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Canadian Woodworking

AUGUST/SEPTEMBER 2003
Vol.6, No. 4

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EDITORS
PAUL FULCHER, LINDA FULCHER

WRITERS
CARL DUGUAY, DAVID EISAN, REA GIBSON, GARNET HALL, GRAHAM MCCULLOCH, LIDY MCVICAR, DANNY PROULX, PAUL ROSS, DENIS ROY, WALLY SCHNEEBERGER, MICHEL THERIAULT, CHESTER VAN NESS, HENDRIK VARJU

PROOF READER
ROBERT E. JOHNS

ADVERTISING
PAUL FULCHER, LINDA FULCHER

GRAPHIC DESIGNER
WENDY ADAMS

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TEL. (519)449-2444 FAX (519)449-2445
email:letters@canadianwoodworking.com
website: www.canadianwoodworking.com

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editorsletters

Linda Fulcher

The number of woodworkers who are really experienced is small, compared to the number of woodworkers who are just getting into it. With that ratio you are fortunate if you know longtime woodworkers, because the experienced woodworkers have two of the most important tools you need to get better: woodworking knowledge and experience.

Understandably, many new woodworkers believe that the more tools you have, the more of a woodworker you are. While it is true that many experienced woodworkers also have well-stocked shops, it isn't long before the new woodworker begins to appreciate the important tools that the longtime woodworkers have: knowledge and experience.

When new woodworkers tell me they are just "getting into woodworking", I know that the first item on their wish list is likely to be a power tool. After watching many woodworkers develop in the hobby, I can attest that it isn't long before they move those two other valuable tools to the top of the list: knowledge and experience. If you are like the majority of new woodworkers, you enjoy the process of learning how to use tools from a woodworker who has experience.

For example, one reader described to me how he loves reading about woodworking. He told me he is going to convert the basement into a shop once the kids move out, in about 10 years. Although he doesn't have the space to work on any projects now, he is picking up information from our magazine and working out some of the details in his mind.

Another woodworker told me that he has a few tools, but isn't using them. I noted that he also isn't selling them, so there's hope. He reported that whenever he goes over to visit his wife's family, his father-in-law invites him out to the shop to show off his latest project. Now this guy, even though he doesn't currently have a lot of tools, is in a better position than many. He already has the most important tools in place: knowledge and experience.

If you recognize yourself in any of these stories, my recommendation is that you don't worry about how many tools you need. Acquire the knowledge through experience. The tools will follow.

Correction: In last issue (June/July '03) we mistakenly quoted the cost to build the lumber rack as $600 when it should have been $60.

Paul Fulcher

After David Eisan's first article on tool restoration (see Feb/Mar. '03), several woodworkers contacted me and told me their stories of antique woodworking tools. I was especially interested in hearing from one woodworker. He didn't like that we referred to the 1948 lathe as an antique. The reason: he had bought that exact make and model of lathe in 1948, and continues to use it regularly to this day. He still remembers the day he bought it, and the salesperson's promise of quality and endurance!

Because such interest was generated by his article, I called David to find out more about the process. As I spoke to him about tool restoration, I found out that he had just picked up three antique Stanley hand planes from Ebay (the world's most active internet auction) and was about to restore them to "as new" condition. David really delights in using such antique tools in his woodworking, and his excitement is truly infectious. I was inspired by his passion and wanted to share his enthusiasm and knowledge with you.

So, for all of you woodworkers who weren't around, or just didn't think to pick up a Stanley hand plane in 1889, it's not too late. On page 4, David leads you through the process of finding and restoring antique hand planes.

Also in this issue: Carl Duguay starts a new series on wood finishing. Although finishing can make or break a project, it is often one of the less understood aspects of wood working. Carl turns that around with this practical and informative series. He leads off with "Surface Preparation" (see page 24). In future articles will cover: Filling the Pores; Shellacking; Varnishing; and Lacquering. By the end of this series, you'll be starting projects just to finish them!

The Canadian Woodworking Competition deadline is fast approaching. Entries are made by sending in photos of your finished piece. With over $10,000 in prizes, it makes sense to enter everything you've made in the last year!

You can enter as many pieces in as many categories as you like. Categories include: turning; scroll saw; carving; furniture; and novice. For more details see page 42 or go to www.canadianwoodworking.com

Winning entries will be featured in upcoming issues of Canadian Woodworking.

deareditors

Hi Paul

I am more and more amazed at the names I see turning up on your woodworking forum ... guys with real expertise, who make their living from woodworking take a real interest in what is said, asked and observed. I love it. You have a great magazine and a fun web site. Keep up the good work.

Phil

Paul

Just a quick note to say how much I appreciate your woodworking forum. It's one of the first things I check every morning over coffee. Not only is it enjoyable, but educational as well...forums such as yours are ever increasing in importance to the woodworking community.

Cheers, Rob Lee, Lee Valley

Dear Editors

I just want to say thanks to Peter (Ontario Sales Manager for General Machinery) for his great service the other day, in regards to my jointer question that I posted on Canadian Woodworking's woodworking forum. I find it kind of neat to see (Peter's) posts on the forum.

Bill

Bill

Thanks for the kind words. I am a big fan of Canadian Woodworking's woodworking forum. It is one of the only places that I can see a true critique of our (and other manufacturers) machines. The forum users always tell the truth, good or bad, so it's a great way to see what woodworkers are saying about the tools they use.

Peter Kennedy, General Machinery

■ continued on page 41

By David Eisan

Restoring Hand Planes

Restored 1889 Stanley hand plane.

As my journey into woodworking continues, I find myself reaching more and more for hand tools (hand planes in particular) to achieve that exact fitting of parts and/or surfacing of panels.

If money were no object, I would simply call up Lie Nielsen and order one of everything in their catalogue. Since that is not an option, I have taken to buying old hand planes and restoring them.

I recently bought a 114-year-old Stanley #5, a 99-year-old #4 and a 76-year-old #3. I bought all three on Ebay and after paying in US dollars, including shipping; the cost was on average $50 Canadian per plane. I paid a little more than was necessary because I bought planes that had intact handles and were well presented (with several clear photographs). That way I knew what I was buying. If you don't know anything about hand planes, buying them on Ebay can be an expensive way to learn.

One of the best books out there on how to identify and date old Stanleys is: "*Antique & Collectible STANLEY TOOLS Guide to Identity & Value*", by John Walter (tel. 1-740-373-9973) (ISBN 18789110105).

Here are some very simple rules to follow when looking to purchase an old Stanley hand plane.

Look for a keyhole-shaped hole in the lever cap. That indicates it is a type 15 or earlier Stanley bench plane (made before 1932). If the hole that the lever cap screw passes through is kidney-shaped, the plane was made in (or after) 1933. That is not to say you won't have success with a later-made plane. If you don't know the subtle differences between a recently made plane of questionable vintage (looks old, but isn't), noting this difference might save you from buying a lemon.

Don't worry about a used up blade. There are many sources for replacement blades. Lee Valley sells both Hock and their own Veritas brand blades, both of excellent quality.

Also, don't worry about what the plane looks like. Just make sure all the parts are there. A rusty plane just means you are going to pay less.

Broken handles can be fixed or replaced. Again, Lee Valley sells replacement rosewood handles if the ones on the plane you buy are beyond repair. There are also several companies on the Internet that sell replacement plane handles for almost every hand plane, in almost every species of wood.

If you are buying on Ebay, be sure to look at the "Completed Auctions". That will show you what different hand planes have sold for, and in what conditions. This is a great research tool to see the market value of a specific plane in a given condition.

Most importantly, when buying on Ebay (or any auction): DON'T GET CARRIED AWAY! If the price exceeds what you wanted to pay, drop out. Next week there will be another 50 Stanley #4 smooth planes up for auction.

Disassemble each plane completely. All that is needed to take apart a plane is a couple of sizes of slot screwdrivers. Put the parts from each plane in separate containers and label them. You can go further than simple disassembly, and use a drift punch to drive the pin out of the frog that holds the "Y" adjusting lever in place. Wrap part of an inner tube around the threaded shaft that the blade-adjusting nut goes on. Then, with a pair of pliers, remove the threaded shaft. Note: it is a reverse thread! If the threaded rod doesn't come

out easily, then don't struggle with it; leave it in. If you ruin the threads, you cannot simply run to the hardware store and buy a left hand thread, 9/32" x 24 TPI rod to replace it.

Collectors and purists may cringe, but I clean and repair these planes to "as new" condition. Keep in mind, the three models that I am dealing with here are very common Stanley bench planes, not some rare and expensive Norris infill smoothers. Mind you, there are some rare and expensive Stanley bench planes, but my subject planes certainly don't fall into that category. Try to find out the value of your planes before you give them this kind of treatment.

The "before" photos don't properly reflect the condition of the planes, as there was much more rust and pitting on them than what appears.

Remove the rust from the cast iron plane parts with electrolysis. Although my high school transcript reports that I took chemistry, I don't remember too much of it. Therefore, I will not include a detailed explanation of how electrolysis works. Instead I will just tell you how to do it. The things you will need are: 12V car battery charger, anode (rebar works well), non-conductive container, and sodium carbonate (Arm & Hammer washing soda).

Attach a copper wire to the plane body and set it in a plastic tub on a couple pieces of dowel (to keep it off the bottom of the container). Bend a piece of rebar and hold it to the side of the container with a spring clamp. Be certain there is no chance of the anode (rebar) touching the cathode (plane body). In another container, make the electrolyte. Mix one tablespoon of washing soda for each gallon of water. The washing soda tends to clump, so make sure to mix it well. Pour enough of the

As bought.

Taken apart.

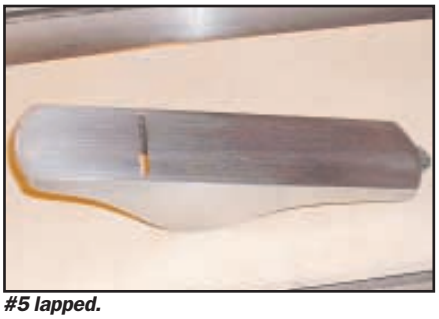
Kidney and keyhole lever cap styles.

All set up to pour in electrolyte.

Electrolyte in action.

One stripped, one not.

Starting to lap #5.



#5 lapped.

Buffing setup.

Buffing lever caps.
#3 done, #5 half done, #4 not touched.

Sharpening iron.

Lapping iron.

electrolyte into the plastic tub to cover the plane body. With your battery charger unplugged, attach the red positive clamp to the rebar and the black negative clamp to the wire attached to the plane body. Be sure your positive connection occurs out of the solution or it will dissolve. It is not as important to keep the negative one out, as nothing bad will happen to it. (Note: make sure you have the polarity correct, or you will dissolve your plane and make a clean piece of rebar!). With all your connections made, confirm the battery charger is set to the 10 amp setting and then you can plug in the battery charger. You will start to see small bubbles rise to the surface of the electrolyte from the plane and the rebar. These bubbles are oxygen and hydrogen, so use appropriate precautions. Do this in a well-ventilated area with no open flames or sparks. Leave the solution to foam and froth away for a few hours (for a light cleaning). Leave for a couple of days for a very rusty plane. Always unplug the battery charger before you connect or disconnect either conductor.

When the plane has sat in the solution long enough, clean it under warm running water with a grey Scotchbrite pad. It is at this point that the plane body will transform before your eyes, from a dirty mess, to clean metal. Make sure that you dry your plane off immediately; otherwise your newly cleaned body will literally rust before your eyes. Dry the plane body as best you can with a towel, then place it in your oven at the lowest setting. My toaster oven is good up to a #5 plane. For larger planes I have to use my full size oven. Leave the plane in the oven for at least an hour to evaporate all the water from every crevice.

If you take the plane body out of the oven and see some very light rust, a couple of quick swipes with a dry grey Scotchbrite pad will clean it all off.

Now, do the same process with the plane blade, cap iron, and frog. You can do these three pieces at once, stringing them together with a single wire for the electrolysis process.

To clean the nickel-plated lever cap, buff it. I put a 6" buffing wheel on my grinder and bought some white rouge buffing compound (Delta part #23-008). I hadn't buffed metal since high school shop, but it's pretty simple. Lightly push the white rouge bar into the running buffing wheel to load it up with compound. Always buff in the downward direction (lower part of the wheel) and be very careful not to catch an edge. I also buffed the remainder of the steel and brass components to clean them up.

Pliers are handy for holding the small parts when buffing. I used a Dremel tool with small buffing wheels and cylinders to get into the rim of the brass adjusting nut and other nooks and crannies. Everything buffed up very well, especially the brass. I was doing the buffing indoors, so I used my dust collector to collect the debris off the buffing wheel. Normally dust collection on a grinder is a very bad thing (dust and sparks don't mix), but there was no danger here.

Now check the plane body for flatness. I took the #5 body over to my stationary jointer's cast iron bed (which I know is flat). The plane body rocked from corner to corner, so I needed to lap it flat. I used 3" wide 80-grit sandpaper from a roll, held flat onto the wing of my table saw with clamps, and I lapped my #5 plane flat. The other two were not nearly as bad, but I decided to lap them as well. I scribbled all over the bottom of each plane with a black marker before I started so I could track my progress of how flat the plane was becoming.

Before I masked off the cast iron parts for spray painting, I went over all the cast iron plane parts with a wire wheel (on a Dremel) to make sure they were absolutely clean and every last bit of loose japanning was removed. The last part of the cleaning process is to rub all parts down with lacquer thinner to remove any dust or oils. Masking is quite simple: use an X-Acto or Stanley knife to trim the tape to sharp edges. All machined surfaces should be masked; all raw casting surfaces

should be painted.

I don't know a lot about paint, so I went to my local, full-service paint store and asked what they recommended for my application. They suggested black reinforced resin urethane enamel, which I then asked them to load into a spray can in black. I gave all of the cast iron parts (including the little yoke) three light coats of paint. It was fun peeling the masking tape off, revealing the strong contrast between the cleaned up metal and the satin black paint.

When I bought these three planes, I was sure to buy ones with intact rosewood handles and totes, as I didn't want to have to repair, buy or make new ones. I didn't care that they were a little dinged up, just that they were whole. To remove the old finish I soaked the handles in lacquer thinner for about half an hour and then cleaned them with a grey Scotchbrite pad. To refinish the knobs and totes I used Deft spray lacquer.

The most important part of the plane is the plane iron or blade. Restoring it is important, but it can be tedious. Don't expect a 100-year-old plane iron to be in good shape. Expect pitting, a chipped bevel, or even an iron that no longer has enough length to be sharpened anymore. If the iron is a total write-off, don't worry, just buy a new one. I find that most irons can be salvaged, it's just a matter of how much effort you want to put into bringing them back to life.

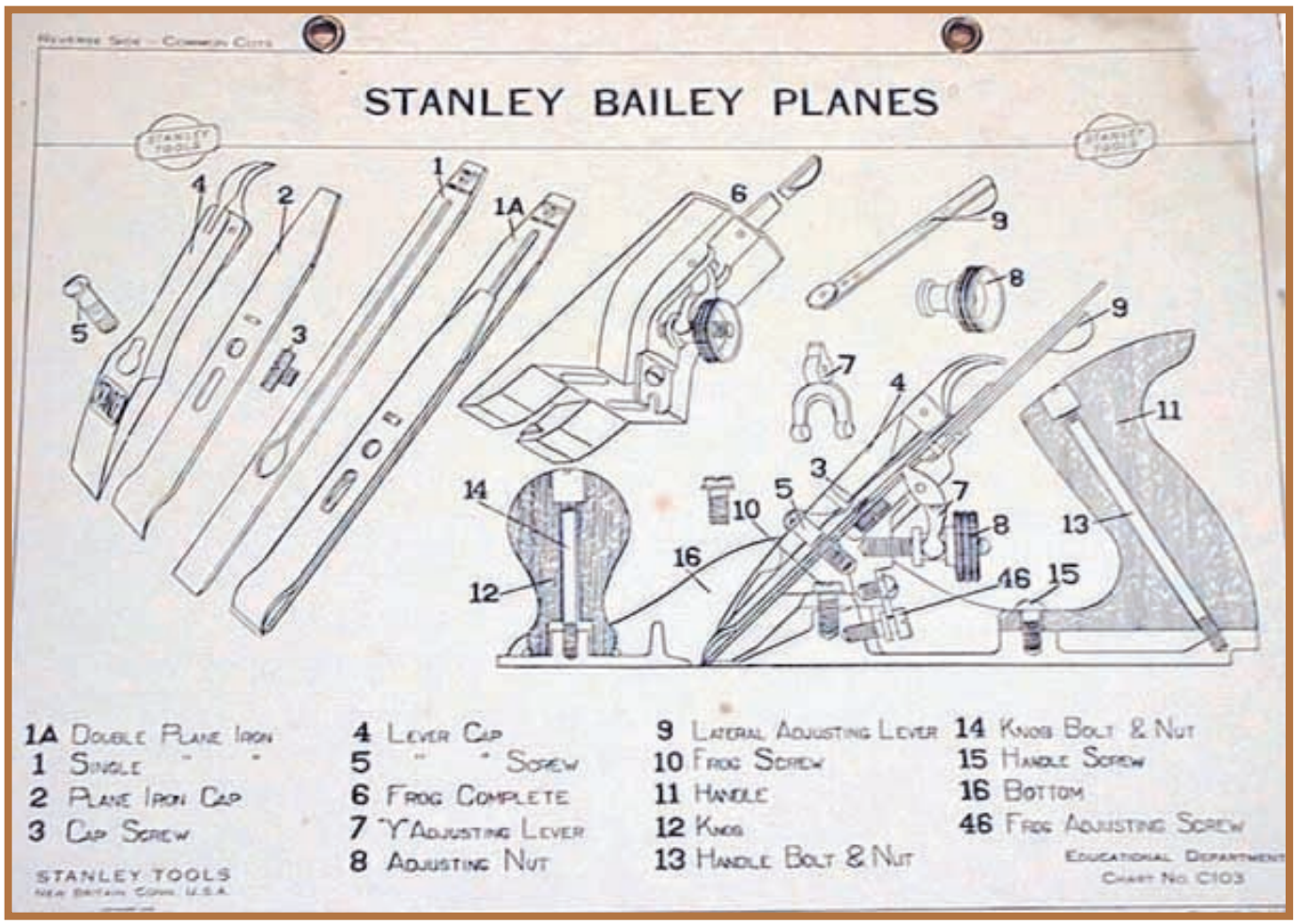
The first thing to do is to re-grind the iron. Set the angle on your grinder tool rest to 25º and grind the iron until all the nicks at the end of the blade have been removed. Be very careful not to overheat and blue the blade while grinding. Cool the iron often in water. Next, lap the back of the blade perfectly flat. I started with an 80-grit sanding belt clamped to my table saw top, then to 120, 220, 320 and 600-grit sandpaper on glass. What takes the most time is trying to lap out all of the pitting with the 80-grit tool. With other irons, I have started much lower down the grit scale (as low as 36 grit) but it leaves very deep scratches that are time consuming to remove later. I finished up on my 1000, 4000 and 8000-grit Samona Japanese water stones. There is no need to lap the entire back of the plane iron, just do about the bottom half inch or so.

As much as I have tried sharpening a thin Stanley type plane iron free-hand, I cannot do it. I still rely on my Veritas precision honing guide. I set the guide so my plane iron is held at 25 1/4º and start sharpening on my 1000-grit water stone. When I can see that I have sharpened all the way across the iron (about 1/16"), I crank up the guide 2 1/4º to 27 1/4º and finish up with a very small micro bevel on an 8000-grit water stone.

When assembling the iron and iron cap, make sure the lower edge of the iron cap sits flat and flush on the back of plane blade. If it does not, fit it so that it does. The cap iron should be set back from the edge of the blade about 1/32". Standard bench planes have their irons installed bevel down. When installing the frog, test-fit the iron to see how large a throat opening there will be for the various frog positions. On smoothers, I like a very tight throat; on jacks and jointers I open the throat more. Re-assembly of the remainder of the plane is fairly straightforward.

So there you have it. You can now turn around and sell your newly restored hand plane on Ebay for a handsome profit; add it to your own hand plane collection; or start using it to create wonderful wooden projects.

DAVID EISAN is a woodworker from London, Ontario
dfeisan@rogers.com



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By Danny Proulx

Building Base Cabinets

Part III

Photo courtesy Canac Kitchens

This article is the third in a series of five that will explore many of the issues and cabinet styles for those of you who want to build kitchen and bathroom cabinets. In this third installment I'll detail some of the procedures involved with building base cabinets. The basic concepts are discussed in this issue and there should be enough information and detail so that you can get started building some great base cabinets.

FRAMELESS BASE CABINETS

The basic frameless base cabinet is a box with two sides, called gable ends, a bottom board, back board, and a top rail. There is normally a door, or door and drawer combination, with fixed or adjustable shelving inside the cabinet.

However, all cabinets are not the same width. We often need specific width cabinets to fill dedicated spaces. Here's a process to use when determining your panel widths for various cabinet sizes.

Standard base cabinets are 36" high when complete. That height accounts for the cabinet base support and the counter top thickness. For these cabinets I will be using plastic adjustable legs, but you can construct a wood base just as easily.

If, for example, a plan calls for a base cabinet that is 27" wide with one shelf and two doors, that's all the information needed to create a cut list. In this example I'll use 5/8" thick melamine particleboard as the sheet material.

Frameless base cabinets do not need a top board because the counter top covers the cabinet, but they do require an upper rail, so that the door clears the counter top. I usually install a 2" high rail as shown in the illustration. The height is constant, regardless of the cabinet width, and the rail width is equal to the bottom board's width.

Cabinet width is always the front dimension. A 27" wide base cabinet requires a bottom board that's 23 3/8" deep by 25 3/4" wide. The 23 3/8" depth, plus the 5/8" thick back, gives us a standard 24" deep base cabinet carcase. The 25 3/4" bottom board, plus the thickness of two sides, equals the required cabinet width.

Side boards, or gables, are the same depth as the bottom boards, at 23 3/8", and the full height of the finished cabinet carcase is 31". Cabinet legs, or a fixed base at 4 1/4" high, combine to create a base that's 35 1/4" high. Adding a 3/4" thick counter top gets us to the required 36" finished height. The back board equals the width and height of the finished cabinet. The adjustable shelf is the same depth as the bottom board and normally 1/16" narrower in width to permit easy movement in the cabinet.

Door width is found using the 1" plus formula. To review: the inside cabinet dimension, in the above example at 25 3/4" plus 1", equals one door width. We need two doors, so dividing 26 3/4" by two, means each door must be 13 3/8" wide. Door height, on frameless base cabinets, usually equals cabinet carcase height minus 1", or 30" total, to allow enough room for counter top overhang.

BUILDING THE FRAMELESS BASE CABINET

Cut the Parts

Cut all the parts, as detailed in your cut list charts, based on the calculations for cabinet widths. The rails for each cabinet are the same width as the bottom board and 2" high. One rail is needed for each standard full door base cabinet (photo 1).

Drill holes for the adjustable shelf pins.

Shelf hole spacing is a matter of personal taste, however, I usually space them 1 1/4" on centre (photo 2).

Apply edge tape

Apply to the exposed edges of the sides, bottom, and underside of the top rail. The easiest tape to apply is heat activated, using an iron. Trim the excess edge tape, after ensuring it is firmly cemented to the board. Use an inexpensive hand trimmer to remove the excess tape on the sides. This task can be accomplished with a sharp file or knife. I've had the most success with a hand trimmer available for about $20 in most home stores (photo 3).

Secure the Sides to the Bottom Board

Use 2" screws designed for particleboard joinery. The lower edges of the sides are aligned flush with the bottom face of the

24" WIDE FRAMELESS BASE CABINET

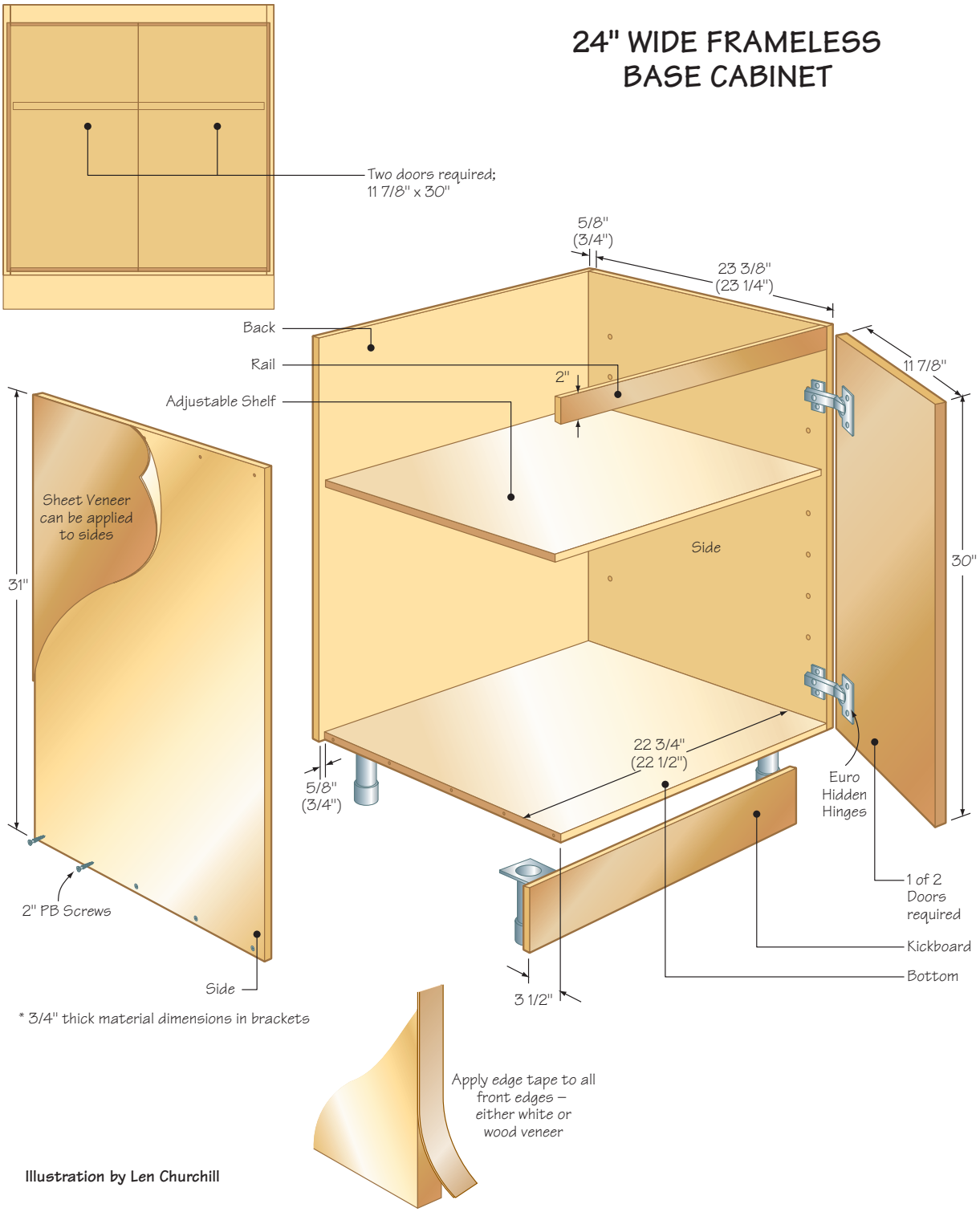
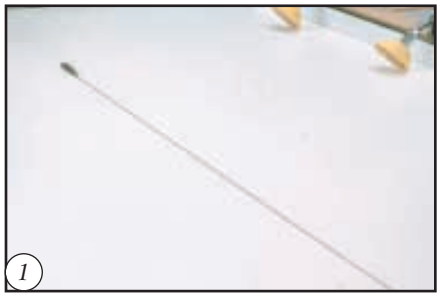


Illustration by Len Churchill



bottom board. Space the screws about 6" apart and always pre-drill and counter sink the screw hole (photo 4).

Attach the Back

Attach with 2" long PB screws about 6" apart. Ensure that the back board is flush with the top, back edges of the sides boards, with the bottom edge of the base board, and with the outside edges of the side boards. This board will strengthen and square the cabinet (photo 5).

Secure the 2" high rail to the base cabinet.

Keep flush with the top edges of the side boards. Install one 2" long PB screw per side in pre-drilled pilot holes.

These screws are close to the edges of the rail and it could split. The common practice, when joining particleboard material, is to keep screws at least 1" away from a board's edge. Drive one 2" screw at the centre point of the rail and secure the back, on each side, with a right angle metal bracket (photo 6).

Basic Frameless Base Cabinet

Attach Four Adjustable Legs

One per corner, 3 1/2" back from the front edge. Secure them with 5/8" long PB screws so that they support the side boards. At one time, these legs were attached with a long bolt through the bottom board. However, many people have opted for the four 5/8" screw method because the legs can be easily moved and cover caps are no longer needed to hide the bolt heads inside the cabinet (photo 7).

Install Eight Counter Top Brackets

Two per inside face, on the sides, back, and rail board. These are secured with 5/8" PB screws and aligned flush with the cabinet's top edge (photo 8).

Edge Tape the Doors With Iron-on Tape

Drill two 35mm holes in each door, 1/8" back from the door edge and 3" on centre from the bottom and top. These holes will be used to attach the hidden hinges.

Screw the hinges in place with the hinge plates attached. I am using Blum 107° clip-on full overlay hinges on my cabinet. The hinge is properly installed when it's at 90° to the door's edge. Use a square to align the hinge when inserting the screws (photo 9).

Perfect Door Placement Method

It's easy to guarantee perfect door placement using this simple installation method. First, cut a 1/8" thick spacer. Then, place the door in its normally open position; making sure the vertical alignment is correct. The spacer strip is placed between the door and cabinet side edge. Insert screws through the hinge plate and into the cabinet side board. After both hinges are secure, remove the door from the hinge plates and install the screws in the plate that are hidden by the hinge. Re-install the doors and adjust if necessary (photo 10).

Install Baseboard

The baseboard can be installed after the cabinet is secured in place. If this cabinet is a stand alone, you should inset the legs 3 1/2" on each side. Toe kick board clips are attached to the baseboard. These metal clips slip on the leg shafts and hold the board securely. On stand-alone or end-of-run cabinets, where the end of the front toe kick board is exposed, edge tape must be applied.

Shelf supports and the shelf can be installed at this point to complete the cabinet (photo 11).

FACE FRAME BASE CABINETS

The standard face frame base cabinet differs from the standard frameless base because we are adding a wood frame on the front edges in place of edge tape. The panel sizes are also slightly different to account for the thickness, and stile width, of the applied frame.

There are two sides measuring 31" high. However, the depth of these panels is less because of the frame and because we want to maintain the industry standard depth of 24". The finished cut size of the sides are 31" x 22 5/8". Adding the thickness of the 5/8" back and the 3/4" face frame gives us a total cabinet depth of 24". Installed standard 3/4" thick doors bring the total depth to about 24 3/4".

There is no top board as the kitchen counter top covers the base cabinet. The counter top is secured with screws and right angle clips. This method, along with

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the face frame, gives the installed base cabinet its strength and rigidity. I use 3/4" by 3/4" metal right angle clips: two per side, two on the back board, and one in the centre of the face frame rail. The counter top is secured with two 5/8" screws through each right angle clip.

Adjustable cabinet legs are installed, replacing the base frame that was quite common with older style kitchens. Cabinet legs are, in my opinion, one of the positive features that the North American industry has adopted from European cabinetry. The ease of installation, in even the most difficult situations, is remarkable. Most legs adjust from 3 3/4" to 5" in height. In effect, the kitchen floor would have to be out of level by more than one inch before the legs require shims.

The bottom board determines the inside carcase width and must be cut accurately and squarely. The face frame consists of two stiles and two rails. The stiles are 1" wide by 31 3/4" long and the rails are 1 1/2" high by the interior cabinet dimension width. A standard base door at 30 1/2" high is normally mounted with European type hinges in the same fashion as the frameless base.

Base cabinets are multi function units. They are equipped with adjustable shelves, pullout shelf assemblies, drawers, or other special features such as trash and recycling containers. Holes for the adjustable shelves are drilled in the carcase sides by the same method, and with the same jig assembly, as the standard upper cabinets. Drawers and pullouts are easily installed using the European bottom mount drawer glide hardware.

Once again, the most critical step is the accurate cutting of the cabinet parts. The sides must be cut square and to a correct, uniform dimension. The bottom board's width must be accurate because it determines the inside width of the cabinet. It's always 2" narrower than the cabinet exterior on this face frame design. Cabinet width is measured at the widest point on the front of the cabinet. The stiles are each 1" wide so, if the cabinet we want to build is 30" wide, our bottom board is 28" wide. This will make the inside face of each stile flush with the inside face of the cabinet sides. That will allow us to use European hinges.


Standard Frame Base Cabinet

The stiles are 3/4" longer than the cabinet sides. The back board is equal to the cabinets inside dimension plus the two thicknesses of side boards. For a 30" cabinet, our back board must be 29 1/4" wide when building with 5/8" sheet material.

Standard base cabinets usually have one shelf installed on adjustable pins. The shelves are cut 1/16" narrower than the bottom boards to make them easier to install and move. As previously detailed, door width is determined by adding 1" to the interior width. If it's only one door, that's the final width. If two doors are needed, divide the interior width plus 1" formula by two. A 30" cabinet would need two 14 1/2" wide doors mounted on European hidden hinges (photo 12).


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24" WIDE FACE FRAME BASE CABINET

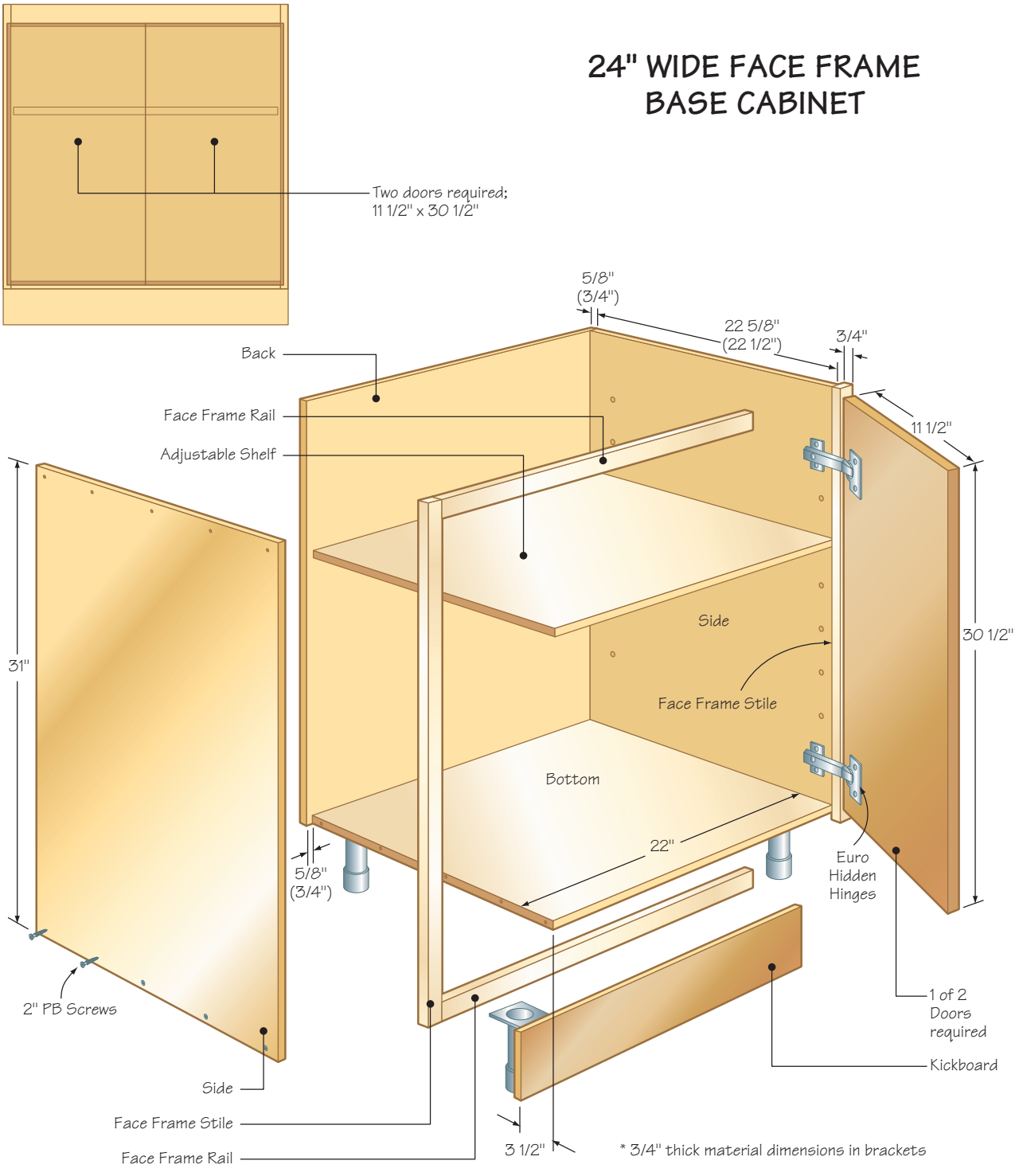


Illustration by Len Churchill

BUILDING THE STANDARD BASE FACE FRAME CABINET

Rip and Cross Cut the Stiles and Rails

Assemble each frame using glue and 2" long PB screws in counterbored pilot holes. If the screw hole will be visible, in the case of a cabinet at the end of a run, fill the 3/8" counterbore with a wood plug.

You can also use pocket holes, a mortise and tenon joint, dowels, or miniature biscuits to assemble the face frame – the joinery options are many and the choice is yours.

Construct and sand the face frame now and apply two or three coats of finish. Do the finishing while the cabinet carcases are being assembled so they are ready when its time to attach the face frame.

Don't put any finish on the back face of the face frame so that the glue can properly bond.

Cut all the Panels to Size

Follow the same steps discussed when building frameless base cabinets. Omit the top particleboard rail because the face frame top rail takes its place. Remember, panel sizes are slightly different than the frameless base of the same width to account for the face frame. To verify, reference a 30" base cabinet: you should have a three-sided box with inside dimensions of 28" wide by 30 3/8" high (the length of the side minus the thickness of the bottom carcase board when using 5/8" sheet material) (photo 13).

Apply Glue

Apply to the three carcase edges and place the outside face frame's top edge flush with the outside top edges of the side boards. Align the tops of the side boards with the face frame to match the bottom of your carcase. The face frame should fully cover the carcase edges.

Secure the top corner of the face frame to the carcase body using 2" finishing nails in pilot holes slightly smaller than the nail thickness. Drill the pilot hole so that it centres, as much as possible, on the PB edge. Secure the other top corner so that the top outside of the face frame is flush with the top outside edge of the carcase. Nail the bottom two corners, making sure the face frame stile's inside edges are flush with the inside face of the side panels.

Install the remaining nails at 6" centres, maintaining the alignment. The bottom rail should hang below the cabinet carcase by 3/4". When building with 5/8" thick sheet material, the sides of the face frame should extend 3/8" beyond each side of the carcase and extend 1/4" for 3/4" thick sheet goods. As well, the inside edge of the bottom rail will be slightly above the bottom board with 5/8" sheets and flush with the top face of the bottom board when using 3/4" thick sheet material.

If you don't like face nailing the frames, use biscuits for an invisible joint. Remember though, the door, in its normally open or closed position, covers the section of the face frame where the nails are located (photo 14).

Attach Right Angle Brackets

Attach onto the carcase side and back boards as well as the back of the upper face frame rail. Use two brackets per section and secure them with 5/8" long screws. The bracket should be flush, or slightly below, the top edge of each panel so the counter top will be drawn down to the carcase.

The cabinet legs are attached with four 5/8" long screws through the flange. The front legs are set back 3 1/2" for a toe kick space. If this cabinet is an end of run unit, open on one side, set back the legs by 3 1/2" on that open side as well.

The toe kick board is clipped to the legs with plinth clips that are screwed to the back of the board. The clips allow you to easily install and remove the toe kick board. My kick boards are normally made with the same wood as the doors and face frames (photo 15).

Drill 35mm Diameter Holes for the Hinges

Drill 3" on centre from each end of the door, 1/8" away from the door's edge. Use a hinge-boring bit to drill the hole 1/2" deep or as specified by the hinge supplier. Install the door following the same steps as detailed for frameless base cabinets (photo 16).

In the next issue, Danny will give you the building steps for a pantry cabinet. Also in the next issue: a few special cabinets you will need when the standard size doesn't work.

DANNY PROULX is a woodworking author and teacher.
www.cabinetmaking.com or email danny@cabinetmaking.com

 By Graham McCulloch

Excalibur Mitre Guide

Osborne EB-3

The **Osborne EB-3 Mitre Guide** by Excalibur is one of the finest, dead-on accurate table saw mitre guides that I have ever used. How about a mitre gauge that gives you 41" of support for those crosscuts? How about a mitre gauge that has positive (and accurate) stops for all of the most common angles? The Osborne EB-3 does all that and more.

The EB-3 fits all standard table saw mitre slots, including "T" slots with the removable washer/screw. The EB-3 quite easily fits the right or left mitre slot and does so in seconds.

I liked the full support it gave when cutting longer boards and I also liked the Alan screw adjustments to tighten or loosen the mitre bar in the slot. They eliminate any chance of side-play. A good idea was to enclose a self-adhesive abrasive strip to cover the fence face.

On the downside is the assembly manual. It is somewhat vague in content and leaves a lot of room for improvement.

Overall, the Osborne EB-3 Mitre Guide by Excalibur, offers very smooth operation.

Dewalt Sliding Compound Mitre Saw

There are two new tools from DeWalt that deserve attention: an **8 1/2" Sliding Compound Miter Saw**; and a **Cordless Impact Driver**.

The **DW712** is the perfect sliding compound miter saw for those of you that are not involved in doing heavy construction. This is not to say that the DW712 is not a heavy-duty tool, it most definitely is. But DeWalt designed this tool for trim workers, cabinetmakers and general woodworkers. If you are in any of these categories, this is the tool for you.

DeWalt thought this one through with features such as miter cuts to 50º left and 60º right. In addition, there are seven positive stops in both directions. The DW712 has five pre-set bevel stops, 0, 33.9, 45, 48 and -2º.

A 15 Amp motor powers the DW712 and it has a no-load 5,400-rpm speed. An ergonomic horizontal handle is user friendly and makes this 43-pound saw easy to carry. DeWalt also includes a 30-tooth carbide-tipped blade.

Dura-Grit Accessories

Those rotary power tools such as the Dremel, Black & Decker, and Ryobi are probably the handiest power tools in the workshop, but they have one major drawback. The accessories such as sanding stones, sanding drums and cutters seem to wear out faster than normal. Although these accessories are apparently designed for high-speed rotary power tools, it is perhaps this same high speed that shortens their life span. If this limited life is as annoying to you as it had been for me, I have an answer for you: **Dura-Grit's High-Speed Tungsten Carbide Cutting and Sanding Wheels**. They are specifically designed for high speed rotary power hand tools and up front, I can tell you that the 5-80, 1/2" x 5 1/16" diameter, flat-head stone is excellent for quick material removal. I used the 80-grit stone on an oak carving with great results. This stone is also available in 60 grit for even more aggressive removal.

The Dura-Grit products are designed for rough and fine shaping as well as finish sanding of wood materials. They also perform well with fibreglass, carbonfibre, laminates, composite materials, leather, rubber and plastic. They are not recommended for using on metal.

The Dura-Grit products are available in a wide variety of shapes, sizes and grit numbers. I particularly liked the cut-off wheel. It chopped unwanted rough portions like a hot knife through butter.

Regardless of which brand of high speed rotary power tool you may have, Dura-Grit's cutting and sanding wheels will make a noticeable difference in it's performance.

The price of the Dura-Grit accessories is less than $15. They are a little more than conventional wheels and burrs, but they will last you 10 times or more longer than the less expensive ones, so that makes it a great deal.

You can buy Dura-Grit products on-line at http://www.duragrit.com.

Dewalt Cordless Impact Driver

The new **DW054K-2** is a tool that you better hold on to with both hands. After all, you don't play around with 1,150 in-lbs of torque. I have yet to experience a 14.4 volt cordless tool this powerful.

The DW054K-2 is a 1/4" impact driver with a quick-release chuck and a variable speed drive. It turns at 0 - 2,400 rpm and hammers at 0 - 3,000 bpm. It is a compact tool as well. The DW054K-2 is only 6 1/2" long, so it can get into those tight spots with room to spare.

The 1/4" chuck means that it will handle all of those quick-release bits, such as nut drivers, socket adapters, twist drill bits, and power screwdriver bits. Be careful though, this powerful tool could easily snap those drivers.

The DW054K-2 comes complete with a one-hour diagnostic charger and two XR battery packs.

GRAHAM McCULLOCH is a woodworker and writer living in Halifax, NS. (902) 479-0221
www.shortcuts.ns.ca graham@shortcuts.ns.ca

furnitureproject By Denis Roy

Sleigh Bed

This pine sleigh bed is an elegant addition to any bedroom. It has a very traditional country styling that fits in with almost any decor. This plan details construction of a double-sized bed, to fit a standard 54" x 75" mattress set.

Create the templates

Use the grid diagram to draw the one-inch grid onto thin plywood or other stiff sheet material. Plot out the contours of the parts on the grid. Cut out the traceable templates using a band saw or jig saw. Note that the curved bars are supposed to be symmetrical, to simplify assembly. Create half-templates for these parts, with a mirror line at the centre. Trace the contour onto one side of a piece of stiff sheet material. Flip the template along its mirror line to trace the opposite end. Cut out the template for tracing onto your stock.

Lay out the parts

Lay out the parts on your materials, starting with the longest parts. Trace the contours for the headboard legs (#1) and the footboard legs (#2). Cut the parts to shape using a band saw or jig saw.

Sand the parts, refining the curves

Using a 3/8" round-over bit in a router table, round over all edges of the parts. Complete final sanding.

Bed bars

The bars in the headboard and footboard are curved, which requires a lot of extra work in sawing and sanding. The bed also looks good with straight bars if you wish to avoid the extra effort. The straight bars need to have the same total length and cross section as the curved ones.

If you decide to make straight bars, create the blanks and rip them into straight bars on the table saw instead.

Prepare the blanks for cutting the curved bars

The headboard bars (#7) require 2x6 blanks to be cut to a length of 34 5/8". The footboard bars require a length of 22 5/8". Each blank creates five bars so three of each are required in order to produce 15 bars of each length. When creating this many parts, it's possible that one or two will be of unacceptable quality, so it may be a good idea to create an extra blank.

Using a 3/4" straight cutter in a router table, cut rabbets along each end as shown. Each rabbet should be 1/2" deep and 3/4" wide. This is a lot of material to remove so at least three passes will be

required. This can also be done with a dado blade in the table saw. The net result will be a tenon exactly 1/2" thick in the centre of each end of each blank.

2x6 construction lumber usually has slightly rounded edges. These blanks must have clean square edges. Using your table saw, rip a small amount of material from each edge of each blank in order to achieve a square edge.

Draw a line across the centre of each blank

Trace the contour of the right side of the bar on the right side of each blank as shown. Cut the arch shape free using the band saw.

Glue the arched piece on the other side of the blank, aligning the centre marks. Clamp it as shown using two or three clamps. Yellow carpenter's glue is the best choice because its gap filling qualities allow you to glue surfaces fresh from the table saw, without jointing. The glue sets up quickly, allowing you to take the clamps off in as little as 30 minutes, in order to use them on the next blank.

Sand the faces of the blank smooth with a belt sander.

Trace the template of the bar on the blanks five times to create five bars, allowing for the kerf of the band saw blade. If necessary, you can modify the width of the bars slightly in order to fit the blanks. If you do modify the widths, make sure all bars are the same width. Cut the bars free.

MATERIALS LIST

2	47 4/5″ x 4 5/8″ x 1 1/2″	Headboard Legs 2x6 Stock
2	35 5/8″ x 4 1/8″ x 1 1/2″	Footboard Legs 2x6 Stock
2	53 1/4″ x 3 1/2″ x 1 1/2″	Top Rails 2x4 Stock
4	54 1/4″ x 3 1/2″ x 3/4″	Frame Slats pine or spruce
2	53 1/4″ x 5 1/4″ x 1 1/2″	Short Bed Rails pine or spruce
2	75 1/2″ x 5 1/4″ x 1 1/2″	Long Bed Rails pine or spruce
15	34 5/8″ x 2 3/4″ x 1 1/2″	Headboard Bars pine or spruce
15	22 5/8″ x 2 1/2″ x 1 1/2″	Footboard Bars pine or spruce

Sand the sawn edges of the bars smooth. Using a 3/8" radius bit, mounted in a router table, round the edges over with the router.

Mark out the tenons on the ends of the bars. The desired tenon width is 1/2". Cut the edges of the tenons to size using the band saw or by hand.

Complete final sanding of all the curved bars.

The curved top rail's supple shape is the prominent feature of this project. It beckons you to run your hand over it.

Cut the top rails

Cut the top rails (#3) a little over-length, from choice 2 x 4 stock. Set your table saw angle to 20º. The accuracy of the angle setting on the saw is adequate for this series of cuts. Set your saw fence 1 1/8" to the left of the blade. Note that the angled blade may render the scale on your fence off a bit. Measure to make sure it's right. Pass the two top rails through the saw.

Re-adjust the fence to 1 1/16", leaving the saw angle as is. Flip each piece, passing through the saw. Reset the saw angle to 28º. Set the saw fence at 2 15/16" to the left of the blade. Flip each piece and pass through the saw.

Reset the saw angle to 45º. Set the saw fence at 3 1/8" to the left of the blade. Flip each piece and pass through the saw. Reset the saw fence to 7/8" to the left of the blade. Without flipping the pieces, pass them through the saw.

The completed top rail is now near its final shape, with facets that must be removed. Use whatever tools you are comfortable with to achieve this. A hand plane, cabinet scraper, or belt sander will all do the job. A stationary belt sander is ideal for this, allowing you to use smooth twisting motions to achieve the required smooth curves. Follow up with extensive fine sanding since these pieces are the most visible of the whole project. Finish by trimming the top rails to final length.

From leftover 2x4 stock, cut out a couple of anvils to hold the top rails with the mortise face horizontal. These anvils will be used to hold the work piece when drilling and chiseling the mortises.

Cut the two short bed rails

Cut the two short bed rails (#5) to length from 2x6 stock. On the footboard rail, trace the template on each end and cut the profile shown. The headboard rail won't show so you don't need to cut the contour. Round over the edges using the router. Don't round over the ends.

Mark the centre lines on the short rails (#5) and on the top rails (#3). Starting from the centre, measure and mark mortise centres 3 5/16" apart, seven on each side of the centre. Each part has a total of 15 mortises to be cut.

Using a 1/2" Forstner bit, drill a hole 3/4" deep at each mortise location. Using a sharp chisel, square up the corners of each mortise hole, creating mortises 1/2" square, 3/4" deep.

Note that the anvils are important when mortising parts #3 to keep the holes perpendicular to the flat bottom of the part. If using a drill press to drill the holes, clamp them to the table, allowing the part to slide horizontally for drilling the 15 holes. When chiseling, be sure to chisel over an anvil to prevent denting the part.

Test fit

Test fit each tenon of each bar into its respective mortise, trimming the mortise or the tenon as required. Ideally, each should be snug but not tight. You will be pulling 30 of these joints together simultaneously, which can be difficult if they are too tight. When determining which way to orient the bends in the bars and the direction of the top rail, hold the corresponding leg in position, at the end of the assembly. Orient the parts to match the curvature.

Assemble the parts, pulling it all together using pipe clamps with the anvils. The anvils prevent damage to the top rails. The clamps could possibly exert a bending force on the top tenons, possibly at risk of breakage. Position the clamps on the anvils in line with the tenons, not the edge of the top rail.

Drill holes

Drill 3/8" holes about 1/4" deep in the positions on the legs (#2). Within the holes, drill 3/16" diameter holes through the part. Apply glue to the ends of the rails and install the leg using 3" #8 screws. Position the top rail within the top of the leg visually. The resultant position of the bottom edge of #5 should approximately line up with the support notch on the leg. The face of #5 should be even with the flat face of the leg. A slight twisting of #5 may be required to line it up with this flat face.

SUPPLIES LIST

5	12′ x 2″ x 6″ spruce or pine
1	10′ x 2″ x 4″ spruce or pine
2	10′ x 1″ x 4″ spruce
4	3/8″ x 6″ lag bolts
12	3″ #10 screws

Double Mattress 54" x 75"

Note: The author has had good luck using western spruce, however, eastern spruce may be too soft. If you live on the east coast, use pine, or check with your local lumberyard for alternatives.

SLEIGH BED

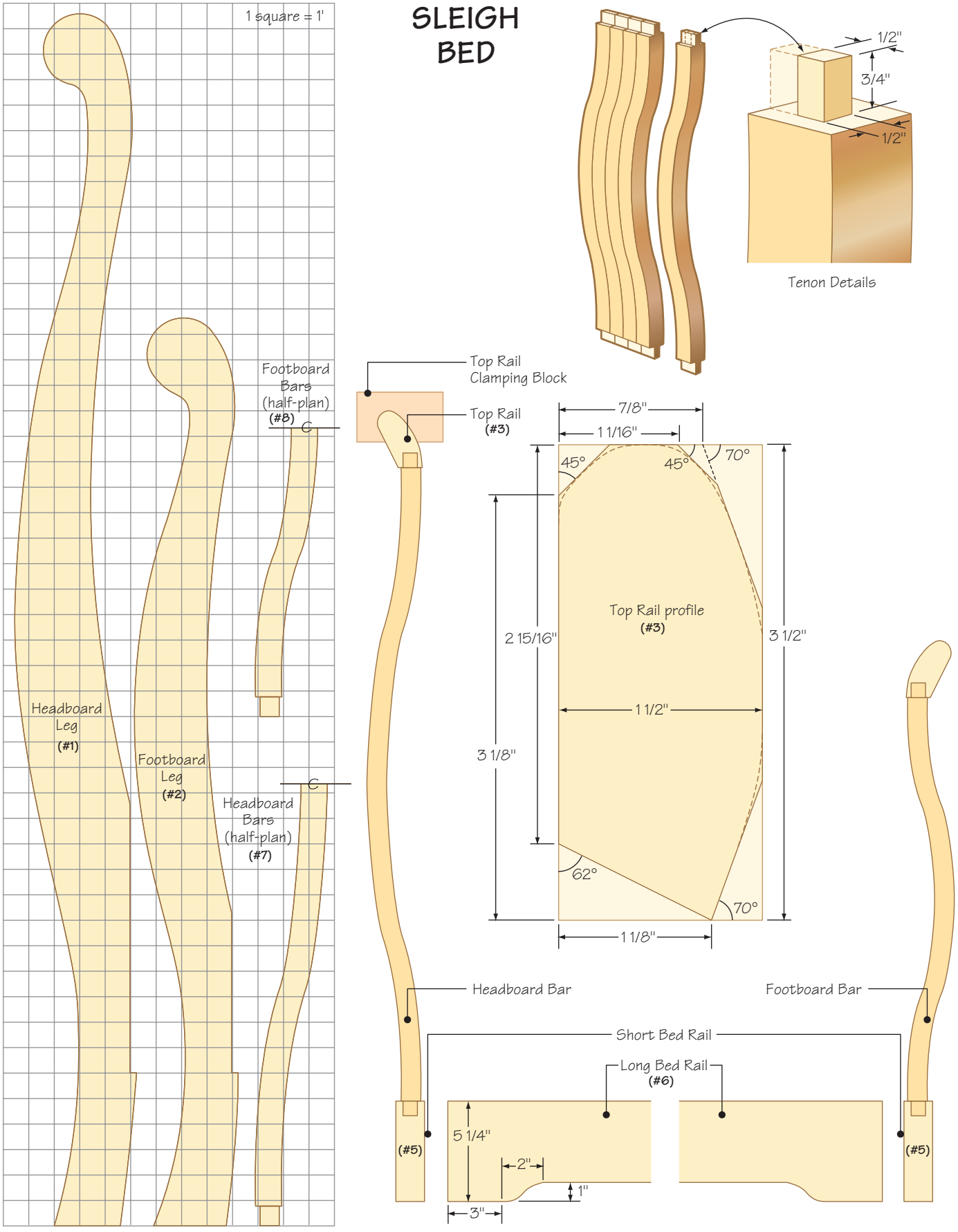


Illustration by Len Churchill

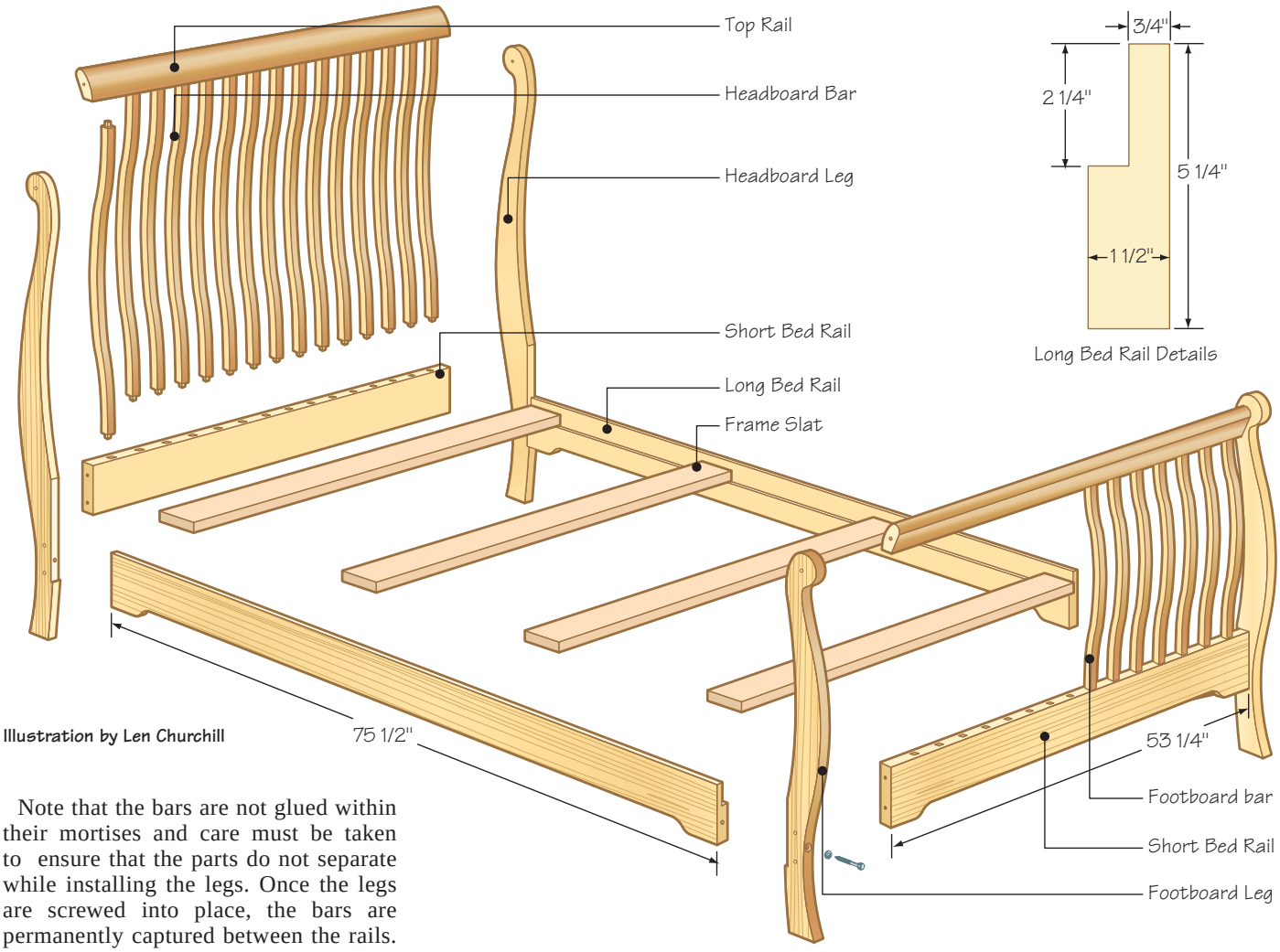


Illustration by Len Churchill

Note that the bars are not glued within their mortises and care must be taken to ensure that the parts do not separate while installing the legs. Once the legs are screwed into place, the bars are permanently captured between the rails. If they seem loose, tap a 1" finishing nail through the rail into each tenon. This should be done on the side that will show the least in the finished bed. Ensure that the assembly is square by comparing diagonal measurements.

Fill the screw holes with 3/8" diameter plugs, cut with a plug cutter. Apply a bit of glue and tap them into place. Sand off the protruding portion after the glue is dry. The upper screw can be covered with an applied wooden rosette if you like.

Repeat this entire assembly process for the headboard assembly. The headboard is taller and therefore somewhat more awkward to assemble with pipe clamps. Web clamps, or ratchet tie-downs can also be used to pull the assembly together. Use the anvils to prevent the web clamps from twisting the top rail. Trim them as necessary to provide a pull that is in line with the tenons.

Cut the long bed rails to finished length

From 2x6 stock, cut the long bed rails to finished length.

With the best face outward, cut the rabbet on the inner upper edge. This is best accomplished by making two passes over the table saw.

Trace the template from the contour diagram onto the ends of the parts and cut the lower edge to shape, using a band saw or jig saw. Sand the edges of the parts and round over the upper and lower edges with the router. Don't round over the ends.

Find a socket wrench to fit the head of your 3/8" lag bolts. Drill a hole into each leg of the bed to fit this socket. This should be 7/8" but, if you are lucky, you may get away with 3/4". A thin, inexpensive socket is a benefit in this instance. Using a forstner or spade bit, drill the 3/8" deep countersink hole at a height about 1 1/2" above the bedrail support notch in the leg. The hole should be centred in the face of the leg.

Position the bedrail on the support notch, recessed about 1/4" from the face of the bed. This recession is needed to allow the bedrail to fit the rounded edges of the legs. Using a 1/4" drill bit, drill through the centre of the countersink hole, into the bedrail. Remove the leg and deepen the 1/4" hole as much as the bit will allow. On the leg, enlarge the hole to 3/8" diameter.

Place a flat washer over the 6" x 3/8" lag bolt and drive the bolt firmly into the bedrail with a socket wrench. Repeat with all four corners of the bed. Since the hole alignment may differ slightly at the different corners, number the parts.

Cut bed frame slats

Cut bed frame slats and install them equally spaced. Each slat is held with a single woodscrew at each end. A minimum of four slats is required but you can add more if you like. They serve to guide the boxspring into place in the bed frame.

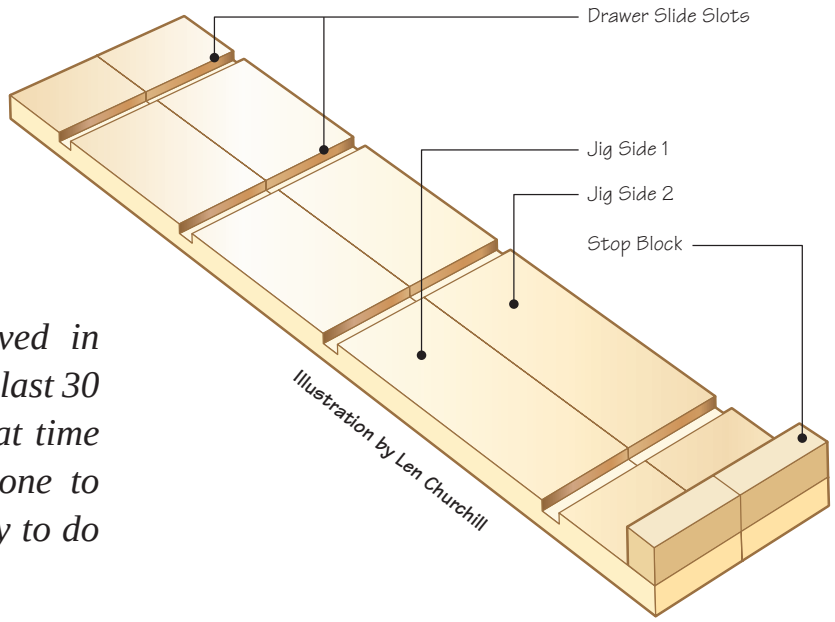
Go over the entire project with fine sandpaper, concentrating upon areas where glue was wiped up. Apply filler as needed to fill minor defects. The sleigh bed is now complete and ready for finishing.

A full material/parts lists for mattress sizes (other than the one featured in this article) is available at: www.ideasinwood.com/sleighbed

DENIS ROY is a power engineer and furniture designer from Winnipeg, Manitoba.
www.ideasinwood.com

By Wally Schneeberger

Drawer Slide Attachment Jig



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 when installing drawer slides.

Because drawer slides can be difficult to install in a cabinet box that is already built, I made a couple of jigs to install the slides before I assembled the cabinet box. That made installation much easier and faster.

Even if you are only building one set of drawers (like a dresser or a chest) it is much easier to mount the slides on a panel that is laying flat on the workbench than it is to mount the slides on a panel that is already standing up.

So stop working against gravity and, instead, let gravity work for you.

The jigs are really easy to build with a dado blade or router with a straight bit.

Just dado a slot to hold the slide where you want it. Make 2 at the same time, so that they will line the slides up square. You can make one wide one and cut it in half to make sure that they are perfectly aligned.

I have set this particular jig up for a 36" cabinet with four drawers (of various sizes). You will set up yours according to your needs.

WALLY SCHNEEBERGER is a renovations carpenter in Calgary, Alberta
wally's@woodworking.com

Wood Movement

We didn't invent wood. We invented plywood, particle board, oriented strand board, medium density fibreboard, and a whole host of other materials, but wood, in its simplest form, was not invented by us.

In fact, wood is barely processed at all to get it from tree to the lumber yard. The tree is cut down, planks are sawn from the log, and the planks are dried. That is all. The point is we don't control the properties of wood, since we didn't manufacture it.

For successful woodworking, we must learn the natural properties of the material we use and design furniture around known properties of wood. If you ignore Mother Nature's rules, you'll be sadly disappointed to find that your furniture succumbs to Father Time.

Over the last two articles, I reviewed the three basic cuts of lumber ("flat-sawn", "rift-sawn" and "quarter-sawn") and looked at how each changes it's shape as relative humidity and moisture content changes. In addition to shape changes, lumber also changes in size as its moisture content (MC) changes.

I summarized the basic relationship in my last article: wood expands in size when it takes on moisture (increase in MC) and wood contracts in size when giving off moisture (decrease in MC). I also explained that MC increases as relative humidity (RH) increases. Similarly, a decrease in RH causes a decrease in MC. Furniture design would be much simpler if wood moved by the same rate in all three dimensions (as many man-made materials do). However, wood, by nature, moves by different rates in width, thickness and length, and that complicates things.

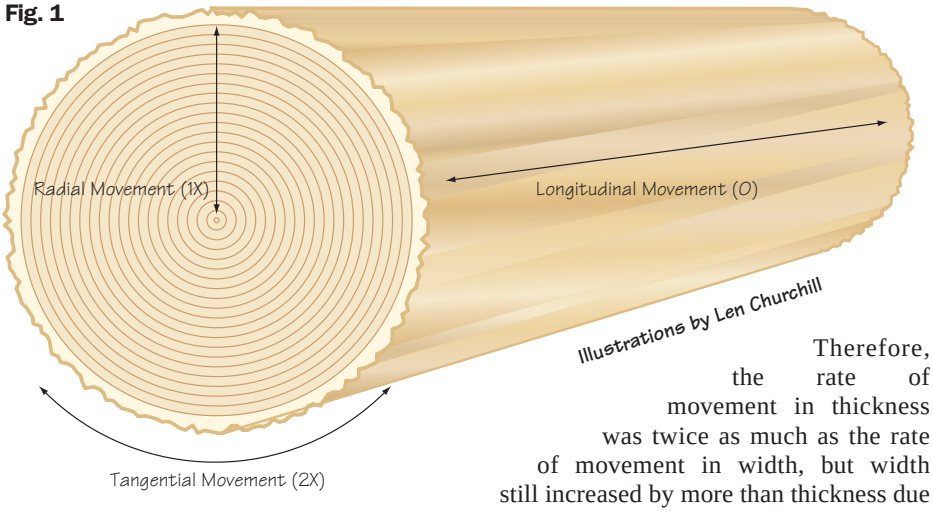
TANGENTIAL, RADIAL AND LONGITUDINAL MOVEMENT

If you look at Fig. 1, you'll see the terms used to describe movement in all three dimensions. First, there is tangential movement, which can be thought of as "movement along the growth rings". Second, there is radial movement, which is "movement across, or per pendicular to, the growth rings". And third, there is longitudinal movement, which is "movement in length". In brackets beside each term in Fig. 1, you'll see the basic rule of thumb that the rate of tangential movement is roughly twice that of radial movement, and longitudinal movement is zero.

I can say that longitudinal movement means movement in length, as this applies to all three wood cuts. But I can't say that tangential movement always means width and that radial movement always means thickness, as it depends on the wood cut being considered.

Fig. 2 shows what I mean. In the first diagram, we see an example of flat-sawn lumber. Since the growth rings run roughly parallel to the wide surface of the board, the width of the board will move by a rate that is about twice as much as the rate of movement in thickness. This is clear once you understand that tangential movement occurs at about twice the rate of radial movement (Fig. 1). Looking at the second example in Fig. 2, you'll see an example of rift-sawn lumber. Since the growth rings run on a 45° angle on the ends of the board, the rate of movement in width and thickness is the same. Looking at the quarter-sawn lumber in the third example, the rate of movement in width is only half as much as the rate in thickness.

Fig. 1



RATE OF MOVEMENT

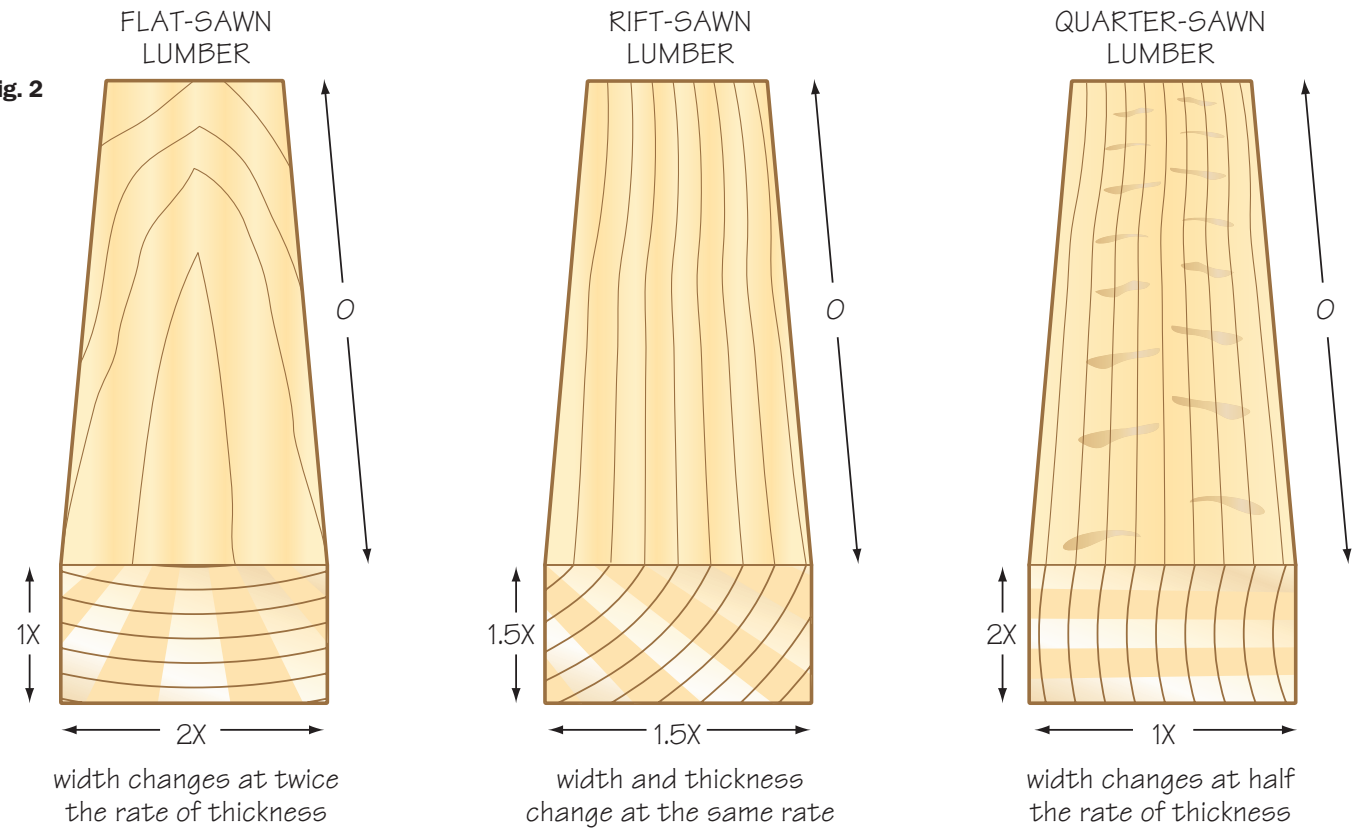
Notice that we are talking about the rate of movement, not the actual amount of movement. So even though the thickness of a quarter-sawn board moves at twice the rate of its width, the actual thickness change will likely be less than the width change, as the width likely starts out more than twice as large as the thickness.

For example, a 6"-wide board might increase in width by 1% as RH and MC increase. So the width will increase by 0.06", ending up 6.06" wide (or about 6 1/16"). If the board is only 1" thick and it increases by 2% with the same RH and MC increase, then it becomes 0.02" thicker and ends up 1.02" thick.

Therefore, the rate of movement in thickness was twice as much as the rate of movement in width, but width still increased by more than thickness due to the initial dimensions being compared.

Notice, too, that length doesn't change in any of the three examples in Fig. 2. Longitudinal movement isn't actually zero, but it's so tiny that it can be safely ignored for furniture building purposes. Most furniture will involve boards perhaps

Fig. 2



8 to 10 feet in length at most, with the vast majority far shorter. Assuming that the boards are already kiln dried to an appropriate level before the furniture is built, changes in length will be extremely small (say, 1/64" or less) given normal RH changes indoors.

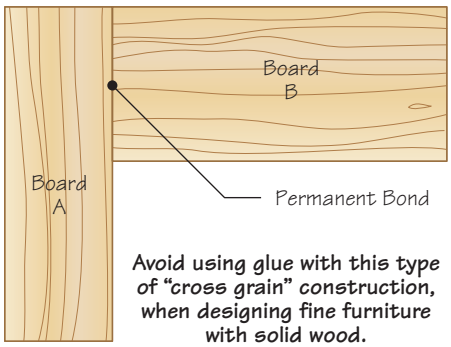
Also, be aware that the assumption that tangential movement is twice the rate of radial movement is only a rule of thumb, though a relatively good one. But, depending on species, it usually varies from the 2:1 ratio by a small amount.

For example, the rate of tangential movement for northern red oak is about 8.6%, while the rate of radial movement is about 4.0% (a ratio of 2.2:1). For black cherry, tangential movement is at 7.1% and radial is 3.7% (a ratio of 1.9:1) (these numbers come from Bruce Hoadley's book, "*Understanding Wood*"). So although the actual ratio is not exactly 2:1, you should still remember that tangential movement is always at a higher rate than radial.

While formulas and charts are available to determine actual amounts of movement for any given change in MC, this kind of precision isn't always needed. But what you should learn, at the very least, is that a 6" wide flat-sawn red oak board will move more in width than a 6" wide quarter-sawn red oak board as RH goes up or down. In fact, the flat-sawn board will move about twice as much in width as the quarter-sawn board.

This explains why quarter-sawn lumber has a reputation for stability. Also, remember my last article: the flat-sawn board will cup slightly as it moves, whereas the quarter-sawn board holds its rectangular form quite well.

Fig. 3



Avoid using glue with this type of "cross grain" construction, when designing fine furniture with solid wood.

MOVEMENT AFFECTS DESIGN

All of this analysis boils down to one very important fact which has already been stated: wood moves by a different rate in all three dimensions. Of particular concern is that longitudinal movement is zero, while the rates of movement in width and thickness can be significant. This means that every time we attach two boards together, such that the width of one board is attached to the length of another, we have a dilemma known as "cross-grain construction". And cross-grain construction is to be avoided when you design fine furniture from solid wood.

Looking at Fig. 3, you'll see the most basic form of cross-grain construction. If we attach Board A to Board B with a permanent bond, such as glue, we have a problem. Board A does not move in length, while Board B does move in width. The result is that Board A prevents Board B from doing what it is supposed to do according to a "law of nature". If Board B tries to contract, it won't be allowed to, but the stresses developed as a result will cause Board B to split. In essence, Board B will contract by splitting in the middle and shrinking on either side of the crack.

Hendrik's next three articles will look at real world examples of how knowledge of wood movement and cross-grain construction is considered and incorporated into the design of furniture. He will also cover table top attachment methods, frame-and-panel design, and breadboard ends.

HENDRIK VARJU is a fine furniture designer /builder who provides woodworking instruction and seminars near Acton, Ontario. (519) 853-2027
www.passionforwood.com email: info@passionforwood.com

By Carl Duguay

Surface Preparation

Most woodworkers will agree: the fun is in the making, not the finishing. We all seem to switch to "groan and moan" mode when it comes to putting the "finishing" touches to our projects. The truth is, putting a decent finish on your project is not as difficult as it may seem. It all begins with care and attention to the way we prepare the wood surface before we apply our chosen finish.

So, to start off this series on wood finishing, we will be looking at wood surface preparation. In upcoming articles we'll be looking at applying various finishes, including shellac, oil, varnishes and lacquers.

If you want to improve your finishing skills, a couple of things will help: access to reliable information the appropriate tools and finishing supplies, and lots of practice.

To properly prepare wood surfaces for finishing you need a few basic tools, which many readers may already have at hand. You've correctly guessed that the main "tool" is sandpaper. I recommend that you buy premium sandpaper. It lasts longer and gives better performance. Talk to sand- paper experts like the ones listed in the back of this magazine.

The two brands that I particularly like are Norton's No-Fil Adalox Aluminum Oxide "Champagne Magnum" paper and the Mirka Royal brand. Both of these stearated papers are flexible yet tough, with excellent edge wear and superior load resistance.

For power sanding I recommend a variable speed random orbital sander (R0S). Use one that comes with a dust bag or that can be connected to a shop vac. ROSs have an offset drive bearing that causes the sanding pad to move in an elliptical orbit, which reduces scratching against the grain. You can move the sander any direction on the wood: with the grain, diagonal to the grain, and even against the grain. I've been using the Bosch 3727DVS for the past two years and am very satisfied with it.

You'll still need to do some hand sanding. For this, a sanding block is the way to go. You can make your own, buy a rubber sanding block from a hardware store for $3-4, or get a top of the line wood block

from Lee Valley (#05Z14.01, $29.95), that takes 1/6 of a sheet of sandpaper.

Finally, you may want to try using a scraper (Lee Valley cabinet scraper, 05P32.05, $49.50, hand scraper, 05K30.01, $15.95.) Cabinet scrapers, in particular, are quite easy to use, and raise a lot less dust than sanding. If you have glued up boards that need to be leveled, a cabinet scraper will do a less nerve-racking job than a belt sander. See Flexner's book (sidebar) for easy instructions on using and maintaining scrapers.

Flat and Smooth

The goal in preparing a wood surface is to make the surface both flat and smooth. This is important because applying a finish to wood not only brings out the natural grain and beauty of the wood, it also magnifies any defects in the wood. In particular, fine scratches and thin slivers of dried glue that may be barely visible prior to finishing will stand out like a sore thumb after the finish is applied.

If you've glued up several boards you will likely end up with ridges along the glue lines, which will need to be removed. Planers and jointers leave mill marks on the wood – a series of small washboard like marks, where the knives have taken shallow cuts out of the wood. You can see these marks by holding your work surface at about a 30° angle to a bright light. These mill marks must be removed as well.

Taking Care of Business

You could begin smoothing your wood surface with a hand plane. However, proficiency with a hand plane takes a fair amount of skill and experience to acquire. Most of us will want to get out our power sanders.

Some sandpapers (abrasives) are designed for sanding raw wood, and others for levelling finishes like lacquer and varnish. The most common types of paper are: garnet, an orange coloured sandpaper made of a natural abrasive: aluminum oxide, a man-made sandpaper that is more durable than garnet, and is probably the most widely used sandpaper in woodworking, and silicone carbide, another man- made sandpaper generally used for sanding finishes, as it can be used with a lubricant.

Both aluminum oxide and silicone carbide also come as "stearated" paper, in which a metallic lubricant soap is added. Stearated paper doesn't clog up as much as unstearated paper. Sandpaper comes in a series of "grits" from 60 (coarsest) to 2000 (finest), although you will really only need 100, 120, 150, 180, 220, and 240 grits for preparing wood surfaces.

There are Five Basic Rules in Sanding

1. Sand progressively. Use a progression of grits. Start your power sanding with a 100 grit paper until you've removed the milling marks. Then move up to the next grit (120). Sand until you've removed the scratches left by the 100 grit. Then continue on up through the 150 and 180 grits. If you plan to use an oil finish you can also sand with 220 grit.

2. Don't skip sanding with each successive grit size, or you'll have difficulty getting rid of the scratches left by the coarser grit.

3. Dust off. Clean the surface before moving to the next grit (use a cloth, brush, vac, or blast of air).

4. Renew: Change your sandpaper often, as sandpaper wears out quickly and looses its effectiveness. If you look at your paper you'll be able to see when its worn down.

5. Lastly, sand by hand. Even random orbital sanders leave swirls, so do a final hand sand using the next highest grit. Remember to use a sanding block and sand with the grain.

So, there you have it. It's not too complicated, really, but good sanding requires a consistent and diligent approach.

In the next article, Carl continues his series of articles on wood finishing, with pore filling.

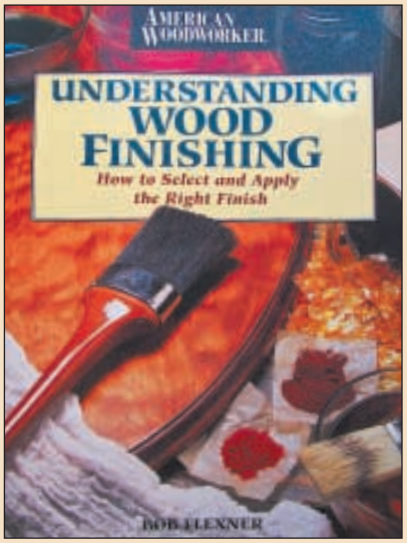
DUST ALERT:

The US National Institute of Environmental Health Sciences (www.niehs.nih.gov) has recently classified wood dust as a carcinogen. According to NIEHS, unprotected exposure to wood dust can increase the risk of cancers of the nasal cavities and sinuses.

As well, breathing dust and fumes isn't a terribly good thing for your lungs. Do them a favour and, minimally, wear a dust mask. Better yet, wear a respirator when you do a lot of sanding. The 3M model 7500, half face piece respirator ($35), is an excellent choice. It's made of soft silicone and has a cool flow exhalation valve, easy to adjust, light as a feather, and super comfortable. It's easily used in conjunction with glasses and earmuffs. Replaceable filters run about $12 a pair. To find a dealer contact 3M at: 1-888-364-3577 or www.3m.com.

There are dozens of books about finishing. For my money, the best is "*Understanding Wood Finishing*" by Bob Flexner (1999, Readers Digest, ISBN: 0762101911, 310 pgs, $26.95 CDN).

If you really want to understand how to select and apply the right finish, then get this book. It provides a comprehensive technical reference that is very well organized, yet easy to read.



The book is filled with useful charts, tips, and excellent photos of sample wood stains. Flexner covers all the essential topics, including oil finishes, staining, glazing, pore filling, shellac, lacquer, varnishing, water-based finishes, rubbing out, repairing finishes, and stripping finishes. He even includes some step-by-step finishing schedules for common woods, including pine, maple, mahogany, cherry, and oak.

Don't be put off by the fact that there is a lot of technical information in the book. Flexner is able to demystify the finishing process and conveys information in a way that is easy to digest. I'll be referring to this book regularly in the upcoming articles in the "Wood Finishing" column.

Flexner is also the editor of "*Finishing and Restoration*" magazine, the information voice for the professional finishing and restoration industry. For more information go to: www.finishingandrestoration.com.

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

By Garnet Hall

Circus Elephant

Everyone loves a circus, especially when the elephants make their entrance. I have always enjoyed watching those huge animals do their act with such intelligence and grace.

This circus elephant is my idea of a playful elephant, about to go through his routine. It is sure to capture the imagination of children, of all ages.

It is a straight forward intarsia project without too many surprises.

I used 3/4" material and raised and lowered as required.

Select the material

Suggestions for LT or DK shades are relative to each other. Just find cedar that is DK, MD or LT compared to each other. Choose the woods carefully, as this is a very creative step, and the woods you choose will make the project uniquely yours.

Transfer the pattern

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

Cut out the pieces

Cut carefully. Be sure to cut right on the line.

I like a #7. P/S style blade or a DT/R. Lately I have been using a #5 Hook Tooth blade. The smaller kerf gives a better fit and the aggressive Hook Tooth blade cuts as fast as the P/S blades.

Assemble the pieces

When assembling, check for fit. The pieces should fit reasonably well but don't have to be airtight. I am happy if I am within a saw kerf or 1/16". Fitting can be tedious 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 lower any pieces that the pattern, or your imagination, suggests.

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

Re-assemble the project and draw on reference lines

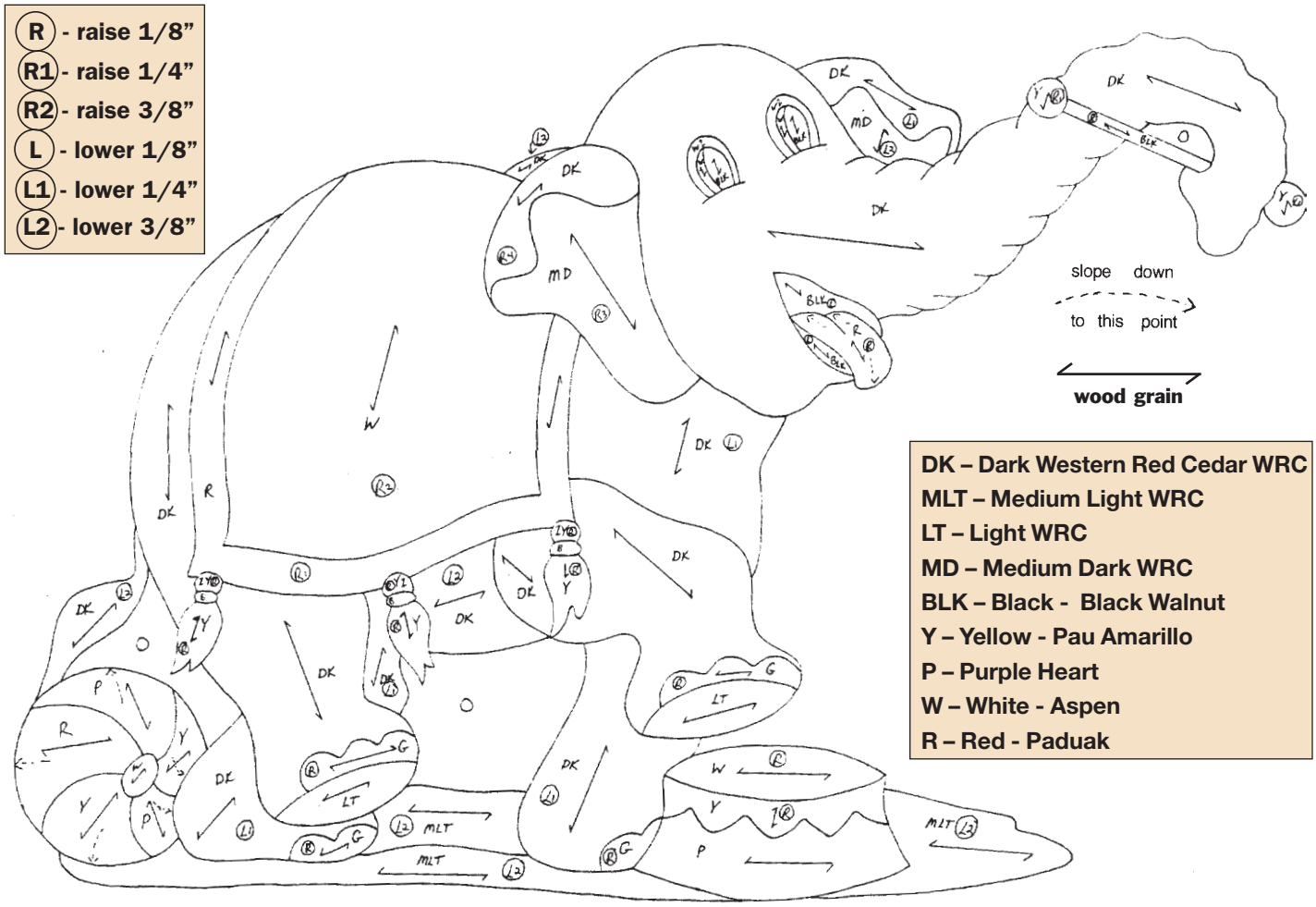
These lines will help with the shaping.

Shaping

Before you do anything, take care of the dust problem. Your tools should be hooked up to a dust collector. An air filtration device is important to remove air borne dust and, as a final line of defense, wear a good dust mask. Now 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.

A number of tools can be adapted to the shaping; I prefer to use a small pneumatic sander in a flex shaft (photo 1).

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 (photo 2).



Try to achieve a smooth transition form one level to the next with your shaping.

Sand the pieces

I don’t sand past 220 grit anymore, mainly for dust reasons. Two tools will speed up the process: a flap sander, or a Star Twister (photo 3).

Apply backing

I use 1/4" plywood. The best is Baltic birch, but ordinary oak or birch plywood will work fine. Keep it flat.

Glue it up

Assemble the project on the backing board and trace around it. Cut out the back, reassemble the project on the back, and then 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 to the middle.

Finish

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

Attach a hanger and ... “Ladies and gentlemen, please welcome the ever-popular circus elephant!”

GARNET HALL is an intarsia artist living in Stoughton, SK. 1-800-729-2473 www.sawbird.com

MATERIALS LIST

Enlarge 300% or size to preference For 22” x 15” finished piece

- 1 piece 2” x 6” - P
- 1 piece 8” x 8” - R
- 1 piece 6” x 6” - LT
- 1 piece 2” x 4” - BLK
- 1 piece 2” x 6” - Y
- 1 piece 6” x 6” - MD
- 1 piece 2” x 12” - MLY
- 1/2 BDFT - W
- 1 BDFT - DK
- 1 piece 1/4” x 24” x 16” - Backing Board

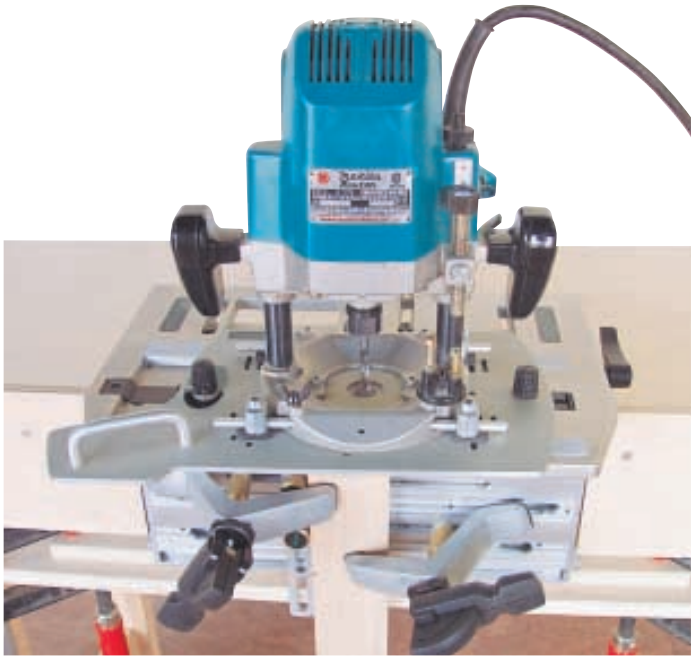

1


2


3

By Carl Duguay

Leigh Mortise and Tenon Jig



The mortise and tenon is arguably one of the most widely used joints in the woodworker's repertoire.

This versatile, traditional joint has always been associated with high quality cabinets and furniture, and continues to be popular because of its inherent strength.

When you only need to make a few mortise and tenon joints, cutting them by hand is the way to go. It's not all that difficult, although getting a good fit does take patience and practice. The most critical factor in ensuring a strong joint is a snug fit between parts.

The sides of the tenon and mortise must be parallel and smooth. Most woodworkers seem to use some combination of chisels, handsaws, drill press, bench top mortiser, and shop made router jig to cut the joints. For a large project where you might be cutting several dozen joints, it becomes more efficient and expedient to cut the joints by machine.

Recently, Leigh Industries (Port Coquitlam, BC) introduced the **Leigh Frame Mortise and Tenon Jig** (FMT). In most woodworking circles the name "Leigh" is synonymous with "dovetail jig". The Leigh D4 Dovetail Jig has long been considered the best of its kind on the market. The prospect of testing the FMT then, was one I eagerly anticipated.

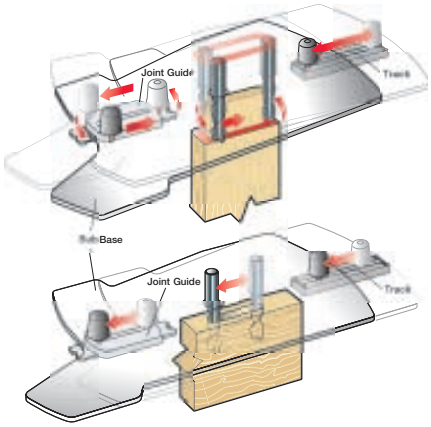
Now, after four weeks of using it in my shop I'm convinced that Leigh has hit the mark again: the FMT is without a doubt the best mortise and tenon jig for the money.

Read All About It!

The FMT is surprisingly easy to use once you know it's operating concept. Start by reading the user guide, which is superbly written and illustrated. Chapters 1-3 show you how to mount the jig on a plywood base so you can clamp it to your workbench; how to mount your plunge router on the sub-base; and, how the template and guide pin system work. The rest of the guide illustrates how to cut 13 different kinds of mortise and tenon joints. Mounting your router on the sub-base takes about half an hour, but once done you can remove it in a few seconds for use elsewhere.

Built to Last

The FMT is CNC machined from a range of tempered and die-cast aluminum parts. Everything looks and feels first class. The parts that move do so smoothly, while the clamping mechanisms hold stock securely without requiring you to exert a lot of torque. The templates are made of "delrin", a Dupont plastic polymer product that has been called "synthetic stone" because of its durability. My overall impression is that this unit will put up with years of shop use. This durability is supported by a generous five-year warranty.



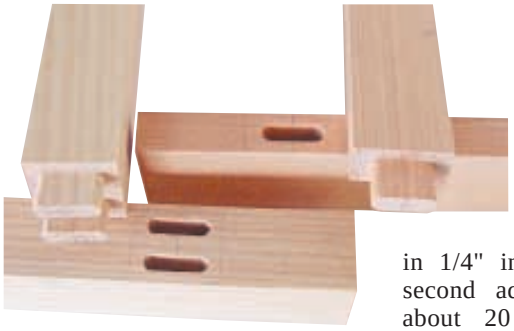
The Heart of the Matter

What makes the FMT a real boon for us woodworkers is that it's template guided, with the same guide and router bit cutting both mortise and tenon (see illustration). You rout around the guide to cut the tenon, and inside the guide to cut the mortise. You cut all your tenons sequentially, then all your mortises. This affords you incredible accuracy, maximum ease of use, and unmatched speed.

If you do even a small run of mortise and tenon joints, (i.e. four or five cabinet doors) you'll experience a significant savings in both time and cost. Imagine your savings over a year's worth of work!

Critical Adjustment

There are two critical adjustments you need to make before using the jig, and both are explained fully in the guide. The first is to adjust the "play" of the pin on the right underside of the sub-base. It only takes five minutes, and you only have to do this once. The second adjustment needs to be done once for each set of joint guides you have. Note: The FMT comes with one



5/16" spiral upcut bit (with a 1/2" shank) and five 5/16" joint guides, which enable you to cut joints from 1/2" to 1 1/2" in 1/4" increments. This second adjustment takes about 20 minutes, and involves cutting a set of test joints.

Cutting Joints

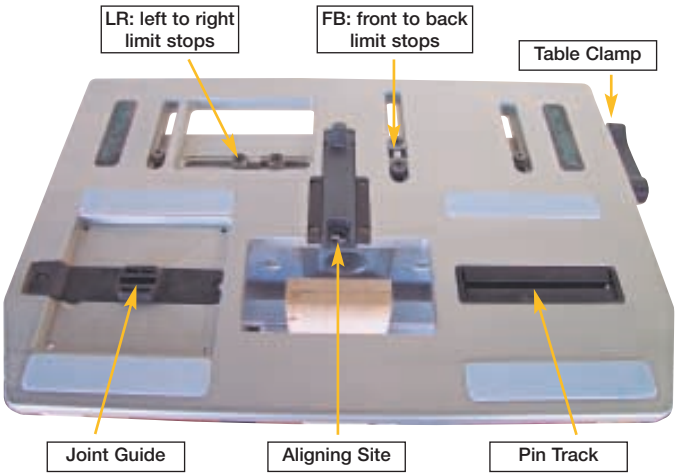
In order to cut perfect joints it's imperative that your stock is true and square, and it's surfaces are smooth and free from milling marks. Form the habit of having the same side of the work pieces face against the clamp plate. It is also important to take care when marking the centres of your tenons and mortises; I found that a marking knife did a better job than a pencil. Patience and consistency are the keywords when cutting joints, particularly for a production run.

The actual process is pretty intuitive, and after a few test cuts, is fairly easy to remember.

As the term implies, the "limit stops" (LR and FB) limit movement of the tabletop. You'll adjust these before you rout your tenons. You'll also use them before you rout the mortises, if your mortise work pieces are of different dimension than your tenon work pieces.

The "aligning sight", which you use in conjunction with the limit stops, enables you to accurately position your work piece. Once set, you'll use the "table clamp" to lock the tabletop in place. The "joint guide" and "pin track" guide the router as it cuts the stock. Simple to remember, easy to use!

Because the sub-base cutter hole is only about 1" diameter, it's somewhat difficult to see the bit as it cuts stock, which for some folks might take a bit of getting used to. The dust port on the back of the jig does a pretty good job of picking up most of the debris, except when large stock blocks up the cutter opening.



The clamp plate tilts up to 30° from vertical, and the side stop fence can be angled up to 45° left or right, enabling you to cut angled and compound joints. I did cut a number of offset, wide, twin, quadruple, and bridle joints without a hitch.

Accessories

As mentioned, the jig comes with matching 5/16" bit and guides. You can buy guides for 1/4", 3/8" and 1/2" tenon sizes. Matching bits can be bought from Leigh or any third-party source. By mixing different bit sizes and guides you can cut a total of 68 different joint sizes from an incredibly small 1/32" by 3/32" to as large as 1/2" by 4 1/2". For a single tenon the maximum work piece size is 1 5/16" by 5 1/2", while for a quadruple tenon it's 2 3/4" by 5 1/2".

Impressions

The FMT is one of the best shop accessories that I've seen in years. It enables anyone, from novice woodworker to seasoned shop pro, to cut faultless mortise and tenons. In a production environment it will pay for itself in increased productivity in a very short time. And best of all, the jig is easy to use. The photo examples show the first single and twin joints that I cut with the FMT. Marking and cutting a set of 16 single joints (5/16" by 3 3/4") took 50 minutes. Each one was a perfect fit!

Where to Get It

The FMT is available from Lee Valley Tools (www.leevalley.com or 1-800-668-1807) for $1,059. A set of 1/4", 3/8" and 1/2" joint guides cost $99. The basic kit includes the jig, five 5/16" joint guides, a 5/16" spiral upcut bit (with a 1/2" shank) and a comprehensive instruction guide. For more information contact Leigh at 1-800-663-8932 or www.leighjigs.com.

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

By Rea Gibson

Wine Bottle Puzzle

To enjoy this wine you have to solve the puzzle. Actually, it's a good thing that you can't get to the wine until after the puzzle is solved, or you might just give up too easily.

The base of the puzzle is made up of 1/2" material but you can use 3/4" material providing you leave at least 3 1/4" x 3 1/4" inside space for the average bottle.

The top part of the puzzle (that sits on the wine bottle) can be turned or shaped by hand.

Cut out the shapes as shown in the drawings.

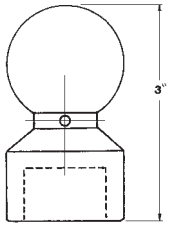
Make 1/8" dadoes in the sides to hold the bottom.

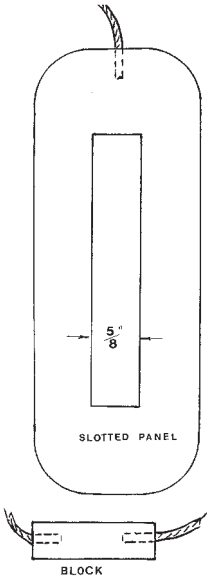
Screw the locking panel with the two 3/8" holes into place before assembly.

The sides are glued together with simple butt joints.

Be sure to set the bottom into place as you clamp up.

The ropes are glued into place as shown.

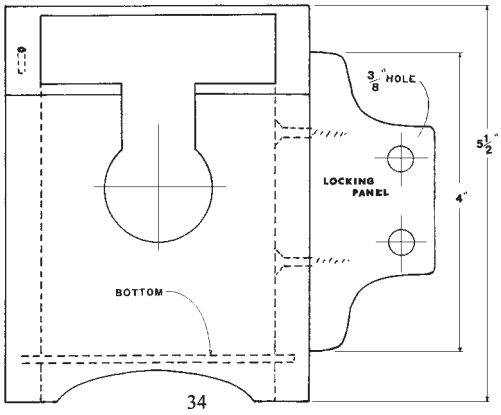




REA GIBSON owns and operates Forest Hill Studio and is the author of The Wooden Puzzle Book. He lives in Mount Forest, ON. email:egibson@golden.net

MATERIALS LIST

2	**1/2" x 4 1/4" x 5 1/2"** Base Sides
1	**1/2" x 3 1/4" x 5 1/2"** Base Back
1	**1/2" x 3 1/4" x 5 1/2"** Base Front
1	**1/8" x 3 3/4" x 3 3/4"** Base Bottom
1	**1/2" x 1 3/4" x 4"** Locking Panel
1	**1/2" x 2" x 5 1/2"** Slotted Panel
1	**1 1/2" x 1 1/2" x 3"** Top
1/8" Braided Rope - **17 1/2"** Long	
1/8" Braided Rope - **20"** Long	



Solution

From last issue's
Magic Square Puzzle

8	3	4	
1	5	9	
6	7	2	

1	15	14	4
12	6	7	9
8	10	11	5
13	3	2	16

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By Paul Ross

Lamp Pulls

Most ceiling fans, and many lamps, come with lower quality, machine-turned pulls. They are practical, but they are often far from attractive. So, why not replace those pulls with an attractive piece made from turned exotic wood?

You could use up those small bits of wood that you have been saving. You know the ones: they are too small to use, but too beautiful to throw away. Now you can use them to create decorative lamp pulls. This simple project can take you as little as half an hour to make, but will lead you through important turning techniques. In fact, this project is an ideal exercise to learn simple spindle turning.

Mount the Block in the Lathe

You only need a piece of wood about 2" long by 1" square. Mount the small block in the lathe between centers. Turn it round with a roughing out gouge. Use the gouge with the flute in an upward position at first. That presents as little resistance to the wood as possible. When most of the corner section of the piece is turned off, turn the gouge on either of its sides and move the gouge in the direction opposite the flute. That presents more metal to the wood resulting in a smoother cut (photo 1).

Now that you have the piece turned round it is ready to shape. Put a spigot on one end. That will enable you to grab the piece with a chuck so that eventually you will be able to remove the tailstock to allow the last cuts to be done. To create a spigot, use a 3/8" beading parting tool. The 3/8" wide parting tool allows a wide cut. Use half the width of the tool at a time, taking two passes. That will result in about a 3/8" long tenon, or spigot (photos 2 & 3).

Drill the Hole

Take the spigot and put it in a “Jacobs” chuck. Drill a small hole, slightly larger than the thickness of the string or chain to

be used on the pull. With the tailstock removed, hold a drill and push it into the spinning wood (photo 4).

Shape the Piece

Put the tailstock back in place for support. Although the piece is in a chuck, you want to use the tailstock for as long as possible. Shape using a 1/2" spindle gouge. Feel free to experiment with shapes (photo 5).

Define the Ends

Once shaping is complete, define the ends by getting rid of the bulk at the tailstock.

This is best done with a skew. Use the toe or long point of the skew. Lift the toe into the spinning wood. When you are almost down to the center, remove the tailstock and cut the last little pip off (photo 6). Do a little sanding before parting off the piece. Very little sanding should be required.

Part the Pull from the Chuck

Once again the skew is used to cut the finished pull off the "Jacobs" chuck. If the last cut is done on the finished side of the pull, no sanding is required (photos 7 & 8).

Have fun making various shaped pulls like the ones shown.

Now you've got an easy and practical use for those "special" pieces of wood that you've been saving.

PAUL ROSS owns and operates Chalet Woodcraft and teaches woodturning in Boston, Ontario.
(519) 443-5369 www.chaletwoodcraft.com


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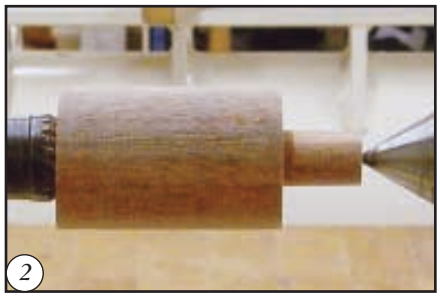
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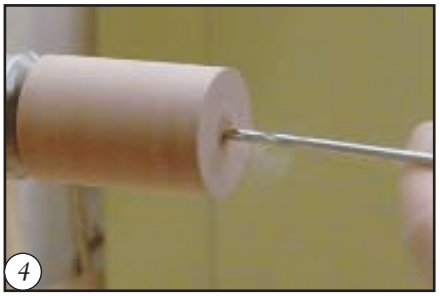
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By Lidy McVicar

Blanket Box

Looking for a project that won't take a long time to complete or cost a small fortune? This smaller version of a blanket box is a simple and inexpensive project. Treasure chests and blanket boxes have been used throughout history. Timeless and beautiful, this project is sure to be passed on through your family for generations.

This blanket box can be built from any number of materials. I used pine because it is easy to work with and I think the grain is beautiful.

Construction of Box

Select the wood you will be using for this project and plane it to 1/2" thickness.

Use your table saw and trim the 1/2" x 12" to a width of 11 1/4".

Make sure that the wood is squared off and use the radial arm saw to cut 4 pieces 18" in length. This is the wood for the top, sides and bottom of your box.

Use the remaining wood, cut 2 pieces each 10" in length. These pieces will make up the sides of your box.

Carefully examine your wood and select the pieces that you want to use for the front, top, back and bottom of the box. Use clamps to secure the project as you glue and assemble the box (4 sides and bottom). Sand completely.

Construction of Leg Apron

Mark the side leg aprons lightly with pencil to show the shape of the curve (2 pieces 11 1/8" x 2 1/2") measuring up 1" from the bottom and 2" in from each side.

Draw a straight line across the apron and round at the corners using a small circle. (I used the bottom of a wood filler container)

The front and back leg aprons should be marked 1" up and 2 1/2" in from the sides.

Cut out the curve of the aprons, shape and sand.

Ensure that your box is square. Glue and fasten side aprons first and then front and back apron pieces. Trimming may be necessary.

Construction of Top

Use the remaining 18" x 11 1/4" and cut 2" from the width.

Glue and fasten the 18" x 2" piece at the rear of the top.

Cut 2 pieces of 2 1/2" x 8 1/2" straps

(glued and nailed) from the remaining material. Straps are important to keep the lid flat and prevent warping.

Glue and fasten the straps 1 3/4 in from each side and flush along the back edge of the lid.

Place top and mark where you wish the hinges to be fixed. It is best to place a thin piece of cardboard (such as a file folder) between the back piece and lid, so the hinges will sit nicely. Fasten the hinges.

Fill nail holes and do the final sanding.

Finish as you wish.

MATERIALS/CUT LIST

You will need:

8' x 12" x 1/2" pine

7' x 2 1/2" x 1/2" pine

4	**18" x 11 1/4" x 1/2"** Front & Back of Box
2	**10" x 11 1/4" x 1/2"** Ends of Box
2	**19" x 2 1/2" x 1/2"** Front Aprons
2	**11 1/8" x 2 1/2" x 1/2"** Side Aprons
2	**8 1/2" x 2 1/2" x 1/2"** Straps for Inside of Lid

Fasteners – nails or staples - 7/8"

Carpenter's glue applied on all joints

Lidy McVicar is the Marketing Manager of The Woodshop at Brittany Boxes, Ancaster, ON
(905) 648-1084
www.brittanyboxes.com info@brittanyboxes.com

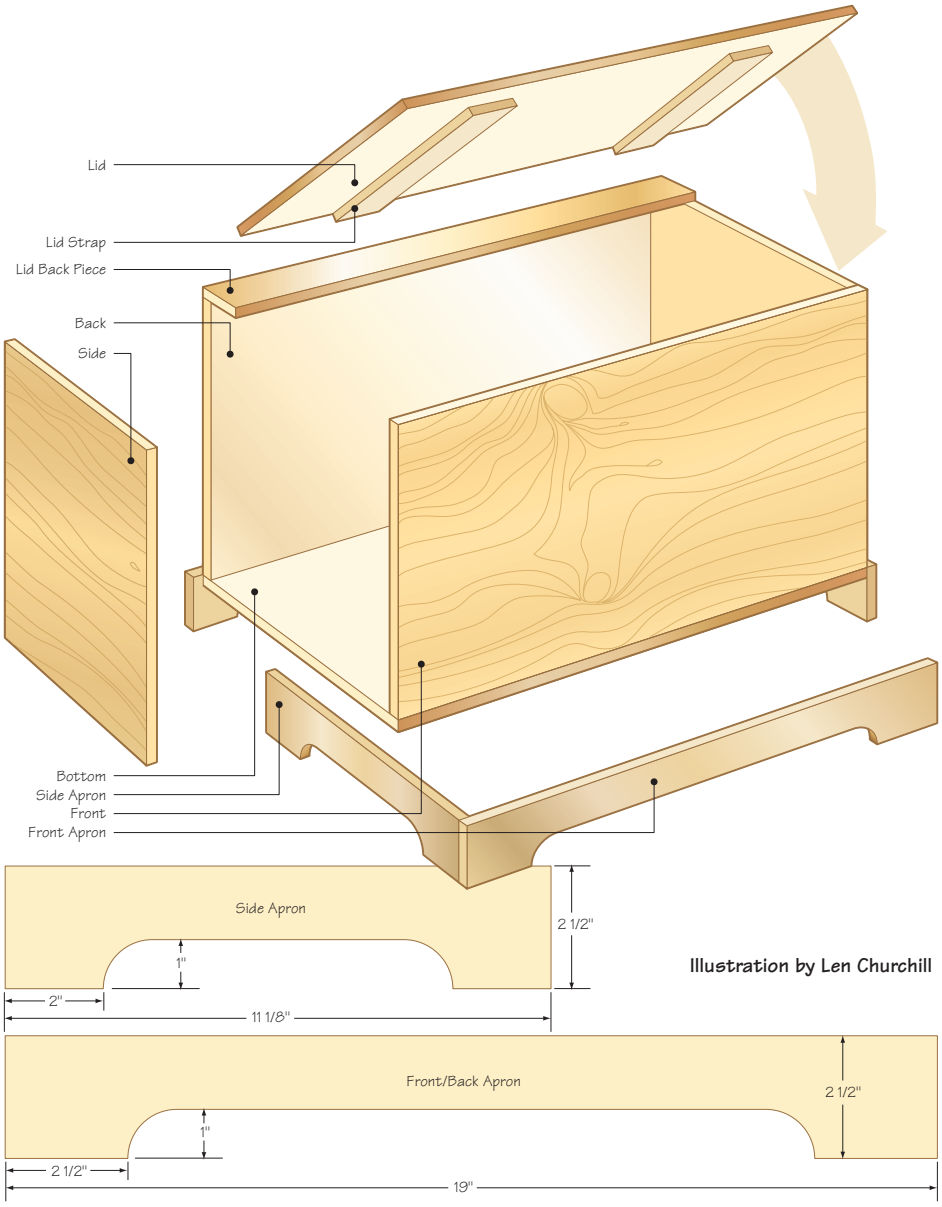


Illustration by Len Churchill

Veritas Standard Block Plane

Over the past few years, Lee Valley Tools, under its manufacturing arm, Veritas, has produced a complete line of high-end hand planes. The latest addition is the **Veritas Standard Block Plane**.

The standard plane (#05P22.30) is functionally the same as their low angle block plane (#05P22.01), except that it has a 20° bed angle.

At 1.8 pounds and just under 6 1/2" long and 2" wide, this plane is heftier than most other steel bodied block planes on the market. The A2 steel blade is 1/8" thick and has a cutting width of 1 5/8". It has a primary bevel of 23° and a micro bevel of 25°. Although the blade comes sharpened (it cut nicely straight out of the box – see the shavings in the photo), it can stand final honing on a 4000-grit waterstone. The back of the blade was dead flat, and can be brought to a mirror finish in no time at all.

The sole of the plane was slightly concave (across its width and from the heel to the back of the mouth). You'll find this on all hand planes, so the .003" measured on this one isn't anything to worry about. The concavity was uniform both vertically and horizontally. A cup of tea on a cold winter afternoon and a bit of elbow grease will give you a perfectly flat sole, if you've a mind to.

The body is made of ductile cast iron. The fittings are all brass. A really nice feature is the set of three fingertip indentions on the side of the body; it makes holding the plane noticeably more comfortable than my other block plane. The sides are dead square to the sole, enabling you to use the plane on its side (with a shooting board) to work end-grain.

As you would expect with a high quality plane, there is an adjustable toe that enables you to fine tune the mouth. I always keep the mouth as narrow as possible.

What I particularly like about this plane is the adjustment mechanism. Release the lever cap wheel and you can quickly, and accurately, adjust both the feed of the blade and its lateral movement. Once the blade is adjusted to your liking, you can lock it in place by gently advancing the set screws on either side of the plane body.

I used the plane straight out of the box for most of a morning, and was very pleased with its performance. During lunch I honed the blade and used it again throughout the afternoon. This is one sweet plane!

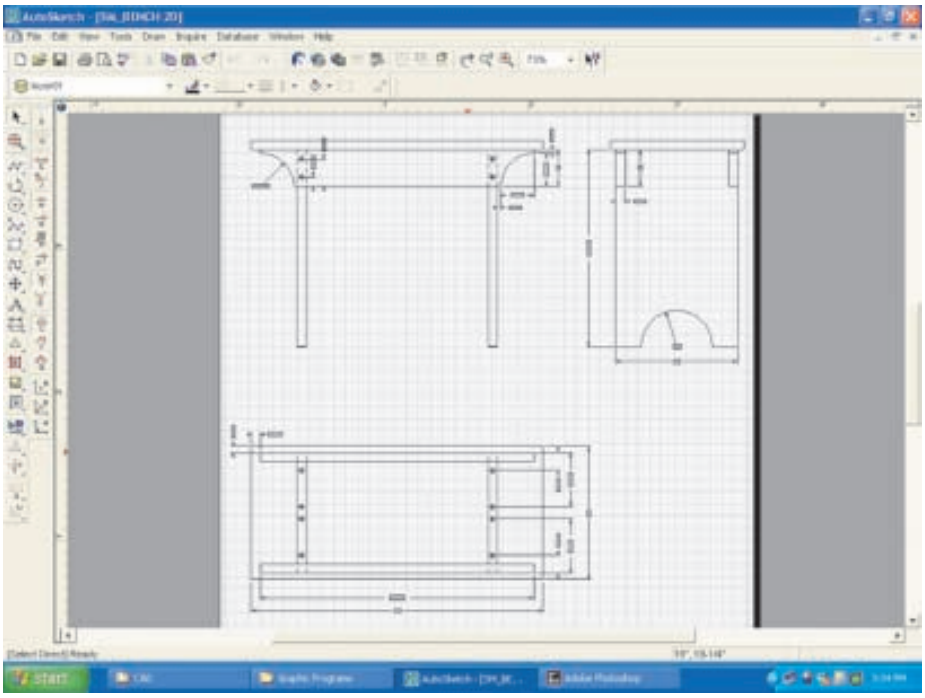
It is priced competitively at $135 and is available at Lee Valley.

1-800-267-8767 www.leevalley.com

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

By Michel Theriault

Design Your Own Projects - With CAD



Screen shot of CAD program.

Why design your own projects?

Using plans is OK, but what about something you can't find a plan for? Or what if you have a unique need that no one has designed a project for? Designing your own projects solves these problems. In fact for some, designing a project is almost as much fun as building it.

One advantage to designing your own project is that you can make the project match your ability and the tools you have available. It also allows you to maximize your material, by changing dimensions as required and by dressing the boards you have down to a different size. This will save you both time and money.

There are really two parts to designing your own projects. The first is the drawing itself, which is made easier with CAD (Computer Assisted Design). The second is how the parts go together – the joints. If you haven't designed anything yourself yet, pick up a book of joints to give you detailed ideas on how to put the parts together.

If you still build most of your projects from existing plans, you can use CAD to simply modifying those plans to meet your specific needs. You can use CAD to change the dimensions or construction methods to suit your needs. You can even add, change, or delete decorative elements/detail from the final product and be confident that the rest of the project will still fit together properly. Once you become comfortable with typical construction techniques, you can begin designing your own projects.

How does CAD help you design projects?

CAD allows you to use your computer to draw what you might otherwise draw on paper. If you have avoided designing your own projects because you feel you can't draw a straight line, CAD is the obvious solution. With it, you can draw with exact precision, and use drawing tools that add an incredible amount of flexibility and efficiency to your drawing time.

To help you build the projects you design, a CAD drawing measures and labels the dimensions of anything on your plan, providing you with an accurate cutting guide. You can also print out the full project on a single piece of paper. When you need a pattern to transfer to the wood, you can also print parts of it to full scale.

If, for any reason, you want to change the design, CAD makes those changes easy to do. With paper, you would have to erase and re-draw the change and anything else affected by it. With CAD, the changes are easy to make. If you want to keep the original and see how your changes will look, you can do that too. A good example of what you can do is design a coffee table, then shrink its length to make matching end tables.

Depending on how you like to work, you can either draw the project in full detail or simply draw the basics. Full detail shows the hidden parts and all the details are fully fleshed out. The basic drawing gives you information, such as the lengths and widths of various parts for cutting, and leaves other details for you to decide during the building process.

Drawing with CAD is very similar to drawing on paper, with a few exceptions. For the most part, you need to plan ahead when drawing (for example: using the last end point of a line as a starting point for the next line). With most programs you don't

need to worry about scale until you want to print – you draw in real size and either zoom or shrink it to fit the screen while you draw.

Because of the precision of a CAD drawing, you must be careful to ensure that the size of the lines, rectangles, etc. is exact. Fortunately, that is very easy to do in CAD. You can usually specify the exact dimensions of each piece you draw. For instance, to draw a drawer front, select the rectangle tool, select a point on the drawing for the first corner and either type in the dimensions (i.e. 13 1/2" wide by 3 1/2" tall) or simply drag the rectangle and the display will tell you the exact dimensions as you drag. Alternatively, you can set up a grid on the drawing (perhaps spaced 1/4") and then "snap" the lines and corners to the grid as you drag the shape.

If you have to draw several identical items, such as a joint or drawer, you can draw it once and either copy it to the new location or even rotate it or mirror it. The mirror function allows you to draw one end of a project and then flip it over and position it at the other end, completing the drawing with half the work.

Types of CAD Drawings

Computer Assisted Drawing allows you to easily produce the two basic types of drawings you would otherwise use pencil and paper for. These are simple 2D and isometric 2D drawings.

2D is used for typical plans and is drawn on a square XY grid to represent height and width. The drawings show only one side of the project at a time, and usually a plan is made up of multiple views (such as a top view, side view, and end view). These are laid out in a logical format so you can visualize the project (fig. 1).

Isometric drawings give a 3D type of view using a modified angular grid. This allows you to show three sides of a drawing in 2D, however the sides won't be

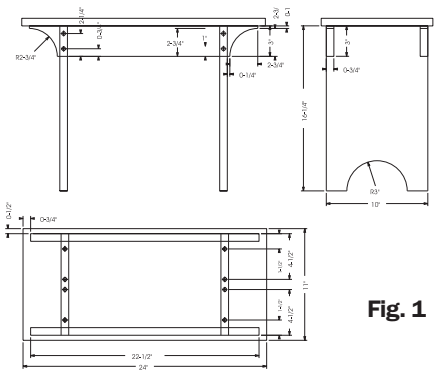


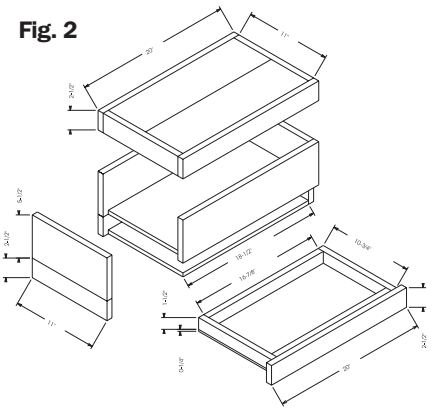
Fig. 1

seen in a standard square format – they will be angled (fig. 2).

A 3D CAD drawing also uses a square XY grid, with a third Z dimension added to indicate depth. This allows a full visualization of the completed project. Often the software allows you to add surface texture to the drawing, rotate the project and view it from any angle. This is usually quite a step-up from 2D drawing both in cost of the software and the level of difficulty in drawing the project. Visually, it looks very much like an isometric drawing, with the added benefit of being able to turn hidden lines on and off and rotate the drawing to view or print any angle.

For most home woodworkers, a 2D CAD

Fig. 2



program is sufficient, with 2D isometric capabilities as an added bonus.

What else can you do with CAD?

While there are specialized CAD programs for things such as designing a house or landscaping your garden, any CAD program that you consider for woodworking can also help you design floor layouts, sheds, and even landscaping projects. You can also use it to figure out how to lay out pieces to be cut on a piece of lumber or sheet of plywood, ensuring the most efficient use of the material you have.

Next issue, Michel gets more detailed with specific CAD programs and highlights their strengths and uses.

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:

- QuickCad - http://usa.autodesk.com
- DeltaCad - http://www.dcad.com
- Autosketch - http://usa.autodesk.com
- DesignCad 3D Max http://www.upperspace.com
- TurboCad V8 http://www.turbocad.com
- IntelliCad Standard http://www.cadopia.com
- EasyCad http://www.fastcad.com/ecw_prod.html

MICHEL THERIAULT is a writer and woodworker living in Guelph, Ontario. www.woodstoneproductions.com mjtheriault@sympatico.ca

dustcollection

By Chester Van Ness

Cyclones

Dust collection with a cyclone is the safest way to collect material from your shop, because no material goes through the fan. A cyclone also reduces the amount of times that you have to handle your dust. Eventually (whether you use a cyclone or a regular stand-alone dust collector) you will need to either empty the shavings or clean the filters. The cyclone reduces that frequency in a couple of ways: 1) the dust and materials are spinning when they exit the cyclone so they pack into the drum and, 2) because properly designed cyclones are highly efficient, less dust exits to the filters, reducing the number of filter cleanings.

Cyclones are fairly tall. In photo 1 you can see two different sizes and designs of cyclones. The cyclone on the left is a round top cyclone and the other two are flat tops. The round top cyclone requires more height to install. The flat top cyclone is designed to allow mounting of the fan directly on top of the cyclone and is the most efficient mounting method. These units can be either wall mounted or free standing.

Before you can decide if a cyclone is for you, you will have to consider if you have room for one. If you do, then you'll have to decide where you should locate it. Adding a cyclone to your system does not change the fact that the return air must still end up back in the shop, so remember that your layout must allow for this. If you don't have the height necessary in your shop, there are some options available. As you can see in photo 2 this 3Hp unit was too tall for the room, so the owners had an opening made in the ceiling to accept the blower unit. (Note: when installing the unit up into an opening, there must be at least 1 inch of clearance between the end of the motor and the ceiling to allow for air flow through the motor's end-mounted fan. Notice in this photo the set of double doors in the background. These provide an easy and direct route to remove the waste barrel from the shop. Such considerations are important, because you don't want to have to lug the waste barrel across your shop to get rid of its contents.

In the case of a basement shop, you may be able to install the motor up between the floor joists. You may also consider making some adjustments to the lower end of the cyclone and flex collar or reduce the height of the waste container. If you're still not able to gain enough clearance you might try an adapter as seen in photo 3. The adaptor goes on top of the cyclone and allows you to mount the fan off to the side. If you add to this two 90-degree elbows and a length of straight pipe, you can set the fan on the floor, or even hook up to your dust collector. If you go with the last suggestion then be sure to install fine filter bags on your unit. Keep in mind that the more pipe that you add to the front of the fan, the less air flow you're going to end up with after the cyclone.

If you decide that you do not want the fan in your shop and you want as much of the piping as possible to run above the ceiling of your main shop. Photo 4 shows the lower half of the cyclone sticking down through the ceiling. A section of 8-inch pipe leads to the flex collar and then to the waste barrel. Because the waste is spinning on the way out, the ducting must be round and located directly below the cyclone. You can also see the air filters (located right beside the cyclone and waste barrel). The flex hose from the fan discharge brings the return air down into the upper air box of the filters and returns the air to the shop.

If you decide on this option, and the space above is un-insulated, you will want to insulate the area around the section of cyclone, any piping, and the blower. That will be sure to reduce heat loss in the winter months. Also, if you're running the piping above the ceiling, the length of the lift (from the equipment hood to the horizontal piping overhead) should be no more than 10 feet.


1


2


3

Photo 5 shows an installation where the shop is located above the cyclone and the filters. In this case all the pipe headers run between the ceiling and the floor. There is an open staircase to the shop from this room so the air from the filters travels back up to the shop. If you decide that this type of set-up would be good for you, bear in mind that you will need access to the piping in case you ever experience a blockage.

If you decide that you just don't have the room (or the budget) for a cyclone then consider installing a "dropout" at the suction to your fan. Photo 6 shows a simple "T" fitting with a plug installed directly in front of the fan. This set-up will capture screws, nails, and large chunks of wood before they can enter the fan. However, in order for this to be effective you must remember to clean it out daily.

Whatever your situation, if you decide that your workshop will handle a cyclone, your set-up can usually be adapted.

If the cyclone is not a consideration for you at this time, be sure to do what you can to reduce the amount of dust in your workshop.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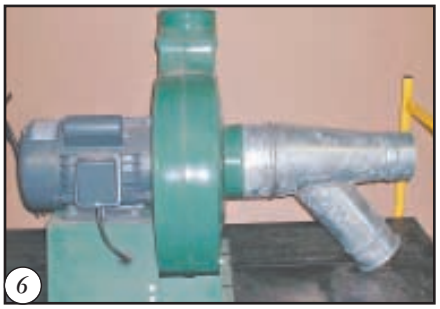
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CHESTER VAN NESS is a Dust Removal Consultant in Scotland, Ontario. (519) 484-2284

■ Cont'd from pg. 3

Dear Editors

I just wanted to tell you that I picked up a copy of your magazine today... I was very impressed. I am an amateur furniture builder. I love seeing articles on home made jigs. Keep up the good work.

Terry, ON

Terry

It seems that you're not the only one who loves jigs. We have received a number of jig requests and, fortunately, just as many jig submissions, so we have picked out some of the best ones and will be running them in the next few issues.

Enjoy!

Paul

COMING EVENTS

THE WOOD SHOW
August 8, 9, 10
Durham Fairgrounds Durham ON
(519)369-6902
http://durham.woodshows.com

THE MUSKOKA WOODSHOW
August 15, 16, 17
Bracebridge Fairgrounds Bracebridge, ON
(705)645-8789
plynd@muskokaoffice.com

THE WOODWORKING TOOL AND HOBBY SHOW
September 19, 20, 21
Prairie Land Exhibition Grounds Saskatoon SK
1-888-389-4752
toolshows@shawbiz.ca

THE 18TH CANADIAN WILDLIFE CARVING CHAMPIONSHIPS
September 20, 21
Wye Marsh Centre Midland ON
(705)526-7809

THE WOODWORKING TOOL AND HOBBY SHOW
September 26, 27, 28
Red River Exhibition Grounds Winnipeg MB
1-888-389-4752
toolshows@shawbiz.ca

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

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

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