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The Journal

of the Guild of New Hampshire Woodworkers

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Dado Plane

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Metric Madness

by Michael O. Moore

The word came down in fourth grade—the United States was going metric and there was nothing we could do about it.

For a whole week we learned about the metric system in all its simplicity. We were told to think in terms of millimeters, centimeters and meters. The system, based on tens and hundreds all seemed so logical especially given that in the Imperial System I didn't have a good grasp on which was bigger—7/32nds or 5/64ths.

Not long after this week-long crash course, I suspected the teachers were telling the truth when soda bottles began showing up in liters in stores. So, I figured maybe I was going to have to learn kilometers instead of miles. But in the end it never happened. The "Powers That Be" had a meeting somewhere in Washington, D.C. and put the brakes on metric in the U.S. Somehow the liter bottles of Coke survived!

So, I lived my life merrily in Imperial measurements. In my woodworking I tried to go the extra mile, not the extra kilometer. It was only when dealing with research scientists who spoke in metric or in trying to stay within the speed-limit on the long, red roads of Nova Scotia, that I was forced to think about metric. Also, my wife's European relatives liked to bandy about temperatures in celsius and road distances in kilometers—of course sometimes they'd address me in Dutch and that didn't make any sense either.

I started to think about all this over the past seven or eight years. A friend convinced me to get a few tools made by the German company Festool. Those budget-busting beauties had, until very recently, no accommodation for Americans hung up on Imperial—it was all metric. As I used those tools more and more, and I occasionally installed metric versions of Blum slides for various projects, I found myself using metric. To make it all go smoother, I got a tape measure with metric on one side and imperial on the other. As time went on, I started using metric more for things like dividing long

pieces in half. Which is easier to divide in half—1402 millimeters or 44-13/64 inches? I'd just go to the millimeter side and make a mark 701 mm and I was done—no fuss.

Dividing in metric is something that the Guild's Beginner and Intermediate Group's (or BIG) leader likes too. Bob Wyatt said that while he uses metric about a quarter of the time in the shop, he always uses it in the kitchen when dividing bread dough.

"I typically mix enough dough for about three loaves and use a digital scale to divide the dough into three equal portions," said Wyatt, who bakes bread every month. "My scale displays in either pounds and ounces or grams. I find it so much easier divide a metric number like 1871 grams into three equal portions of 624 grams vs. an imperial number like 4 pounds, 2 ounces into three equal portions of…64 ounces = 4 pounds + 2 ounces = 66 divided by 3 = 22 ounces = 1 pound, 6 ounces each."

I've noticed over the past few decades that more and more screws and bolts on router bases and the like often come in metric. So I ask you, what's bigger a M6 (6mm) or an M8 (8mm) bolt? Pretty straightforward.

And then really problematic situations popped up as I designed and made custom-sized pieces to fit odd spaces in houses and offices. When creating a final design in the computer assisted design program Sketchup Pro, the program will calculate measurements that are dependent on the others in the plan. So, as it determines the length of various angled pieces and other odd parts in furniture, it heads into the 64ths.

For instance, I've been working on a large desk unit for a home office. Where two of the desk tops came together, there was a section of edge at a 45° angle. Because of the customer's space and what he wanted for the rest of the table top, this length of this angle was not a nice clean number. Sketchup spit out 64ths. The same happened in many other places on the plan.

When I got into the shop and was confirming measurements for moldings and the like, the stream of fractions with different denominators kept slowing me down. Frustrated, I headed to the computer and converted the imperial fractional number to millimeters. So 17-41/64˝ translates to a clean 448 mm. And 18-5/32˝ is 461mm.

Years ago I jury-rigged a digital gauge onto my thickness planer—I understand they make them purpose built now. As I plane down, the damn thing will give me nasty numbers in 64ths, 32nds, 16ths — the denominator changing all the time. I can't really tell where I'm going half the time. But put the thing on metric, assuming you know where you are going in metric, and the thing moves beautifully—18 mm, then 15 mm, then 13 mm. With metric I'm a king in simple control of my board's thickness. Of course, if I could easily read the affixed imperial ruler that came on the planer none of this would matter either, but that's something else.

I'm sure some of you are fluent in Imperial—but I don't think much beyond 16ths. In comparing numbers below eighths I have to start thinking. Still, I do think in terms of quarters, eighths and 16ths as I think about sizing things. I'm not planning to ditch Imperial as my main way of measuring things and even though you see metric on lots of labels these days, it doesn't seem there's any move toward it in the U.S. to either.

"Few people ask for metric, and Festool's (recent) adoption of Imperial speaks volumes," said Roger Myers, a former Guild President, a furniture-maker and now manager of the Portsmouth Woodcraft.

I'm always amused by people that are hardcore in one camp or another," Myers added." Imperial is not that difficult to work with and when you have been using it for so many years, converting is a challenge. I'm comfortable with both, but do all my design work and construction using Imperial. As woodworkers our measuring precision—at least using a rule—seldom needs to exceed 1/64". Dividing fractions in half is easy enough which is the most common thing we need to do."

To be sure, I'm as resistant to change as the next guy. But, I am going to try to use metric more in an attempt to be more "bilingual." That double sided tape measure is handy and I have both systems on the tapes on my table saw and chop saw extensions.

Don't get me wrong, I love so much about Imperial measurements. I mean it just doesn't sound right to say "give them a centimeter and they'll take a mile." But, I secretly wish the Powers That Be had just gone the whole Kilometer and made America pay the price for retooling in Metric with an eye to the future. If that had happened, I'd probably be able to think in metric. Maybe I could even dream in metric. ■

Michael Moore is head of the Hand Tools & Carving Group and makes furniture in Merrimac, MA

Shaping Wood

December 3, 2016

Spokeshave, Chisel, Rasp & Card Scraper

by Bob Wyatt

In this BIG meeting, *Matt Wajda* demonstrated how to shape wood using hand tools. Matt began this session with a discussion on how the design of fine furniture often requires a woodworker to move beyond the initial straight lines and perpendicular or other angled joinery of a piece. Many times there may be sections of a furniture piece that call for some aesthetically pleasing shape. A few examples of such spatial attributes are facets, curves, contours and carvings. Matt showed us how he is able to create some of these visually pleasing shapes using old world techniques and a few basic hand tools often used by early American craftsmen and furnituremakers.

Spokeshave—Matt calls attention to one of his favorite shaping tools, the spokeshave. He says we should think of the spokeshave as a *finesse tool*.

Because spokeshave irons do not have sufficient length to properly fit in traditional honing guides commonly used for plane irons and chisels, he hones a spokeshave iron freehand. Spokeshaves, like hand planes, are used to remove shavings, primarily with the grain. He recommends flat-soled spokeshaves for the majority of our woodworking projects. Potential advantages of using a curved sole spokeshave on a part are far outweighed by the disadvantages of it being a much more difficult tool to set up and use in an efficient, controlled manner.

Tuning a spokeshave, much as is the case with a hand plane, often requires us to flatten the sole of an old spokeshave you may have acquired at a flea market. Matt flattens the sole by working the tool in a forward motion across 80-grit sandpaper that has been applied to the flat surface. He does not use a push-pull motion when flattening a spokeshave sole. It is okay to leave the scratch pattern on the sole because it actually improves the tool performance.

Matt uses an old "2x" rule of thumb method to set the proper bevel angle for the iron. The 2x method is a simple ratio where the width of the bevel equals two times the thickness of the iron.

The spokeshave can remove the bandsaw or other tool marks from curves cut into patterns, or furniture parts, such as the curve of a cabriole chair leg. It can be used with either a push or a pull motion depending on grain direction and user preference.

The tool is able to effortlessly remove thin shavings of wood as it approaches a layout line. The spokeshave can be used with the grain along either convex or concave curves. He notes the importance of fairing all the way through a curve while carefully approaching a pencil line. To not correct any imperfections on a pattern results in the imperfection being transferred to the part, compounding inefficiencies of both time and effort.

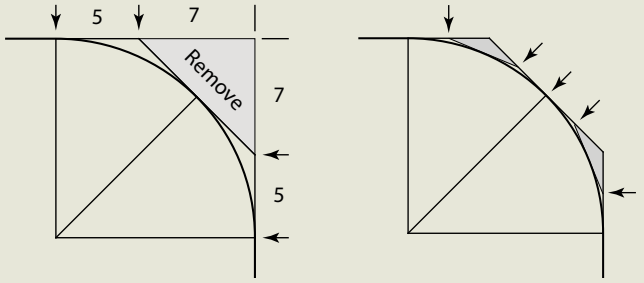
To get a flat-soled spokeshave iron into and through a tight curve is not always possible. Matt notes some success doing so, but it is sometimes necessary to adjust the iron further out as he works it through that section of the curve. For patternmaking, Matt explains how he would fair the edge of a piece of ⅛″ Baltic birch plywood into a smooth, curved pattern for a cabriole leg using a spokeshave first, followed by a Nicholson No. 49 rasp, and sometimes finishing with a card scraper. For removing lumps, bumps or dips from a pattern or a part, Matt frequently uses the Nicholson No. 49 rasp. The Nicholson No. 49 has a finer cutting pattern than the Nicholson No. 51. Both of these rasps are made with a rounded face on one side and a flat face on the opposite side. Because of its versatility, he recommends the No. 49 rasp as a tool that can be acquired for short money and is a must-have for any woodworker's toolbox.

Roundovers using the 5:7 rule—In the next segment of this BIG session, Matt showed us how he uses a 1″ wide chisel to methodically shape the straight, square edged end of a 5/4 hardwood scrap into a 1″ radius, quarter-round shape. The chisel has a longer handle than most bench chisels which provides some advantages in his next demonstration.

Matt's careful layout on the 5/4 stock begins with the board being placed in his bench vice with the long grain 5/4 edge facing up. He lays out a 1″ square on the end of the 5/4 edge, referenced to one face of the board.

Next, Matt references a compass point into the newly drawn corner located 1″ in from each reference edge and end to trace a perfect 1″ radius arc connecting the two lines on the edge of the board. He then flips the board in the vice and repeats the marking exercise on the opposite 5/4 edge.

Now Matt draws straight lines across the reference face and reference end connecting the 1″ lines. The chisel will be used to



Create a primary chamfer & then two secondary facets.
Note: Arrows indicate where lines on reference faces are drawn.

methodically remove waste wood that is outside the penciled arcs and inside the connecting lines on the reference face and end.

The first chamfer removes waste from the outside corner between parallel lines drawn on a 5:7 reference as shown above. This forms a flat facet tangent to and centered on the arc. This is the primary chamfer.

Next, draw three lines splitting the primary chamfer into four equal parts. The center line lies on a boundary of the quarter round and so should not be removed.

Finally, draw a line to divide each 5-unit flat in half. These lines and the outer two lines drawn on the primary chamfer mark the edges of two new flats also tangent to the quarter round.

Remove stock to create the new secondary facets. Finally, strike center lines on these two new flats to mark additional boundaries of the quarter round and fair the four ridges to complete the surface. As the shape becomes more apparent with each cut, you will see a near perfect quarter round edge which can be cleaned up with a card scraper.

Cabriole leg—Finally, Matt shows us how to use a pattern to mark out the shaped profile of a cabriole style chair leg, followed by a step-by-step approach to removing the waste, progressing through multiple stages of shaping, measuring, marking, smoothing and final cleanup.

The first step is to use the cabriole leg pattern to trace the leg profile onto opposite sides of the leg blank. The leg blank was previously cut to proper post dimensions. After the two-dimensional profile is traced onto one side of the leg post, Matt then uses the opposite face of the pattern to trace the profile onto the opposite side of the leg. The leg post is now ready for the initial shaping. Matt orients the leg post into a heavy-duty bar clamp and locks the bar portion of the clamp into his bench vise. Using his 1″ wide chisel in a bevel down configuration, Matt quickly removes large chunks of waste wood while being careful to stay above the layout lines. As the waste wood removal begins to approach the layout lines, he uses his chisel in a more controlled bevel up configuration. The chisel cuts are now visibly deeper into the lower section of the leg post, forward of the ankle and above the foot.

The area just below the knee is where the cut into the post is shallower. At his point he uses his spokeshave to smooth out the chisel cuts while creeping up to the layout lines. The shaping in the tighter curve where the lower, narrow ankle section of the leg transitions to the wider foot requires careful layout line placement and a combination of hand tools to work the area into a smooth natural curve. Matt uses the chisel, spokeshave, specialty Grobet multi-use rasps and card scraper to smooth and clean up the curve. This process of measuring, marking and shaping with hand tools continues through additional iterations as Matt zeroes in on a perfectly shaped cabriole leg.

He closes this demonstration by performing the final shaping using his finesse tool, the spokeshave, along with the Nicholson No. 49 rasp and a card scraper. ■

Power Tools & Files

February 4, 2017

by Mike DiMaggio

In our meeting this week with *Bob LaCivita*, the BIG members had the opportunity to discuss various hand and power tools that might possibly be used in woodworking. A tool with specific application to furniture making is the biscuit joiner which was developed by the Lamello company in the late 1960s. Hermann Steiner started a company in Switzerland that perfected this tool and to this day the Lamello joiner is considered the "Cadillac" of biscuit joiners. This tool was used primarily to edge glue boards together. However with the advent of strong modern glues, biscuits are rarely utilized in modern furniture making. Thus, biscuits have been relegated to a position of an alignment tool more than for structural purposes.

With the advent of the Festool Domino tenoning machine, the ability to produce quick, accurate mortise and tenon joints was a great boon to the furniture making industry. This device with its oscillating cutters has the capacity to cut multiple mortises in furniture parts with such speed and accuracy that conventional mortising machines have become obsolete except for the fine furniture maker. It is machines such as these that have brought the art of furniture making in the shops of many DIY woodworkers throughout the country.

Other tools that have application for furniture construction are the Kreg jig which utilizes a pocket hole system and fine threaded screws. This provides for extremely rapid construction of various projects. However this screw holding methods pales in comparison to the strength of mortise and tenon joints or dowels.

The electric power planer is another tool that provides the user with a fast an efficient method for removing considerable quantities of wood from stock. Although not meant to replace the stationary planer, the power planer is an excellent addition to the journeymen's armamentarium of portable tools.

Bob LaCivita

Today, there is not a woodworker who is not the owner of at least one cordless drill or router. The former allows for rapid placement and removal of screws as well as for drilling various holes in wood, metal or other mediums. The cordless drill is no longer tethered to a plug and can be taken to any remote site to facilitate drilling, screw placement and removal. The router is one of the most versatile tools in the furniture makers arsenal. This tool allows for decorative edge treatments, the cutting of rabbits and dadoes anywhere on a board and the ability to plunge cut a particular shape on a board. With the availability of multiple bit profiles, jigs and various attachments, the router has proven to be an indispensable workhorse for the fine furniture maker.

Lamello biscuit joiner

Festool tenoning machine

Makita power planer

Kreg jig

DeWalt cordless drill

Porter Cable router

The next topic we discussed was the use of files for sharpening tools and sculpting wood. The following will provide some excellent examples of files that are used to sharpen a variety of saws used in joinery.

Saw Blade Sharpening Tools (courtesy of Dieter Schmid Fine Tools)

What is the difference between normal three-sided files and saw files?

Regular three-sided files have sharp corners that cut a hard angle. Saw files have corners that are ever so slightly rounded to maintain the round gullet between the saw's teeth. This is to help prevent cracking the base of the teeth which is easy to do if you do not work carefully and precisely. Because of technical issues in the manufacture of saw files, there is a limit to how small the files can be made. An alternative for very fine-toothed Western type saws is to use a small Japanese sword-form file, which also has a lightly rounded corner. But you must then file both the tooth's front edge and back separately. This is in contrast to using the proper triangular file, which will file the front of one tooth and the back of the previous tooth on the same stroke.

What size of file should one use?

It is in principle simple—a triangular file should be chosen that is big enough so that as the teeth are sharpened, the file can be rotated in between teeth and all three sides of the file will be evenly worn down. Measure the tooth depth and look to the width of the file. The file's width should be a hair under double the tooth depth.

If it is particularly important to have a good view of the teeth while filing, choose a smaller file with sides just a little wider than the tooth depth. The file will wear out faster but you will have better control over the work. Good light also is very important for this kind of work. ■

Nicholson flat file

Saw file regular

Saw file slim

Saw file double extra slim

Saw file for Gent's saws

Needle file three square—for extremely small teeth

Saw Set

Box Panel Movement—*When making a small box, how small is small enough to not worry about wood movement breaking the piece? When is it OK to glue instead of using floating panels?*—Matthew Bogle

Peter Breu replies: I learned the hard way that even with small and thin panels—in this case cherry ¼″ thick and 3″ wide—that stopping movement is impossible. The piece cracked. The choice of wood makes a difference too. Look up the specific species you are interested in to see how much they move. Part of the answer too is how well the wood is finished. A thick surface finish will slow moisture movement and the environment the piece experiences. Modern indoor environments tend to have pretty wide moisture swings which is of course the reason why the wood moves.

"Springy" Wood—*Which wood should I use for "springy" applications like spring locks and bench dogs? The wood needs to bend and maintain tension but not take on a curve.*—Alan Saffron

Garrett Hack replies: Ash and hickory work well, but bend them too much and they will permanently deform. Spilt your material for maximum strength and springiness and design your bench dogs or other so your springs bend only moderately and over their whole length. Some of my bench dogs are 30 years old and still have lots of spring.

Richard Oedel replies: I use ash for some of that. It is tough, and tends to stay pretty straight as long as you are not over-stressing it.

Joe Barry replies: For a springy wood you can't beat Ash.

Steve Costain replies: I like ash for springy applications

Air Compressors—*I am in the market for an air compressor for my shop. I see compressors advertised with all kind of different specifications. What should I look for?*—Anonymous.

Peter James replies: While the specifications listed by the manufacturers have gotten more realistic in recent years, they still need to be checked carefully. The size of the tank is of secondary importance to the actual output volume of the compressor at usable pressures. The horse power ratings need to be checked carefully. While 746 watts equals 1 hp at 100% efficiency, in actuality, the horsepower is closer to half that. The listed hp may be highly exaggerated and misleading. Check the rated output at the pressures that you will be needing, especially at least at 90 psi or above. You can regulate it down but not up.

Also, note that there are single stage and two stage compressors. A two stage compressor can reach higher pressures more easily. A single stage compressor is limited to about 120 psi. Although manufacturers may claim higher pressures, these come at greatly reduced output volumes.

Diluting Glue—*Wood glues such as Tite Bond and Elmer's can be thinned with water. What percentage is safe to add before bonding integrity is sacrificed?*—Harvey Best

Richard Oedel replies: Don't go there. As little as 5% thinning can result in a 50% reduction in strength. When using it as an end-grain sealer, as in a miter joint, I thin it 50%, then paint it onto the end grain and let it dry for an hour before gluing up the joint with full strength unthinned glue.

Applying Finish on a Cherry Table—*What is the recommended method to apply a finish on a cherry table?*—Jorge Torres

Bruce Hamilton replies: When I began finishing projects that had new wood, I learned to Watco the wood to either darken it of accent the grain. Once this dried (a few days at room temperature and a reasonable level of humidity) I would coat the wood with lacquer. When dry to the touch I would lay on additional coats as needed. Opportunities for this type of work decreased to the point that I was only refinishing previous stripped objects.

I spoke with an old friend the other day who has been making new furniture for the past thirty years and asked him what he was currently doing to finish his projects regardless of the type of wood he was using. I was very surprised by what he told me regarding the available new types of finish materials. He is using a film forming oil based poly.

His favorite finish material is Minwax Wipe-On Poly. It is solvent based and applied with a rag. Don't forget the rags must be laid out flat on a nonflammable floor, preferably outside away from any combustible objects because the oil oxidizes as it dries, creating heat and may spontaneously ignite.

This finish material easily flows out to a smooth finish. It is necessary to work quickly during application. It dries quick enough to be able to apply three coats in a day starting at 7 am, then one at noon and finally another at 6 pm. You need to eliminate as much dust as possible from the air and on yourself. Sanding lightly between coats is recommended.

If a thicker final film finish is needed such as for a table top, he uses Minwax

Helmsman Spar Urethane and applies it with a Wooster 7″ x ⅛″ Tiz foam roller (Home Depot). Thin coats enhance the drying times. This material takes longer times to dry and even longer to fully cure. As the name implies it is meant for exterior surfaces and boat bright work. I use it annually to renew the surface of my carved sign.

Watco makes Wipe-on poly finish in various sheens, gloss, satin and perhaps flat. I used it on an oil based stained surface and it did not dry so I wiped it off with mineral spirits and sealing the oil stain with shellac. The shellac was sanded light to give some "toothing." When it dried I proceeded with the poly and it dried fine. The poly was sanded lightly between coats.

Sanding will tell you how cured any finish is by creating a powder and not clogging the sand paper. Testing by creating a story board is important.

Steve Costain replies: My favorite finish for cherry is a wash coat of shellac followed by a couple coats of Watco oil and wax. For table tops I would spray lacquer after the oil.

Storing Shellac Flakes—*How long can I store shellac flakes in an air tight container before they go bad?*—Sal Morgani

Richard Oedel replies: You've heard the response "It all depends…". Well, in this case it does. It depends on the amount of refinement of the shellac as well as on the storage conditions. Buttonlac, probably the darkest and least processed of all the shellacs, can last for several years in an airtight container at normal temperatures. But if you want to save Blonde or Superblonde shellac, you have a much more difficult problem. The most refined (lightest color) shellac in flake form will last less than six months before you see degradation in its ability to dry and form a solid, hard film. After you mix it up, it is even more sensitive, and may degrade over a much shorter time.

When I buy shellac flakes of any kind, the first thing I do is repackage them in an airtight bag (heavy duty quart freezer bags do the trick) and store them in the freezer. If the shellac comes in a foil bag, do not open until you are ready to use it. Then keep testing on a piece of glass as you mix up new batches. Good shellac dries quickly and smoothly. Old shellac dries slowly or not at all and may wrinkle. I get at least a year out of blonde shellac in the freezer, and have gotten as much as four years out of it on occasion.

Bruce Hamilton replies: I store my shellac flakes in individual poly bags by color and type. Then all the bags are stored in a larger storage container in a cool spot in my basement shop. When I add the flakes to alcohol, if there are any that are no longer good, they will not dissolve in the alcohol. Decant off the good shellac and test for its ability to dry.

Knowing Whether Finish Will Cure—*Is there a way to know before applying an oil or varnish to the wood that my finish will cure and not stay soft?*—Jim Forbes

Bob Couch replies: In general, most finishes have a shelf life, some longer than others. My experience is primarily with two finishes, shellac and Waterlox.

I have the habit of marking all of my cans with both the Purchase and the Open dates. I also like to try and buy the newest material on the shelf if I can determine what it is. I also use a product called Bloxygen, which is really just a can of argon gas, to extend the life of my finishes.

Just spraying a few seconds of Bloxygen just before I seal up the can after every use does help extend the life.

Depending on where you buy it, the price can vary quite a bit. I buy it from Klingspor (*woodworkingshop.com*) where it's $4 to $5 cheaper per can than Woodcraft for instance. Some people decant their finish into smaller airtight containers, like canning or jelly jars. I've seen some who add water to the can, which goes to the bottom and brings the finish up to the rim of the container.

The best way to tell if a finish is getting too old is to do a test piece. Give it the recommended time to cure before trying to sand it. If it doesn't sand well and clogs up the paper, it's getting old or too old to use depending on the severity of the problem. With shellac, you can reduce it more with alcohol to help some, but if that doesn't work, give up and buy a new can.

I've used a product called Japan Dryer, found in most paint stores and home centers to help improve the drying time and hardness of Waterlox when needed. It does not work in shellac however.

Bottom line is to test and sand, its the only real way to know the condition of your finish.

Bob LaCivita replies: Let's start with oils. Most oils sold as a brand name are generally a blend of oils, varnish and dryers. I can say I have never had one fail. Linseed oil is a drying oil made from flaxseed. Drying oil means it dries by evaporation. Linseed oil is sold as raw or boiled. Raw linseed oil takes many days to dry, but it will dry. Boiled linseed oil usually will dry in 24 hours. Drying time is very dependent on temperature. Usually, 65 degrees or less will need more time. Below 60 degrees, more time and so forth. I would not finish much below 60 degrees. 70 degrees is a nice all around finishing temperature.

Tung oil is another drying oil made from the tung tree. It is sold as raw or polymerized. Like linseed oil raw takes days to dry where the polymerized will dry in about 24 hours. Again, temperature is a factor.

Varnishes also fall into the never fail category. Temperature will effect drying. However, oily tropical woods like rosewood, Madagascar ebony and teak to name a few can take many days to cure. I would hit these woods with a shellac based sanding sealer before coating with varnish. Old oil and varnish that is gelling should not be used. Good luck. ■

General Putnam

BY MIKE DUNBAR

The hand written caption on this postcard's right edge identifies the scene as the fireplace in the Land Office at Marietta, Ohio. The place has the distinction of being the oldest building in the state. It was used by General Rufus Putnam, one of Ohio's founders and a friend of George Washington and other major historical figures. For those reasons, both Putnam and the Land Office are important in American history.

The photograph also shows three Windsor chairs that supposedly belonged to General Putnam. Given that Rufus died in 1824, that claim can be divided like this—possible, doubtful and no way.

The New England sack back was probably made in the western half of Massachusetts in the 1790s. That is where Putnam lived the first half of his life, and it is conceivable that he lugged the chair to Ohio. However, Rufus arrived in the first group of Marietta settlers in 1788. The company's priority would have been to bring what was necessary to establish their new community, and a chair doesn't fit the bill.

The arrow back dates to the 1820s. The drooping scrolled arms are idiosyncratic and suggest a maker who worked apart from the mainstream. Ohio is a possible location. However, Nancy Goyne Evans' landmark work *American Windsor Chairs* lists the few Ohio Windsor chairmakers recorded in the 1820 census—they were mostly in the northeast near Cleveland. Still, it is possible Putnam purchased the chair shortly before his death, at age 86. Possible, although unlikely.

The General was long dead by the time the third chair was made. Although only partially visible, what we see is sufficient to date it. The double box stretcher is a factory feature, indicating a late 19th century chair.

Why such obvious anachronisms? The postcard was printed in the first quarter of the 20th century. We know because we have a solid terminus post and ante quem. The card has a split back introduced in 1907. It is a real photo, as opposed to being printed. The stock was produced by Ansco and bears a logo the company only used until the 1920s.

When the picture was taken by Harry Philip Fischer of Marietta, antiquarians were really collectors, and their museums were very different from ours. Antiquarians had more in common with P.T. Barnum than with today's scholarly curators. While modern history museums accurately recreate an interior to a time in its past, their early counterparts assembled collections of unrelated curiosities. It was common for local families to donate old objects and furnishings to these museums, and these were accepted and displayed with no concern for relationship to person or place. The cast iron andirons in the fireplace are mid-19th century, not late 18th.

Acquisitions were frequently displayed in ways that made little sense. Notice the object (either a sword or a walking cane) propped on the mantel. The French-made Charleville musket is Revolutionary War vintage. France supplied thousands of these .69 caliber weapons to colonial troops, so associating it with Putnam is understandable. However, it is exhibited leaning against the door architrave, and with a mounted bayonet!

I assume the ephemera hanging on the over mantel are documents associated with Putnam or early Ohio. I recognize the silhouette as Rufus. It was copied from a profile portrait made during his middle age.

Today, Rufus Putnam is forgotten, except in two places—Marietta and Rutland, MA. Both have a Rufus Putnam house, and because of their common history with the General, they recognize each other as sister communities. Putnam was born in 1738 in Sutton, MA. His father died when he was young and his mother apprenticed him to a millwright. Like many other Revolutionary War officers (George Washington included) Rufus learned his military skills fighting in the French and Indian War. In 1757 he enlisted in a Connecticut regiment and saw action in the Great Lakes and at Lake Champlain.

Returning to civilian life he relocated to Braintree, MA. While lacking in formal education, Putnam was an autodidact. He taught himself geography, mathematics and surveying. These skills would result in his military commission and eventually bring him to Marietta. George Washington shared those same skills and that may explain the future president's longtime friendship with Rufus.

In 1773, with his cousin Israel Putnam (who would also become a Revolutionary War general), Rufus travelled south to survey areas along the Mississippi River. The British Crown planned (but later reneged) on granting the land to war veterans in payment for their service. This idea would resurface later in Rufus' career.

The same day as the Battle of Lexington, Putnam enlisted in a Massachusetts revolutionary regiment and was commissioned a Lt. Colonel. He used his skills as a millwright and surveyor to oversee construction of Continental fortifications around Boston. Later in the war, he did the same along Long Island Sound and at West Point, leading Washington to appoint

Putnam Chief of Engineers of New York. In 1783 he was commissioned a brigadier general.

After the war Putnam established his connection to Rutland, a small town with only two other distinctions. It is the geographical center of Massachusetts and my family has lived there for decades. In 1780 Rufus purchased a farm confiscated from a prominent Loyalist who had fled to New Brunswick, and resided there until 1788. However, that short occupancy linked his name to the place and it has been known ever since as the Rufus Putnam House. I have been in the house many times. During the 1970s its owner collected antiques and engaged me as a consultant. In my senior year in college I took a directed studies course in American History that produced an architectural survey of Rutland's 18th century homes. I researched the Putnam house for that project.

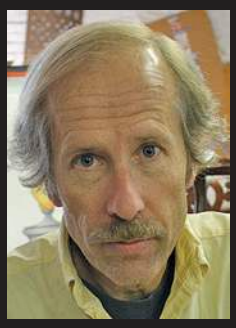
While living in Rutland, Putnam surveyed western regions for the Confederation Congress, and without success, lobbied the weak and cash-strapped government to grant veterans land as payment for their service. In 1787, following the adoption of the U.S. Constitution, the new Congress passed the Northwest Ordinance, creating the Northwest Territory out of lands ceded by England in the Treaty of Paris. The Territory was later divided into the states that border the Great Lakes. The Ordinance also authorized land warrants to veterans, the soldier's rank determining the number of acres he received.

Putnam, along with three other investors, formed the Ohio Company of Associates. They purchased 1.5 million acres, paying partially with warrants. On April 7, 1788, Rufus, along with 48 men, arrived at the confluence of the Muskingum and Ohio Rivers. There, they established the first permanent U. S. settlement in the Northwest Territory, laid out according to a previously drawn plat. They named the place Marietta after Marie Antoinette. Putnam's company built two forts, Campus Martius (Field of Mars) and Picketed Point Stockade.

The company also constructed the Land Office shown above. It was originally located on the banks of the Muskingum River, but in 1791 was moved so it could be protected by Campus Martius' guns. Putnam established his residence in one of the fort's blockhouses. When the fort was dismantled that structure remained and became the second Rufus Putnam house.

Putnam continued his life of public service. In 1796 he was appointed U.S. Surveyor General. In 1802 he was a delegate to the Ohio Constitutional Convention. He served two decades as a trustee of Ohio University and in 1808 was elected Grand Master of the Ohio Masonic Grand Lodge.

Campus Martius is now a museum and it contains both the Land Office and Marietta's Rufus Putnam house. ■



by Al Breed

How to Use a Dado Plane

I don't usually make my dadoes by hand. Often they are stopped, so I use a router or dado blade on the saw and finish the dead end by hand. In a softwood like pine or an easily planed wood like mahogany, however, making them by hand is very quick and quiet, generating only shavings—not dust. If the dado is stopped, it's usually possible to rip the edge off, run the dado and then glue the strip back on. Usually the dado is across the grain to house a top, bottom, draw divider or runner, so this is the application I'll illustrate.

Earlier dado planes are wood replaced later by a metal version. The metal ones I have are Stanleys. The wood planes are subject to all the vagaries of wood planes in general, including most commonly, clogging of the chips in the throat and warping of the plane body itself. The latter can be a show-stopper if it's extreme, the former usually cured with a little wax or reshaping of the wedge. The metal models are much easier to adjust and can't warp or clog. Both will make a dado, but you will be fiddling with the wooden one more, at least in the initial setup.

In order to tune up a dado plane you need to understand how it works. Unlike most planes, the actual cutting of the trough which is the dado is done by the nickers, not the blade. As the knickers precede the blade, they score the cross-grain of the wood. Following the nickers, the blade is set a bit shallower than the nicker cuts and removes the wood between them. The blade is skewed to cleanly cut cross-grain.

Since the nickers are really the workhorse of the plane, sharpening them is critical. The nicker iron from the wooden plane has both nickers on one iron (Photo 1). If they don't protrude the same depth from the plane body, they need to be filed or ground so that one is not longer than the other. The tips are shaped with a rounded end and the outside edges of the iron are rounded also so that they don't interfere with the cutting (Photo 2). In the metal plane there is a separate nicker on each side of the plane that runs in a canted track in the plane body. Its outward slant ensures that the nicker will always be a bit wider than the plane body (Photo 3) .

Each nicker is extended from the body until they cut even depths. Nickers must always be filed on the inside, otherwise you'll be changing the width of the dado and the body may not clear the cut (Photo 4). In this photo, the nicker iron is seen installed in the body of the wooden plane. Note the filed notch in the depth stop to give the nicker room to clear the body.

The blade of this plane came to me ground at 35° and seemed to work fine (Photo 5). Next time it's due for a sharpening I'll hollow grind it a bit more, but since it worked fine, I left it


1


2


3


4


5


6

alone! The side of the blade facing us is ground back to clear the body as the blade is skewed.

The only other element to deal with is the depth stop. Set it a bit light, take a sample cut and then slowly adjust it until it stops at the depth you want. Both stops on these planes are adjusted by a thumbscrew. The key to the depth stop working well is closely tied to the use of a fence to keep the plane on the line and upright, otherwise any tipping of the plane will decrease the depth and give a dado with a bottom that's not parallel to the board.

Using the plane depends on a fence, as just mentioned. Lay out the location of the dado and clamp, nail or screw a fence on your layout line. Usually your dado is on the inside of the case, so these holes won't be a problem. Make sure to mark which side of your layout line the cut is to be made! It's easy to get turned around on this. If you do, you'll be filling in dadoes which I've had to do more than once.

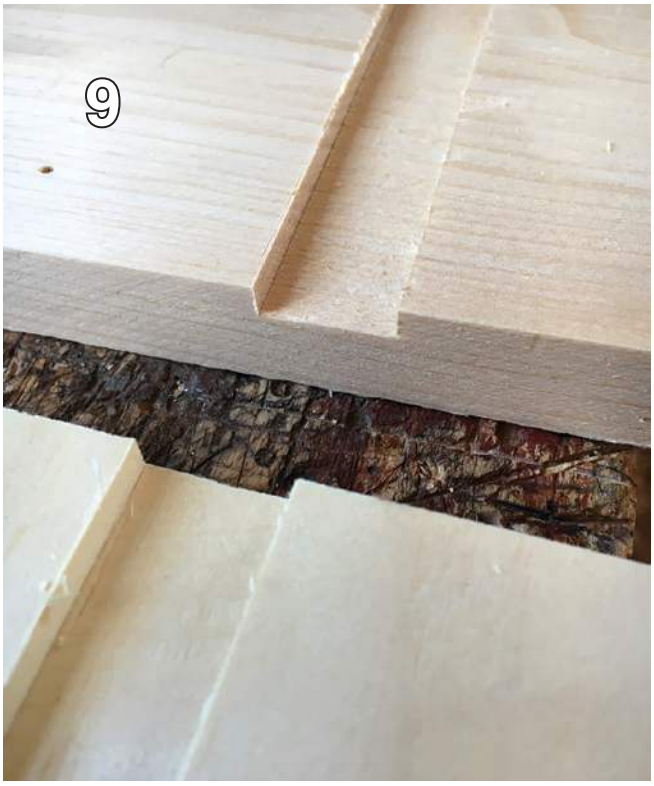
The fence wants to be as high as possible without hitting your knuckles as you use the plane. Set the plane at the far end of the cut and draw it backwards to let the nickers cut the grain. Check that they are both scoring the same depth. I usually set the plane up on a test piece, but make sure your blade isn't cutting deeper than the nicker cut, otherwise it will tear out and make a mess (Photo 6).

Now, keeping the plane vertical and against the fence, push the plane through its first cut (Photo 7). Pressure at the front of the plane will make sure the nickers are cutting. You should get a clean shallow cut with well defined edges. Sometimes you'll have to tap the blade to one side or the other if it's extending past the nicker and tearing out on one side. On softwood you can set the nickers deeper than hardwood due to the decreased resistance it gives. As always, a little wax on the fence and the sole of the plane will make things easier. Here the advantages of the Stanley 39 are evident in the ease with which the shavings are ejected. The fence keeps the plane upright to keep the bottom of the dado flat and not tipped.

Often at the end of the cut, the plane will tear out a chip as it exits the cut (Photo 8). To avoid this, clamp a piece of scrap with the grain running parallel to the dado at the end of the cut (Photo 9). Once your plane is set up and cutting cleanly, you can easily cut a ⅜″ x 18″dado across a pine cupboard side in about 15 seconds.

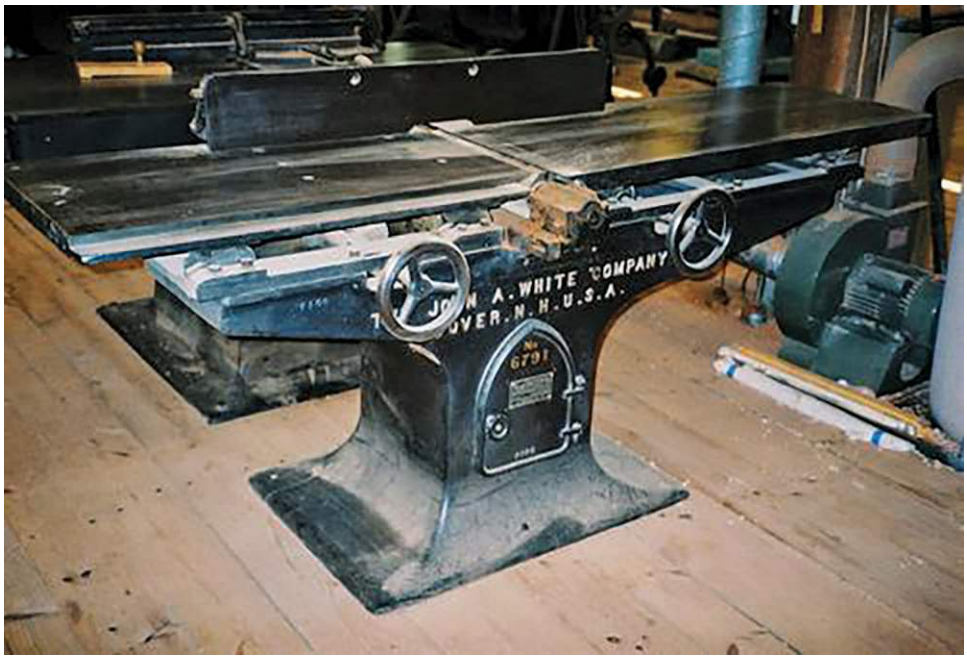
I usually clamp the sides of a case down on the bench with the two front edges against each other so that the fronts will be identical even if the dado is a bit off as it heads towards the back of the box.

In buying wooden dado planes, make sure that the body is still true and the blade is not pitted on the side opposite the bevel. Sometimes the depth stop is just a pressure fit tenon of wood into a mortise in the body, but if it's loose or missing, it's not a big deal to replace it. On the Stanley 39, missing nickers would be a problem, so you'd have to fabricate them or find a Stanley collector with parts. I have ⅜″, ¾″ and ⅞″ 39s and wooden ones from ¼″up. The most common are ⅞″ and ¾″. Have fun! ■



The Jointer

by Peter James



A John A. White "New Improved Buzz Plane" from about 1905 in David Lamb's Collection. This has Babbitt bearings.

The invention of the jointer as we know it goes back to about 1791-1793 and the Englishman, Sir Samuel Bentham. This is according to information in the book *Machine Woodworking* (Peoria, IL: Bruce Publishing, 1937) by Herman Hjorth. He goes on to say that Bentham's contribution to woodworking was the rotary cutting used in most of today's powered woodworking machinery including jointers, planers, shapers, routers and circular saws.

The first machines were made with heavy wood frames and only the cutter head, bearings and knives were metal. It was not until about 1850 that all metal machines with heavy iron castings came into being. It is interesting to note that the basic designs from the mid-1800s have not changed significantly.

The machine that we today in America call a *jointer* has had and still has various names depending on where you are. Originally, it was called a "buzz planer." The logical reason for this is because it did the same job as a hand plane, but the rotating knives made a loud buzz just as they do today. In England and other parts of the world, the machine is called a planer and the machine that we call a planer is called a surfacer. Some manufacturers/sellers call jointers jointer/planers but that is not accurate for the operation that they do. A true jointer/planer is a dual function machine in which the table or tables can be configured to flatten a surface in one operation and make two surfaces parallel in a different configuration.

The modern jointer is designed to do two things. The first is to make one surface of a board flat without any twist, cups, or bows ready for the planer to make two surfaces parallel. The second is to make an edge straight so that it may be joined to another without a gap. These same operations can be done with hand planes. A jointer is not designed to make two surfaces parallel to each other and attempts to use it for this will result in nice wedge shaped pieces of wood.

Size

Jointers come in a wide range of sizes. The size referred to is the width of the cutting knives. The smallest is about 4″ and the largest may be in the 36″ range if you can believe that. Some people jokingly refer to the large ones—say over 12″—as "aircraft carriers." The really large ones are often used in casket factories to flatten the very wide boards used in the sides of the caskets. The most common size used in hobby or small professional shops is 8″—a nice compromise between too big and too small.

The length of the bed is important. There is a theory that says that you can flatten a board or straighten the edge of a board that is twice the total length of the tables. A jointer with tables 60″ long should be able to do a board ten feet long. There are some methods to tweak this and the Delta DJ series jointers used it. They made the infeed table longer than the outfeed table. This increased the capacity without adding as much to the total length.

Bearings

The cutterhead bearings in the early jointers were made of a material called Babbitt, invented in 1839 by Isaac Babbitt.

Straight knife cutterhead—top
Insert cutterhead—bottom

Powermatic wedge bed jointer

Babbitt is an alloy comprised of either mostly tin or mostly lead with copper and other metals in the mix. Contrary to popular opinion, Babbitt bearings are probably as smooth or smoother running than all but the highest quality ball bearings used today. One down side is that they usually leaked the oil that was used to lubricate them which was messy. Babbitt is still the material used in the connecting rod bearings and crankshaft bearings of automobile and truck engines today and is not an outdated technology. Properly maintained, they will last almost forever.

Modern jointers use ball bearings. In smaller jointers they are sealed and lubricated for-life (for-life is not forever and they need to be changed from time to time). The bearings in larger industrial jointers are high precision and often run in an oil bath and with good maintenance will last nearly forever.

Like modern ball bearings, Babbitt can be replaced if the Babbitt is worn beyond the limits of the adjustments. This is done by heating the old Babbitt to melt and remove it and pouring new Babbitt around the cutter head shaft. The bearings are then precision fitted to the shaft by removing small amounts of the material to make a perfect fit. This process is called scraping. The short story on Babbitt bearings in jointers is that if you are interested in a jointer and it has Babbitt bearings, do not say no to it just because of that.

Delta DJ20 Parallelogram bed jointer
Note the uneven bed lengths.

Cutterhead

There have been many cutterhead designs over the years—both *cutterhead* and *cutter head* are in common usage. In the early years, the heads were square and held either two or four knives. These were/are dangerous because the large gap in the spinning heads can catch the board, a knot or worst of all, a finger or hand. Later designs featured round heads with various methods of holding the knives in place. Some of these worked better than others and the style that eventually became the standard used a separate piece of metal called a gib that clamped the knife in a slot in the head with jack screws.

The number of knives on straight knife machines may be two, three, or four with four being used on the larger machines which have slower turning cutterheads.

The most recent design of cutterheads uses many small four sided insert carbide cutters arranged in rows around the cutterhead in a spiral pattern. The individual inserts can be rotated to easily compensate for wear or a nick. There are several different design options used in insert cutterheads and some work better than others. They are very good at dealing with highly figured woods like curly maple and burls. They also run much quieter than straight knives. One big advantage to the insert cutterhead is the ease of changing the individual cutters. No special tools are required and the alignment is fixed by the insert seat on the cutterhead. Insert cutterheads require larger

My old Delta 8″ jointer. One of the Guild members still has it and says it is still as smooth as silk.

motors than ones with straight knives. This is because there are always knives in contact with the wood.

Table Adjustment

There are two basic methods of adjusting tables to control the amount of material removed in a pass over the cutterhead—the wedge and the parallelogram.

With the wedge, the jointer tables ride on a large inclined wedge. When the bed is moved back and forth, the amount that is removed by the cutter head changes. One disadvantage to this style is that the opening around the cutterhead gets larger as the table is lowered. If the tables on a wedge bed jointer need to be adjusted to bring them into alignment, it is done by adding shims into the wedge joint. This is usually done on the outfeed table as that is usually not moved once the jointer is set up as changing the amount of stock to be removed is done by moving the infeed table. The control for the table adjustment can be either a handwheel or lever. Some people prefer one and some the other.

The parallelogram support method uses links on all four corners of the table that have arms about the same length as the cutterhead diameter and when the table is lowered. It follows the cutterhead outside diameter and the opening remains nearly constant. On a jointer with a parallelogram bed setup, the table alignment is done by adjusting four eccentric bushings on the lower end of the four links between the base and each bed. This gives greater flexibility in making the alignment adjustments.

On a jointer with conventional straight knives, the infeed table and the outfeed table are adjusted so as to be flat and coplanar with each other. The knives are then adjusted to the outfeed table. On a jointer with an insert type cutterhead, both tables are adjusted to the cutterhead. While this may seem like a good method, sometimes the cutterhead itself may need to be adjusted by adding or removing shims under the bearings in order to be able to get the tables in alignment—this can be difficult.

Motor

Modern jointers are usually powered by electric motors that transmit the power to the cutterhead via pulleys and V-belts, but older jointers, especially larger industrial models often had the motor connected directly to the cutterhead. The speed range of the cutter head is usually in the 3,500 rpm range for direct coupled motors and 4,500 rpm for belt driven machines.

Fence

When the jointer is used to create a straight edge for jointing, the fence becomes a critical part of how well the machine performs this function. Fences can be mounted on one end of the jointer and extend beyond the cutterhead or they can be center mounted over the cutterhead. The center mounted fences tend to be more rigid and accurate. The surface of the fence must be flat and straight for it to do its job. If it is not flat and straight, it will be difficult if not impossible to get a good edge on the board as the board will follow the deflection in the fence.

The fences on most modern jointers are not as good as the ones from decades ago. At this point, I have to say that one of the nicest jointers that has passed through my hands was a Delta 8″ from 1952. It ran as smooth as silk and the fence was a piece of precision machining. It was easy to adjust to varying angles and would come back to a perfect 90°. I replaced it with a Delta DJ20 8″ from the 1990s and while the tables were longer, the fence system is typical of most modern machines and not nearly as accurate or easy to adjust.

Bench Top Jointers

One type of jointer that I have not addressed here is the small bench top machines made out of aluminum castings and using high speed universal motors. They are really too small and too light in weight for most jobs. For the same amount of money, a really good used cast iron 4″ or 6″ jointer with longer tables can be found and will give far better service.

What's Next?

In another article, I will go into setting up the jointer and replacing and setting the knives to get the perfect cut. Yes, perfect joints can be done by machine. You can even do ″spring joints″ and tapers with the correct settings. Getting the jointer set up to give that perfect cut can take some time, but once done, it should stay in tune for a long time and is well worth the time and effort. ■

Portable Finishing Table

by Gary Wood

Turntable style worktables are useful for finishers. Unfortunately, many of the units available are either designed for the hobbyist who wants to airbrush small projects, or the industrialist who needs to work on something with the weight of an engine block. Woodworkers have projects with a range of sizes and weights. If your space is limited, and if it's not practical to have a dedicated workbench for just finishing, a portable worktable may fit your need. It can also be handy to bring to a job site and set on sawhorses.

My projects often start with a small sketch or just the imagination and the nearest pile of wood. I often think the first model will be just a prototype, and then I will refine the next *real* one. In this case, and from experience, I knew that my first finishing table would be the one that I would actually use, flaws included, for a long time. And so I set out to make a portable finishing table that would be immediately useful, versatile and rugged.

To start, I purchased a cabinet grade sheet of ¾″ plywood choosing one that was perfectly flat. Thinking that Baltic birch would be best, it actually had a little warp. I chose instead a Canadian brand, Husky. From this 4x8 panel, I cut one 23″ square, one 24″ square and one 18″ square. An 18″ circle was cut from the 24″ square using a router and simple circle jig (Photo 1). A ⅛″ spiral up-cut bit was used. The depth of cut was not enough for the full ¾″ ply so I needed to tackle it from both sides. The 18″ square was also cut to an 18″ round, but that proved unnecessary. It could have been left square. To make the turntable, I purchased a ball bearing unit with a 400 lb. rating from Woodworkers Supply (Photo 2). After mounting the two plywood pieces to the turntable, it was temporarily set aside.

A riser frame and corner blocks were made to sit on the 23″ square (Photo 3). It was approximately 1⅛″ thick. Before permanent fastening, I set the turntable and the 24″ top over the framed assembly. From this dry run, the riser frame was carefully planed until the whole assembly was an even thickness. The frame was then glued to the bottom square.

Attaching the turntable and top to the base unit took a little trial and error, but I finally settled on centering and carefully screwing the turntable to the bottom square from underneath. No glue was used because in the event that the turntable needed to be replaced or just vacuumed for dust, it needed to be easily removed. When the top was placed over the turntable, centering was easy because the top was made oversized. After gluing the top down, the plus or minus ½″ overhang was cut flush to the 23″ square.

The initial plan was to frame the sides just for a neat appearance. When I realized how heavy the worktable was, I decided to extend the frame to include a carrying handle. The 18″ turntable was usable for smaller items, but I wanted the flexibility of adding larger auxiliary tables.

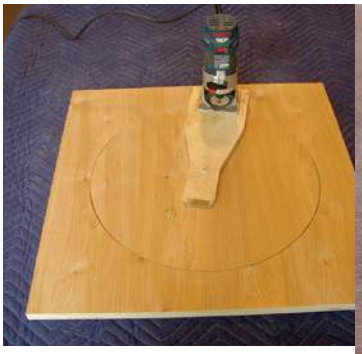


Photo 1—Router jig set-up

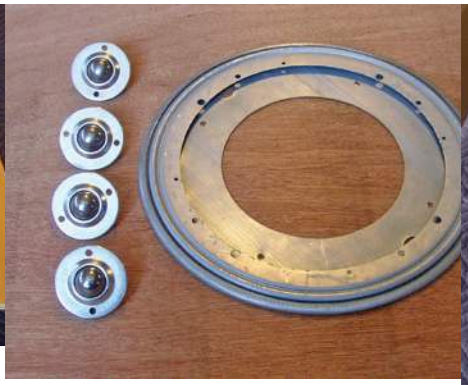


Photo 2—Ball bearing unit

Photo 3—Turntable in frame

Photo 4—Additional ball bearings for larger turntable top

Photo 5—Candle stand on turntable

Photo 6—Larger table on the larger turntable plate

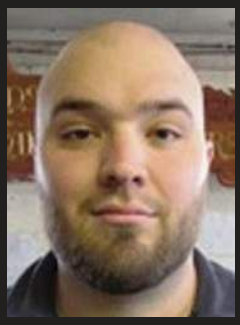
The next step was to add four sturdy ball bearings to the outer corners (Photo 4). The ball bearings, again from Woodworkers Supply, each have a 75 lb. rating. When combined with the turntable rating of 400 lbs., a well balanced load would theoretically increase to 700 lbs., but that seems too optimistic and well outside of the need for supporting furniture or cabinets.

A final step was to add two set screws to the sides. Made from ¼″ threaded rod, they screw into corresponding threaded inserts on each side of the 18″ turntable. Small wood knobs were attached with epoxy. One set screw would have been enough to keep the turntable stationary, but two provided much better stability.

Everything works very well. In fact better than expected. Auxiliary plates are easily attached for larger pieces, and just as my pickup truck rides better with a couple of sand bags in the back, the larger plates move freely and quietly on the bearings when there is significant weight. The optional plates only need a center screw to go into the turntable and small riser blocks to match the height of the outside bearings. I have, so far, put on a 40″ square auxiliary plate (Photo 5) but it appears that a 48″ round or 48″ square piece of plywood would be well supported. ■

Full Steam Ahead

Perriand Chair



by Greg Brown

We could steam bend the posts, use less material, have the grain flow up the back. Bingo!

First and foremost, I want to discuss not messing with the JUJU. Always stay positive and be a part of the community. Before this inquiry came to my bench, there were several occurrences that summed it up nicely. You must wear a lot of hats in this trade. So is making your shop as versatile as it can be to make you competitive in the services you wish to offer. Your ready when it comes.

This past summer, I acquired a Newton B-7 horizontal borer from a friend at a great price, I built a new shave horse to help clamp parts in my sculptural work plus a new steam box and kiln were created for another job last spring. These are very specific tools but there is always a bit of hesitation to not fill a maker's space with tools that collect dust. Naturally I started to feel frustration but then I got the call…

Charlotte Perriand, was an early 20th century designer who teamed of with Le Corbusier, an architect and designer from the Modern movement. They created tubular designs in anodized aluminum and chromed steel. Perriand was considered the catalyst to Le Corbusier designs in comfort and industrial appeal. To my knowledge, in her later years Perriand started making Post and Rung derivatives with that. They were straightforward with subtle detail. This caught my patrons eye one of which was the unsupported steam bent back posts which is what I would like to focus on for this article.

Now, why steam bend? We can cut the legs out from a wide plank. But in my calculation, you would need three times more material which would raise cost and waste. We could make a bent lamination but this again would increase time and affect the aesthetics.

We could steam bend the posts, use less material, have the grain flow up the back. Bingo! Well Perriand essentially opened a can. Since she was designing these chairs for production, speed was a factor and unfortunately that came to bite her. It's common knowledge at this point that any steam bent part that is unsupported could move at its discretion. Through my research of these chairs, they are all over the place. Some straightened out, some didn't. This is a big problem, especially when these pieces are patroned.

So how do we solve it? In my mind, I view these chairs like Windsors so I followed accordingly. The first thing that popped in my mind was green wood. I understand that most woodworkers cringe when they hear logs are in the equation and for good reason. However you feel about it, getting logs can be a major pain as well as the means and skill to cut it down safely and transport it. Not to mention finding one that is straight and those are in the middle of the forest. So, your earning it.

Fortunately, my good friend Jon Brooks had some nice ash trees on his property and he invited me over to take a hike. We found a beautiful ash tree so the JUJU was in good supply. Jon used his Jedi chainsaw tricks and dropped this thing down a narrow pass surrounded by large pines and other deciduous species.

Skinned and sealed logs ready for splitting

Splitting

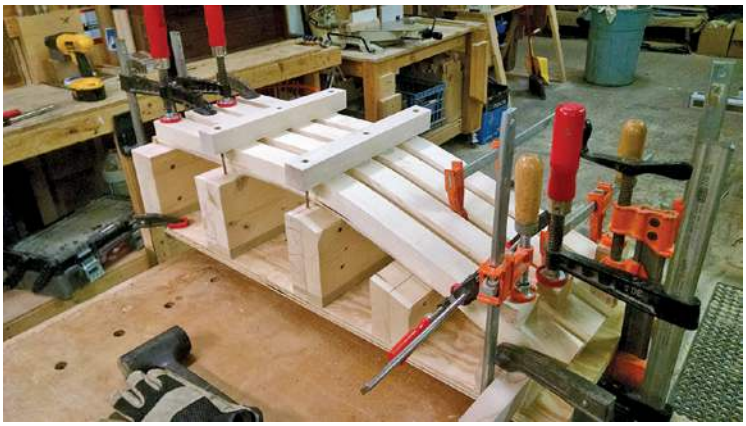
Looking good

Steaming

Orienting growth rings

Encouraging Mark during his clamp exchange

Grant (left) and Mark (right) taking the Helm



Over-bend form using clamp exchange—set for a day

Note: Ash trees are not supposed to leave their county due to the emerald ash borer. So, once we cut them down and bucked them up, I stripped the bark and cambium layer off completely, which the ash borer favors. With no bug infestation at all, the ends were sealed and were ready to go to the shop.

With the logs ready to go I can then prepare for bending. First I need to make my bending forms. The best part about manipulating green wood is that you can control it for the most part but it needs to dry. The splay of the back is all of 12° so that's not intimidating. However the thickness of the posts are. The other consideration is to leave yourself outs. Don't try to bend the posts at their true angle. Remember in this case they are unsupported. They are going to move. Give yourself some extra wood so that you can tweak the angle as necessary. Since you are working with green, you will need to calculate how much it will shrink. With a good moisture meter, the dimensional change coefficients exist to measure how much.

My finished post dimensions were around a 1 11⁄16″. The shrinkage rate I calculated was about 3⁄32″ so I was going to shoot for a 2″ riven blank. After I attain this information, I then can make my forms.

From what I learned over the years, over-bending was going to be my solution. The green billets allow me control how the lignin cures. Over-bending will allow me to stress the fibers and then relax them while they dry. I calculated my over-bending form, from experimentation, that the spring back would match my finish angle. As the fibers were stretched, they then sprung back in a relaxed state which is where I captured the bend and let the billets dry under a fan for a few weeks.

When making the form, I designed a four leg system that could stand independently under a fan. There is an immense amount of tension in all bends; more so in this scenario because the billets are so thick. I reinforced my blocking with strong backs to prevent the form from warping. Simple 2x4s from Home Depot will work just fine. To be efficient with my form material, I made three forms. One with the over-bend angle and the other two with the final angle.

I needed eight posts, so I made twelve as back up. Once I got to the third run of legs, I swapped out the blocking with the final angle. The design worked quite well and allowed easy clamping. I also modified my kiln with a side access for my forms to fit in.

With my forms set and steam box ready, it was time to rive. As Curtis Buchanan says, "Splitting these trees is like Christmas. You don't know what you're going to get." Fortunately harvesting these trees on your own helps the process outside of picking a log at the yard.

Someone was on the nice list this year and the butt sections split straight as an arrow. If the split is in my favor, I will quarter the log and mill out the blank which will make the work more accurate in relation to the form I made. You will notice the discoloration I had to avoid—tricky work. If the splitting takes time, don't hesitate to put your blanks in a garbage bag to avoid evaporation while you're preparing the remaining logs.

With the blanks measured and dimensioned it's time to fire up the steam box. My box is very straight forward and nothing new—exterior plywood box screwed and epoxied together. There are holes beneath the box to expel cold air and water. I use two wall paper steamers which get the box up to temperature quickly. However I'm limited up to two hrs. A homemade kettle with a reservoir would be preferable to refill but it doesn't matter. It does the job and tailor your system around the parts you are steaming. Standard cook time is 1″ per hour for green. It's about 45 minutes per inch. While the steam box is heating up, orient the post blanks in mating pairs with similar grain orientation. These small details aid in construction and the overall aesthetic.

When it's time to saddle up, remember to be prepared and organize your bench to avoid confusion! The entirety of a successful bend is the prep work. Fortunately, to my benefit, I had two visitors with strong forearms from North Bennet Street School to help me out. Grant Burger, the Alden Artisan Advancement recipient, and his classmate Mark Bokelman joined me for a tutorial at the shop. One of our sessions was bending—an intimating process. However, these two up and coming woodworkers were a great help and pulled these hefty planks down with a clamp exchange until we met our angle. Many thanks to Grant and Mark!

Once the blanks have been bent, keep them clamped for about a day or so. Then remove the clamps and put the blanks in the final form. I made clamping cauls to free up my clamps and avoid extremities (from clamps) on my form. As you can see I matched the spring back. I then stood my forms up in a cluster around a ceiling fan. The design of my forms also allows proper air flow around the blanks.

A fun occurrence I noticed was when the blanks were fresh out of the steam box and bent. They began to create small stress fractures along the end grain—almost the thickness of thread. While I slowed the drying process under a controlled environment, the small fractures closed, and cured in place.

I left the cluster around the fan for about a month. I measured the moisture content to about 7% at the end grain and about 13% by the center of the post. You can see the angles did not spring back. I then made a freestanding rack to hold the legs in a form for a final bake in the kiln. I wanted them to dry freestanding so when they finally cured, they could in a relaxed state. Fingers crossed at this point!

Drum roll please! After two weeks in the kiln, everything came out great. The moisture content level was about 6% overall. The legs did move, but they subtly moved in my favor matching the prototype I had made before this commission commenced. With the extra room, I left to clean up the posts. I could pair four sets of posts, all with angles within a degree of each other. Amen!

Spring back from over-bend

FInal form matching spring back and my desired angle

Cutting out post

Matching sets—bend holding!

Set in clusters underneath a ceiling fan for about two weeks

Consistent bend

Now this process took a fair amount of thought and time. During the time of Perriand, I'm assuming their material had a higher moisture content than what we use today. Remember, green wood, over-bend, final bend, then let it dry smartly. Using these simple steps will hopefully open doors for any curved solid work as well as allow you to harvest your own material in your favor. Experiment, be prepared, never mess with the good JUJU and full steam ahead! ■

by Garrett Hack

Curved Drawer

I want my furniture to be fun. Useful and elegant is nice too, but I love lots of delightful surprises—discovering a secret drawer or some sparkling detail. A tall cabinet I have been working on has many drawers, all of them fun, some secret, some not so secret, three swing out and are a combination lock for a door, and one is curved.

The curved drawer arcs to the left as you pull it out. It's surprising and unusual. The shape is amusing too—a drawer with sides that appear elastic enough to bend into a curve. Otherwise my curved drawer doesn't look that complicated—but it turned out to be.

I usually start building a drawer with the pocket made, guides in place, and carefully fit the face first, and then build the drawer to it. Because of the way this cabinet is constructed, the interior around the drawer is not accessible later, so I had to build from the inside out. My drawer also had some tight tolerances, fitting within 1/16″ of a tambour door that slides by it. An accurate paper pattern seemed the best way to get the tolerances right, and to see how the curve of the drawer felt. I also used it to set the left guide. I could fit the right one after the drawer was built.

For a drawer to work smoothly it has to be a consistent width—parallel sides—so it glides in and out of its pocket without any looseness or snugness. The guides that control it must be parallel too, and in this case the same curve as the drawer sides. I knew that by laminating the sides I could make them thin, strong and smoothly curved. I cut a pine laminating form to an arc of 20″ radius and laminated the two sides on it. With four thin laminates, for sides just under ¼″ thick, I got very little springback.

The problem is that these sides were only parallel when right next to one another and as I unhappily discovered, not at all parallel when I built them into a drawer. For my next drawer only 2″ wide, parallel sides would have to be arcs of 20″ radius and 18″ radius. That would require two pretty exact bending forms, and even then I wasn't sure they would yield truly parallel sides. I worked on other parts of my cabinet while I thought about my next move.

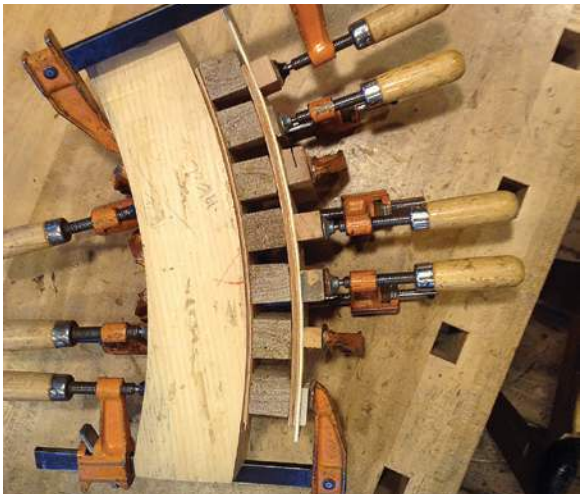
The solution turned out to be easy and accurate. I made a single form to the smaller radius and laminated the inner side on it. And then I laminated the outer side on top of the

first, only spaced with blocks the exact width of the inside of the drawer. Since my drawer was so small, I actually did both laminations at the same time. These sides are perfectly parallel, even if they are not exact arcs of a circle (due to springback). Before unclamping my laminations I marked the sides with a line perpendicular to the form, so I could keep them in the same orientation within the drawer.

My sides were wider than I needed. Some of that extra width became the guides. The rest was cut away jointing the top and bottom edges. I use either of two methods (or both) to hold curved parts to joint them. One way is to hold an end in a wooden jawed clamp fastened to my bench. Another is to jam the far end into a stop or V slot in a piece of scrap clamped down. I occasionally checked the side on my jointer table to see if it stood square.

For my first curved drawer, the one with the same radius sides, I cut half blind dovetails to join the face and sides. It wasn't easy, but if you lay out the parts together on that paper pattern and get the angles accurate for the ends of the sides and the face, those are the surfaces that guide cutting the joint. For my second much smaller drawer, I cut a locking rabbet joint by hand. The form was a useful place to support the sides while laying out and cutting the joinery.

The curved bottom and curved groove were further challenges. I've used a router with a three wing cutter (cutting a groove horizontally) housed in a rounded ″fence″ to cut accurate grooves in curved parts. I've also made a simple scratchstock



Laminating the two sides with blocks the width of the inside of the drawer separating the two

Jointing the edges of the sides

Using the form to support a side while cutting the joinery

The drawer in place, positioning the outside guide

cutter to scrape a groove. Then there was the issue of how to slide the bottom in on a curve.

My solution was again simple. In Japan I saw many drawers with a thin paulownia bottom merely glued (and sometimes pegged) to the underside of the sides and face. The drawer rides on the bottom, and since paulownia is very stable, it somehow works. Since I am using as many native woods as possible for this cabinet, I chose curly maple for the bottom, reasoning it was hard, fine grained, and would slide sweetly. Since I can ignore seasonal movement in such a small bottom, for simplicity and strength I ran the grain down the length of my drawer.

I was going to add a fancy face to my drawer, in this case birdseye maple with some inlaid dots, so I hung it down to cover the thickness of the bottom.

The last step was fitting the outside guide. I slid the drawer in, laid a piece of paper as a shim along the outside, moved the guide into position, and screwed it down lightly. After trying my drawer a few times, and a light tapping here and there on the guide to position it perfectly, I secured it with a few glue blocks on the outside. A pine block at the rear is the stop for the drawer.

What's next? A secret drawer hiding in the back of a larger drawer could be fun. ■

Tight tolerances, with one guide let into the internal divider (on left) and a tambour door sliding by on the right

White Pine

by Ted Blachly

The Ipanema Shaker Cupboard was made in 2009 from large planks that had been stored in Jack Noons barn loft since the 1950s. He said "they were in his way." Thanks Jack. Glad to help you out! It's a simple form but required bent laminated sides and some angled joiners. The battens are white oak.

"The Pine has been appropriately called the Monarch of the forest. Taken all in all, it is the crowning master-piece of all woody plants."

Thus opens John S. Springers book *Forest Life and Forest Trees* written in 1851. His passionate account of trees and early lumbering in New England provides a window to the era when the old growth pines, some of us dream about, stood tall. There are many historical accounts in the book of these trees. Some were 350 to 400 years old with the first limbs several saw logs up the trunk, lengths of up to 264′ and diameters to 7′ to 8′ at the butt.

Jack Noon writes "Before the arrival of the first European settlers and during several generations of their descendants, New England's white pine grew to sizes scarcely to be imagined in modern times. After they began to fall to metal axes, some of these tremendous trees had their dimensions recorded. In claims of varying degrees of credibility to us today, a few of them reportedly had attained nearly twice the height and twice the diameter of the Bradford pine" (one of the tallest pines in New Hampshire—152′ high and a diameter of around 5′-3″).

"Lumber sawn from these slow growing trees was virtually knot free and had tight growth rings—a dozen or so to the inch. Consequently it was far more weather resistant than today's fast growing pines and was used for long lasting clapboards, shingles, timbers and boards."

The marking and harvest of Mast pines that were to be shipped to England is one of the wonders of early American

industry dating to 1634. Contracts are recorded for pines in the range of 108′ long and 36″ in diameter. Specially built mast ships carried forty-five or fifty masts at a time back to England.

I personally got my affinity for white pine flipping through a stack of wide, clear (or close to it) boards long ago with an old time New Hampshire carpenter. His passion for the book matches and wood itself was infectious. The 200 year old hand planed wainscoting and paneling we found in some of the early Cape houses we worked on was also inspiring.

In the late 80s, I found myself hunting around for antique paneling that had been removed from these old houses and made a number of pieces for one particular client. It was the age and worn patina we were after—see the little desk top cupboard to the right made from pine with old red paint—not fine woodworking but a challenge just the same.

I often am looking at antiques now, not for what they are but for the wood they are made from. I don't have a problem taking them apart to get at the wood for my own ideas unless they have some value I ascribe to them.

Big planks of good quality fresh sawn pine are not easy to come by, but they can be found. Yes it's soft and can bleed sap gumming up the soles of your planes or worse the planer rollers, but a little thinner on a scotchbrite pad takes care of it. I had one cupboard made from air dried that kept bleeding sap for a number years. I periodically would rub it down with thinner and 600 grit wet or dry paper and it eventually quit. It's got a silky smooth hand planed finish now and a beautiful warm color.

You can see here some of a few pieces I've made from this old New England favorite. Special thanks for historical info to Jack Noon. He is a writer, historian and neighbor of mine. ■

A white pine blanket chest currently being made in the shop. Made from two large planks—clear and all heartwood.

Desktop cupboard. Pine with original old red paint finish. Made in 2016.

New England pine cupboard made in 1990 from pine sawn off my land. This was in the first exhibit the guild was involved with as a group at Canterbury Shaker Village. Hand planed surfaces with an oil varnish finish.

photo by Bill Truslow

Black Ice Cabinet aka

Four Seasons of Acadia

by David Lamb

Over the last several years I have been developing a visual aesthetic I call Frost and a dyed version I call Black Ice. While I have done several table tops using the black ice concept, I had been itching to follow through on some conceptual drawings from my sketch book on doing a Black Ice Cabinet. The following is a brief account of that realization.

I have been captivated by the idea of a cabinet having a black exterior and a glowing golden interior. You know, the kind that sings like a chorus of angels when the doors open. While I call this the Black Ice Cabinet, its formal name is The Four Seasons of Acadia. The idea of this design was to employ elements that referenced the four seasons. For my needs, the exterior theme had to be winter focused with the heavy use of the black ice veneering and coloring.

The interior references spring, summer and fall primarily through the use of the golden color. The carved panel gave me the chance to compose an imaginary, idealized scene of Acadia National Park based on several images and experiences of my own. The wild flowers in the foreground spoke to spring and summer and the maple and pine branches with developed seeds and cones speak to autumn.

The exterior will be my focus here. It is a cabinet on stand. I wanted it to have a presence in the room and this form accomplishes that nicely. It has bow front doors for a more dynamic presentation and to correspond to the large coved cornice and the sweep of the bracing.

The first step is to develop the concept with full size drawings and ice pattern work. Significant here is the pattern work needed to portray the idea of black ice crystallizing patterns as seen on ponds. There needs to be balance without being a mirror image. It needs to be relevant to ice formation and needs to be convincing.

My go-to wood for this effect is our native birch. I have found tremendous success using white birch, though black and yellow birch are also productive. Birch has a very mellow grain structure that can look buttery and not harsh. It takes dye very well and in the crotch pattern the similarity to the feathery nature of ice crystals forming is remarkable. So, that is what I use. The remainder of the cabinet exterior and interior was curly maple to continue with the northern New England theme and the carved panel was "red birch" or more accurately the heart wood of the black and yellow birch.

I created ice pattern work for the doors, front apron, the canted corners and the upper legs. The remainder was curly maple, similar enough to be compatible.

What follows is a photographic journey of this piece. ■

photo by Bill Truslow

A recent piece displayed at Somes Sound Gallery on Mt. Desert Island, Maine. It is called 'The Four Seasons of Acadia' and was commissioned to celebrate the 100th anniversary of the National Parks System and Acadia.

photo by Bill Truslow

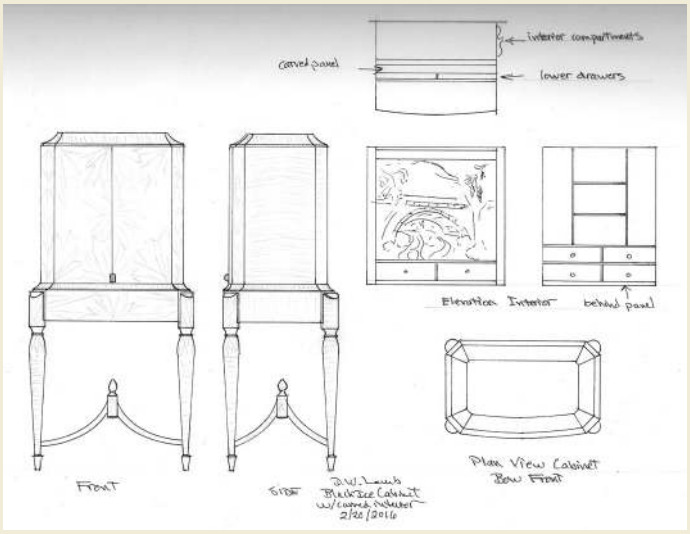
David Lamb developed an early connection with Acadia National Park. His father and stepmother lived on the island for a number of years and his childhood exploration of its wilds created the spark of inspiration for his latest masterwork, *The Four Seasons of Acadia*.

The Gallery at Somes Sound approached the NH Furniture Masters about commissioning a piece for "Acadia through a Furniture Makers Eyes" as part of the Acadia Centennial Collection. David presented his concept and it was readily accepted.

The Gallery assisted in securing a patron to support the complex making of the piece. David emphasized his gratitude, "Without the patron's assistance, 'Four Seasons' may have remained just a sketch to be imagined."

'Four Seasons' is primarily curly maple with birch predominating the facade and carved panel and featuring David's 'black ice' design element that he has been perfecting for several years.

The birch 'black ice' is a fractal orientation of crotch figure birch and there are hundreds of pieces fitted throughout the door faces, apron, upper legs and corners. David said that "Black ice relates directly to the rigors and extremes of weather we face in New England and the darker months of winter."



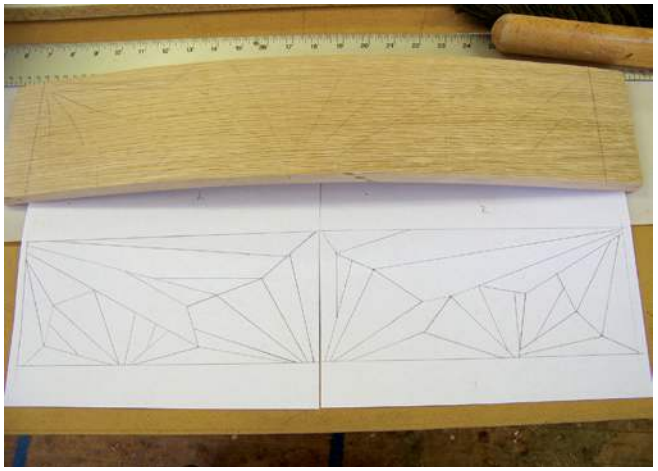
For the remainder of the cabinet's exterior, David chose a curly maple, also dyed in black, but with a less concentrated finish to allow the wood's spectacular figuring to shine through.

When the cabinet is opened, spring, summer and fall—rendered in a lush curly maple—burst into view. The interior is dominated by a richly carved panel depicting the stone bridges, trees and plants common to the park." I wanted to pay tribute to the beautiful carriage roads constructed by John D. Rockefeller throughout Acadia National Park and the bridge represents the span of 100 years, a nod to the park's centenary."

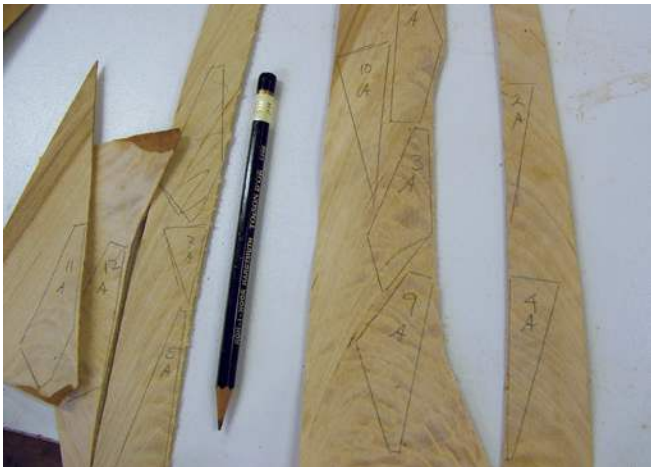
'The Four Seasons of Acadia' addresses all aspects of the seasons in its ice display on the exterior and interior carving and warm coloring.

The Gallery of Somes Sound is at 1112 Main Street, Somesville, Maine. ■

Pictured with David Lamb is Tyra Hanson, The Gallery at Somes Sound, who proposed the commission to the NH Furniture Masters.



Laying out the pattern work for veneering the front curved apron. The rough pattern idea is sketched on the apron stock.

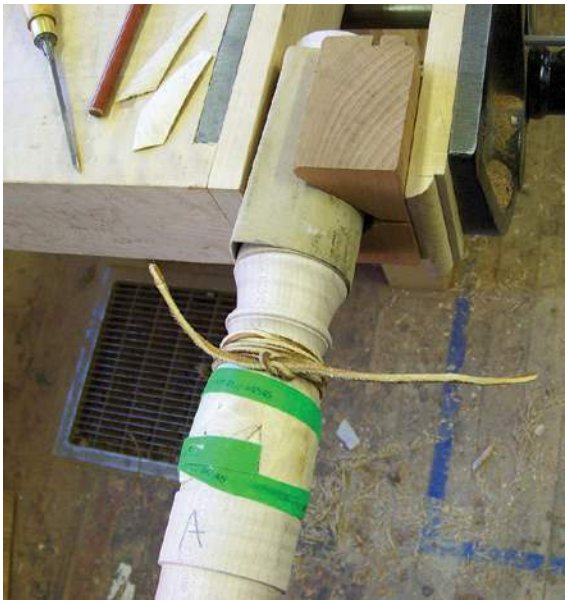


Assigning patterns to veneer stock, taking full advantage of figure in each piece.

Once the pattern is assigned, it is glued right onto the veneer, cut to size and edge glued. The smaller rectangles are to be bent-formed around a tube, then used on the legs.

Veneering on the 1/2 cylinder and the more complex bell shape of the upper leg. This work cannot be done all at once. The veneers are softened with a glycerine solution, dried, then glued in smaller sections.

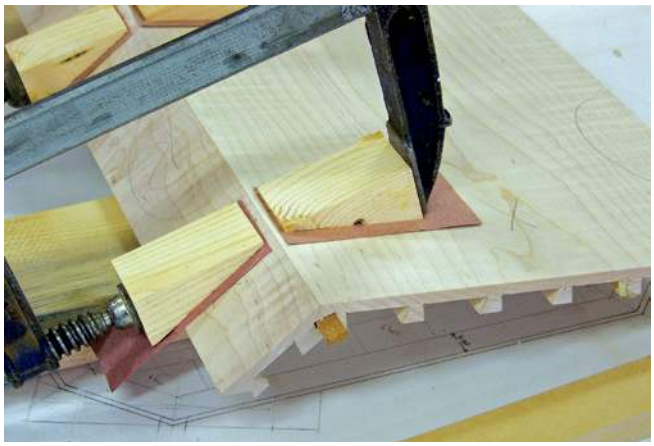
Only the front legs were veneered. They all melted and they all join into the base frame with a split turned leg with integral tenon. The tenon work is cut before the legs are turned. I have secondary material used as backers to keep the curly maple from blowing out during turning.



Use whatever works to glue these compound shapes. Here I use rawhide and the small velcro strips that vegetables often come bundled with.

The idea here was to have "melting ice." The lower edges of the veneers are softened visually and small drips are carved from the solid. This was done with the router, rasps, rifflers, scrapers and whatever works.

Layout and joint cutting is critical. Fussy and precise. That said, cut once and glue it! No fooling' around.



Gluing on the canted sides. Note the spline coming through the top dovetails. The drawing below is used to ensure alignment is correct.

Fitting the upper cabinet work and the lower stretchers.

The doors as paired showing a scraped left side and the paper patterns still on the right. It was a real nail biter covering this beautiful wood with black dye, but I'm so happy with the results of the black ice. Nothing ventured, nothing gained.

Building Fine L. Lee

by Jim Ray

Right side up and primed

For as long as I can remember, I've been addicted to anything that has to do with the water, especially boats. I discovered *WoodenBoat Magazine* around 1994 and read every issue cover to cover, devouring as much information as possible, hoping to learn how to create something as beautiful and enjoyable as the works of art that filled the pages. Each issue seemed to have *the* boat that would be perfect for me to someday build for my family.

A few years ago, I finally decided that I wanted to build a small, trailerable, sailboat. However, there were so many beautiful boat designs to choose from. I had five or six designs that I was certain would be the perfect one for us, only to discover a few months later that yet another design had more appealing qualities! I then found Paul Gartside's *Skylark* design. A beautiful, traditionally built, plank on frame sailing dinghy 14′ long and 5′8″ wide. According to the designer, a high skill level would be needed to build this boat. However, this boat was just too nice to give up on, so I called Paul Gartside for advice. I told him that I had been woodworking for years, had built a couple of canoes, and that I wanted to know if he thought I'd be getting in over my head by building *Skylark*. He said that if I was patient and willing to work hard, I'd be fine. I ordered the plans!

I read Greg Rossel's book, *Building Small Boats*, and reread some sections several times. His writing style is clear, informative and humorous, and he knows more about boatbuilding than anyone I know. Because of the increased difficulty of this design, I decided to take a class taught by Greg at WoodenBoat School called *Fundamentals of Boatbuilding*. The class used a hands-on learning technique with three different boats for students to apply newly learned skills. Drawing boards, posters, props and demos constantly appeared, and I learned more tricks and techniques than I thought possible. Greg was a great teacher with an abundance of energy. The school runs several different classes at once, so I spent my time interacting with like-minded people from all over the world while drooling over beautiful boats. This was an experience that I'll never forget!

Getting started—I got home from the class ready to start. The first thing I had to do was loft the boat. Lofting is the process of laying out the boat's lines (or shape) full size so that patterns can be made for the molds and for many parts of the boat. Using the table of offsets, I plotted out points on a grid and connected them with a batten to get a fair line. What's interesting is that the dimensions aren't all on the table of offsets—some dimensions are taken from the lines already drawn in a different

Battens to establish the plank locations

view. I had trouble wrapping my head around this at first, but as I went along it made perfect sense. I blame the confusion on so many years of working with projects that had constant angles, whereas a boat's angles are constantly changing!

Once I had everything lofted it was time to make the molds, which are the forms that are laid out to give the boat its designed shape. Since I lofted the design full-size, I could make my molds using the lofting as an exact pattern. I made my molds out of pine, being very careful to get each one perfect. This saves a lot of trouble in the future. Once built, I set them up on the strongback, which is a very solid framework set up at a comfortable working height. This needs to be perfectly straight, square and level, and securely attached to the floor.

Skeleton—Next I worked on what is essentially the skeleton of the boat—the keel along the bottom, the stem or the curved piece in the forward end of the boat, and the transom which is the wide, flat section across the back of the boat. I used white oak for these because it is resistant to rot and very strong. Also I was fortunate to have a neighbor who let me cut a couple of trees off his woodlot! I milled it myself, giving me the opportunity to decide which piece should be cut next, basing this on what the surface of the log reveals from the previous cut.

The keel is 1⅝″ thick and 4″ at its widest point and this piece had to be bent. Although I've done some steam-bending before, I had never done anything this big. I built a 12′ long steam box for this project and it worked well. The steamed wood bent right over the molds with a couple of small blocks put between them for overbend to allow for spring-back. The wood didn't spring back! Back in the steamer for another 1½ hours (an hour per inch). Yet another lesson in boat building!

The molds all set up

The last plank clamped in place

Ready to flip!

Shaping the stem came next. Since I had found a white oak tree which had grown with a crooked section that had an "almost" 90° angle near its base. The stem was built out of one piece of wood. Once again, I could make a pattern directly from my lofting. The stem gets a rabbit on each side to accept the forward end of the planks and, with the locations marked out on each side (from the lofting), I chiseled the ever-changing angle of the groove using as a guide a small piece of wood the same thickness as the planks.

Planks—Lining off the planks was the next challenge. Plank locations were not on the plans—instead, just the recommendation to have ten to twelve planks per side. After cutting several battens the thickness of the planks (½″) and the width of the overlap the planks would have (⅞″), these were laid out at what I thought would be the ideal plank locations. For instance, above the waterline the planks should look as though they're about the same in width, even if they're not, but the opportunity to make up the difference can happen below the waterline. This is a crucial point in the build with a lapstrake boat. If you don't get them fair (a nice, sweeping flow), it won't matter what the rest of the boat looks like since this will be what catches the eye! I spent a few hours adjusting the battens, and once I had one at each plank location, the shape of the boat appeared. *I can't tell you how much time I spent staring at it!*

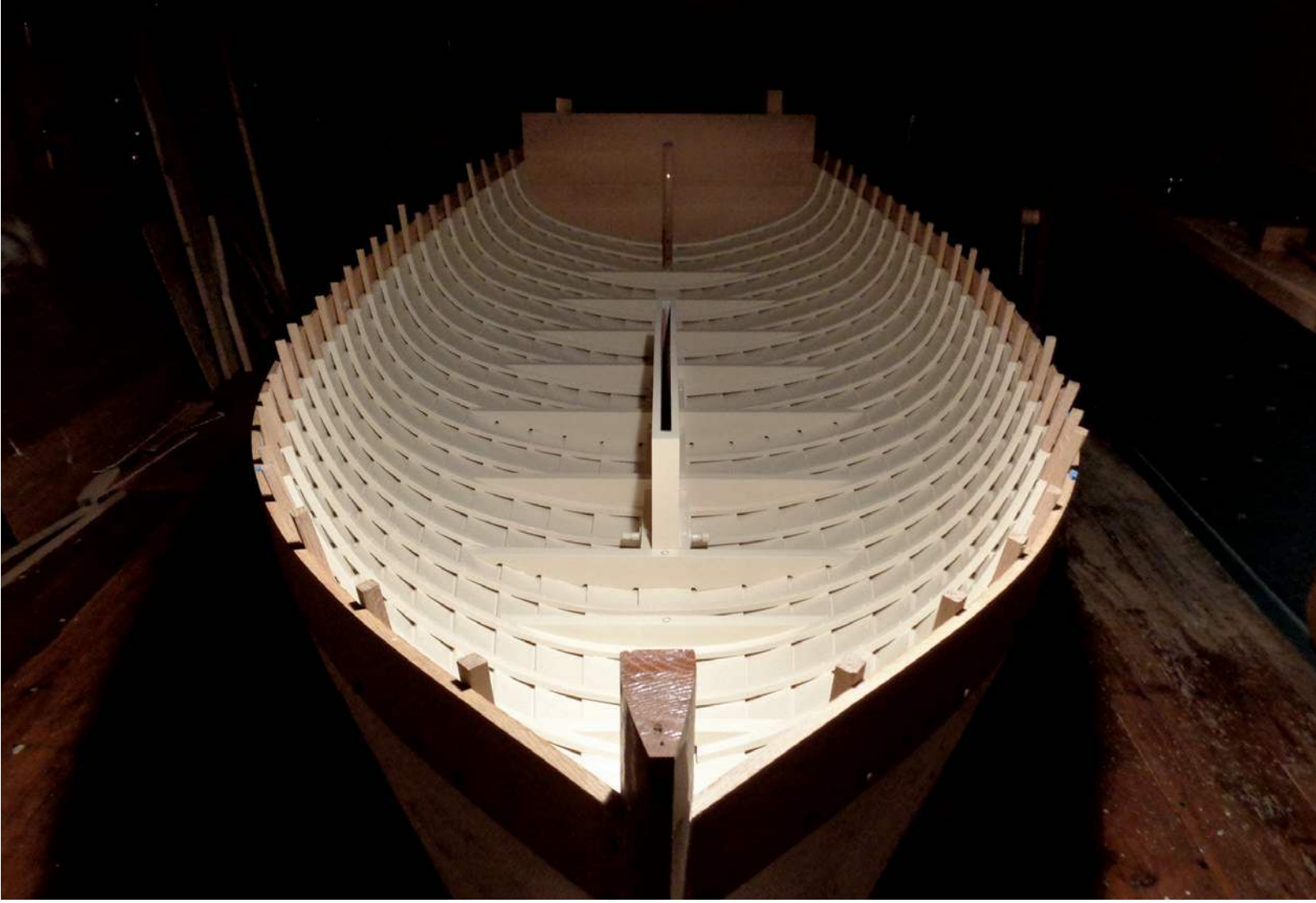
The planks are made from white cedar. Rot resistant, strong, light and forgiving. Although it bends well without steaming, the first few planks on the bottom of the boat have an almost 90° twist in them, so I did steam the first four to help negotiate this twist. The planks have a bevel at the top to accept the one above it and I made a jig with a hand plane to get each one of them perfect. A pattern for each plank was made directly off the boat from the previous plank to the marks I made when I lined it off. Typically, I could make a plank for each side in a day after which I would enlist the help of my very patient wife to rivet them together. I pre-drilled, then drove a copper common nail through the two planks every few inches to join them together. On the inside of the boat, a small washer (a rove) was driven over the rivet before cutting the excess nail off and lightly peening it over. The whole boat has roughly 1,688 rivets holding it together! Yes, a very patient wife!

With the hull all planked, I braced up the boat so that it would retain its shape and then removed all the molds and the strongback. The boat wasn't very heavy at that point, but awkward enough that I called several friends to help me flip it over. It looked like a boat!

Plenty of rivets to hold everything together

Making a floor timber pattern

The frames are bent in



The interior is painted and ready for furniture

Centerboard, thwarts, rails, benches, knees and a mast—Next came the centerboard trunk (where the centerboard lives) and the floor timbers. The floor timbers run across the bottom of the boat and add a tremendous amount of strength to the boat. The floorboards rest on top of these, creating a comfortable walking surface inside the boat. For each frame, I scribed the contour of the boat where the frame would sit and then recorded the angle of each plank on the pattern. I used the pattern on the oak piece and with a chisel, plane and file, worked the angles on the bottoms. I then rubbed some chalk at the floor location, wiggled the floor around, removed any high spots indicated by the chalk, and repeated this until I was happy with the fit.

Fitting a floor timber

Fitting a thwart

By now the oak frames were too dry to bend, so I put them in a tub of water for few days, followed by some time spent in the steamer and then they bent very well. Their shape not only follows the curve of the hull, but many also have varying degrees of corkscrew to keep them against the hull. After cooling, the frames got a rivet at each plank lap.

The thwarts, rails and benches—all oak—went in next. The knees (braces in the corners of the transom and from the thwarts to the sides) are all from the same oak crook as the stem. The way the grain matches the shape almost makes them look laminated!

I built a hollow spruce mast using a birdsmouth method. Once I had the eight staves tapered, I cut a 90° groove in one edge by running it through the tablesaw a couple times with the blade set at 45°. The staves were then epoxied and held together overnight with several hose clamps.

Fine L. Lee—Everyone seems to want to know how long this boat took from start to finish. I began this boat at the end of June, 2015 and on April 17, 2016 we had our launching. We invited our friends and family to meet us at nearby Spofford Lake to see if she'd float. She did and didn't leak a drop! It was a great day, great weather for April in New Hampshire at 70°, but not a breath of wind. Fortunately, we brought along a paddle and were able to get away from the beach.

I still can't believe how much I learned during this build. It was by far the most challenging and most enjoyable project I've ever accomplished. In addition, this boat is just a joy to sail! If you are contemplating building a boat or any other challenging project, get started! With some ambition and the support of the people around you, especially the Guild, you can do it!

After struggling with the decision about which boat to build, the name came easy. About once a week last summer, I had a blast sailing *Fine L. Lee* with a smile that never stopped! ■

Lucky to find this tree!

One of the knees

Glueing the hollow mast

The interior is finished

Cascade Table

by Bradley Wolcott

Each year the members of the New Hampshire Furniture Masters submit a small item to be auctioned off at our annual fall exhibition. The proceeds from the silent auction help support our education programs. I treat the silent auction item as an opportunity to explore new techniques or design ideas and I did both with this small three legged side table. This article will cover three topics from the design, construction and shaping of the piece that capture the evolution of the piece.

The inspiration for the table was an interesting piece of 2″ thick crotch walnut that was left over from a previous job. The three legs were cut from one side of the board and the remainder became the top. A series of large cracks on the right side of the board compromised the structural integrity of the piece. Cutting out the cracks helped determine the final shape of the top. Limiting myself to the material from a single board was liberating in its constraints.

When I was working through the design for this table, I knew that I wanted the legs to connect directly to the top without the support of an apron. A standard technique in this situation would be to turn a round tenon on the end of each leg and insert it into a mating hole on the bottom of the top. In this case I wanted the legs to flow out of the edges of the top. A standard tenon was not practical. Instead I used a housed dovetail to connect the legs to the top.

This joint has the benefit of working well without glue. Gravity presses the top down onto the legs and the large dovetail prevents the legs from moving laterally. The broad shoulders on the leg provide good glue surfaces and additional resistance to racking.

Moving from machine-cut surfaces to more organic hand-shaped ones is a natural step in the evolution of a furniture maker. Hand work is one of the things that distinguishes studio work from factory furniture and thoughtful shaping produces elegant results.

One of the concepts that I have been exploring over the last few years is a design element called the “hard line.” While you won’t find a definition for this in the dictionary, I define the hard line as a crisp edge that divides two shaped surfaces. My tendency was to round over all the edges when I first became interested in incorporating shaped surfaces into my work. That is the easiest way to shape a piece and in many situations it makes sense, but when used inappropriately, it can lead to design elements that seem amorphous and unrefined. Incorporating hard lines helps to define and frame each shaped surface. It adds crispness to the design that is lost when the edges are rounded.

I love incorporating clean curves and organic surfaces into the pieces I design, but that kind of shaping is far more time consuming than you might believe. Without the right tools to remove all the waste, shaping can be an arduous process. Over the years I have accumulated a series of tools that take me from rough stock removal to a smooth finished surface in a reasonable amount of time.

My basic premise when shaping is that I want to remove 90% of the waste material as quickly as possible so that I can spend the majority of my time using fine tools like spokeshaves and cards scrapers to refine those surfaces. Nothing wears you and your tools down faster than trying to remove an inch of waste material with a spoke shave.

I start off with a Lancelot carving tool when I need to remove lots of material quickly. It is essentially a chain saw blade sandwiched between two steel discs and attached to an angle grinder. I was introduced to this tool by fellow Furniture Master Jon Brooks. Despite its aggressive appearance the Lancelot is actually easy to control and can be used to do surprisingly delicate stock removal. When appropriate, band saws and belt sanders are other ways of removing stock quickly.

After I'm finished with the rough stock removal, I use a rasp and coarse cabinetmaker's file to smooth and refine the surface left by the Lancelot. These tools will take me very close to my finished shape. Once I am finished with that I pull out the spokeshaves and card scrapers to further refine the surface. Sandpaper is the last "tool" I use. It helps to even things out and ensure that the surface accepts finish in a uniform manner.

Using a progression of tools from aggressive to fine helps me remove waste quickly and focus my time and efforts on that finished surface.

There are few things more satisfying in this work than putting on the first coat of finish. Walnut can look pretty grey and dusty as you are preparing it for finish but that first coat of shellac is revelatory. Very few pieces leave my shop without shellac being used in the finishing process. It is an all-natural product produced by the lac bug and it has a host of properties that make it an exceptional finish. It is compatible with both oil and water based hand-applied finishes. It dries almost instantly. It doesn't blotch. It is easily repairable. And it is easy to apply with a brush, rag or pad.

Unlike varnish or lacquer, shellac doesn't yellow significantly over time and shellac is the gold standard for clarity and depth. Its only big drawback is that it has minimal resistance to high heat and moisture and that makes it unsuitable to be used alone on a table top.

When I am finishing a small table I typically use shellac solely on the vertical surfaces and apply two coats of a more durable varnish like Waterlox or polyurethane on the top to protect the shellac from moisture. This allows me to bring out the depth and richness of figured woods like the crotch walnut used in this table while incorporating some added protection to the area where a wet glass may be placed.

Overall I felt the Cascade Table was a successful experiment, but like many drafts, there were obvious elements I wished I had handled differently. For this particularly table I felt the top shape could have been more dynamic and the treatment of the top edge would have benefitted from more irregular shaping. For me those points of improvement are the most important lessons from every project. ■

by Owain Harris

1966 Airstream Caravel Renovation

Updating an American Icon

Occasionally a project comes along that is so unlike anything you have done before that you are left to wonder if it is even something you should take on, or if you will come to regret it down the line. This is how I felt on a sunny August day when a 1966 Airstream Caravel trailer was towed into the shop. The project scope seemed quite straightforward on paper; create an interior space that could function as an office, a reading sanctuary and a guest bedroom for the clients summer home on lake Winnipesaukee. But as I came to learn through the course of this project, designing and building around the convoluted compound curves of the classic Airstream's contours was anything but simple.

The first Airstreams were built in California in the late 1930s, but soon WW II brought aluminum shortages and made travel a luxury few could afford. It wasn't until the post war boom that increased wealth and leisure time, coupled with the recently completed interstate highway system, created the perfect nexus for road travel and the Airstream trailer with it's sleek lines and futuristic look was there to fill that niche. By the 1960s, the silver trailer was so cemented in the American psyche that when NASA needed a mobile quarantine unit for astronauts returning from moon missions (presumably infected with space germs), they turned to the Airstream company, who would eventually build 4 of the specialized trailers at it's Jackson Center Ohio plant. Given the iconic status of The Airstream, I knew that I had to get the details of this project right.

Getting started—When I received the trailer it was an intimidatingly blank slate consisting only of an empty aluminum skin and a new ¾″ plywood floor. Before I could even start the construction of new cabinetry, a floor-plan had to be developed that incorporated all of the elements the clients were hoping to have in the new interior. From discussions we had, I knew that they wanted a storage closet, a banquette that would fold out into a double bed, a desk, a prep area that would include a microwave oven and a mini fridge, and sleeping accommodations for one more person. Quite a lot to squeeze elegantly into a 17′ trailer!

For this phase of the project I enlisted the help of my friend Aimee Brothers of Lavender and Lotus Interior Design. I had collaborated with her in the past and I knew that her keen design sense would be invaluable when it came to working out the details of the layout. I especially wanted her input to ensure that the color schemes of the flooring, walls and fabrics worked in

harmony. Together we came up with a layout that incorporated all of the elements the clients were hoping to achieve, whilst retaining a sense of openness and flow through the small space.

With the design phase mostly completed it was time to start considering how to construct the walls. Originally I had hoped that I would be able to find either an aftermarket fiberglass wall kit or work with a boat builder to fabricate new wall panels to fit the signature curved ends of the Airstream.

Unfortunately both of these ideas ended up being dead ends, so I spent the time to figure out how to do it with the one medium I am most comfortable with—wood. After some experimenting, I discovered that I would be able to follow the compound curves using wedges of ⅛″ bending poplar to mimic the same technique that was used for the aluminum skin on the exterior of the trailer. Instead of the seven panels used for the metal though, I went with eleven panels.

Infrastructure—I had my plan in place but before I could get started, I still needed to have the rough wiring done and fabricate some curved studs that the wall panels would be attached to. Wiring—easy enough (completed by Chris Ward of Ward Electric), curved studs—less so.

After a lot of experimentation, I settled on a technique of building laminated studs in place, using the curves of the trailer as the mold. The hardest part of this technique was fixing the first layer of ⅜″ bending ply to the underside of the aluminum skin. I was able to do it using a combination of polyurethane glue and a hot melt glue to hold the piece in place as the poly glue set. Once the first layer was secure, it was easy enough to glue and screw subsequent layers to the first, until the stud reached the required thickness.

Studs and wiring complete and with a layer of fiberglass insulation in place, it was time to tackle the laborious process of scribing, cutting, and attaching the wall panels. There ultimately wasn't any secret technique to this process, just lots of patience and time with a pencil and bandsaw. Once this was finished I could finally start thinking about the fun stuff—the built-in cabinetry.

Cabinetry—For the cabinetry we settled on a baltic birch plywood construction with sycamore veneer and walnut trim. The client really liked the look of the exposed laminations on the edge of the Baltic birch plywood which provided a cool retro look and made my life a lot easier too! I warmed up by first building the two relatively simple cabinets that would be the prep kitchen area and the writing desk. Other than the large scribes needed to fit the curved walls and accommodating the wheel wells, both pieces were relatively straight forward. Once they were complete, it was time to move on to bigger and better things.

One of my goals in designing the interior, was to mimic the curves of the shell as much as possible in the cabinetry. There would be curved cutouts in the partitions and rounded doors in the storage bins, but to really get the full effect there would need to be curves in the cabinetry too. I had done a fair amount

of bent lamination work in the past and I was eager to put my skills to the test here.

Bent laminating—I designed the banquette and also a built in bench seat with conical curves in them. But the show piece would be the curved closet corner that would be scribed into the compound curves of the Airstream's ceiling and walls. At seven feet tall, the single piece corner would be the largest lamination I had ever attempted, so I decided to dive right in and start there.

As I have discussed in previous articles for *The Journal*, all bent laminations start with a mold, and this one would require a big one. Because I needed to be able to slide the mold and the work piece in and out of the vacuum bag with relative ease, I decided to build it with less ribbing than usual to reduce the overall weight. Luckily I did I dry run with just the mold in the bag as this turned out to be a big mistake! The light weight construction of the form was no match for the forces of the vacuum system, and the whole thing imploded inside the bag. Oh well, so much for lightweight! My next iteration of the form was more rugged and held up inside the press.

The next problem to overcome was ensuring that the pressure of the bag on the work piece was evenly distributed across the surface. This was necessary because the outer layer of my closet corner would be a piece of sycamore veneer. If the pressure was not evenly applied, I could end up with air pockets on the surface where the veneer was not sufficiently pressed into the glue layer. After some experimentation, I settled on a combination of an ⅛″ piece of plywood used as a caul and a layer of ¼″ quilt batting that would act as a breather fabric between the caul and the bag. This would allow air to flow over the surface as the bag was pulled tight. To ease the stress of the glue-up, I opted to use Unibond 800 as the adhesive. This gave me plenty of open time to work with and I made sure there was an extra person in the shop in case things got hairy and I needed a hand.

All of the prep work, experimentation and dry runs paid off and I was able to achieve the bend on the first attempt—further proof that woodworking is 90% preparation and 10% execution. As is true for most things in life I imagine.

The conical pieces I needed for the bench and banquette were relatively easy by comparison. Rather than a typical bent lamination which is a section of a cylinder, these pieces would be a section of a cone, so correct layout of the mold was critical. I drew out the form full-scale to determine the size and placement of the ribs in order to achieve the correct angle. The beveled ribs were cut on a band saw with the table tipped at the necessary angle. Once the mold was built, the rest of the process was the same as any other bent lamination, although I opted to give myself a few extra inches of material on either side of the angle so that I could creep up on the final size.

Build in place—From here on out, most of the rest of the furnishings would need to built in place with some sections being constructed at the bench and then scribed into the curves of the Airstream and installed. The technique I developed over

this part of the project consisted of using ¼″ MDF as template stock, a pair of scribes, and many trips between the bandsaw, spindle sander, and edge belt sander. Once I had the scribe perfect, I would transfer it to whatever piece I was working on using a trim router and a flush cut bit with the bearing riding on the template I had just created. Slowly in this manner, the interior cabinetry began to take shape. First the closet, then the banquette and day bed, and finally the small conical bench. The same scribing technique would be used to get a perfect fit on the prep cabinet counter and the desk top.

Round spaces—There were some head-scratching engineering challenges along the way—how to get a bed with square corners

to fold away into a space that is round for example—but eventually everything was in place and I could pay attention to the cosmetic details of doors, drawers and a small vanity mirror for the sleeping area.

Finishing touches—To keep the sleek, modern look of the trailer I decided on flat doors and drawers with vertical grain veneer and a small walnut bead to cover the edge of the baltic birch plywood substrate and provide a contrast to the sycamore.

I also wanted to use shop made walnut pulls. I felt it was important for the pulls to be flat to reduce the chance that someone may catch themselves on one while moving around the small space. I chose to make them similar in style to a set I had developed for a recently complete jewelry cabinet. They would be inset with a cutout for your fingers. Instead of a round hole as I had done for the cabinet, I once again looked to the Airstream for inspiration and created an elliptical shape reminiscent of the elegant curves of the Airstream's ceiling.

Home stretch—One of the things I have learned over the years is to recognize where my strengths and passions lie, and to subcontract out the things that I either don't have the skills for, or the interest in doing. For this project that meant paint for the walls, finish on all of the cabinetry and furnishings, and upholstery for the banquette, the daybed, and the bench. The paint and the cabinetry finish was completed by Bob Realy, and the cushions were made and upholstered by Deborah Fisher.

The final parts to install were the window trim and the walnut ribbing that would cover up the seams in the paneled walls and ceiling. For these elements I fabricated strips of walnut ¾″ wide and ⅜″ thick with a ⅛″ radius on the edges. These pieces were substantial enough to hold the edges of the panels in place, but still thin enough that I could bend them around the curves in the ceiling. Once cut to length and scribed where necessary, they were held in place with decorative oval head screws.

After many months of planning, obsessing, experimenting, building, worrying and working, the completed Airstream was finally ready for it's debut, and on a rainy October afternoon I watched it disappear down the road with a mixture of pride and relief.

Had I known what I was getting myself into it's possible that I would have turned the project down, but as T.S. Eliot memorably quipped…″If you aren't in over your head, how do you know how tall you are?″ Now with some space and time between myself and the project, I am glad that I didn't. The opportunity to collaborate with people as patient, enthusiastic and engaged as my clients were on this project is in itself a treat, but to do so on a something this unique and special was even more so. ■

Easy Cabinet Doors

by Bob Oswald

I love making these rail and stile cabinet doors. I say they are easy but I remember a time when they weren't. The joinery is fun and they look very stylish with mid-rails and muntins. I have a drill press cabinet which begs of a door. It's a big cabinet and would look too plain with just a simple frame and panel. Let's build one.

They are referred to as frame and panel doors as well as rail and stile doors. We see them daily in nearly every kitchen in the country. An attractive presentation, this style has been around before the Romans. This article is to encourage you to try it, but if you are successful, watch for that false sense of security. If you build several, attention to detail, organization and layout of your material is essential to prevent cutting the wrong parts.

What is a frame and panel door?

Five pieces, three components. Rails, stiles and a panel. The rail is the top and bottom of a frame. The stile is the left and right side. But you can embellish this look, especially on larger doors with mid-rails, muntins and an arched top.

Mid-rails and muntins

A mid-rail is just another rail and usually only one is added. I determine the vertical position by eye. What looks good? Raise it closer to the top until it clearly does not look good. Lower it towards the bottom until it clearly does not look good. The right position is probably half way in between those extremes.

Making an arched top rail

An arch, simple Roman or an ogee style, adds a huge touch of class to an otherwise square and blocky frame. This is just another rail made wider to allow for shaping.

Mill lumber to dimension (32, 15¾, ¾)

- The rail is the horizontal member. I remember it as a railing—horizontal. That leaves the stile as the vertical piece.
- The stile length is the full height of the cabinet, 32″ in this application.
- The rail and stile width can vary depending on look but a

good starting point is 2½″ rough stock width.
- The rail will be shorter than the cabinet width by two stiles (5″) but longer by the depth of the panel cut. This cut is traditionally ⅜″. That is what the router bits cut. If you use tablesaw methods, it is a good standard to follow. This cabinet is 20″ wide, so the rails will be 15¾″ long.
- Thickness is typically ¾″ like most furniture building lumber.
- Mid-rail is the same as all other rails.
- The length of the muntin is the distance between the bottom rail and mid-rail, adding ¾″ for the tenon.
- Arched top is just another rail but it is 3½″ wide.

I mill my lumber to *final* dimensions. I have seen a number of classes and shops make the parts thicker with the intent to run the finished door through a surface sander. You can do that if you have access to a belt sander wide enough to handle your doors. However, I'm going to claim that we are fine woodworkers. We don't need to surface sand poorly created joints. Do it right from the beginning. However, it takes great care and accuracy.

Router bit set or tablesaw?

This focus is on the more attractive trim style offered by router bits. The set runs about $100. It's worth it if you like the look and the set will last a long time. The tablesaw will work fine for making a more basic Shaker style door.

Note: You must use a router table with a fence. Ironically, the bearing on these bits is not used for the conventional straight line cuts. The bearing is used with a pattern taped to a rail to cut an arch. Set the bearing flush with the fence.

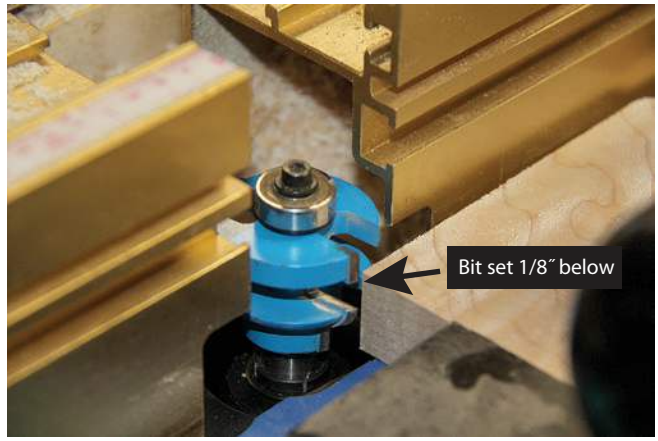
Select and install the rail bit

Start with the bit that cuts the ends of the rails. You don't need to buy the setup blocks if you follow a bit of logic. The finished rail has a tenon on its end, to fit into the slot in the stile. Looking at the two bits side-by-side, which one will cut the end and leave a tenon? There is only one part of the bit that makes a "square" cut. The bit on the *right* has a 'hole'. It will leave a tenon. That is our first bit.

Inserting it in the router begs of buying that setup block to set the height. Not necessary. Look at the back of your (hopefully typical) kitchen cabinet. The panel is inset about ⅛″. So we set the bit height so it leaves the top of the tenon about ⅛″ below the top of the board.

Note: With the bits installed in this direction, the face of the boards is against the table. This eliminates offsets due to slight differences in thickness of the boards.

Tip: The height of this bit is not highly critical other than for consistency. Setting the second bit will be critical, and the commercial gauge block will not be accurate enough.



Cut the rail ends

You will get best results if you use a sled. It firmly holds the workpiece and provides a wood backing to reduce tear-out. Be sure to set the bit height with the sled in place.

Tip: If you hold the sled next to the stopped bit and it looks like it will cut the sled, you have it set up wrong!

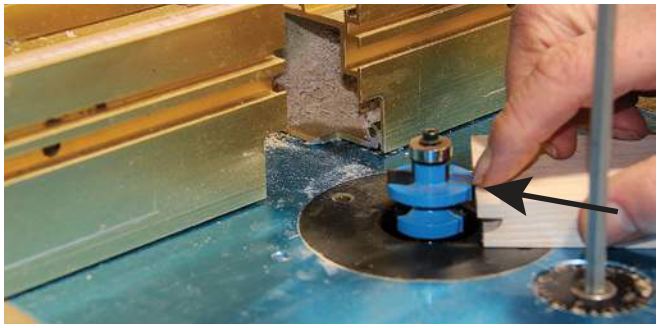
Tip: Before starting the sled cut, position the sled past the bit so it lands on the outfeed fence before starting the cut. It protects the leading edge for more controlled cuts, especially in the case of a mis-adjusted height.

Make the cuts on each end, remembering as you rotate to the other end, to keep the face down. Cut all rails and any muntins. Do not cut the ends of the stiles.

Tip: Be very careful that each rail is flat on the sled and there is no sawdust under the sled or against the fence. Very slight variations here will have you surface sanding the finished door.

Select and install the stile bit

All pieces get a slot cut lengthwise down one edge. *However,* mid-rails and muntins get slots cut on both edges. This is a perfect place for a mistake, so mark your pieces or keep them well organized. Setting the second bit is the one critical step to keep you from having to surface sand your door. It is extremely wise to make a few test pieces and do fit checks.



With the second bit in place, adjust the height so the top of the 'square' cutter is flush with the top of the tenon on a rail sample. Use your fingers, and a fingernail scraping from the wood to the bit to get it as absolutely flush as possible. This is a good starting place, but test cuts often reveal needing a small adjustment in height. Make a final test cut and dry fit test it on all the rails. Are you happy? If you are, you saved eight dollars on a setup block, and you are smarter.

Plan your cuts

Lay out your material in an orderly fashion so you don't have to pick up each piece and determine what to cut. Lay out the mid-rails muntins in a separate location. They get two slot cuts.

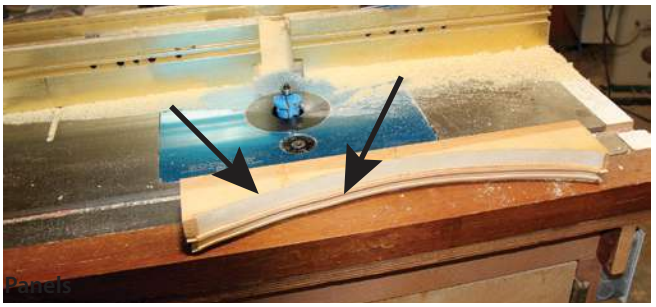
Make all the slot cuts on all the correct sides. Test occasionally as you proceed. It has been known for a router bit to slip slightly.

Making an arched top rail

You should have already made the end cuts with the rail bit. The easiest way to explain this is to make a duplicate rail piece, same length, 3½″ wide. This will become a template. The template ends do not need the rail router cut. Mark the midpoint of the template and mark again about 2″ down from the top, at the midpoint. With a flexible stick or ruler, draw an arc from the bottom corners up to the top mark. Bandsaw the arc and sand it smooth.

Lay it on the rail and trace the shape. Bandsaw the rail leaving 1⁄16″ to 1⁄8″ away from the line.

Tape the template firmly to the *back* surface of the rail with double sided tape. With the stile bit still installed in the router table, move the fence away and manually cut this slot, guiding on the template. Keep a *firm* grip on everything.



Flat or raised? Plywood or solid wood or glass? One-quarter inch plywood is easy. No seasonal expansion issues. Pretty quick to cut to shape.

If you want a raised panel door, much more stylish, you must glue up boards to make the full size required. I will leave those details to another time.

Assembly

The panels are typically left floating to allow for seasonal expansion. From here it is your normal glue up operation. Slide the panels in before the 'capturing' rail is put in place. Use Titebond III for longer pot time as this process is a bit slow, particularly if you are making multiple panel doors like this one.

I will leave these cabinets natural and unfinished because I like that look in the shop. But it is very wise to pre-finish the panels before assembly. If you don't, as the slightly loose fitting panel moves, you will have exposed thin strips of unfinished wood.

What could go wrong?

Why do we bother telling people our tales of woe? Maybe it helps to exorcise the demons. I easily spent over two hours selecting maple. I was looking for stuff I would not use for other nicer projects. Some of it was bent. Soaking in water and weighting a couple of pieces produced warped and twisted, bent boards. Working around defects and blowouts took a while but I found enough lumber to get the milling done.

The first router cut on the ends of the rails went smoothly. But, something didn't feel right about tightening the bit—pay heed. I didn't The bit moved during each cut and I didn't bother to watch and test. End result, a beautiful pile of curly maple scrap and three hours wasted.

When things go south, I have developed the practice of sitting for a half hour staring out the living room window. It worked. This door is for a shop cabinet. I don't really need a nice hardwood. A nearby pine board would serve little other purpose in my shop other than fixtures. Rip, crosscut, trim, rail router cut, stile router cuts—done! The entire process took thirty minutes to produce the frame you see. It is pretty nice using dimensioned lumber. ■

References

- Rockler Round Rail and Stile Router Bit
  1-5/8″ D x 1″ H x 1/2″ Shank
- Bill Hylton's *Frame and Panel Magic* by *Popular Woodworking* is wonderful.

Founders' Bench

by Tom Whitaker

In 1976, a Seattle school bond levy was rejected by voters and, consequently, the school board laid off some 1,800 teachers and staff. Staring at an uncertain future, seven of these teachers banded together to found a new school for grades 6 to 12 named University Prep. From a modest start and a student body of 52, the school steadily grew in scholastic excellence and size, currently with 533 students enrolled.

In 2002, the head of school announced his intent to retire at the end of the school year which would coincide with the completion and dedication of a new fine arts building including a theater named Founders' Hall.

To commemorate him, the theater and the entire group of founders, one member of the original seven proposed the idea of a Founders' Bench. It would include their names inscribed in alphabetical order and be situated in the lobby of the new theater.

That was the beginning of my project. The concept was presented to me in January, and the dedication ceremony was scheduled for early May. Seemingly plenty of time, except that I was involved in the construction of kitchen cabinets for four condominium units. That was the largest project I'd ever accepted and, in retrospect, too large for my shop. However, I was making good progress but change orders, design changes, and job site construction delays were slowing the completion and installation. I really wanted to work on the bench if only I could be done with the kitchens.

Aside from including the founders' names and fitting it into the lobby alcove, the bench design was left pretty much up to me. So, I sketched, doodled, and winnowed ideas until I had a coherent proposal and price to present to Aileen Welgan, the founder who had proposed the bench idea and who would be funding it. She was a wonderful client. Her enthusiasm, encouragement, and questions were refreshing. So, after several meetings, we agreed upon the design, price, and materials.

I saw no reason to pinch the dimensions as this would be a big bench since the lobby alcove where it would reside was quite spacious. Aileen proposed cherry as a warm and appropriate choice of wood. My plan was to have the seven names carved into the crest rail of the bench. Four back supports would lead down from each name to a seat. The seven seats would be slightly spaced apart but visually merging to form one continuous seat, creating a representation of their work founding and growing the school together.

So, taking a break from the kitchen project, off to my lumber suppliers I went. I didn't need wide or matched planks. Rather, I was looking for lengths greater than what I usually needed for previous projects. I could scarf joint to make what I needed, but wouldn't it be nice to find something 12 feet or more in length?

At my first stop—Crosscut Hardwoods—unbelievable! Multiple pieces 12/4 x 8″ x 14′! Hardly any sapwood and no major knots, splits, warps, twists or killer defects for my purposes.

I would be re-sawing and laminating several curved components. Perhaps in areas of this country where cherry is harvested and milled such fine lumber as this is common, but is seldom found in the Pacific Northwest. Having found my wood source, I returned to my shop for lunch and to calculate the footage I would need.

But I nearly fell over in a dead faint when I returned to the lumber yard ready to purchase stock: one of the yard men was crosscutting the 14s into 8s and 6s to more easily fit them into

the storage rack! A quick walk to the manager's office to express my consternation and state that I'd willingly pay a premium price, but only if I had a selection of 14s from which to choose. The manager was alarmed, too, and readily assigned the guy to other tasks. In hindsight, I should have done my calculations first! I just didn't expect to find such fine material so quickly. Usually a search requires more time and the necessity of tweaking a design to accommodate available material.

The clock was ticking. By now it was early April and the condo kitchens, though nearly completed, were still tugging at my calendar. So, with no definite date from the condo site as to when I could finish and clear out, I spent two days doing construction drawings for the bench, laying out a preliminary construction sequence chart, sketching ideas for laminating jigs, shaper jigs, and extending layout/work tables since my regular tables would be too small for this project.

With a firm preliminary design, I was comfortable knowing that some details would have to evolve during construction—final leg and armrest shapes and proportions, individual seat spacing, leg spacing, etc.

My initial idea of machining the back supports from maple and then having them ebonized prior to assembly and final finishing wasn't viable. Time was short, the finishers schedule uncertain, and what if the support shape just wasn't quite right after all? So, I decided that I would use wenge which I already had stock in hand. The color and grain were suitable for the bench, and I could tweak the shape, if necessary.

I began working in earnest. I re-sawed cherry for lamination and set it aside, stickered, for a few days while I extended work tables, made master patterns and various jigs.

And so, the construction proceeded—laminations glued and shaped, seat sections tapered, scalloped and glued together. Piece by piece, joint by joint, surface by surface, curve by curve, it all came together.

My intent is not to give a step-by-step treatise here. Rather to present a very fine bench that seemed to me to embody a rare confluence of right design, right client, right material, right purpose. Despite the time constraints, the bench was delivered a few days ahead of dedication day. During the three plus weeks and 225 hours of construction time, I made only a couple of minor errors with no bloodletting accidents, aside from a couple of splinters. Final dimensions: 11´8″wide x 36″high x 22″deep.

During the final week, I recall my mental focus was such that my head radiated heat like a boiler—a sensation I had never experienced on a woodworking project. Though I've had opportunities to build many fine pieces of furniture since then, no project has so intensely focused my skills and energy as did the Founders' Bench. However, with a major mistake, I likely wouldn't have made the deadline.

There are three people forever linked to the bench for whom I am thankful—Aileen Mary Welgan for her concept of the bench, generosity and constructive encouragement—Roger Bass, the head of school at the time, for having sufficient confidence in my work to introduce me to Aileen—and John Thoe, a local Seattle woodworker and master carver who so expertly incised the seven names. Thank you all. ■

This was a self assigned project because I haven't made a blanket chest for several years.

Blanket Chest

by Jere Osgood

From a design point of view, I wanted a simple form that would fit in any home. There is space for two to four blankets depending on size. It is made of some really fine curly maple. Here is how I made it.

The sides have a slight outward curve—about ¼″ in 17″ or an estimated radius of 12 feet. I laminated two ⅜″ and one 1/16″ layer using a form in my vacuum press with Unibond 800.

Photo 1 shows one of the curved side panels exiting the vacuum bag. A note on this outward curve. There is a cant out of vertical and a slight outward curve—Photos 2 & 3.

I am limited by what my table saw can cut at 45°. The saw carriage for this cut has two ¾″ ribs to boost one edge up—Photo 2.

After the sides are cut to 45°, they need a spline slot which is curved to echo the curve at the outer point of the 45 (this is different from the outward curve of the panels). For the router fence to work well, the curve at the edge of the 45° should be very close to the curve of a circle—Photo 5. See also Photos 6 & 7 which show the jig to hold panels at 45° making joint area level or parallel to the floor. I used a ¼″ spline stopped at the top edge and through on the bottom edge.

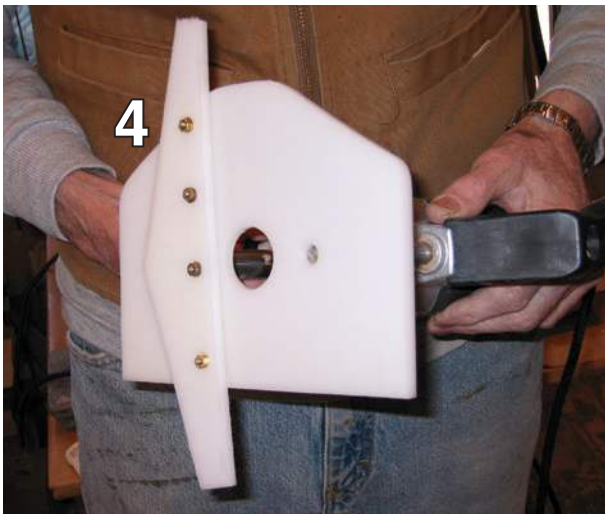
The next steps are to profile the four sides. I did this on my shaper using a 50mm x 85mm straight cutter with matching ball bearing. You could also use a router table setup with a straight ball bearing bit—Photos 8 & 9.

construction photos by Suzanne Cox

One of the curved side panels exiting the vacuum bag

Panel shimmed up to reflect angle on shop drawing

Cutting the 45 on table saw



Curved delrin fence on router base

Running the router using the delrin fence on the pointy edge

Curved slot at 45°—face with the slot is jigged up to be level

There are two jigs for the front and back panels. One for a slight ⅛″ downward curve and a second to put in the mitered leg joint—Photo 10. Because of the tight radius I used a ½″ ball bearing straight router bit for this joint. It is also mortised for the leg tenons.

The bottom is a ¾″ unfinished panel of cedar of Lebanon. It is rabbeted with a ⅜″ tongue set in a ⅜″ groove.

For a gluing jig you need panels of ⅜″ wiggle board to conform easily to the curve of the maple panels—Photo 17. The view looking down shows the 13⁄16″ carcass side, the ⅜″ wiggle board. The 45° clamping ridges give gluing pressure parallel to the glue line. They need to be carefully made. They are curved in two planes matching the lines of the carcass.

You need to make clamping panels for all four sides and 12-16 clamps. Do a dry clamp so that all is rehearsed and use

a glue such as Unibond 800 or an epoxy that gives you time to get it all together. Remember to prefinish the inside (two light coats of lacquer or shellac) prior to glueup leaving the bottom panel unfinished.

After glueup, setup for the dovetail splines. You will need a specially made router jig—Photo 13. The spline is made tight and carefully sanded to just push in.

The feet are made and fitted individually and have slots for the loose tenons. There is a cross rail underneath tenoned into the feet. It does not have to allow for seasonal expansion.

The final step is to make the top. It is two ⅜″ panels, each of three ⅛″ layers that are glued in the vacuum press on a curving form. The ⅜″ panels are then glued up using graduated spacers—Photo 14.

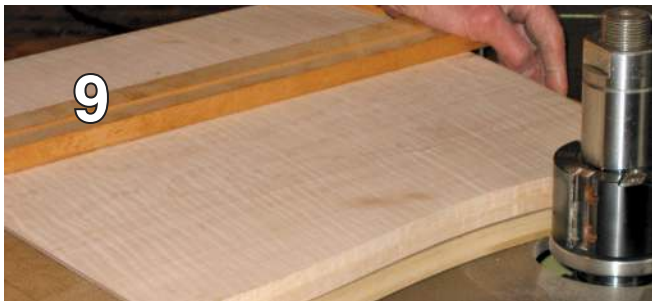
Photo 15 shows the loose splines for attaching the end batten. The end batten is carefully made to match the curves of the center panel using a shaper jig. The mortises on the center panel and the batten need to match exactly. This is done with a simple jig that will hold either the center panel or the batten on the horizontal mortiser (Langhulsbormaskine). Scrape or delicately hand plane the batten so that there is a slight hollow at the glue face. Clamp and glue only the center area.

I used a 1″ wide leather strap to restrain the top on opening—Photo 19.

Finally, I finished the blanket chest with several coats of clear lacquer. ■

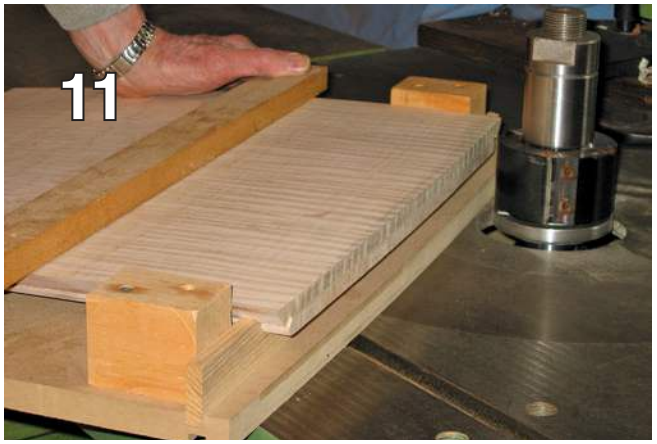
Jig for holding side at 45° for slot

Using the shaper to profile curve on bottom edge



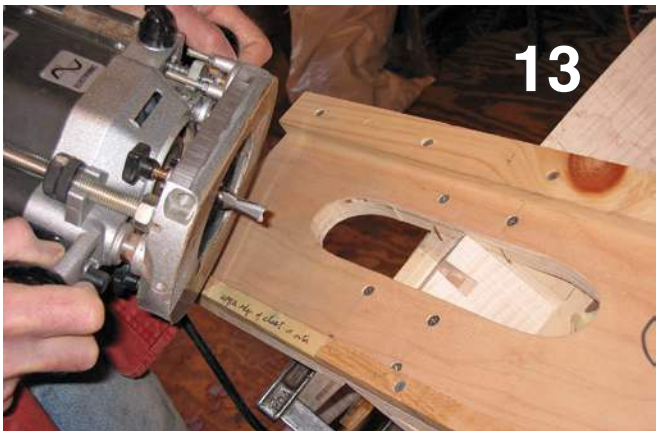
Using shaper to profile upper edge of end

Profiling to receive foot



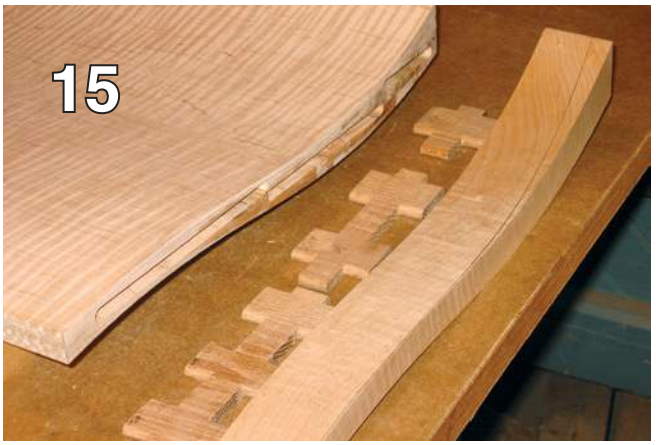
Shaper doing bottom edge—shows bottom panel slot for positioning on jig

Curved spline slot in 45 joint also shows slot for bottom panel



Carcass with jig in place to put in dovetail spline

End view of top construction—two 3/8˝ panels, each of three 1/8˝ glued up with graduated spacers



Loose splines for attaching the end batten

Carcass clamped—note curved 45° clamping ridges glued on wiggle ply

Looking down at corner of carcass

Top panel

1˝ wide leather strap restrains the top

A Little Innovation

by Alan Saffron

Look at the Guild calendar and you will see meetings and demonstrations focusing on various woodworking technical skills. Not so with creative skills which seem to be under appreciated in woodworking. Creativity in woodworking is much more than project design, which some may argue, is a skill that can be learned. And being creative does not require being original and new. Creative skills include construction design and problem solving which are often adaptations of existing forms applied to current work. As with technical skills, woodworkers can improve creative skills by taking advantage of presentations and articles, and by being observant and open.

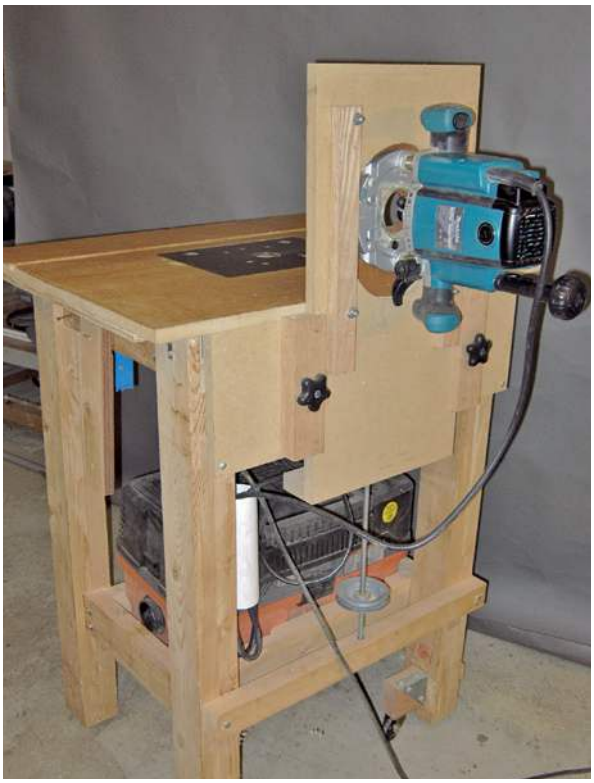
An often overlooked creative ability is innovation which includes the ability to combine different and sometimes unrelated existing ideas and forms to create novel solutions, new processes or new products. One of Henry Ford's great innovations was the assembly line which came from observing "disassembly lines" in meat packing.

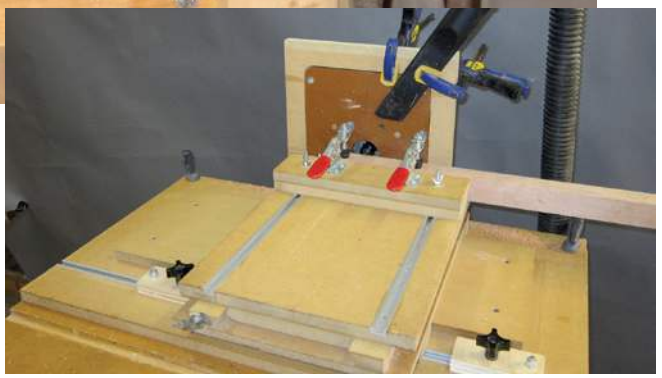
Another great innovation combining existing elements in what was a novel way was made by Frederick Stanley, the man whose name is commonly found in many woodworking shops. Some time after establishing his hardware manufacturing company in New Britain, Connecticut in 1853, and needing to increase sales, Stanley made a change in the packaging of his hinges. It was something different, no one else did anything like it, and so it was a bit of a risk. But it worked and contributed so much to the success of his company, he later bought out his cousin Henry's company, Stanley Rule and Level. The rest as they say, is history. What was the innovation that increased sales so dramatically? He included the screws. He solved his problem, increasing sales, by combining two items normally packaged, handled, sold and thought of separately.

For Ford and Stanley, their solutions may have come easy. For me, I needed an innovation to solve a woodworking problem. But then I still needed a kick in the butt to come up with my solution.

I have a small amout of experience with vertical and horizontal milling machines. I use my router/table for many milling operations. So inevitably, when reading the April, 2004 edition of Fine Woodworking magazine, the opening photo accompanying the A Versatile Router Table article shows a woodworker doing horizontal routing on a conventional router table. This peaked my interest. The author, a mechanical designer and machinist, designed a vertically adjustable assembly holding a router horizontally that could be attached to the back of a conventional router table. What looked like a sturdy, well built, if not overdone design could smoothly raise and lower a router with precision and lock it in place.

I was concerned that for horizontal milling, it didn't have the additional control of the workpiece I needed. Even with the





described accessories and functions, I judged it as a well designed challenging bit of work which didn't seem justifiable. The next article on cherry was waiting.

Some time much later while browsing woodworking books at a Barnes and Noble, I came across a title, Classic Joints with Power Tools, by Yeung Chan, a San Francisco custom furnituremaker, published by Lark Books. I purchased the book and it has been a valuable reference for me. Before getting to the various joints, the author covers recommended jigs and fixtures. There on page 31 was a mortise and tenon jig. It resembled a feed-table on an old Bridgeport vertical milling machine—a vice mounted on sliding dovetails going in and out, which was mounted on sliding dovetails which moved left and right. A crank raised and lowered the entire assembly for depth of cut. The author's jig emphasized a feed table comprised of two sliding surfaces, each with angled runners forming dovetails arranged at 90° to one another and mounted on a base. Two toggle clamps screwed to the top surface held the workpiece.

My interest wavered with the business end of the fixture. A router was simply mounted to a board as a fence, which was then held in a bench vice. The feed table was set against the fence and clamped to the bench. The front vice on my current bench is square to the top—then…

Due to the vice's position on my bench, clamping the feed table securely to it seemed awkward. And, I could not imagine loosening the vice and adjusting the router's height with any precision. So much for that jig. But I did go on to use the author's design for a drill press table.

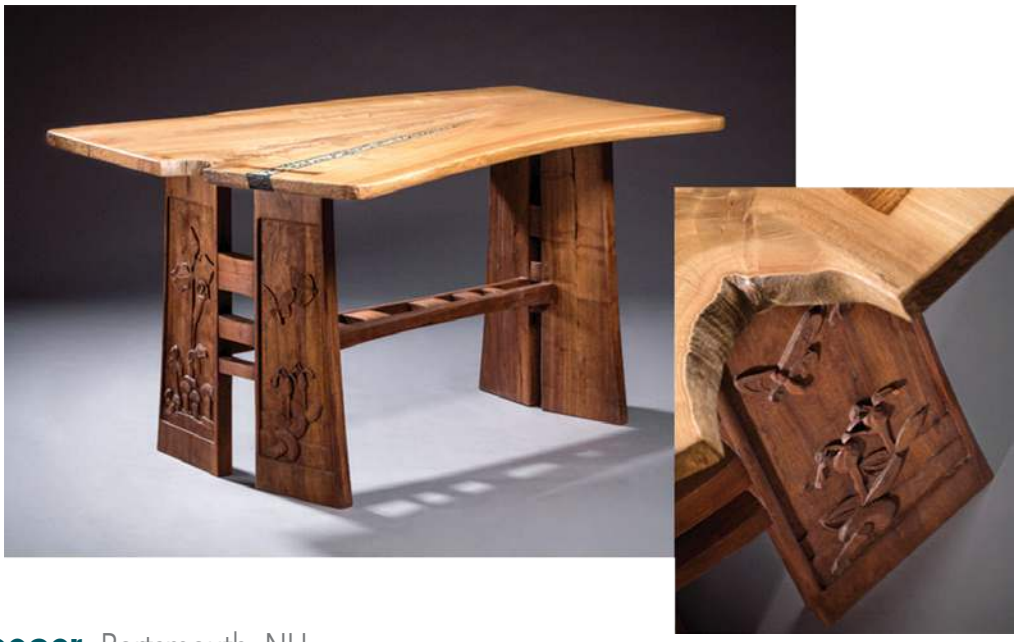
You're thinking I did not remember the first router setup when I saw the feed table based jig in the book. It took some pretty loose mortise and tenon joints to come to the realization that I needed a better way to make mortises. I resorted to a little research. Flipping through Yeung Chan's book, I came upon his feed table based setup, and then remembered a router table in Fine Woodworking that might work. I searched routers and router tables in the article index not knowing exactly what I was looking for. I knew it as soon as I saw it.

As woodworkers we all have a certain amount of inventiveness and innovation among our skill sets. My purpose for going through this is to encourage you to increase your consideration for design and creative thought in both finished products as well as jigs, fixtures and processes. Sometimes it takes effort and patience. As an example, I shared my design process for a tool which I have relied on for years for its accuracy, repeatability, safety, productivity and quality. It is based on two great designs, neither of which are mine. All I take credit for is a little innovation. ■

Member Gallery

Jeffrey Roberts Unity, NH

Swooning Sofa—Mahogany, upholstery. 70˝ deep x 36˝ wide x 33˝ high. Impressions from youth form lasting attractions. My client approached me with the desire for a custom chaise lounge to fit a specific place in her breakfast nook overlooking Essex Bay. Blends of styles from her English childhood, her passion for art and the idea of sitting side-by-side reading stories to her grandchild formed the design for this piece. Graceful curves fit to the inch of the nook and to the bodies that grace the sofa define this piece, a finished piece that the family could not be happier with.



Jeffrey Cooper Portsmouth, NH

'Judy's Impulse'—English elm, walnut base. 25˝ deep x 25˝ wide x 21˝ high. The challenge was that the base design had to accommodate a top that is wider at one end than the other, and is divided into two parts at the wider end.

The slab was large enough for four to dine at, but to be sure people wouldn't be kicking each other or the table base, I made a full-sized cardboard model.

The next challenge was how to bridge between the two sides of the divided base. That inspiration came from a Tim Coleman table that featured an understructure of two long stretchers connected by short cross ties. I modified that idea in accordance with the shape of the slab table top, adjusted the spacing and proportions using some mathematics based on the golden mean, designed some relief carvings for Judy and Tony based on what they see in their own garden, and voilà!