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APRIL 2024 | #277

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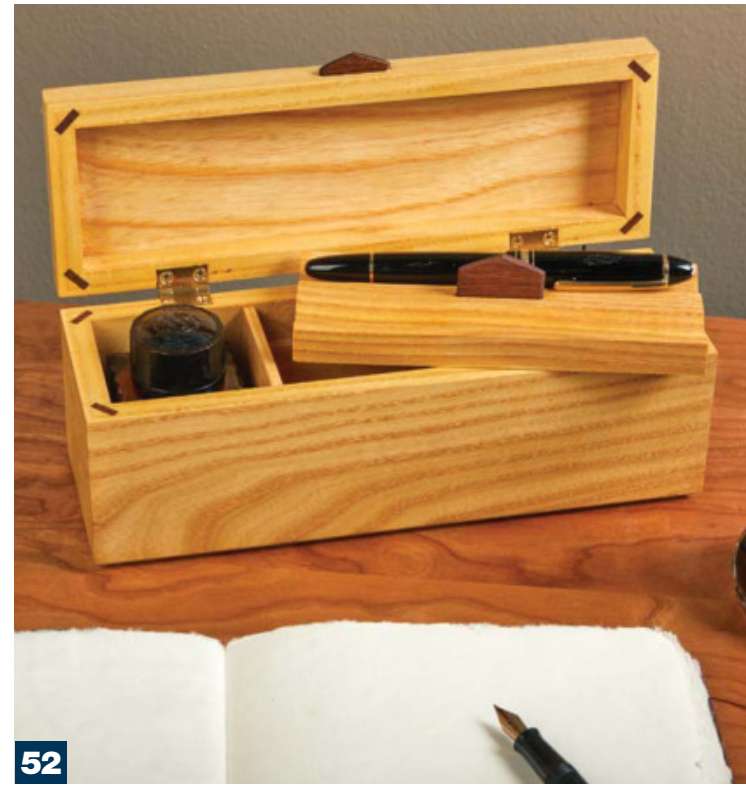

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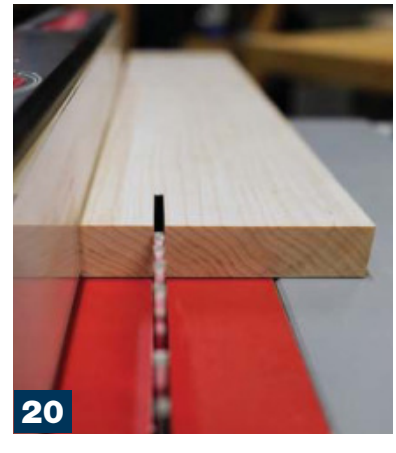
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FROM THE EDITOR

The Patternmaker

By Logan Wittmer

I've long talked about woodworking containing a variety of disciplines such as turning, carving, scroll sawing, etc. In my opinion, there's one type of woodworking that shaped this country (and possibly even the world) — patternmaking. Imagine building something out of wood precisely to an engineered drawing to the thousandth of an inch. I guess that sums up patternmaking in a nutshell — woodworking with metalworking tolerances. Building patterns out of wood so that a foundry could cast parts. This was truly the building blocks of the industrial revolution and beyond.

One of the friends that I've been able to make over the last several years is a patternmaker by the name of Norman. Norman (who also goes by Josh — don't ask, as it's not my story to tell) spent his working career as a patternmaker at *Barber-Greene* (a manufacturer of asphalt machines), running the pattern shop. Over the years, Norman shifted his pattern work to his shop at his home in Sandwich, IL.

I was able to meet Norm when I traveled to his shop to pick up a vintage *Oliver* patternmaker's lathe, as well as a few other items. And yes, once I get the *Oliver* moved into the shop, I'll share some photos of it and show what makes it different than a regular lathe. That's no mean feat however, as this lathe is a massive beast.

Norm, as most patternmakers do, has amazing pieces of equipment that are the same, yet different, than standard woodworking machines (usually, they have some form of odd setting to create tapers or draft angles). Apart from their equipment, what really makes them special is their skill set. Their ability to hold the tolerances that they do and create the shapes necessary for their patterns make them craftsmen beyond compare.

My friend Norman and I in his shop. His shop is full of some of the nicest old iron (woodworking) machines that I've seen. What makes his machines really special is that he actually made his living using them.

This time that I've been able to spend with Norm has been some of my most memorable and enlightening that I can remember. The amount of knowledge that someone like Norm possesses is rivaled only by my own ignorance. Find yourself a Norman. Learn from them, appreciate them, and keep their knowledge (and equipment) going for future generations. Most of them may be retired, but their hands have not lost any of their touch. And to you, Josh — I appreciate you, and our time together. I look forward to our next chance to visit and hang out. Cheers!

ABOUT THE AUTHORS

DOUG STOWE:

Pen Box – *pg. 52*

Doug Stowe started his career in woodworking in 1976. Since then, he's published thirteen books on woodworking, and teaches at various venues across the United States, including the Marc Adams School of Woodworking. Doug has often been referred to as the Master of Boxes, but his work expands far beyond these little beauties he makes. Doug resides in Eureka Springs, Arkansas with his wife Jean and golden-doodle Rosie.

JENNIFER FELTON:

Carving a Pheasant – *pg. 26*

Jennifer Felton is a world-champion bird carver that competes in the Ward World Carving Championship. In the 2023 championship, Jennifer swept the Advanced Division, winning the birds of prey, songbird, and upland bird categories. The pheasant in this issue was the winner of the upland division. With the 2023 wins, Jennifer was promoted to the Masters division for all upcoming competitions. Jennifer and her husband reside in Northern Iowa. You can see more of Jennifer's work at JenniferFeltonArt.com.

PHOTOS PROVIDED BY THE AUTHORS

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NEW TOOLS

Double Dowel Tenon Cutter

During *AWFS* in Las Vegas this last year, I ran across an interesting little company producing and selling a tool called the *Double Dowel Tenon Cutter*. In short, it's a router table fixture that cuts a pair of twin dowels on the end of a workpiece. You can see that in the lower right photo. Like many new tools, it's something that you need to put your hands on to appreciate how it works, but I'll do my best in photos.

The Twin Dowel Tenon Cutter has a baseplate that clamps to your router table and a turntable fixture that holds the workpiece. Using specific setup steps (they're simple enough to dial in), you turn the router on, slide in the workpiece holder, and spin the turntable with attached workpiece. After the first pass, you flip up a stop and feed the workpiece further into the bit before repeating the rotation.

The second half of the puzzle is drilling matching mortises at the drill press. The Double Dowel Tenon Cutter includes a flip stop for use here as well. After positioning the first hole, you flip the stop up to drill the matching hole that's perfectly spaced for the dowels.

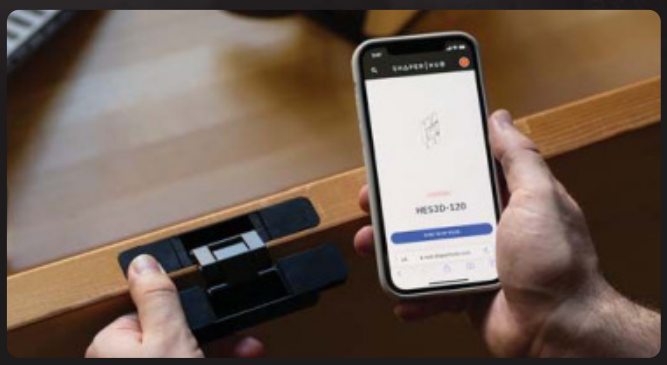
So—why use this rather than other joinery techniques? Well, first, it's fast. I think the only way to do integrated tenons that touches the speed of this is the *Pantorouter*. The Double Dowel Tenon Cutter is more affordable, and you probably already have a router table and drill press. Second, it's strong. Without any fasteners such as loose tenons, dowels, or screws, you're getting a joint as strong as a traditional mortise and tenon.—*Logan Wittmer*

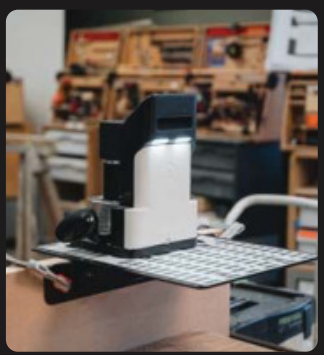
DOUBLE DOWEL
Double Dowel Tenon Cutter
DoubleDowel.com
Price: $600

PHOTOS BY THE AUTHORS

SHAPER

PRECISION CUTTING SIMPLIFIED





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NEW TOOLS

Harvey Big Eye Rip Fence System

BIG EYE RIP FENCE
Harvey Woodworking
HarveyWoodworking.com
Price: $,1249.99+

There are times when there is a product released that I think really met the mark. One of those is the *Harvey* Big Eye Rip Fence. For years, there hasn't been a quality aftermarket fence available. Now, I think there is, as the Big Eye will become the new standard.

The Big Eye fence uses front and back rails to completely remove slop out of the fence. This is done via a lock on both ends of the fence. Ball bearings ride on the front track (they can be fine-tuned for an effortless glide) while the tail of the fence has a dovetailed guide. The locking handle pushes forward, into the fence so there's no handle hanging down to run into. An extruded aluminum European-style "High-Low" fence can be swapped back and forth if needed (the fence scales adjust for fence orientation as well). One of the genius features can be seen at right—a fine-adjustment wheel. Simply unlock the fence, and roll the wheel to micro-tune the fence position before locking it down. Well done *Harvey*, well done. —*Logan Wittmer*

WGM Toolworks Cutter

WGM TOOLWORKS
WGM
WGM-Toolworks.com
Price: $340 (varies)

In the last issue, you may have seen a photo of my helical cutter head for the large, vintage jointer that I'm restoring. On the hunt for more economical helical heads for "standard" sized machines, I came across a company selling quality heads at a very reasonable price—WGM toolworked.

Deciding to try out the WGM head, I ordered one in for our smaller Delta jointer here in the shop (a DJ-20 to be exact). The head appears to be machined well. The 8" head has 4 rows of cutters in a helical pattern. The head also comes with several extra cutters and driver bits.

Installing the head on the DJ-20 was quick — maybe 2 hours (including swapping bearings) and fine-tuning the beds. The cutter itself performs as well as any other helical cutter head that I've used. It's quiet, and leaves a glassy smooth finish (even on the figured maple I used in the saw till article, later this issue). I'm not exactly sure how WGM is manufacturing heads of this quality with this price point (about 30% cheaper than their competitors), but I believe if you're looking to replace a current head with a helical one, WGM deserves the first look. Note: WGM offers heads for many brands, but may not have all makes and models. Check their website. —*Logan Wittmer*

PHOTOS BY THE AUTHORS

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XTool P2 Laser

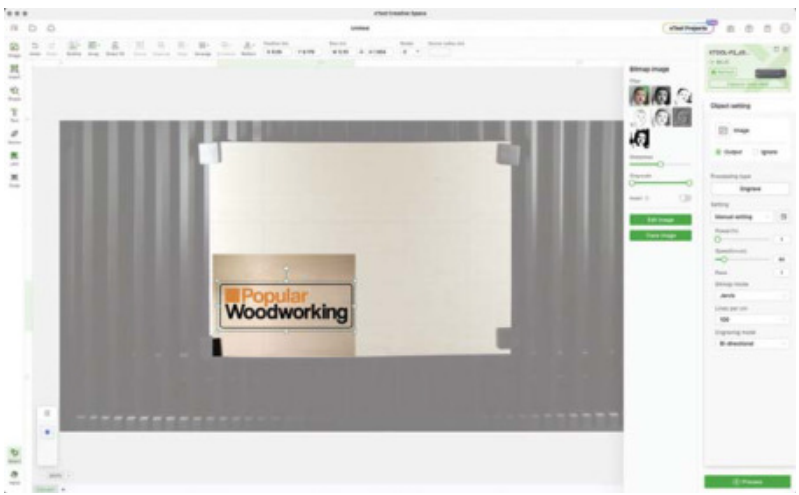
XTOOL P2 LASER
xTool
xTool.com
Price: $4999

If you spend any amount of time flipping through woodworking content online or on *YouTube*, you've probably been introduced to lasers, and maybe even the *xTool* P2. The P2 is a laser that's just a bit larger and more powerful than other in its class.

The P2 is a 55w laser, which means it can cut through a lot of different material that you use in the shop—plywood, hardwood, acrylic, etc. Dual cameras within the laser give you a real-time view on what's inside. This makes lining up cuts easy—you can stretch your material further by nesting parts together. Another great feature is the auto focus. By selecting the material within the software, the laser will automatically read the thickness and set the focus.

All of that is pretty great, but what makes the P2 stand out in my mind are the accessories that you can get for it. In the photo here, we have the riser base installed—allowing taller material to be fit inside the laser. Additionally, there are options for items such as pass-through rollers (for engraving or cutting long parts), rotary chucks for holding stuff such as mugs or cups, and rollers for working with round material.

Personally, I was pretty skeptical of a laser when they first came on the scene. They were a neat, one trick pony. However, as the lasers have gotten better (and more accessories have been added), I think that the possibilities and applications in the shop have increased. Let's not forget to mention the ability to add a side hustle and generate a bit of extra income. And in my mind, the *xTool* P2 is leading the pack in this category of lasers. Keep an eye out for more content coming on the P2 down the road. —*Danielle Lowery*



TOP: The xTool P2 is a medium-sized laser, big enough to be useful in the shop, but small enough to still fit on a cart.

MIDDLE: xTool Creative Space is an easy-to-use interface for those not experienced with lasers.

BOTTOM RIGHT: Cutting, engraving, and scoring can all be done within the xTool P2.

PHOTOS BY THE AUTHORS

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The ultimate bit for creating tearout-free cabinet parts from thin veneer plywood.

Solid carbide, 1/4" shank, 1/2" diameter.

US2512UC ~~Reg $118.74~~ | **SALE $99.99 +FREE Shipping***

SOLID CARBIDE FLUSH TRIM COMPRESSION

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Available in 1/2" shank, 1-1/2" or 2" cut length.

US5202FTC ~~Reg $148.75~~ | **SALE $119.99 +FREE Shipping***

SOLID CARBIDE SPIRAL

One of the most commonly used router bits. 1/4" diameter and 1" length of cut is perfect for mortising.

Available in other diameters and lengths.

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For the first time in a generation, woodworkers have a new and better choice for their table saws. Introducing Ultra·Shear Saw Blades, meticulously crafted American-made saw blades engineered and built for professional woodworkers.

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Available in either full (.125") or thin (.094") kerf.

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Our new 10" Glue Line Rip Blades produce glass smooth rip cuts in hardwoods and softwoods of any thickness. When invisible glue lines are the goal, this is the blade.

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NEW TOOLS

BOOM ARM
Mullet Tools
MulletTools.com
Price: $149.99

Mullet Tools Boom Arm

Collecting dust at the source is the most surefire way to keep it from spreading around the shop (and getting into your lungs). Not every tool has a dust collection port though, and even tools with integrated dust collection can struggle. Enter the *Mullet Tools* Boom Arm. Designed to mount into existing dust collection systems, the boom arm can be easily positioned to collect dust where it would otherwise escape. No more having to duct tape the vacuum hose to your worktable.

Like their High-Speed Cyclone, the *Mullet Boom Arm* is incredibly well-made and feels built to last a lifetime. I had no trouble getting the arm positioned where I liked, and the large knobs made it easy to lock into place. Whatever you're mounting the arm to needs adequate weight to prevent tipping though. As expected, the boom arm works best at collecting larger particles; the closer you get the better it works with the fine stuff. — *Collin Knoff*

Leather By Dragonfly Shoulder Pads

Over a year ago, I received my *Leather By Dragonfly* apron. It's been one of the best additions to my shop and my woodworking time. I've stayed in touch with the owners, Patrick and Michelle over the last year. In fact, during the *Handworks Woodworking Show* (hosted here in central Iowa), I got to spend time with them in their booth, helping answer questions about the aprons, which was a blast.

While I was hanging out in their booth, I noticed a pair of shoulder pads on one of their displays. I had not considered adding shoulder pads to my apron, as it was ultra comfortable as it was. However, after trying them on, I knew I needed to get a set. I think I had the order placed before Patrick and Michelle got back to Ohio.

The pads I ordered were the wool lined ones — you can see them on my apron below (and in photos later in this issue). The wool is great, especially rolling through the winter season. It makes the apron straps soft, and lifts the apron up a bit — it feels like it rides even nicer than it did before (which I didn't think was possible). The shoulder pads are available with the wool lining, or as flat leather. Wearing the wool pads on my apron, I've requested to be addressed as "Lord Commander" (*Game of Throne* fans will understand). Nobody's indulged me yet.
—*Logan Wittmer*

LEATHER BY DRAGONFLY SHOULDER PADS
LeatherbyDragonfly.com
Price: $85+

PHOTOS BY THE AUTHORS

NEW TOOLS

Bosch Smart Jig Saw

Smart tools: Love them or hate them, you're going to keep seeing more and more of them going forward. The new GST18V-60BCN from *Bosch* is a good tool with a good app, which is hopefully the template we'll see going forward for this category. There are a lot of thoughtful details packed into the design; switches on both sides for ambidextrous use, adjustable blade guide/channel to minimize blade deflection, and adaptive speed-control, which dials down the strokes per minute (SPM) to provide extra control.

One thing I noticed right away setting up the saw — there's no bevel adjustment for the blade as the saw is fixed at a 90° angle. This definitely limits the types of cuts you can make, though I almost never change the angle when using a jig saw. With that being said, this saw cuts very well. The cuts were smoother and faster than the non-smart barrel grip saw I was testing at the same time. How much that has to do with the smart sensors versus fewer adjustable parts I can't say, but it's probably a combination of the two.

The app itself works well without any bugs that I found. There's data like battery life, and the ability to change the number of speeds available as well as the SPM for each speed. You can also fine-tune the aforementioned adaptive speed control exactly to your liking. These features are targeted more towards the trades, where you could be cutting OSB one minute and PVC the next, though the hobbyist certainly can find some value in them — *Collin Knoff*

CONNECTED JIG SAW
Bosch
BoschTools.com
Price: $209 (bare tool)

Blue Spruce Optima Chisel Plane

It goes without saying that a chisel is a staple in almost any shop. However, there are some operations where you really need a hybrid — something between a chisel and a plane. Enter, the chisel plane. Many manufacturers have produced these goofy planes throughout the years, but I think that the new Optima Chisel Plane from *Blue Spruce* is a cut above the rest.

There are a few points that make the *Blue Spruce* plane different than the rest. First — the little wood pad (either maple or cocobolo) is perfectly placed and shaped. It fits in your hand nicely, and you can apply downward and forward pressure without issue (this is one of my biggest issues with another brand's chisel plane, which I will not name even though it's not made anymore).

The second reason this plane works so well is exactly what made the Optima line so good. As with the chisels, the back of the chisel plane is ground, lapped, and polished to a ridiculous degree. This means that the back is flat, the edge is sharp, and you need to do nothing to this tool other than put it to use. I also appreciate that everything's one piece; there are no moving parts like on a plane. It's amazing the amount of uses you'll find for this little tool in your shop — from planing plugs flush, to cleaning up dried glue, to doing some light-duty bull-nose work. — *Logan Wittmer*

OPTIMA CHISEL PLANE
Blue Spruce Toolworks
BlueSpruceToolworks.com
Price: $119.99

PHOTOS BY THE AUTHORS

WORKSHOP TIPS

Low-Tech Alignment Tool

This simple jig enables you to quickly and accurately align your saw's blade with a miter slot. Perfect alignment helps prevent kickback and burned cuts. You can also use a jig to align your fence with a miter slot.

First, make a 12" long runner that fits snug in the slot. Position a block of wood on the runner 1/2" away from the blade and glue or fasten the block to the runner. Screw a round-head brass screw into the end of the block facing the blade.

To check your blade, unplug the saw and color one tooth with a marker. Rotate the blade so this tooth sits just above the front of the throat plate. Back out the screw until it just touches the tooth. Rotate the blade so the marked tooth sits at the back of the throat plate and check the distance between the screw and the tooth. If the screw just touches the blade, the alignment is correct. If not, you'll need to loosen and adjust the saw's top or trunnions. — *Jeff Fagan*

Make a Gauze Block

When you apply a wipe-on finish with a regular cotton cloth it can leave little bits of fuzz in the finish. To prevent this, take an old pair of nylon panty hose and roll them up into a ball. The nylon holds lots of finish and applies it without leaving any lint behind. It really works great! — *John M. Harrington*

Glove Saver

After brushing the first coat of finish on my shelf project, quite a bit remained in the disposable cup. I didn't want to pour it back because that would contaminate the fresh finish that remained in the can. But I didn't want to waste the finish by throwing it away either. Knowing the shelves were going to need a second coat the next day and because I was using a disposable brush, I decided on a third option. I simply stretched a latex glove over the brush and around the top of the cup. This option not only saved both the finish and the brush; I was ready to put on the next coat with a minimum of fuss. — *Ray Lanham*

PHOTOS BY THE OTHER UNLESS OTHERWISE STATED

Renew a Stripped Screw Hole

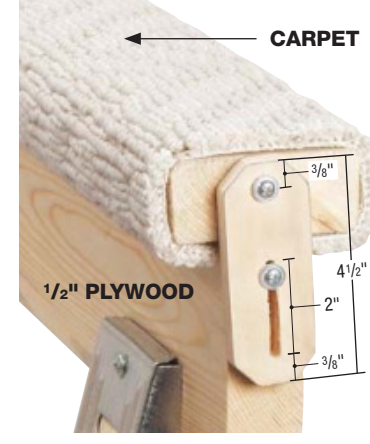
Simply fill the hole with epoxy. When it has cured, predrill for the screws and reinstall the hinge. You can also let the epoxy cure with screws in place for a permanent attachment. If you want to make the screw removable, apply a coating of oil to the threads before pushing the screw into the wet epoxy.

TIP: On a vertical surface, it's nice to have an epoxy that won't run. Gel epoxy is the perfect choice. It has a consistency similar to that of petroleum jelly. You can even make your own gel epoxy by adding a thickener.

PHOTO BY PATRICK HUNTER

Flip-Top Sawhorses

I got tired of rummaging around for a blanket or anything soft to lay my finished projects on, so I rigged up these simple carpet caps that fit on top of my sawhorses. They just fit out of the way when I'm back to rough work. — *James Blandford*



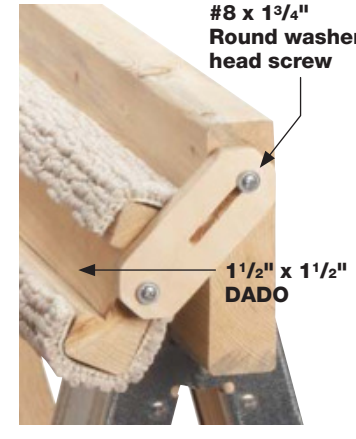


PHOTO BY RAMON MORENO

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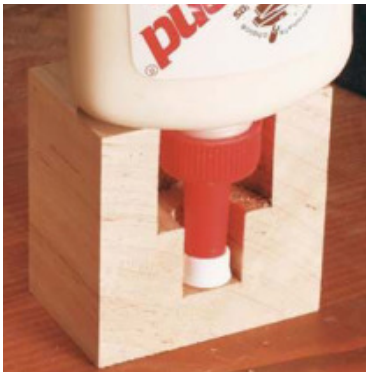
WORKSHOP TIPS

Eliminate Clogged Caps

Is your glue bottle half empty or half full? Either way, you're sure to become an optimist after trying this glue-bottle storage block. By storing the bottle upside down, you eliminate the half-dried glue that's forever plugging up the nozzle. Plus, there's no more waiting for the glue to run down the sides and into the tip.

Here's what to do: Take a block of wood about 3" x 3" and drill a $1\frac{1}{4}$" diameter hole for the cap of the bottle followed by a $\frac{5}{8}$" diameter hole for the neck. Make the hole just deep enough to hold the cap onto the upside down glue bottle. Store the bottle in the block and your glue is ready to run right when you need it. And because there's no air in the cap, there's never any crusty buildup to clean out. — *Bruce Kieffer*



Reinforced Sandpaper

While refinishing some old chairs, I discovered an easier way to sand the turned legs. I'd been using plain strips of sandpaper, but they tore and wore out quickly. I reinforced the sandpaper strips with a few layers of masking tape which made them last longer. I saved money too because this do-it-yourself taped sandpaper costs half as much as cloth-backed abrasives. — *David Healey*

PHOTOS BY THE OTHER UNLESS OTHERWISE STATED

Grit-Free Benchtop Weights

I keep a few landscape pavers handy in my workshop to use as hold-downs when clamping instead of using weights, which I find inconvenient. The only problem is that they leave grit behind with every use and grit and woodworking don't mix.

I solved this gritty problem by encasing my pavers in rubberized plastic, the same stuff you dip tool handles in.

To knock off all the loose grit and round the sharp corners, I rubbed the pavers together. Then I dipped them into a shop-made box containing a $\frac{1}{4}$" deep layer of rubberized plastic. After the plastic dried, I dipped the pavers' other sides. I sealed four pavers with one bottle of rubberized plastic; a 14.5 oz bottle cost around $10 at our local home center. — *Gary Wentz*

PHOTO BY PATRICK HUNTER

Marking Dark Wood

I often use dark, exotic woods for turning pens. It's difficult to see center marks on these species, so I paint the ends of my pen blanks with liquid paper. After it dries in a few seconds, I can easily mark the center with a pencil.
— *John Woods*

Biscuit Gauge

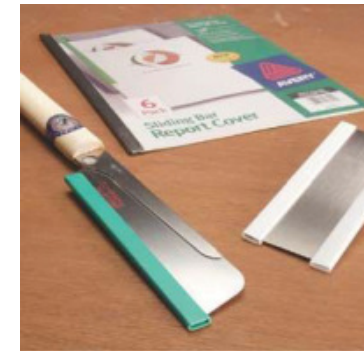
I use my biscuit joiner all the time to quickly make strong joints. With narrow boards like face frames, I used to spend a lot of time figuring out which biscuit size to use so the slots wouldn't be too wide and show. To avoid all that recalculation, I made a permanent reference block.

I cut slots for No. 0, No. 10, and No. 20 biscuits in a block of wood and recorded all the information I need: the slots' exact widths, depths, and centerlines. When locating slots for mitering, I insert a biscuit and note its curvature. This way I avoid cutting slots too close to the miter's tip. I drilled a 1/2" hole through the block to hang it over my bench, but I often keep this handy tool in my apron pocket. — *Serve Duclos*

PHOTO BY VERN JOHNSON

Sharp Edge Protection

To protect the sharp edges of my scrapers and fine handsaws, I use the spine from a plastic page protector. They're available at office supply stores. They are easily cut to length with a utility knife. — *Randy Lee*



Small Tool Cases

Old glasses cases are great for protecting, containing, and organizing small tools, scrapers, and plane irons. I label the outside so I can see at a glance what's inside each case.
— *John Rustan*

COMMUNITY

Wendell Castle School

When it comes to modern day furniture designers, few were as influential as Wendell Castle. Wendell's designs have influenced and shifted the perception of furniture and art as we know it. When recently talking to one of our contributing editors, Scott Grove, he mentioned that Wendell's shop is being turned into a woodworking school. The official press release is as follows:

"The Wendell Castle Project, a nonprofit organization dedicated to supporting the artist's legacy through education, conservation, and programming, is launching a school in Castle's longtime studio. Focused on the intersection of creativity, design, and technique, the Wendell Castle Workshop invites woodworking enthusiasts, emerging and established artists, designers, and makers to learn, collaborate, and innovate in a supportive and stimulating environment. Located in the studio where the world-renowned artist created his art furniture for over five decades, the WCW is a creative hub where students come together to follow in Castle's footsteps—using his tools and machines—by taking classes with instructors who studied under, worked for, collaborated with, or were inspired by Castle. Classes in furniture design, woodworking techniques, and more are offered in a creative atmosphere like no other.

"We selected our instructors and course content very carefully, and with access to many of Wendell's pieces, students and instructors will be inspired to do their best work in his space. We look forward to providing an outstanding environment and instruction for our students", said Ken Page, interim director, Wendell Castle Workshop.

The WCW focuses on practical education, design, and artistic expression, welcoming students of all skill levels, from those looking to learn new techniques to experienced makers seeking new challenges. The weekend, week-long, or two-week classes are project-based, technique-based, or both. Registration is open now for classes beginning in April 2024."

WENDELL CASTLE SCHOOL
Interim Director: Ken Page
Email: ken.page@wendallcastle.org
WendellCastleWorkshop.org

ABOVE: *Wendell in his shop working.*
RIGHT: *Black Cherry Chair*

PHOTO PROVIDED BY WCW

Woodworking Basics

Common Cuts

By Collin Knoff

A bevel is a bevel… except when it's a miter, unless it's a chamfer. Confused yet? You're not alone.

PHOTOS BY COLLIN KNOFF, ILLUSTRATIONS BY DANIELLE LOWERY

To the uninitiated, woodworking can be a tough nut to crack. Even the most basic of projects assume a certain level of prior knowledge.

In order to create any of the projects in this magazine, you need to be able to follow the instructions and understand the intent of the author. And while for many readers that's second nature, everyone's a beginner at one point in time. A simple instruction like "joint the face and edge, then rip to 6" wide" is effectively a foreign language to someone who isn't familiar with what that means.

So we're introducing a new series that's going to go back to basics, teaching common terminology and basic techniques that are the building blocks for a lifetime of woodworking. In this inaugural article, we're going to tackle the anatomy of a board, and the types of common cuts you'll be making.

BOARD BASICS:

Face, edge, end grain,** and **grain direction

First, we're going to look at the orientation and layout of the wood itself. Every other pieces of knowledge going forward will be built on these principals. The photo above highlights the key elements to know when looking at a piece of lumber.

Grain Pattern

For the intent of this article we're only going to focus on two directions of grain pattern — long grain and end grain. A tree grows in two directions — up and out. The upwards growth is characterized by long strands in a (mostly) uniform direction, called long grain wood. Looking at the long grain shows you the grain direction, which is what dictates the the rest of the cuts discussed in this article. In photo one, the grain direction is horizontal, or side to side

The outward growth of a tree is demonstrated by growth rings, visible as a cross section of the long grain. This is commonly called end grain. End grain sometimes referred to as cross grain.

Face, Edge, and End

The core terms to understand here from an instruction standpoint are face, edge, and end. To generalize, the face of the board is the largest flat surface with a horizontal grain pattern. The edge of the board is the smaller surface with a horizontal grain pattern. And the end of the board is the only surface with cross or end grain pattern.

In practice, there's no real difference in the woodworking properties of face grain and edge grain. The term is used simply to make clear which surface you are supposed to be working on. However, end grain has unique properties we will cover in a future article.

Board Feet

While we're discussing the various parts of each board and where to find them, it's as good of time as

any to discuss board feet. (Feet as in measurement, not the things you stand on.) While it's not used often in the magazine, board feet is the unit of measurement the lumber yard uses when selling wood. The measurement refers to the overall volume of the board, not any one dimensions that would be specifically useful when shopping for a project.

CUTTING BASICS:
Crosscut, rip, and kerf

The two main types of cuts you'll need to know for following most instructions are crosscut and rip.

A crosscut is (as the name implies) a cut that is made across the grain of the wood, creating a new end grain surface. A rip cut is one that goes with the grain of the wood, creating a new face or edge of the board.

1 Here you can clearly see the grain direction of this long grain segment.

2 End grain is where you can see visible growth rings and open fibers.

Be Prepared at the Lumberyard

Take a tape measure and calculator with you on trips to the lumberyard and easily determine how much your selected boards will cost. Rough-sawn boards come in random widths and lengths; therefore no two are alike. Each are measured by *volume*, which can be calculated by using a simple formula.

The standard unit, a board food (bd. ft.), measure 12" x 12" x 1" thick or 144 cubic inches. Because bd. ft. is a measure of volume, *any* combination of thickness (minimum 1"), width, and length that equals 144 cubic inches also equal some board foot. Rough lumber is sold based on its cost per board foot.

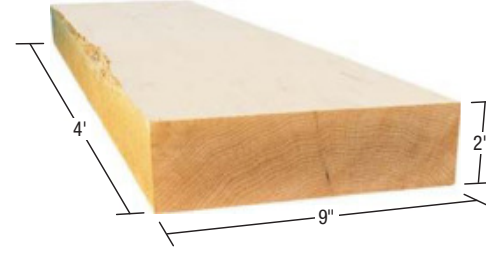
Some species are more pricey than others and thicker boards cost more per board foot than thin ones.

To determine cost, multiply the total number of board foot in the boards you have selected by the board foot price. See an example below.

BOARD-FOOT FORMULA:

Width (in inches) x **Length** (in feet) x **Thickness** (in inches) ÷ **12** = **Board Feet**

9" x 4' x 2" ÷ 12" = 6 bd. ft.
Cost at **$7/bd. ft. = $42**



To put it more plainly, if you've making a board shorter, it's a crosscut. If you're making a board narrower, it's a rip cut.

Now it might stand to reason that if you have a 6" wide board and you make a rip cut down the middle, you'll end up with two 3" boards, right? Well not quite.

Any time you cut a board using a saw, you're going to have kerf. The kerf is simply the material removed by the saw teeth during the cutting process. Certain saws, like a bandsaw for example, leave a thin kerf that removes minimal material. Others, like a table saw blade, can remove a full 1/8" of material or more. So if you used a table saw in our earlier scenario, you'd actually end up with two boards that were 2 15/16" wide.

ANGLED CUTS:

Square vs. bevel, miter vs. chamfer, and chamfer vs. taper

Okay now we're getting into the weeds a bit. There are official names for different types of crosscuts you can make at different angles. The terminology is not always used uniformly though, especially if the cut is being made for joinery purposes instead of aesthetic. I will do my best though.

If an angle isn't specified for a cut in the instructions you can safely assume the cut should be made at a 90° angle to the work surface. Two board surfaces that are 90° to each other are referred to as square. Square can also be

3 The kerf of this table saw blade is clearly visible here.

4 A crosscut goes across the grain of the wood.

5 A rip cut goes in the same direction as the grain.

used as a verb to dictate a 90° cut being made to prepare stock.

A miter cut is simply any cut made across the grain at an angle that is not 90°. More specifically it's a cut made across the face of a board at an angle that is not 90° to the edge surface of the board.

A bevel is a cut that is made across that grain on the edge of a board that is not at a 90° angle to the face.

Now you would think that a miter joint is when two miter cuts are butted together, and you'd be correct. But what about when you make a joint between bevel cuts, wouldn't that be called a bevel joint? You'd be sadly mistaken my friend. That is also called a miter joint. In fact, a miter joint between two bevel cuts is far more common that a miter joint between two miter cuts.

To top this all off, it is standard practice to call the type of cut used in a miter joint a miter, regardless of the orientation of the cut. This is why we include diagrams and images in our articles, to give you the proper context of the correct cut to make.

While your head is still spinning, I have a few more angled cuts to throw your way.

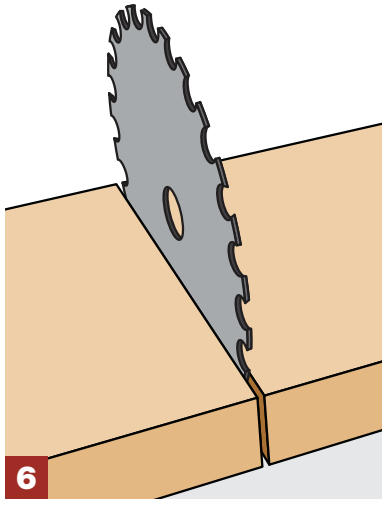
Compound Miter. If you're making a cut that is both at an angle to the edge and to the face of a board (a cut that is mitered and beveled) that's called a compound miter.

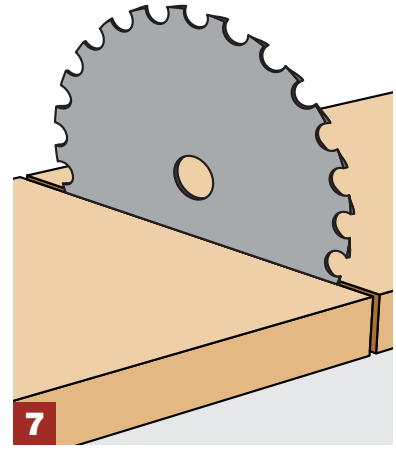
Chamfer. A chamfer is a cut made for aesthetic purposes along the edge or end of a board at an angle that is not 90°. Think tabletops or ornamental tops of bookshelves and you'll get the idea. Unlike a bevel cut, and chamfer generally leaves a portion of the original edge or end, instead of coming to a point.

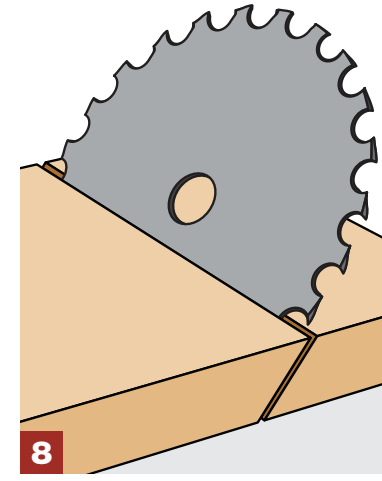
Taper. As a rule of thumb, miter cuts are measured from the edge of board, leaving parallel edges and ends that are at different angles. On a taper, the opposite is true; the ends of the board are parallel while the edges are angled to each other. Since the cut is more with the grain instead of against it, it's considered a rip cut.

Looking Ahead

If you're going to build a house, you need a strong foundation. The same goes for building a new hobby. Keep an eye open for us adding to this groundwork in future articles, covering everything from processing lumber to basic case construction. **PW** — *Collin Knoff*







6 A standard, square cut.

7 Miter cuts are made at angle

8 Bevel cuts are made at angle to the face of a board

9 A chamfer is usually used for aesthetic purposes, or to soften a corner.

10 Here's a taper being ripped on the table saw for a table leg.

Carving a Pheasant

Get inspired to give bird carving a try by learning about the sculptural process.

By Jennifer Felton

PROJECT #2404
Skill Level: Advanced
Time: 3-6 mos.
Cost: $250

I love to be outside no matter the weather conditions. I am rarely without binoculars and always have an eye to the sky. When I catch a glimpse of something wild and wonderful, I'm often amazed I was in the right place at the right moment. When I was recently asked why I carve birds — "why birds?" Honestly, the answer is endless. At the heart of it is a connection to nature. Birds kick my curiosity into overdrive — bird calls, plumage colors, feather shapes, amusing behavior, mechanics of flight, migration patterns — and it all invites me to learn more. The concept of using a rigid material like wood to create a

visually soft, lofty bird carving—recreating and sharing a moment in time—challenges and drives me.

How & Why I Carve

I only carve with tupelo and I wouldn't trade it for the world. It has five significant properties that make it ideal for carving. It's strength makes it robust enough to carve ultra-thin and not break. It's softness makes it easy to work with. It is primarily grainless making bits and burning pens react uniformly. It's light in weight making unique compositions possible. And, it holds a sharp edge making it possible to achieve extreme, non-fuzz detail unlike basswood.

There are significant similarities between carving and building a cabinet, table, or bookcase. Patterns, rough cuts, dowel joints, assembly, and adding stand out details to name a few. The difference between the two are how the individual maker interprets what they see when observing or studying reference to inform decisions and guide direction. For example, judging readiness to move on to the next stage in the process (Have I rounded the body enough?), evaluating symmetry accuracy (Is my centerline true and straight over all plains and curves?), visually comparing one element to the next (Is the eye channel below the ear tuft?), and observing reference material for direction (Is my feather flow accurate?).

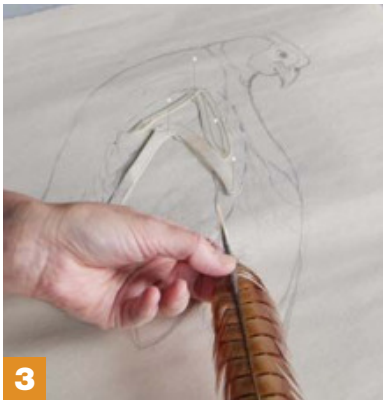
While I'm not able to provide every how-to detail of this pheasant carving in these pages, I carved the head and tail separately so you could choose to carve only a bust or a tail feather if desired. My hope is that you enjoy learning more about the process and are inspired to carve a bird whether that is a pheasant or not. What I cover in this article applies to any bird you wish to carve. Give it a try!

1 Gather as may visual references as possible at the onset. If you wonder how something is shaped or flow into another section of the bird, look at your reference first. The better you know the bird you are carving, the better the end result. I provided the patterns for this project, but if you are carving a different bird, create a composition, your patterns, and a carving plan as your first step.

Reference, Study, and Composition

Start by gathering visual references. You can never have enough. Take your own images, research images and videos on the Internet, locate a study skin, frozen bird, mounted bird, or observe at a zoo or aviary—whichever is

PHOTOS BY JENNIFER FELTON & LOGAN WITTMER



2 Before starting, I draw the composition to plan out the carving. This further helps me to determine the personality I would like the final carved pheasant to embody.

3 Understanding anatomy is key!

4 Enlarge the patterns to the scale you want to pursue (full, half, or 1/3 are common).

accessible to you. This bird isn't a protected species so reference is much easier to come by, however, if you decide to carve a different bird, please be aware of possession laws. It's important that you gather enough to know the bird — meaning you can see all the details from all angles, and you understand how it stands, moves, and behaves. Post your reference where you can view it often and easily. I have a metal wall above by my carving workbench with magnets where I post my top 20-25 images. I also used a study skin, two mounted pheasants, and plenty of tail feathers.

Study your references to determine a composition you find pleasing. Make decisions such as how to position the tail, head, and feet. Each of these considerations adds character and adds interest to the composition. For the pheasant I wanted to portray him in spring plumage, looking over his shoulder with the tip of his tail bent by the wind and a mean facial expression like he is going to fight over a hen.

Pattern Making and Roughing Out

There are many places to purchase patterns. I have always made my own. If you are going to create your own pattern for a different bird, knowing bird anatomy is essential. For instance, I went as far as studying the skeleton and recreating a paper version for wing and leg accuracy. (See photo 3.)

At the end of my pattern making process, I ended up with a top and profile pattern for each of the three segments of the bird: head, body, and tail. I'll use them during two stages of the project: for cutting out the rough shape on the bandsaw, and later, for determining details like the position

5

6

5 Transfer each to tracing paper. Then trace the rough shape outlines of the head, body, and tail on your wood blocks.

6-8 Begin to cut out the rough shapes on the bandsaw starting with the profile following by the top.

7

8

of feather groupings.

I transfer the profile pattern of each segment to each block of wood I have selected, making sure the grain runs with the length of the pattern. Cut out the profile pattern of each and establish a centerline. This line should never be lost from this point on. As you progress to rounding, carving feather groups, and carving texture, be careful to keep a portion of this line so it can be drawn back.

Trace the top view pattern being careful to hold the pattern straight and not along the profile curvature or the dimensions will become skewed. Note: The slit in the top pattern allows you to align the pattern centerline with the wood centerline.

Cut out the body on the bandsaw. Use the discarded side pieces to stabilize the bottom of the piece when you start to cut the top view.

Rounding and Shaping the Body

With the centerline clearly visible, the quickest way to round off the square edges is to use a 4" DeWalt grinder with a 40- grit flap disc. This is an aggressive disc removing wood very quickly, be careful not to remove too much. A contour gauge can be helpful to make sure each side has the same curvature. (See photo 12.) You don't want to remove too much from the neck area until you're ready to fit the head. The same would be true for the tail to body union. When you have a good round shape with equal sides, transition to the Foredom with a 50- or 80-grit sanding drum to fine tune the shape. (See photo 13.)

9

9 Use a 4" grinder with a 40-grit flap disc to begin to round the edges of the body.

10-11 Continue to use the grinder to rough in the round shape. At this stage there is a quite bit of wood to remove and the grinder makes quick work of this.

12 A contour gauge is helpful to check symmetry.

13 Further refine the shape with the Foredom tool with a 50- or 80-grit sanding drum.

Tip: I'll use approximately two dozen foam-centered, double-sided fingernail files (80-grit on one side and 100-grit on the other side) purchased in bulk from a beauty supply store to do quite a bit of hand profiling. Light gray is best because it doesn't leave a color residue. I have found I can cut these to any shape or size to reach an area or get a desired result. I have more control when removing a minute amount over the power tools. I won't be mentioning each time I use them throughout the article, but you'll notice them in the background of a lot of the images.

Cutting Out and Preparing the Head

Now switch focus to the head and cut out the profile and top patterns just as you did the body making sure to work from and preserve the centerline. Use the Foredom with sanding drums to refine the exact pattern lines. The neck is wider than the top of the head. Be sure to work around the ear tufts. Spend some time here to be exact and symmetrical.

Next, create two head detail patterns on tracing paper that are the mirror opposites of each other. You can tape them to a window to identically trace them easily. Turn both patterns over, and using a soft pencil, trace the lines that you can see through the tracing paper. Be exact here and use a sharpened pencil. You're creating a transfer paper of sorts so you can transfer the pattern to the wood with a ballpoint pen or stylus when pressing on the non-pencil side of the pattern.

Once both are identically traced with pencil, turn them back over and use small pieces of tape to adhere each side of the face to the head (non-pencil side out). Alignment and measure are key here. I find it easier to start the alignment at the front of the beak on the centerline and shift each pattern up or down. That way I have one point to pivot from that is common. If you find any discrepancies, adjust one side or the other. Once the patterns are equally placed, use a ballpoint pen or stylus to trace the lines. (See photo 14.) Remove the patterns to reveal the transferred pencil lines. Using the soft pencil go over the lines to make them more visible. Double check the alignment of the lines by measuring from the centerlines again. If these aren't exactly accurate, erase, reposition, and trace again. Or adjust an edge of a line freehand if a slight adjustment is needed.

Shaping the Head

Carve the ear tufts and the wattle, to establish a cheek, with the NSK. I tend to like the flame Saburr tooth bur, but it is aggressive and removes wood quickly. If you

14 After carefully placing both sides of the face detail patterns, use a stylist or ball point pen to transfer the lines.

15 Take the time to double check symmetry and detail placement accuracy.

16 Carve the eye channel and taper the bottom of the eye channel down leaving the top edge that will become the eyebrow area.

prefer to be cautious, the flame carbide cutter may be a better option. Use what you are comfortable with and have good control over. Keep in mind the depth you are aiming for. It will likely take several passes to reach the desired depth. The wattle is shallow so apply less pressure. Carve the eye channel with the same bit. Observe the alignment of the eye channel to the ear tuft—one flows under the other. Taper the bottom of the eye channel down leaving the top edge. You are beginning to create the top of the wattle, so look at your reference when removing the bottom portion of the eye channel—remove only the bottom edge.

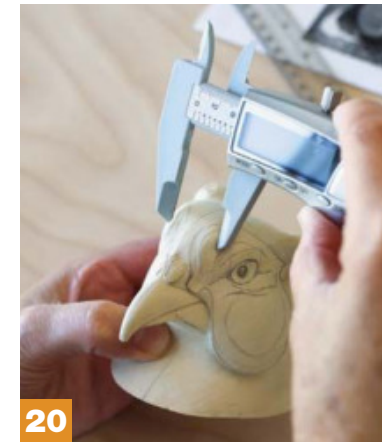
Continuing to the beak, round the top edges down being careful to remove the same from each side. Observe your reference for curve direction. Remember to always keep to centerline. Don't sharpen the beak nail (tip) at this time. It will be too fragile. That is one of the last things to do to the head. Round the top of the head and ear tufts after studying your reference. Note the eyebrow shape details and the layers of feathers that separate the ear tufts. Mark the details for both sides and create the relief with a small round diamond bit.

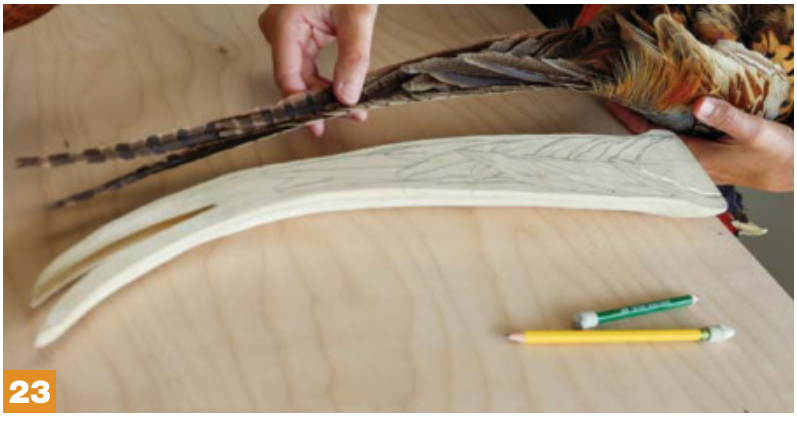
17 Carve the ear tufts and wattle with the NSK (micromotor).

18 Round the beak from the top down being careful to remove the same from each side. Use a dental tool to press in the line between the top and bottom of the beak.

19 Round the top of the head and further separate the ear tufts.

20 Always double check to make sure everything is symmetrical before moving on.





21-22 Profile the top of the tail with the Foredom stopping short of the last 7-8" where the tail changes from a convex shape to a slight upward facing "V".

23 Transfer the lower tail feather pattern. Compare with your references before carving.

Shaping Top of the Tail

Use the bandsaw to cut out the shape of the tail. Then profile the top of the tail with the Foredom using a 50- and 80-grit sanding drum. You want to round down from the deck feather (center feather) to the outside edge of the longer feather underneath, but stop short of the last 7-8" of the tip of the tail. Here, the convex shape gradually transitions to a shallow upward "V" shape within the last 5-6". Tip: It's best to carve the top of any feather first before carving the underside in essence bringing the underside up to meet the top.

Carving the Feathers Underneath the Tail

Using the same tracing paper/pencil method as the face, transfer the lower tail feathers. Beginning with a flame Saburr tooth bur in the NSK, remove the wood beyond the newly drawn feathers to form the concave shape underneath the longer feathers toward the tail. Be cautious of the depth and transition to a convex shape near the last 5-6" of the tip of the tail. Next, using either a flame diamond cutter or flame Saburr tooth bur in the NSK, carve the outside edge of each newly transferred feather. Begin with the longer feathers and work toward the short feathers thinking through how they overlap as you carve. Frequently check the profile and carving depth as you work. You want to see the feathers drop down some from the three longest feathers, while not interfering with the edge of those longer feathers. Tip: It's important to be careful of the tail tip while working because it will gradually become more and more fragile.

24-25 Form a concave shape under the longer tail feather you just profiled on top. Again, stop 7-8" from the tail tip where it transitions to the shallow "V" shape. Work around the edges of each shorter tail feather removing wood to stack the feathers from the tips to the base. Be aware of the depth and the edges of the longest feathers. There is more depth at the tips of the feathers than at the base because of how the quills enter the body.

Joining Head, Body, & Tail

To dowel the head to the body, find the center of the neck platform on the body and center of the bottom of the head. Test fit to ensure good overlap and positioning with the head turned. Drill a hole in both pieces and glue a dowel into the body only. I used a 3/8" dowel, but any size will work. This will add strength to the final union, but in the meantime will allow for sanding the neck to the body and adjustment of the head turn. The tail is doweled in the same manner with a dowel glued in the body and the tail sliding on temporarily underneath the upper tail coverts.

Leg Supports & Standing the Body on the Base

For my base, I used five pieces of red oak burl that I configured to make an abstract S-curve. You can create any type of base that suits you. The process for the legs and feet is the same regardless of the base.

Determine where you want the center of each foot to be on the base. They should be approximately 3" center to center. Envision where each toe will extend from the center of each foot for a placement with a realistic and believable toe position. You may want to angle the feet on the base or offset one foot with the other—your choice, I chose angled.

Cut two pieces of 1/4" steel at 7" lengths for the legs. Length can be approximated; it just needs to be long enough to slide the bird's body on the end and be stable.

26 Create doweled union in two areas: body to head and body to tail. This allows you to sand between the two and form a smooth union. Glue the dowels to the body, but not to the head or the tail.

27 Plan the placement of the feet on the base for a natural look.

28 Hold the body in position over the base to approximate angles and balance.

29 Once you have planned the feet and the balance of the bird, mark and drill straight down to accept the lower portion of the steel support/leg. Use your reference to determine the bend angle when creating the foreleg.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30-31 Measure from the centerline to align each feather grouping pattern and transfer them to the wood as a unit.

32-33 Draw individual feathers within each grouping. I find it easiest to draw the feather flow as swooping lines and then add each feather shape. After drawing one side on the wood, copy it and transfer it to the other side.

34-35 For individual feather relief, use a flame carbide cutter to carve below each line working on a few feathers at a time. Remove the lower edge of the grove you just cut so the feathers begin to "stack." When sanded with a fingernail file they will look smooth and soft.


35

Note: The angle of the leg and foot position can make or break the physical and visual balance of the bird. I hold the legs and body together to visualize angles and compare the reference photos during this stage before I bend or drill. (See photo 28.)

Based on your leg study and placement decisions, mark the steel rod foot position on the base and drill each rod foot position on the base and drill each hole straight down. (See photo 29.) Bend the rods approximately 1.5–2" up from the bottom and be mindful of the angle that will become the foreleg. With the rod in place in the base, mark the angle the rods go into the body of the bird at the correct distance apart—centered to the bird's chest—and drill a hole for each rod. Slide the bird onto the legs. This is a good point to check that the body and head are level. Adjustments can be made later, but it will be much easier at this stage.

Adding Feather Groups & Large Areas of Texture

Isolating feather groupings from the profile pattern, create mirrored patterns of each grouping

36-38 Use the same process as the back down the chest, carving larger feather groups, followed by individual feathers and finally smoothing with the file. Look at your reference for feather flow direction.

and use the tracing paper/pencil method to tape and transfer each pattern to the body of the bird using the centerline to guide placement. You'll want to do this for the scapulars, nape, and wings across the back and sides. A reminder: it is important to know bird anatomy. Once all of those areas are marked, begin profiling each area starting with the chest feathers overlapping the wing. Next round the wing tip back and down to tuck under the upper tail coverts. Lastly, work on the scapulars and finally the nape. These are subtle lines carved with a flame carbide cutter in the NSK. Be gentle and think about the depth you want to create between the soft feather layers.

Once the feather groups are in place, begin to mark smaller sections within these larger groupings to profile undulations, valleys, or indentations. When looking at your reference, you can see how the light catches sections of feathers or perhaps there is a small valley between 5–10 feathers. These areas can be drawn on freehand. The key is not to be too patterned or uniform. Use a flame carbide cutter to add these subtle lines. Then, using the fingernail file, smooth out the edges. When done they should look very soft and begin to look lofty.

Wing Feather Relief

Returning to the profile pattern, trace the primary and secondary feather groupings of the wing together as one unit. Create a mirrored pattern. Use the tracing paper/pencil method to tape and transfer each pattern to the lower portion of the wing. Using either a flame carbide cutter or flame Saburr tooth bur in the NSK, separate the primary feather group from the secondary feather group being sure to preserve the curvature of the wing—creating two tiers of stacked feathers.

Redraw individual feathers on both tiers and use a cylinder diamond safe-end bit in the NSK to carve below each pencil line to create a stacked effect. Be sure to preserve the curvature of the wing and angle of the feather. Use a fingernail file to profile and refine each feather. Once satisfied with the top surfaces, transfer each feather outline around the wing tip and under the wing with a pencil and continue to carve the outline of each feather. Refine with the fingernail file. Then, as a final touch, use a flame diamond bit in the NSK to carve between each feather tip to add separation.

Individual Feather Relief

Refer to your references to observe the feather flow on each feather grouping or section of the bird and note the direction of the quills. Draw the feathers being mindful to not make them too uniform and allow for some staggering when overlapping. Trace what you draw for use on the other side.

There are several bits that can be used for individual feather relief carving—a ball diamond or a flame carbide cutter are common—use what is comfortable to you. Carve below each line working on a few feathers at a time from low to high. This relief is shallow and subtle. Use the bit to remove the lower edge of the grove you carved to "stack" the feathers. Then sand with the fingernail file to shape each feather. The end result of each feather should look soft and rounded.

Continue this process on both wings, across the back, and upper and lower chest. The feathers change to a longer thin shape where the body meets the top of the tail (or upper tail coverts). Study your references for shape and flow and use the same process. It is a good idea to do this with the tail in place to ensure a smooth transition.

39-40 Draw individual feathers on one side of the head and transfer them to the other side being mindful of feather flow direction. Refer to your reference for feather size and shape. Detail the ends of the ear tufts.

41-42 Mark the flow of the wattle texture and the larger indentations. Use a small flame bit to create this texture working the bit in the same direction as the groves.

43 I used a stoning bit in the NSK with a gentle touch to texture the head. I wanted more texture for mica powder in the iridescent paint to catch light when I got to that stage.

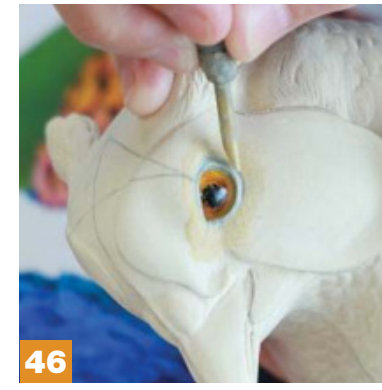
Texturing the Head & Setting the Eyes

The head texturing process is the same as the body, except the scale is smaller and depth is more shallow. The wattle is a different texture. Refer to your reference. I used a combination of very small ball and flame diamond bits for the head and for the wattle.

Measuring and marking during this stage is key. The "eye sockets" that you'll carve need to be exact in placement, shape, and depth. I like to use calipers to measure out from the centerline to the inside and outside of each eye socket and from the top to bottom. Then use a round carbide cutter to create each socket. You can also measure back from the nail of the beak. A common mistake is to not set the eyes deep enough. Continually check the placement, shape, and depth as you remove wood. Once satisfied with both sides, gently remove the edges of the socket. This is a light removal, just knocking the sharp edge down.

Mark the center of each eye socket at the front, top, and bottom making sure the alignment is the same on both eyes. Mix a small amount of two-part epoxy putty (like *Magic Sculpt* or *A+B Epoxy*) and put a small amount in one eye socket (generally the size of a pea). Using a pheasant glass eye on a wire (with the wire cut and ground off), seat it into the epoxy. It is helpful to have a close-up image of a pheasant looking directly into the camera lens. Center the eye with the marks you made earlier and align the eye so the bird is "looking" at the nail of the beak. After setting both eyes, measure out from the centerline to all edges of the pupils and glass eye for exact symmetry. You will also want to look at the bird from the top view to be sure the eyes are set at the same depth. A pencil with an eraser makes a good tool for making slight adjustments to the eye position. This is a crucial step in the process and one you want to spend some time getting right.

Once the eyes have set and dried overnight, make a thin, short roll or "snake" of epoxy to form the eye ring and lid. Begin at the inside corner (where the tear duct would be on a human) and carefully ring the eye. With a dental tool or stylus, gently blend the outside edge of the epoxy into the wood making sure to not alter the inside of the rolled shape. Repeat



43 Mark the center of each eye socket. Then draw the full socket shape using the template and your photos for reference. Once accurate placement is achieved, carve using the NSK.

44 A common mistake is to not set the eyes deep enough. Dry fit the eyes and view the head from the top to double check they are deep enough. Don't be afraid to carve them a little deeper and check again.

45 Mix a small amount of two-part epoxy to place in one socket at a time and seat the eye in epoxy. Align the pupil to the socket center line. Angle the eye so it is "looking" at the nail of the beak. Set the other eye to match.

on the other side taking care to match the first side. Use a clear ruler to measure out from the center line to check both eye rings for symmetry.

Making the Feet

I have made feet from wood and from two-part epoxy depending on the support that is needed. In this case, the steel rods are needed to support such a large bird with a long tail, so epoxy was a logical choice. Begin by outlining each foot with tracing paper and create a hole in the center to slide over each steel rod. Use your reference to best understand how the pheasant stands and how the toes interact with the surface it is standing on. Tape them in place on your base and cover them with plastic wrap so the two-part epoxy doesn't stick to the base. Cover the steel with epoxy up to where the legs go into the body. Next, roll epoxy into the toes, position them over the tracing paper template, and with a dental tool or stylus, blend the putty into the epoxy to cover the steel. Let this dry overnight.

In the meantime, create several rolls of epoxy that have tapered and slightly curved ends to resemble a shallow "C" for the toenails. Create two curved cone

47 Position the feet templates into place on your base. Tape a piece of plastic wrap on top of the base to cover the templates. This gives you an easy way to remove the feet once completed.

48 Cover the forelegs with two-part epoxy to the approximate diameter of the final leg. Remember to have the plastic wrap in place over the base. Add each toe and blend it into the foreleg epoxy with a dental tool. Let them dry overnight on the base. Before cleaning up, create the toenails and spur and set aside to dry.

49 The next day, use the NSK to shape the foreleg and toes to the correct dimensions.

50 Draw the overlapping scale pattern on the forelegs and tops of the toes. Using your NSK, carve this relief first.

51 Then, draw the smaller pattern on the sides and back of the foreleg and the sides and bottom of the feet. You can carve these as larger indentations or individual small bumps.

52 At this stage, I permanently glue the head and tail to the body. For transporting or shipping, the feet are glued to the base, but the bird is not glued to the legs. (For clarity, the entire bird lifts off of the feet which are glued to the base).

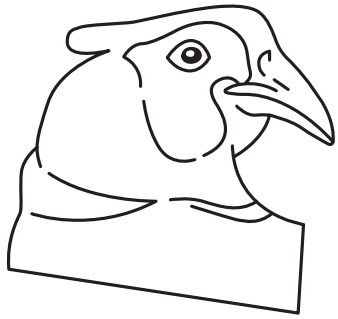
shapes for the spurs. Let these dry overnight as well.

Next, use a combination of very small ball and flame diamond bits to begin to further define the large surface areas of the toes, pads, webbing, and hallux (back toe). After measuring for length, cut each toenail off the end of the "C" shape. Using a ball diamond bit, carve a concave grove under each toenail and shape the end of the nail to a point. Create a grove for the toenail to rest in at the end of each toe and affix the toenail with two-part epoxy putty. Be sure to affix the toenail while the foot is on the base for proper toenail alignment. Let the nails dry overnight. Repeat the process for each spur.

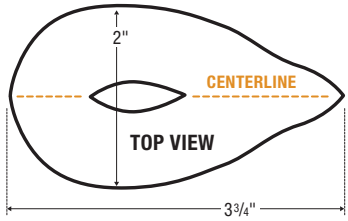
Now study the feet in your reference photos and add as many details as you would like. The tops of the toes and forelegs have an almost reptile-looking, scale pattern to them. The bottom pads have a tiny bump texture. I love carving the feet, so I go as far as wearing a magnifying visor to add literally hundreds of tiny bumps per foot.

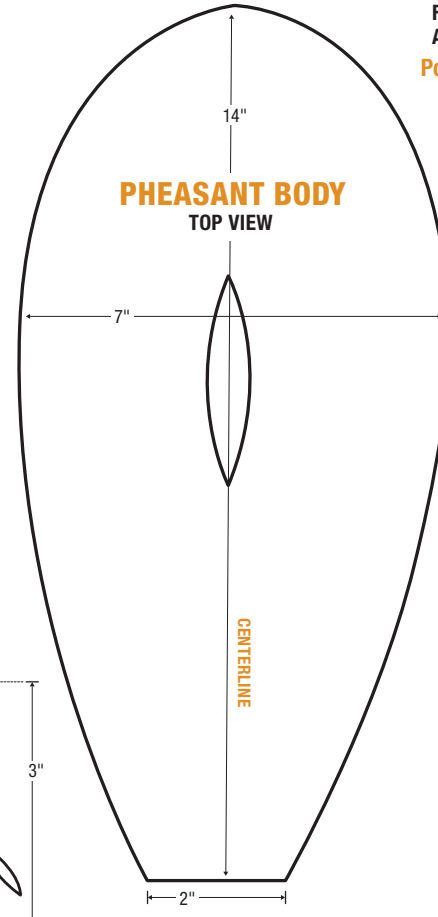
When adding individual feathers around the legs, you'll want to pay close attention to your reference for feather flow. The further down the chest the feathers go the more open and loose they appear.

Carving a Ringneck Pheasant



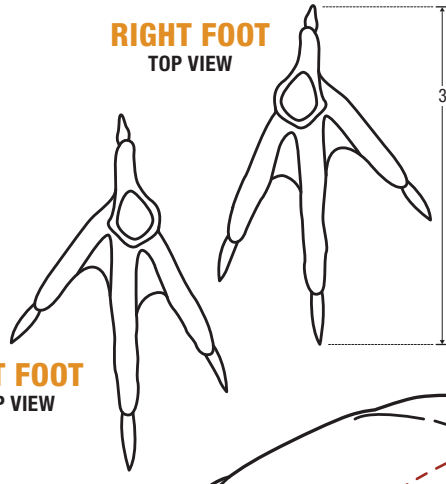
PHEASANT HEAD
PROFILE



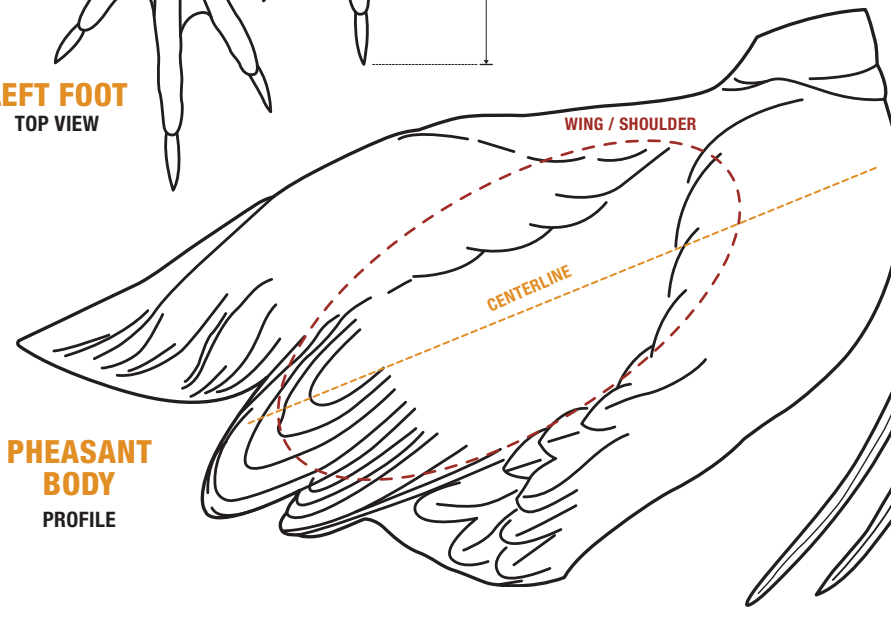


FOR A LIST OF PAINT COLORS AND SUPPLY VENDORS, VISIT:
PopularWoodworking.com/OnlineExtras

TAIL
TOP VIEW



LEFT FOOT
TOP VIEW



PHEASANT BODY
PROFILE

53 After drawing on all of the quills, I use a dental tool to press on each side of the quill line to dent the tupelo and raise the quill.

54 Before wood burning, prepare the bird by hand sanding with up to 1200-grit. This will reduce the carbon build up on the tip of the wood burning pen. Starting underneath the tail, press in each quill with a dental tool or stylus and mark the direction of the barbs along the length of the feather as a guide. Test your wood burner for the appropriate heat setting and begin to burn in each barb per feather. The longer the barb the slower you want to move the pen because it cools the more it is in contact with the wood. It's a good idea to test and practice barbs before working on the bird.

Adding Feather Quills and Barbs

In preparation for wood burning, I hand sand the entire bird with gradually finer sandpaper up to 1200-grit. With a pencil, I redraw the quills for each feather starting underneath the tail working to the top of the tail up the body to the head. With a tool like a dental tool, I press on each side of the line to dent the tupelo and form a raised quill. I also add barb splints to appropriate feathers with this tool. I draw woodburn guide marks roughly every 1/4" so I can keep the barbs flowing the same. With a feather as long as the tail, it can be easy to get off the angle; therefore, the guides come in handy. For this bird, the burning depth is light because the feathers aren't coarse.

On the head and in places where the feathers are different in texture — where the body meets the tail (upper tail coverts) for example — I use a stoning bit in the NSK to add the same type of detail. It is a very light touch with little relief.

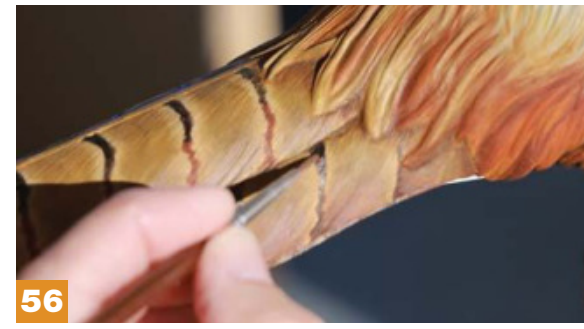
Preparing for Paint

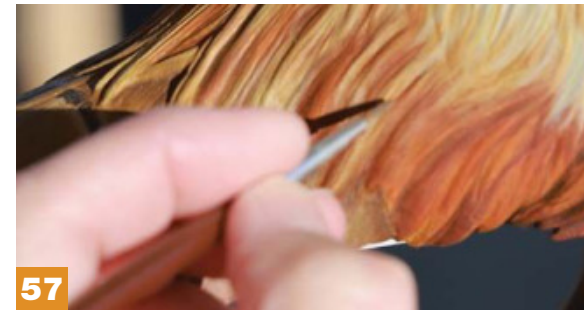
Once all of the minute texturing is finished, I coat the eyes with eye protector or a frisket masking material. It allows me to paint right up to the glass eye and even get some paint over the eye with easy removal later. Next, the pieces needs to be sealed and readied for painting. I use a product called *Japan Oil* in white which serves both purposes. I apply several thinned coats so I don't fill in the wood burning or stoning textures. Once dry I begin to paint the colors and patters.

Painting the Pheasant

I start under the tail working toward the top of the tail and up the body to the head. It is more typical for carvers to use acrylic paint and a combination of brush and airbrush, but I prefer oil paint and brush application only. I treat each feather like it is a canvas and don't tend to wash large areas with color. Each feather is painted with multiple coats of paint gradually gaining depth through saturation, highlights, and lowlights. The last step is adding iridescent paint to the upper chest and head.

I hope I have encouraged you to try something new by experiencing and practicing a new skill set. And, maybe even given you a reason to pick up a few new tools! If so, welcome to the world of bird carving! **PW** — *Jennifer Felton*





55 After masking the eyes, I thinned white Japan Oil with mineral spirits and applied three light coats over the entire bird. Be careful not fill in the texture by using too much. Two reasons for the coating: It seals the wood without raising the grain like a sanding sealer would and it creates a uniform "canvas" of white to paint on. If you were to use a clear coat, the tan color of the wood would skew the paint colors and the paint wouldn't be as true or bright.

56-59 Begin painting under the tail working your way to the top of the tail and up the back. Then move to the chest, head, and feet. I use thin coats to block in the color patterns, carefully blending the colors together while not muddying them. I circle back over the entire bird 4-6 times to define pattern edges, add intensity, shadows, highlights, and finally accent with iridescence when appropriate.

PROJECT #2405
Skill Level: Intermediate
Time: 3 Days
Cost: $150

This saw till is a great way to keep your saws organized, protected, and close at hand.

By Logan Wittmer

PHOTOS BY LOGAN WITTMER

Saw Till

There is a debate among hand tool woodworkers about saw tills. Officially, there haven't been any historical accounts of a saw till in an old-time shop. Most of the time, saws would have been hung on a peg on a wall, or in a holder in the back (or lid) of a toolbox. However, I think there's something beautiful about a well-made hand saw, and I want them out where they can be seen. That, combined with my growing... collection... of hand saws led me to design and build the saw till that you see here.

The design of this till is fairly common. Two sides are connected by some inner framework. I decided to also include a few drawers for saw files, sets, and other random saw-related items. On the ledger board below the drawers, a few pegs offer places to hang items that don't fit in the till. Coping saws, fret saws, even a bow saw find a home here (and of course, my apron).

Now, I would be remiss if I didn't mention one facet of this project. Prior to designing and building this till, I was talking about it on our *ShopNotes* podcast (we do it weekly by the way). A saw maker whom I respect greatly reached out to offer his thoughts on a saw till. In his opinion, the best way to store a saw is hanging by the handle—whether that is from a peg, nail, or some form of holder that is similar to a saw scabbard. The idea being that, in the vertical orientation, the plate is being twisted and torqued.

I agree with Jared's assessment and input on the saw till. With that said, I could not come up with a design that I liked holding the saws by the handle, letting the saw plate hang down. Maybe I like seeing the saws lined up in an orderly fashion. I know. Throwing logic and professional advise out the window simply for aesthetics. I never have claimed to be a smart man.

Start with the Case

In essence, this saw till is a hanging wall-shelf. A pair of sides are connected by framework that holds the saws. For this till, I wanted to paint it (I've been experimenting with linseed paint lately—look for that in an upcoming article). I happened to have some poplar that I knew would paint well, so I grabbed that for the painted portions of the case. I like my shop fixtures to look nice enough to hang in a house, but I would never shame anyone for choosing to make this out of something like pine or plywood. In the shop, function over aesthetics (regardless of my prior comments).

The sides are made from one wide board, ripped to final width. Even though the top edge of the sides get shaped a bit (and therefore could be left rough), I trimmed down both ends. Starting with workpieces that are square from the get-go just makes everything go a bit smoother in my opinion.

1-2 Start this saw till off by breaking stock down for the sides. Poplar is available in wide boards, but you could glue up stock if you need to.

3-4 Clamp the parts together to mark out the dado locations.

The sides are mirror images of each other. For accuracy, I clamp sides like this together and lay out my lines all at once. The inner framework (and top) of the till is attached to the sides with stopped dadoes. After laying out the dado locations (there are three in each side—top, bottom, and divider), it's time to decide how to cut the dadoes.

The dadoes go through at the back edge, but not at the front. Cutting these dadoes with a router means you can stop them at the correct location and has the benefit of using the part that goes into the dado to set the width—an easy way to get a good fit. The steps I took to cut these dadoes are outlined below in the photos.

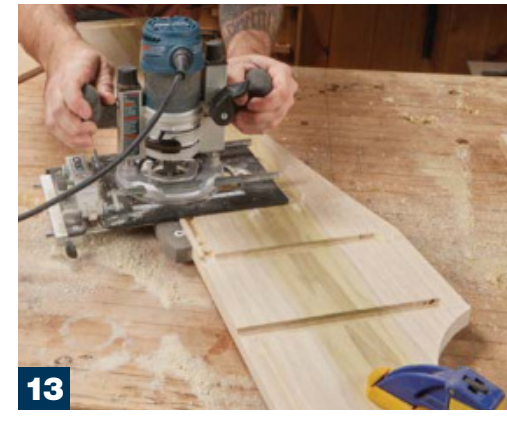
5 Double-sided tape applied to the part will hold a pair of fences in place.

6 Sandwich the divider between two fences (which are scrap plywood).

7 A dado clean-out bit (*Woodline WL-1007D*) follows the plywood fences to rout the stopped dadoes.

8-9 Chisel the ends square.

10-11 Lay out lines to shape the sides. The shape doesn't matter, but just avoid cutting into the stopped dadoes. A drawing bow, such as the one here, helps get smooth curves.



12 Refine the shape with a compass plane.

13 Rout the rabbet using an edge guide.

Shape the Sides

Now, you can shape the sides of the till. I like the asymmetrical curve that I chose for the sides. It's actually an intentional curve — the shape is reminiscent of a skew-back saw. I like the poetic-ness of it. I used an asymmetric drawing bow (Photo 10) to come up with the curve, and transfered it to the sides. (I stuck them together with double-sided tape). I also drew a small scoop on the bottom edge. That scoop size isn't intentional. It happens to be the same radius as a *Folgers* coffee tin full of rusty nails. (Disclaimer: I don't know if the radius changes if it's not full of Tetanus).

I don't actually own a bow saw, so cutting this curve is done at the band saw. The shape of the curve isn't critical, so I trimmed close to the line. Any clean up that needs to happen on this curve can be done with a rasp and sandpaper, or if you own a compass plane, here's a great place to use that tool before putting it back on the shelf for the next few years.

The final thing left to do on the sides is to form a rabbet along the back edge. This rabbet will run from the top dado through the bottom edge. The rabbet will capture two parts — the back slats as well as the ledger board. Routing the rabbet is straight forward. I used the same dado clean-out bit as before, but instead of guiding the bearing, I added an edge guide to the router base. You'll need to make two passes to form the rabbet. Any final cleanup can be done with a router plane.

The Inner-workings

With the sides complete, we can turn our focus to the inner-workings of the saw till. The bottom,

14 Rabbet the square stock at the table saw.

15 Form a dowel with a roundover bit. Test out the set up to make sure you get a completely round dowel, and leave the ends square for support.

16 Glue the holder up.

17 Spread glue inside the dadoes using a brush.

a horizontal divider, and two vertical dividers form the majority of this assembly. The assembly will hold the handle rest, as well as a saw divider. Before working on the assembly, I decided to get the handle rest glued up and drying.

As you can see in Photos 14-16 (as well as the drawings on page 48), the handle rest is (basically) a rabbeted dowel glued onto a board. Rabbeting a round dowel would be sketchy, so I started with a square blank that I rabbeted with a dado blade (Photo 14). At the router table, I used a roundover bit to form the dowel, leaving the ends square for support. This can be glued up and allowed to cure.

The horizontal divider as well as the bottom are dadoed. I cut these the same way as before—a pair of fences, sandwiching the workpiece to set the width. Unlike the dadoes in the sides, these are through-dadoes, so I cut them with the workpieces clamped edge-to-edge. Before grabbing the glue bottle, the bottom has a rabbet along the back edge for the ledger board.

The vertical dividers are cut to size and glued in place with the divider and bottom (Photo 18).

18 Glue up the divider assembly and allow it to cure.

You'll notice in the photo that the dividers are all the same depth, but the bottom is a little wider. Everything is aligned on the front faces. Because the horizontal divider isn't full depth, it will allow

19 Dry-fit the saw divider and measure the length of the holder.

20 Glue up the till case.

the back slats to sit behind the divider and be screwed in place.

Saw Divider

With the glue cured, I took a measurement and routed a stopped groove in the top of the assembly. This is for the saw divider—you can see this in place in Photo 19. The saw divider is to break up the cavity of the till into panel saws and back saws. The divider has a similar curve to the sides. At this point, I also decided to curve the top edge of the divider. I liked the look enough that I went back and sanded the same curve into the side panels (you can see that curve in Photo 20).

Here's where real-world building comes in. With the saw divider in place, I was able to play with the position of the handle holder. I used a few of my saws to see where the best position for the holder would be, then routed a groove for it to sit in. Finally, a measurement can be taken for the length of the handle holder and it can be cut to length.

The Big Assembly

Here's where building something designed from scratch gets really exciting—the first assembly. Here's where you can really see your design come to life. (It's also where you realize if you made a design or sizing mistake, but we won't worry about that).

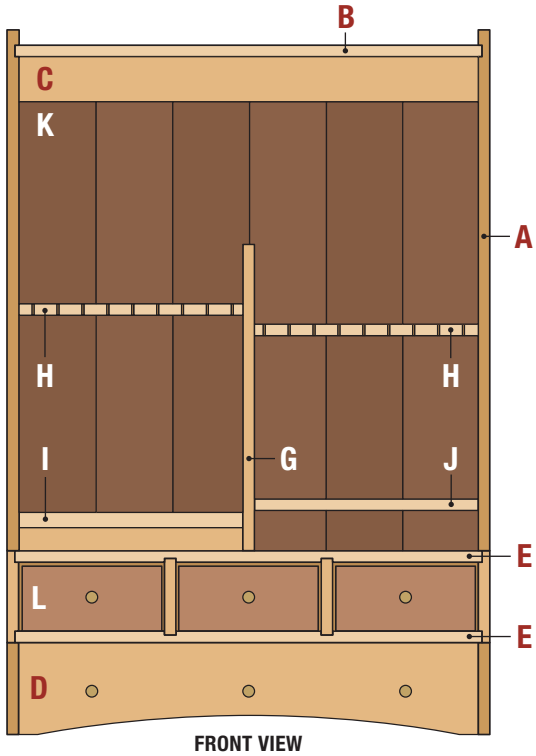
Nothing crazy is going on with this saw till assembly. The divider assembly you glued up earlier slips in place in the lower stopped dadoes. The top slips into place as well. There are two other pieces to add as well—the first being a top cleat. This cleat seats in the side rabbets, directly below the top and has a rabbet along the bottom edge on the back face. It is screwed into the top from the top face. This cleat will be where we attach the till to the wall.


19

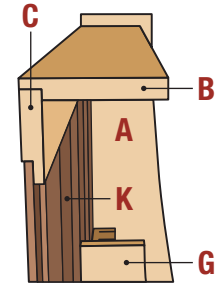

20

The second piece to add is a lower ledger board. As you saw in the main photo, the ledger board has a curve cut in it. You could leave it straight—no problem. I liked the little curve to reflect the shapes on the sides. After I had everything glued in place and clamped, I drove a bunch of screws. I'm not too proud of a woodworker to not use screws, at least where they're appropriate (and where you can fill the screw holes). I tried a new type of screw here (*Spax* MDF/Hardwood screws). They're pretty legit—I didn't pre-drill anything and nothing split. A few screws through each joint is all that's needed to

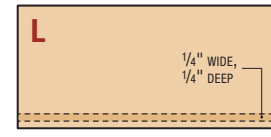
Saw Till



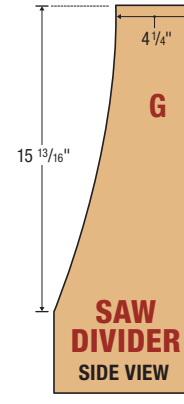
FRONT VIEW



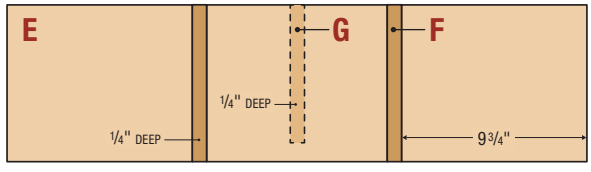
SIDE VIEW



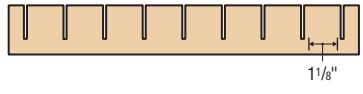
DRAWER FRONT
FRONT VIEW

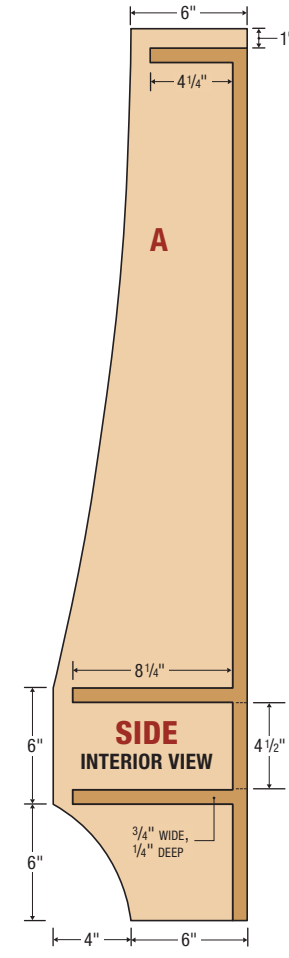


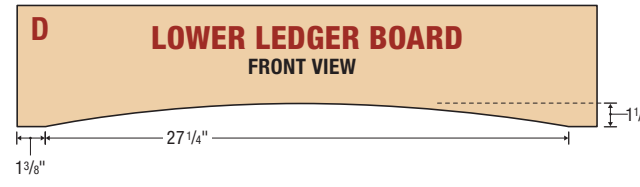
SAW DIVIDER
SIDE VIEW



HORZ. DIVIDER / BOTTOM
BOTTOM VIEW







Cutlist

No.	Items	Dimensions (inches) T	W	L
2	**A** Sides	3/4	10	46
1	**B** Top	3/4	5	30 1/2
1	**C** Upper ledger board	3/4	3 5/16	30 1/2
1	**D** Lower ledger board	3/4	6 3/8	30 1/2
2	**E** Horz. divider/bottom	3/4	8 1/4	30 1/2

No.	Items	Dimensions (inches) T	W	L
2	**F** Vert. dividers	3/4	5	8 1/4
1	**G** Saw divider	3/4	7 1/4	20
2	**H** Saw holders	3/4	2	14 5/8
1	**I** Handle holder *(for panel saws)*	1 3/4	1 3/4	14 5/8
1	**J** Handle holder *(for back saws)*	1 3/4	1 3/4	14 5/8
6	**K** Back slats	3/4	5 3/8	35 1/2
3	**L** Drawer fronts	1/2	4 1/4	9 1/8
3	**M** Drawer backs	1/2	3 3/4	8 5/8
6	**N** Drawer sides	1/2	4 1/4	7 3/4
3	**O** Drawer bottoms (plywood)	1/4	8	8 5/8

MATERIALS:
Hard maple = saw holders, drawer backs, and drawer sides
Curly maple = black slats and drawer front
All other parts are poplar.

21 Drive a few screws in each joint.

22-23 Mix up the *Bondo*, a small amount at a time and cover the screw holes. After 15-20 minutes, sand the *Bondo* flush with the surface.

24 A template helps position the Forstner bit.

25 Glue the dowel and tip the saw divider (with glue) into its dado.

keep everything tight while the glue cures.

Covering screw holes can be done many ways. Plugs and filler work, but one of my favorite ways to plug screws is with *Bondo*. It's a trick I picked up from my trim carpenters when I built my house. The colored *Bondo* is easy to see, cures very quickly, sands easily, and it doesn't shrink as it cures. The blue stuff I used here is sold as "all purpose filler". The smell and working properties tell me it's the same as the standard "pink" body *Bondo*, and I simply paid $5 more for it. (It may actually be different, but I couldn't tell—see the previous remark about me not being too bright).

Back Saw Holder

Something that I did not realize before building this till is just how different backsaw handles are from panel saws. The handles need to be held several inches higher, due to the length and hang angle of the saw. To deal with this, I chose to use a dowel as my handle holder for the backsaw side of the till. Holding my saws in place, I eyeballed where the dowel should go, and made a template to help position the Forstner bit. The template is aligned with the front edge of the horizontal divider, not the front edge of the side. After clamping it in place, I could drill the hole in both the side and the saw divider. This hole only goes in a bit—don't poke through the outside. Now, the dowel and saw divider can be glued in place.

26-27 Rabbet the edges of the back slats, as well as the top, front face of each slat.

28 Chamfer the edges for a clean look.

29 Space out the slats and screw them in place. Using a pair of screws on the same edge of each slat will allow the "wild side" to expand and contract as needed.

A Fancy Back

I'm going to be a little pompous now. I really like the look of a fancy wood (in this case, some curly maple) with a painted case. So, curly maple back slats and drawer fronts it is.

The back is a ship-lap back. This allows the back slats to expand and contract as needed. To create the ship-lap, I used a dado blade buried in an auxiliary fence and cut a rabbet on opposite faces on each edge (see Photo 26). Push pads help keep a consistent downward pressure on the workpiece to ensure a full-depth rabbet.

The top edge of each back slat has a rabbet along it. This will seat in the rabbet on the top cleat. Cutting this is done with the same set up, but using a miter gauge to guide the workpiece. To make the inside look neat and tidy, I chamfered the edges where the slats meet—simply count the number of swipes along each edge (mine was 6 swipes). Before screwing them in place, I finished them with a thin coat of shellac followed by Danish oil.

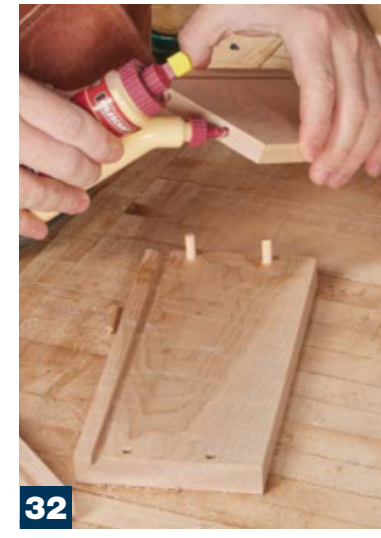
Attaching them to the back is done with screws. The biggest thing is to only attach one edge, allowing room for movement. As you see in Photo 29, I attached only the right hand corner of each slat. The next slat holds the previous one down. A few washers in the rabbet space out the slats creating breathing room.

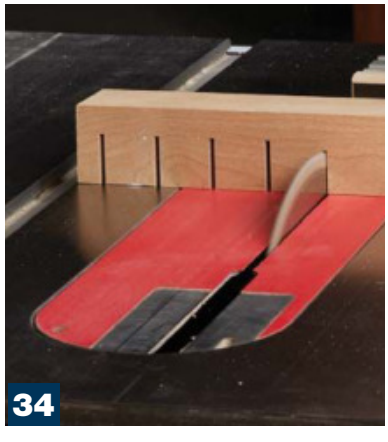
The Drawers

Good-looking drawers don't need to be complicated. Not every fancy drawer needs to be dovetailed. For these drawers, I used dowels to hold them together. Dowels into the front and sides will be plenty strong for what these drawers will hold. To be honest, I received a *Milescraft Joint Master* doweling jig for Christmas and wanted to try it out. For what it is, it's much more versatile than the self-centering style of doweling jig. It gets an A+ from me.

After gluing up the drawers, I slipped the bottoms in place. You can see in Photo 33 that I left the back shorter than the other parts. This allows the back to slide into the groove and get installed with one screw. Then, it's easy to replace the bottom at a later point if necessary.

Pulls for the drawers were a thorn in my foot. Everything at the hardware store was much too large—the drawers needed a bit smaller pull, but I didn't want to wait on one to get shipped. That's when I remembered I had a "spare parts tray" that contained a few saw nuts and medallions... so, the pulls for





30 Cut a groove in all of the drawer parts for the bottom panel.

31-32 Drill the dowel holes in the edge of the sides, and faces of the fronts.

33 Slip in the bottom and install a screw to hold it in place.

34 A thin-kerf blade makes nearly a perfect slot for even the heaviest-set saw plates.

my drawers are saw medallions. Once again—poetic and pompous. You can order your own pulls, or buy saw medallions on *Ebay*.

Saw Holder

The final part to put together is a saw holder. This captures the blade and keeps them from tipping. I simply spaced out marks on a block of hard maple, and made kerfs at the table saw using a thin-kerf blade (see photo 34) A pair of these are needed—one for each side. To install them, I simply screwed them in from the back using a pan-head screw and oversized holes (so the back can continue to move).

Here's where you may need to start to customize some of these saw holders. I have several pull-style saws and gent's saws. To hang these, I cut wider slots in a small shelf and screwed it in place on top of the backsaw blade holder. You can see these in the main photo on page 42. The final detail is to decide if you want pegs on the ledger board. I turned 3 shaker style pegs from offcuts of the curly maple. The perfect spot to hang some specialty saws. Hanging the till can be done with cabinet screws through the top cleat. **PW**—*Logan Wittmer*

PROJECT #2406
Skill Level: **Intermediate**
Time: **3 Days**
Cost: **$35**

A small project such as this pen box is a great way to hone your skills and focus on precision work.

By Doug Stowe

Fountain Pen Box

I was asked by a friend to design a box to hold a bottle of ink and two fountain pens. These days while inkjets and lasers spew out dozens of pages per minute and keyboards are so heavily relied upon to express thought, it may seem unusual that someone might savor the smooth flow of letters from mind, to hand and thence to page, but there are those (thankfully) in the world of a more sensitive type.

Designing the Box

The first part of designing this box was to settle on the design of the ink bottle. They come in odd shapes and sizes, so there's no way a box like this can be made to fit all. But a carefully chosen bottle can be refilled with the ink of choice. I chose a nice square glass bottle of ink and designed the box around it, knowing that a good bottle can be refilled with fresh ink for generations to come.

The other thing of importance in making this box, is that it needed to be designed to be lovely enough to reside on a lawyer's desk, keeping his instruments of writing at hand.

I chose to make the box from ash and to use walnut accents both as the lift tab at the front and in the hidden splines that strengthen the mitered corners of the box. You can use other woods and other corner joints if you prefer.

PHOTOS BY LOGAN WITTMER

Lastly, why make one box when you can just as easily make two? The answer for me is clear. So, I made an extra one at the same time knowing that there are other lovers of fine writing left in the world that would like a box.

Getting Started

Start by resawing 4/4 stock right down the middle. The selected stock should be 25" long and about 3 3/4" wide to start out. Then plane the wood to a thickness of 3/8". While you can make the sides thicker and thinner than that, the 3/8" thickness works well with my choosing of *Brusso* hinges for the finished box, and to allow sufficient space for the ink bottle and pens to fit within.

For the Sides

Joint one edge of the stock and then rip it to a uniform width. Then cut the groove for a bottle panel to fit. I use a Forrest WW2 blade with a square top cut to make sure the bottom panel is easy to fit. Cut the groove 3/16" from the bottom edge of the box and 3/16" deep.

Next use the router table and 45° chamfering bit to chamfer the top outside edge and bottom inside edge of the stock. These operations done on the stock for the box sides will help in recognizing where the sides will fit to each other with matching grain at each corner but one.

I use a miter sled and stop block with a spacer to alternate between long and short cuts, forming the front and back of the box and the matching ends. Careful grain matching is essential in a quality box. For this box, alternating between cuts requires a spacer block 6" long. The sequence is simple. Confusing at first perhaps, but there's a rhythm to it that makes sense after making a few boxes. Making a trimming cut at one end of the stock forms the first miter, making sure that the outside face is down on the sled. Then mark the length of the stock for a long side and use that mark to position the stop block. The second cut bringing the long side to length and forming a miter at its other end is made with the stock outside face up. To form the short side with the grain matching, make a trimming cut with the stock outside face down. Then flip the stock and with the spacer in place, cut the miter on the opposite end. By going long, short, long, short in sequence by removing or replacing the spacer block between cuts, grain matched box sides are formed.

1 With a square-ground blade, cut a groove in a long piece of stock.

2 Chamfer one edge of the grooved stock.

3 Miter one end of the workpiece first.

4 Use a stop block to position the next cut, and cut a front/back of the box.

5 Flip the piece over to cut the miter the opposite direction.

6 Reposition the stop block to cut the ends of the box.

7 All of the box parts laid out with continuous grain.

Top & Bottom

With the box sides taped together you can measure for the top panel to fit. Planning to install a floating panel top, I measure the opening and add 3/8" to allow for a tongue to be formed fitting into a groove to be cut into the box sides.

Cut the top panel and bottom plywood to size and set up to cut the grooves in the panel and box sides for the panel to fit.

Final Grooves & Chamfers

You may ask why I didn't cut the grooves in the box sides earlier when I cut the groove for the bottom to fit. It's because to get a perfect fit cutting the grooves at the edges of the top panel, cutting the grooves at the same time in the sides makes sense as the table saw setting will be the same. With the blade with a flat top grind in the table saw, adjust the height of the cut to 3/16" and the distance between the blade and fence to 1/8". I do a test cut on scrap wood to see that I've set up for a perfect fit. Not too tight so that the box will be a challenge to assemble, and not too sloppy loose where the top panel will rattle or slide around in the finished box.

Cut the groove in the sides and then the grooves in the top panel. This can also be done safely using a slotting cutter on the router table. Lastly, use the table saw to chamfer the top panel. Chamfer the ends first then the sides.

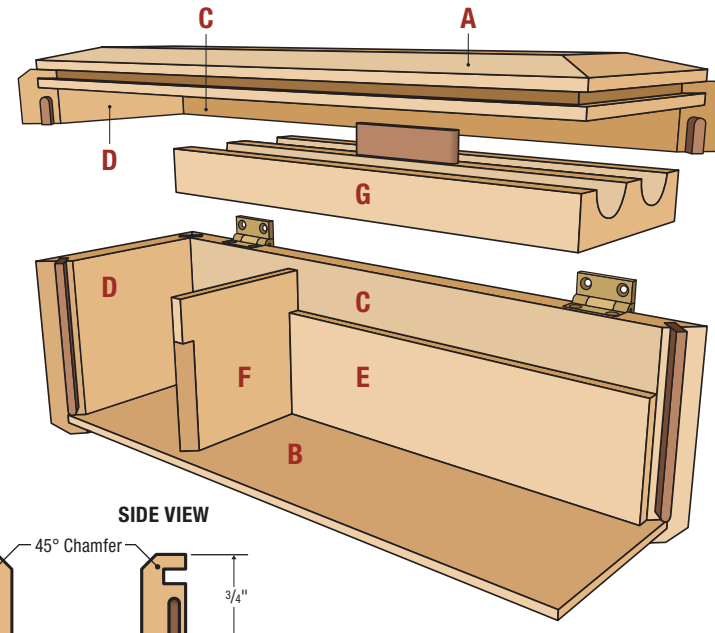
8-9 Rip stock for the top and bottom of the box.

10-11 With a rip blade set low, cut a groove around the perimeter of the top of the box.

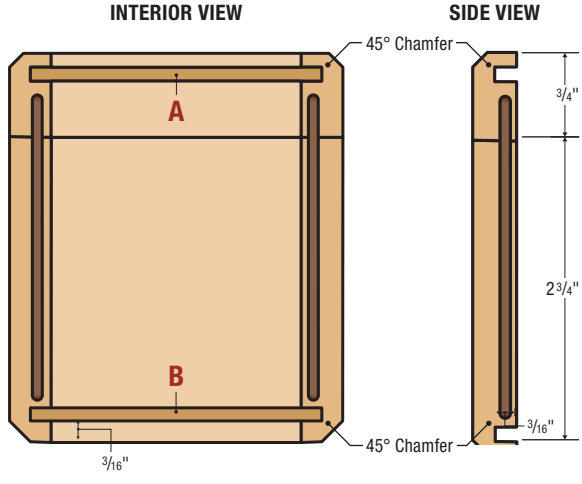
12 Now, groove the box for the top.

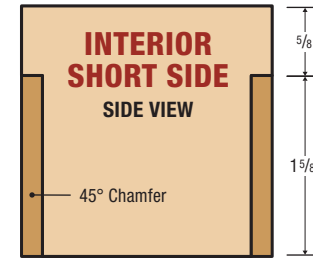
13 Bevel the lid of the box.

Pen Box

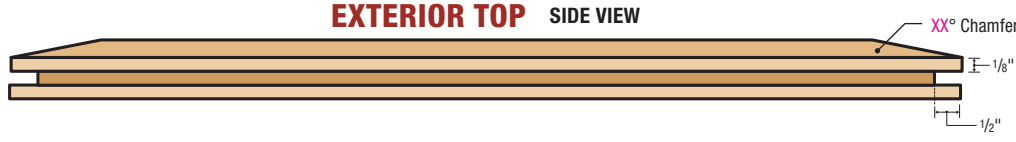


EXTERIOR SIDES



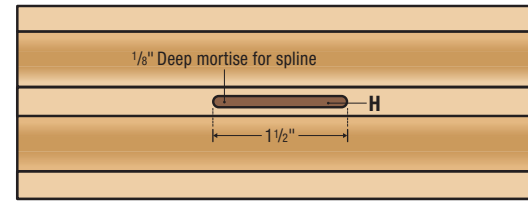


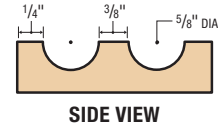
EXTERIOR TOP



Cutlist

No.		Items	Dimensions (inches) T	W	L
1	A	Exterior top	9/16	8 5/8	25/8
1	B	Exterior bottom	1/8	8 5/8	25/8
2	C	Exterior sides (long)	3/8	9	3 1/2
2	D	Exterior sides (short)	3/8	3	3 1/2
2	E	Interior sides (long)	3/16	6	1 5/8
1	F	Interior side (short)	3/16	2 1/4	2 1/4
1	G	Pen holder	9/16	5 7/8	2 5/32
-	H	Splines			





PEN HOLDER

TOP VIEW

14 A miter sled holds the mitered parts of the box with the mitered face down.

15 Carefully measure the bit location as to not rout through the ends of the parts.

16 Cut spline material out of a contrasting wood.

17-18 Glue the splines in place.

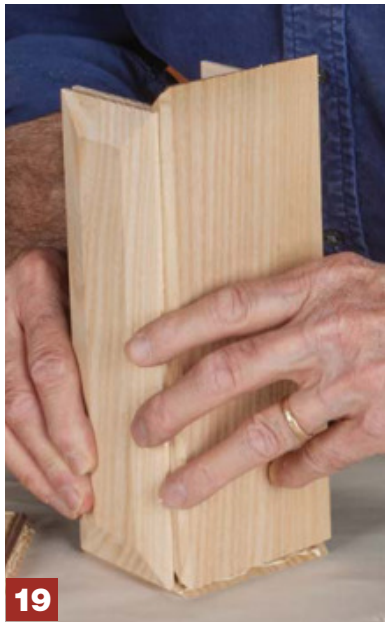
Rout for Hidden Splines

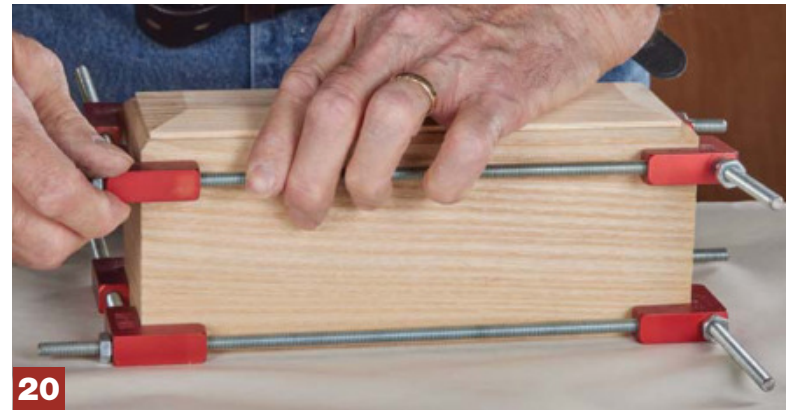
With the sides cut to length it's time to rout for the hidden splines to fit. I use a shop made jig that holds the workpiece at 45° as it passes over a 1/8" straight cut bit in the router table and between stops. By mounting the work piece in the jig inside out you can observe and measure to set up the router table stops. A low fence and low stop block work best for this operation as they are less likely to interfere with the use of the jig.

I use walnut as a contrasting wood so that the hidden spline will be visible when and only when the box is open. A sign that a craftsman's attention has been applied, but one that's not immediately visible on the outside of the box. To make the spline stock I saw and plane a piece of contrasting wood to a thickness to match the grooves routed at the ends of the mitered parts. Getting the spline stock to the right thickness and then the splines to the right lengths requires special attention. I use a crosscut sled and stop block to cut the splines to length.

Assemble the Box

The hidden spline joint is one of the few mitered joints for the box making that require the use of clamps. Normally rubber bands or tape is sufficient to pull the joints tight. But with the hidden splines between the joints and the box being pulled in from four directions at once, frame clamps are ideal for this box. Work the four sides into position and use the clamps to pull the corners tight. With this joint I always do a trial assembly first to make certain that the splines are cut to the right length.

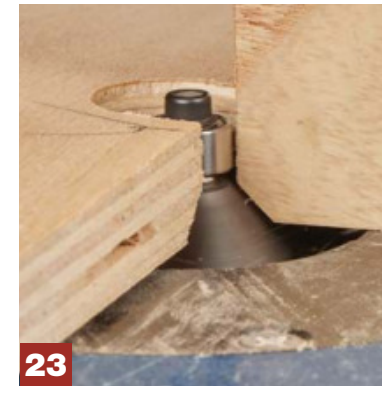




19 Fit the lid in place as you assemble the outside parts of the box.

20-21 Specialty box clamps hold everything tight and square as the glue cures.

22 Cut the lid free from the box.



23 Add a chamfer around the bottom edge of the box.

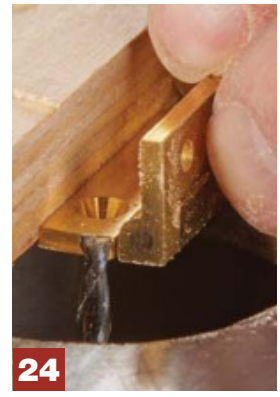
24 Adjust the router bit height to match the thickness of the hinge leaf.

25 Set a template up with stops for routing the hinge mortise.

Add the Hinge

Once dry, cut the lid from the body of the box and sand the surfaces smooth on a sanding table. Rout a 45° chamfer to the bottom edges of the box to give it a unique look.

Next, cut the hinge mortises in the top and body of the box using the router table and stops. I make a story stick the same length as the box, cut a recess in it to the exact fit of the *Brusso* hinge chosen for this box. With a 1/8" upcut router bit in the router table, adjust the bit height to half the thickness of the hinge. Set the fence distance from the outside of the bit to control the depth of the mortise from the back edge of



the box. Then use the story stick to set stop blocks to control the travel of the box body and lid on the router table. Rout the lid and body at the first step up, and then use the story stick to reposition the stop blocks for the matching mortises on the other side. Then use a chisel to square the corners of the hinge mortises.

Create & Install a Lift Tab

To install a lift tab at the front of the box, raise the router bit slightly (to about 3/16") and use the story stick to position the groove for the lift tab to fit. I mark on the story stick the approximate width of the lift table and set a stop block using that mark as my guide. With the story stick against the stop block, drill through using the router bit. Then turn off the router and flip the story stick to set up the stop block on the opposite side. With the stop blocks in place, lower the lid on the router bit and rout between stops to form the groove for the lift tab to fit.

Shape a tab to fit using stock 1/8" thick. First cut the stock to length and round the edges on both ends to fit the groove. Then, shape the front of the pull using a disk sander and glue it into place.

26-27 Guide the lid into the bit and slide it back and forth to form the mortise. Check the hinge fit in the box.

28 Adjust the bit height and stop block locations to rout a slot in the front edge of the lid for a lift tab.

29 Mortise formed by routing.

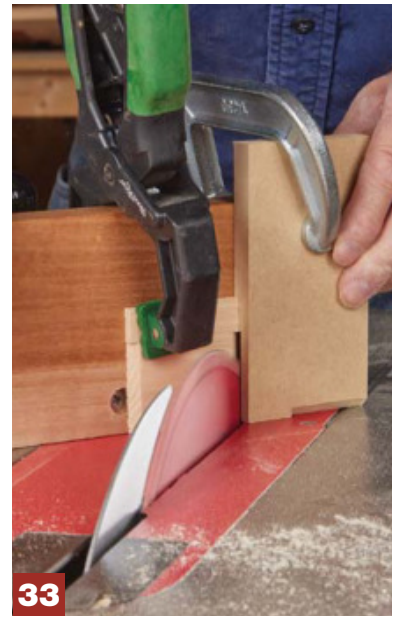
30 Use a piece of walnut and shape a lid lifter.

31 The final shape of the lid lifter once it's installed into the mortise in the box lid.

Lastly, the Interior

Next, form the parts to divide the inside of the box and support the tray inside. I resaw material to 3/16" thickness for these parts. Miter the ends of the tray support and then make partial miter cuts on the divider. This is a delicate operation requiring a clamp on the miter gauge to hold the stock in position. Glue the parts in position.

Form the tray to fit. Use a core box bit to rout for the pens to fit, then use the 1/8" bit in the router table to rout for a lift tab to fit so that the compartment underneath can



32-33 Miter the ends of the box liners.

34 The divider is mitered only part of the way up.

35 The liner parts are placed loosely in the box.

36 A core-box bit is used to create the pen tray.

37 Plunge the tray over the bit to create a lift tab mortise.

38 Check the fit of the tray in the box before gluing the liners in.

39 A walnut lift tab is cut to fit and glued in place on the pen tray.

be accessed, using the same walnut as the splines to create the lift tab. Before gluing into place, round the edges of the tab with sandpaper.

Using these same techniques, you can make multiple styles of small boxes for a variety of small-sized objects. **PW** — *Doug Stowe*

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Community News

Woodworking Magazine Index

By Logan Wittmer

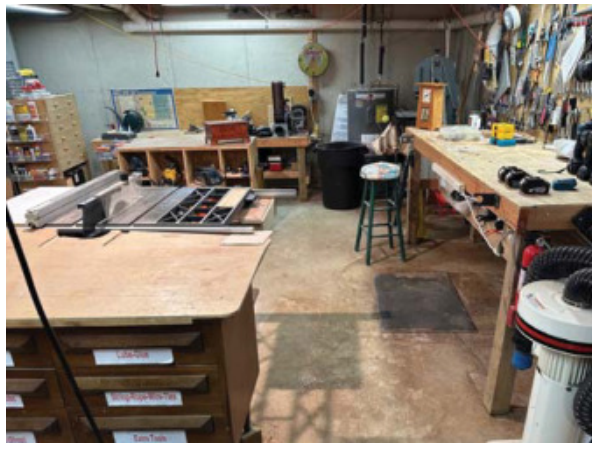
Have you ever read a magazine article that piqued your interest and then a few years later you wanted to find it but didn't know where to start looking amongst the issues in your library? Well for 25 years, the Woodworking Magazine Index has been the solution to this problem. The index is online and continually updated with each new issue. With the index you can search over 34,000 magazine article listings and 6,000 project images using a variety of filters and keywords. We checked in with Rick Van Schoick, a woodworker and publisher of the index.

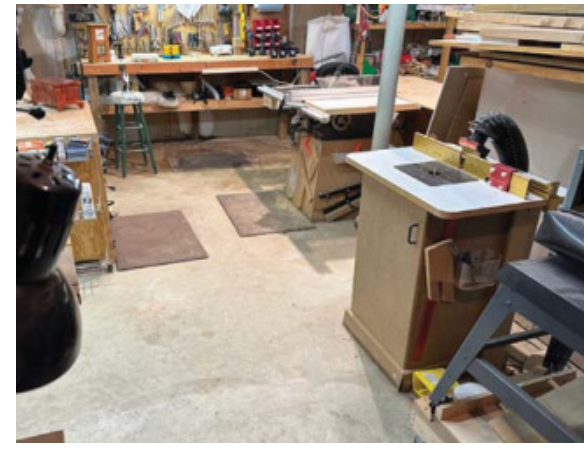
Hi Rick. Tell us how you got into woodworking. Well, my father was always building things in the workshop, so I had early exposure to the craft. I also built simple projects in woodshop in high school. Once I married, I thought it would be fun to take up the craft more seriously and gradually built out a small woodshop. I've built a variety of things from a rocking horse to a mailbox, and refinished / rebuilt some furniture. And of course, I spend a fair amount of time keeping the index up to date.

Tell us about the start of the magazine index. Back in the late 1990's, having subscribed to a few woodworking magazines, there would be times when I would recall an article and I wouldn't know exactly where to find it. So I started to keep track of the articles in an Excel spreadsheet. (My personality is very tilted towards details and organization, so it was a good fit). I would add to the spreadsheet with each new issue and keep it for handy reference. Not long after this I started offering the spreadsheet to anyone that wanted to make a small donation to my woodworking addiction. After a couple years of that I decided to create a website that would enable my fellow woodworkers to easily take advantage of the fruits of my labor. And that is how WoodworkingMagazineIndex.com came to be. I'd already been online with my general woodworking site, RicksWoodshopCreations.com and that's a good place to go to see more about my projects, an early version of the index, my woodshop, and my life in general.

PHOTOS PROVIDED BY RICK VAN SCHOICK

Who can take the most advantage of the index? The index is really helpful to anyone that has a large library of woodworking magazines and really want to fully take advantage of their investment there. Certainly, individual woodworkers are my most frequent customer. However, woodworking schools and woodworking clubs are a great fit because they too have large libraries that their librarians maintain for their members. The question they have to ask is, are we making the most use of our library? If a member wants to review blanket chest projects, how are they going to do that efficiently amongst 500 issues of woodworking magazines in their library? With the Woodworking Magazine Index, it's a 30 second exercise. At a glance see





all of the images for the various blanket chest projects, and then pick the ones you think you might want to build.

Is there much competition in this space? Back in the 2000's there was a CD-ROM based index that I competed with. They would send you updated discs every 6 months and they would charge over $60/year for the service. I think I put them out of business (sorry). With the Woodworking Magazine Index, you don't have to wait 6 months for an update. The index is updated within a day or two once I receive a new issue. Also, you don't have to worry about loading CD-ROMs. Because the index is online, it is available to you anywhere in the world from any computer that has an Internet connection. Finally, an individual woodworker doesn't need to spend $60/year. The Woodworking Magazine Index is only $9.95/year for access. For woodworking clubs and schools, there is special pricing that is dependent upon the number of members. Everything is on the honor system. The index is more of a labor of love for me and I appreciate the opportunity to get the word out. **PW**

EDITOR'S NOTE:

I've had access to the Woodworking Magazine Index for several years now. Internally, we have a database of all of our woodworking brand content for internal use (Popular Woodworking, American Woodworker, Woodworking, Woodsmith, ShopNotes, Workbench, and Fine Woodworking). However, the level at which Rick classifies and categorizes articles from the 35+ titles is unparalleled. Being able to search out projects for inspiration, techniques, or simply to browse is a fantastic resource. Being able to utilize a resource built by someone within the community is something that I'll always jump at the chance to support. – ***Logan Wittmer*** *(Editor-in-Chief)*

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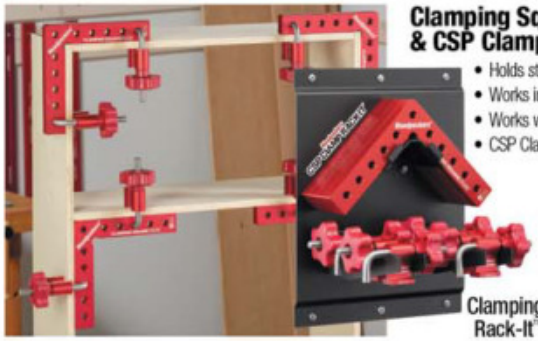

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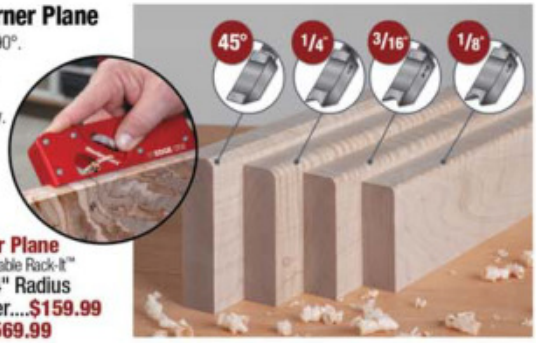

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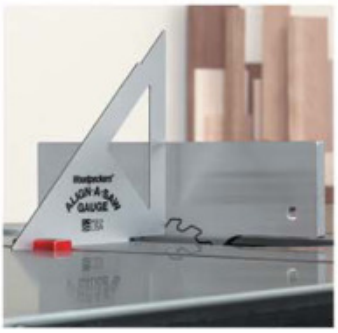

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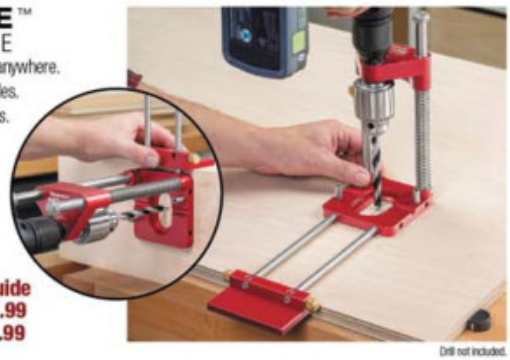

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- Heavy-duty, true 3-axis linear control.
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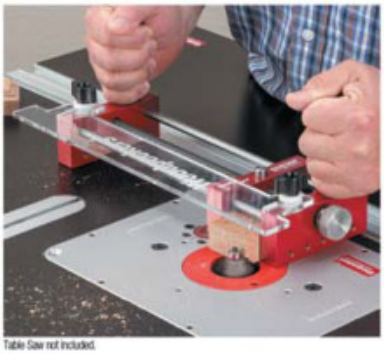

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