8 PROJECTS PLANS TIPS JIGS TOOLS

Canadian woodworking

OCTOBER/NOVEMBER 2003
Vol.6, No. 5

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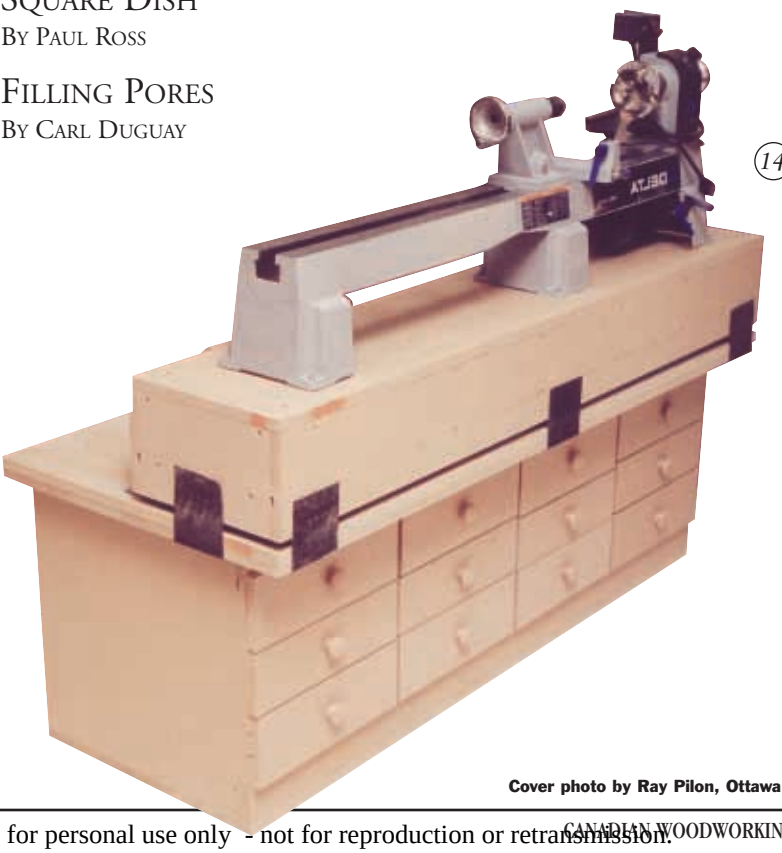

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editorsletters

Linda Fulcher

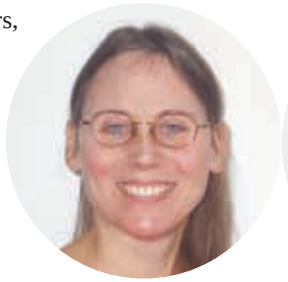
I attended a wood show last week with my daughter. She decided to check out a workshop, where she would have an opportunity to pick up some wood and work with it.

There were a number of projects she could have chosen to make but, lucky for me, she decided to make a rocking footrest for her mother. I left her to her task and wandered into a very entertaining and informative seminar on finishing, presented by John Sillaots.

When I came back to the workshop area, she was halfway through the project. Seeing me, she rushed over to show me her work. I looked at my smiling, sawdust-covered daughter and saw how delighted she was with her effort.

Setting it down on a table, she gave it a tap to demonstrate how it rocked.

The footrest moved back and forth, bumping over some rough edges somewhere along the bottom.



Now, I should tell you that, over the years, I have been using a variety of makeshift footrests as I work at my computer: card board boxes, plastic tubs and old postal code books. I can also tell you that they all have greater drawbacks than bumping when they rock! So, I would have been quite content with a sturdy, though bumpy, footrest.

My daughter was not.

She picked up the footrest and turned it over to examine it more closely. Then she pointed to where the curve was not quite smooth and said, "I have to sand that down, so it rocks better." And, off she went.

As I think about her experience, I am impressed by her persistence. The effort of doing something new may result in the project falling short of your expectations, but persistent effort will show you what you need to work on.

I am now a grateful owner of a very smooth, rocking footrest.

Paul Fulcher

This issue marks the beginning of our 5th year of publishing Canadian Woodworking Magazine. We are recognizing and celebrating this milestone with our first all-gloss issue.

It is something that we've been working towards for a while, but like a well-equipped workshop, it's not something that we could start out with.

I'm sure many of you can relate. You probably have a detailed idea of your workshop "as it will be". While you hold that picture in your mind, you work towards it, one project (or new tool) at a time.

You may be striving towards having a detached workshop in your backyard; a dedicated area of your basement; or even a corner of your garage. We're all wanting to improve what we do, and how we do it.

I hope that's why Canadian Woodworking Magazine is growing as it is: because we are helping you to do what you want to do (and do it better).

In this issue, Hank Ethier shows you how to improve the performance of smaller lathes (pg. 14). Follow Hank's plan, and you'll be able to get a lot more out of your lathe.

On page 22 of this issue, Hendrik Varju takes what he has taught you in past issues (re: wood, moisture and movement) and applies that understanding to designing and building tables.

So please read on. Enjoy this newest issue of Canadian Woodworking Magazine. We are really excited to begin our 5th year with you. I hope that together we will continue to improve, and share many more milestones together!

Corrections: Restoring Hand Planes (Aug/Sep 03).

1) lead photo was actually a 99-year-old model #4. **2)** The photos showing the lapping refer to the plane as being a #5. However, the first photo showed a #4. The second photo was a #5 only. **3)** The sharpening iron and the lapping iron captions were reversed. **4)** In the third paragraph, the angles referred to when sharpening the irons should be degrees, not inches: "I crank up the guide 2 degrees and 27 degrees and finish up ..."

Our apologies.

deareditors

Hi Paul

I read the article about the guy who restores old hand planes to "new" (Aug/Sept 03). Now please understand, I don't like hand planes, and I'll never use them. Give me a jointer and planer any day. But I have to say, the article was superbly written (humorous, succinct, intelligent). I'll still never use a hand plane, but at least now I know about restoring them.

I wish you would have more cerebral articles like that one...

I know you guys are dedicated to the magazine, and believe me, I hope you will succeed as Canada's finest wood publication.

Keep working hard! You're doing a fine job !

D.D.

Hi D.D.

Thanks for your feedback. We got a lot of interest from that article and will be doing more like it in the future.

Paul

Hello Paul and Linda:

First, let me say how much I enjoyed your article on Plane Restoration in your last issue. Are you interested in more articles about Antique Planes (ie..the types, makes, dates, etc.)?

Also, I live in NE British Columbia and would like to advertise to meet other plane collectors in my area. Would this be possible? If so, please advise of rates.

Thanks for your time, and keep up the good work.

B. Cameron, Fort St. John, BC

■ continued on page 16

By Adrian Jones

Accent Table

The organic shape of this accent table is created by a series of matching nested curves that produce a light, visual appearance.

Face aprons are cut from single boards and opened with sweeping curves to create a light and graceful look. The face frames are braced with two aprons: the upper being a scaled version of the face and a lower higher single arch. The legs are also curved outward along their length mirroring the upper curve of the face apron. The top is shaped with parallel sides and curved ends, all cut at an angle to blend into the leg curves.

The frame is built with pinned blind mortise-and-tenon and dowel joinery for strength and clean, uninterrupted lines. Sliding brackets attach the solid top to the frame to allow for seasonal movement. The table measures 31" H x 40" L x 17" W and is finished in low-lustre Tung oil with a Varathane finish.

Construction Details

The joinery in this table is the easy part of the project and requires only the minimum of tools. The large sweeping curves use full-scale templates and final shaping uses bearing-guided router bits.

Make Templates

Cut the templates for the legs and the three apron shapes, full-size. Using the curve details on the drawings, trace the leg and the three apron shapes onto MDF or hardboard. The radius of each curve is given so that you can draw the curves with a beam compass.

Cut the curve of the leg template just to the waste side of the line. Do the same for the upper and lower curves of the lower side apron. For the face and upper side aprons, drill out the end of the main cut-out with a 3/4" Forstner bit in a drill press. Bandsaw from each end to this hole to complete the cut-outs and then saw the main continuous lower curve. Use your preferred combination of spoke-shave, drum sander and/or wood file to clean up the saw marks and smooth the curves to shape.

TIP ***To reduce drawing and template making time, the leg curve is the same as the upper curve of the face apron.***

Mill Stock

Mill 6/4 solid stock for the legs and 4/4 for the aprons to final thickness (see cutting list). The actual thickness does not really matter. You will compensate for it later, so you can substitute pre-dimensioned lumber if you prefer.

Form the Leg Mortises

Use blind mortise and tenon joints to connect the apron to the legs. Cut the legs to width and form the face apron mortises (see detail) using your favourite method. The mortises are 1/2" wide, 1 1/16" deep and centered on the width of the leg. The upper mortise starts 1/2" from the top and is 1 1/4" long. The lower starts 5" from the bottom and is 2" long. Clean up with a sharp chisel and lightly relieve the edges of the mortise to prevent splintering.

MATERIALS LIST

2	32″ x 7 1/4″ x approx. 7/8″	
(i)	Front/Back Apron Rails	4/4 Mahogany
2	12″ x 4 3/4″ x approx. 7/8″	
	Side Upper Apron Rails	4/4 Mahogany
2	12″ x 3″ x approx. 7/8″	
	Side Lower Apron Rails	4/4 Mahogany
1	40″ x 17″ x approx. 7/8″	
(ii)	Top Panel	4/4 Mahogany
4	30″ x 2 1/4″ x approx. 1 1/4″	
(iii)	Legs	6/4 Mahogany

Notes:
i. Includes length of end tenons
ii. Panel made up by edge gluing multiple boards
iii. Cut to dimension during assembly

Shape the Legs

Use the leg template to trace the curve of the leg. Use carpet tape to stick two leg blanks together. Align the mortises and cut out on the bandsaw. Use more carpet-tape to stick each pair of legs together and sand all four to shape. While they are stuck together, joint the long straight edge and cut the bottom of the legs to length. Separate them and mark back/front, left and right on the top end grain.

Cut the Face Apron Tenon Blank

For the face aprons, it is easier to cut the tenons on the blanks before the final shaping. Cut the face apron blanks to length and choose the best faces. Mark them front/back, top/bottom. Install a dado blade in your table saw. Flip the board end-over-end and cut a tenon on each end 1" thick. Sneak up on the thickness until it fits snugly into the leg mortise. Using the leg as a guide, cut the top (approx. 1/2") and bottom (approx. 1/4") of each tenon. Make sure that you keep an eye on your markings and test continuously.

Cut the Face Apron to Shape

Trace the apron template onto the blank between the tenons. Use carpet tape to attach the two blanks together (with best faces in), and cut them out approx. 1/16" bigger than the template. Drill out the insides of the apron cut-outs in the same way and use scrap as backing to prevent tear-out. Separate the aprons and attach the template with carpet tape. Clean up the curves with a bearing-guided flush trim bit on the router table.

Cut the Tenons to Length

With the apron cut to shape, line it against a leg and mark the width of each tenon. Cut the tenons to length to get a good fit into the mortise. Ensure that the top of the apron is flush with the top of the leg.

Cut the Side Aprons to Shape

In a similar manner, trace, cut out, and shape the upper and lower side aprons.

Relieve Edges

Use bearing-guided round-over bits in a router table to relieve all curves (including cut outs) of the face and side aprons. Rout a 3/8" round-over on the straight edges of each leg and a 1/8" round-over on each leg curve.

Cut the Groove

As the top is made of solid wood, it will expand and contract with seasonal changes in moisture. To allow for this movement and yet firmly attach the top to the frame, metal “Z” brackets are used. One end of the bracket screws to the underside of the top while the other end grips a groove cut around the apron. A groove is cut into the inside top of all apron rails. It runs through the side upper apron but is stopped before the tenons on the face aprons. Use the table saw to cut a 1/8" wide groove 3/8" deep and 7/16" from the top. If you are using different hardware, adjust these measurements appropriately.

TIP ***To make the stopped groove, set the blade and fence as above. Using masking tape, make a mark on the fence 1/4" forward of the front of the blade and 1/4" behind the rear of the blade. Make sure it can be seen when the apron is on the saw. With the blade running, and the apron tight against the fence, face-side up, gently lower it onto the blade. The forward tenon cheek should line up with the rear mark. Push the apron through the saw and stop the blade when the rear tenon cheek aligns with the front mark.***

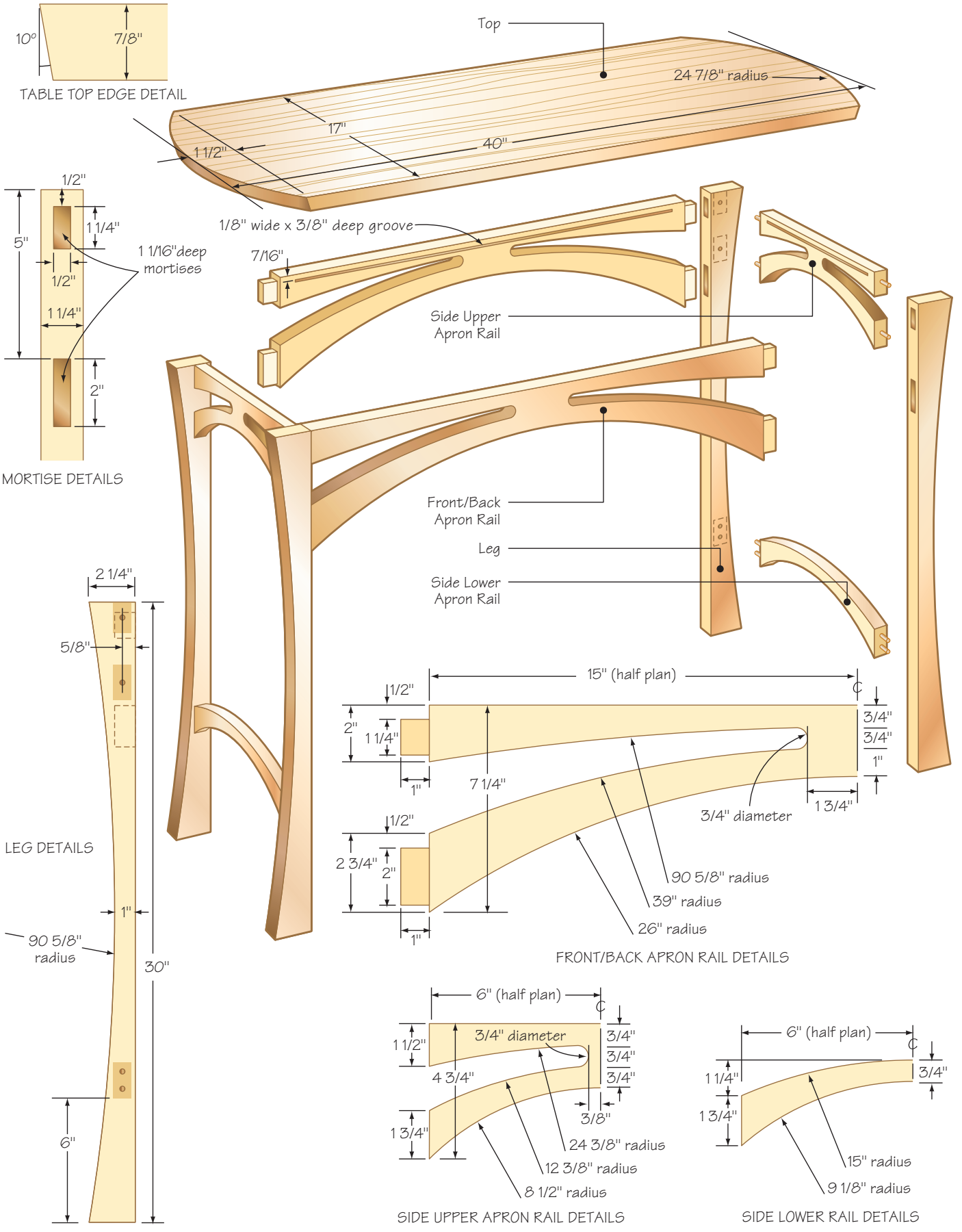


Illustration by Len Churchill

Finish and Oil

Finish the sanding up to 400 grit and remove all surface dust. Mask off the areas around the leg mortises, face apron tenons, and side apron end grain. Apply a coat of Tung oil to all parts. Allow to dry and repeat until you have a silky smooth coating.

Assemble the Face Frame

Dry assemble the front and back face frames. The joints must be able to come together without significant effort. Glue up each face in turn using a couple of pipe clamps. Use the top 8" of the leg curve off-cut as a clamping block. Apply a thin even coat of glue to both the mortises and tenons and work it into the wood a little. Clamp each joint lightly.

You will notice that the frame will tend to "crown" (bow at the centre) if you tighten the lower tenon clamp too much. Use a straight edge to check for bowing and back off clamping pressure as necessary. Remember that the joints are going to be pinned so you will be adding extra strength to the joint. When skinned over, remove glue squeeze-out with a chisel.

Assemble The Side Aprons

Dowels are used to attach the side upper and lower aprons to the legs. The dowels at the top of the side apron pin the face apron mortise and tenon. In each leg, drill the four 1/4" dowel holes 3/4" deep (see details).

Starting with the front frame, use dowel centres to transfer the hole locations to each apron in turn. Ensure that the top of the apron is flush with the top of the frame and position it 1/4" from the straight edge of the leg. Drill the two dowel holes in each upper apron 3/4" deep using a brad-point bit and stop. Position the lower apron 6" from the bottom of the leg and centre it. Mark the holes as before and drill 3/4" deep holes. Use 1 1/4" long, 1/4" wide fluted dowels and test fit all joints. Do the same with the back frame for the upper side aprons.

TIP ***To bore straight holes into the ends of the apron, clamp it upright in a vise. Stand a long square next to the vise. Visually line up your drill with the square and bore the hole.***

Assemble The Frame

Glue the aprons to the rear frame and dry fit the front. Clamp the assembly and adjust until square. When dry, glue the side aprons to the front frame.

Finish

Clean up all glue squeeze-out and final sand to 400 grit and apply your top finish.

Laminate The Top

Choose the mahogany boards for the top with the best grain pattern, colour, and match. Joint each edge and plane for consistent thickness. Cross cut each board approx. 1" longer than necessary and wipe on a coat of Tung oil to the faces of each board – this will help in cleaning up any glue squeeze-out. Apply a thin even layer of glue to each edge, working it into the wood a little.

Clamp the boards alternatively top and bottom and apply sufficient clamping pressure to raise a small bead of glue from the joint. Check for flatness and if necessary, clamp across the joint ends of two boards to align them. When dry, scrape off any glue and sand or scrape the top until it is flat.

Cut the Top

The sides of the top are cut at 10 degrees so that when installed the top edge blends into the start of the curve of the legs. Joint one edge of the top and cut it to width. Set

the table saw blade to 10 degrees and cut both long edges. With a large square, mark a perpendicular across each end of the board 40" apart. With a drawing bow or thin strip of hardwood, trace a convex curve starting 1 1/2" from each end. Attach an extension to the front of your bandsaw and angle the table down 10 degrees. Cut out both end curves. Use a spokeshave and sandpaper to smooth the curves. Final sand, and finish as before.

Attach the Top

"Z"-type brackets attach the top to the frame. Use a small brad-point bit to drill pilot holes into the top for #8 screws. (The length of the screws really depends on the thickness of the wood used to make the top. The thickness of the wood I used was approx. 13/16" [4/4 planed] and I used 3/4" screws without problems.)

Use a bracket at the end of each apron close to the leg and another in the middle of the face aprons. Install them so that there is 1/4" to 3/16" gap between the bracket and the apron. Tighten the screws so that the top is just pulled onto the frame – there is no need to tighten further.

ADRIAN JONES runs WoodsGood, a custom furniture business in the Ottawa area.
Contact: adrian@woodsgood.ca
www.woodsgood.ca

Curve Cutting Details

PART	CURVE	CHORD HEIGHT	CHORD LENGTH	RADIUS
Face Apron	Lower	4 3/4″	30″	26″
	Mid	3″	30″	39″
	Upper	1 1/4″	30″	90 5/8″
Upper Side Apron	Lower	2 1/2″	12″	8 1/2″
	Mid	1 1/2″	12″	12 3/8″
	Upper	3/4″	12″	24 3/8″
Lower Side Apron	Lower	2 1/4″	12″	9 1/8″
	Upper	1/14″	12″	15″
Leg		1 1/4″	30″	90 5/8″
Top		1 1/2″	17″	24 7/8″

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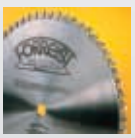

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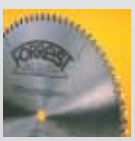

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FORREST
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By Danny Proulx

Special Cabinets and Countertops

Part IV

This article is the fourth in a series of five that will explore many of the issues and cabinets styles for those of you who want to build kitchen and bathroom cabinets.

In this fourth installment, I'll discuss some of the issues you might face when building special cabinets. These so-called "specials" are non-standard uppers and base units, such as tall cabinets, pantries, and stove and microwave cabinets. However, "special" simply means a variation of the standard base or upper cabinets (detailed in Part II and III of this series) so we always apply the basic construction principals. The procedures apply to both frameless and face frame styled cabinets.

As well, I'll detail the construction steps involved in building beautiful wood edged counter tops. They really add a touch of class to any kitchen or bathroom cabinet project and they're easy to make.

PANTRY AND MICROWAVE OVEN CABINETS

Face frame pantry and microwave oven cabinets share the same basic carcase assembly. The sides are 80 1/2" high and as deep as you require. The top and bottom shelves follow the width rules for standard cabinets, and the back board is also 80 1/2" high and as wide as the bottom board plus the two side thicknesses. There may be one or two additional fixed shelves, depending on the style of the cabinet. The face frame is 81 1/4" high, following the rule that face frames are 3/4" longer than cabinet sides, with 1" wide stiles and 1 1/2" top and bottom rails. The face frame may also contain up to five additional rails depending on the drawer and door combination. Each cabinet is normally fitted with adjustable shelves, drawers, pull-outs, or a combination of all three.

The upper section of the pantry cabinet is high and sometimes very deep. The tendency is to store kitchen utensils that are not often used for day-to-day meal preparation. To better use this space you might consider installing vertical fixed partitions in place of the normal horizontal adjustable shelf. Vertical partitions allow you to store articles such as cutting boards, pizza trays, and large serving platters that usually end up stacked on top of one another in a base cabinet. Simply attach the verticals with two screws through the top of the cabinet and two through the underside of the fixed shelf. You don't have to be concerned with shelf loading capacity as these verticals simply define cubicles for large item storage. Use 5/8" or 3/4" thick melamine coated PB as the divider partitions with plastic edge molding, veneer tape, or hardwood edging covering the cut end.

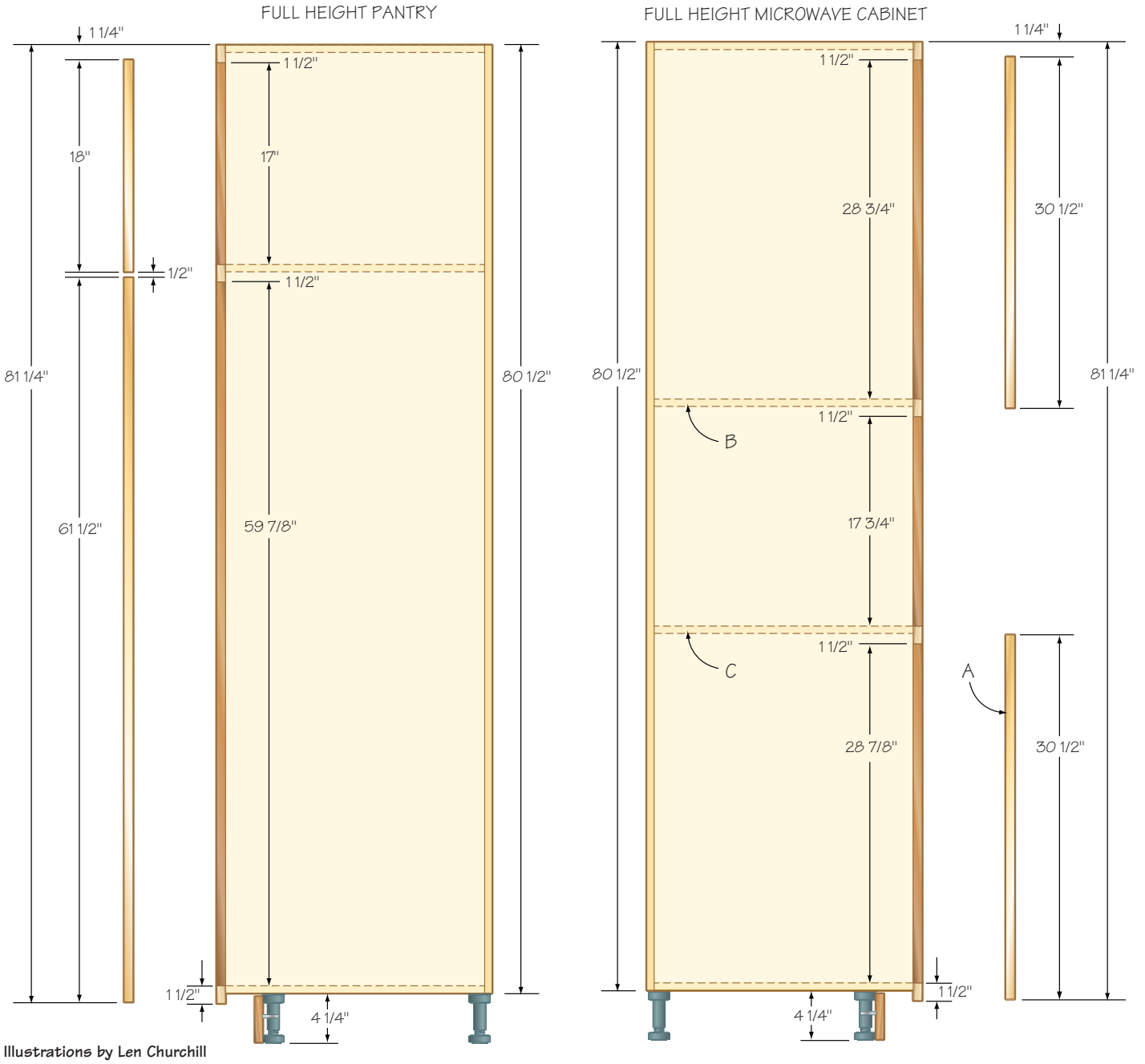
The illustration details the construction of a pantry cabinet in which you install adjustable shelves or pull-outs. The pantry cabinet is built using two doors with the lower larger door(s) having three European hinges installed. The lower door is usually 61 1/2" high and the upper door is 18" high. A 1/2" gap is left between the upper and lower door so that we maintain the 1 1/4" space at the top of the face frame. A rail is installed, with a fixed shelf board, at the point where the upper and lower doors meet.

Microwave oven cabinets, as shown in the illustration, follow all the standard cabinet construction principles and usually contain a lower drawer bank or pull-outs behind doors, with adjustable shelves behind the upper doors. The middle opening normally contains the microwave. The opening space is large enough for most microwave ovens using a standard cabinet width of 27", which has a 25" inside face frame width. When planning for a microwave oven cabinet as part of the renovation project, don't forget to have an electrician wire an outlet in the space where the microwave oven is to be installed.

The microwave oven cabinet carcase can be built using wood veneer covered particleboard, as a portion of the cabinet interior is visible. A 5/8" or 3/4" thick wood veneer board will allow the face frame to extend beyond the carcase which makes it easy to use the wood doorstop molding around the perimeter that is visible. This technique covers screws and softens the look of these large cabinets. Check the molding thickness before cutting your tall cabinet stiles.

Microwave oven and pantry cabinets are simply an upper and a lower with the space between them connected. Install these cabinets before, or at the same time as the base cabinets, so your maximum cabinet height is defined. This uniformity of height is important for upper cabinet trim installation, as well as visual appearance. Since these cabinets are often end of run units, finishing trim should be applied.

Don't let the size or apparent complexity of these cabinets bother you. They are



Illustrations by Len Churchill

simple to build, although somewhat awkward to handle alone. You will probably need someone's assistance during the assembly stage.

The back boards of these cabinets, as with all the other standard units, will be installed over the side edges which reveals the back board edge at the side of the cabinet. These visible edges will be "trimmed out" with doorstop molding to finish the cabinet after installation.

Finally, visualize these tall cabinets as standard uppers and lowers with common full height sides. Cut the horizontal shelves to the width you require for a microwave oven, built-in oven, or any other special application. If you keep the general principle of face frame height being 3/4" longer than the cabinet sides, you can easily design and construct any tall cabinet.

FRAMELESS TALL CABINETS

Frameless pantry and microwave oven cabinets share the same basic carcase assembly. The sides are 82 1/4" to 84 1/4" high and as deep as you require. The top and bottom shelves follow the width rules for standard frameless cabinets, and the back board is the same height as the sides and as wide as the bottom board plus the two side thicknesses. Cabinet height is determined by the final position of upper cabinets. To be visually pleasing, the top of tall cabinets should be in line with the top of upper cabinets.

The variation in height range is dependent on the space left between upper and base cabinets. The typical countertop surface to the bottom of upper cabinet is between 16" to 18". That range is based on cabinetmaker's preferences, choices by kitchen designers, and sometimes by the client. A person who is short may prefer lower upper cabinets and the opposite will be true for tall people. You may be called upon to vary this range on occasion, so it's difficult to fix the heights of tall cabinets.

SPECIAL HEIGHT CABINETS

Reduced height upper cabinets are simply a variation of the standard units. Frameless cabinets over stoves are built shorter by reducing the height of the sides and back board, as well as the doors. Deep, short uppers, over a fridge are in the same class, but have extended side, bottom and top panels. The standard assembly procedures are the same as the standard units.

These special duty cabinets include fridge surrounds and even desk drawer bank units in today's kitchen.

COUNTER TOPS

The choice of countertop materials has greatly increased over the last few years. At one time, a kitchen countertop was simply a piece of plywood with square edges covered with laminate. I'm sure most of you will remember the imitation "butcher block" design that was so popular in the 1960s. Fortunately, we've realized that countertop material was more than just a covering for the base cabinets. It's now understood that it must be functional, able to withstand years of use, and add design and interest to the kitchen.

You can purchase a ready-made conventional roll top (post formed) counter top or make a great looking custom top.

BUILDING CUSTOM WOOD-EDGED COUNTERTOPS

This counter top style is easily made and well within any woodworker's capabilities. The process involves attaching a solid wood edge to a panel, called the substrate, and covering the top with high-pressure laminate (HPL).

HPL is made with decorative surface papers, impregnated with melamine resins, which are pressed over Kraft paper core sheets. The sheets are then bonded at pressures of 1,300 pounds or more per square inch with temperatures approaching 300°F (149°C). The finished sheets are trimmed, and the backs sanded to facilitate bonding. Most manufacturers have over a hundred different patterns available.

There are two thicknesses of high-pressure laminate materials. The thinner version is used to manufacture post-formed countertops which are common in most kitchens and bathrooms. The thicker, general-purpose (GP), laminates are able to stand more abuse because of its thickness.

This great looking wood edged counter top style has a number of applications. It can be used as a kitchen or bathroom counter top, a work center/desk, or as a utility countertop. I've used it in dozens of unique projects over the years. And, because the laminate is available in 4' by 8' or 5' by 12' sheets, most tops can be made without a seam.

You can use any stable sheet material as the substrate, including: particleboard, plywood, or medium density fiberboard. I recommend a minimum 19mm (3/4") thick substrate for strength and stability. The wood edge can be any hard or softwood that matches or compliments the cabinets.

Cut the Substrate Sheet Material

Cut to the required size. Reduce the desired finished size by 3/4" where a wood edge will be installed. I am using 19mm (3/4") thick particleboard as my substrate for this top.

Attach the wood edge with glue and screws covered by wood plugs. You can also use dowels, or biscuits – any of these three options will work equally well. Be sure the top of the wood edge and the surface of the substrate are perfectly flush. If not, sand both to achieve a flat smooth surface. This is a critical step, as the laminate won't properly bond to an uneven surface (photo 1).

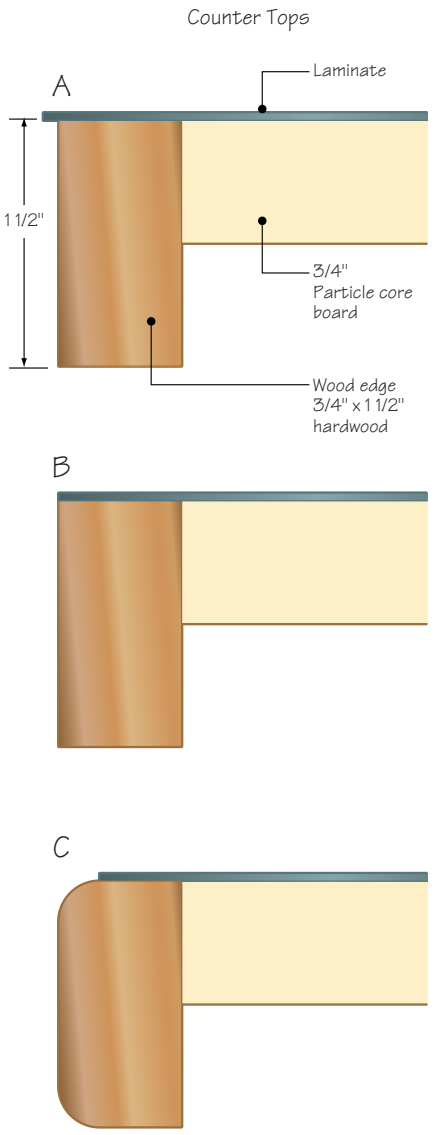


Illustration by Len Churchill

Cut the Laminate

Cut laminate 1" longer than the substrate on all edges. That extra width and length will allow for any slight positioning errors. Apply a contact adhesive to both the underside of the laminate and substrate top. Make certain there's an even coat on both surfaces and that all areas are covered.

There are many types of contact cement available. I use a roller grade liquid, but there are brush and spray contact cements available at most suppliers (photo 2).

Bond the Substrate and Laminate

The contact cement is set when it's dry to the touch. However, read the instructions listed on your container for best results. This adhesive will only bond to another surface with the same glue applied. Therefore, place dry sticks on the substrate to keep the materials from touching until the laminate is correctly positioned. Be careful, once the two glued surfaces touch they are bonded! (photo 3)

Remove the center stick and press the laminate in place with your hand. Move your hand from the center to the outside edges pushing out any trapped air bubbles. A pressure roller is the best tool to make certain the laminate is completely bonded to the substrate. If you don't have a commercial roller, use a wooden rolling pin or large wood dowel. Again, roll from the center to the edges, with particular attention paid to the laminate edges.

Cut Laminate Flush

The excess laminate can be cut flush to the wood edge using a flush trim router bit. These bits have a guide bearing, which tracks along the substrate and wood edges cutting the laminate flush. Be sure the bit is clean and the bearing is in good shape (photo 4).

Profile Bottom of the Wood Edge

A round over bit in a router is used to make a simple rounded profile on the bottom of the wood edge. The top or laminated surface of the countertop is cut using the same round over bit. Set the bit so its straight cutters, which are above the curved portion of the bit, cut slightly lower than the thickness of the laminate material. That cutting pass will trim the laminate cleanly and expose the wood under the laminate as well as rounding over the top edge (photo 5).

Sand and Finish

The wood edge and laminate profile should look like the end view shown. Once all the cutting has been completed, sand the wood edge smooth and apply a finish (photo 6).

CONSTRUCTION NOTES

Using general-purpose laminate, which is a thicker material, will provide you with a durable countertop. However, use care when cutting to avoid damaging the laminate. The best router bits are carbide tipped and they work exceptionally well for this application.

The wood edge used was oak, but any species can be used. Stick with the major brands of laminate material for the best results. High quality material and contact cement will give you perfect results every time.

Some of the adhesives are toxic, particularly the petroleum based products, so work in a well-vented area.

Next issue, Danny discusses what you need to know to install completed cabinets.

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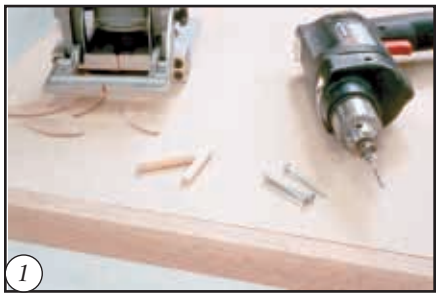
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By Hank Ethier

Mini Lathe Bench & Cabinet

With the prices of mini lathes plunging from approximately $600 down to $299, such lathes are finding their way into more and more workshops.

They are just plain fun to use and the only thing you need is a spot to secure it. They are well made, quiet and light. But because they are so light, you sacrifice some vibration dampening which is so prized in the larger lathe. Therefore, you must be sure of the bench on which you bolt it. A bench can either contribute to the vibration in a lathe or help absorb it. Vibration is the #1 enemy of any machine, woodworking or otherwise. We all look for ways to minimize it and we would kiss a toad if any of it could be eliminated.

Well, pucker up because we can eliminate some of it. Specifically, we can reduce the vibration transferred from your lathe down to the floor via your bench and back again. Both increasing the mass of your lathe and creating a barrier impervious to vibration will accomplish this. Increasing the mass of a lathe is easy. Simply bolt it to something heavy. However, this needs to be something that will soak up vibration as it is produced. A box filled with sand, will both increase mass and have a dampening effect. Sand is made up of small particles that rub together to use up the energy of vibration, it makes ideal medium.

How much sand do you need? The more the better, but sand is heavy and you don't want to overload your bench or floor. As an example, a box measuring 57" long x 10" deep x 4" high will hold approximately 61.5kg of sand. This, plus the box material, will substantially increase the weight of the lathe. Use clean dry sand (run your sand through a window screen and dry it in the oven).

This box will increase the mass of your lathe but does not eliminate vibration transferred to the bench. If you mount the lathe on this sand box and sit the sand box on a bench, the bench will vibrate when the lathe is running. The best substance to eliminate vibration is a soft, pliable material. The softer the better, and naturally, air would be a perfect choice for this purpose. Air is an extremely efficient insulator. You can't feel a palm sander vibrate until you touch it. Even holding your hand 1mm away, the vibration is undetectable.

So how do you suspend your sand box and lathe on a cushion of air? You will need a chamber made of a soft, pliable material. An inner tube with its tough thin rubber membrane is really the only option, and they need not be very big. Consider a wheelbarrow wheel holding a load of concrete.

The dimensions of the sand box given in this article will hold three tubes approximately 10" in diameter, without air. These are trapped in chambers in the bottom of the sand box. Inflate them so there will be approximately 1/2" of space between the bottom edge of the box and the bench top.

Valve stem extenders are added so the tubes may be inflated or deflated from under the bench. Narrow rubber strips on the front, sides and back hold the sand box and lathe in the desired spot. Without them you could tip the whole unit onto the floor.

Once secured in this fashion. The lathe will rock back and forth on the inner tubes as you push your chisel into the wood you're turning. Therefore, stops are added to the back and front to limit this swaying. The contact point on the stops is ribbed rubber made from car floor mats glued to cork. Because the ribs flex and there is not a lot of pressure at this point they transmit no vibration to the bench.

This set-up will let the lathe sit on its cushion of air for those delicate cuts and be limited from swaying too much during heavier operations. It is possible for the lathe to bounce if a really out of balance piece is turned. Should this be a concern for you, simply jamb wedges at each corner between the bench top and bottom edge of the sand box, effectively pinning it in place.

Construct the bench that the sand box, and lathe, sit on so that the final height is

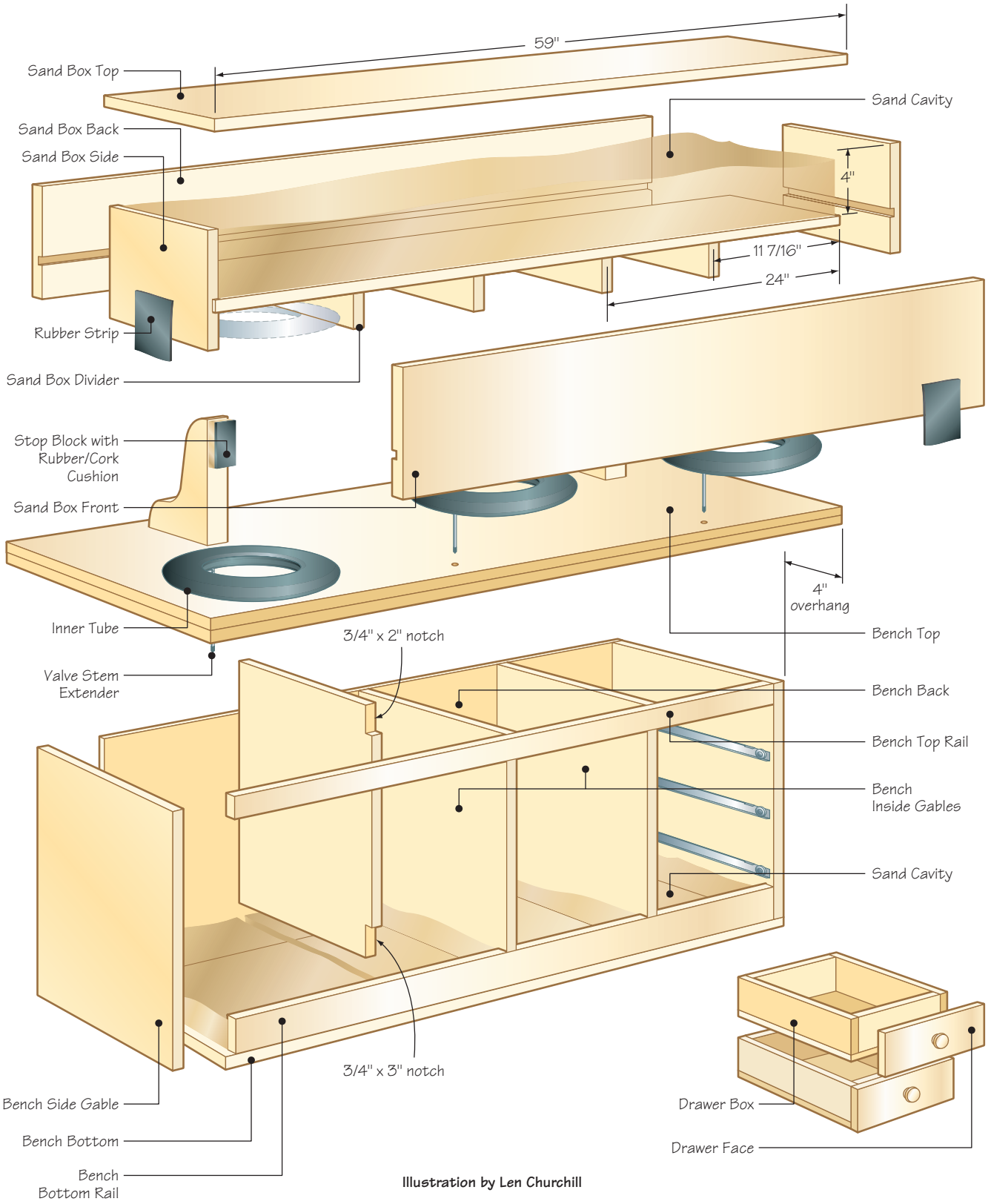

Illustration by Len Churchill

comfortable for you. The bottom 4" of the bench is also filled with sand for ballast. The drawers are used for bolt, screw, and hardware storage. All this adds to the mass of the whole unit. Now if you hold your hand on the lathe as it's running you feel the vibration, which you can trace all the way down to the sand box. If you hold your hand on the bench top, you feel nothing. Mission accomplished.

To further decrease vibration, the motor could be mounted on the bench, using a longer belt and perhaps a jackshaft. Of course this depends on the construction of your lathe.

All of this takes time and effort but it is well worth it if you are doing delicate items. With this simple bench, your mini lathe will feel and perform like a much larger unit.

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■ Cont'd from pg. 3

Dear B. Cameron

Thanks for your email and kind words. I'm glad that you enjoyed the article.

Yes, I am interested in more articles on antique planes. David Eisan will be doing articles on restoration in the future, but I like the idea of detailing various types, makes and dates. Let's talk more.

As for you advertising to meet other collectors in the area, you don't have to spend money on that!

Go to the WOODWORKING FORUM on our web site: www.canadianwoodworking.com and make a post, letting people know that you are looking for other plane collectors.

Our forum users are a helpful lot, and form a network of wood workers across Canada. I am sure that, if you make a post saying that you are looking for other plane collectors, the folks on the forum will either identify themselves as collectors or direct you to where you can find same.

You may also want to start a small club in your area, and let people know about it on our WOODWORKING CLUBS page. That too is a free service that connects wood workers coast to coast.

If you do any of the above you will have no problem collecting collectors.

Paul

fulcher@canadianwoodworking.com (Monday July 21/03)

I am a recent beginner to woodworking as a hobby. I picked up one of your magazines ... and enjoyed the varied articles and interesting projects.

I have two questions:

1) In my first issue there were two continuing articles (Wood Cuts and Building Upper Cabinets). I am hoping you might tell me how I can obtain the initial complimenting articles.

2) I have many beech, cherry and maple logs 5' to 8' long and 10" to 16" in diameter that were windfalls in my dad's bush. I am currently quarter sawing them with my 17" bandsaw as I am aware of the problems associated with cupping. I am wondering if I should plain saw some as well for a different grain effect. When the boards are dry I plan on making furniture and cabinets with them. Hopefully you can answer both of my questions.

Thanks, Kevin

fulcher@canadianwoodworking.com (Tuesday July 22/03)

I should have checked your web site first, as the answers to both my questions can be found there.

Thanks, Kevin

By Garnet Hall

Puttin' on the Ritz

Canadian Woodworking Magazine is "puttin' on the ritz" with this, their first all-gloss issue.

I felt that this all-new, upscale look deserved a project appropriate to the event, so "*Puttin' on the Ritz*" came to mind. This Koala bear is looking every bit the part – dressed in top hat and tails!

"*Puttin' on the Ritz*" is a basic intarsia project. Special attention to shaping will give it a real teddy bear look.

This project has 50 pieces and when finished is about 20" tall and 12 1/2" wide.

Material

Start with 3/4" material and raise or lower as required. Suggestions for LT or DK shades are relative to each other. Just find cedar that is DK, MD or LT when compared to each other. Choose the woods carefully, as this is a very creative step. The woods you choose will make the project uniquely yours.

I used a few unique woods in this project. The vest is palm wood. Palm is actually a grass plant, but has the properties of wood. The vest pockets are snake wood. The two work well together. Although these are the woods that I chose, you don't have to use these woods. Eye maple would also look good as a vest.

Transfer the Pattern

Transfer the pattern to the wood, by whichever method you prefer: trace with carbon paper, make a template or cut and paste a photocopy.

Cut Out the Pieces

Cut carefully, right on the line. I like a #7, P/S style, or a #7 DT/R blade. Lately I have been using a #5 Hook Tooth blade. The smaller kerf gives a better fit and the hook toothed blade cuts as fast as a P/S blade.

Assemble the Pieces

Assemble the cut out pieces and check for fit. The pieces should fit reasonably well, but they don't have to be airtight. I am happy if I am within a saw kerf or 1/16". Fitting can be tedious work, but patience will be rewarded. I usually start with one of the larger pieces and fit surrounding pieces to it, one at a time.

Raise or Lower the Pieces

Once the pieces are fitted to your liking, raise and/or lower any pieces as the pattern (or your imagination) suggests.

Raise in increments of 1/8" by gluing scrap plywood to the bottom of the pieces. Lower by cutting or sanding the pieces thinner.

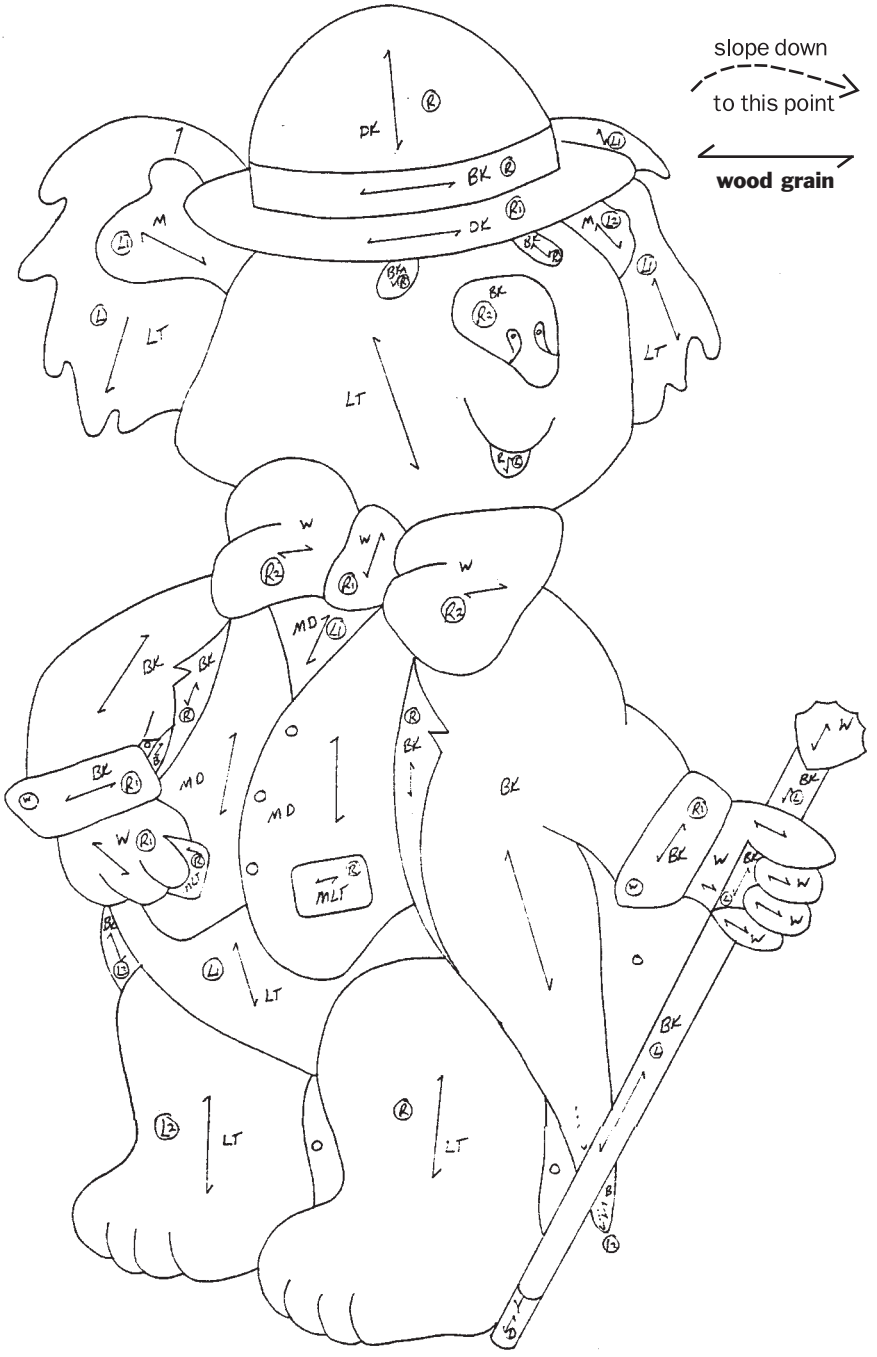
Re-assemble the Project and Draw on Reference Lines

Reference lines help with shaping.

Shaping

Before you start shaping, give some serious thought to dust control. All of your tools should be hooked up to a dust collector. An air filtration device will remove airborne dust, and as a final line of defense, wear a good quality dust mask.

Shape the pieces to achieve as much dimension as possible. This step, like the woods you choose, is a very creative step. The more shaping you do, the better your project will look.



R	- raise 1/8”
R1	- raise 1/4”
R2	- raise 3/8”
L	- lower 1/8”
L1	- lower 1/4”
L2	- lower 3/8”
L3	- lower 1/2”

BK (B):Black - Black Walnut
W: White - Aspen
Y: Yellow - Pau Amarillo
R: Red - Paduak
LT: Light Western Red Cedar WRC
DK – Dark WRC
MLT – Medium Light WRC
MD – Medium Dark WRC
M – Medium WRC
O - Open

MATERIALS LIST

Enlarge 285% or size to preference
For 20" x 12 1/2" finished piece

- 1 bd/ft - BK
- 1 piece 6” x 8” - W
- 1 piece 1” square - Y
- 1 piece 1” square - R
- 1 piece 2” x 6” - Y
- 1/2 bd/ft - LT
- 1 piece 2” square - MLT
- 1/2 bd/ft - MD
- 1 piece 2” square - M
- 1 piece 6” square - DK

A number of tools can be used for shaping. I prefer to use a small pneumatic sander in a flex shaft.

A sanding tool like the “Flex Sander” compliments the “Sandstorm Sander”. The tension can be adjusted by turning the tension knob. The natural flex of the tool is ideal for contoured surfaces. Try to achieve a smooth transition from one level to the next with your shaping.

Sand the Pieces

I don’t sand past 220 grit anymore, mainly for dust reasons. The less dust I make, the less there is the breath in. Two tools will speed up this process: a flap sander (photo 4), or a “Star Twister”. Remember to always wear a dust mask.

Apply Backing

I use 1/4" plywood. The best is Baltic Birch, but ordinary Oak or Birch plywood will also work, just keep it flat. You can use 1/8" plywood for smaller projects (i.e. under 1' square) and 3/8" for larger projects (i.e. over 4' square). Assemble the project on the backing board and trace around it. Cut out the back and you are ready for the glue up.

Glue Up

Re-assemble the project, on the cut out backing board, and start the glue up. Ordinary white carpenter’s glue will work fine. I usually glue up the pieces around the outside of the project first, and then work toward the middle.

Finish

Once the glue has dried, apply the finish of your choice. I like a satin clear coat. Put three coats on the front and one on the back.

Now attach a hanger on the back and you’re all set to be “Puttin’ on the Ritz!”

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Air Nailers

Porter Cable DA250A

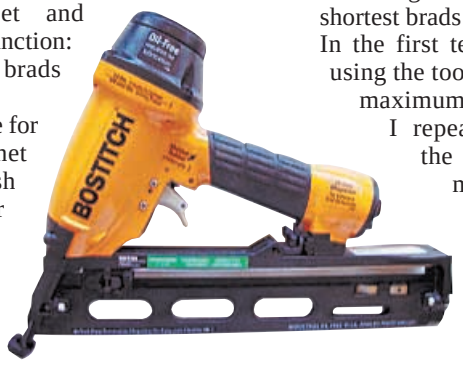
Air tools are becoming much more common in woodworking shops.

Even factoring in the initial cost of an air compressor, the cost of ownership is highly competitive with electric tools: air tools typically cost less and they last longer. For a variety of repetitive tasks, such as assembling cabinet carcasses and trim work, one handed nailing saves you considerable time.

Because the brads are thinner than conventional nails and they are shot with such force, you'll find that they rarely split your stock. I tested nailers that you'll likely find at, or can be ordered through, building supply centres and big box stores (such as Home Depot, Canadian Tire and House of Tools).

Along with the air nailers, I tested a cordless and an electric nailer. Two of the air nailers (Accuset and Airy) are dual function: they shoot both brads and staples.

Nailers suitable for use in a cabinet shop, for finish carpenters or for the home handyman come in 15, 16 and 18 gauge sizes. Gauge size refers to the size of nail (or "brad") they shoot. A brad is just a thin nail with a small head, or headless, that comes in different thicknesses. "Finish" nailers shoot 15 and 16 gauge brads from 1" to 2 1/2", and are used for assembling cabinet carcases, installing face frames, door and window casings, baseboards and mouldings. "Brad" nailers shoot a thinner, smaller brad 18 gauge nail (3/8" to 1 3/8"), and are used in assembling furniture and for finer trim work



Bostitch N52FN

Cordless nailers are somewhat new on the market. The Paslode uses a combination of battery and fuel cell. The battery powers a fan that pushes the fuel mixture into the piston, and it provides the spark that ignites the fuel. You can expect up to 4,000 shots per battery charge (about two hours to recharge) and 1,200 shots per fuel cell.

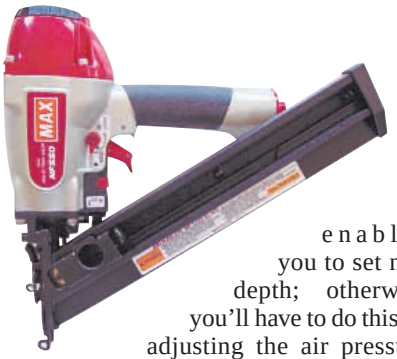
I carried out the tests using a Porter Cable side stack oil-less compressor (model CPF23400S). I made the same number and type of shots with each tool, first using the longest then the shortest brads it could handle. In the first test I shot brads using the tools minimum and maximum depth settings. I repeated this test at the minimum and maximum recommended air pressure levels. To test for jamming I shot three clips (300 brads) from each tool into the end and face of 2" ash. I also shot one clip from each tool into pine crown molding.

Makita AF631

Finally, I tested each tool for accuracy of nailing, surface marring, handle and trigger comfort and overall tool balance.

All the air nailers operate within a 60 to 120 air pressure range, have a 100 brad magazine capacity (Accuset holds 110), come with an instruction booklet, a carry case (except the Makita and Max NF352ST) and a one-year warranty (Airy comes with 90 days, Campbell Hausfeld with a generous three years).

There is a blast of air that comes from the air nailer each time you pull the trigger. If your compressor uses oil, this air gets contaminated. An adjustable exhaust vent enables you to direct this oil-contaminated air away from your work. Only the Makita, Accuset and Airy models lacked this feature. The Accuset thoughtfully vents out the rear; the other two vent straight into your work. The Bostitch BT35B requires you to loosen a screw each time you adjust the exhaust vent. A driving depth adjustment dial



Max NF550

enables you to set nail depth; otherwise you'll have to do this by adjusting the air pressure level on your compressor. All the nailers had a tool free depth adjustor except the Max NF352ST, Bostitch BT35B and Accuset. To adjust the Airy you have to unscrew the main bit guide, a somewhat awkward and ineffective procedure.

I liked the Makita's depth adjustor, which is a stepped nut with nine increments of approximately 1/32". A no mar tip helps prevent the nosepiece from leaving dents in finished work. The Max NF352ST, Bostitch BT35B, Accuset and Airy lack such a tip.

Campbell Hausfeld NB0050

If a nail gets jammed in the tool you want to remove it quickly and easily. All the nailers except the Max NF352ST, Bostitch BT35B, Accuset and Airy use a hinged quick release nose. For the Bostitch N52FN you release a latch and slide the magazine forward. I found this method a bit cumbersome to use.

Most nailers come in a sequential fire mode. Push the nosepiece against the work, press the trigger, and it fires. Some nailers offer bottom or bump mode firing: hold in the trigger and each time you press the nosepiece against the work it fires a nail. Bottom fire mode is useful for repetitive nailing. The Makita, Max NF550 and Campbell Hausfeld provide both modes on the tool. The two Bostitch nailers and the Accuset can be ordered in sequential or bump fire modes, and you can order an optional bottom fire trigger free of charge for the Porter Cable. Changing from sequential to bump fire mode is very quick on the Makita; you simply push a button on the trigger.

All together I shot over 5,000 brads and none of the tools jammed.

Max NF352ST

Bostitch BT35B

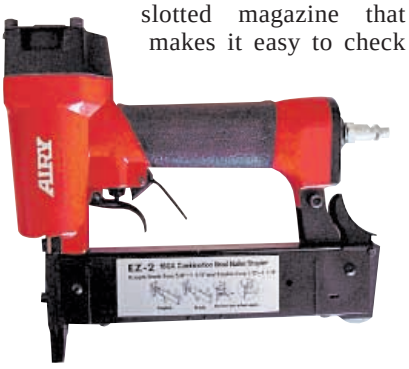
All the nailers performed well in softwood, plys and hardwood. At the lowest recommended air pressure setting (and nail depth gauge set to maximum) the Bostitch N52FN, Porter Cable, Makita, Max NF550 and Campbell Hausfeld easily drove the longest nails into solid ash. I did notice that the contact arm for the Bostitch BT35B and Accuset left slight impressions on the work. With the Max NF352ST I had to keep the psi up to its maximum setting to drive the longest nails. For the Arrow I found it necessary to exert pressure forcibly when nailing into hardwood, particularly with the longest brads.

Paslode IM250A

If you are using a tool for an extended period of time, tool weight and balance become important considerations. The Bostitch N52FN at 3.7 pounds is one of the lightest 15 gauge nailers on the market, and has excellent balance. The Porter Cable is the heaviest, although it feels much lighter due to its exceptionally balance. The same is true of the Paslode, which feels much lighter than its 4.9 lbs. I found the Makita overly top heavy, putting a lot of strain on my wrist.

Accuset A2N125

In general, these tools are well constructed. The Porter Cable is likely the most rugged, with its anodized aluminum magazine, hardened steel nail guide rail and hardened driver blade. The Makita and Max NF550 are also impressive tools that should give years of reliable service under the most rugged of conditions. The Bostitch N52FN has a slotted magazine that makes it easy to check nail supply, although it might be susceptible to collecting debris. The magazine housing is made of a hard plastic; I thought aluminum might have been a better choice here. Most of the nailers have a reload indicator or small window on the magazine that allows you to see when its time to refill.



Airy EZ2

Several of the tools have unique features. The Bostitch N52FN is the only oil-less nailer in the group (one less maintenance task to remember). The Max NF550 has an anti double fire mechanism. The Makita has a very convenient lock button at the end of the

Arrow ET125

magazine that holds the nail pusher while you load or unload. It also won't fire when the magazine is empty. The Airy has a safety trigger that you have to hold down before pressing the firing trigger, a nice feature. The Paslode has a lock out at 10 nails, a blinking light on the handle to let you know when to recharge the battery, and a convenient belt hook.

These are all very capable tools. Among the 15 gauge nailers, the Porter Cable DA250A or Max NF550 are excellent choices for continuous heavy-duty nailing. For light-duty or intermittent use, the Bostitch N52FN is a good choice. Although the Makita AF631 provides a lot of nice features it is rather top heavy and lacks an adjustable exhaust vent.

In a 16 gauge shop nailer the Campbell Hausfeld NB0050 stands out because of the full range of features it offers. Although the Max NF352ST performed very well in all the tests, its steep price, in relation to the set of features it offers, makes it a less viable choice.

The Paslode IM250A is the tool that I'd love to own. It offers the ultimate in convenience, performs as well as any pneumatic tool, but unfortunately comes at a very hefty price. Excellent quality, dual function (nailer and stapler) and competitive price give the Accuset A2N125 top marks for an 18 gauge nailer.

If you don't need the stapler, then you can't go wring with the Bostitch BT35B. It's a great tool at a good price. The Airy EZ2 is a competent dual function nailer, operating at a lower air pressure range than the Accuset, but is not as well constructed even though it costs the same. The Arrow ET125 is a viable alternative for those who want the benefits of a nailer but don't want to invest in a compressor.

COMPARISON CHART

- not applicable to this model
L length of tool in inches
$ price in Canadian dollars
V tool free adjustable exhaust vent
GA nail gauge
D tool free adjustable nail depth control
F format: "A" angled or "S" straight
T replaceable no mar tip
Size size of nails in inches
ND hinged quick release nose door
psi recommended air pressure range
O operational mode: "S" sequential, "B" sequential and bottom,
wt weight in pounds, "E" models come either sequential or bottom

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	$	GA	F	Size	psi	wt	L	V	D	T	ND	O	comes with
Bostitch N52FN	$493	15	A	1-2 1/2	70-120	3.7	15 1/2	yes	yes	yes	*	E	carry case, box of brads, 1 yr warranty
Porter Cable DA250A	$349	15	A	1 1/4-2 1/2	70-120	6	15	yes	yes	yes	yes	E	carry case, 1/4" quick coupler, oil, allen keys, box of brads, safety glasses, 1 yr warranty
Makita AF631	$601	15	A	1 1/4-2 1/2	60-120	5.5	14 1/2	no	yes	yes	yes	B	oil, safety glasses
Max NF550	$599	15	A	1 1/4-2 1/2	70-100	4.6	13 5/8	yes	yes	yes	yes	B	carry case, 1 yr warranty
Campbell Hausfeld NB0050	$321	16	S	3/4-2	70-110	4.8	11 1/2	yes	yes	yes	yes	B	carry case, 1/4" quick coupler, oil, allen keys, box of brads, safety glasses, 3 yr warranty
Max NF352ST	$599	16	S	1-2	60-100	3.6	11 3/4	yes	no	no	no	S	1 yr warranty
Bostitch BT35B	$232	18	S	5/8-1 3/8	70-120	2.4	10 3/8	no	no	no	no	E	carry case, box of brads, oil, 1 yr warranty
Accuset A2N125	$199	18	S	5/8-1 1/4 (nails) 1/2-1 (staples)	70-120	2.9	10	no	no	no	no	E	carry case, 1/4" quick coupler, oil, allen keys, box of brads, safety glasses, 2 yr warranty
Airy EZ2	$189	18	S	3/8-1 1/4 (nails) 3/8-1 1/8 (staples)	55-95	3.1	9 3/4	no	no	no	no	S	carry case, oil, box of brads, 90 day warranty
Pasolde IM250A	$725	16	A	1 1/4-2 1/2	-	4.9	10 1/2	-	yes	yes	yes	S	carry case, box of brads, safety glasses, 1 yr warranty
Arrow ET125	$200	18	S	5/8-1 1/4	-	4.5	9 1/2	-	yes	yes	yes	-	carry case, 10 foot cord, 1 yr warranty

* uses a retracting magazine Prices quoted are averaged from several dealers.

Contacts

Stanley Works
www.stanleyworks.com
860-225-5111

Porter Cable Canada
www.portercable.com
519-836-2840

Makita Canada
www.makita.com
905-571-2200

Paslode
www.itwconstruction.com
800-387-6472

Senco Products
www.accuset.com
888-222-8144

Max USA Corp
www.maxusacorp.com
800-23-4293

Airy Sales Corp
www.airy.com
714-776-3235

Campbell Hausfeld
www.chpower.com
866-247-6937

Arrow
www.jardel.com
514-321-3983

By Hendrik Varju

Table Tops and Wood Movement

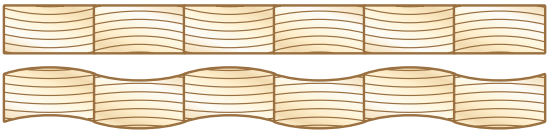


FIG. 1 washboard effect as wood dries

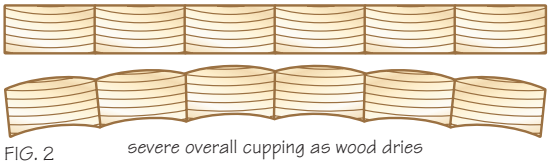


FIG. 2 severe overall cupping as wood dries

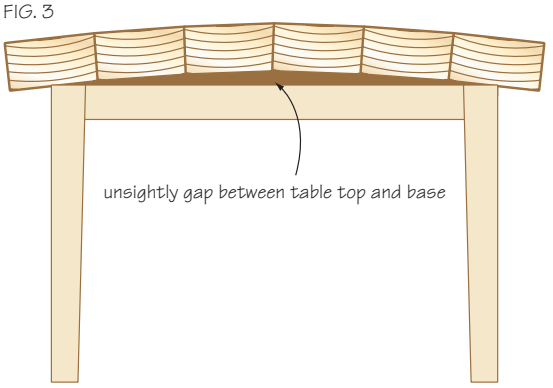


FIG. 3

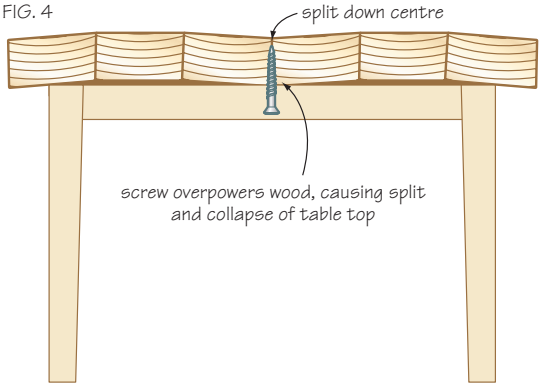


FIG. 4

Most people have seen one form or another of failed table tops. Sometimes they crack down the middle. Sometimes they are so badly warped that they've pulled screws right out of the aprons below. These failures can be attributed to one phenomenon: wood movement.

ALTERNATE GROWTH RINGS

I'll start by reviewing the well accepted wisdom that one should alternate the growth rings of boards glued together to make a solid wood table top (or any panel, for that matter). This is an important step when using flat-sawn lumber, which is the most common cut of lumber you're likely to buy. Fig. 1 shows the reason for this arrangement.

If you remember back a couple of articles, you'll recall that flat-sawn boards cup in the opposite direction to the curvature of the growth rings as they dry. They will actually curve the other way when taking on moisture, but that doesn't matter. The point is that each board will cup in the opposite direction to the next one if you alternate the growth rings from one board to the next. Over time, this results in a slight "wash-board" effect across the table top. Keep in mind that the amount of cupping will be extremely small if the lumber is already properly dried and if you limit the width of each board.

If you do not alternate the growth rings and, instead, orient the growth rings all in one direction, you will get severe warpage because the effect is multiplied over the entire panel (Fig. 2). This may not seem all that bad, but remember that the curved top is resting on a flat base (Fig. 3). An unsightly gap will form between the top and base.

Even worse, there is likely to be a screw holding the centre of the table top ends to the base. As the table top cups upwards, the screw will strip out of the table top. Or the screw might hold on, and the table top will collapse and split down its centre (Fig. 4). Nature's laws require the table top to cup. But the screw, made of a stronger material, doesn't allow such cupping, so the wood breaks.

LIMIT BOARD WIDTH

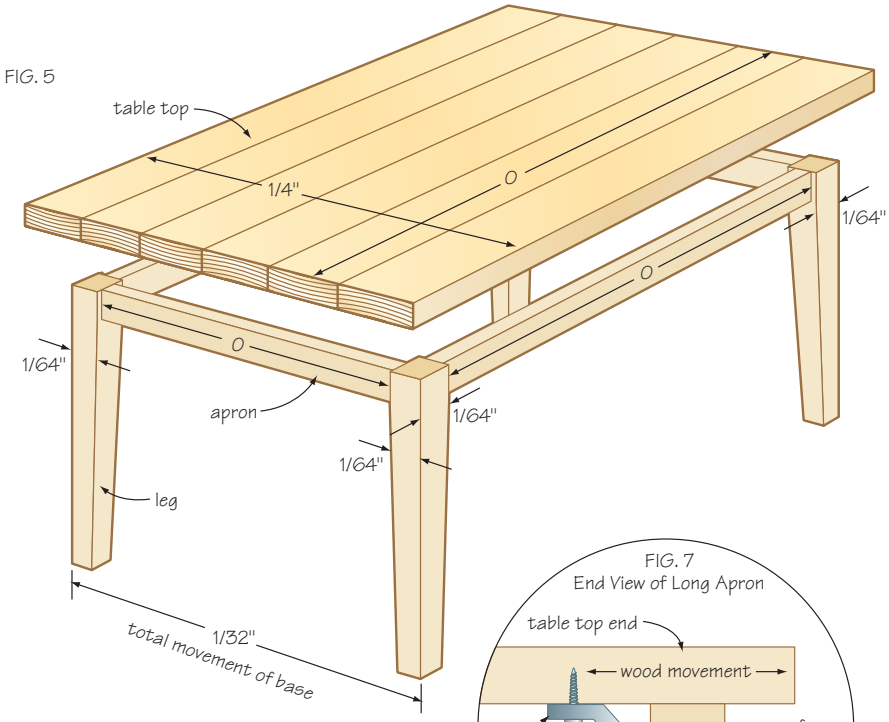
Remember that limiting the width of each board is important because the wider the board, the more severe the curvature of the growth rings. The more severe the growth ring curves, the worse the cupping. My rule of thumb is to keep boards 4" wide or less. You might push the limits occasionally where striking grain patterns would be ruined by using narrower boards. But, in my opinion, that is where veneered materials should come into play. I always keep the boards four inches or less in width when working with flat-sawn, solid wood.

ATTACHMENT METHOD

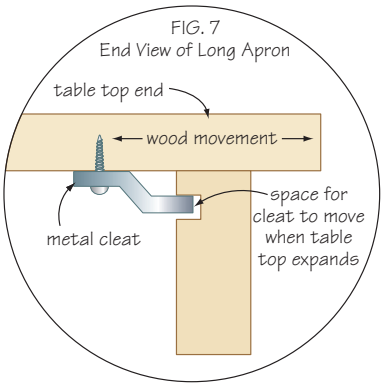
Although different table top attachment methods exist, depending on the type of table being considered (such as trestle tables, frame-top tables, breadboard-end tables, etc.), the scope of this article doesn't allow a review of each one. Instead, we'll take a look at a standard design, consisting of four legs, four aprons and a top.

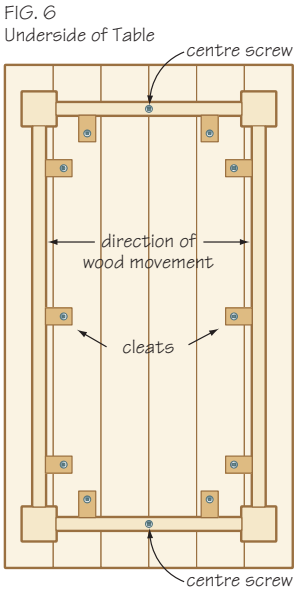
If you analyze how each furniture part moves (Fig. 5), you'll understand why special attachment methods are required for the table top. Looking at the aprons, you'll see that they don't expand or contract in length. As discussed in my last article, longitudinal wood movement is considered zero for furniture building purposes.

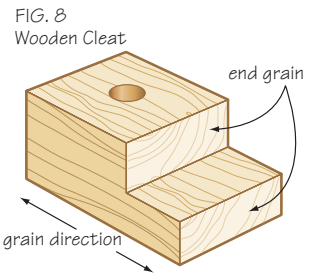
The legs, on the other hand, expand and contract in width and thickness. We don't know the amount of movement until we



Illustrations by Len Churchill







know the dimensions of the legs, the cut of wood, the species, relative humidity fluctuations, etc. But let's assume that the legs are about 3" by 3" in size, and rift sawn. The wood movement you might see, both in width and thickness (the same rate of movement for both in rift sawn lumber), is 1/64". Looking at the end of the table base, its total change in width from winter to summer is 1/32". The base's length will change by the same amount.

The table top, however, is a different story. If the boards run the length of the table (such as a harvest table), the length of the table top will not move from season to season (longitudinal movement is zero). But the width of the table could easily move by 1/4" for a table that is 36" wide. A wider table could easily move more. So here we have the crux of the problem. The table top moves by 1/4" in width while the base moves by only 1/32". If the table top is simply screwed down onto the base all around, we will have a serious problem.

The length dimension isn't an issue at all, with the base moving just 1/32" and the table top zero. But we have a problem across the width. As the table top expands, it will break the joint connecting the end aprons to the legs. As the table top contracts, it will split, because it is restricted from contracting.

ALLOW FOR VARIED WOOD MOVEMENT

The solution is to attach the top to the base such that it can still move freely as required. Table top ends can be attached at the centre points to the centre of each end apron, with a screw (Fig. 6). While this might look like a problem, it merely fixes the table top to the base at one point along its width. The screw isn't necessary, but it keeps the table top centred on the base through all seasons. Yet the table top is free to expand and contract across its width as relative humidity and moisture content change.

Of course, the rest of the table top needs to be attached as well. In Fig. 6, you'll see other bits of hardware around the inside perimeter of the base, called "cleats". These can be metal ones you buy or wooden ones you make yourself. The whole purpose of cleats is to attach a table top to its base in a non-permanent way that still allows the top to expand and contract freely.

In Fig. 7 you'll see a close-up view of the end of a long apron, showing how a cleat works. A groove is cut on the inside of the apron, which accepts the cleat. The cleat has a single hole on one end, through which a screw is driven into the table top.

As shown in the drawing, it's important that the cleats are positioned only half-way into the groove so there's room for the table top to expand and contract. Remember that the direction of wood movement will cause the cleats to move in and out of the long aprons (as shown in Fig. 6). The cleats on the short aprons can actually be positioned fully into the grooves, since those cleats will move from side to side instead of in and out (because there is no wood movement along the length of the tabletop).

Fig. 8 shows a wooden cleat, to help you if you are going to make your own. Notice the proper wood grain direction, which is from the back of the cleat to its tongue. This is especially important for larger tables, as the tongue will have greater strength with the grain direction running as shown.

So here we see just how simple, yet important, it is to account for wood movement in designing a standard table. These types of examples are commonplace, yet too often overlooked. In my next article, I'll look at frame-and-panel design, which is an important design concept used for doors and other furniture parts.

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www.passionforwood.com email: info@passionforwood.com

By Michel Theriault

CD Holder

Keep your favourite CDs right next to your CD player with this attractive holder.

It's expandable to any size simply by making it taller. You can make it as large as you want by eliminating the base and attaching it to a wall.

Glue the bottom holder rib 3/4" from the bottom of the back piece and clamp until dry.

Place a CD jewel case against the first rib and add two business cards to the top. Glue and clamp the next rib in place. The business cards will ensure there is enough space to easily insert and remove the CD jewel cases.

Continue this process, being careful not to shift the previous rib.

Allow the complete assembly to dry and trim the top with a handsaw to match the last rib.

To attach the base, drill two countersunk pilot holes into the base 3/8" from the back edge and 1" from the sides, then screw it to the back. If necessary, drill pilot holes into the back through the pilot holes in the base

MATERIALS/CUT LIST

1	3/4″ x 5 1/2″ x 14″	Back Maple
2	3/4″ x 5 1/2″ x 6 1/2″	Base Maple
12	3/4″ x 3/4″ x 5 1/2″	Holder Ribs Walnut

before screwing the pieces together.

For added strength, drill countersunk pilot holes at each rib (Fig. 2) and screw the back and rib pieces together.

OPTION

• Make this holder any height you want.

TIP ***Since the ribs will eventually be screwed on for strength, apply the glue sparingly and allow it to tack-up slightly before putting the rib in place. This will reduce the clamping requirements.***

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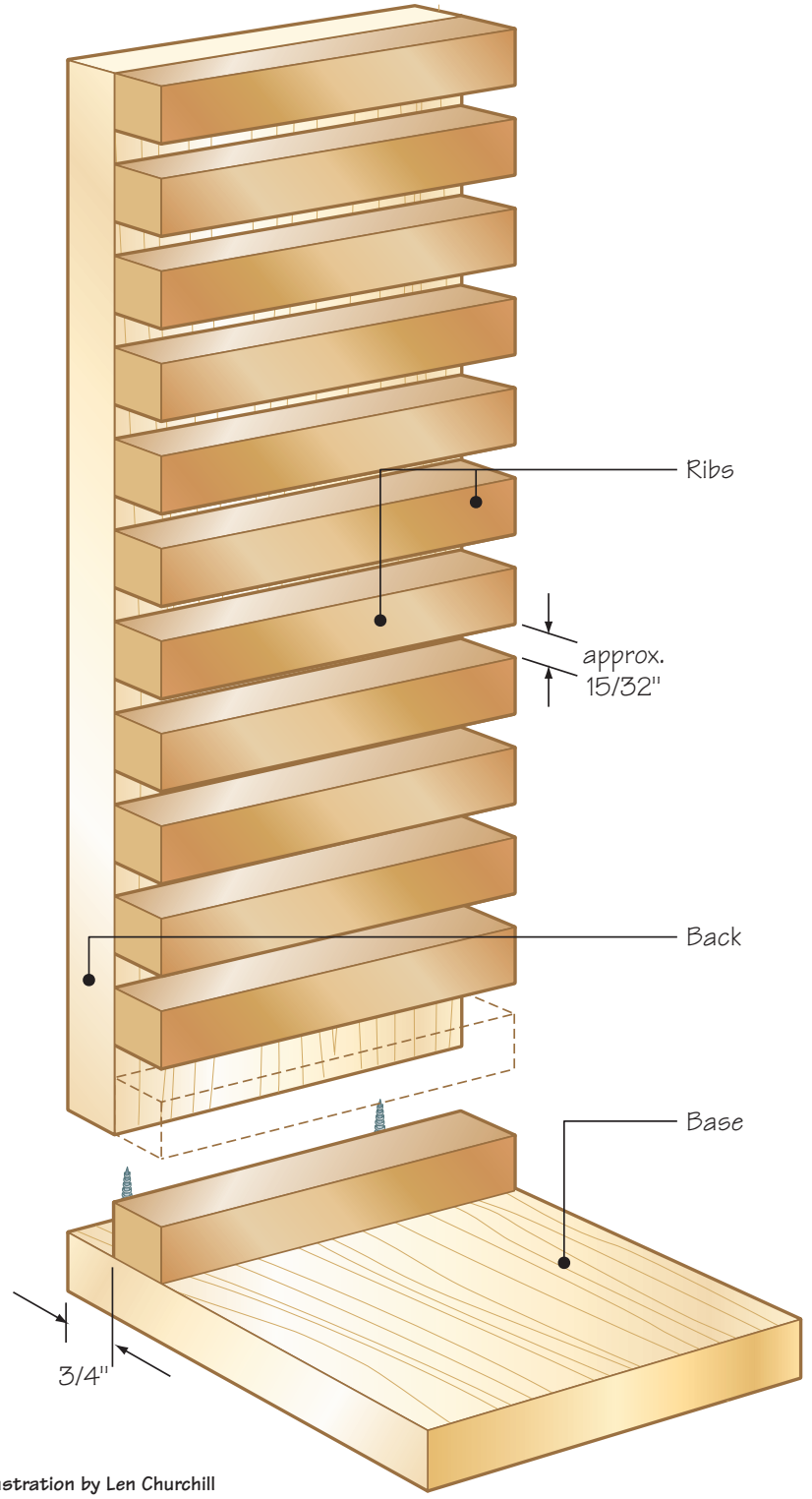

Illustration by Len Churchill

COMING EVENTS

THE WOODSTOCK WOODSHOW
October 3, 4, 5
Woodstock Fairgrounds Woodstock ON
(519)539-7772

THE WINDSOR WOOD CARVING MUSEUM WOOD CARVING SHOW
October 18, 19
Lions Hall Kingsville, ON
519-977-0823
http://members.tripod.com/woodcarving

THE CALGARY WOODWORKING AND TOOL SHOW
October 17, 18, 19
Stampede Park Calgary AB
1-888-999-5513
www.canwestshows.com

VICTORIA WOODWORKING SHOW
October 17, 18, 19
Saanich Fairgrounds Vancouver Island, BC
1-888-999-5513
www.canwestshows.com

LA FOIRE DU BOIS
October 17, 18, 19
St. Hyacinthe Fairgrounds St. Hyacinthe, PQ
1-800-889-2060
www.foiredubois.com

THE EDMONTON WOODWORKING AND TOOL SHOW
October 24, 25, 26
Northland Park Edmonton, AB
1-888-999-5513
www.canwestshows.com

VANCOUVER/SURREY WOODSHOW
October 31, Nov. 1, 2
Cloverdale Fairgrounds Surrey, BC
1-888-999-5513
www.canwestshows.com

THE MONCTON WOODWORKING SHOW
November 7, 8, 9
Agrena Complex Moncton, NB
(519)657-8646
www.woodshows.com

THE ATLANTIC WOODWORKING SHOW
November 14, 15, 16
Exhibition Park Halifax, NS
(519)657-8646
www.woodshows.com

THE OTTAWA WOODWORKING SHOW
November 21, 22, 23
Lansdowne Park Ottawa ON
(519)657-8646
www.woodshows.com

Ryobi 10" Contractor's Table Saw

Ryobi keeps coming up with new, innovative tools. Here, is their most recent: the new mobile **10" Contractor's Table Saw (Model BTS20)**.

The BTS20 is a direct-drive table saw and is powered by a 15-amp 115-volt motor.

At first glance, you might think that the BTS20 only has a 19" rip capacity on the right. Upon closer inspection, however, you will find two yellow knobs on the underside of the right-hand table. Loosening these knobs allows the extension table to extend to 27". That's more than enough for sheet goods. With the table extended fully, the extremely accurate rip-fence scale is a real bonus. A neat out-feed extension pulls out and tucks away when not in use.

With the blade set at 0 degrees, the BTS20 will give you a 3 5/8" cut and at 45 degrees, a full 2 1/2" cut.

Mobility

The BTS20 has a unique folding stand that will adjust to uneven surfaces through an adjustable spring-loaded foot. The large rubber tires make it easy for hauling up and down stairs. Setting-up and knocking-down takes only a few seconds and, whether the folding legs are up or down, they are locked securely.

The milled aluminum tabletop gives the tool a very smooth surface. The saw comes complete with a 10", 36-tooth combination carbide-tipped blade.

The saw, being mobile, has plenty of on-board storage spots for the included "T" slot mitre gauge, the positive lock rip fence, wrenches, extra saw blades, the blade guard assembly and the 10' electrical cord. A removable safety switch is included to prevent unauthorized use of the tool.

Controls

There are crank wheels to control both the blade height and the bevel. A separate lock is provided for the bevel angle. The controls have a soft over-mould and no sharp edges to contend with. Although the crank wheels are a little small (I feel that larger wheels would operate a little smoother), they do work well. They will free up after a few weeks of continuous use.

Dust

The blade and motor on the BTS20 are partially enclosed, which explains the relatively quiet motor. It also makes for a really efficient sawdust collector. The exhaust port fits standard 2 1/2" vacuum fittings.

At $349 at Home Depot, the BTS20 is quite a deal.

Senco Mini Air Compressor

The new **Senco Mini Air Compressor (PC1010)** is aimed primarily at finish and trim applications. This 1 HP, 1 gallon air compressor is a flyweight, but it packs a heavyweight punch. The tool weighs a mere 20 pounds, is ultra-quiet and has a soft-cushioned handle grip. It includes a regulator, pressure gauges, 1/4" universal NPT coupler and an air filter. Should that not be enough for you, then add a 25' coil air hose, a package of mixed brads and an 18 gauge brad nailer.

You won't want to put this little powerhouse down. It will drive brads at over 20 drives per minute, and it is a lot lighter to lug around the job site than it's heavier counterparts. The whole kit is priced just over $300 and is available at:
Canadian Industrial Distributors.
Web site: www.cid.ca

Ridgid 5" Random Orbital Sander

Ridgid Inc. has just announced a new and comprehensive line of hand-held, corded, cordless, bench top and stationary woodworking tools for the advanced and professional woodworker.

The new tools (35 in all) have some heretofore unheard of features that will make things more convenient in your shop. For example, 12' cords with lighted plugs and a Velcro wrap, high capacity batteries that fully charge in just 30 minutes, auto-stop brushes that stops the motor to prevent damage.

Of all their new offerings, it was the **R2600 5" Variable Speed Random Orbital Sander** that really caught my eye. And, after using it, I must say that I am very impressed. The R2600 comes in a hard shell case and had both a PSA (Pressure Sensitive Adhesive) pad and a hook and loop pad with a Micro Fibre Loop on the sanding sheets (one 80 grit included).

The tool has a 12' rubber cord and a unique plug. The plug lights up and shows an icon of the sander. Now, when you are using one of those power bars with a bunch of plugs, you will know immediately which one belongs to the sander.

The R2600 is quiet, partially due to the permanent magnet motor. The permanent magnet motor is also responsible for the sander being able to maintain a constant speed under load. There is a smooth dial that tunes the electronic speed control between 7,000 and 12,000 RPMs and a soft start feature that prevents gouges. We sanded pine, spruce, cedar and oak with excellent results.

Usually I can tell if there is cedar dust in the air, because I will start sneezing. Not so with this sander. The on-board dust bag/vacuum adapter got most of the sawdust and I remained "sneeze-free".

The R2600 5" Variable Speed Random Orbital Sander is a very impressive tool.

After seeing what Ridgid has accomplished with this entirely new line, I look forward to testing and reporting on the other 34 new tools!

The Ridgid family of tools is available nationally at industrial supply centres and Home Depot.

For a look at the complete line of new tools offered by Ridgid, check out: www.ridgid.com

Ryobi SC180VS Scroll Saw

I knew that I was going to like the **Ryobi SC180VS, 18" Variable Speed Scroll Saw** as soon as I took it out of the box. The table itself impressed me, no waxing and polishing to be done here, the Teflon coating makes it as slick as melting ice. It also tilts 12 degrees left and 48 degrees right.

The SC180VS is a variable speed scroll saw with 500-1600 strokes per minute, controlled by an up-front on/off/speed knob. There is a spot for a padlock to prevent unauthorized use. Ryobi's new saw has some innovative features that you will appreciate. For example, a unique combination dust blower and fibre optics light (on a flexible arm) that puts both right where they're needed.

A dust port is provided to look after the sawdust from below. The tool will accept both pin-end and plain-end 5" blades and tools are not required to install them. The blade tension release is right up front on the upper arm housing, as is the light/blower switch. Up top you will also find the locking control for the drop-foot blade guard.

I liked the quiet operation of the SC180VS and the truly vertical cut motion of the arms. There are four lubrication points to keep the tool running smoothly and the 1.2 amp motor has the provision for user-replacement of the motor brushes.

The SC180VS only weighs 35 pounds, so it is truly portable. When in use, you can easily clamp it to your workbench.

At only $279 at Home Depot, the SC 180VS is good value.

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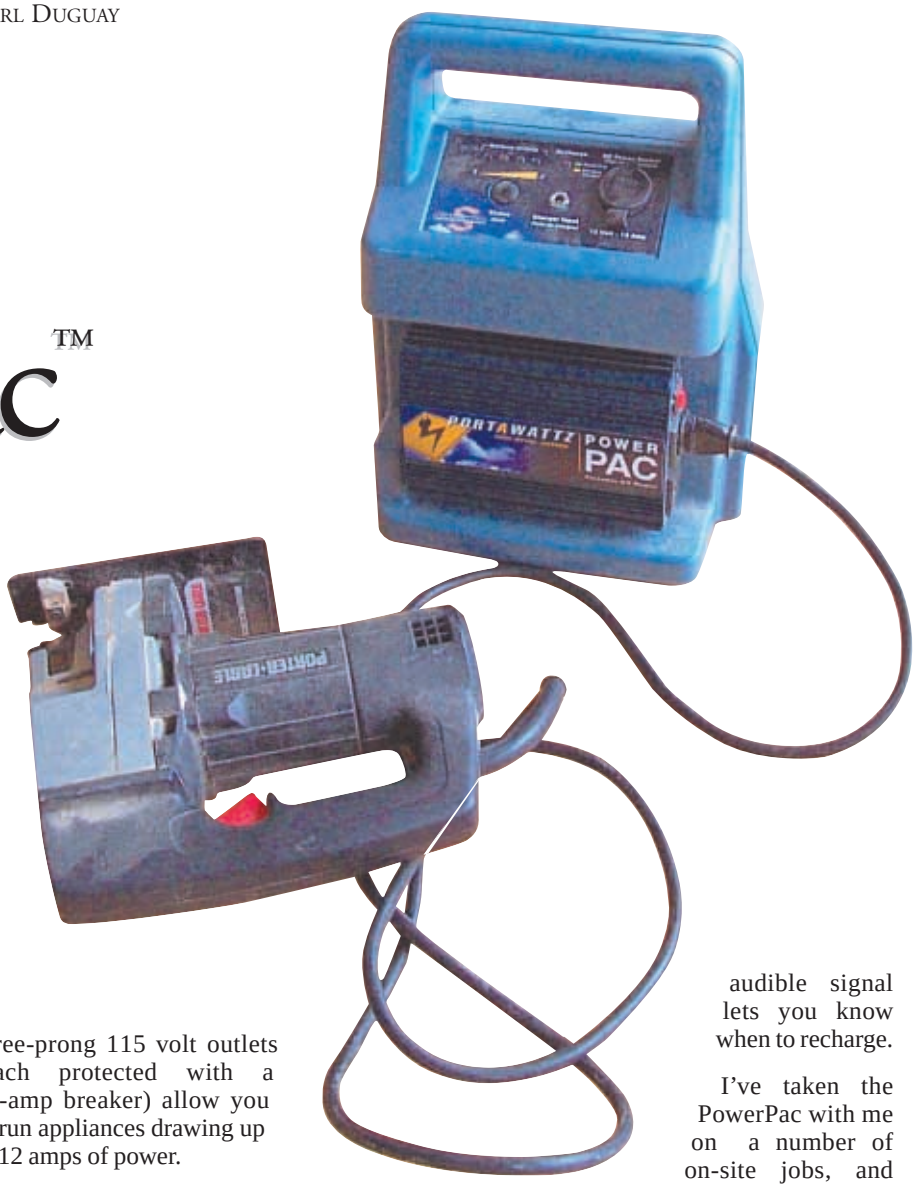
 By Carl Duguay

Portawattz Power Pac™



You might not think that an advanced power electronics products company has much to offer the average woodworker. Well, Vancouver-based Xantrex Technology has a nifty product that just might catch your attention.

The **Portawattz Power Pac™** is a rechargeable AC/DC power system that gives you up to 300 watts of 115-volt power when and where you need. This ultra rugged, portable (indoor or outdoors) power source weighs in at 17 1/2 pounds and measures a mere 12" x 9" x 5".

You can power almost anything with this unit, including small appliances, communications equipment and virtually any portable power tool. You can even use it to boost your vehicle, as it's capable of delivering 500 watts of surge power (the PowerPac comes standard with a set of booster cables).

The heart of the PowerPac is an 18-amp, hour-sealed lead acid battery and a modified sine wave AC inverter. The dual three-prong 115 volt outlets (each protected with a 15-amp breaker) allow you to run appliances drawing up to 12 amps of power.

The PowerPac features both overload and over temperature shutdown protection. Unlike the chargers for virtually all the cordless tools I own, the PowerPac comes with a "plug and forget" AC charger, which makes it always ready to go out on a job with me.

When completely discharged the PowerPac takes about 30 hours to fully recharge; or, you can recharge it ultra fast from a running vehicle in under three hours. I left the PowerPac unplugged for three weeks; it didn't seem to loose much of its charge.

With appliances that have small power requirements (camcorders, radios, cell phones, and the like), Xantrex claims you can expect run times of up to 40 hours. For a bilge pump, power drill, or jigsaw, expect three to four hours of run time. An indicator shows recharge status, while an audible signal lets you know when to recharge.

I've taken the PowerPac with me on a number of on-site jobs, and have been pleased with its performance. It's convenient not to have to deal with extension cords and out of the way electrical outlets.

I've used the PowerPac with a bayonet saw, laminate trimmer, finish sander, and hot melt glue gun. You'll find lots of uses for the PowerPac, and be extremely glad to have it when the power goes out!

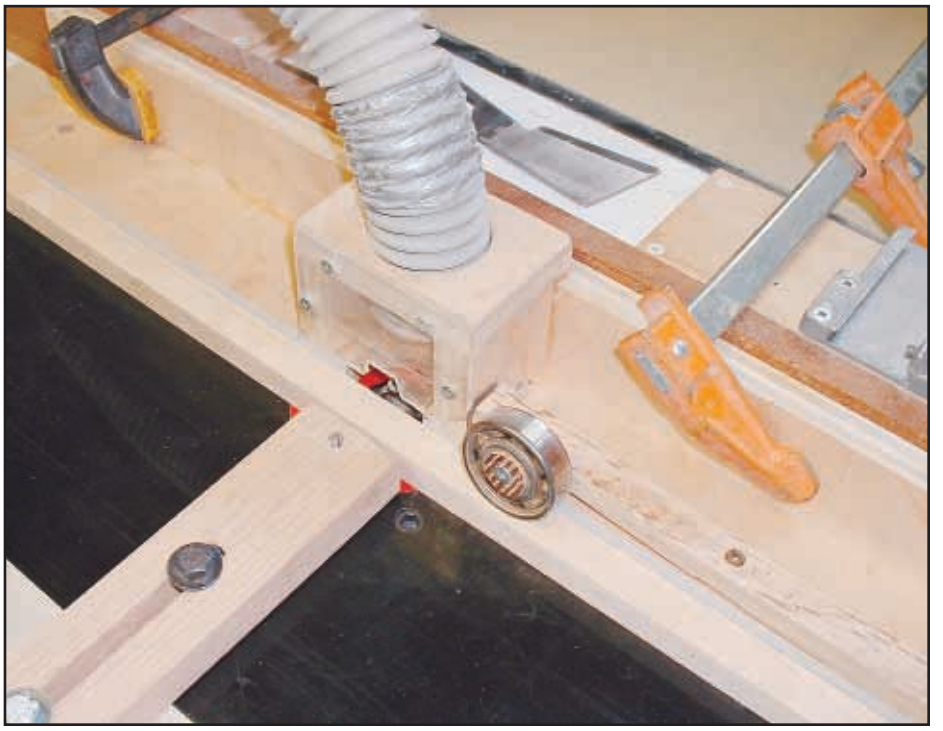
Priced at around $189, the kit comes with jump-start cables, an AC charger and a DC charging cable.

For more information and a dealer in your area, contact Xantrex at 1-800-670-0707 (www.statpower.com).

CARL DUGUAY is a writer and woodworker from Sidney, British Columbia (250) 888-5067
carl@finewoodworking.ca www.finewoodworking.ca

By Wally Schneeberger

Featherboard Alternative



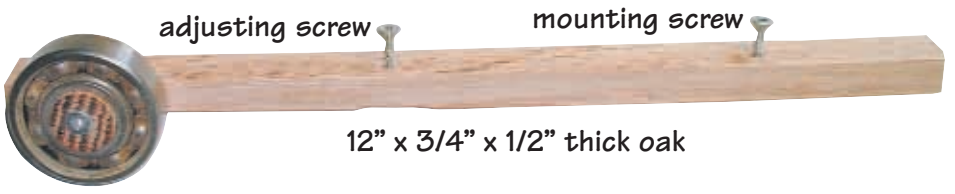
As I mentioned in the last issue, I have been involved in carpentry for the last 30 years. During that time I have always been one to look for an easier way to do things. Often that means coming up with my own jigs, thereby making my job easier, safer, more accurate, and less costly.

Here is a jig that I have found quite useful as a featherboard alternative.

I've always had a problem with featherboards. Too often, when I've got the featherboard tight enough to securely hold the stock, it is difficult to feed the piece through the bit or blade.

After some consideration, I came up with a couple of featherboard alternatives. They use old bearings to hold the stock tight, yet still allow easy feeding of the stock.

One big advantage of these jigs is their ability to feed stock the opposite way (climb cut) when you run into stock that splinters easily.



You can control the feed by tightening the bearings on the stock. If you look closely at the pictures you should be able to make your own easily.

You might also use a mitre slot clamp (from a featherboard) to make it adjustable. The rubber bearing I salvaged from an old reel to reel recorder. The steel one came out of an old drill press.

The bearing that holds the work down to the table is mounted on a piece of oak that is 12" long x 3/4" wide and is 1/2" thick. It tapers towards the bearing, which allows for it to flex slightly. I use two screws to mount it to the base so that the height, or pressure can be adjusted.

The second bearing is made to hold the work against the fence and router bit. This is made from oak also but any good hardwood may be used. It is mounted in a recess that I cut with my dado head. The slot was also cut with the dado and then capped afterwards. This bearing is 1 3/8" in diameter so the holder is 1" thick x 2" wide x 10" long to give it some room to adjust. I drilled and tapped two holes in my table saw to accept the ajusting bolts.

WALLY SCHNEEBERGER is a renovations carpenter in Calgary, Alberta
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By Rea Gibson

Tower of Brahma Puzzle

The object of this puzzle is to transfer all the discs to another peg, one at a time, never placing a larger disc on a smaller one. This puzzle has 6 discs ranging from 1" to 6" in 1" increments.

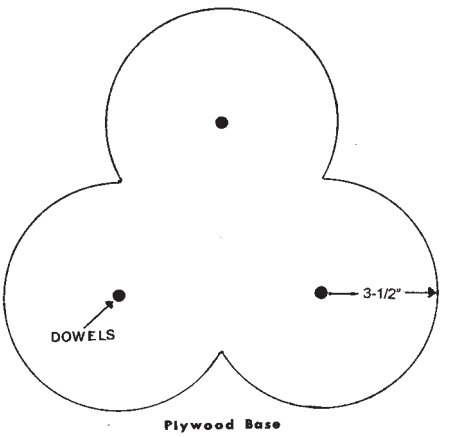
Layout the base shape with compasses on the 1/2" plywood.
Layout the circles for the discs on solid wood.
Cut all the pieces to shape and sand all the edges.
Drill 3/8" holes in the base, as shown, and glue the dowel posts into place.

To move the discs from one post to another requires 63 moves.

MATERIALS LIST

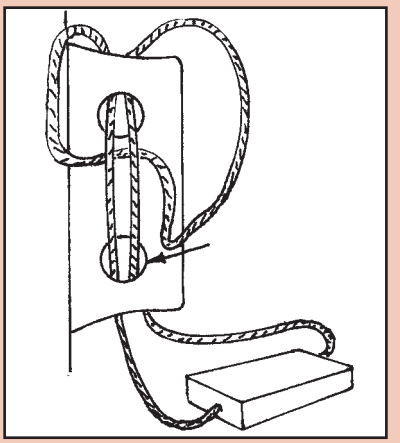
1	1/2" x 14" x 14" Plywood Base
6	3/4" x 10" x 12" Solid Wood Discs
3	3/8" x 5" Dowel Posts

REA GIBSON owns and operates Forest Hill Studio and is the author of The Wooden Puzzle Book. He lives in Mount Forest, Ontario email:egibson@golden.net



Solution

From last issue's
Wine Bottle Puzzle



Loosen the rope at the top hole as shown.

Push the rope through the bottom hole as shown.

Put the block through a loop made with the rope behind the locking panel and the rope can now be removed.

CHEERS!

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By Paul Ross

Square Dish

Most people think of bowls as being round. In all fairness, they usually are. However, sometimes it's fun and interesting to try turning something new.

This square dish, with a patina rim, is definitely not your standard dish, but you'll see below that there are no special machines or tools needed to create it. All you really need is just a few turning techniques, and the confidence to apply them to something a little different. In fact, you'll discover that turning a square dish is really exactly the same as turning a round one, as far as the techniques are concerned. This attractive small dish is the perfect place to drop your car keys and change, although I am sure you will find many uses for it.

This dish is approximately 8" in diameter and was turned from maple. The rim was also turned from maple and then blackened with patina. Patina is a liquid wax which, when applied creates a dark coloured finish through oxidation. Interestingly "patina" is also a Medieval Latin word for a shallow dish or bowl, so both interpretations apply equally to describe this dish.

Square Off the Piece of Maple

To start, square off an 8"x 8" x 1" piece of Maple on your table saw to get nice right angles. Onto the four edges, glue on waste blocks of wood. This can be any type of wood, preferably the same consistency as the piece being turned. That way, there is not a big difference when cutting the waste block.

Draw a Circle

Draw a round circle where you will cut out the bowl blank. That gives you a round piece of wood in order to start shaping the dish. If you were to turn a square dish without the process of adding waste blocks you would have the danger of four corners rotating and possibly catching. With the waste blocks on, you can proceed safely (photo 1).

Take an Outside Cut

Take an outside cut, with a 1/2" bowl gouge. Cut just until you are at the four corners of the square piece (photo 2).

With this done, you can now move the rest across the face and proceed with the facing cut, traveling from outside to centre (photo 3). Whenever you can, use your body behind the gouge to absorb any vibration.

Make a Spigot

With the bottom surface of the bowl blank straight and clean, you are ready to make a spigot, which you will eventually grab the bottom of the dish with the chuck. Cut a spigot approximately 1 1/2" in diameter using a 1/8" parting tool. Make about two cuts, side-by-side, the second in order to give the tool a little clearance while deepening the cut (photo 4).

Remove Waste Material

Next, remove the waste material from around the spigot, from the outside to the edge of the spigot. You can do this using several facing cuts. Be careful when coming close to the spigot: if you're still pushing the tool and the tool falls into the space that was produced by the parting tool, the tool could jump and advance forward into the spigot, wrecking the spigot. A better way to approach this situation is to push the tool from the outside, towards the spigot and when the tool is approximately 1/8" away from the spigot, simply lift the handle of the tool and the tip of the tool where it is cutting will fall into the void. In other words, you have more control by lifting than you do by pushing.

Shape the Underside

Now you are ready to shape the underside of the dish. Because of the shape of the dish, you have to take half of it from the outside, into the centre (photo 5). Next, shape from the centre out (photo 6). Once you have completed cutting this "arch" under the bottom of the dish, you will lightly scrape any tool marks from the

surface (photo 7). Now sand, starting at 120 grit, and working through 180, 240, and 400.

Clean Off Surface with Facing Cut

Take the piece off the screw chuck and flip it into the #1 jaws of a One-way Stronghold Chuck. First, take a facing cut to clean off the surface and then shape from outside to the centre and from the top of the rim to the outside, following the same profile as the bottom of the dish. Use your hand on the back of the dish for support (photo 8). When you've finished shaping, lightly scrape with a 3/4" round-nose scraper and then sand, placing your hand behind the dish for support (photo 9). It is very important at this point, on the rim, that you prepare the wood properly. In other words: no sanding lines. The reason being when you patina this with black Special Effects Wax, it picks up absolutely every scratch mark (photo 10). I can't emphasize how important it is to have your wood prepared properly.

Define the Rim and Bowl

Now you have to define the rim from the bowl of the dish. Do this with a spear point scraper which cuts a small groove. Do this right at the edge where the black meets the bowl of the dish (photo 11). Shape the dish in the middle, using a 3/8" bowl gouge (photo 12). Scrape and sand, being careful not to sand the rim. Flip the dish and cut a small bead on the foot (photo 13). To complete your square bowl, cut off the waste wood and lightly sand the edges (photo 14).

Although there are many methods to turn a square dish, this one is by far the safest and most effective one I know.

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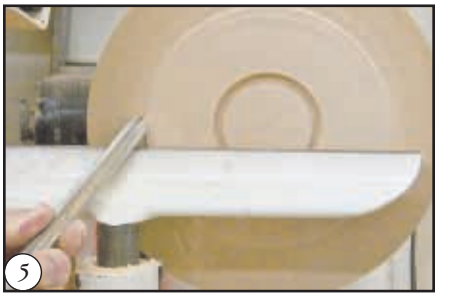
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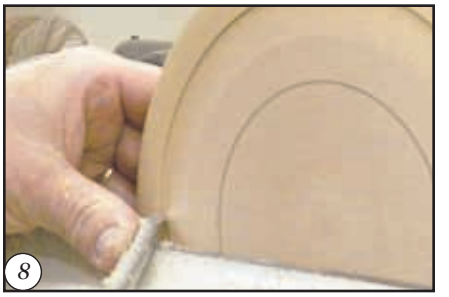
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By Carl Duguay

Filling Pores

Some woods, such as oak, ash, mahogany and walnut, have large open pores. If you want to finish these woods to a super smooth surface, then you're going to have to fill the pores so they are level with the surrounding surface of the wood.

There are two ways to fill the pores. On close grained wood you can use the finish itself. Essentially you apply as many layers (or "coats") of finish as needed to fill the pores, either sanding between each layer, or sanding after applying the last layer of finish.

On open pored wood your best bet is to use a paste wood filler. There are two kinds of fillers, one for film finishes (shellac, lacquer, varnish, polyurethane) and one for water based finishes. Keep in mind that you shouldn't use a filler under a penetrating finish (tung, linseed, wiping varnish, or oil/varnish blends such as Danish oil), as they don't cure hard enough.

For a detailed discussion of pore filling you might want to read the ultimate reference book: *Understanding Wood Finishing* by Bob Flexner (ISBN 0-7621-0191-1).

Filling Is Not Sealing

You may come across a product called a sanding sealer. This isn't the same thing as a pore filler. When you apply your first coat of finish to a wood surface, the wood fibres will swell, giving the surface a fuzzy texture (referred to as raised grain). Before you apply subsequent coats of finish you need to sand off these fibres. Once you have sanded back the raised grain, it won't occur again.

Because finishes such as varnish, lacquer, and water based finishes are difficult to sand, manufacturers have created "sanding sealers" which are applied before the finish. They raise the grain, but are very easy to sand, which makes them a popular item in production shops. Sealers don't fill the pores then, they raise the grain. If you plan to use a sealer, do so after you have filled the pores.

Colour Your Wood

If you plan to stain the surface, you can do so before or after filling. Fillers come in clear and tinted colours (or you can add a stain to a clear filler). Regardless, the filler will likely take the stain differently from the surrounding wood, and sanding after you stain might result in some of the stain being removed. Don't forget that over time most woods will darken somewhat.

Gearing Up

There are a lot of pore fillers on the market. I use a clear, acrylic filler (Fuhr Paste Wood Filler, product code 175). After sanding the wood surface to 180 grit with a random orbital sander, I hand sand with 220 grit, then wipe the surface clean. I then assemble my filling kit.


1


2

Laying It On

Begin by mixing the filler thoroughly. You can apply it by brush, roller, or rag. The objective is to pack the filler into the pores of the wood. The best way to rub it in is with a rubber squeegee. For a small surface, a paintbrush works well. Work the filler diagonally to the grain and don't forget to do the end grain. Work it in just until it gets somewhat pasty. It shouldn't take more than three or four minutes to work the filler into a one square foot of surface (photo 1).

Wiping It Off

The filler has a glossy sheen that begins to dull after a few minutes, then rapidly begins to dry. I find that the Fuhr product dries very quickly, so you should remove the excess paste before the filler becomes too hard as it's very difficult to remove then. For the first few times you try pore filling, be on the safe side and wipe it off sooner than later.

I begin by scraping off any excess with a laminate chip or an old credit card. I tend to wipe in the direction of the grain. Then I take a piece of burlap or coarse cloth (which ever is handy) and rub the surface thoroughly (photo 2). On a molded or turned surface you can use an old toothbrush or sharpened wood sticks to remove excess filler from details.

Once you've got the excess filler removed take a break and do something else. You'll want to give the surface several hours to dry.

3

Sanding it Back

Once the filler is completely dry it needs to be sanded. The idea here is to remove all the filler from the wood surface except from the pores (photo 3). After it dries, check to see if the pores are filled. Hold the surface up to a raking light (i.e. hold the board at a shallow angle to a light source so you can better see the surface of the board). If the filler has shrunk in various places, you can put another coat of filler over the piece. Otherwise, you're now ready to put on a finish.

There are two keys to success in pore filling: practice, and practice. Don't worry about rubbing the filler off too soon; you can always put another coat on. Do give the filled surface ample time to dry before you do the final sanding and, once filled to your satisfaction, let the surface cure for a few days before applying your final finish.

Next issue Carl will cover oil finishes.

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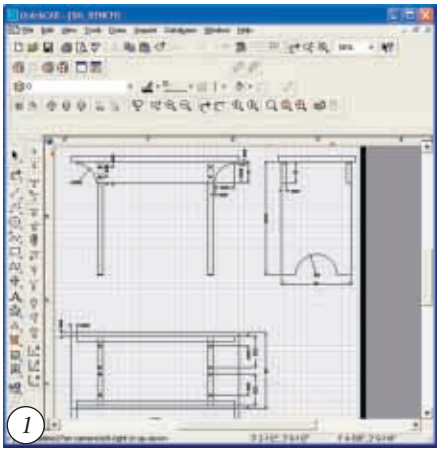
softwarereview By Michel Theriault

CAD Software Review

This is the second installment of a two-part series on designing with CAD.

In the previous article, we looked at how you can use CAD to design your own projects, and discussed what CAD can do for you. This article explores seven CAD software packages in order to help you decide which one is right for you.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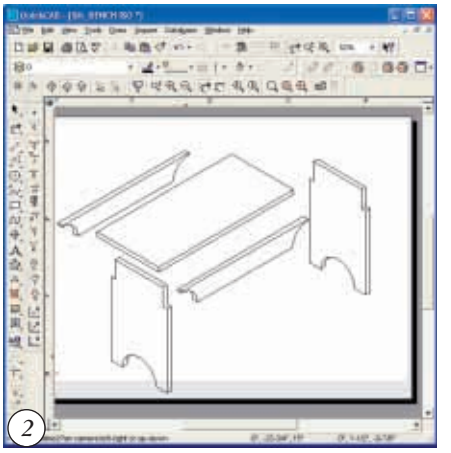
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Using CAD

Designing your own projects from scratch or using existing plans as a starting point is not only rewarding, it allows you to design the project to fit your specific needs.

The best thing about CAD is that you don't need to know how to draw to use it. In fact, even if you can't draw a straight line with a pencil, CAD will help you make precise drawings using it's many tools and features.

Contrary to popular belief, a good CAD program doesn't have to be expensive. For under $100 you can start designing your own projects with a full-featured CAD program. Like everything else, though, if you want to get more capability, such as 3D modeling and rendering, the price starts to go up.

2D or 3D?

To build a project from a CAD drawing, all you really need is 2D capability. This lets you easily create drawings like the ones you buy or used in woodworking plans, with fully dimensioned front, side, and top views (screen shot 1). Some 2D programs also make it easy to create isometric drawings (screen shot 2).

More sophisticated programs allow you to draw in 3D, however they are more expensive and a drawing in 3D is more complicated than 2D. The advantage is that you can view and print 2D views of the drawing (i.e. front, side, top, bottom, back) as well as isometric views that show all the parts (screen shot 3) or hide parts behind others (screen shot 4). In addition, you can view a rendered version (screen shot 5) from any angle.

Choosing a Program

Beyond the differences in 2D or 3D drawing, most CAD programs work much the same, with similar features and functions that may work differently, but accomplish the same thing. Just as when you buy a tool, be sure that the software you buy will meet your long-term needs, not just today's project.

The following reviews will give you some idea of the different programs, their features, ease of use and documentation.

DeltaCAD Professional for Windows

At $60, this is the least expensive CAD program on the market. It is also the simplest, both for ease of use and features, although it has all you need to draw most 2D projects.

It uses a straightforward tab menu at the top of the screen that gives you quick access to the features and functions you need when drawing. This includes various snaps that make accurate drawing easier, entry of coordinates (which allows you to draw pieces by typing in their size) and the ability to enter feet/inch/fractional dimensions. It doesn't provide an isometric grid, however it includes a parallelogram drawing tool instead. Two features it doesn't include that are available on all other programs is a Trim function (for trimming lines to length after they have been drawn) and a Stretch function. While a Scale function is provided, this changes the object's size in both directions – a Stretch function allows you to change it in only one direction.

Each of the features is well described in the manual, with a step-by-step guide on how to do things. The manual starts off with a simple tutorial that exposes you to the basics of a CAD drawing, then the rest of the manual describes the various functions.

Autodesk QuickCAD 8

By Autodesk, the maker of AutoCAD, this program is almost as inexpensive as DeltaCAD, at $70. It isn't quite as simple as DeltaCAD, however it has many more features to make drawing easier once you learn how to use them. When you start a new drawing, it asks you to select an experience level. Selecting "Beginner" will limit the features and simplify the toolbar menus so that only the standard functions will be available. The Advanced or Expert level simply adds toolbars and functionality, many of which will make it even easier to draw once you learn them. In addition, the placement of toolbars as well as the functions on them can be customized.

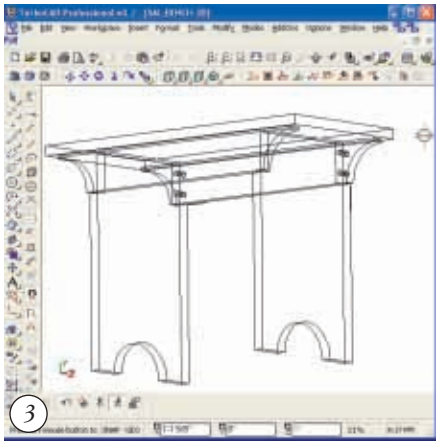
QuickCAD includes all the functions needed for efficient 2D drawings, including isometric grids to make it easy to make isometric drawings, stretching, and the ability to fill an area with a hatch pattern, solid colour, or even a bitmap image. A number of features QuickCAD has that DeltaCAD doesn't have won't be immediately useful to you, however, as you draw more projects, you may find them increasingly important.

The manual is quite slim and is an introduction to drawing with CAD, using a tutorial format to explain how to use

the basic features. It doesn't explain each function or how to use them. For that, you need to use the Help menu within the program.

DesignCAD Express v12

With a price tag of $125, this is the little brother of DesignCAD 3D Max that is reviewed later. It is limited to 2D drawings. It has all the functionality of DesignCAD 3D except for the 3D capability. This includes the step-by-step tutorials available in the Help menu.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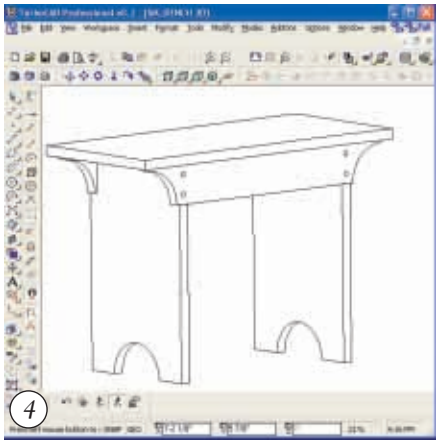
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AutoSketch 8

This program is also made by Autodesk, and is almost identical to QuickCAD with a number of added features for the $140 price. This includes a "new drawing" wizard, Web tools that enable you to create a web page so you can publish your drawing on the Web, and 3D effects tools (extrude and perspective). While it is not true 3D, it does simulate some 3D effects.

The Autosketch manual is virtually identical to the QuickCAD manual. For advanced features, you need to use the Help menu.

TurboCAD V8

At $140, this is the least expensive program with full 3D drawing capabilities. Since it is geared to 3D drawings, it is not as easy to use as some of the pure 2D programs discussed, mostly due to advanced features. If you don't want to draw in 3D, however, you can simply ignore the 3D functionality. It doesn't include an isometric drawing grid, so if you want the isometric look, you will need to learn to use the 3D features. This program includes the complete range of features to make drawing easier.

The manual is quite comprehensive and uses a tutorial format to explain almost every feature, with examples to help you understand how the features are used. A companion 'Getting Started' guide walks you through both a 2D and 3D project from start to finish, using most of the key features. This is an excellent start for a first-time user.

IntelliCAD Standard

The next step up in price, IntelliCAD, is $210 and also has full 3D capability. While all the programs reviewed except for DeltaCAD can import an AutoCAD file, IntelliCAD actually uses the native AutoCAD file format as it's own format. It has rich compatibility with the actual AutoCAD functionality, including the command sets, which can be entered by typing the command names instead of selecting a menu or tool. The 3D features and its higher-level target market, makes it less easy to use than the 2D programs. To accommodate novice users, it allows you to identify your skill level and will set up the toolbars and menu accordingly.

DesignCAD 3D Max

This is another full-featured 3D drawing program and the price tag is getting into the next bracket, at $250. While the DesignCAD 3D Max also provides 2D drawing capabilities, the program is very much geared towards 3D drawings. This means 2D drawing will take a little more time to get used to. For the price, you get all relevant features except for an Isometric Grid. This program provides a couple of tools that make it easier to draw Isometric drawings without the grid, although it is still not as easy to use as some of the 2D programs.

The manual is a simple command reference that lists each feature and describes how to use it. It assumes you are already familiar with how to draw using CAD. Fortunately, there is a very good set of step-by-step tutorials included in the Help menu.

Choosing a CAD Program

The two main considerations when choosing a CAD program are price and whether or not you want 2D or 3D capabilities. All the programs reviewed will enable you to draw your project with the precision you need to build it, and do it relatively easily once you learn how. If you are a first time user, make sure to choose a program with good tutorials or manuals. If the manual is not providing the information you need, you can also buy a third party book on CAD that will help you get started, making the manual less of an issue. Some companies provide demo versions and, even if you don't end up buying their program, it is an excellent way to decide if CAD is for you.

The prices shown are US dollars list prices converted to Canadian dollars.

Sources

A good source of free woodworking plans in CAD can be found at: http://www.woodworkersworkshop.com/cadfiles/

CAD Programs

CAD software is available at a wide variety of prices and capabilities. Here is a list of packages you may want to consider. The price range is about $100 - $250:

- Autodesk QuickCAD 8 www.autodesk.com
- DeltaCAD - www.dcad.com
- Autosketch 8 - www.autodesk.com
- DesignCAD Express v12 www.upperspace.com
- DesignCAD 3D Max www.upperspace.com
- TurboCAD V8 www.turboCAD.com
- IntelliCAD Standard www.CADopia.com

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By Chester Van Ness

Shut Offs

If you have unmodified plastic shut offs (or blast gates), then I'm certain that you have a few that just don't close tight any more. Such gates can rob your system of much needed suction at the machine that you're working on.

Photo 1 shows a quick fix for such situations. I simply cut the back flange off the gate body, installed four pop rivets with backing washers in the side flanges (two per side) and installed a short piece of bare, 14 gauge copper wire, as a static jumper around the gate.

The backing washers ensure that the plastic flange doesn't crack when the rivets are installed. The small gap along the back of the gate is only open when the gate is open, and the airflow is not enough to worry about. The opening allows for a cleaning airflow. It also allows the gate to expel any dust or shavings from its tracks when the gate is closed.

Table Saw Dust Collection Make-over

While changing my saw blade recently, I noticed that the saw was full of sawdust. The dust removal hopper and the rear baffles were not doing as good a job as I thought.

Photo 2 shows the saw as it was set up, with a side discharge hopper and rear baffle plates. When I saw the amount of dust that had built up with this set-up, I decided it was time for a makeover.

Photo 3 shows the top of the hopper with the saw removed from its base. Notice that the sawdust is piled up on the leading side of the hopper, and not running down to the outlet at the side.

When I had originally designed this hopper, I thought that it's sloped sides would guide the sawdust to the outlet more efficiently than the commercially available flat plastic saw plates. Although partially true, the slope of the hopper sides was not great enough.

I had also reasoned that the side outlet would give better access to hook up the hose and leave the bottom of the saw base free for storage. Well, that was then, and this is now, so I decided that there was no better time for a dust collection makeover.

Tearing down the saw was an ideal time for a good cleaning and inspection. I found that the stop for the blade angling gears needed to be repaired, so I did so before proceeding with the dust collection modification. (**Safety Note:** Always unplug machinery before working on it)

Once the saw was upside down, it was much easier to see and access the blade area. Using cardboard and Bristol board, I determined there was room to accommodate a dust collection hood. The most extreme position for the blade was in the fully down position at 45 degrees of angle. That position places the bottom of the blade near the wall of the saw body. Working from this position (using cardboard and Bristol board) I made a basic mock-up of the hood. I used a piece of 9" pipe to trace out rounded ends on the hood's sides (front and back). The outside width of the hood is the inside width, from the mandrel to the opposite trunion rod. Photo 4 shows the preliminary design in cardboard.

Placing the saw on its backside allowed me to access both the top and the bottom of the saw, so I could determine the total allowable depth for the hood sides. This is done with the blade set to 90 degrees for the mandrel side of the hood, and at 45 degrees for the opposite side of the hood. Keep in mind that whatever the design of the hood, it should allow you to change blades un-hampered.

I used Bristol board for determining the layout of the mandrel side of the hood, to allow the full travel of the mandrel from the raised stop to the lowered stop. I took the measurement from the centre of the pivot point to the back end of the mandrel bearing casting. I added 1/8" to this, and transferred it to the Bristol board using a compass. Photo 5 shows the Bristol board in position. I then used the outside dimension of the mandrel sidepiece to determine the length of the base of the hood.

After some consideration, I decided that flanges fastened to the sides of the hood,

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and then fastened to the trunion rods, would be the best way to attach the hook firmly in place.

Once most of the hood was laid out on paper, I needed to decide what material to use. Welding galvanized steel is just a little beyond me, so a quick trip to the local Canadian Tire netted me a car body repair panel of 20 gauge steel. After cutting out the main parts of the hood, I tack-welded them together and placed them on the trunion rods to check the fit and blade clearance. At this time I made up a 4" diameter paper tube and started to cut it to fit the hood. Photo 6 shows this process.

You must be careful here so that the dust hood outlet pipe is clear of both sides of the saw body, and that you leave enough room for the flex hose to be connected. I also wanted the pipe to be as close to the front of the hood as possible, so that the dust from the leading edge of the blade would be firing down into it. Note that the motor hangs off a bracket to the rear. The design of the base determined that a rear discharge would not be possible without major modifications to the saw base. Once I had formed the pipe from the sheet metal, and cut it to the paper template, I was able to determine how much of the hood bottom and side I could remove. After tacking this in place I clamped it to the saw trunion rods and added a short length of flex for a final clearance check. Photo 7 shows the results with the blade set to 90 degrees.

Next I needed to determine how to fasten the hood in place without having fasteners located near the blade. On the mandrel side of the hood I was able to accomplish this by welding bolts on two brackets. On the other side of the hood, I opted to drill through the hood flange and trunion rod, and use a bolt to hold the hood securely in place. Photo 8 shows the painted/sealed hood fastened in place.

Before removing the hood for painting I did some final tuning to the front edge of the hood to ensure that all the small cracks were filled. The hood was removed, painted, and then sealed with silicone.

Preliminary testing shows that this hood delivers much better dust collection than the hopper had done previously.

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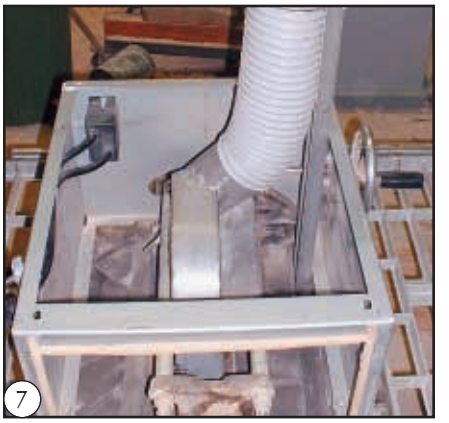
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