35.4 lbs, 1 yr warranty
- Shop Vac has dozens of models
www.shopvac.com

gal: Imperial measurement

cfm: Cubic feet per minute (higher is better)

swl: static water lift (higher is better)

db: decibel rating (lower is better)

AUTO START MODELS



Milwaukee 8936-20

- \$395
 - 9.5 amps, 6.25 gal wet/dry, 159 cfm, 59" swl, 82 db
 - 1½" hose dia, 7' hose length
 - 35' power cord
 - High energy filtration system; paper filter; accessory kit, tool basket
 - 17 lbs, 5 yr warranty
 - 9 other models
- www.milwaukeetool.com



Porter Cable 7812

- \$449 - \$499
 - 9 amps, 8.3 gal wet/dry 114 cfm, 94" swl, 83 db
 - 1½" hose dia, 12' 8" hose length
 - 22' power cord
 - Dual filtration system, static dissipation system ready (requires static hose), 15 sec. run on, top mounted washable automotive type paper filter
 - 20 lbs, 1 yr warranty
- Model 7814 is 12.5 gal
www.portercable.com



Fein 97725 Turbo III

- \$699
 - 10 amps, 14.5 gal, wet/dry 126 cfm, 99" swl, 57.8 db
 - 2¼" hose dia, 10' hose length
 - 16' power cord
 - 3 second run on, top mounted 5 micron cloth filter, optional HEPA filter available
 - 36 lbs, 3 yr warranty
 - 3 other models: 5 - 15 gal
- www.feinusa.com



Bosch 3931A Power Broker

- \$799
 - 15 or 20 amps, 10.8 gal wet/dry 130 cfm, 100" swl, 69 db
 - 35mm hose dia, 9.85' hose length
 - 26' power cord
 - electro-magnetic automatic filter cleaner; Power Broker System auto switches between 15 and 20 amps; filters capture 99.93% of all particles 3.0 microns and larger; 7 second run on; soft start
 - 45.7 lbs., 1 yr warranty
- www.boschpowertools.com

Halifax



Illustration: Marcus Cutler

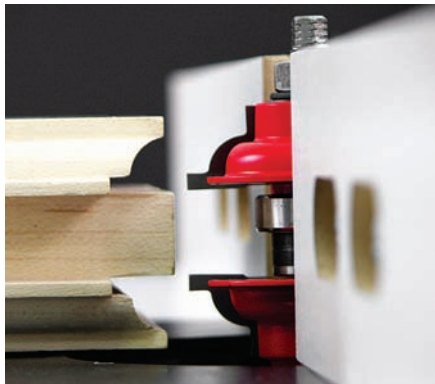
The Bluenose, the Citadel, Holly Cole, Alexander Keith's beer, the Nova Scotia International Tattoo, the Halifax Explosion, Sidney Crosby, Point Pleasant Park... names synonymous with Atlantic Canada's most populous city. Founded in 1749, Halifax has the second largest harbour in the world, and the first largest natural harbour. Often called the 'City of Trees', it's the home of Canada's oldest park, the 75-hectare Point Pleasant Park. Halifax sits astride the Acadian Forest,

rich in a diversity of northern hardwoods, spruce, fir, and an array of intermediate types of coniferous, deciduous and mixed forests. At the top of our pattern we have the Nova Scotia flag showing a blue cross or saltire, on a white background with a Scottish lion in the middle. The building is the Citadel Tower Clock, which dominates the Citadel proper and has been keeping Haligonians on time since 1803.

Scroll Cutting Tips

Photo-enlarge the pattern to the size you want. Cover your substrate (such as ¼" Baltic birch ply) with masking tape, and then spray-glue the pattern to the substrate. Using a #5 13 tpi blade, cut out the shaded areas on the template. Start cutting out the smallest areas first, moving on to the next larger areas. Once the pattern is cut out, remove the masking tape, lightly sand as required, and then apply your chosen finish.

Router Bits For Home Improvement



Cope cut with the rail bit



Stick cut with the stile bit

Have you ever thought of making a door, but were intimidated by the prospect of cutting all the mortises and tenons by hand?

If so, Freud's Entry and Interior Door Router Bit System (Item 99-267) is just the ticket for you. This matched rail and stile bit set comes fully assembled for milling 1- $\frac{3}{4}$ " joints for exterior doors, and 1- $\frac{5}{8}$ " interior door joints (by simply removing the spacers from each bit).

You can also use this set to make sidelights and transoms. To cut tenons of any length you simply remove the top cutter and bearing assembly from the coping cutter (without removing the bit from the router) and the bottom cutter undercuts the rail end. You then flip the stock over, and complete the cut. You still need to cut the

matching mortise in the stile (for this you can use a router, mortiser, or do it by hand). This is a very quick and efficient system. Use these $\frac{1}{2}$ " shanked bits in a table mounted router only.



Tired of ho-hum panelling and wainscoting? The Reversible Wainscoting bit (Item 99-470) from Freud is a quick way to spruce up your next project. This $\frac{1}{2}$ " shanked bit works with stock from $\frac{1}{2}$ " to $\frac{5}{8}$ " thick. You only need to set the bit height once for both the male and female joints. You just rout the stiles face down and then the rails face up. Nothing could be easier. Use this bit in a table mounted router only.



Wainscoting bit and door bits available at:
Morley Miller Machinery
www.morleymillermachinery.com
Tegs Tools www.tegstools.com
For other dealers contact Freud Tools
www.freud.ca

- CWM

Skateboard Deck

Here's a chance to try something a little different. No square stock, no crisply executed joinery and, although there is a lot of gluing up of material, you don't need a rack of expensive clamps.

This is a great project to involve younger members of the family and share some quality time in the shop.

The skateboard deck featured here is built from a kit produced by Toronto based Roarokit Skateboard Company.

The kit comes with everything you need to build a deck: materials, supplies and tools. Even if you don't have a workshop you can still build this on your kitchen table. The skateboard deck is made of seven layers of maple veneer that are glued up using a form in a vacuum veneering bag.

The maple veneer is cut to shape and already punched with the holes for the fasteners that hold the wheel assembly in



Shop vacuum removes air from veneer bag

place. Begin by identifying the first three layers of veneer. They are all identified and stamped with a directional arrow. Use some painter's tape to mask off the edges and the punched holes on the top surface of the top layer on the deck. Turn the slice over and trim the tape with a knife.

With the veneer ready, lay the bag on a clean flat work surface and have the breather, netting, and pump handy. The kit ships with its own glue, specifically formulated for skateboard manufacturing. One of its attributes is a long open time, which is required as regular carpenter's glue would set before you would be able to get the assembly in the bag and establish a vacuum.

When everything is ready, apply the required amount of glue between each of the first three layers and stack them on the form. Use the alignment pins (roofing nails) to pin the layers to the form and then wrap everything with the elastic bands. This keeps everything aligned through the next stages. Slide the breather netting over the form and insert the whole assembly into the bag.

I use my Fein vacuum to remove most of the air - the nozzle just happens to be the same size as the manual pump. The Fein has a separate fan to supply ambient cooling air to the motor. If your vacuum does not, you could cause heat damage to your motor. The manual vacuum pump will evacuate any remaining air quickly. As the air is evacuated from the bag, atmospheric pressure forces the maple veneer to conform to the shape of the Styrofoam mould.

This lamination process is repeated three times until all seven layers have been built up. At this point the deck is ready for its final shaping and finishing. You can use the '4 in hand' file included with the kit for this task, but if you have a power sander you'll speed things up considerably. The edges of the laminations will be rough and covered in glue right out of the bag. The object is to use the sander to shape them



into a smooth, symmetrical skateboard shape. When the edges are finished, sand the deck and apply a finish of your choice. You can apply decals, paint or stain the board before applying your finish. As for the hardware that bolts to the underside, you'd best leave that choice to the final rider.

Skateboard kits available at:
Roarokit www.roarokit.com

Thin air press vacuum bags available at:
Lee Valley Tools www.leevalley.com

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woodworkersgallery

In this issue we are introducing a new column that will appear now and then throughout the year. We will showcase some of the work of the members of Canadian Woodworking's Magazine Woodworking Forum.

The Canadian Woodworking forum brings together woodworkers of all skill levels and all backgrounds, sharing ideas and experience. It is a community for woodworkers by woodworkers, and we are all proud of our fellow members whose work is displayed here.

Be sure to check out our Woodworkers Gallery, and while you are there, drop in and join the discussions. You won't find a nicer, or more knowledgeable bunch of woodworkers anywhere.

Who knows, maybe your work will be the next to be displayed on these pages.

Woodworking Forum:
www.canadianwoodworking.com/forum/

Woodworkers Gallery:
www.canadianwoodworking.com/forum/vbpicgallery.php?

BRENT SMITH
brent@canadianwoodworking.com



Curly maple and walnut table:
MIKE HARRIS
 London, ON



Cherry rocking chair:
BRIAN PENNING
 Baie B'Urfe, PQ



Walnut bed:
EDWARD G. ROBINSON
 Burlington, ON

Nu-Lustre-55

Circa 1850's Nu-Lustre-55 finish is, without a doubt, one of the most resilient finishes you can achieve. It's a two part epoxy that dries to a clear, glossy finish. A single coat is about 1/16" thick – the equivalent of 55 coats of brushed on varnish.

Nu-Lustre is somewhat easier to apply than varnish. You simply pour it on a surface – the product self-levels fairly quickly, and cures within 24 hours. When using Nu-Lustre it's important to mix equal parts of the hardener and resin. Measuring is crucial – no eyeballing amounts here. You have about one hour before the mix sets up. It's a good idea to do a trial run on a small surface just to get the hang of the product before you commit to your finished project. Occasionally bubbles rise to the surface. The easiest way to remove these is to gently blow over them through a straw. When cured it's a very durable finish that resists scratching. If it does get scratched judicious sanding with fine sandpaper will restore the finish. You can add universal tinting colours to Nu-Lustre as well. A new version, Nu-Lustre Anti-UV Formula, specifically designed for exterior and marine use, has just been announced.



Nu-Lustre is best used on flat, level surfaces. On vertical or round surfaces it will run and attempt to self-level. For these surfaces you can slightly heat the product before using it so that it can be brushed on. The resulting finish will not be as thick as on level surfaces. Nu-Lustre has been very popular for a number of years as a sealant for crafts. People use it as a finish over leather, puzzles, plaques, clocks, trading cards, photos, artwork and the like. Woodworkers could also use it on architectural trim (balusters, rails, pilasters and the like), and on bar tops, wood kitchen counter tops, and cabinetry in high humidity environments (such as bathrooms).

For a list of retailers that carry Nu-Lustre-55 go to:
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www.chathamwoodshow.com

THE LONDON WOODWORKING SHOW February 9, 10, 11, 2007

Western Fairgrounds, Rectory & Florence Streets, London, ON
www.woodshows.com

THE KITCHENER-WATERLOO WOODWORKING SHOW March 16, 17, 18, 2007

Bingemans Centre, Bingeman Centre Drive, Kitchener, ON
www.woodshows.com

17TH ANNUAL WOODCARVING SHOW AND COMPETITION March 31, 2007

Heydenshore Pavilion, 589 Water Street, Whitby, ON
www.brooklinwoodcarvers.ne1.net

28TH ANNUAL SHOW AND COMPETITION March 31, April 1, 2007

Optimist Park, 4751 Dorchester Road (at Morrison)
Niagara Falls, ON
www.niagarawoodcarvers.ca

NAWCA ANNUAL COMPETITION AND SHOW April 21, 22, 2007

Westmount Jr. High School, 11125 - 131 Street Edmonton, AB
www.nawca.ca

For more woodworking events:
www.canadianwoodworking.com

List your CLUB and event TODAY!

continued from page 2



Afghanistan along with the regimental cypher. All told it took approximately 50 hours to complete.

Please know that I will be retiring, most likely next fall, and you have inspired me to pursue the craft of carving.

RJ Albert, Sgt

Dear Canadian Woodworking:

I am a member of the Canadian Forces currently overseas in Camp Mirage and I just wanted to pass on comments on your latest issue, in particular the shadow box for military collectables.

A few years ago one of the members of the unit was retiring and I was approached to build some sort of shadow box. After searching what was on the web and a little design work, I came up with a design of my own that I am quite proud of. The box starts out as 3/4" oak and has a removable door made with rail and stile (it is removable as opposed to hinged as the door is quite large). The inside is 1/2" hardboard with a velvet material covering.

Each individual smaller window within

the box is framed out either with walnut, cherry, cedar etc (what ever I have on hand that looks and fits well) and is also backed in a suitable material (ie. blue for air force, green for army, black for navy or air force tartan etc). A crown moulding is added to the top to balance it all out. Styles and sizes vary, with the object being to keep it not too large, but large enough to display the items with pride and dignity. As a result of my first box, I have made several more for friends and co-workers who have retired. The flag is usually flown at the members base and when the shadow box is presented to the individual, I am proud to



say it has moved some to tears. As a weekend woodworker and a member of the CF, it makes me feel proud when I see my work presented to a member who has given so much.

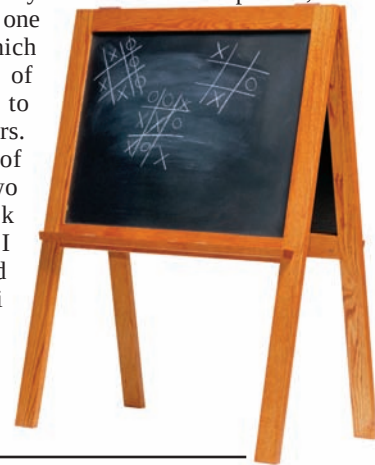
Again thanks for doing a project that I hope others will follow to display a loved ones military contribution with dignity and pride.

Craig Stone

Camp Mirage, South-West Asia

Editor:

The plans for the easel black board (issue #44) reminded me of ones that I built for my grand children a number of years ago. They were very similar in size and pattern, except for one thing, which may be of interest to your readers. Instead of making two black boards, I substituted "Abitibi Plastic Finished White board" on



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one surface. I believe that product is still available, but might be under another name. The washable, multi-coloured felt pens were a hit with both children and parents. I also bought some adhesive backed letters, and added a name and a few letters along sides and top of the board, I hope others have as much fun building, and seeing the pleasure they produced as I did.

Allen K. Stettler AB.

Canadian Woodworking:

I liked your article on installing drawer slides in your last issue (Issue #45). I especially liked finding out about using undercut screws. They will certainly improve my installations. My problem now is not installing drawers, but finding

those screws! I live in Kingston ON. Any help will do. Thanks.

Greg W.

Greg

Undercut screws can be purchased at Lee Valley.

CWM



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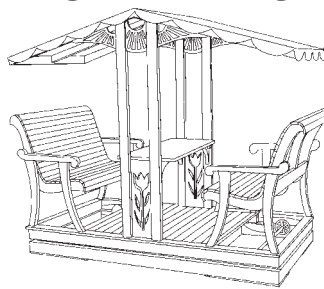


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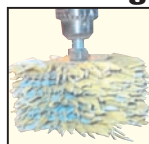
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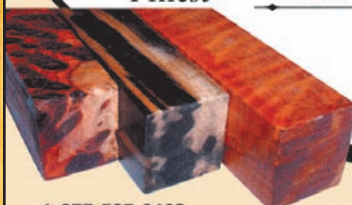
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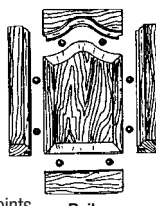
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Table Saw Cross Cut Sled

A cross cut sled enables you to cut material safely and accurately. This sled was made for a 10" Steel City Tool Works cabinet saw. You will need to customize your sled for your saw. The size of the sled will depend on your needs. Many woodworkers build two – one for cutting large panels and another (as in the photo above) for smaller stock. For this sled to work, your table saw blade must be perfectly parallel to the mitre slots on the tabletop. If your saw needs adjusting, refer to your saw's user manual.

- Begin by cutting and milling $\frac{3}{8}$ " x $\frac{3}{4}$ " hardwood stock for the two **runners** that will run in the table saw slots. They should slide without sticking, but not be loose. A dense straight grained hardwood, like beech or maple, works best. You can also use polyethylene strips.

- Cut the sled **base** to size. Half inch thick Baltic birch provides a stiff rigid base without significantly reducing the effective cutting depth. (Note: make the runners and the base the same length).

- Set the runners in the table saw slots, and place the base on top. Lock the table saw fence against the right side of the base to keep it from moving; it will also serve as an aid in squaring the base to the front edge of the table saw. Glue the base onto the runners. Optionally you can countersink and screw the base to the runners. You may need to use a cabinet scraper to carefully fine-tune the runners,

so the base glides freely in the table saw slots.

- Cut stock for the two **fences**. You can use $\frac{3}{4}$ " Baltic birch or hardwood. The front fence needs to be at least 1" higher than the maximum cut height of the saw blade.

- Install the **front fence** (farthest from the operator). Ensure that the fence is parallel to the back of the sled.

- Make a stopped cut from the front of the sled, stopping about 2" from the back of the sled (closest to the operator).

- Using a sharp pencil extend the cut line to the back edge of the platform.

- Lay a square against the saw cut and temporarily screw the **back fence** to the edge of the sled, and 90° to the saw cut. Take a piece of scrap wood with parallel edges and cut it in half using the sled. Take the two pieces, flip one upside down and bring them together against a straight edge. If there is no gap between the ends of the two pieces, then the back fence is square to the saw cut. If there is a gap you will need to adjust the fence. You may need to repeat the test cut several times. Once you have a perfect alignment, fasten the fence in place permanently. - CWM

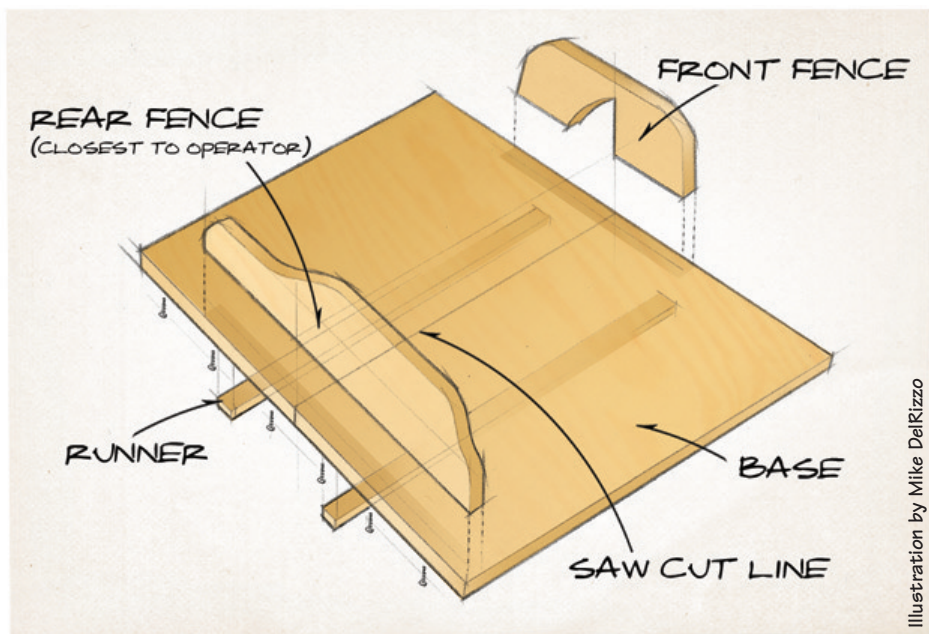


Illustration by Mike DeRizzo



Dust Collector Promotion



Prices are in effect from
January 15th to August 31st, 2007



Take the breathtaking drive to Tools Wood.

This woodworkers' haven is located in Thunder Bay at the head of the Great Lakes on Lake Superior. Tools Wood has the largest woodworking showroom in Northwestern Ontario. It is truly a unique store with its hardware, flooring, demos, and focus on woodworking.

All personnel are woodworkers - each with a special niche. In the words of customers; "they give me excellent service, tools, and machinery with good prices, are fun to deal with, and we even get math lessons when needed". Also; "you can find it at Tools Wood". Gary is not only a fount of knowledge but also offers a large variety of woodworking machinery, power tools, dust collection systems, and accessories to meet everyone's needs whether hobbyist or industry.

From its beginning, Tools Wood has been a General dealer. They live up to their motto, "There's only the best for you at Tools Wood."

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Since 1849, Welbeck Sawmill has been serving the woodworking industry with more than 26,500 sq. ft. of showroom on two levels. They have one of the largest displays of hand and power tools in Ontario under one roof.

Included in their large selection lumber, hardware, fixtures and accessories, they also have a very large variety of cabinetry hardware including many hard to find items.

Woodworking machinery is one of their many areas of expertise and General is proud to recognize Welbeck as one of the original dealers serving the Ontario woodworker.

At Welbeck Sawmill you will find a fine selection of exotic and domestic woods as well as standard building materials. The friendly and knowledgeable staff are well versed in virtually all areas of woodworking.

Take the scenic drive to Durham, you will be pleasantly surprised at what you will find.

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