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OCTOBER 2020

VOLUME 44, NUMBER 5

PROJECTS



Easy Live Edge Table
By Dan Cary

Page 38

Using Timber-Link pine slabs assembled into a tabletop with pocket screws and a set of welded-steel legs, you can make this modern table project in one day!



Ginkgo Leaf Table
By Willie Sandry

Page 30

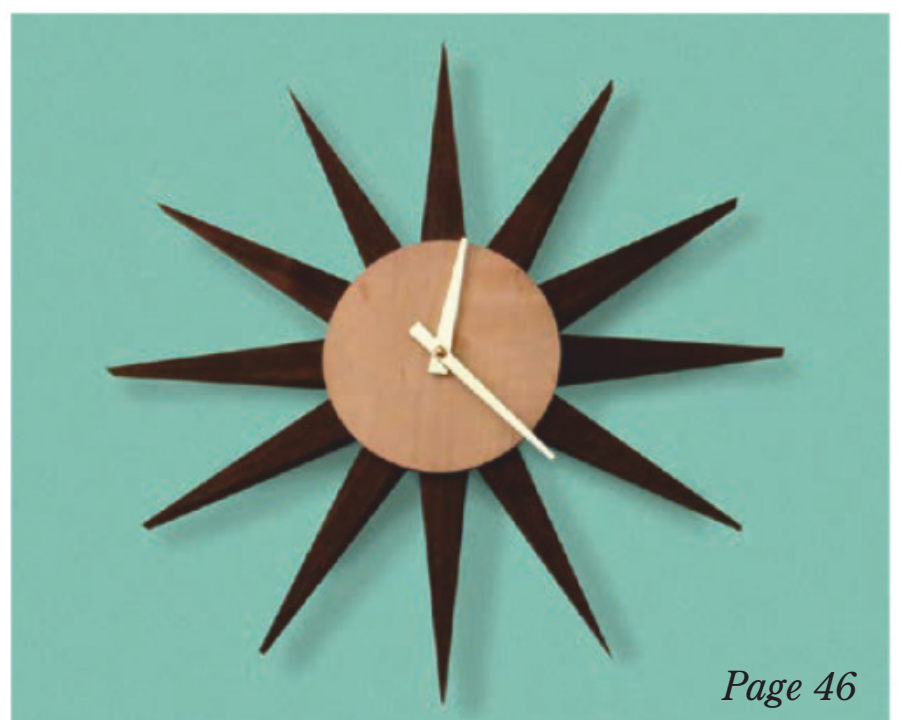
Influenced by both Japanese architecture and furniture, our author's walnut table offers good opportunity to practice template routing and cutting angled joinery.



Five-spindle Inlaid Bench
By Rob Johnstone

Here's a hybrid that combines basic woodworking, spindle turning, CNC carving and even an epoxy "inlay" pour in the same build.

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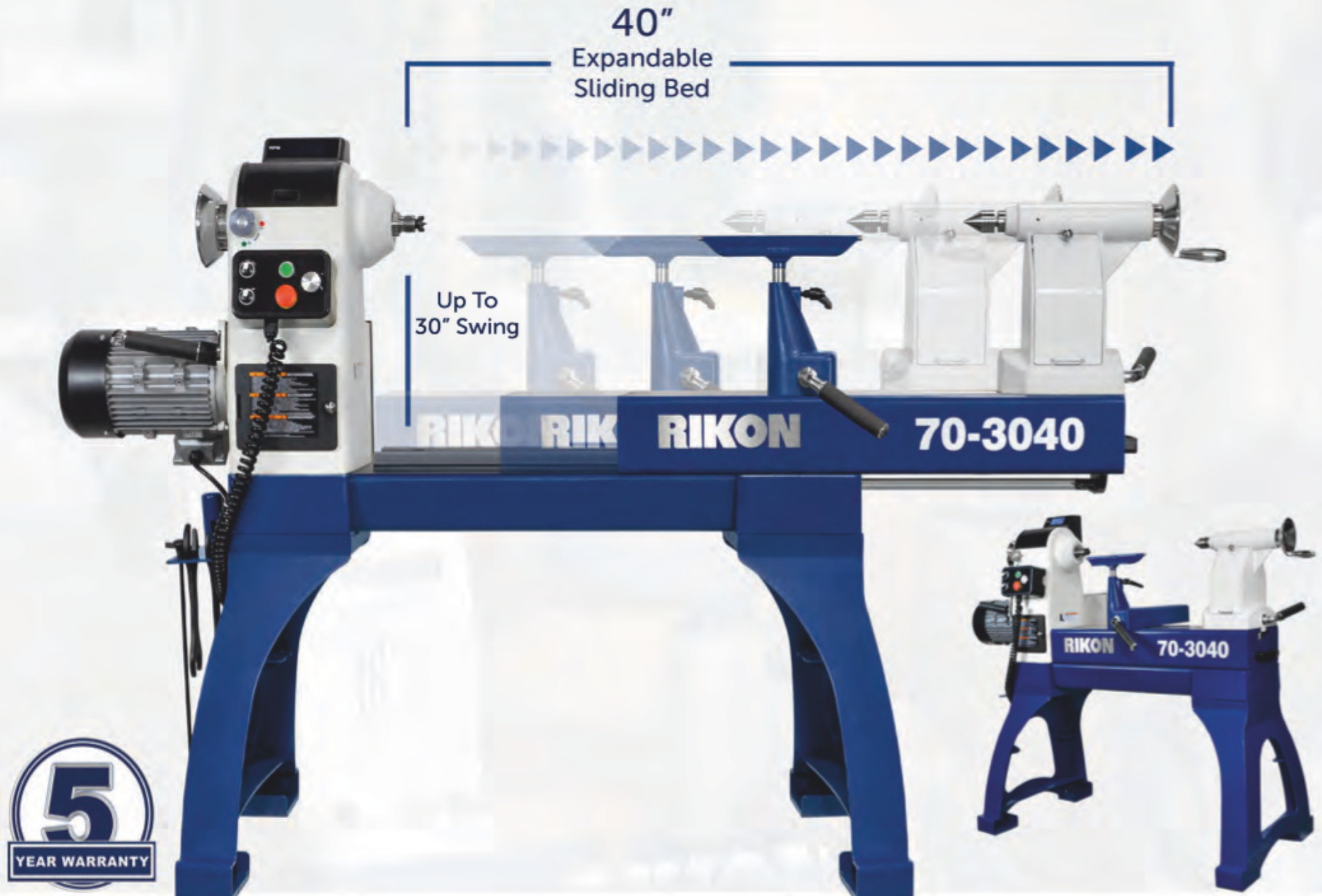
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Retro Starburst Clock
By Jeff Jacobson

This funky, cheerful clock is reminiscent of many 1950s designs. Make one (or even two!) from a small amount of 1/4" and 3/4" stock you may already have on hand.

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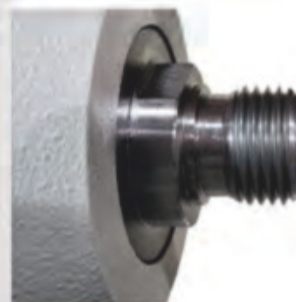
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Ash trees — friend to sluggers and steam-benders alike — may one day lose their ash borer battle.

Finding Good Wood Doesn't Have to be Hard

While it is very true that woodworking is a generic term covering a huge range of activities, it is unified in one aspect: wood. Folks who are not woodworkers are unlikely to appreciate the amazing characteristics of our favorite medium ... from balsa to lignum vitae. And certainly those outside of our community will never know the swell of joy we feel as a truly unique piece of stock exits the planer and reveals its inner beauty.

But often that presupposes we have a source of lumber to buy from. And in recent weeks I have learned that many of our cadre are having a bit of a challenge finding good quality hardwood.

Some of that problem may be geographic. If you live in the middle

of a desert in Nevada, you won't find a yellow poplar tree for 1,000 miles. But I'm hearing that for some woodworkers who previously had a wealth of lumber sources from which to choose, now there are fewer options. If that is your situation, I have a few suggestions to consider. First, there are some fine lumber



companies that advertise in our pages, and they will ship boards right to your door. Second, I would encourage you to do a bit of web searching for local sawmills. They can be a gold mine, in my experience. Specialty woodworking stores like Rockler also have excellent stock for sale. Lastly, I have scored some great buys off of local online "swap meets" and online classified ads. Keep your eyes open and you just might find some treasure!

— Rob Johnstone

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Mahogany (African)..... 4/4..... Select..... 5.25	8/4..... Select..... 5.55		4/4..... \$124.00	8/4..... \$127.00
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Oak (White)..... 4/4..... 1C..... 2.20..... Select..... 2.80	8/4..... Select..... 4.95		4/4..... \$107.00	8/4..... \$135.00
Poplar..... 4/4..... 1C..... 1.30..... Select..... 1.80	8/4..... Select..... 2.00		4/4..... \$ 87.00	8/4..... \$ 91.00
Walnut..... 4/4..... 1C..... 3.25..... Select..... 6.25	8/4..... Select..... 7.00		4/4..... \$129.00	8/4..... \$149.00
White Pine (Soft)..... 4/4..... F.G..... 1.40..... Select..... 1.80	8/4..... FG..... 1.80	4/4..... \$ 80.00	8/4..... \$ 86.00	
Yellow Pine (Soft)..... 4/4..... Clear..... 2.20..... Select..... 2.60	8/4..... Clear..... 2.60	4/4..... \$ 92.00	8/4..... \$ 99.00	
Western Red Cedar..... 4/4..... 2C+Btr..... 2.50	8/4..... 2C+Btr..... 2.50	4/4..... \$101.00	8/4..... \$107.00	

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FROM OUR READERS

Woodworkers to the Rescue!



THE SUMMER OF OUR DISCONNECTION

Looking back on this summer, I have to say my feelings are mixed. The pandemic disrupted our summer plans and activities from Memorial Day to Labor Day. Here in Minnesota, the State Fair — a really big deal to us — was canceled. My arteries will benefit from the deficit of deep-fried foods, but my heart will miss the connection to so many wonderful people, displays and memories the fair provides.

But through the dispiriting changes and challenges, there have been many uplifting moments as well. And riding the wave of making the best of things are woodworkers getting busy in their shops ... and surfing that wave right to the shore. In my 20-plus years at this magazine I have never seen so much woodworking activity. Apparently if you send a woodworker home and tell him or her to stay there — they go to their shops and don't come out!

Your productiveness has helped me take the same steps and get busy in my shop. The results are gifts for my kids and grandchildren, new project ideas for upcoming issues of the *Journal* and a sense of comfort in discomfiting times.

— Rob Johnstone

LETTERS

Lending Library Thanks Plus Some Painting Advice

I've been putting off building my wife a lending library for a couple of years until I saw Kimberly McNeelan's article in your August 2019 issue. She provided

every detail I needed to get the ball rolling. After building her library design, the only improvement I would suggest is to paint all parts before assembly to ensure sharp lines between the contrasting colors. I also found it helpful to first draw the page lines on the book's edges before tracing them with my wood-burning tool. Keep up the great work, and thank you for an excellent resource! I read the magazine from cover to cover and learn something new in every issue.

Steven Witcher
Anderson, South Carolina

Planing Epoxy Cutting Boards?

I have been making cutting boards for some time now but would like to incorporate epoxy into them. I normally run my all-wood cutting boards through the planer to flatten them, but I see many

Continues on page 10 ...



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OCTOBER 2020

Volume 44, Number 5

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Safety First Learning how to operate power and hand tools is essential for developing safe woodworking practices. For purposes of clarity, necessary guards have been removed from equipment shown in our magazine. We in no way recommend using this equipment without safety guards and urge readers to strictly follow manufacturers' instructions and safety precautions.

Woodworker's Journal (ISSN: 0199-1892), is published in February, April, June, August, October and December by Rockler Press Inc., 4365 Willow Dr., Medina, MN 55340. Periodical postage paid at Medina, Minnesota and additional mailing offices. Postmaster: Send all address changes to Woodworker's Journal, P.O. Box 6211, Harlan, IA 51593-1711. Subscription Rates: One-year, \$19.95 (U.S.); \$28.95 U.S. funds (Canada and other countries). Single copy price, \$7.99. Reproduction without permission prohibited. Publications Mail Agreement Number 0861065. Canadian Publication Agreement #40009401.

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FROM OUR READERS CONTINUED



people use a drum sander instead if the cutting board includes epoxy. Can I run a wood and epoxy cutting board through my planer, or will it chip or create too much heat that could affect the epoxy?

Mike Kilar
Whitewater, Wisconsin

Rob Johnstone Responds:
Mike, as long as you have sharp blades in your planer,

the cured epoxy resin should cut like butter. And if you have carbide-insert cutters in the tool, even more so — cutting the resin is not difficult. There may be a problem, however, with using the resin in a cutting board. None of the epoxy manufacturers I know of verify their product to be food safe. That is especially true when the resin is mixed with colorants or other decorative products. While a quick spin around the Internet will show you

that many folks are using it in just that way, we at the *Journal* do not recommend using epoxy resin in cutting boards or other food contact applications.

Which Dyes are Fade-resistant?

I want to use dye rather than stain to color a piece of Arts & Crafts furniture I'm in the process of finishing. The wood is white oak, and I

Continues on page 12 ...

READER PROJECTS

Multi-species Rolling Workbench

Here's a heavy-duty workbench I've built from leftover maple flooring, oak plywood, a solid oak face frame and walnut that I cut down over a



decade ago. It features a pair of vises and storage drawers underneath. I used Rockler's foot-activated Workbench Casters (item 43501) to make the bench easier to lift and roll around my shop.

Dale Bartel
Brainerd, Minnesota



Rotating Fruit Tray

Recently I made this five-compartment fruit tray for our kitchen island. It rotates on a lazy Susan base. The center hanger is for bananas, and I made it removable so the compartment underneath can be used for other storage, too. The project is made of cherry and poplar finished with lacquer. I had a tough time finding a piece of hardware for the banana hanger, so I removed the metal hook from a wooden coat hanger and epoxied it into the wood.

Dan Martin
Galena, Ohio

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don't want to emphasize the medullary rays. That's why I'm considering dye over stain. However, I'm worried the dye will fade, whereas the stain would be more colorfast. How do I know which dyes are fade-resistant?

Robert Jones
Saginaw, Michigan

Chris Marshall Responds:
Unfortunately, UV light will fade all dyes to some degree.

The best way to prolong the color is to keep your dyed furniture out of direct sunlight. If that's unavoidable, you could top-coat the project with an exterior varnish containing UV blockers/inhibitors (they'll advertise that benefit on the label) to help shield the underlying dye color. If your main reason for choosing dye is to not

Continues on page 15 ...

SURVEY

FINISHING METHODS AND MATERIALS WAS THE TOPIC OF A RECENT READER SURVEY

Whether you love or loathe the finishing process, it's a necessary and unavoidable woodworking step. Here's how you do it.

Which of the following finishing products do you prefer as a top coat for a hardwood project?

Oil-based polyurethane	32.73%
Water-based polyurethane	28.95%
Shellac	5.11%
Danish oil	11.19%
Varnish	1.95%
Lacquer	8.76%
Tung oil	5.84%
I don't apply clear finish	1.34%
Other	4.14%

How often do you use stain or dye to change the color of your woodworking projects?

Nearly every project	18.17%
Only some projects	49%
Rarely	26.49%
Never	5.71%

Which of these coloring products do you prefer?

Oil-based pigment stain	53.18%
Water-based pigment stain	23.11%
Dye	13.33%
Paint	3.3%
None of the above	7.09%



When applying a clear top coat, would you likely sand the wood:

Extra smooth, 400- to 600-grit	22.2%
Very smooth, 220- to 320-grit	62.56%
Less smooth, 120- to 150-grit	10.85%
I don't apply a clear top coat	1.46%

Where do you primarily go to learn about finishing techniques?

YouTube	22.44%
Manufacturer websites	5.49%
Woodworking magazine videos	20.37%
Books	8.78%
Woodworking magazines	30.24%
Woodworking store websites	1.22%
Woodworking store demos	1.34%
Guild classes or demos	1.46%
Other	8.66%

There's more online at
woodworkersjournal.com



Check online for more content covering the articles below:

Woodturning (page 20):
Author discusses bowl examples from his collection (video)

Easy Live Edge Table (page 38): Assembling Timber-Link slab sections and pre-made legs (video)

Five-spindle Inlaid Bench (page 40): Overview of the building process and routing inlay with Shaper Origin (video). Bamboo inlay patterns (PDF).

Retro Starburst Clock (page 46): Measured drawings and full-size clock base template found on page 49 (PDF)

Tool Tutorial (page 54):
Inline condensation and water filter considerations in air compressors (PDF)

What's in Store (page 62):
Featured tools in action (videos)

Finishing (page 64):
Video of finishing techniques.
<https://www.rockler.com/6-simple-finishes-recipes> (video).



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What's This?



For lack of a better term, Henry Norona calls his mystery tool a "gauge."

The circular dial on its main body is delineated into 100 degrees, rather than 360. Its knurled knob turns and can be removed

but doesn't have a clear use to him.

Turning the pointed rod, however, rotates the circle's center. The rod is fixed in the jig and cannot be removed. Can you identify this tool?

Email your answer to stumpers@woodworkersjournal.com

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Woodworker's Journal, 4365 Willow Drive, Medina, MN 55340.

Three readers speculate that Dennis Jakubisin's red-handled mystery tool in the June issue might be most familiar to vintners or wait staff.

Larry Hines from Land O Lakes, Florida, thinks its purpose is to insert corks into wine bottles. But both **James Yarbrough**, from Winston-Salem, North Carolina, and **Luther Steele** believe it just removes the corks.

Evidently, according to the rest of you, these three guys haven't spent enough time in the garage — because the mystery tool has a unanimous purpose with the "grease monkey" crowd.

Ed Zagorski, David Boyle and **Kyle Amberman** knew it clearly as a tool for installing or removing drum brake shoes on old cars. "Cool find," Kyle adds.

Gary O'Brien explains that drum brakes are held in place with a spring assembly "that consists of a bottom cup washer, coiled compression spring and a top cup washer with a slotted center hole."

Doug Haerle adds that the spring assembly is held in place on a pin with a flattened end that goes through an assembly backing plate.

This configuration keeps the side of the shoe flat to the backing plate, says **Karl Hofmann**, "but allows it to expand to apply the shoes to the drum when you step on the brake pedal."

Traditional drum brake maintenance tools enable the



While Chris Meyer's drum brake maintenance tool (bottom photo) might be a simpler design than the one shared by Dennis Jakubisin in our June issue (top photos), Meyer has used his to work on brakes for four decades.

top cup washer with a slotted center, plus the spring, to be held in position. "You push the (top washer) and spring down over the pin and, with a quarter turn, latch everything together," says **Peter Bonnel**. **Fred Rasel** of Washington, Pennsylvania, echoes the same procedure.

"I used one of these when I did auto repair in the 1960s and '70s, recalls **Thomas Polsin** of Lowell, Wisconsin. **Chris Meyer** of Tolland, Connecticut, says he's used his drum brake tool (pictured above) for 40 years, but "I never saw one (like Jakubisin's) with the spring-loaded side tabs."

Bob Allen, hailing from Richmond, Virginia, explains that particular enhancement in the tool's design: "I think the plier-like nosepiece is a solution for holding the little retaining (cup washer) for one-handed use of the tool — good idea."

O'Brien also weighs in on that feature. "The two levers

are squeezed together so that the arms spread apart, allowing the end flanges (of the arms) to be seated behind the bottom cup washer," effectively capturing the entire spring assembly and not just the top slotted washer.

Either the simpler traditional brake installation tool, or this modified version, makes drum brake installation much easier than it would be otherwise. Potentially less painful, too. "With the tool, the job takes 30 seconds," assures **Philip Slawson**, who's been rebuilding brakes with a tool he bought in the 1960s. "But without the tool it can take forever, and you will have at least one bloody finger."

"Sometimes it isn't as easy as it sounds to keep (the whole spring assembly) together," **Ronald Hawley** adds. "So (Jakubisin's tool) holds the bottom cup, spring and top cup together as a unit; I wish I had one of these in my toolbox."

accentuate the ray flakes, you could use an ordinary pigment-based wood stain instead (see “Six Simple Finishes,” page 64). The pigment won’t fade in sunlight or accentuate the medullary rays. However, it will get trapped in the open-grain areas and darken them, so experiment on some scrap white oak first to see if you like the effect.

Are Kit Projects “Real” Woodworking?

In response to a recent online “Weekly” editorial, readers shared opinions about project kits. - Editor

I built a ukulele for my granddaughter using a kit. Although it was challenging, the final product came out very well. She loves it, and I don’t think I would have had the patience to make it without a kit.

Red Mulvanny

As someone who works on average 60 hours a week and has a limited shop, a kit can come in very handy. Assembling and finishing are often the real keys to making a project shine, so that part is not lost ... Whether you build from a kit or from scratch all depends on how much time you have available. The key is just to be making things.

Frank McNulty

Kits limit creativity and don’t stretch your abilities. Mistakes hone your skills.

Tom Moss

I think kits have their place, especially for something complex that you have never done before ... however, I don’t think I would use a kit for the second one I make. You should be able to learn enough from following their construction to repeat it yourself. The exception to



this might be if special machinery you do not possess and that does not make sense to purchase might be needed to make accurate parts.

Tom Shapley

Kits are simply a pile of wood. How to convert that wood to a usable item is “woodworking.”

Gary Knotts

Every kit I’ve seen is a waste of money, and the end product will be mediocre at best. I can make a ukulele from a cigar box that will beat any kit at a quarter the cost, and the quality will be better.

Chris Jenkins



TRIVIA

Hide Glue: Eight Millennia of Use

Hide glue, sold in both granular and ready-to-use liquid formulas, is made from the hides or skins of animals along with other connective tissue, like tendons (not hooves). It is a renewable resource that is non-hazardous, nontoxic and biodegradable. Hide glue makes an incredibly strong, rigid, shear-resistant bond that doesn’t creep or move over time. Dried glue can be colored with dye stain. It is gap-filling and compatible with all finishes. You can scrape, chisel or sand off dried squeeze-out or scrub it off with a toothbrush and warm water. It is indefinitely reversible with heat, hot water or steam. The test of time proves the value of hide glue. Archaeologists have found 8,000-year-old artifacts held together with animal protein glue, and the earliest how-to record of hide glue appeared 4,000 years ago.

The Collins Complete Woodworker
(HarperCollins Publishers; ISBN 0060825758)

TRICKS OF THE TRADE

Nifty Tips for Better Saw Fence, Hold-downs



Toy Jacks Make Good Finishing Stands

When we bought a bunch of unfinished furniture for our new house, I used toy metal jacks to elevate each piece off of my work surface for finishing. These jacks have rounded ends that won't penetrate the wood, and their tiny tips don't pick up much paint or other finish. They also allow you to finish both sides of your project without waiting for one surface to dry first. There are more expensive alternatives to prop projects up, but toy jacks worked great for me.

Lawrence Southwick
Van Buren Point, New York

Small Parts Hold-down for Miter Saws

It's dangerous to hand-hold short workpieces when cross-cutting them at a miter saw. My solution was to glue a thin, flexible strip of scrap to another smaller block, forming an L-shaped "bridge." I adhered sandpaper to the bridge's contact surfaces for even more holding power. To use it, just set the flexible end of the bridge on top of the part you want to cut, and press the saw's hold-down clamp against it to deflect the bridge slightly. Make the block a little taller than the workpiece you want to secure for cutting. I've got several bridges of different heights to suit many stock thicknesses.

Charles Mak
Alberta, Canada



Stationary Tool Plug Storage is a Snap

I used to keep the power cords of my stationary tools draped over the top of the tool when not in use, but often they would fall to the floor where I would inevitably step on them. No more. Now I clip one of those inexpensive keyring carabiners to a convenient place on the tool, and I capture the plug inside it. The carabiner's spring-loaded gate makes it easy to store or remove the power cord, and those delicate electrical prongs are never underfoot.

Ed Klodnicki
Durham, North Carolina



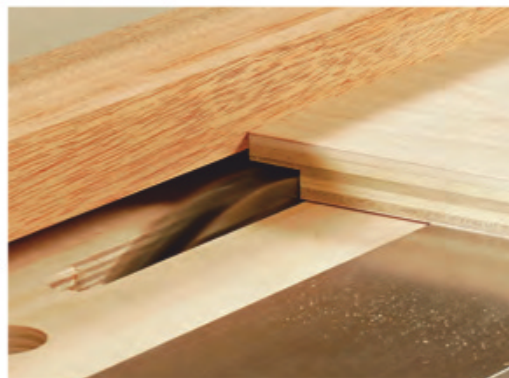
Red Pen Lines Easier to See when Scrollsawing

Continually aligning a black pencil line to a black blade when scrollsawing can lead to eye strain. Instead, I trace my patterns with red ink. I find it provides a line that's easier for me to reference against the dark blade. A ballpoint or fine-tipped pen both work fine for drawing on light-colored wood.

Dick Ayers
Barron, Wisconsin



**PICK
OF THE
TRICKS**



Adjustable Rabbeting Fence

A sacrificial fence facing is one way to set up rabbet cuts with a dado blade on a table saw. But these fences don't last very long for me. Here's another option. I drilled a pair of holes near the ends of a long piece of straight scrap to accept a pair of "F" style fence clamps. I also installed a couple of T-nuts to the bottom face of the fence a few inches in from the fence holes. Into these go two pieces of "all thread" that act as height adjusters and stabilizers for the fence — but bolts would also work. To use the fence, set the height adjusters so the fence's bottom edge is just above the blade, and clamp it to the rip fence. This way, the fence will make contact with the tongue of the rabbet you are making, but it never touches the blade.

Pat Keefer
Manning, South Carolina



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Willie Sandry: An “All In” Woodworker

By Chris Marshall

Woodworking leads to lumber drying, leatherwork and stained glass skills.



Works of Gustav Stickley, Harvey Ellis and Charles Limbert influence Sandry's projects. Sometimes he builds close copies of originals; other times, the designs are refreshingly new.

refinish floors during summer breaks from school. Two uncles — one a boat builder and the other a wood-carver — also were early woodworking influences.

Sandry's mother, a writer, helped shape his publishing pursuits, too. "In the most basic sense, I build things and write about them," Sandry says.

"Talk about the acorn not falling far from the tree!"

Over the years, Sandry has gravitated toward Arts & Crafts style furniture, and we've published several of his projects embracing this aesthetic (see "Ginkgo Leaf Table," page 30). He's developed a particular fondness for Charles Limbert.

"Sometimes I'll do Limbert reproductions, trying to match every angle and dimension. Other times I'll let functionality guide the

design and add in cutouts and inlays reminiscent of a Limbert piece," Sandry says. "Limbert used angles, curves and cutouts in a recipe that almost always produced a beautiful piece."

Among his résumé of projects, Sandry says the one he's just completed is often his favorite. But a special example that stands out is a master bedroom suite that includes a bed frame, dressers and nightstands. He's also pleased with a Limbert Hutch that ran in our magazine's June 2019 issue.

Sandry's work demonstrates a high degree of skill. But of course, no one becomes a talented woodworker overnight. Sandry admits that it's taken many years to gain proficiency with the craft. He feels the evolution of his skills started with the ability to make joints fit together well. Then, he focused on his project design skills, and last came the ability to apply a sprayed finish well.

Decorative cutouts filled with contrasting wood inlay often accentuate Sandry's projects. He creates them with a combination of power and hand tool techniques.

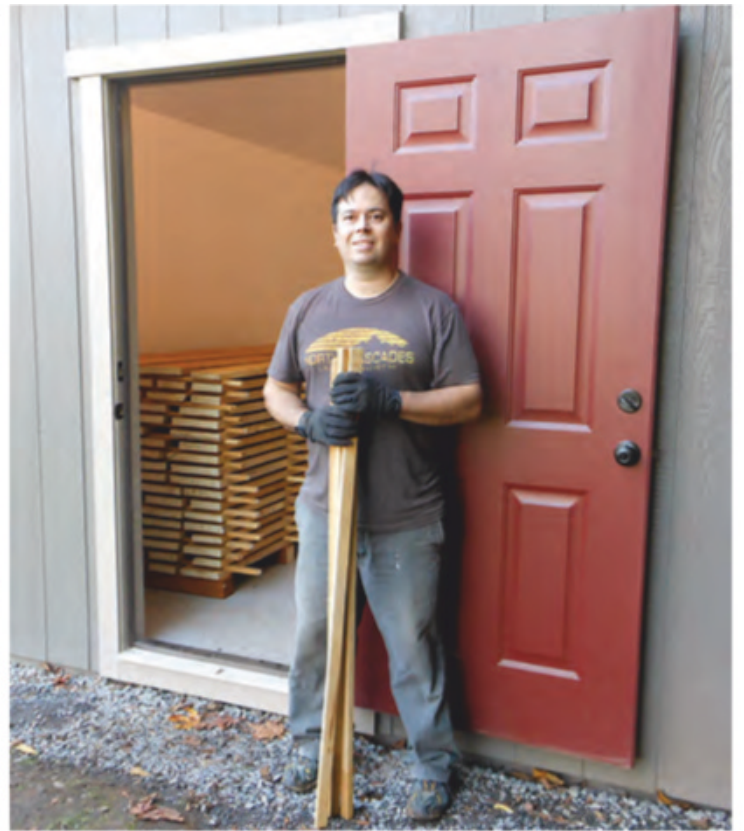
When Washington-based woodworker Willie Sandry gets excited about a project, he jumps in with both feet. And considering he's a physical therapist, he can take these leaps forward without hurting his back.

"My biggest reward of PT is inspiring someone to turn a sedentary life into one filled with fun, useful activities."

As a young man, Sandry would help his father, a contractor, build decks and



The woodworking “bug” occasionally bites Sandry’s wife, who accompanies him to woodworking shows or antique stores and even helps him sand projects from time to time. He also shares project-building with his twin sons.



A shed-style kiln (a project you can read more about in our June 2017 issue) enables him to buy unseasoned white oak lumber and dry it himself.

Adding More Skills

A number of years ago, the high cost of buying kiln-dried, quartersawn white oak lumber prompted Sandry to build a lumber drying kiln. Aside from cost savings, the kiln also helps him better control his lumber’s quality.

“It changes the whole way I look at my lumber supply,” Sandry says. “I don’t calculate down to the board foot anymore. I buy by the stack and not by the board.”

Arts & Crafts has even inspired Sandry to try his hand at leatherwork. When he wanted to sew leather cushions for a Morris chair and ottoman years ago, he took a class to learn how.

One aspect of the woodworking process Sandry has decided against is sawing boards directly from the log.

“I debated about buying a band saw mill one year, but that same year a log rolled onto a sawyer friend of mine. He broke his pelvis, and it forced him to retire early,” Sandry recalls. “Right then and there my wife made me promise I wouldn’t get a lumber mill.”

But provided he stays away from bucking logs, Sandry says his wife “heartily” embraces and encourages his woodworking. It’s also sparked interest from his twin teenage sons who occasionally build with him.

Sandry’s woodworking is an avocation that continues to offer new opportunities for both learning and enjoyment. “If a chair needs a leather cushion, let’s sew one. If a cabinet needs a leaded-glass panel, get out the soldering iron and let’s do this thing. And if someone reads about my work and is inspired to make something like it, well that’s just the cherry on top of it all, my friend.”



This white oak Arts & Crafts bedroom set ranks among Sandry’s favorite woodworking accomplishments. He’s added leatherwork (below) to his woodworking skillset.



WOODTURNING

Bowl Design Dos and Don'ts

By Ernie Conover

*Beauty is in the eye of the beholder,
but some design principles still apply.*



museums, art galleries and craft shows, too. Exposure to things of beauty subconsciously helps you create beautiful objects. A good start is to look at the timeless beauty of any silver bowl made by our horseback-riding hero of the American Revolution, Paul Revere. His S-curve at the base and flared rim have become a classic and even iconic design known the world over.

Is it Art or Treenware?

From antiquity, bowls have been both utilitarian and art forms, and this remains a major bifurcation of modern bowl turning, too. Because of the structural properties of wood, utilitarian bowls must have thicker walls, between 1/4" and 5/8" thick. Artistic bowls range from utilitarian thicknesses down to 1/32".

Before installing a bowl blank on your lathe, I think it's helpful to have some sense of what the purpose of your bowl will be. Is it going to be a useful kitchen bowl for mixing cookie dough or tossing a salad, or are you making an object of art, such as a closed form adorned with carving?

Bowl design is an article I have always wanted to write but never quite had the courage — until now. In part, that's because the form a vessel takes is a subject of much debate: "To each his own, said the old lady as she kissed her cow." On top of this, popular taste is constantly changing; a design that is all the rage today can be passé next year. All this being said, great

design ends up in museums while ugly work fails to sell at a tag sale and is left by the road. Every bowl is certainly not a masterpiece.

My purpose here is not to try to convince you that any given design is what you should adopt but to talk about general shapes and styles to work toward. In the long run, each turner should find a unique design repertoire. By all means, visit

www.woodworkersjournal.com MORE ON THE WEB



For a video overview of several of the bowls featured in this article, visit woodworkersjournal.com and click on "More on the Web" under the Magazine tab.

Artistic Bowls



Traditional: The design mimics a traditional bowl but is sanded and finished to a much higher level than a bowl meant for kitchen duty. This example, turned by the author in 1998 from sycamore maple, is 8½" dia. by 2½" tall.



Closed Form: The rim is smaller than the internal cavity, giving the vessel a torus shape. This example, turned by the author in 2011 from butternut, is 10¼" dia. by 4¼" deep. Closed forms are artistic and better expose carving, pyrography and drawing, but generally are not very useful.

Artistic Bowls

Artistic bowls can also be utilitarian, but those made with particularly thin walls or of delicate material often won't survive much daily use. Normally they are meant to be objects put on display. Artistic bowls often take the following basic shapes.

Traditional: The design mimics a traditional bowl's shape and thickness but is sanded and finished to a much higher level than a bowl meant for kitchen duty. You can see an example of a traditional artistic bowl at top left. I turned it in 1998 from sycamore maple.

Closed Form: The rim of a closed-form bowl is smaller than the internal cavity, giving the vessel a torus shape. I turned the example shown here (top right) for an April 2012 article on carving texture into bowls. Closed forms are generally more artistic than utilitarian and better expose carving, pyrography and drawing. They aren't very useful because the rim restricts access to the bowl's full interior — a problem that becomes more obvious when you try to stir a batter or toss a salad in them.

Natural Edge: Bowls that use the organic form of the outside of the tree or the bark as the rim are considered "natural edge." Burls are particularly well suited to this design form. The turning community fell in love with natural-edge bowls starting in the 1970s because these vessels can be turned from green wood, and warping during the drying process isn't obvious.

The natural-edge bowl shown at center right was turned by my good friend and mentor, Rudy Osolnik. Rudy first turned the outside, then wrapped the exterior with duct tape and turned the inside until the wall was about 3/16" thick throughout. If made from solid wood, this bowl would have to be spindle-turned, but burl removed this limitation. It's too fragile and porous for use but exceptionally beautiful for display.

Bird's Mouth: Another natural edge variation, pioneered by Bob Stocksdale, involves turning a tree limb between centers to create a bowl shape that looks like a baby bird in the nest waiting to be fed (bottom right).



Natural Edge: Vessels that use the organic form of the outside of the tree as the rim. Burls are particularly well suited to this design form. This 11"-dia. by 8"-tall natural-edge bowl was turned from a tulip poplar burl by the author's mentor, Rudy Osolnik. Its walls are a mere 3/16" thick throughout. Anyone holding it is amazed at its size and light weight.



Bird's Mouth: Another natural-edge form involves bucking a tree limb to the same length as its diameter and turning it between centers to create a rim that simulates a bird's mouth. The overall shape looks like the head of a baby bird in the nest wanting food.

Utilitarian Bowls



A large traditional curly maple bowl turned by the author about a decade ago is 15" dia. by 5½" deep with a 5/8" wall thickness. Its foot is 4¾" dia.



This 14"-dia. x 2"-deep sushi platter was turned by the author in 2003 from an exceptional piece of quilted hard maple. To evoke this Japanese design, he used straight walls with a square rim.



Small salad bowl turned from curly maple by the author. It is 7¾" dia. by 2¾" deep with a 1/2" wall thickness and a slight Revere flair at the rim.

Bowls for Practical Use

Utilitarian bowls range from half hemispheres with straight or slightly flaring walls to open, flat cones that gives a Japanese look and feel. The former are kitchen workhorses and best turned from green wood because they need 4" to 6" of depth. It is much better to obtain a thicker blank than to increase the diameter of utilitarian vessels. Depth adds volume, while diameter simply increases turning difficulty and takes up valuable real estate on the table or kitchen counter.

Platters, a third type of utilitarian bowl, range from deep sushi plates to simple serving trays.

A short list of things that utilitarian bowls can be used for is to hold fruit, nuts and rice. They also make handy popcorn bowls and general-purpose mixing vessels.

Design Basics

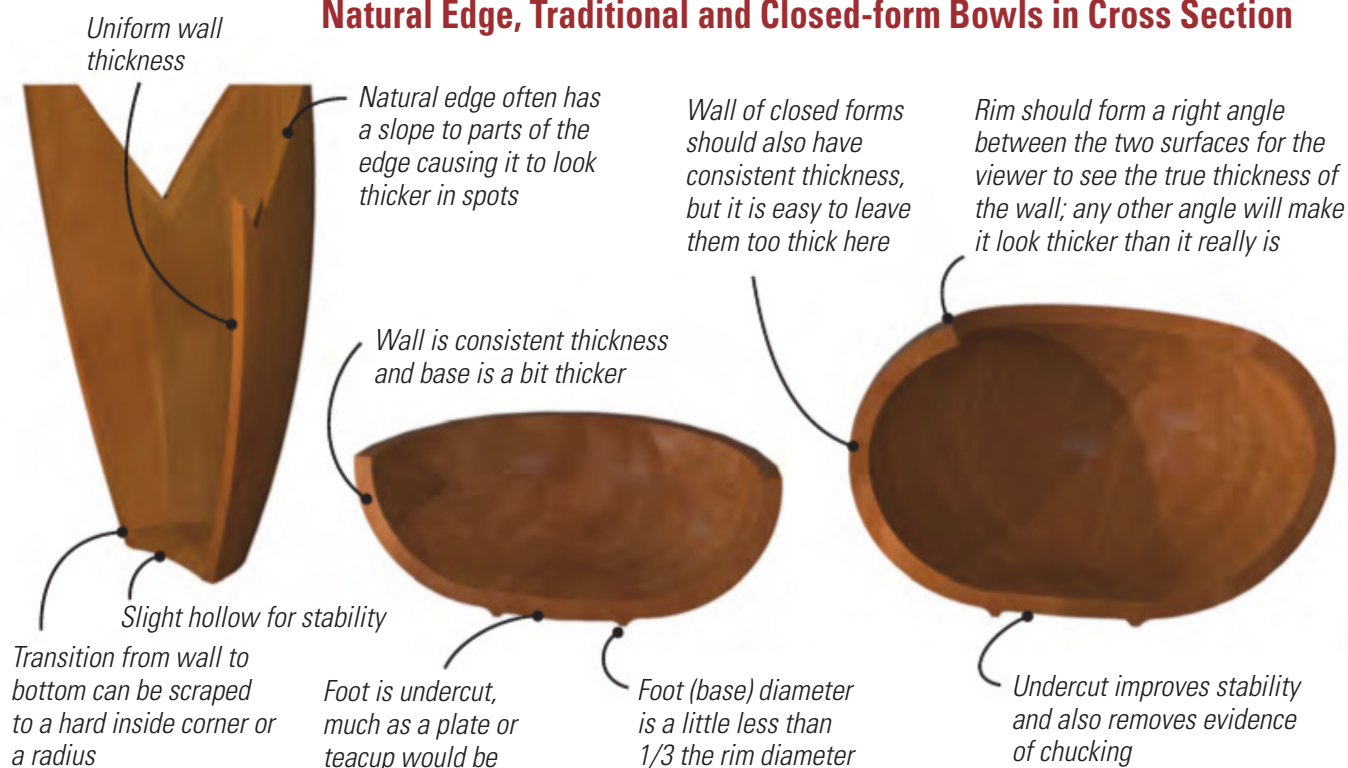
Let's consider a few design factors that relate to a bowl's foot/base, walls and rim.

Foot/Base: The most common mistake some bowl turners make is not turning the foot or base of their bowls small enough. A good rule of thumb is that the foot should be a bit less than one-third the largest diameter of the vessel (measured at the rim on traditional shapes but below the rim on closed forms).

Actually, it's almost impossible to make a foot too small. This is because the sloping lower walls distribute any substance in a bowl equally; this self-leveling, combined with walls sloping to the center, concentrates force at the center. For thin artistic bowls, the foot can be amazingly small.

An important function of the foot, which is not obvious to the casual viewer, is to lift the vessel up above and separate it from the surface it is resting on. A foot should also be undercut; turning the bowl upside-down reveals a slightly concave depression

Natural Edge, Traditional and Closed-form Bowls in Cross Section



Continues on page 24 ...

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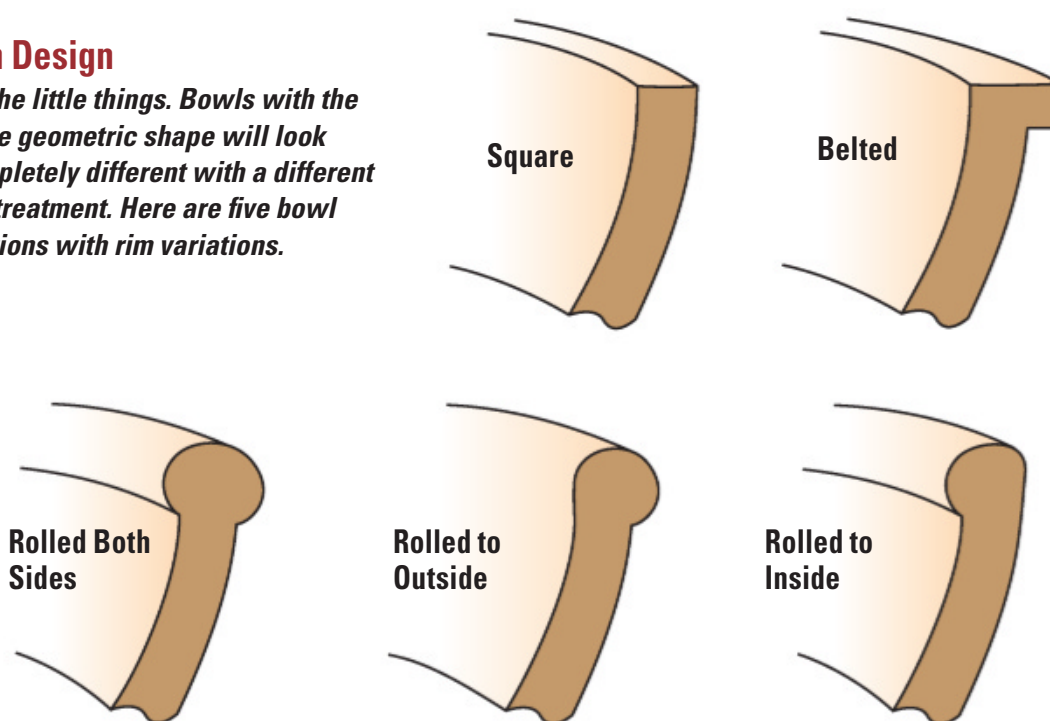
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Rim Design

It's the little things. Bowls with the same geometric shape will look completely different with a different rim treatment. Here are five bowl sections with rim variations.



akin to china plates and cups. I also chamfer the bottom outside corner of my bowl feet, which helps to visually separate the bowl from the surface it is resting on.

I advise my students to use a compass or dividers to scribe a circle that is a bit less than one third the largest diameter of the blank they're about to turn, in order to work toward a proportionally correct foot.

Wall Thickness: Decide what the wall thickness of your bowl should be and work constantly toward that end. Check your

progress with a calipers to keep tabs on the relative thickness of the wall from the foot to the rim. Always work the wall by steps from the rim to the bottom. If you make the intermediate wall too thin before getting the rim to the correct thickness, there may not be enough strength in the wall

to support further cutting at the rim.
Rim: What will the bowl's rim design be? Is it going to be a hard edge with sharp corners or a softer-looking rolled profile? You may not have considered them all, but bowl rims can take several different shapes. They can be rolled on the inside or outside edge, or both. The rim can also be slightly thicker than the rest of the bowl. This can be achieved by adding a belt to the inside or outside at the rim or by an inward or outward roll.

Room for Improvement

As I said at the outset of this article, good bowl design doesn't come instinctively. New and ever-improving woodturners should keep watching for good examples of bowl design as well as refining our tool-handling skills. Along the way, we'll make some bowls that, well, might be better for kindling than display. I call them "clunkers." These bowls have extremely thick walls that grow thicker the lower you go, combined with a base

that is almost as big as the rim. While most turners will gravitate to better design with experience, some never get beyond this stage.

Another beginner mistake is to create bowls shaped like lampshades or conical straw hats. For example, here's a "lampshade" bowl I turned from red oak in 1985 (bottom left). It is utilitarian with walls that are of uniform thickness and sufficiently thin. My last-ditch effort of creating a step in the rim and the cove at the base improve it sufficiently so that it is not a total clunker. But as the old witticism goes, "in the morning it will still look like a lampshade."

A conical hat-shaped bowl is typically the result of tool control, which boils down to not being able to turn the S-curve required to gracefully transition from the base to the wall of the vessel. Modifying the design to have greater flair, with straight sloping walls and a small and uplifting base, can transform the hat shape to a useful, artistic design. But proficient tool control is necessary to carry it off.

I hope this article will help you refine your sense of bowl design. Good design is learned through careful thought, observation and experimentation. A must for any dedicated bowl turner is to know when to walk to the wood stove and throw the occasional clunker in.

Ernie Conover is the author of The Lathe Book and Turn a Bowl with Ernie Conover.

A Near Clunker



Red oak bowl the author turned in 1985 (9" dia. x 5" deep). It has uniform walls that are the same thickness as the base. Stepping the rim and adding a cove at the bottom to reduce the base diameter were attempts to save the piece, but it is essentially a lampshade that just barely works as a bowl.

end. Check your progress with a calipers to keep tabs on the relative thickness of the wall from the foot to the rim. Always work the wall by steps from the rim to the bottom. If you make the intermediate wall too thin before getting the rim to the correct thickness, there may not be enough strength in the wall



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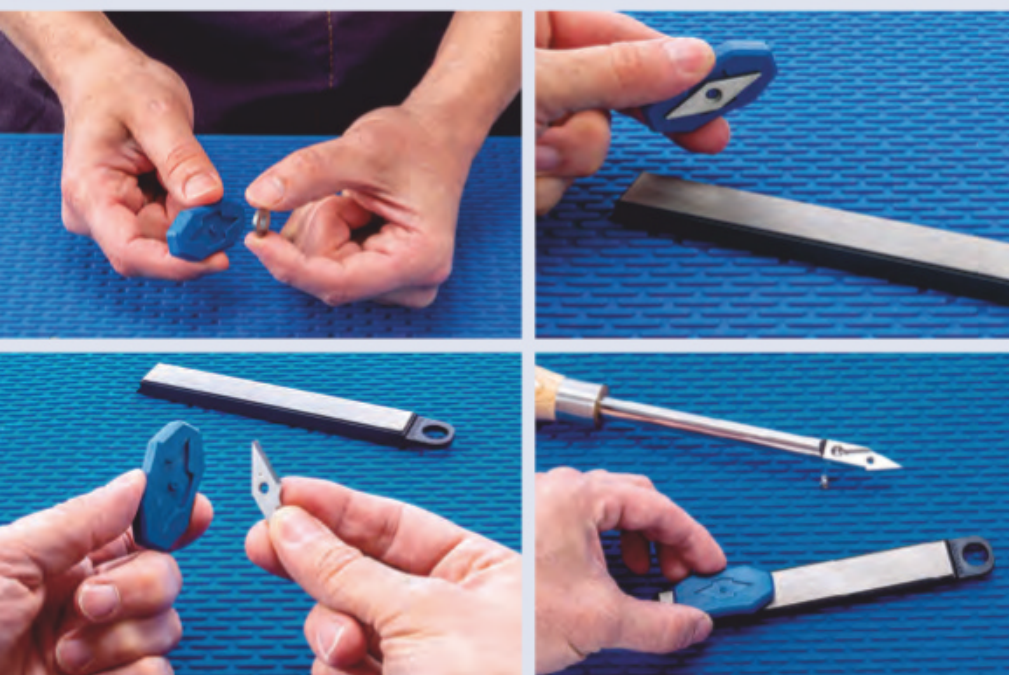
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Ginkgo Leaf Table

By Willie Sandry

While this table is the author's original design, he drew inspiration from Japanese furniture and architecture.



Although it's my original design, the inspiration for this ginkgo leaf table draws heavily from Japanese influence. Tapered elements that are wider at the base, and rafter-like members that project through legs and posts, are common in Japanese designs — in both furniture and architecture. Other elements of the table, such as the solid panels with leaf cutouts, are reminiscent of Dutch designs dating back hundreds of years. I found that this table's angled joinery makes it both a joy and a challenge to build.

Mine is constructed from solid walnut lumber. If you're

fortunate enough to have 8/4 stock available, you can simply cut the legs from a plank of walnut. My best-looking stock was only 7/8" thick, so I laminated leg blanks from two strips of wood. Rip eight strips of walnut 1 3/4" wide, and glue them together in pairs to make four legs. Once the glue cures, flatten and plane them to a finished size of 1 5/8" square by about 19 1/2" long (the legs will be trimmed to final length later).

Leave their ends square for now, as the notch at the top of each leg needs to be cut before the legs are angled. Use a tenoning jig and dado blade to form those 3/4"-wide x 2"-deep

Unless you're fortunate enough to have a plank of 8/4 walnut, this table's legs will need to be made of glued-up laminations.



The author created 1 $\frac{3}{4}$ "-thick leg blanks from two strips of 7/8"-thick stock glued together. He then planed the flattened blanks to 1 $\frac{5}{8}$ " square.



Using a tenoning jig and dado blade, form a 2"-deep x 3/4"-wide notch in the top of each leg. Cut from both sides of the leg to center these bridle joint notches.



Plane a test board to 3/4" thick, and use it to gauge the width of the leg notches. Incrementally adjust the rip fence as needed, and make more passes until the test board eases into the notch.



With the miter gauge swiveled to 5 degrees, trim the top ends of the legs. Remove just enough material to create the required angle.



Now slide the leg down the auxiliary fence and set a stop block to trim all four legs to the same length. Keep their orientation the same for this cut.

notches at the table saw. I installed a 5/8"-wide dado stack and cut each notch in two passes, flipping the legs to opposite faces for the second cut. This centers the notches perfectly.

Once the notches are completed, go ahead and miter-cut the top and bottom ends of the legs at a 5-degree angle. This operation can be tackled at either the table saw or on a miter saw.

I chose to use a standard blade and my miter gauge equipped with a long auxiliary fence at the table saw. First, miter-cut the top of the leg, then slide the leg down the miter gauge fence, making sure to keep the leg in the same orientation. Set a stop block on the auxiliary fence, and trim the leg to a final length of 18 $\frac{7}{8}$ " (measured "long-to-short").



A shop-made tapering sled handily slices the side panels to their 5-degree tapers. This one is guided by a wooden strip riding in the miter slot.



Form stopped grooves in the side panels with a 1/4"-wide dado stack. Note the clamp on the rip fence here, acting as a stop block.



Reset the rip fence for a centered cut on the legs, and make one stopped groove in each leg. A featherboard and push pads help control the cut.

Creating the Side Assemblies

Next, glue up a pair of side panels from 3/4" stock. Trim these panels to overall size. Their pleasant tapered shape is 5-degrees along each edge, so set a bevel gauge and draw layout lines to mark these taper cuts. I used a shop-made tapering sled at the table saw to cut the angles uniformly. If your shop

isn't equipped with one, a circular saw with edge guide could also work fine. When you trim off these edges, be sure to save the offcuts for use as the table's corbels.

There are a number of ways you can attach the legs to each side panel. Loose tenons or biscuits typically work well for this sort of application, as do splines and grooves. Dowel joinery would be problematic because it wouldn't allow any adjustment to align the parts. I decided to go with loose splines fitted into grooves in the legs and panel edges. To mill the stopped grooves, install a 1/4"-wide dado blade in your table saw. Start by setting the blade height to 1/4", and position the rip fence for a centered cut on the panels. Clamp a stop block to your table saw's rip fence to limit the length of cut to 15", so the groove stops about an inch from the bottom of the panel. Complete all four grooves this way, before adjusting the rip fence for a centered cut on the legs. Each leg receives one groove, also approximately 15" long. Make some spline stock to fit these grooves, and test fit the legs with the side panels. Don't glue the side assemblies together just yet, as we have a couple more steps to complete first.

A template is useful to make matching ginkgo leaf cutouts that dress up the side panels. I made a full-size template for them from 1/4" plywood. Lay out the ginkgo leaf shape on the template using a set of French curves and following the gridded *Drawing* on page 34. Cut out the template's shape with a jigsaw or scroll saw, and refine it with files. Once the template is complete, clamp it to a side panel, and rough out the shape with a router. I used two different router setups to cut out the leaf shapes. My first was a 1/4" spiral bit paired with a 7/16" O.D. guide bushing. Make several clockwise passes to remove the material, increasing the depth of cut with each pass. This will invariably leave some lines and ridges, so there's one more step to clean up the cut: I switched to my 3/8" O.D. guide bushing and made one final clockwise pass around the template cutout. This left a nice clean surface that only required some light hand sanding.

Through mortises in the side panels for the lower shelf come next, and that's another job for the router. Carefully lay out the mortise locations on both faces of the side panels. Outfit your router with an edge guide and a 1/2"-dia. spiral bit, and cut just short of your layout lines. I plowed the 3"-long x 1/2"-wide mortises into the outside face first. Then maintaining the same edge guide settings, I flipped the side panel over and extended the mortises to an overall length of 7 1/2"



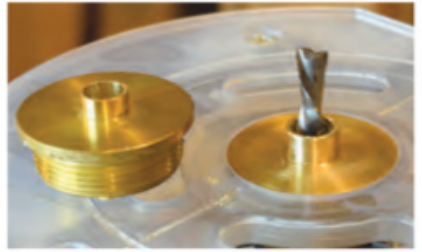
Shape the ginkgo leaf template with flat and round files. Make sure the stem portion of the design is at least 7/16" wide.

(I trimmed the material between the mortises to a depth of 1/4" on the inside face as well to preserve the strength of the panel). Finish the job by squaring up the four mortise ends.

At this point, all the joinery for the side assemblies is complete. Go ahead and sand all the parts you've made, and glue a pair of legs to each side panel with the splines installed. Use your panel offcuts as clamping cauls when you bring each side assembly together. Once the glue sets up, trim the panel offcuts to a length of 12", and install them as corbels — one on each leg. I used a pair of #20 biscuits to center and attach these corbels on the leg. Align the corbels flush with the top of the legs, and glue them in place.



A plunge router removes the waste inside the leaf cutout in a multi-step process. The author used two guide bushing sizes and a 1/4" spiral bit.



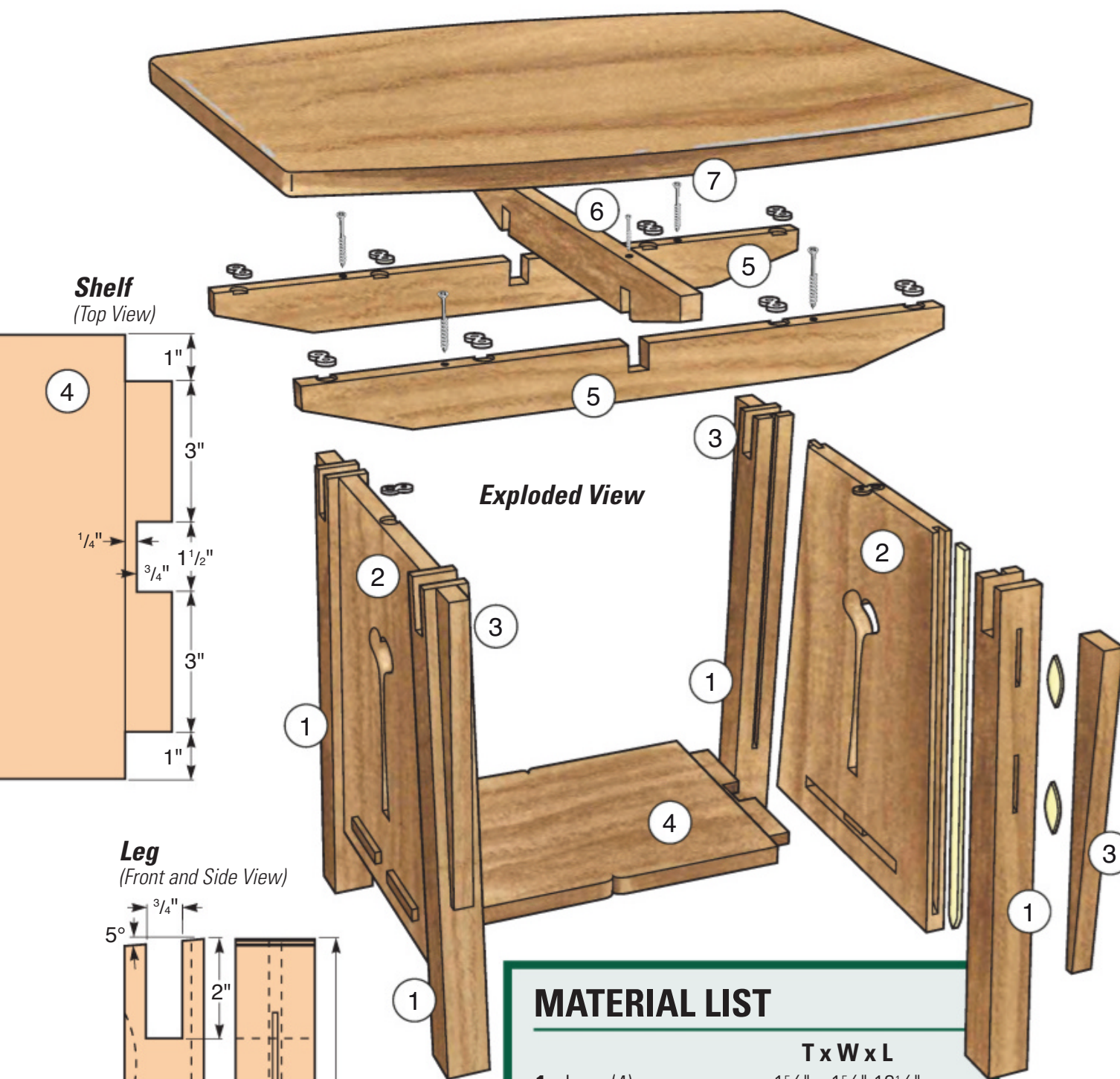
Start with a 7/16" bushing installed to rough out the inner waste material in several clockwise passes. Then switch to a 3/8" guide bushing with the same router bit for a final cleanup pass. The resulting shape needs very little sanding.



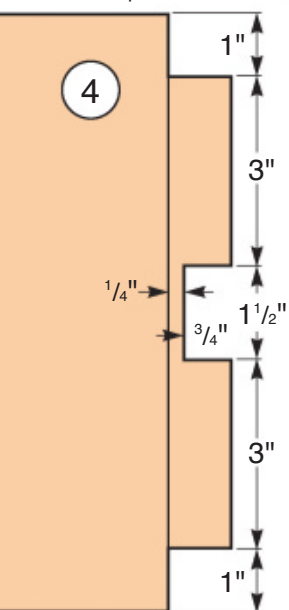
A router equipped with an edge guide and 1/2" spiral downcut bit handles the mortises. After the through mortises are cut from the outside face, flip the panel over and extend the mortises on the inside face (shown here).



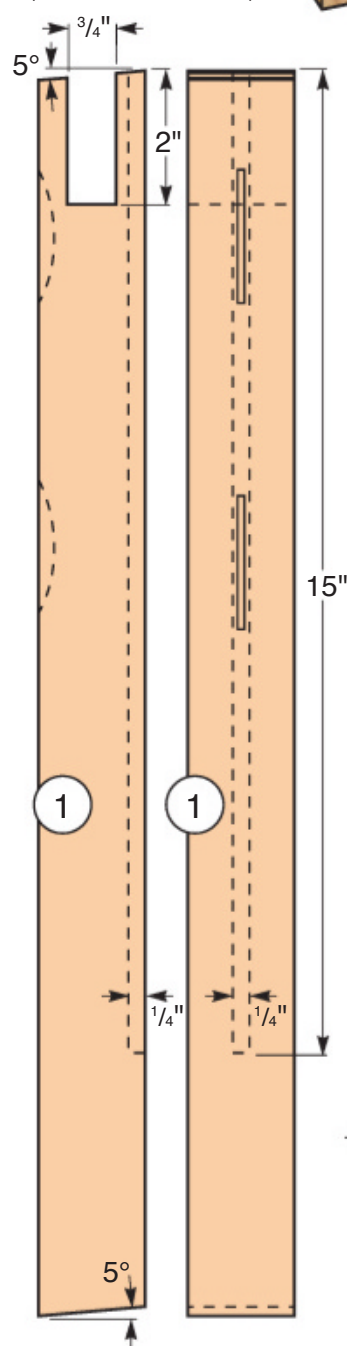
Chisel the corners of the four through mortises square. Make these cuts into the outside faces of the panels to reduce the chances of chipping the mortise edges. That damage would show after final assembly.



Shelf
(Top View)



Leg
(Front and Side View)

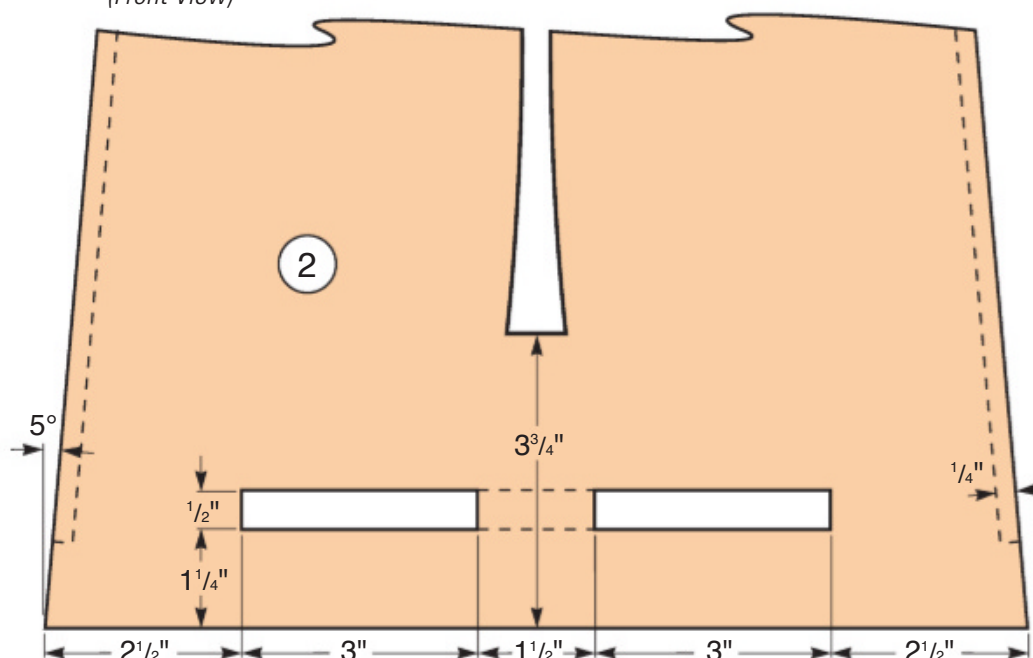


Exploded View

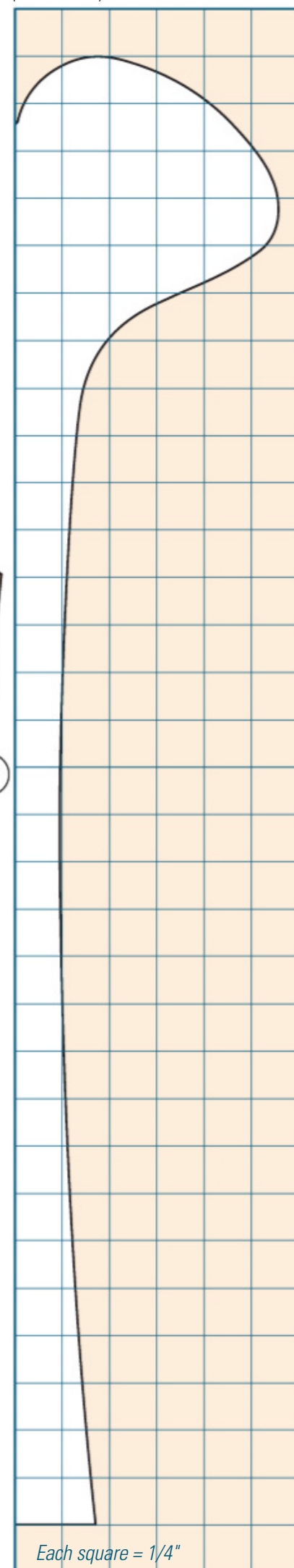
MATERIAL LIST

	T x W x L
1 Legs (4)	1 5/8" x 1 5/8" 19 1/2"
2 Side Panels (2)	3/4" x 12 1/2" x 16"
3 Corbels (4)	3/4" x 1 5/16" x 12"
4 Shelf (1)	3/4" x 9 1/2" x 15 3/4"
5 Stretcher Rails (2)	3/4" x 2 1/8" x 24"
6 Cross Rail (1)	3/4" x 2" x 20 5/16"
7 Top Panel (1)	3/4" x 22 5/16" x 26"

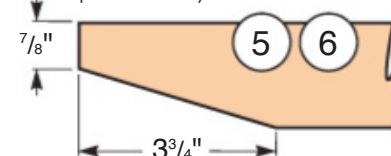
Side
(Front View)



Ginkgo Leaf Cutout Template
(Front View)



Rails
(Front View)





Glue a pair of legs to each side panel using splines. Note the panel offcuts temporarily attached with painter's tape to act as clamping cauls (right). Then glue the offcuts to the legs to act as corbels (above).

Making the Shelf

Glue up a panel for the shelf, if you're working with narrow stock, then cut it to 9½" wide and 15¾" long. Now switch to a wide dado stack, and install an auxiliary fence on your miter gauge so you can raise a 1"-long tenon on each shelf end. Make multiple passes until the tenons ease into the mortises from the outside face. Once the tenon thickness is established, turn the shelf on edge and raise the dado blade to a height of 1" to form its outer shoulders. Finally, turn the shelf up on end, lower the blade to ¾" and make side-by-side cuts to separate each long tenon into two with a ¼"-tall shoulder in between.

I added a V-notch detail in the long edges of the shelf to echo the ginkgo leaf motif. You could make a template for pattern-routing these notches, or simply make the cuts at the band saw and sand them smooth. Use a file to refine the point of the



Once the shelf's long tenon thickness is established with a dado blade and miter gauge, turn the shelf on edge to cut the end shoulders (above). Next, lower the blade height to ¾" and turn the shelf on end to divide the tenons (right). Test the tenons against the mortises frequently, aiming for a snug fit.



"V" where the bit can't reach, if you rout these notches.

You're rounding third now and on the home stretch with this intricate little table! For the final glue-up, bring the two side assemblies together with the shelf. Small blocks may be





The shelf receives a V-notch detail on both long-grain edges. Here a template is clamped beneath the shelf, and the shape is routed with a 1/4"-dia. flush trim bit.

helpful to direct clamping pressure between the protruding tenons. Ease the edges of the clamping blocks to avoid denting or damaging the side panels.

Next up, make the two stretcher rails that will nestle into bridled joints atop the legs. These 3/4"-thick rails are 2 5/8" wide



Make a centered notch in the stretcher rails with a dado blade. Since the edge of this part receiving the notch has already been angled, it's important to hold the rail flat against an auxiliary fence.



Tilt a dado blade to 5 degrees to cut opposite-facing notches in the cross rail. Use a full 3/4" dado stack plus a .004" shim to ensure the parts will come together without a wrestling match.



Clamp the side assemblies together with the shelf using parallel clamps. The middle clamp bears on a wooden block to direct pressure between the tenons. Use just enough pressure to close the joints.

x 24" long. The only wrinkle here is that the top edges of the rails need to be angled to sit flush with the legs. So tilt your table saw blade to 5 degrees and rip the stretchers to width as needed until the parts fit. Then crank the blade back to 0 degrees and cut the cross rail to size.



Test fit the stretcher rails in the legs' bridled notches. The stretcher rails project 3 15/16" beyond the legs, so make sure to center the rails for the next step.



Since the rail joinery is angled, the parts won't drop right together. You may need to use a clamp, reversed as a spreader, to gently flex the stretcher rails apart to ease the half-lap joints into place.



Tidy up the tapers on the ends of each rail by making repeated passes with a block plane. Hold the plane at a skewed angle while making these smoothing passes to minimize tearout.



The solid walnut top is attached with figure 8 fasteners to allow for seasonal movement. Three screws through the cross rail offer additional anchor points.

Forming Half Laps and Adding the Top

Go ahead and install a $\frac{3}{4}$ "-wide dado stack so you can form the table's half-lap joints. Set the blade height to about an inch, and cut a centered notch on the top edge of each stretch-er rail. Now two complimentary notches need to be formed in the bottom edge of the cross rail. For this part of the half-lap joint, tilt the arbor on your table saw to 5 degrees, and make the two opposite-facing notches. To locate these notches correctly, install the stretcher rails on the table legs and measure directly from these parts. Use a bevel gauge to mark the exact location of the angled notches.

While the cross rail is still a loose component, drill it for the figure 8 tabletop fasteners. You'll also need one centered and two elongated pilot holes for screws at each end. Then you can create tapered ends on all three rails. Mark a line that leaves their ends about $\frac{7}{8}$ " tall. Cut these angles at the band saw, and plane them smooth.

If the half laps fit together correctly, you're ready to permanently attach them with screws and glue. Countersink and pre-drill the stretch-er rails for #8 x $2\frac{1}{2}$ " screws, driven into the legs from the top. The cross rail can be attached in a similar fashion to the stretcher rails with a pair of #8 x $1\frac{1}{2}$ " screws.

All that's left to make is the tabletop. It starts out as a $22\frac{5}{16}$ "-wide x 26"-long panel. Lay out a curved treatment along its edges with a bow-string, so the ends of the tabletop are reduced by the curves to $18\frac{1}{4}$ " wide. Band saw these barrel-shaped curves and sand the top smooth. Round over any sharp edges, and give the table a final inspection with a shop light to check for any imperfections.

As far as finishing goes, I often use a medium color "fruitwood" oil-based stain on walnut projects. While some may argue that walnut doesn't need stain, I find that it darkens the wood in a pleasant way and tends to unify the parts. If you choose a liquid stain as opposed to a gel stain, the natural grain of the walnut won't

be obscured. After the stain on my table dried overnight, I sprayed on a top coat of pre-catalyzed lacquer in a satin sheen. Attach the top with figure 8 fasteners to allow for seasonal movement, and this Asian-inspired side table is ready to display your favorite vase.

Willie Sandry is an avid woodworker who builds furniture and dries his own lumber in Camas, Washington.



Easy Live Edge Table

By Dan Cary

Even a beginning woodworker can build this trendy and attractive table in a day, thanks to pre-made components.



Timber-Link slabs are pre-drilled for pocket screws and come in both 4- and 6-ft. lengths. Waney-edged slabs are 5" to 8" wide, and straightedged slabs are 8" wide. Combine them to create custom tabletop widths. Start by arranging boards in the order you prefer and marking them.



Modern-style live edge tables with metal legs like this one have exploded in popularity in recent years. If you've ever shopped for one, however, you know how very expensive they can be at a furniture store or gallery. And building one can be challenging if you don't have access to slabs or the shop machinery to process them.

But take heart: there's a simple solution for both the tabletop and legs. Timber-Link pine and maple slabs, available from Rockler, come in both live edge and straightedged pieces that are ready to assemble and finish right

out of the package. Pre-drilled pocket screw holes make the top as easy to build as applying glue and screwing the slab sections together. The number of

Easy Live Edge Table Hard-to-Find Hardware

Pine Timber-Link Slab, Edge Piece, 6' Long x 2" Thick x 5-8" Wide (2) #63608 \$69.99 ea.
Pine Timber-Link Slab, Center Piece, 6' Long x 2" Thick x 8" Wide (2) #64197 \$69.99 ea.
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pieces you buy determines the top's width, and you can cut it to any length you prefer.

Arrange the 2"-thick live edge and center sections for a pleasing grain pattern — there will be some variation, especially if you order online and can't handpick the pieces. Mark the boards order, then spread glue on their mating edges and assemble with 2½" pocket screws. When the joints dry, remove the edge bark with a scraper, drawknife or chisel and sand the surfaces up to 180-grit. Then apply your choice of finish. I used wipe-on urethane for my table.

Rockler offers several styles and sizes of painted or unpainted welded-steel leg sets that simply fasten to your new tabletop with lag screws. Then voilà, you're done. There's no faster way to build a custom on-trend table than this!

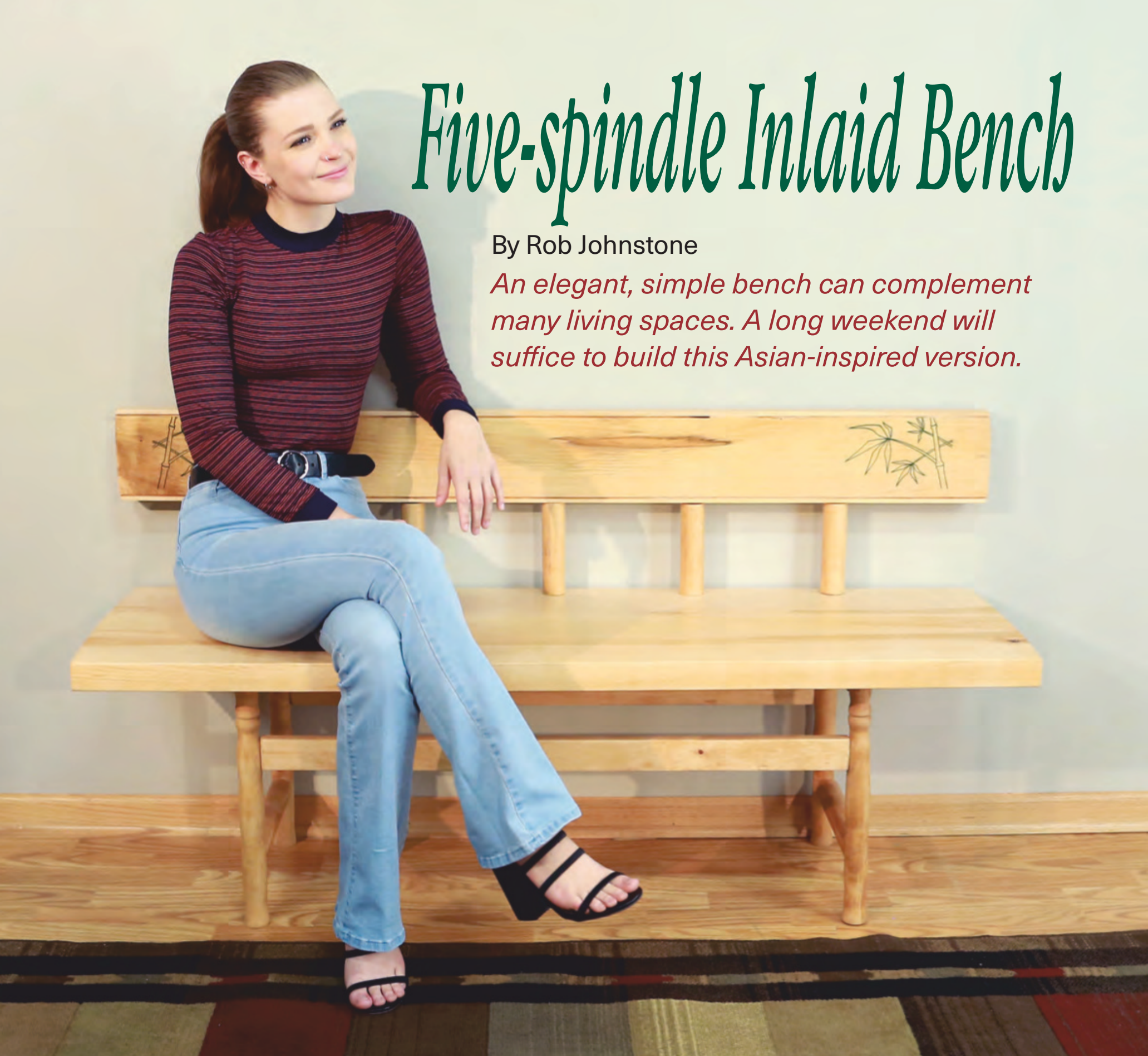
Dan Cary is senior content strategist of Woodworker's Journal.



Invert the boards so their bottom faces are up and, keeping them in order, assemble the joints with glue and 2½" pocket screws (inset). Here, a helper makes minor adjustments to keep the boards flush while the screws are being driven.

Remove the bark from the tabletop edges and sand its surfaces smooth. Apply your choice of finish — the author used urethane. Then install the pre-painted steel leg sets with lag screws.



A woman with brown hair in a ponytail, wearing a dark red and black striped long-sleeved shirt, light blue jeans, and black sandals, is sitting on a light-colored wooden bench. The bench has a simple design with a flat seat and a backrest made of horizontal slats. The backrest features two small, hand-drawn illustrations of bamboo plants. The woman is looking off to the side with a slight smile. The background is a plain, light-colored wall.

Five-spindle Inlaid Bench

By Rob Johnstone

An elegant, simple bench can complement many living spaces. A long weekend will suffice to build this Asian-inspired version.

Sitting down, and what we sit on, is kind of a big thing. We all do it every day in a multitude of settings and for a wide range of reasons. Some of my most pleasant times have been sitting under a tree or on a grassy hillside with nothing more separating my behind from the earth than a layer of denim. Not surprisingly, like many guys my age and in similar circumstances, I have “my chair” in my home. It is where you will find me regularly reading a book, scanning the Internet or simply caught up in deep thoughts. (What if the hokey pokey is *really* what it’s all about?)

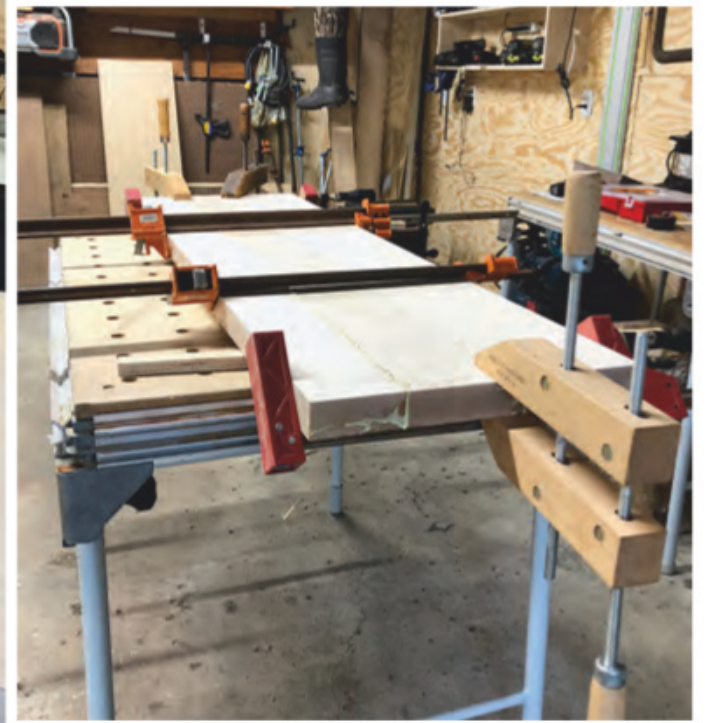
But chairs, benches and other sorts of seating are more than just utilitarian. Over time, they have come to represent statuses from elevated to humble, societal roles or cultural conventions. If I were to invite you into my house and you chose to sit in my preferred chair, I would be gracious and sit somewhere else — but I might give you the stink eye when you were not looking. (Uncouth knave! You have usurped my place in my home!) We all know what the terms seat of power, seat of honor, the hot seat or place at the table represent. Thrones are simply chairs with

mere humans sitting upon them, but clearly they are also much more than that.

So we should not be surprised that when it comes to the things we sit on — chairs, benches, stools, sofas, ottomans, pews — the variation in those items is remarkable. Which brings us to this project: a five-spindle turned and inlaid bench.

First, Some Design Context

I fell in love with a version of this bench on Pinterest (yes, I look at Pinterest — judge me if you wish). When showing it to my co-workers, I described it as Asian-inspired. I



Starting out with 1³/₄"-thick maple lumber, the first step was to glue up a blank for the bench's seat. Thick joints like this require extra time to cure.

got pushback from a couple of them claiming its Danish Modern influence, so I put the kibosh on that by deciding to add a couple of carved bamboo images on the backrest.

I found the style of a wide bench with a low back attractive, so I was also pleased and surprised when it turned out to be comfortable for me to sit on with the backrest nestling into the small of my back. If you are shorter or taller than me, I don't know if that will hold true for you.

While I was inspired by an image I found, how many woodworkers do you know that just build an exact copy of a project? Not me for sure. For that reason, I did some sketching as I modified the bench to suit my aesthetic and then moved on to building a prototype from MDF. I can't say enough about the benefits of prototyping and seeing a full-sized example of what you wish to build. In this case, I moved the long stretchers higher on the legs and added a very slight curve to the ends of the seat and backrest as a result of this process. Then came the real work: building it.

Preparing Materials

I chose to make the bench from 1³/₄" maple lumber. The thick lumber provides visual weight and the actual substance required to support

the joinery. I ripped and crosscut the seat pieces to width and length, and I glued them up slightly oversized in both of those dimensions. Then I took the remaining stock from that process and ripped pieces for the various turned parts to width on my band saw. Next, I stepped to a miter saw to cut them to length. You'll find the dimensions and joinery details in the *Drawings* on page 43.

I decided to join the legs and stretchers using Festool's Domino loose tenons. Dowels or another loose-tenon system would work as well. I formed the mortises before I turned the



The stock remaining after making the seat and backrest was then cut to width on the band saw and to length on a miter saw. These blanks will be turned into the various spindles.



*Before turning the spindles, the author used a Festool Domino machine to form mortises on the legs and stretchers. See the *Drawings* for mortise location details.*





With the blank preparation completed, it was time to get busy turning the various spindles for the undercarriage and those that support the backrest. The spindles that join the backrest to the seat have 5/8"-long tenons turned to 11/16" diameter.



The short stretchers needed a Domino mortise in each end. That made mounting them between centers difficult. A Domino was put into each mortise and cut flush to solve the problem.



Thirteen spindles of various lengths and shapes are required for this bench. All of them were sanded to 400-grit while still on the lathe to prepare them for a Watco Oil finish.

back spindles and legs to more easily and accurately place these joints. But I should have thought ahead and waited to mill these mortises into the ends of the short stretchers, as these holes prevented me from easily mounting those parts between centers on the lathe. "Plan B" of temporarily filling those mortises with Domino tiles (left photo) worked to solve the dilemma.

There are 13 spindles to turn for this bench, most of them simple cylinders. I did attempt to turn the legs in a way that evokes a cured bamboo stalk. I didn't really think I succeeded until an observer commented that they do look right. You can decide. My lack of skill using a skew chisel was made painfully clear as I turned all of these pieces. (I've got to practice more ...)

Then I sanded the spindles up to 400-grit because I chose to use Wat-

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MORE ON THE WEB



For a video demonstrating the bench's construction techniques and carving using the Shaper Origin, as well as downloadable PDFs of the bamboo motif, please visit woodworkersjournal.com and click on "More on the Web" under the Magazine tab.

co Oil finish on the bench. Usually I preach applying finish while the pieces are still on the lathe. In this case, though, I didn't want to take the time to mask all the mortises, so the finish came later.

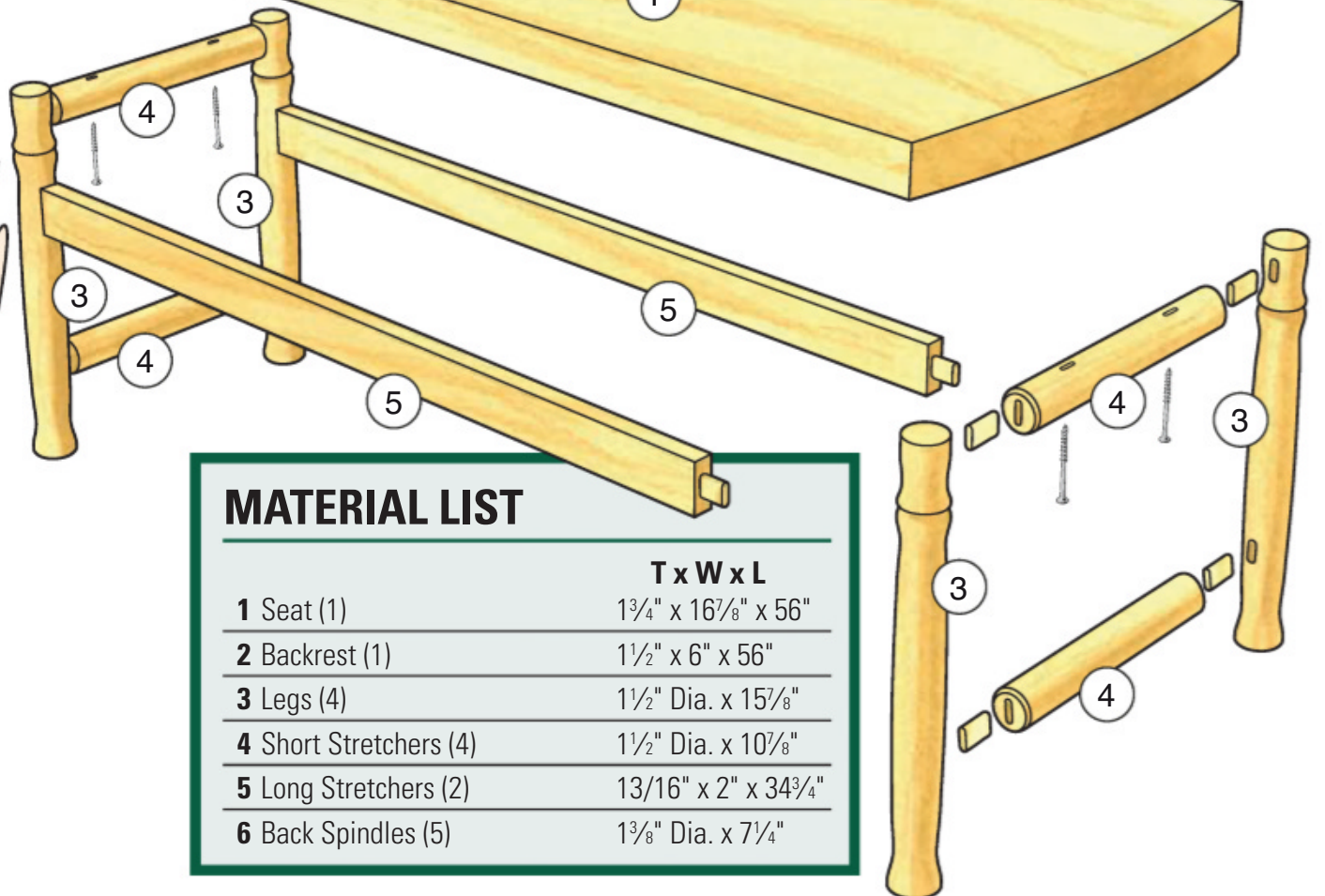
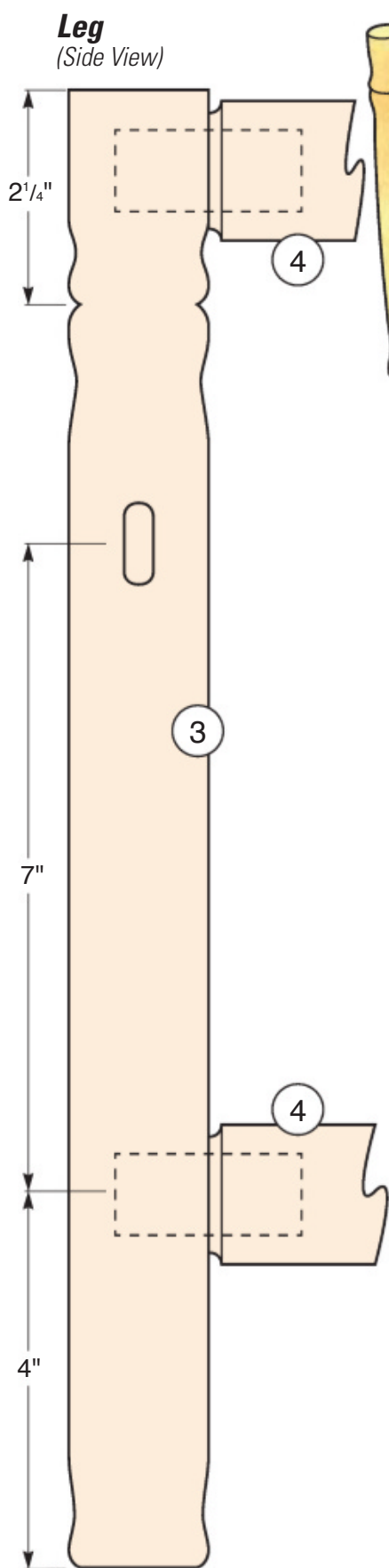
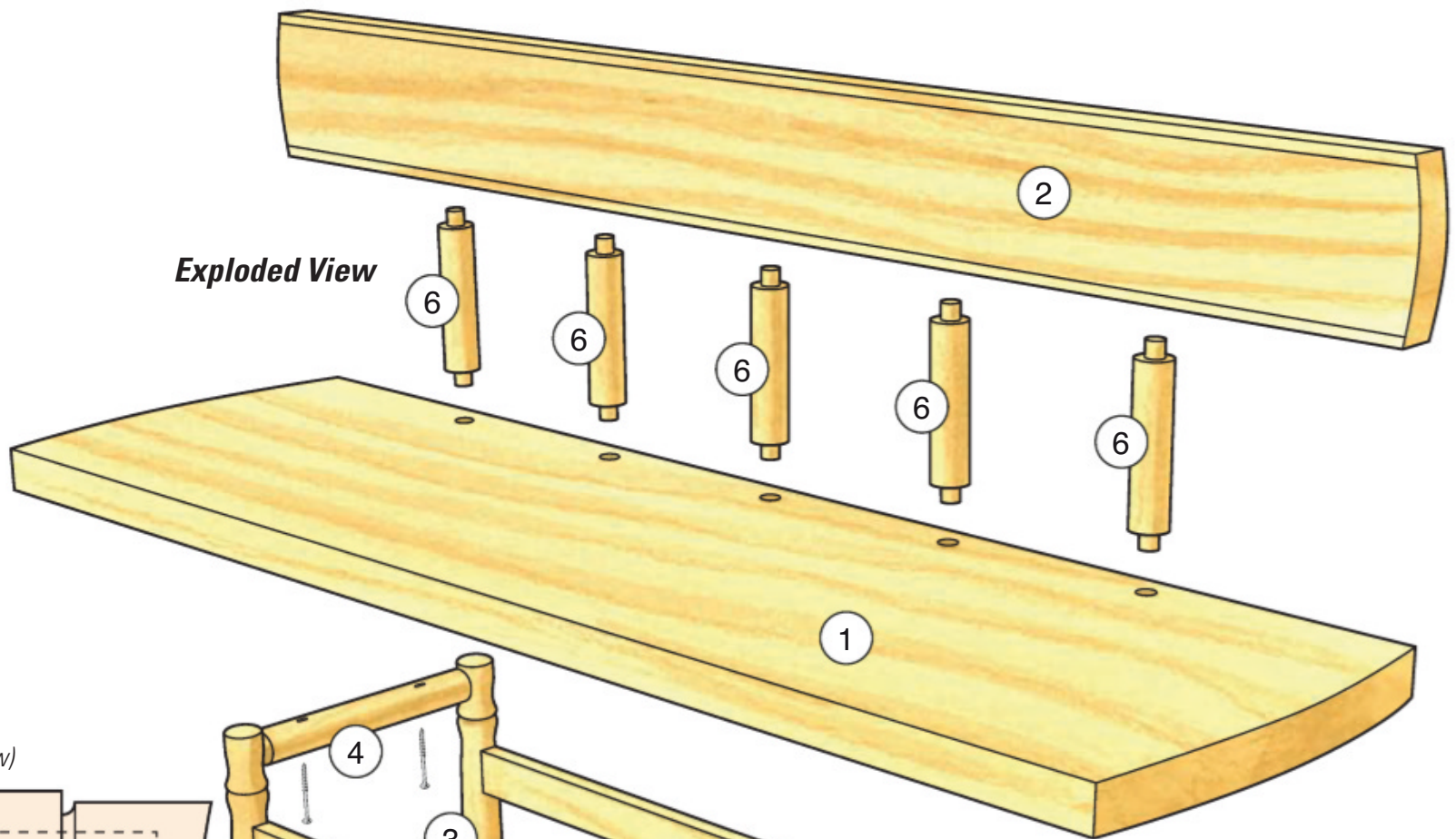
There are just two more pieces to make: the long stretchers. After I cut them to length and width, I centered Domino mortises in their ends and sanded them smooth. I also drilled pilot holes in the short top stretchers for screws that will attach the undercarriage to the seat. One hole on each stretcher is elongated to accommodate seasonal wood movement. With that done and after a full dry assembly, I glued and clamped the leg sets together.

Making the Seat and Backrest

The seat glue-up was now ready to come out of the clamps. I scraped away the glue squeeze-out and then cut the seat to width on the table



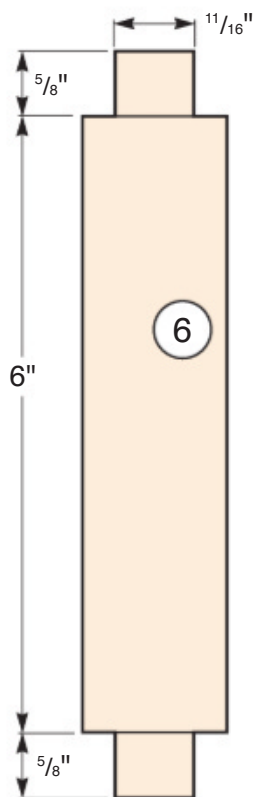
Without a drill press in his home shop, the author used Rockler's Portable Drill Guide to bore 11/16"-diameter holes for the spindles. The guide handled the task easily.



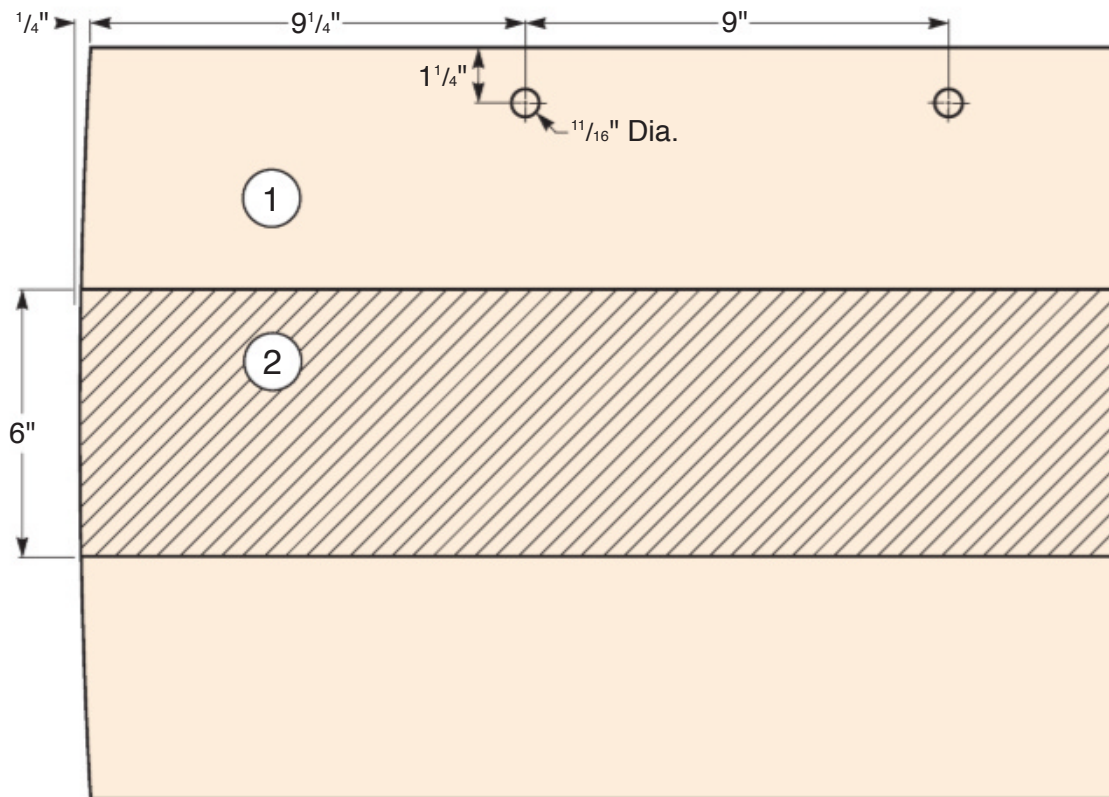
MATERIAL LIST

	T x W x L
1 Seat (1)	1 3/4" x 16 7/8" x 56"
2 Backrest (1)	1 1/2" x 6" x 56"
3 Legs (4)	1 1/2" Dia. x 15 7/8"
4 Short Stretchers (4)	1 1/2" Dia. x 10 7/8"
5 Long Stretchers (2)	13/16" x 2" x 34 3/4"
6 Back Spindles (5)	1 3/8" Dia. x 7 1/4"

Back Spindles
(Front View)



Seat and Backrest
(Top View)





To enhance the Asian influence of this project, a simple bamboo motif (inset) was carved onto the face of the backrest. These mirror image carvings were easily done with a Shaper Origin CNC.

saw. I wanted to form a very delicate curve on each end of the seat, so I marked the center of the seat blank on each end as well as the exact length of the seat (56") on those

lines. I then measured back 1/4" and used a square to scribe a line across the width of the seat blank on both ends. Flexing a thin piece of stock that connected the scribed

line on each side of the seat with the center point at the 56" mark, I drew a gentle curve on the ends of the seat. I cut those curves on the band saw, then faired them with a handheld belt sander.

With that done, I set the completed seat on top of the backrest blank and traced the end curves onto it. A trip to the band saw and a bit of belt sander action finished up the backrest's curves.

With the backrest and seat shapes completed, it was time to sand them. And boy, that was a lot of sanding. Once again, I was determined to sand through all the grits, starting with 60-grit up through to 400-grit. I took a break at the 180-grit stage to form the 1/8"-wide x 3/16"-deep shadow lines in the backrest using a full-thickness table saw blade. Before moving on, I drilled 11/16"-diameter holes for the back spindles



The carved bamboo designs were filled with colored epoxy resin. This "inlay" procedure could not have been easier. Mixol colorant was added to the prepared resin, which was then flowed into the carving with a glue syringe. It cured completely in 24 hours.



After the excess and overflow of the green epoxy was sanded away, the surfaces of the backrest and seat were smoothed up to 400-grit.



As with any woodworking project, a dry assembly before gluing and clamping is a must. Here the author found that the spindles' tenons needed a little adjustment before they fit properly.

using a new portable drill guide from Rockler. Now it was time to do some carving.

Carving and Inlay the Easy Way

Bamboo carvings had been part of my concept for the bench from the beginning. But carving is one area of woodworking that I find tedious. Frankly, the skill is "heavy lifting" for me. Enter the Shaper Origin handheld CNC machine. I was able to carve the bamboo motifs easily and accurately with this tool. My "More on the Web" video for this project shows you how that process works. For those of you with better carving skills than I have, there are also free PDF downloads of the design available at "More on the Web." After I carved the shapes into the backrest, I sanded with 320-grit paper and then applied a wash coat of shellac to the carved face.

Just as the Shaper Origin makes carving easy, "inlaying" with colored epoxy is even easier. I mixed up the epoxy, added color, put the mix in a glue syringe and "stayed within the lines" as I filled the carving with it. I made puddles of the epoxy in a few places on the carving. But once it cured, it sanded off in a snap, thanks to the shellac wash coat, leaving the carved lines neatly and fully filled.

At this point, I sanded the entire front face of the backrest once more, starting at 220-grit and continuing to 400-grit.

Finishing and final assembly was all that remained to be done. Before I installed the backrest on the seat, I did a couple of things. First, I dry fitted the back spindles in their bored holes. A couple of the tenons needs to be sanded slightly smaller.

Then I applied the first coat of Watco Oil to the seat and the back spindles, but I carefully kept the tenons and the areas where the spindles would be housed bare of finish. I used Watco's "light walnut" color on the spindles and "natural" on the seat and backrest. Then I glued and clamped the pieces together and let the glue cure. While that was happening, I applied several coats of the light walnut Watco to the leg set. I wanted the color to mimic bamboo. I then fastened the undercarriage to the bottom of the seat with #10 x 2½" screws. After assembly, I applied several more coats of the Watco products to build up a more durable film coat.



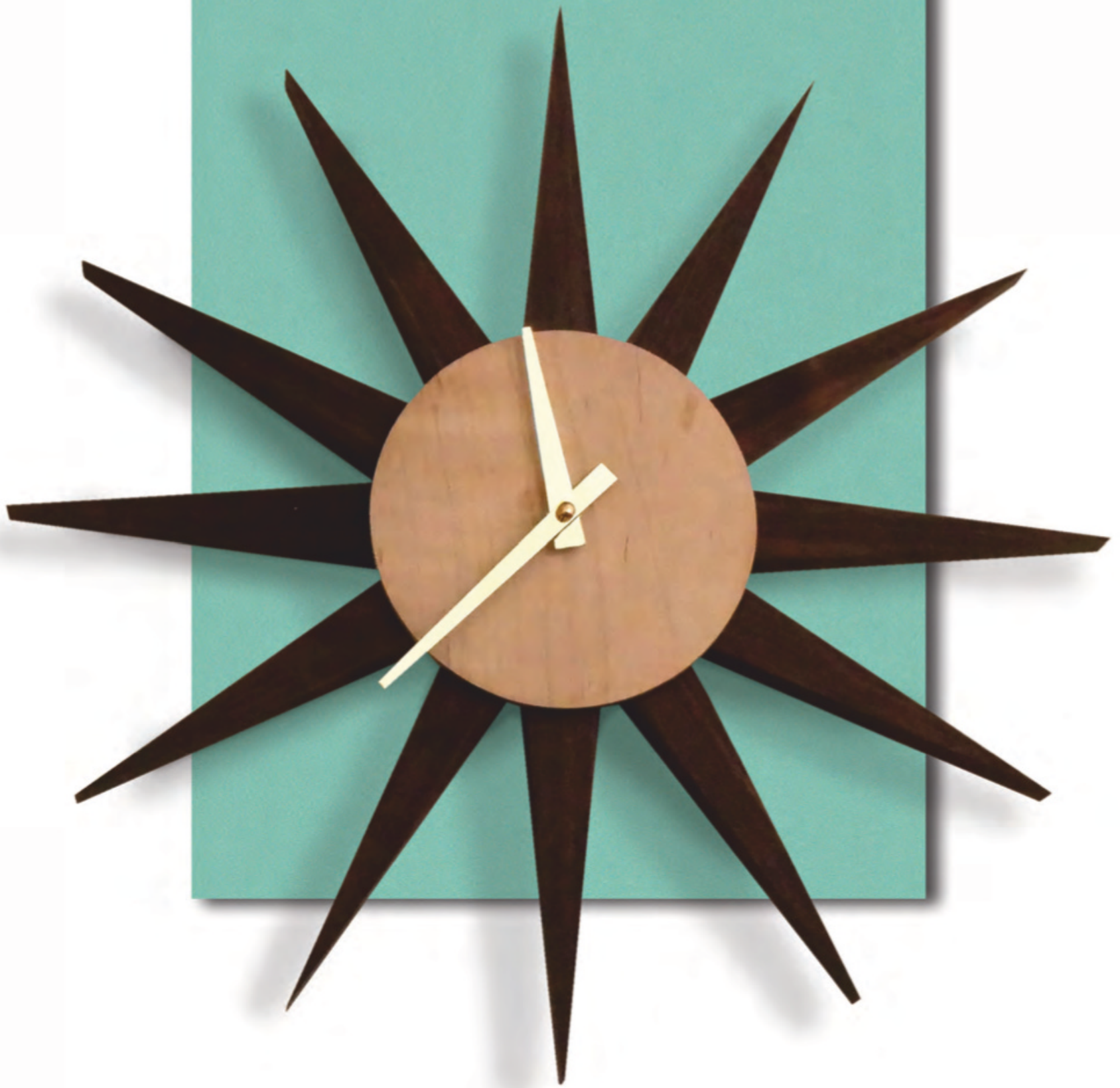
Once the dry fit was successful, it was time to glue and clamp the bench together. The tenons and spindle shoulders provide significant glue area.



The undercarriage attaches to the seat with 2½" screws. On each upper stretcher, one of the through holes that accommodates the screws is elongated to allow the seat to expand and contract across its width seasonally.

While it is no throne, I'm very happy with this bench on several levels. It's a fun project to build, looks beautiful when done and provides some very practical seating.

Rob Johnstone is the publisher of Woodworker's Journal.



RETRO STARBURST CLOCK

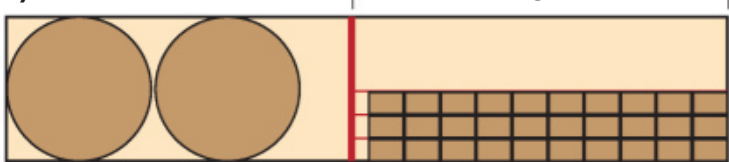
By Jeff Jacobson

Bring a dash of 1950s charm to your living room when you build one of that period's iconic wall clocks.

Outer space, and all of its futuristic promise, influenced Mid-century Modern design. And clearly, folks of that time period appreciated its celestial shapes, because if you do a web search for 1950s starburst clocks, you'll find oodles of eclectic variations on this theme. When I shared my idea for this Retro Starburst Clock project with senior editor Chris Marshall, he immediately recalled the massive version of one that hung on the paneled wall in his grandparents' living room. Made of steel with an array of scary-sharp points, he says if it had fallen off the wall unto the couch below, any unsuspecting person who happened to be seated there would have suffered some painful collateral damage.

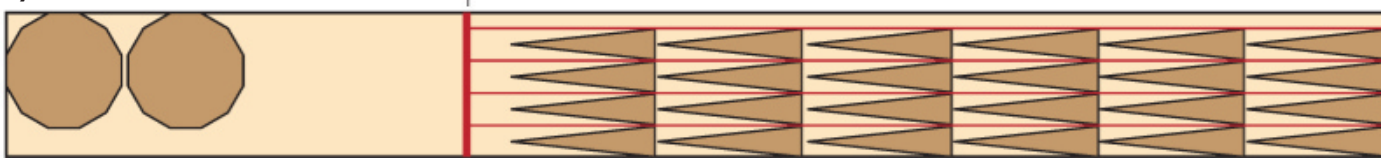
Well, at a more modest 14" across, my wooden version of this iconic time-keeper is much smaller and friendlier to handle than that metal relic he remembers. It's also lots of fun to build. If you've got a band saw, router table and a tapering jig that works on either your table saw or band saw, this clock could be hanging on your living room wall and marking the hours after just a day or so of time in the shop.

1/4" x 5" x 24"



You can build two clocks from just two boards of the same species, following the board sizes and cutting diagrams here. Or mix and match woods for a contrasting look.

3/4" x 5" x 48"



Material Choices

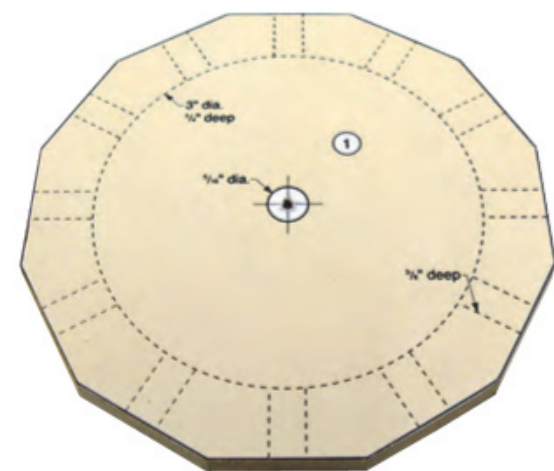
If you flip ahead to the *Material List* on page 49, you'll see that this clock has just four types of parts: a 1/4"-thick face, a 12-sided body piece behind it, a dozen pointed rays and loose tenons that connect the body to the rays. I made the face and body pieces from scraps of maple and the rays and tenons from walnut. I like the contrasting wood tones, and the blonde-colored maple also makes the various pencil lines you'll need to follow during the building process much easier to see. The project requires very little wood overall. If you'd

rather use one wood species for the whole project, just two boards in the sizes shown above are enough to make two complete clocks.

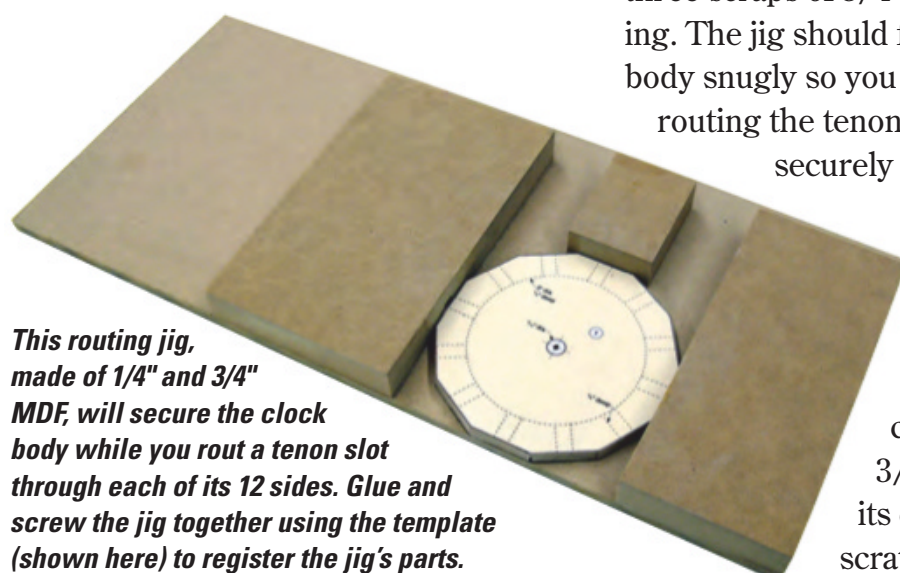
Making a Template, Routing Jig

The trickiest part of building the clock is accurately routing slots in the body piece for the loose tenons. To do that, we'll use a simple routing jig that registers and holds the body piece. And to make sure that the clock body fits into the jig properly, I'll recommend that you first make a body template like the one at left. You can photocopy the full-size *Drawing* on page 49 and use that, or download a free PDF of that page by going to woodworkersjournal.com and finding it as a "More on the Web" feature for this project. Either way, cut out the paper pattern and adhere it to a piece of 1/4" MDF or scrap with spray adhesive. Then very carefully cut out and sand the 12-sided template to shape.

Now make a routing jig that looks like what's shown below, using the template to locate the jig's three support blocks accurately. I made my jig from a 6" x 14" piece of 1/4" MDF for the base and three scraps of 3/4" MDF for its blocking. The jig should fit around the clock body snugly so you can rotate it for routing the tenon slots but also hold it securely in each position.



Make a clock body template from 1/4" scrap, using the full-size drawing on page 49 as a pattern. Adhere the pattern and cut out the shape.



This routing jig, made of 1/4" and 3/4" MDF, will secure the clock body while you rout a tenon slot through each of its 12 sides. Glue and screw the jig together using the template (shown here) to register the jig's parts.

Forming the Clock Body

Next, use the template to trace the clock body onto your 3/4" stock, and mark its centerpoint (I used a scratch awl driven into a

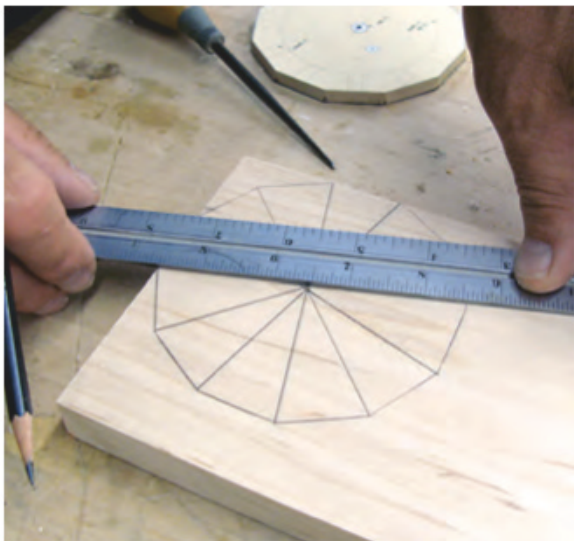


Trace the body template shape onto your 3/4" board. Align the template so two of its sides are aligned with the board's squared end and edge.

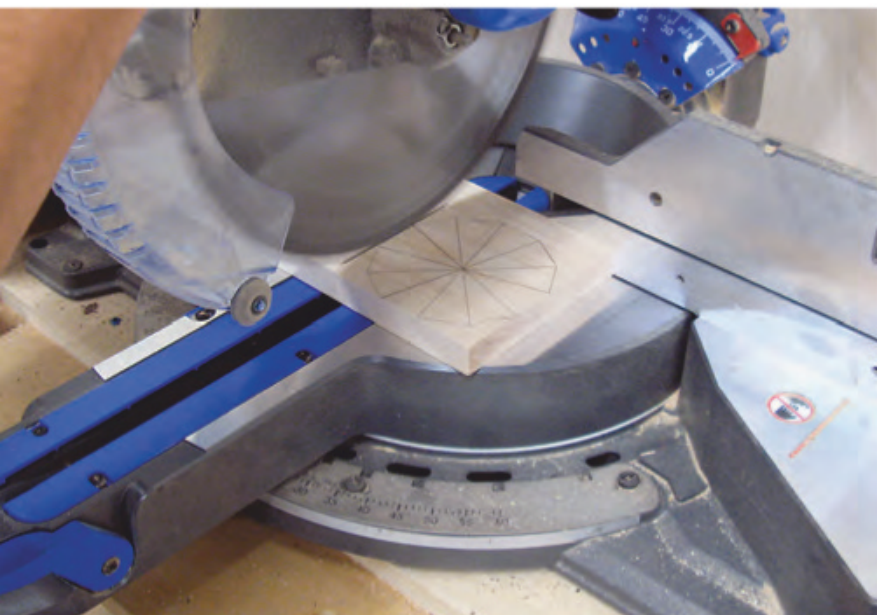


Prick an exact centerpoint onto the traced body shape. The author drilled a tiny hole through his template to guide a scratch awl for this task.

tiny hole I drilled through my template). Align one side of the template flush with a squared end of your board and another side to the board edge before tracing the shape — it'll take care of two of



Using a sharp pencil, draw six fine lines across the body blank through its centerpoint to divide the shape into 12 equivalent wedges.



Crosscut the body from the larger board. Align the blade so it just kisses the layout line but doesn't remove it. Accuracy is important here.

the body's flat sides immediately. Then draw six lines across the body through the centerpoint, dividing the shape into 12 matching pie-shaped wedges. These layout lines will provide accurate references when sanding the body to

final shape. Once those lines are drawn, head over to your miter saw or table saw to slice the body off of the board with a square crosscut to define a third side of the shape.

The clock's quartz works will recess into a 7/16"-deep, 3"-diameter hole in the body's back face. I installed a Forstner bit on my drill press for this step. I like to use my brass setup bars whenever possible, and here was a chance to put them to good use for setting the drilling depth. Slipping the 5/16" bar size under the bit and lowering the bit until it touched the brass bar, I could lock the drill press depth stop, knowing that my drilling depth would be 7/16" (3/4" minus 7/16" equals 5/16").

With that dialed in, I secured the body blank in a large wood screw clamp so I could hold it safely during drilling. After carefully lining up the Forstner bit's centerpoint with the body blank centerpoint, I slid my drill press fence

up against the back of the clamped blank and locked it in place. Once that was done, I bored the hole at a slow speed so the big bit could cut the recess cleanly. Without changing the fence setting, I then switched to a 5/16"-diameter brad point bit to drill a hole through the body's centerpoint for the clockwork's shaft to pass through.

When you're done drilling, you can unclamp the body workpiece. Take it to your band saw and, cutting just outside your layout lines, remove the remaining waste to form the other nine sides of the shape. When you do this, I'll strongly suggest you don't attempt to make these final cuts right up to the body's perimeter layout lines. If you happen to accidentally cut one or more of these sides a bit too short, the body will fit too loosely in the jig during routing, and the tenon slots won't be correctly centered on the sides.

Instead, this is where your disc sander or stationary belt sander can come in very handy for refining the body shape. Working carefully, sand opposite sides until you're splitting the outer layout



To drill a 7/16"-deep recess in the body for the clock's quartz works, the author used a 5/16" brass setup bar (above) to dial in the Forstner bit's depth of cut, then clamped the workpiece in a large wood screw to hold it securely for drilling (center). After the large hole was bored, he switched to a 5/16"-diameter brad point bit to drill a through hole at the centerpoint (far right).

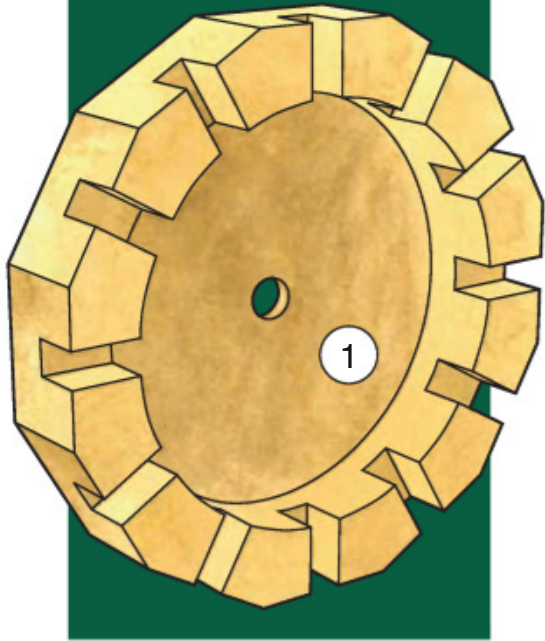


Clock Hard-to-Find Hardware

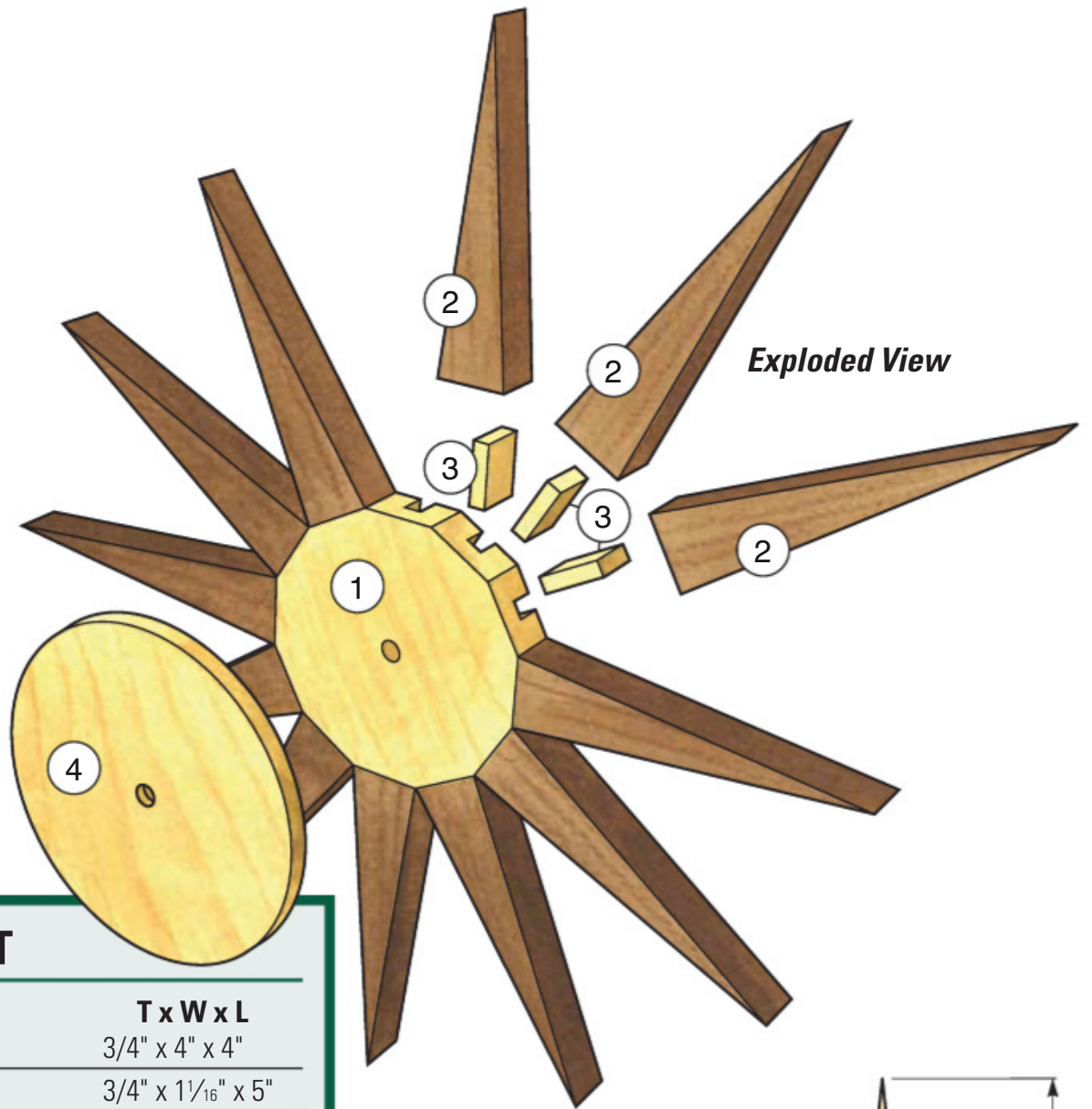
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Back of Body



Exploded View

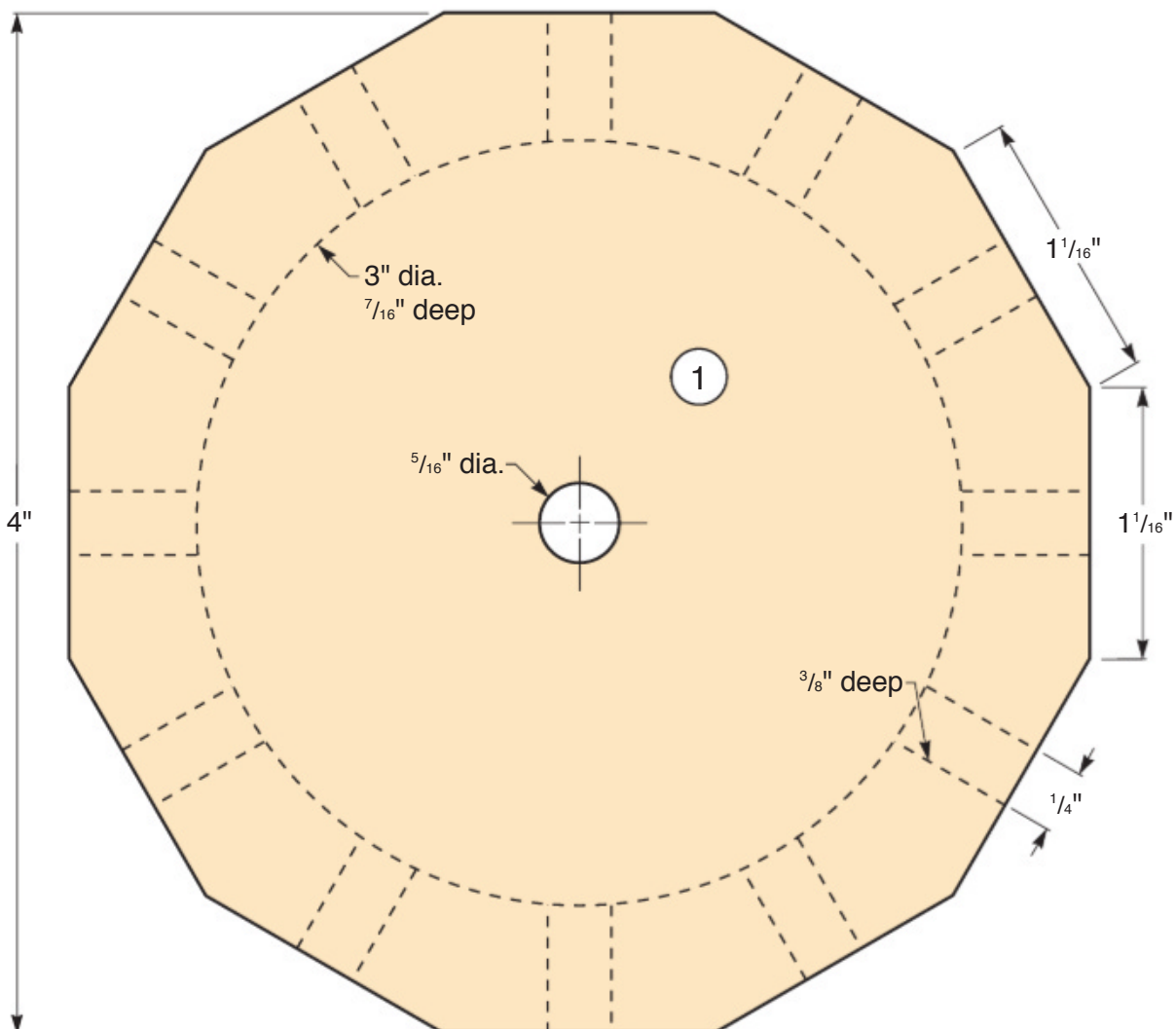


MATERIAL LIST

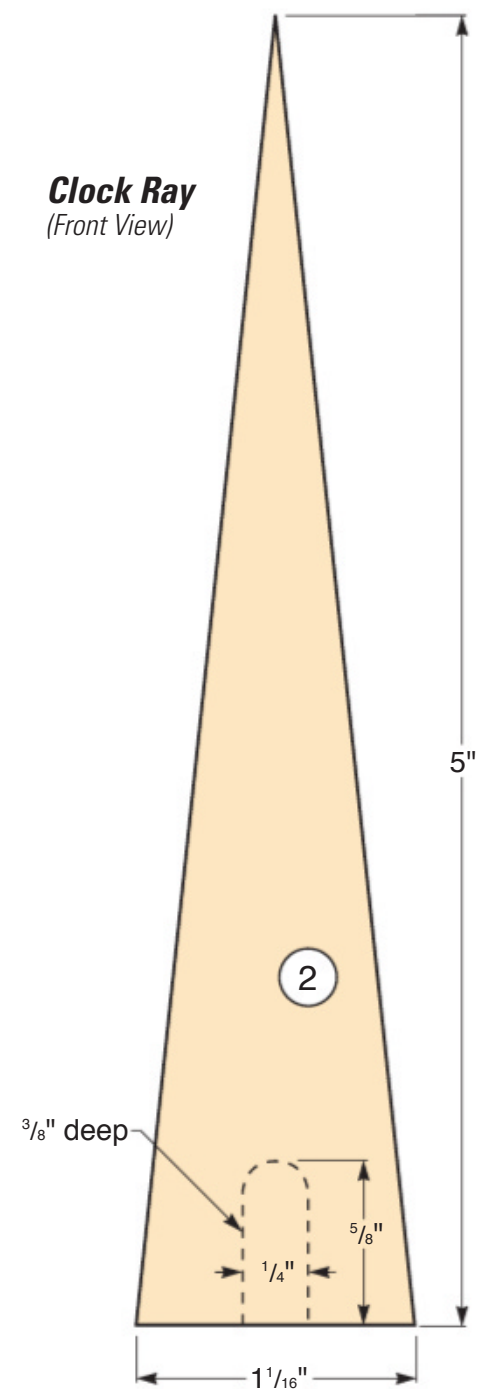
	T x W x L
1 Body (1)	3/4" x 4" x 4"
2 Rays (12)	3/4" x 1 1/16" x 5"
3 Tenons (12)	1/4" x 3/4" x 1 3/16"
4 Face (1)	1/4" x 5" Dia.

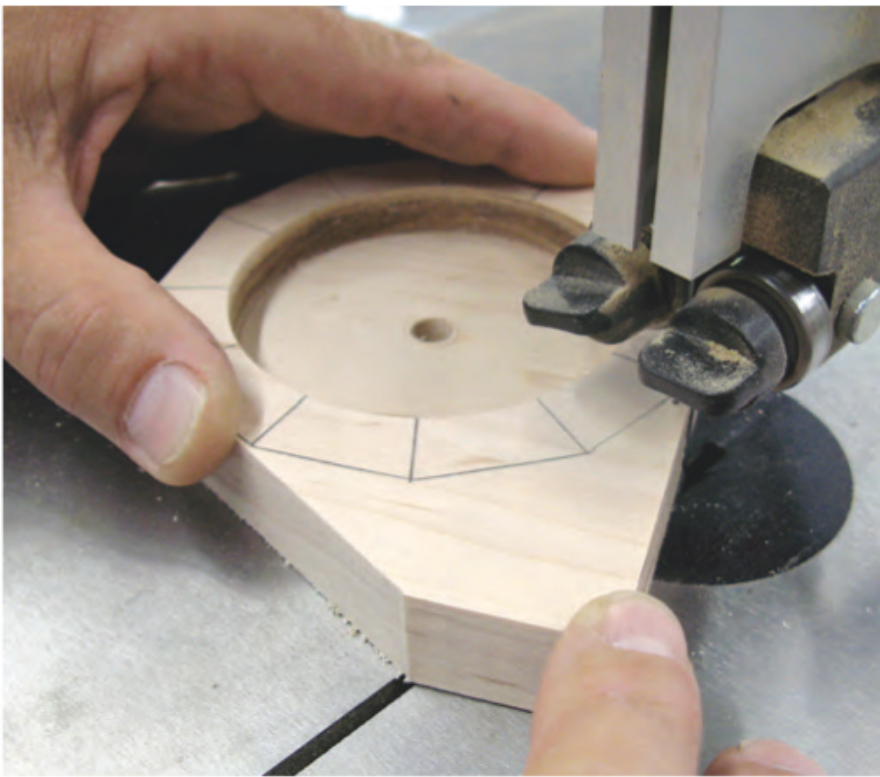
Clock Body Pattern

Full size



Clock Ray
(Front View)





Cutting just outside the clock blank's perimeter layout line, remove the remaining waste to bring the part to its 12-sided shape. These are rough cuts only; refinement of the shape happens at the sanding stage, next.



Sand the 12 sides carefully and lightly up to the layout lines, aiming for the clock body to fit snugly in the jig (in-set). Make sure the diagonal layout lines remain centered on each corner of the shape.



lines. Be very careful not to sand too far; try to insert the body into your routing jig periodically as you sand opposite faces. You want the body to fit into the jig snugly so it doesn't move. When pairs of sides fit into it well, pencil a check mark onto them to note your progress. Sand all 12 sides this way.

Ready for Routing

Prepare your routing jig for use by installing a 1/4" spiral bit in your router table and setting the fence 1 7/8" away from the bit. (This will center the tenon slots on each side of the body.) Then pass the jig along the router table fence to cut a slot through its base and blocking. Your goal is for the bit to cut 3/8"-deep tenon slots into the clock body at the bit's final height. But to save wear and tear on the bit and to minimize tearout on the jig, cut its slot in two or three passes of increasing depth.

When the jig's slot is finished, install the clock body in the jig with its back (recessed) face down, and rout the first two slots. Use a push pad to protect your fingers. Since these are "blind" cuts, feed the jig slowly over the bit so it can pass through both walls of the clock body without chipping the area around the slots as it enters and exits. Repeat this process five more times, repositioning the clock body in the jig each time, to cut the remaining 10 slots into it.

Creating the Rays

Follow the *Material List* to prepare a dozen blanks for the clock rays, plus a few extra to serve as test pieces.

Head back to your router table to re-set the fence for cutting a centered 1/4"-wide, 3/8"-tall tenon slot into one end of each ray. I clamped a stop block to the router table's fence to limit the length of these cuts; I made my slots 5/8" long.



Once the routing jig's slot is cut through it from end to end, plowing the clock body's tenon slots is easy: install the body on the jig and push the jig slowly past the bit to mill a pair of slots across the workpiece's width. Reposition the body and repeat this cut five more times to complete all 12 tenon slots.



Plow a 5/8"-long tenon slot into one end of each of the 12 ray blanks. Use a 1/4" spiral bit, raised to 3/8", for these cuts. A clamped stop block, shown here, is a simple and helpful way to limit the length of these cuts.

Test your setup on a scrap ray to make sure the slot is nicely centered on its width, and make any fence adjustments that are necessary. When you're satisfied, mill slots into all 12 rays.

With that work completed, you can now slice the rays into their pointed shapes with two cuts on a tapering jig.



Make the first taper cut on the rays with the tenon slots facing down and forward in your tapering jig. This jig's fence and backstop fully support the uncut edge and back end of the blanks for this cut (see inset).



For the second taper cut, flip the rays over so the tenon slot faces up but still forward in the jig. Slide the ray along the fence until the point is aligned properly. Use the two hold-downs to secure the ray blank. Here's a tip: mark the taper jig with a pencil so you can place the next 11 rays quickly for clamping and cutting.



(I used my table saw for this operation, but you could also use a band saw if you prefer. Either option will work fine, depending on your tapering jig style.)

Mark both faces of a scrap ray with the taper angles, and adjust the fence on your tapering jig to support the first angled cut (see top left photo and inset). Here, the fence is flush against the uncut side, and the slotted end of the ray blanks face down and forward in the jig.

Once those first cuts are done, however, the second taper cut involves flipping the rays over so the tenon slots face up. At this point, the workpiece is too narrow on its back end to rest against the jig fence without also cutting into the metal backstop found on most tapering jigs (see top right inset photo). So you'll have to rely on the pressure of your jig's clamps to hold the blanks securely for the second pass. If you are uncomfortable making these second taper cuts this way, you could cut them freehand at the band saw instead, using a push stick to support the parts while keeping your fingers out of harm's way.

Now sand the rays up through the grits to smooth their edges and remove saw marks. Then go ahead and cut a dozen tenons to fit the slots. Draw a round clock face onto your 1/4" stock with a compass, cut it round and drill a 5/16" hole through its center. Sand the clock face and body up through the grits until smooth.

Final Assembly

Assembling your clock is easy. Set the rays in position on the body, spread glue in the tenon slots and press the tenons home; they'll stand proud of the clock back by 3/8". When the joints dry, flip the clock over and glue on the face. After that was done, I applied two coats of a wipe-on finish to all the clock's surfaces and let it dry thoroughly.

The last step, of course, is to install the clockworks on the body and attach the hands to the shaft. Then find a prominent spot above your couch to enjoy this timekeeping blast from the past.

Jeff Jacobson is senior art director of Woodworker's Journal.



The author tried Titebond's new Speed Set glue for installing the tenons on his clock. Speed Set tacks up and dries much faster than regular PVA wood glues, to shorten overall assembly time. It worked well for this application.



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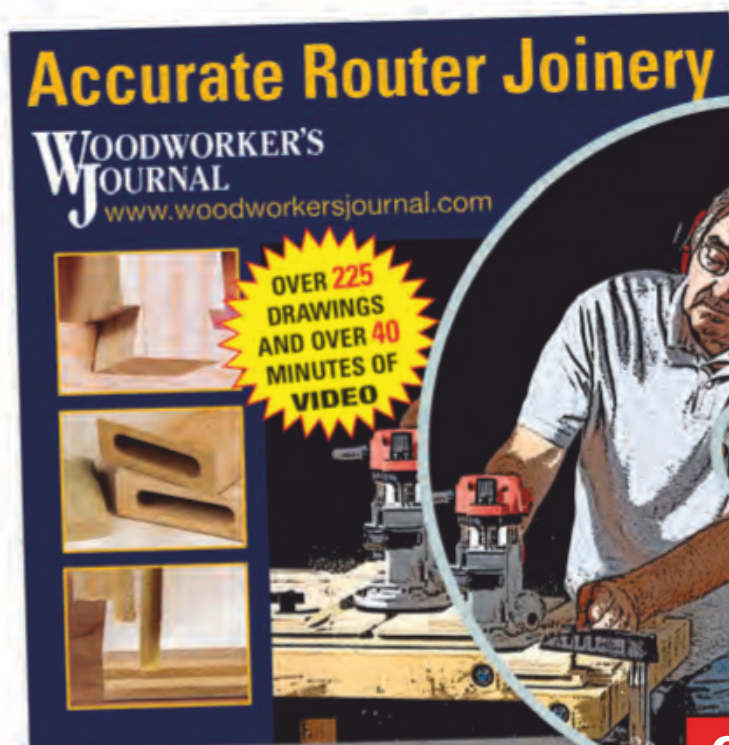
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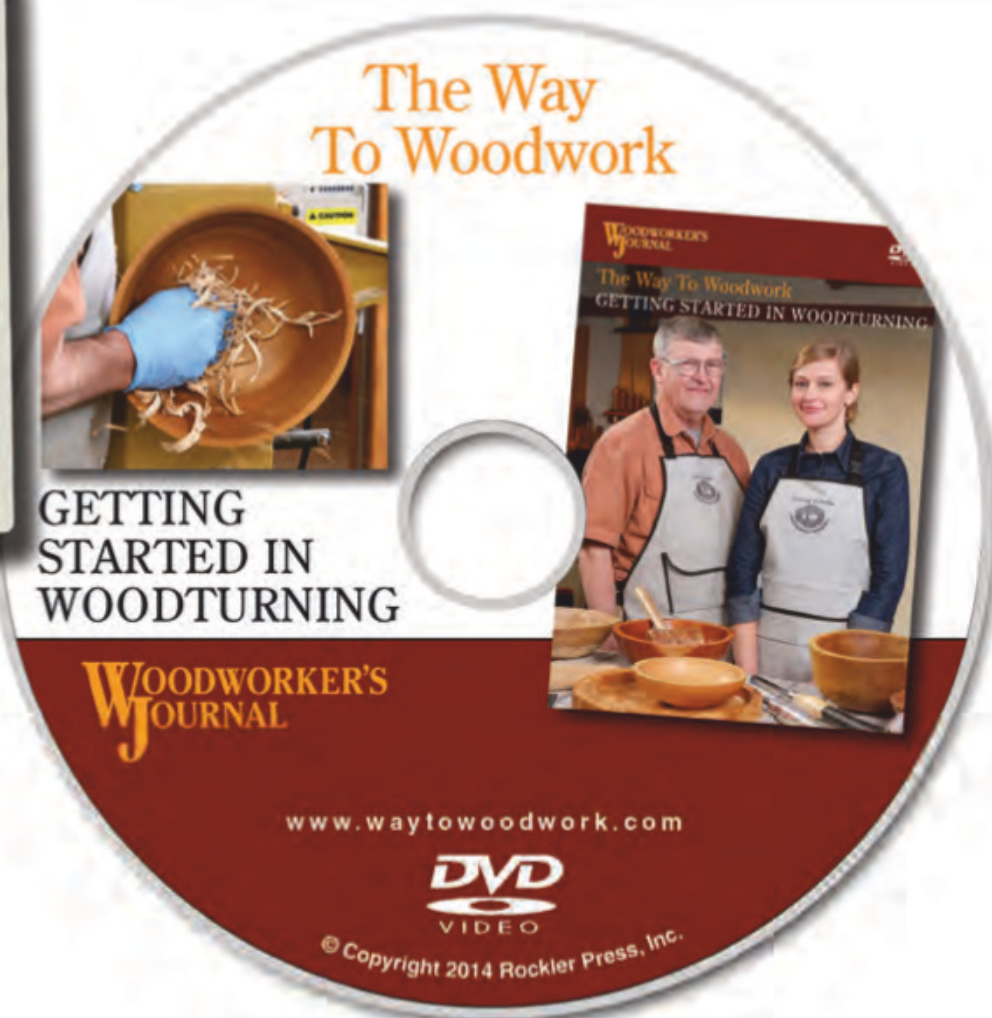
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TOOL TUTORIAL

Air Compressors: Working Under Pressure

By A.J. Hamler

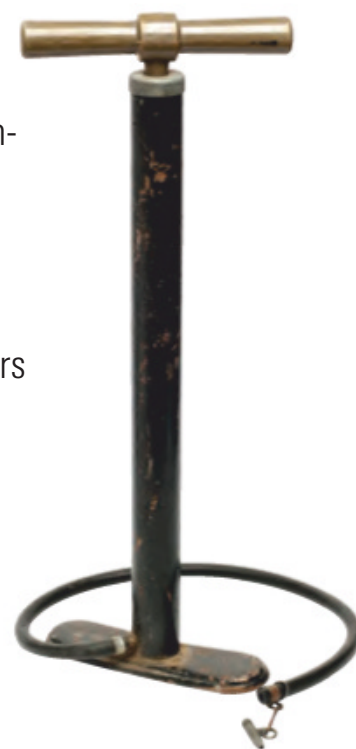


Air nailers and other pneumatic tools are little more than paperweights without a source of compressed air to run them. Here's what you need to know when shopping for and using an air compressor.



Air compressors, among the oldest means of powering tools, have been around for ages. With the ability to create and regulate high amounts of air pressure, there's almost no tool application a compressor can't handle, with their specialty being fastening chores in the shop. Although battery-powered tools are becoming increasingly common, no battery has the staying power of a constant supply of air, making compressors the go-to source for extensive nailing or stapling. Before or during project assembly, you can swap the nailer out for a sander to

smooth its surfaces. When it's completed, you can replace the sander with a sprayer to apply the perfect finishing touch. Once a staple of machine shops, today's compressors have become thoroughly ingrained in woodworking and come in an enormous range of styles and sizes suitable for whatever job you throw at them. One is probably just right for you.



Automotive and machine shops were among the earliest adopters of air-powered tools back in the day, using large stationary compressors. But downsized engineering has since made air compressors portable and brought them handily into the woodshop to power many tools.

How They Work

Air compressors have only one job: compress air. To do that, a piston reduces the volume of incoming air and sends it to a storage tank up to a factory-set "cut-out" pressure, and then the motor shuts off and takes a rest as this volume of air is used.

As it's used, tank volume decreases to a "cut-in" pressure, which is set at the factory, and the motor restarts to pressurize air once more. How long it takes to refill the tank back to the cut-out pressure is known as the recovery time. This fill, cut-out, deplete, cut-in and recovery cycle continues as long as air is being used.

Compressors used to be truly noisy, typically between 80 and 90 decibels (dB).

Today's compressors are far quieter, with most running under 80 dB, and some a lot less. Many ultra-quiet models produce only 60 to 70 dB — soft enough to talk normally right next to it while it runs.

What's Out There?

Compressors made for tool use come in the following three predominant styles.

- **Pancake:** Named for their flattened round tanks, these are among the smallest regular-duty compressors, with tanks from 2 to 6 gallons. Very stable due to their low profile, they require little maintenance and are affordably priced.

- **Hot dog:** Having either one or two horizontal sausage-shaped tanks, "hot dogs" are usually larger and more powerful, with higher profiles and greater air capacity. (Newer compact hot dog models can be quite small, however. See "Capable Compacts" sidebar, page 58.)

- **Vertical:** Among the largest and most powerful compressors you'll find for woodworking or any pneumatic tool task, vertical tanks have a very small footprint.



Compressors come in all sizes, but three basic shapes are the most common: vertical, horizontal (hot dog) and pancake.

Nearly all have wheels for portability.

- Various other compressor types include gas-powered models, small specialized machines for airbrushing and detail work and some extremely small compressors intended only for inflation tasks — not for tool use.



In spite of a vertical air compressor's top-mounted bulk, wheels allow it to be moved around the shop with relative ease.



For a downloadable PDF that discusses adding an inline water filter to a compressor, visit woodworkersjournal.com and click on “More on the Web” under the Magazine tab.



With improvements in lithium-ion tool battery technology, cordless compressors like this one are becoming more widely available.

Most compressors use regular 110-volt shop current, but constant improvement of lithium-ion tool batteries has spawned a growing number of cordless compressors, including several 18-volt battery models, such as the one shown above.

Compressors are classed according to how many

stage compressors are larger and more powerful, and they compress air somewhat differently. The first stage is the same, but air is compressed once or twice more before going to the tank.

Air compressor pumps may or may not need oil. Oiled compressors are very robust but require regular maintenance and oil changes. Today’s oilless compressors are far more common. They’re much lighter in weight, as powerful as you could need and offer longer service life than they once did without routine maintenance hassles.

Compressor Safety

Here are some specific things to keep in mind when working with these under-pressure machines.

- Before every use, check the air relief valve (most have a pull-ring attached) to make sure it moves freely. If a tank over-pressurizes, this valve is designed to automatically release excess pressure.

- Water is an unavoidable byproduct of compressing air, and of course it invites rust, which can weaken the compressor’s cast-iron or steel tank. Always drain the tank of accumulated water

after each work session.

- Working parts of a compressor can become very hot during use. Be careful reaching inside the motor and pump area.

- Avoid contacting bare skin with a pressurized air stream (such as from a blow gun), and never direct compressed air at your face.

- Likewise, depressurize the air hose by turning the regulator all the way down before connecting or detaching tools to it.

- Finally, never exceed recommended air-tool pressures, which will be clearly identified on the tool (see photos, next page). Exceeding maximum pressure ratings can damage the tool, burst a connection or create a leak. A damaged tool or breached hose can destroy a project or, more importantly, cause serious injury.

Understanding Ratings

All the associated numbers and ratings — horsepower, maximum psi, minimum psi, cfm and scfm, duty cycles, etc. — make shopping for a compressor a bit confusing. Here’s what they mean.

Although greater *horsepower* provides faster tank



Although designed as a safety feature, an air release valve also serves as a means to quickly empty the tank.

stages of compression the air goes through. Most wood-working compressors are “single-stage,” compressing air directly to the tank with each stroke of the motor’s piston. Two- and even three-



All air tools and accessories prominently display the maximum pressure they're designed to handle. Never exceed these recommended air pressure limits. Doing so invites tool or project damage and possible injury.

filling and higher pressures, the more important numbers define what you get out of a compressor, determining how well a tool works.

Don't worry as much about horsepower as the *tank pressure rating* of how much air a tank holds. The gallon rating is the literal tank volume, but tank pressure determines the actual amount of air in it. A tank pressurized to 250 psi has twice the available air as a same-sized tank pressurized to 125 psi, so tools run twice as long between refills.

Tank pressure isn't related to *regulated pressure* going to the tool. If a brad nailer requires 70 to 120 psi, adjust the regulator within those numbers. Higher pressure in that range provides power to sink long brads into hardwood; lower pressure is fine for driving shorter nails into softwoods.

The air volume flowing into the tool — rated as *cubic feet per minute (cfm)* — is determined by the size and power of the compressor. Tools require a minimum cfm to function, even if the psi requirement is met.

Rapidly firing one nail after another can "outrun" a small compressor, causing a

delay as it builds up more air volume. Most shop nailers aren't used nonstop, causing compressors to run constantly. The more continuously a tool runs, though, the higher the air volume it needs. Framing nailers, sanders, grinders and sprayers are good examples.

Manufacturers aren't consistent when rating air volume; some use "cfm" and others "scfm," or *standard cubic feet per minute*. The scfm rating is determined the same way as cfm, but at an industry-standard set of conditions including barometric pressure, temperature and humidity. While the scfm rating is technically more accurate, in real world terms the difference between the two is very slight.

Practically all manufacturers provide cfm ratings at a regulated output of 90 psi — the sweet spot for most tools — making comparison easier. Most also provide a lower rating, usually 40 psi. Generally speaking, most home shop compressors put out about one additional cfm by cutting the pressure by half, so use these figures to match a compressor to the air-volume requirements of tools you intend to use.



The gauge on the left shows tank pressure, while the right-hand gauge displays the regulated pressure going to the tool. A regulator knob adjusts the output going to — in this case — a nailer requiring 90 psi.

The last rating is the *duty cycle*, expressed in a percentage, describing how much the machine actually runs. For a duty cycle of, say, 50 percent, if you use a tool for an hour, the compressor should run no more than 30 minutes. This isn't a factor for low-demand woodworking tools like nailers that aren't running continuously. In fact, many compressors made for home shops don't even supply a duty cycle rating. If you'll be using a

High-volume tools like sprayers and the sander shown here require an air compressor capable of high cfm output. Use a too-small compressor for these tasks, and you'll find the machine running constantly to keep up.





A typical accessory set, usually priced at less than \$20, includes a good selection of fittings and connectors, plus some application-specific tools like inflator tips and air guns. Most of these are handy to have on hand.

pneumatic sander, grinder, sprayer or automotive equipment — tools that typically run constantly for long periods — seek out and follow the rated duty cycle recommendations.

Setting Up a Compressor

Most compressors include one or two quick-connect outputs. Buy an accessory set that includes the most commonly needed items. Typically you'll get four

1/4" connectors, a pair of quick-connect fittings, adapter couplers, Teflon tape, a blow gun, a trio of inflator tips, tire inflator and even a tire pressure gauge.

You'll need at least one air hose, of course. Basic rubber hoses are the cheapest option. They stand up to a lot of abuse but tend to be stiff, especially when cold, and they kink and tangle as often as the typical garden hose. Opt instead for a "hybrid" polyurethane hose — they're sturdy, lightweight, flexible and resist kinking.

Capable Compacts

Sometimes, just a little air is plenty. For tasks involving general trim carpentry, or for when you want to carry a compressor around the house (or toss one in the trunk of the car for small jobs away from home), one of the growing army of compact compressors may be just the ticket. In fact, if your pneumatic needs for woodworking or household DIY are mostly limited to nailer use and inflating tires, a

Compact compressors are easy to tote from one small job to another. They're designed to be lightweight, maintenance free and easy to carry. Roll cages give them jobsite durability.

compact compressor could fill the whole bill for your shop. Almost every manufacturer has introduced its own compact with specs that are similar. They typically sport tanks of about a gallon, and virtually all put out at least 125 psi. Air volumes vary, but these compressors have no trouble powering pin and brad nailers. And while they can't handle framing nailers, sanders and other high-demand air tools, most will accommodate less demanding finish nailers.





An air hose is essential. From left, choices include an extremely flexible hybrid polyurethane hose, a retractable spiral hose and a conventional rubber hose.

Most home shop compressors accommodate 1/4"- or 3/8"-diameter hose, but always opt for the larger diameter as it allows the most unrestricted airflow between compressor and tool.

Procedure for Use

While several of these steps were mentioned in the safety section, let's review the procedure for using a compressor.

To prepare for startup, with the power switch off and compressor depressurized, connect a hose to the compressor. Turn the regulator knob all the way counterclockwise, and close the drain valve(s). Confirm that the compressor is resting solidly on the floor.

Test the relief valve, and check that hose connections are secure. Then plug it in and turn it on. Allow the tank to fill with air until it reaches full capacity and stops. Now, prepare the tool for use (load nails, etc.) and attach it to the end of the hose. Adjust the output pressure with the regulator knob to match the tool's requirements, and you're ready to go.

When finished, shut off and unplug the compressor. Turn the regulator knob counterclockwise until the output gauge reaches zero. Disconnect tool and hose.

Empty the compressor by either pulling the relief valve ring or opening the drain valve. I've found it's best to relieve most of the pressure first at the valve ring, and then open the drain when almost all pressure is gone to avoid blasting condensed

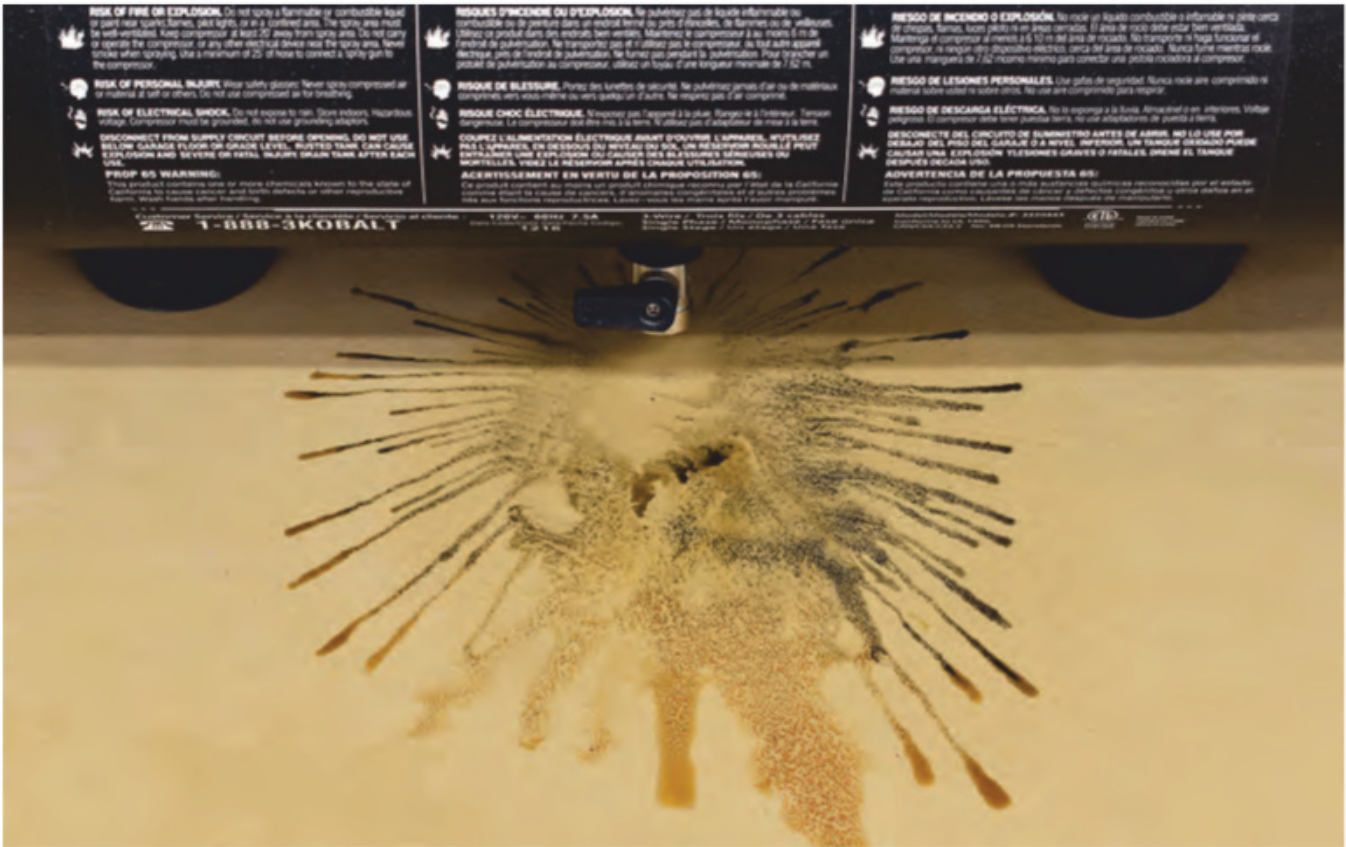
water several feet in every direction out the bottom.

Don't be concerned with what the water looks like when drained — it's always discolored. A small amount of internal surface rust is unavoidable, and some will rinse out with the drainage.

A.J. Hamler writes frequently for Woodworker's Journal.



With a centrally located compressor and a versatile retractable hose reel, you can use an air tool almost anywhere in the shop. Typical reel lengths run from 15 to 100 ft.



All compressors accumulate condensed water, which can rust the tank if not drained regularly. And yes, the water always looks this nasty, resulting from light surface rust inside the tank.

TOOL PREVIEW

Rockler Rock-Steady Folding Steel Stand

By WJ Staff

Here's a way to create a rugged yet ready-to-travel full-size router table — or any other shop table you need.



When you think of a folding leg base, your mind might wander back to those rickety, light-duty TV trays from the 1970s that were barely strong enough to support their own weight. But their folding design sure saved space and made them awfully handy to have around anyway.



If you've always wanted a full-size router table but couldn't justify the floor space for a fixed-leg stand or cabinet base, Rockler's new Rock-Steady Folding Steel Stand can provide the solution.

Well, erase that notion from your mind with Rockler's new Rock-Steady Folding Steel Stand, because it offers the best aspect of folding legs — space-saving stow-ability — plus the sturdiness of 14-gauge rectangular steel tubing. The end result is a made-for-the-workshop stand that offers an impressive load-bearing capacity of up to 200 lb. but

can stow in a 3"-deep space against a bench or wall when folded up.

Thick-gauge steel, combined with ample anti-racking supports and strong pivot points, are what give this stand its ruggedness. When propped open for use, the stand has a working height of 35½", making it suitable for a router tabletop, a T-track table or any other work surface



The stand's front table bracket with angled sockets attaches beneath the tabletop. It captures the top front legs that hold the table upright.

A pair of steel safety locking pins are tethered with cables to the front table bracket. They lock the top front legs in position during use (left) as well as secure the legs when the stand is folded up (right).



A built-in handle makes the 33-lb. stand easier to lift and carry around when folded up.

of your choosing. Rockler recommends a maximum table size of 24" wide x 32" long and a minimum table size of 20" x 26". Tabletop material should be at least 3/4" thick.

If you have a space-challenged shop, this stand opens up real potential for the full-size router table you've always wanted but could never justify, based on floor space limitations. Here's a way to have a large work surface to support any heavy-duty routing task without having to resort to a cabinet base or fixed-leg stand underneath it.

When set up for use, the stand's open footprint measures 22½" deep and 26" wide. Four plastic feet feature non-slip pads that help to provide solid stance on a shop floor or wherever your jobsite happens to be. They pivot for added adaptability.

Stone-simple Setup

Once assembled, the Rock-Steady Folding Steel Stand is easy to prop up for use. Just position the folded stand upright, and swing out the lower rear legs until they stop. Tip the stand backward slightly so its rear feet touch the floor. Then, the front of the tabletop can be swung upward in order to engage the stand's short upper legs in a pair of angled sockets — they're on a bracket mounted under the tabletop. Two steel safety locking pins, tethered to the stand, secure the upper connection points, and a pair of locking flip stops prevent the lower legs from folding forward if the erected table is lifted up.

Reversing the process, of course, folds the stand flat again for storage. When collapsed, the 33-lb. stand (not including the tabletop) has a

closed footprint of 2¾" x 26". A handle on the stand's center angle brace makes your folding router table or other work table easier to lift and carry where it's needed. A powder-coated finish gives the stand added durability.

Rockler's new Rock-Steady Folding Steel Stand (item 54819) is available this fall and sells for \$129.99. Learn more about it by visiting rockler.com or a Rockler store near you.



Pivoting feet equipped with non-slip pads help to provide stable footing on your shop floor or the ground.

WHAT'S IN STORE

Helpful Low-cost Turning Accessories

Contact Information

Easy Wood Tools
866-963-0294

Milwaukee Tool
800-729-3878

Pony Jorgensen
800-776-2228

Rockler
800-279-4441

Wagner SprayTech
800-328-8251

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For videos demonstrating featured tools, please visit woodworkersjournal.com and click on "More on the Web" under the Magazine tab.

A new *Carbide Cutter Honing System* (item 52632; \$19.99) from **Rockler** solves the problem of how to resharpen those carbide inserts on Rockler's line of turning tools to a keen, crisp edge when they dull. The un-beveled back face of eight different inserts — D1, R1, S1, Sr1, D2, R2, S2 and Sr2 — can simply be honed against the 6"-long, 1,200-grit diamond plate that comes with this kit. It has a non-slip backing to prevent it from sliding during use. A 1" x 2" plastic grip has molded recesses on both faces that fit the various cutter shapes for honing, and an internal magnet holds them in place. It also sticks the grip against the plate for convenient hanging storage. Both components stow in an included plastic case.

The *FLEXiO 4300 Paint Sprayer* from **Wagner SprayTech** is a versatile solution for completing a wide variety of indoor and outdoor projects ranging from crafts, furniture, cabinets and trim to larger applications like interior walls, decks, siding

Rockler Carbide Cutter Honing System



and fences. Its powerful X-Boost turbine will spray both thinned and un-thinned latex or oil-based paints, primers, paint/primer all-in-one coatings, stains, lacquers, urethane clearcoats and sealers. Two interchangeable nozzles cover the gamut of finishes and application areas. The gravity-feed nozzle provides better control when spraying smaller projects or in tight spaces; it has 150 and 600 ml cups to hold smaller quantities of finish. Wagner's patented iSpray nozzle, also included, delivers fast and even coverage on larger projects. It adjusts to spray horizontal, vertical, narrow



and wide patterns and has a 1.5 qt. cup. The turbine is located in this unit's stationary base to keep weight on the ground instead of in the user's hand, and a 15-ft. high-flex hose provides 30 ft. of working area. Wagner SprayTech's FLEXiO 4300 Paint Sprayer sells for \$199.99.

Wagner SprayTech
FLEXiO 4300 Paint Sprayer



Harnessing the power, performance and run time of its 18-volt lithium-ion tool batteries, **Milwaukee's M18 FUEL™ 2-gallon Compact Quiet Compressor** operates on a single M18 battery to deliver 1.2 cfm of air pressure



Milwaukee M18 FUEL™
2-gallon Compact Quiet Compressor

at 90 psi. That's sufficient to power finish and for brad and pin nailers. The compressor produces 68 dB, which Milwaukee reports is half as loud as standard corded compressors. Without a battery installed, the machine weighs 31.2 lb, and it has a single quick-connect coupler. Its low-profile design and roll case aids both in storage and durability. When powered by Milwaukee's M18™ HIGH OUTPUT™ XC12.0 Battery, it will fire up to 1,600 18-gauge brad nails on a single charge. The M18 FUEL 2-gallon Compact Quiet Compressor (item 2840-20) is priced at \$349. It is sold as a bare tool without battery or charger.

If the area behind your router table's fence tends to

get cluttered with routing accessories, a steel *Router Fence Storage Tray* (item 51061; \$19.99) from **Rockler** could tidy up that space by providing a more organized fence-mounted solution. The tray's interior measures 1¼" deep x 4½" wide x 8¾" long. A row of five flexible inserts hold either 1/4" or 1/2" shank bits. Three pairs of slots stow longer collet wrenches and other setup tools. An open compartment in front could keep a push pad or router lift wrench within easy reach. Included low-profile hardware enables the tray to be mounted to top- or rear-facing T-track slots.

Easy Wood Tools offers an *Easy Chuck Template Set* (item CT100; \$14.99) that works in conjunction with its Easy Chuck and Easy Jaws. Five die-cut measure-

ment templates display the minimum tenon and mortise sizes for each corresponding jaw size. Simply mark your project with the template, then turn the tenon or mortise for secure chucking.

Pony Jorgensen's ergonomic *Heavy-duty E-Z HOLD Expandable Bar Clamps* come in three lengths: 12", 24" and 36" (\$24.98, \$29.98 and \$34.98, respectively). These models develop up to 600 lb of clamping force, which is double the holding power of the company's Medium-duty E-Z HOLD clamps. They have a bar-to-tip reach of 3⅝" and can be converted to spreaders. A patented feature also enables them to join together for greater opening capacity when needed.

Easy Wood Tools
Easy Chuck Template Set



Rockler Router Fence
Storage Tray



Pony Jorgensen Heavy-duty
E-Z HOLD Expandable Bar Clamps

SIX SIMPLE FINISHES #5

Stain Finish for Open-grained Hardwood

By WJ Staff

Accentuate open-pored woods with pigment stains.

www.woodworkersjournal.com
MORE ON THE WEB

VIDEO For a video demonstrating the technique of applying pigment stain and urethane topcoat, please go to <https://www.rockler.com/6-simple-finishes-recipes>.



If you appreciate the bold grain pattern of hardwoods such as red oak, ash or walnut, you can capitalize on the contrast between their open- and closed-grained areas using oil-based pigment stain. These pigments are generally finely ground earth. When flooded onto open-grained wood, the pigment particles lodge in the pores and are held in place with binder in the stain. The surrounding close-grained areas don't trap the pigments, which produces a dark-and-light stain effect that accentuates the grain's contrast.

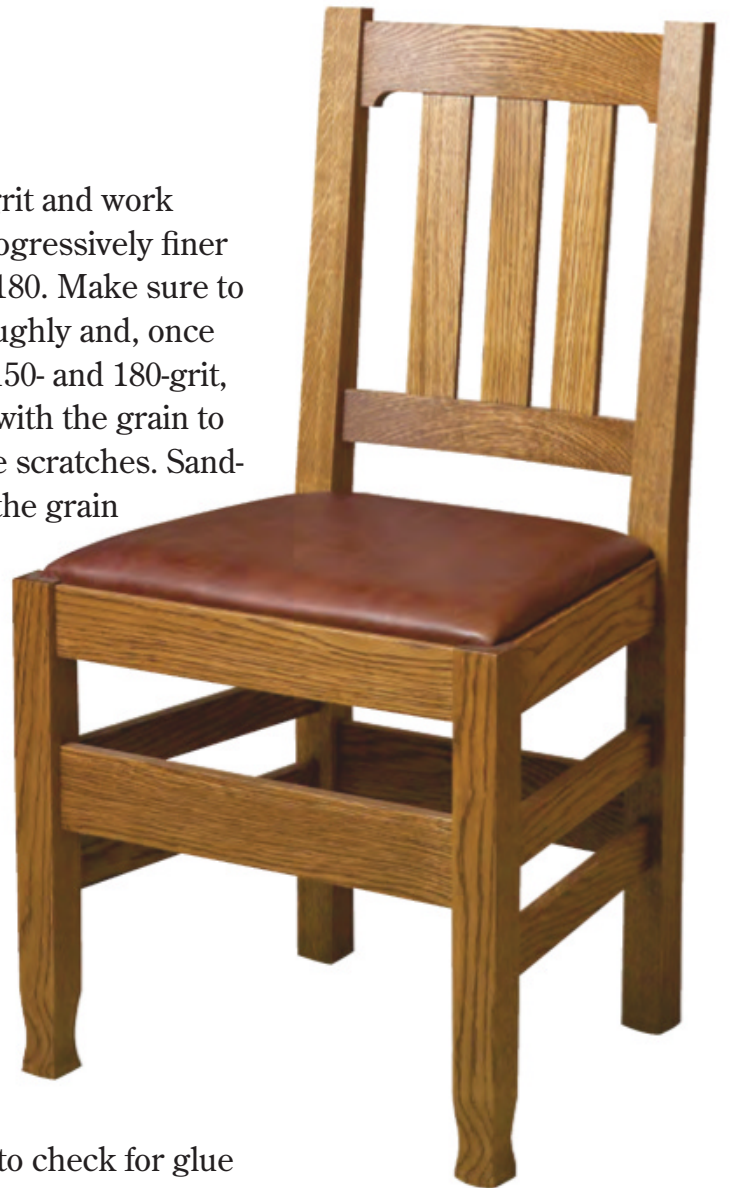
The first step to creating this effect involves carefully sanding the wood. Start with

80- or 100-grit and work through progressively finer grits up to 180. Make sure to sand thoroughly and, once you reach 150- and 180-grit, hand sand with the grain to blend in the scratches. Sanding across the grain can lead to scratches large enough to trap pigment and look unsightly.

Once all surfaces are sanded, flood the wood with mineral spirits to check for glue splotches, dents and other blemishes that should be removed with more sanding. Sand these problem areas with the same grit sequence you used for the initial round of sanding.

Next, mix the pigment stain thoroughly to suspend the color evenly, and apply it liberally to the wood with a clean cloth. Let the stain soak in for a few minutes, and wipe off the excess. Allow the stain to dry overnight; if your workspace is cool or humid, allow even more drying time.

Apply the first seal coat of oil-based urethane with a brush or synthetic scrub pad after the stain has cured



completely. Now is the time to fill any nail holes with wood putty that closely matches the color of the stain and finish results.

Spot-sand the putty to remove any excess, then apply the next coat of urethane. Give the coat 24 hours to cure, then lightly sand with 220- or 320-grit paper if there are any dust nibs that have become trapped in the dried finish. Remove the sanding dust by vacuuming or with a tack cloth. Apply at least one more coat of finish (two is even better). When it fully cures after a week, polish with a coat of paste wax.

Stain Finish for Open-grained Hardwood

Step-by-step instructions:

1. Sand the project up through 220-grit. Don't skip grits. It is a good idea to sand pieces that will be hard to reach before assembly.
2. Wipe the project with mineral spirits to check for glue splotches and blemishes that may appear on the dampened wood. Sand them away.
3. Apply oil-based pigment stain with a clean cloth, allow it to soak into the wood for a few minutes and wipe off the excess.
4. Apply the first coat of polyurethane. When dry, fill nail holes or cracks with wood putty that matches the color. Gently sand it smooth.
5. Apply at least two coats of urethane topcoat. If dust nibs in the finish now make it rough to the touch, lightly sand them off.
6. Optional: After a week, apply paste wax. Let it dry to a haze, and buff the surfaces smooth.

Woodworking Tools & Supplies Index



October 2020

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HARDWORKING WOODS

Ash: *Fraxinus nigra, Fraxinus americana*

By Chris Marshall

Often substituted for oak, ash is easy to work, shock-resistant and affordable. It's also under continued siege.

Since 1884, when the first Louisville Slugger baseball bat was turned out of a piece of white ash, both ballplayers and spectators alike have marveled at the shock resistance of this species. Woodworkers will appreciate ash's easygoing nature in the shop — it machines and fastens well and accepts both stain and dye readily. In fact, the lumber's open-pored structure, prominent flatsawn cathedrals and relative hardness have made it a convincing substitute for oak. Ash is also budget-friendly, with select grade lumber often selling for under \$3 per board foot.

The genus *Fraxinus* consists of 40 or more species of ash around the world with at least 14 types in North America.

Ash lumber is usually sold as white ash (*Fraxinus americana*) or black ash (*Fraxinus nigra*). The white ash group includes white, green and Oregon ash,

while the black ash group includes black and pumpkin ash.

Color-wise, white ash has brown heartwood with creamy to white sapwood. Black ash has darker brown heartwood.

Will it Survive?

As you are probably already aware, North American ash trees have been under widespread siege by the emerald ash borer (EAB) beetle since 2002, where it first began decimating ash forests in Michigan. An invasive species from Asia, the beetle lays its eggs on the bark. Its larvae then bore into the tree's phloem, cambium and xylem layers where they create serpentine tunnels of destruction, effectively girdling the tree and starving it of water and nutrients until it dies.

Advanced signs of infected trees include upper canopy die-off and bark with vertical

splits. When the mature beetles emerge, they leave telltale D-shaped holes behind (see photo, above).

The USDA Forest Service reports that as of 2016, emerald ash borers have been found in at least 24 states, and they continue to spread each year. A certified arborist can provide systemic injections, soil treatments and bark and foliage sprays to protect healthy trees. Studies are currently underway to develop hybridized trees that are EAB resistant. However, the long-range future of this bountiful hardwood and welcomed neighborhood shade tree remains uncertain.



Shop Scorecard

Uses: Baseball bats, tool handles, veneer, cabinets, furniture, flooring, millwork and crates

Hardness: Good overall strength properties relative to weight; excellent shock resistance

Area of Origin: Native range is widely distributed across the U.S. and Canada

Workability: Unseasoned ash dries easily with minimal degrade. Dried ash planes, cuts, routs, drills and fastens well. It's ideal for steam bending.

Finishing: Readily accepts stains, dyes and top-coats. Open-pore structure may require filling.

Cost: Low when compared to other furniture-grade hardwoods; comparable in price to poplar

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