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SHOP TESTED:
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TRACK SAW



p.14
DOVETAILED
WINE BOX

ISSUE #135
DECEMBER/JANUARY 2022

CANADIAN Woodworking & HOME IMPROVEMENT

Make Textured Christmas Ornaments

+5 AWESOME GIFT PROJECTS

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20 Make Textured Christmas Ornaments

These glittering ornaments look great on a tree and make fantastic gifts. BY ROB BROWN

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editor's letter

As the saying goes, the holiday season and giving go hand in hand. And as my mom has told me since I was a kid, the best gifts are those that are made, not bought. I'll be honest; I hate choosing gifts for friends and family, but the thought of making gifts gets my creative juices flowing. I think we woodworkers have it easy, because our ability to make something beautiful and functional is like a superpower during Christmas time.

The main challenge for me has always been deciding what to make. It has to be something the recipient is going to appreciate and use. In this issue we've brought together six gift projects that might just take care of everyone on your list. From games and ornaments to picture frames and wine-related gifts, these projects cover a lot of ground. Maybe my favourite gift project in this issue is how to make simple wooden customizable gift tags that can go to everyone on my gift list. I'm not sure why I've never made these in the past. The fact that my 10- and 11-year-old kids made the tags and wrote the article makes these even more awesome, but I might be slightly biased.

As a quick side note: We hope "Kids' Corner" will be a regular feature, so if you know any budding woodworkers between the ages of 10 and 20 who might like to have an article published, please have them contact me. I want to get more young people involved in woodworking, and hopefully this will encourage a few young folks to get in the shop and learn about woodworking, while also making a few dollars and becoming a published writer.

Tools, tools, tools!

The sixth annual *Canadian Woodworking & Home Improvement* "Tool of the Year" awards run from November 1 to 30 this year. Visit our website to vote for tools in four categories: machines, power tools, hand tools and accessories. We'll be giving away prizes, too.

Still on the topic of tools, we just wrapped up a tool survey, and were pleased with the response we received; almost 2,400 people completed the survey. If you'd like to know what the respondents' most important hand tool, hand-held power tool and stationary machine were, along with some of their purchasing habits, go to CanadianWoodworking.com/results-of-our-2021-tool-survey/.

— Rob Brown



rbrown@canadianwoodworking.com

CANADIAN Woodworking & HOME IMPROVEMENT

Issue #135

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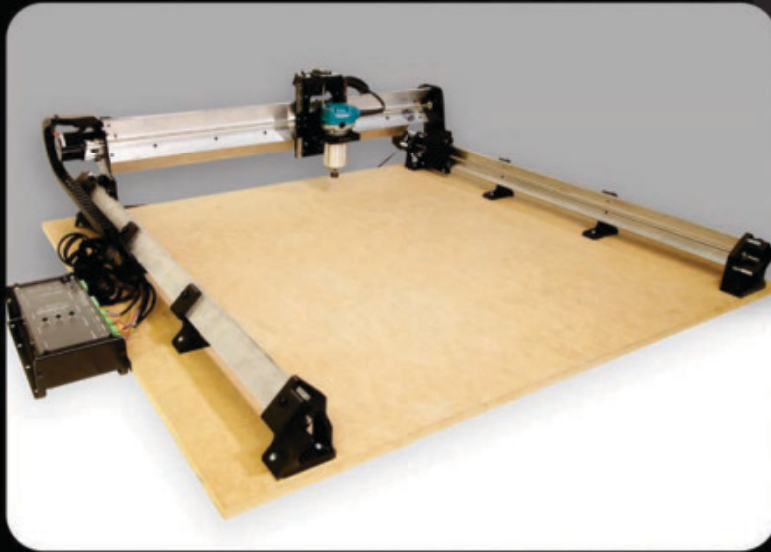


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letters

Great ornament, but no drawings

Hi Rob,

I was very excited to see the gorgeous wood Christmas ornaments on your cover ("Make an Intricate Christmas Ornament", Dec/Jan 2021), but when I flipped to the article, I was disappointed to see there were no measured drawings to help me with making them. I find the written word is good, but a 3D drawing, with measurements and details, is what I really need to visualize a project.

Stephanie G.

Vancouver, B.C.

Hi Stephanie,

Thanks for your letter. In hindsight, I should have included a 3D drawing with measurements in that article. Sorry about that. I had a drawing made, and it's currently included in the digital version of the article (CanadianWoodworking.com/plans/projects/make-intricate-christmas-ornament). It can even be downloaded or printed if you'd like. Heather Craig, who wrote the article, did a great job describing the process, but the 3D drawing makes the ornaments even more enjoyable to make. —Rob Brown, Editor

The wonderful world of shellac

Carl,

Thanks for writing the article "Film Finishes" (Dec/Jan 2021). I have always been confused about when to use shellac. I have used polyurethane for years. When would/should I use shellac?

Also, in your article you mention, "If you plan to topcoat the shellac finish with polyurethane..." Why would one do this? Why not just use polyurethane?

Thanks for your help and keep up the great work writing for *Canadian Woodworking*.

Duane M.

Lacombe, Alberta

Central Alberta

Woodworkers Guild

Hi Duane,

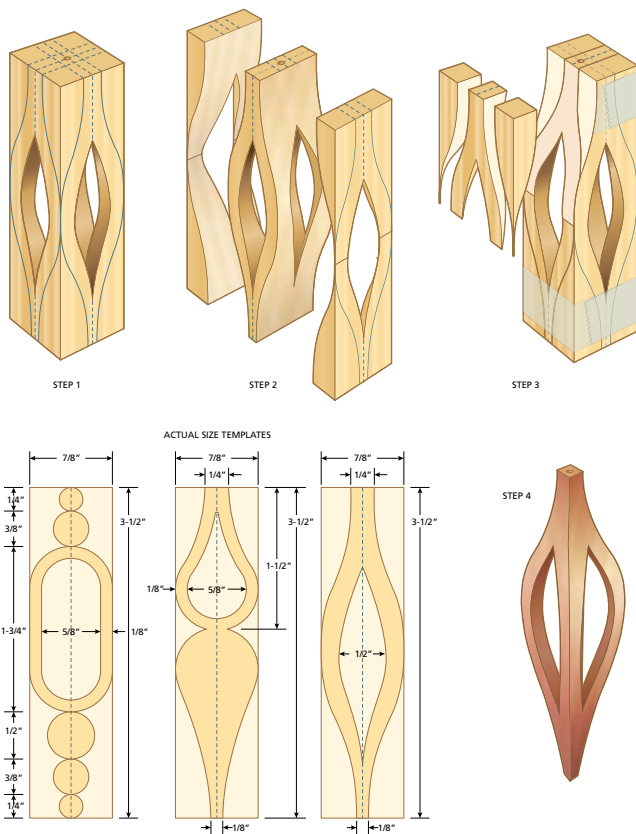
Ah, shellac! Years ago, we used it all the time. It doesn't seem to be that widely used today, certainly not in any production shops that I know of. Some people use it because of the charm associated with a "traditional" finish, while others choose it because it's quick and easy to apply, builds up nicely, and is super easy to repair. Over time it matures into a very lovely finish, particularly

the darker garnet grade. It's great for sealing wood surfaces. I still use it to seal the inside of drawers because it doesn't emit any odour and for any French polishing.

However, shellac isn't all that durable. It has low scratch and abrasion resistance. So, you can seal raw wood with it to make subsequent coats of any finish easier to apply, and then topcoat with a more durable finish, like poly.

Nowadays, I simply seal with the topcoat I'm using, diluting the topcoat before applying the first coat.

Hope this helps. — Carl Duguay, Digital Editor



From Rob's Bench

Hello Rob,

I sure appreciate reading the "true life" experiences you share with us in your weekly blog post. They're sufficiently descriptive — almost as good as looking over your shoulder.

I always thought I'd get into some sort of furniture making, but haven't yet. There always seems to be something else construction-wise that I want to get off my plate first. While having the right quality tools is important, what I read in this and other articles is that, above all, patience is key. Take the time to do it right and also know what right is. All of this comes hand-in-hand with preparation.

Thanks, Rob.

Ralph

Via email

Hi Ralph,

I'm glad you're enjoying my weekly blog posts. There's always something going on in the woodworking world for me to write about. Readers can either click on "Rob Brown's Blog" under the "Community" link on our website or simply subscribe to CW&HI's weekly shopNEWS to have my latest column delivered to your inbox.

I hope you're able to finish up most of your construction projects, as building furniture is a lot of fun! — Rob Brown, Editor



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Tool Reviews

Worxsaw Cordless Compact Circular Saw

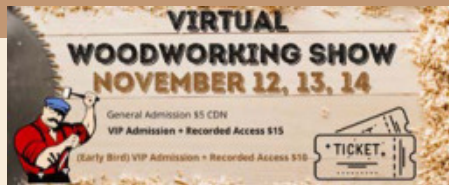
View these reviews and more at:
canadianwoodworking.com/reviews



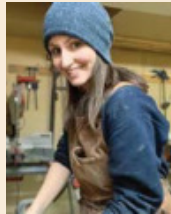
Events

Virtual Wood Show

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WoodShows.com



Join Vic Tesolin, Lesley de Abaitua, Marty Schlosser and other experts online, and learn from the comfort of your own home.



Micro Mystery

Can you guess this object commonly found in most shops? Follow us on Instagram to see regular "Micro Mystery" challenges. We will post the answer to this one in our Feb/Mar issue.



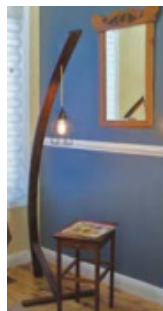
Previous issue:
1/4" dowel center

Best Build

Check out the **Turning** section of our forum for our latest "Best Build" thread – a dovetailed wall cabinet. This month's winner, Peter Follett, wins a **Veritas Dual Marking Gauge** from Lee Valley.



To find out more about this project, go to:
forum.canadianwoodworking.com
or simply go to CanadianWoodworking.com and click **FORUM**.



Free Plan

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canadianwoodworking.com/free-plans

Product Watch



Mortise Master

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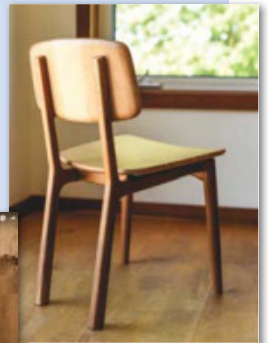
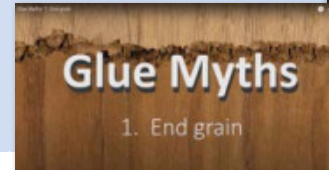
The beauty of this jig is that it doesn't require you to do any detailed laying out of mortise lines – you simply mark a centerline for the mortise on your stock, insert the workpiece into the jig, select an offset (the distance from the edge of your stock to the middle of the mortise), set your fences for the width of the mortise, and rout away. The jig accommodates stock up to 3-1/2" thick and you can rout mortises up to 3-1/2" wide. Learn more at **MortiseMaster.com**.

Video Links

canadianwoodworking.com/videos

End-Grain Glue Myths Busted

Canadian Quotes:
Stephané Dumont



Forum Thread

Check out these home improvement threads and many others at forum.canadianwoodworking.com

- Removing Blown-In Insulation – Blowing in insulation is a great option for many situations, but what do you do to remove a portion of it? Our forum members have some great ideas.
- Rain makes an obnoxious tapping sound from roof / gutters – One of our forum members was having trouble dampening the sound of water dripping. Read about what some potential solutions to this common problem are.

Got a question? Join our forum so you can ask our skilled and experienced members any home improvement question you like. It's free, and is just a click away.

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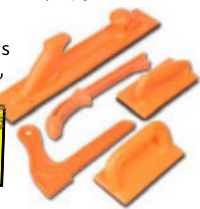
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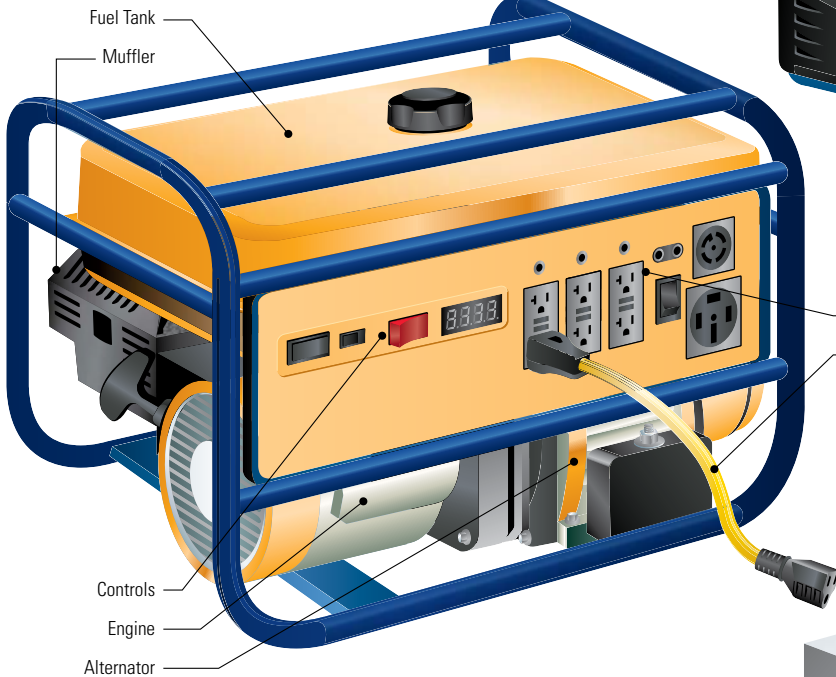
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Price: \$280 to \$3,800

Peak watts: 800 to 15,000

Running watts: 600 to 12,000

Run time @ 50%: 3 to 32 hours

Fuel: Gas, propane, diesel

Weight: 23 to 350 pounds

Get the Most Out of Your Portable Generator

Know what you need

Before you buy a generator, calculate the total running wattage of all the electrical devices you plan to operate at the same time from the generator. Then select a generator that meets the overall electrical load you intend to power with some excess capacity built in.

Size the power cord correctly

Not any power cord will do. Choose a heavy-duty exterior-rated power cord that can handle the current flow (amperage) for the generator.

Give it regular TLC

To ensure your generator runs efficiently all the time, perform regularly scheduled maintenance as recommended by the manufacturer.

Stock up

Don't get caught in the middle of a blackout without the accessories needed to keep your generator running. Along with a supply of the fuel your generator uses, keep a set of spark plugs, a container of motor oil, an oil filter and an air filter on hand.

Keep your distance

Gas, diesel and propane all emit carbon monoxide, so never operate a generator in any kind of enclosed space, even with the doors or windows open, and point the generator's exhaust away from the house.

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Ways to Teach Young Woodworkers

If young kids show an interest in woodworking, it's time to take them into the shop. A patient, careful approach while allowing them to lead the way, will set kids up for life-long learning in the shop.

BY ROB BROWN

1 Make It Fun — Kids are much more likely to pay attention if they like what they're building. They're also more likely to want to return to the shop.

2 Small Chunks of Time — An adult's attention span can last hours, while a child may have only minutes when they can focus. This is natural, so try your best not to push them beyond their limits.

3 PPE — Getting out of the shop in one piece is obviously important. Have eye protection that doesn't constantly slide down their nose, a dust mask that fits and works, and ear protection if machines and power tools will be used is a good starting point.

4 Be Patient — These machines, power tools and hand tools will all be new to kids, as will the general concept of the steps involved to complete even a small project. Patience will allow a child to soak up the important information at a pace they can handle.

5 A Bit of Teaching, But Not Too Much — If a machine or tool we're about to use is new to my kids, I like to give a short explanation of it and talk about the main points surrounding the process. I then watch them like a hawk to make sure they don't hurt themselves. I find too much information too early only complicates the matter.



6 Show Them the Way — There are many times when my kids want me to demonstrate an operation before they try it. They're picking up on everything from feed speeds to where to put their hands, to the sound a tool or machine makes and much more.

7 Follow Their Lead — If you head into the shop to make some cutting boards, but your child is fascinated by the compressor, show them what the compressor can do. The best way for them to learn is to learn about something they're interested in.

8 Lean Towards Hand Tools — Hand tools are safer and quieter so they're a great place to start. They also don't ruin a workpiece as quickly as power tools can. If your child is only interested in power tools then proceed to the safer options with caution.

9 Keep Your Tools Sharp — This should be a rule in your shop in any case, but the last thing a beginner woodworker needs is to have to wrestle with dull tools.

10 Get Them Their Own Gear — An apron, pencil, tape measure, 6" rule, PPE and a set of drill / driver bits may get kids excited about the shop and make them feel like they belong.



ROB BROWN

rbrown@canadianwoodworking.com



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RELATED ARTICLES: Top 10 Tools to Teach Your Kids to Use (Aug/Sept 2017)

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SINCE 1958

Stéphane Dumont

...on mistakes, the joys of CNC machines and how music makes sanding easy.

BY ROB BROWN



"Ogive" Dining Table – This 106" long dining table was built from wenge and lacewood. Much of the joinery was machined using a CNC router, but it's on the underside of the top so it can't be seen. Dumont says he's fine with that. "It would have been nice to see the complexities of the frame," he said, "but in the end I don't feel we have to show off. I appreciate Japanese furniture for this reason; the construction can be very complex but it's not all visible."

How long have you been building furniture?
Since 2001.

What sort of furniture do you specialize in?
High-end furniture, rocking chairs, dining tables, bookshelves, chairs, any challenging project.

If you were not a furniture maker what would you be?
Bush pilot. I was working on it when I decided to take a year off and go to Selkirk College to try woodworking.

In order, what are the three most important items in your shop apron?
6" ruler, electronic caliper, 4" square.

Do you prefer hand tools or power tools?
I like the feel of a hand tool, but over the years I have to say I like the cerebral way of making and designing with computer drawing and CNC machining.

Solid wood or veneer?
I use more solid wood, but one of our trademarks is to laminate three layers of contrasting 1/16" thick veneer between solid wood. Veneer offers many ways to design that are not possible with solid wood.

Figured wood or straight grain?
Both.

Inherited Vintage Stanley Sweetheart or fresh-out-of-the-box Veritas?
Veritas by far. So well-designed and crafted.

Flowing curves or geometric shapes?
I'm leaning toward very simple lines. Or flowing curves with some geometric shapes. Sorry! Both can be very nice together.



Photos by Julie Houde-Audet

Stéphane Dumont, 45 years old, Arbol Cuisine Inc.
arbolcuisine.com

Location & size of studio — Rivière-Ouelle
in the Kamouraka area of Québec. My studio is 26' x 104'
Education — Fine woodworking at Selkirk College

quotes

My studio is very well equipped. All the tools you want in 2021, we have them. The most important thing in a shop in a cold country is a heated concrete floor. The tools are always warm. It's located on the shore of Rivière-Ouelle, beside our house. I built the first part 26' x 40', then a second one behind it 26' x 32'. I then added a third section at the front that is 26' x 32'. Now it is 26' x 104'. That's all the land I have!

I don't mind sanding as long as I'm listening to music.

I use my CNC machines more and more often. They are so accurate and they push me to go further in my design. They push me to get better quality or to do things that would not be possible with regular tools. They're not as sexy as hand tools, but it can be really fun. You still need to work with the same principles as hand tools. You still need to consider wood grain when you cut your piece. It's not magical. It's a different mindset. I know a lot of people think working with CNC is not crafting anymore. I don't agree with that. I would say come to my studio and look at the designing process. We make very complex pieces that are very accurate.

I get my design inspiration from patterns in nature, visual art, museums.

My design process is mostly a flash in my head... I can work for days or years on an idea.... and then — poof! — it comes.

Draw and don't push yourself when the idea doesn't come right away. Take time. It will come maybe when you take a shower.

Respect to all the woodworkers who make a decent living with their passion in life.

The sales on the web are getting more important and we promote ourselves more with social media than five years ago.

Quebec's Kino Guérin makes some very spectacular pieces. I also like the work of Peter Pierobon. Very clean and sculptural.

Makers have to keep imagining stuff and keep pushing ourselves. No cruise control, otherwise you lose the passion at some point.

Design comes first, then the materials.

The guys at the shop hate when I start with an idea that evolves over the build. When you have employees, it's harder to do it, but I love this approach.

I love finding the best process to get furniture or kitchenware built. David Fraser, my teacher at Selkirk, was always talking about the process.



Grinders — Dumont and his team make a wide variety of turned grinders and kitchen utensils. These grinders are made from a 220kg piece of amboyna burl that he bought from a wood collector in Quebec City.

We woodworkers will need to be creative in the distant future. Fewer trees. Maybe more veneer.

Mistakes are easy and costly.

Customers are thankfully more aware of fine craft these days.

Twenty years ago, I had to convince people that wood cutting boards were better than plastic. I was at the right place at the right moment and my love for both cooking and nice tools led me to create a line of wooden kitchenware.

The motifs and repetitions of nature offer me an inexhaustible source of inspiration.

It's important to minimize our impact on the environment, so quality and durability are strongly considered during the making of the furniture and accessories that I create.

It must not be forgotten that we design the antiques of tomorrow.

ROB BROWN
rbrown@
canadianwoodworking.com



Go Online for More

SLIDESHOW: To view a slideshow of Stéphane's work, visit the Videos section of our website.

Make a WOOD WINE BOX

A great way to serve and preserve wine, this dovetailed wine box will also help steer the conversation towards your amazing woodworking skills.

I like to buy decent wine, but because I'm the only one drinking it at home, it oxidizes and is wasted. By decanting a few of bottles of the good stuff into a bag and squeezing out the air, I can have a glass from time to time without spoilage. These wine boxes utilize 4 L refillable plastic wine bags that you can buy at winemaking stores. The boxes would make a great gift for anyone who likes wine, especially for anyone who makes their own. They would also be an attractive way to serve wine at a party, as opposed to the cardboard boxes some wine is sold in. And, why make one when you can make four?

Hardware

As always, purchasing the hardware for a project before starting is a good idea. The most important item you'll need before making sawdust is the plastic wine bag with spout, as it determines how thick the sliding door needs to be. You can find wine bags with spouts at most winemaking stores.

Dovetail joints

I start by dimensioning the two sides, top and bottom to 1/2" thickness. I also mill some test pieces to help fine tune the dovetail joints. Then I lay out the dovetails on the dovetail jig and do a test cut. Once I'm happy with the fit, I cut the pins and tails on the box parts. I like using a dovetail jig, as once it's set up the joints are cut quickly and efficiently without wasting any wood. You could easily hand cut these dovetails if that's what interests you. If you're good with hand tools, hand-cut dovetails are very satisfying from both the maker's and the user's standpoint.

Front and back dadoes

Next, I cut the dadoes that will hold the sliding door on the left, right and bottom panels. I used a 1/4" router bit to cut the 9/32" groove in two passes. It's easy to position the grooves in the top and bottom panel so they don't exit at one of the pins, though the sides will need stopped grooves at both the top and bottom. You can accomplish this with a pair of stop blocks limiting travel of the side while you machine the groove that allows the sliding door to slide.

If you look carefully at the photo, you can see the front groove goes all the way through the side, which is a mistake. It should be a stopped dado at the bottom of the side. I plugged the hole at the bottom with a closely matching piece of wood. Because it's on the underside of the wine box, I doubt anyone will ever notice.

Before assembly, the top of the box is cut along the front, allowing room for the sliding panel to be raised and lowered. After assembly, a piece of 3/4" x 3/4" wood is glued to the underside of the top between the sides and flush with its front edge of the top. This is the locking knob strip. Down the road, this piece will receive a 1/2" diameter hole for the locking knob shaft.

Next, I made the front and rear panels. The grooves I machined are both 9/32" wide to match with the plastic dispenser spout, but double check the spout you have. I pre-finished the back panel with one coat of wipe-on polyurethane before gluing it up.



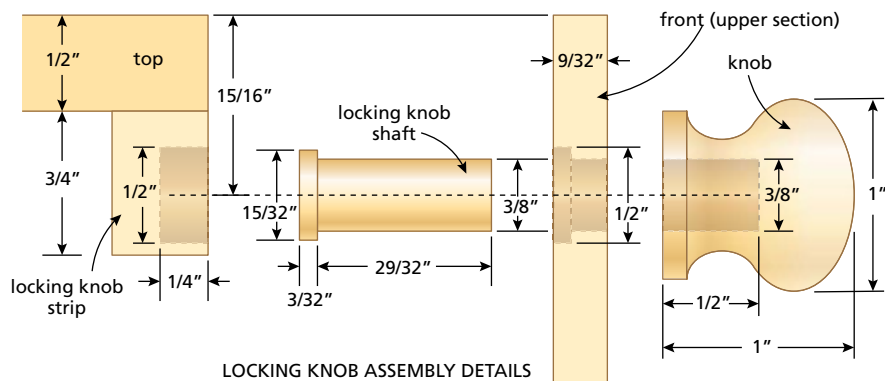
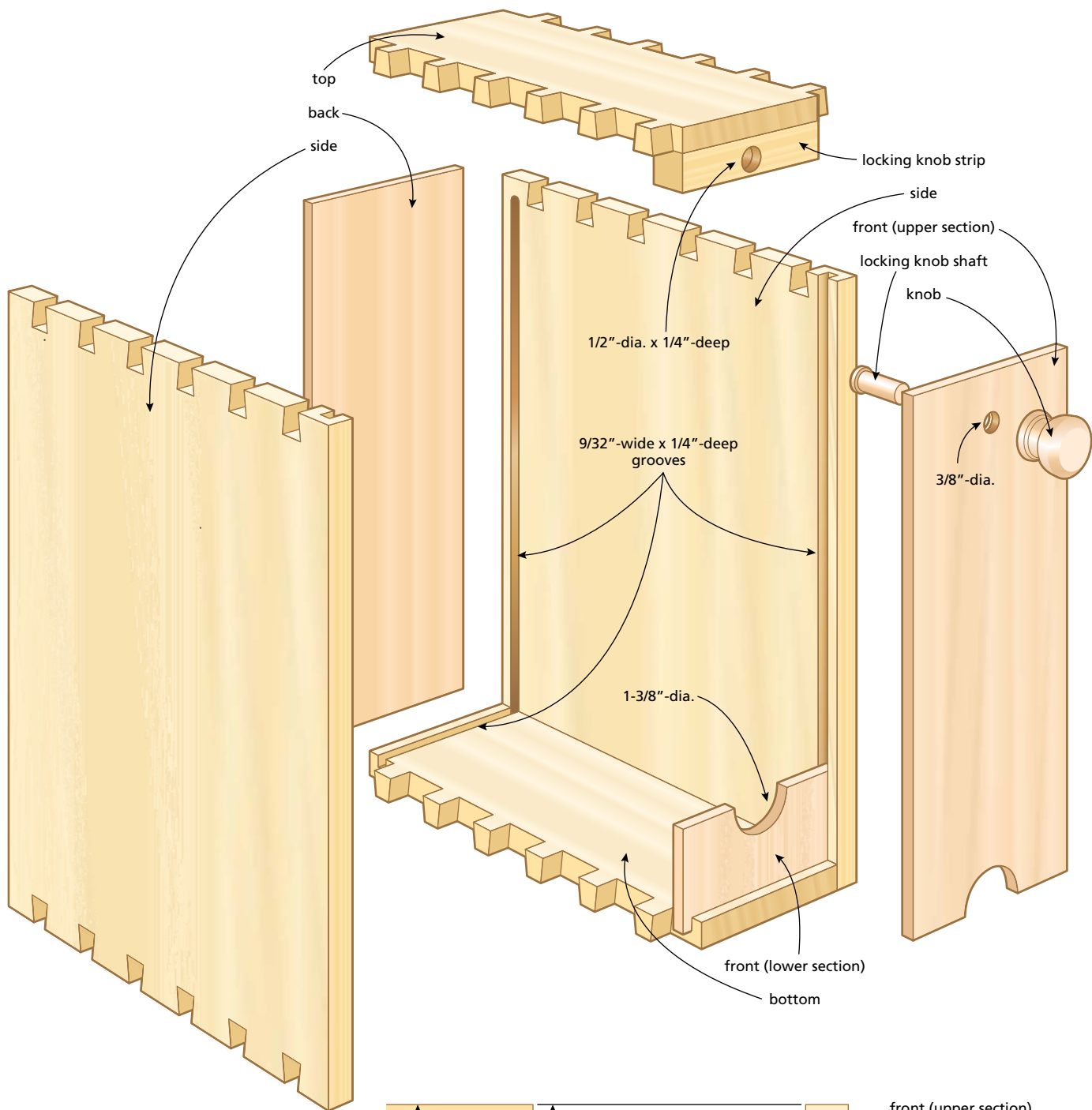
Dovetail Options – Gillard uses a dovetail jig to machine the corner joints on the four parts. Jigs are great for accuracy and repeatability, but hand-cut dovetails can be a lot of fun and satisfying to make.



Add Some Grooves – Grooves to accept the back and front panel are cut into the sides, top and bottom. The grooves in the sides should all be stopped, except for the grooves at the top, front of the sides. These grooves will accept the front sliding panel.



Locking Knob Strip – To give the upper locking knob shaft something to protrude into, a locking knob strip is glued to the underside of the top, flush with the front of the top.



Materials List

Part	Qty	T	W	L	Material
Sides	2	1/2	9-1/2	12	Hardwood
Top and Bottom	2	1/2	9-1/2	4-1/2	Hardwood
Front and Back	2	To Fit	To Fit	To Fit	Hardwood
Locking Knob Strip	1	3/4	3/4	To Fit	Hardwood
Locking Knob Shaft	1	15/32" dia	-	1	Hardwood
Knob	1	1" dia	-	1	Hardwood

Hardware List

Name	Qty	Size	Details	Supplier
Wine Bag w/ Spout	1		4L	Winemaking Store
Leather Handle	1	7"	01A2901	Lee Valley

Front panel

The front panel started off as one piece, but once the lower hole was drilled the door was cut into a smaller bottom piece that's stationary and a larger door that slides upwards.

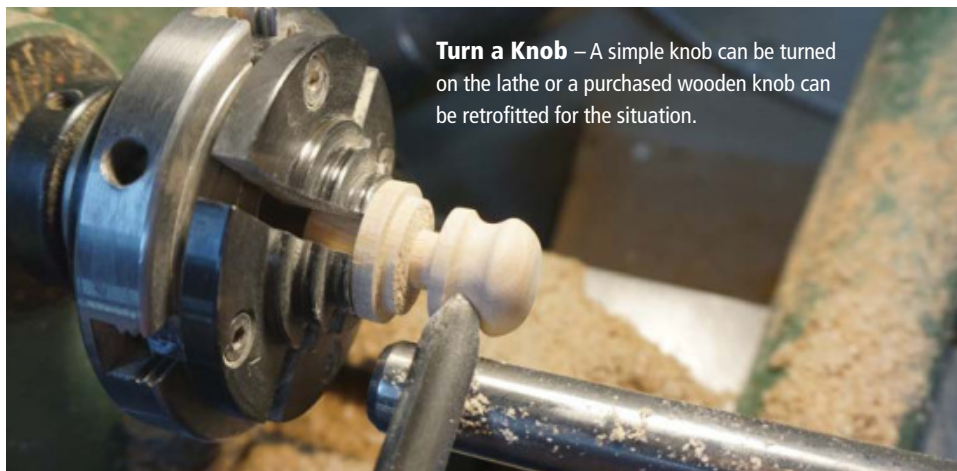
The front panel has two holes drilled in it, three if you consider the fact that the upper hole has a second, larger hole bored part way through the rear face of the sliding door. The smaller holes at the top contain a captive knob system to lock the door closed when in use. Drill the larger hole in the rear face of the sliding door first, then bore the smaller hole all the way through the sliding door.

The bottom hole is larger, and captures the plastic dispenser spout. Once the lower, larger hole is bored, the front panel is cross-cut at the centerline of the large hole. This allows the smaller, lower section to remain stationary, while the larger, upper panel slides up and down to allow access to the wine bag.

Although I left the sliding panel free of adornment, there's nothing to say you couldn't add some inlay to this solid wood panel. Or, if you wanted to do some marquetry or use figured wood, making the front panel out of veneer is a great option. I think a few grapevines would be the perfect motif, but I'm sure there are many other options, too.

Turn the knobs

Next, I turned my attention to the knob assembly that goes in the upper hole. This upper knob assembly isn't technically needed, though it does offer an extra bit of assurance when using and moving the wine box. When the new bag goes into the box, the lid is slid down. At this point gravity will do a decent job at keeping the sliding door in place, but a bit of jostling can easily happen, and the sliding door could get raised up a bit, allowing the plastic dispenser spout to move around. Even a user



Turn a Knob – A simple knob can be turned on the lathe or a purchased wooden knob can be retrofitted for the situation.



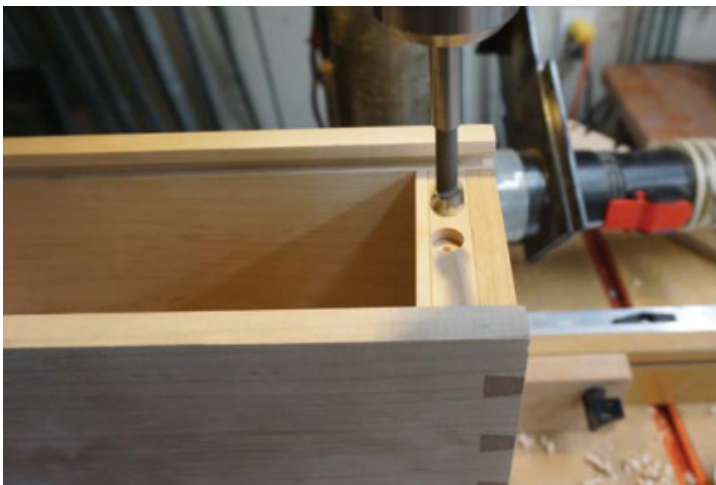
Flush on the Backside – When the locking knob assembly is pulled forward the larger portion of the shaft fits into the recess bored into the back of the sliding door. This allows the door to slide past the front edge of the top.

could possibly lift the plastic dispenser spout upward, causing the sliding door to rise. Both situations aren't the end of the world, so it's up to the user whether to add the upper locking knob assembly or not.

The upper knob assembly is made up of two turned parts: the knob itself and a shaft with two different diameters. The knob has a 3/8" hole drilled in it to accept the 3/8" shaft. The larger section of the shaft is 15/32" in diameter to fit the recessed



Brad Point Bit to the Rescue – A Brad point bit will allow you to mark the location of the 1/2" diameter hole in the locking knob strip. With the sliding door closed, press the bit through the hole and press the tip to mark the hole.



Locking Knob Hole – The 1/4" deep × 1/2" diameter hole to accept the locking knob assembly is bored on the drill press.



Lock Up That Wine! – Once the upper knob assembly is assembled it can be pulled forward to unlock the sliding door or pushed in to lock the sliding door in place.

hole in the back side of the door. To slide the door open or closed, the knob is pulled forward, recessing it into the back of the panel, and once the door is in place the knob can slide forward, with the 15/32" section of the shaft lining up with a 1/2" hole drilled into a piece of wood glued to the inside of the cabinet.

Before gluing the knob together, I used the 3/8" hole in the door to mark where the 1/2" hole should be in the cabinet. A 3/8" brad point bit pressed through the hole while the sliding door is closed does a good job of this. The 1/4" deep hole in the locking knob strip is then drilled on the drill press with a 1/2" Forstner bit.

After a dry fit to ensure the holes align and the knob locks easily followed by a bit of sanding, I glued the knob together, capturing the front panel between the two turned parts.

Time to sand

I sanded all the parts with 220 grit, then applied four coats of wipe-on polyurethane. This approach offered more than adequate protection, and warmed the colour of this attractive presentation box. Since this wine box may be the focal point of gatherings and will showcase your woodworking to friends and family, take extra care to apply a finish that's smooth to the touch and blemish-free. Once fully cured, this was followed by paste wax rubbed in with #0000 steel wool. The handle on the top is optional, and is available at many online and specialty retailers.

Randy has been a passionate woodworker for over 20 years, and enjoys making a variety of projects.

His passion for wine goes back even further, and this project brings both together.



RANDY GILLARD
rrgg654@gmail.com



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Create a Set of Textured Ornaments

Bright, eye-catching ornaments make great gifts. This two-piece maple ornament is finished with glitter and then textured to reveal the bare wood under the bold finish.

BY ROB BROWN

Dealing with small workpieces has its pros and cons. On the pro side, small parts aren't heavy or expensive. You also don't need a large space to work them. On the con side, I see only one: they're harder to hold while machining them. When you make these ornaments, you have to commit to making a grooving jig for your table saw to keep the operation safe. Although the jig takes a bit of time to make, it's not overly complex. It provides you with repeatable and accurate results and, best of all, keeps you safe. Once made, the jig allows you to easily cut grooves in dozens or even hundreds of parts so you have lots of ornaments to give away to friends and family.

On the other hand, if you want to use hand tools to cut the grooves, that's an option, too, however somewhat exacting cuts need to be made to create grooves the same width as the mating workpieces are thick. Not impossible, but if you want to make even a dozen of these ornaments, this approach isn't my idea of a fun time. Hopefully, you're more accurate with your hand saw than I am.

Dress some blanks

To ensure the workpieces you mill will fit nicely into the grooves, set up a 1/4" wide dado stack in your table saw and cut a groove into some scrap wood. You can use this groove to check for proper workpiece thickness down the road.

The ornaments are made from two 2-3/4" diameter wood disks, so starting with blanks around 3" wide works well.

I used 6/4 stock to obtain three blanks from that thickness of material, though you can also resaw 4/4 stock in half. I jointed one face of the blank, then planed the upper face before heading to the table saw. I raised the blade to a little below 1-1/2" high so it wouldn't cut through the stock while it was being ripped on edge. Once I made two cuts, I went to the bandsaw to cut the workpiece free. I find this approach is more accurate than resawing 3" wide material directly on the bandsaw unless your bandsaw is properly tuned, your blade sharp and you are familiar with the process. I also find it much safer than ripping through the entire width of the stock in two passes on the table saw, as then you have a thin piece of wood sitting between the blade and fence you have to control.

Now the lengths can be dressed to final thickness while checking your progress with the 1/4" wide groove you machined in the piece of scrap. A friction fit is what you're aiming for.

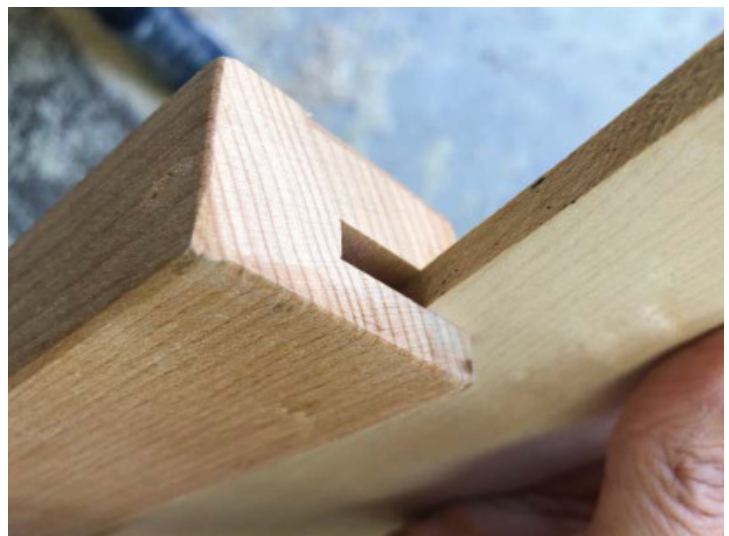
Draw and cut some circles

Mark a line down the center of the lengths. This will give you a location for the pin in your compass so you can draw the circles and it will also give you a locator while machining the grooves later. Next, mark 2-3/4" diameter circles along the length of the blank, leaving about 1/4" between them.

I used a scroll saw to accurately cut these disks from the blank, though a bandsaw would also work. I found it was important to be as accurate as possible, as the more uniform the disks, the better the grooving jig works. Barely leave the lines on so you can sand to the line if need be. I had to touch up a few later, as my concentration wanes and waxes, especially after cutting a few dozen disks.



Not Quite Through – Unless your bandsaw is tuned up nicely, it might be easier to rip about 40% of the way through your blank from both sides on your table saw, then head to the bandsaw to separate the halves.



A Nice Fit – Make a groove in a piece of scrap with the 1/4" dado blade you're going to use for the groove in the workpiece. This will allow you to dial in the thickness of the blank to fit the groove nicely.



Centerline and Circles – Mark a centerline down the middle of the part. This will assist with positioning the disks for grooving and for marking the circles with a compass.



Make the Grooving Jig – A piece of solid wood slightly thinner than the disks with a half circle cut out in it gets attached to a thicker backer board. This assembly gets attached to your miter gauge to complete the grooving jig.



Create Some Friction – Cut a disk of sandpaper and use spray adhesive to fix it to the opening on the backer board. This will help keep the disks in place while cutting the grooves in them.

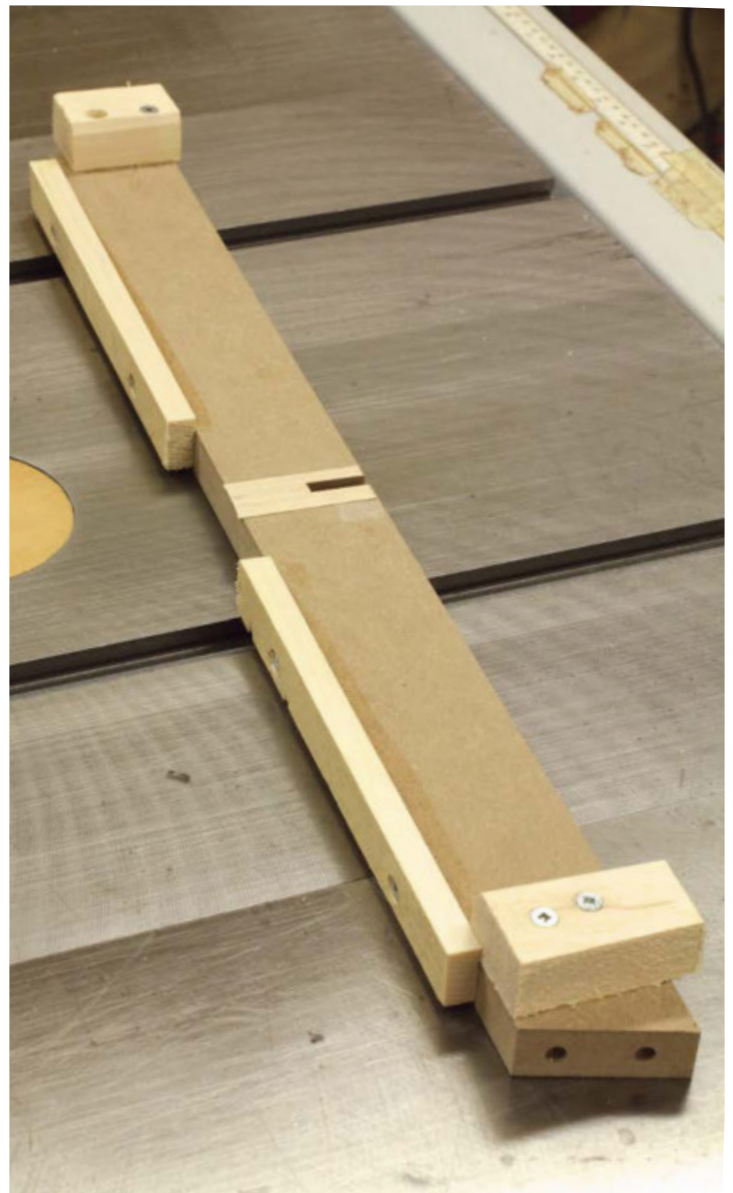


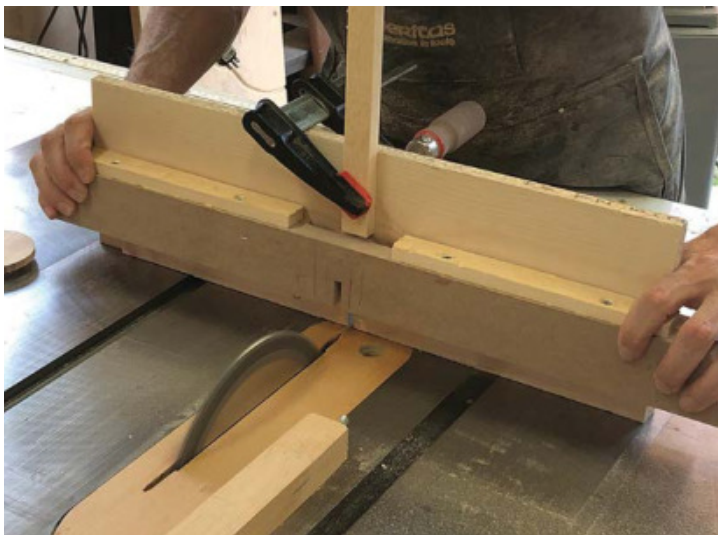
Center the Grooving Jig – Center the grooving jig on the blade when attaching it to your miter gauge.

The grooving jig

Attached to your miter gauge, the grooving jig and hold-down device will make cutting grooves in the disks easy and accurate while allowing you to keep your fingers a safe distance from the blade. I have a piece of solid hardwood screwed to my miter jig at all times to help keep the workpiece positioned properly during use. The grooving jig gets attached to it. If you don't have a piece of wood on your miter gauge I'd recommend adding one now so the union between the grooving jig and miter gauge is solid.

Hold-Down Device – This assembly allows the user to quickly and easily add a bit of pressure to the disk being grooved with hand pressure. The cleats on the top and sides of the main piece of material are strictly to position the device before each cut, while the thin piece of iron-on tape at the center of the device applies pressure directly to the area of the disk being grooved.





Downward and Inward Pressure While Cutting – With the disk in place and the hold-down device applying pressure to the face of the disk, the only thing left is to clamp a piece of wood directly above the disk to keep it from moving upwards during the cut.

There are two fairly simple assemblies that make up this jig. The first assembly is made of two wooden parts and a piece of sandpaper and gets fastened directly to your miter gauge fence. It positions each disk. The second assembly is made up of six parts and applies pressure to the disk while cutting. We'll focus on the first assembly now — the grooving jig.

I used a piece of 1/2" thick particleboard trimmed to around 15" long and 6" high, though the exact size isn't critical. Next, I cut a piece of solid maple slightly thinner than the disks, around the same length as the 1/2" particleboard piece, and about 3" wide. A half circle was then drawn on this piece. The lower quadrant

of that circle should be about 3/8" above the lower edge of the maple. Cut the half circle out, then make two trim cuts from the side quadrants of the circle upward on a slight angle, allowing you to be able to insert the maple disks into the half-round cavity to cut each groove. This piece of solid wood gets glued and screwed to the face of the 1/2" particleboard, so their lower edges are both flush. Cut and adhere a sandpaper disk to the 1/2" particleboard face in the circular opening to help keep the disk in place while grooving them.

Hold-down device

To keep the disks from moving while the grooves are being cut, a second assembly needs to be made. This hold-down assembly consists of a main face about 2" wide and a few inches longer than the 1/2" thick particleboard face of the first assembly, a pair of upper cleats, a pair of side cleats and a strip of iron-on edge banding.

The upper cleats should overhang the edge of the piece of maple that is attached to the first assembly, while the side cleats get glued and screwed to the face so they prevent the face from moving side-to-side while the disks are being grooved. A short piece of iron-on edging (or a 1/16" thick piece of solid wood) is fixed to the inner face of the second assembly, and applies pressure on the workpieces while machining the grooves. These two assemblies keep the disks stationary while in use.

Machine the grooves

Now that your grooving jig and hold-down device are complete, and the disk is in the grooving jig, take a measurement from the upper surface of the table saw to the center of the disk and set your 1/4" wide dado blade to slightly under that height. If the grooves are too deep the fit won't align the two mating halves of the ornament when they're assembled. But if the grooves are cut slightly less than halfway across the disks it's not too hard to use a hand

shopnotes

Bessey EHK Series Clamps

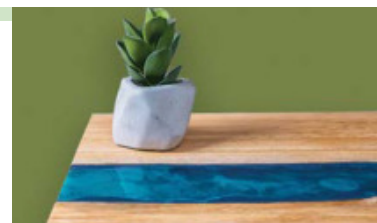
Sponsored: The new EHK Trigger Clamps have been engineered to offer a clean design, comfortable handles, up to 600 pounds of potential clamping force and the ability to quickly transform from clamping to spreading without using tools. The EHK Series is ideal for the home owner or professional craftsman seeking a range of clamping options that are ergonomically designed, well-engineered and competitively priced. Clamping force from 4-1/2" to 50" and 14 configurations to choose from make this product an attractive solution. Visit BesseyTools.com for more details.

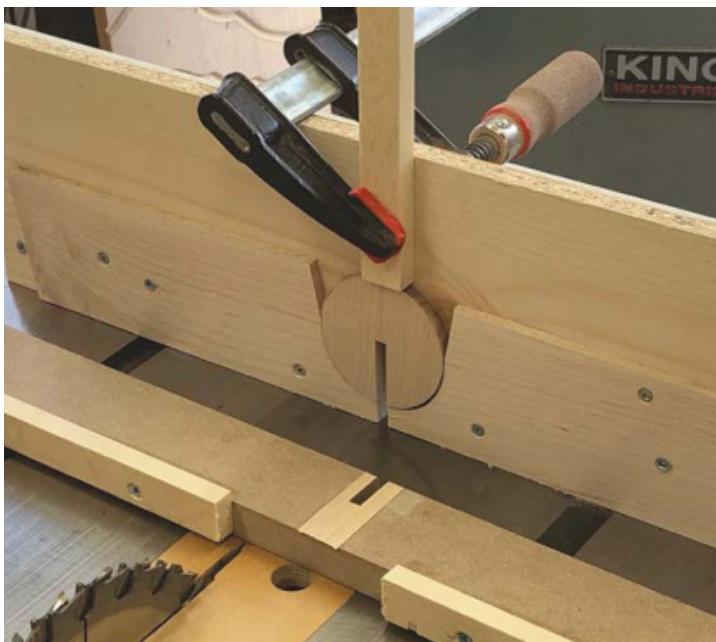


EcoPoxy FlowCast

Sponsored: EcoPoxy Inc. is a Manitoba-based manufacturer of bio-based epoxies made from annually renewable resources that offer customers an alternative to traditional epoxy resins made from fossil fuels. One of their famous brands is FlowCast, which is mainly used for casting. Woodworkers prefer it because of its water-like clarity, air release and unmatched reliability, which helps with consistent results in deep casting applications, such as river tables.

Recommended for 1/2" to 1-1/2" thick layers, the epoxy has allowed customers to create fantastic furniture, staircases and deeper encapsulation projects. Check out their website for a gallery of customer images. EcoPoxy is expanding its customer network and is offering a wholesale pricing program to interested woodworkers through its web page EcoPoxy.com/wholesale/.





A Fresh Groove – With the first groove machined you can repeat the same operation with the rest of the disks.

or bandsaw to cut the groove a bit deeper to get a perfect fit. Since these disks aren't all uniform in diameter the grooves will all be cut at a slightly different depth.

With the blade height set, insert a disk and install the hold-down device. The hold-down device is kept in place by hand pressure. To ensure the disks don't ride up while being cut clamp a piece of solid wood above the disk so it can't go anywhere. If the top of the disk isn't visible above the hold-down device, machine the strip of solid wood slightly thinner than the disks so it can protrude down to come in contact with the disks.

Slowly move the disk across the blade to cut the groove. Be aware that the blade will likely protrude out the user side of the miter gauge assembly, so keep your hands away from this area. I used a stop



How Far Off? – If you happen to end up with grooves at imperfect depths, you can trim one of the grooves a bit deeper at your workbench. Dry assemble the parts and measure how far off the ends are, then transfer that distance to the end of one of the grooves. At this stage the pairs can be marked so they go back together with their mating halves.

block clamped to my table saw to limit the travel of my miter gauge.

If for some reason the grooves aren't the perfect depth, you can use a hand saw or bandsaw to lengthen one of the grooves. Dry assemble an ornament and measure how far away the halves are from lining up, then mark that distance on one of the parts, right at the end of the groove. I had to do this with a few of the disks, as the first few I made rode up while being grooved and weren't deep enough.

Assembly

Even a small project like this needs to be assembled, though it's a lot easier when there are only two pieces per finished item and they both fit nicely in your hands. Apply a small amount of glue at the base of the groove and on the sides of the groove, very close to the base. As long as you have a decent friction fit the glue will just be added insurance to keep the two halves together. Remove any squeeze-out when dry.

Sanding

I sanded the edges of the disks and ensured they were even with their mating partner. I did this freehand on a belt sander while it was turned on its side. I was aiming for a smooth transition where the bottoms and tops of the two parts met and to have the edges of each disk show a nice, even curve. It doesn't have to be perfect, though. A bit of hand sanding eased all the sharp edges.



Lengthen the Groove – Use a hand saw with minimal set to cut the walls of the groove deeper. Brown used a Japanese hand saw to make the outer kerfs, then his bandsaw to remove the waste in the center to the marked line.



Just a Few Drops – If the grooves are sized appropriately the two disks should fit together with a friction fit. A few small drops of glue are all that's needed to keep the ornaments together forever.

Apply the finish

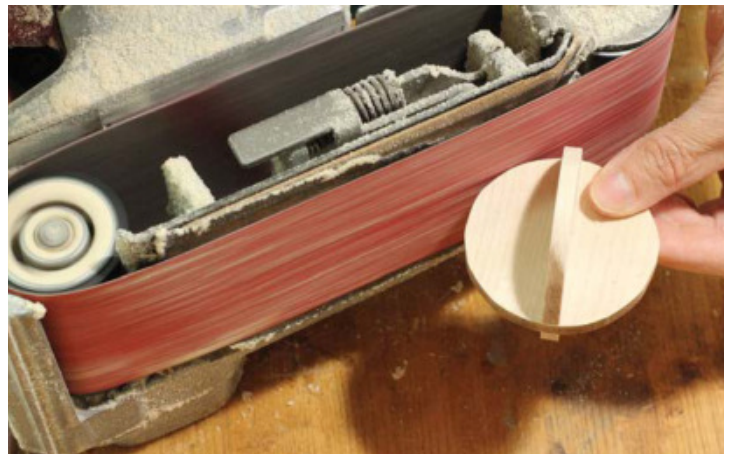
There are dozens of approaches to take at this point, though I narrowed my focus to applying a finish to the parts, then adding texture to create a two-tone effect on each ornament. By applying the colour first, any wood I uncovered while adding texture would provide a solid hit of contrast.

I wanted to add colour to these ornaments, and when I went to the local hardware store I found a product that was available in many colours and also had glitter in it. I can't imagine applying a glitter finish to furniture or woodwork, but for ornaments Rustoleum Glitter was perfect. You could apply a different finish by hand or brush, but an aerosol product applies a quick, even coat and makes finishing this type of small project a breeze.

As you need to spray all the surfaces of these ornaments at once, you'll need to suspend them. I bored a small pilot hole in the upper end of one of the disks and installed a small screw eye into the ornament. I used a small rope to suspend each ornament while I finished it. Large- and medium-sized screw eyes are everywhere, but I found it hard to find small screw eyes. Workshop Supply had some that were 4mm diameter, so I ordered a bunch, and they worked great. Because the screw eyes were going to get coated with glitter, I used a few of them for the finishing process, and replaced them with clean ones when I was done. Thankfully, I wasn't in a rush, so spraying only a few at a time was fine. Otherwise, you will either have glitter screw eyes (which isn't awful) or you can clean them when each ornament is complete.

Although Rustoleum has a primer you can apply first, I applied the glitter spray finish over top of bare wood. Adhesion may be better and fewer coats of the glitter product needed if you use the primer, but I didn't have any trouble without it. It could be a case of me not knowing what I was missing out on.

For the glitter finish, three light to medium coats will go on better than one or two heavy coats. I hung an ornament then sprayed it at 90° angles to cover all the sides, then sprayed some finish on the upper and lower ends of the ornament. Once an even coat was



Sand the Circumference – A belt sander turned on its side with medium grit belt will allow you to fair the outer edges of the both disks, and ensure they meet evenly at the top and bottom of the ornament. You could also use a coarse grit and a hand sanding block, though this takes longer.



Spray on a Finish – Aerosol spray products, like Rustoleum's Glitter product, make spraying small, irregularly shaped objects like these ornaments a breeze. Several light coats are better than fewer heavy coats.



Add Texture – Although you could skip this step, texture adds so much to these small ornaments. Both physical and visual texture are nice to touch and look at, and by uncovering the solid wood under the finish another colour is added to each ornament.



Ready to Hang – Small screw eyes allow you to pass a piece of fabric, string or fishing line through so the ornament can be hung. The smaller the better, as you don't want a large screw eye taking away from the ornament. Brown sourced these small screw eyes from Workshop Supply.

applied, I let it dry before applying another even coat. When the glitter and colour coverage was complete I applied a sealer coat to the ornaments. This helps lock the glitter in for texturing and Christmas usage for years to come.

Adding texture

I found the texture brought each ornament alive even more. I used a sharp V-gouge to create a series of small grooves toward the outer edge of each disk. There's no need to worry too much about being even, as a bit of variation shows the ornaments were textured by hand.

If you don't have a sharp V-gouge you could try a small burr in a rotary tool to leave a series of small divots.

With clean screw eyes in the ornaments, it was time to hang a few on the tree. I recommend giving a few away, too. A small box for each gift ornament would make a very nice presentation. Nothing overly fancy is needed, but it would really showcase your craftsmanship. But if it's already late December I'd understand if you just wrapped each gift ornament in paper and rushed out the door right away.



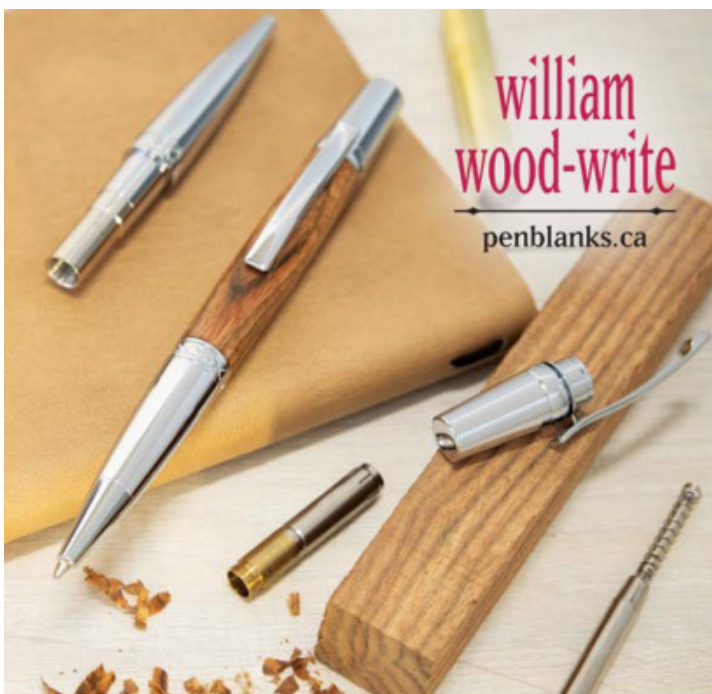
ROB BROWN

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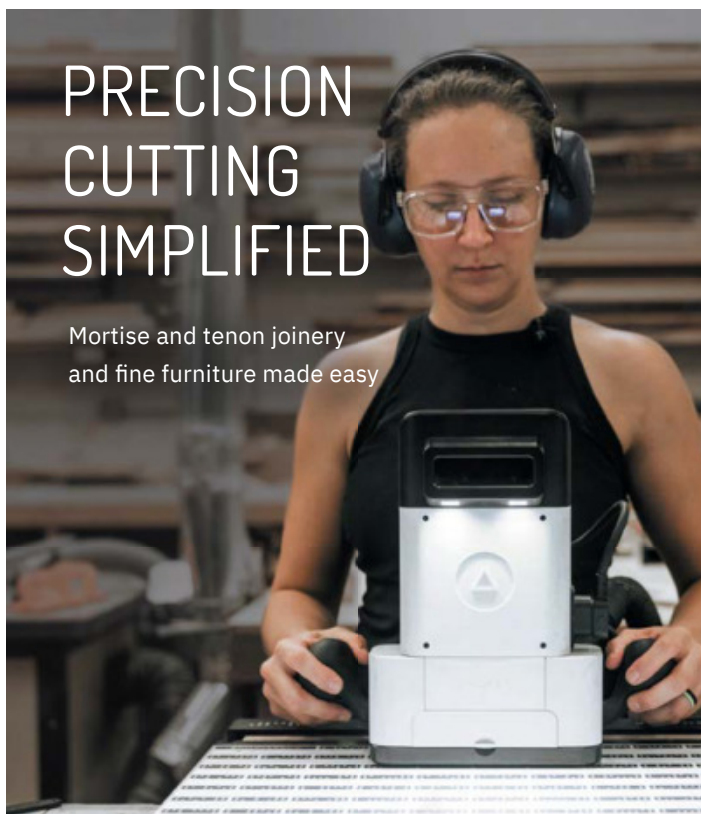


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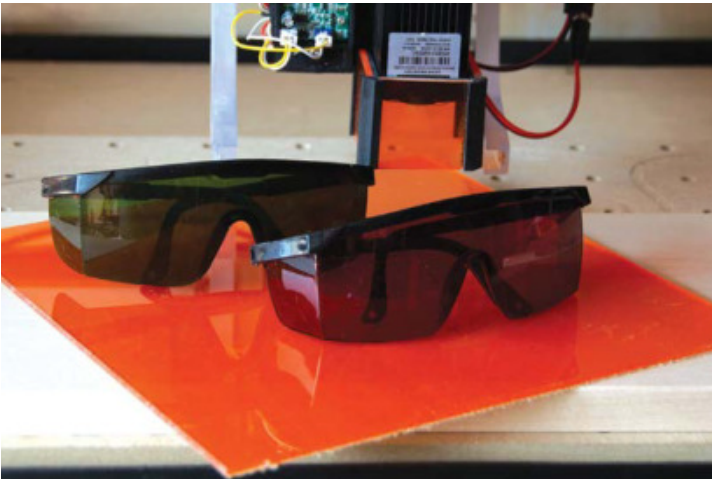
 **RUST-OLEUM**



LASERS IN THE WORKSHOP

Lasers have helped woodworkers and DIYers for years, but now they can be used for cutting and engraving in the small shop.

Photos by Chris Tucker



Protective Safety Lenses or Shields – PPE must be used when operating all lasers. This can be in the form of safety glasses or shields specific for the wavelength of the laser being used.



DIY Laser Add-On Package for a CNC Machine – Lasers can also be purchased as DIY kits from a variety of online retailers, then added to a CNC machine. (Photo by AxiomPrecision.ca)

BY CHRIS TUCKER

Lasers aren't new in the workshop; we've have been using them for years to determine distances, temperature, level and alignment in our work. What is relatively new is the use of lasers as an engraving or cutting tool. If you've recently purchased a wooden model kit and noticed that the edges have burn marks, or wondered how a craftsman achieved such intricate detail work, these effects were most likely produced by a laser. In this article, I'll explore basic types of lasers, how lasers can be used and some practical applications of lasers.

The study of lasers is part of the field of optics and photonics, which is a branch of physics. Laser is actually an acronym for Light Amplification by Stimulated Emission of Radiation. In essence, a laser is a focused beam of light. Before we get into their applications, we need to confirm two main points about lasers:

- Despite what science fiction has taught us, the path of a laser is not visible to the human eye.
- Lasers can cut and burn material; this includes your skin and eyes.

These two points clearly demonstrate the need for proper personal protective equipment (PPE) and safety procedures when working with lasers. Specific safety lenses and shields are the primary forms of PPE. Guards to prevent direct contact with the path of the laser beam are also necessary. Ventilation and filtration considerations are also required, depending on the material you're working with. Before I discuss selecting different types of material in more detail, I'll outline the basics of lasers.

While there are many different types of lasers in use in our daily lives, they're separated by two general characteristics: 1) how the laser is created; and 2) its power, measured in watts (W). However, in the woodshop, there are two main types: diode and carbon dioxide (CO²) lasers. Each of these come in a variety of sizes and power. To help categorize the safety of lasers, there's a classification system that's based on a laser's power. According to this system, Class 1 lasers offer little risk to the user, whereas Class 4 lasers are extremely hazardous and include most engraving and cutting lasers. However, the majority of commercially available CO² lasers are fully protected, and classified as Class 2 lasers.

Laser Classifications Chart – Lasers are classified into one of four categories, depending on their power and their ability to cause physical harm.

	Class 1	Class 2	Class 3	Class 4
Power	Emits a beam less than 0.39mW	Emits a visible light beam less than 1.0mW	For visible light, emits a beam between 1.0 and 4.99 mW	For visible light, emits a beam greater than 4.99 mW
Eye and Skin Hazards	Safe for unprotected eye exposure	Safe for unprotected exposure less than 1/4 second	Eye hazard: avoid exposure to direct or reflected beam	Severe eye hazard: avoid exposure to direct or reflected beam
Examples	CD and DVD players	Laser pointers, rangefinders and CO ² lasers with full safety enclosures	Spectrometers and entertainment light shows	Laser engravers and cutters



Desktop Diode Laser Unit – Due to their compact size, diode lasers are often available as completely enclosed desktop units. Shown here is the Emblaser 2 by Afinia. (Photo by iDesign Solutions)



Raster Vs. Vector Image – The image on the left shows the pixilation of a raster image versus the vector image on the right.

Are you engraving or cutting?

Your intended application is the primary factor for determining the power of your laser. Are you looking to engrave material or are you looking to cut it? If you're looking to engrave or etch material, a 500 mW diode laser may be sufficient, but if you want to cut material other than paper you'll need a more powerful unit. The more powerful the laser, the faster and deeper it will engrave or cut. A general rule of thumb in the industry is 10 watts of power for every millimetre of material to be cut. However, more power also means more money. To offset the cost, you can achieve the cutting performance of a stronger laser by reducing your feed speed (allowing the laser more time to "burn" through material) or performing multiple cutting passes for a project.

Diode lasers

Diode lasers generally have a maximum power rating of 10W and consist of a laser unit, control board and power supply. Due to the enclosed and compact nature of diode lasers, they're often used as desktop machines or are easily added onto an existing CNC machine. If you're considering a laser as an add-on to a CNC unit, you need to be aware of the increased PPE required for their operation. Diode lasers generally range in price from \$150 to \$4,500, depending on the power and if it's a stand-alone unit.

CO² lasers

In comparison, CO² lasers for woodworking typically have power ranges from 20W and up. This increase in power allows for faster production speed and thickness of material to cut. These units are fully enclosed with interlocked lids specifically designed to block the wavelength of light produced by the laser for added safety. With the increase in power also comes additional requirements for cooling of the laser tube and exhaust and filtration of the laser bed. Generally, CO² lasers range from approximately \$5,000 to \$40,000.

Materials to work with

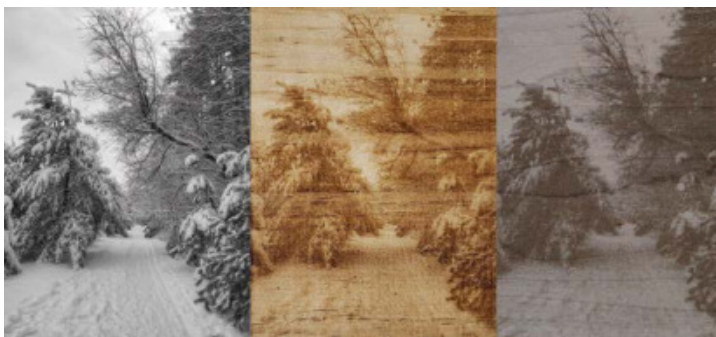
Now we need to explore how material can impact a laser's performance. Lasers can be used to engrave or cut a wide variety of material, such as any paper product, fabric, leather, all types of



Common CNC Accessories – Lasers are a common accessory purchased for CNC machines. Shown here is the Jtech laser accessory for Axiom CNC machines. (Photo by AxiomPrecision.ca)

CO² Laser – Carbon dioxide lasers are usually fully enclosed units that require dedicated filtration and/or ventilation systems. (Photo by Inksmith)





Engraving or “Burning” an Image File – Lasers are capable of engraving or “burning” images onto a variety of materials. From left to right: the original image (photo by Jessica Tucker); the photo burnt onto pine; the photo burnt onto maple. You can see how the physical features of wood, such as its grain, can affect a laser’s performance.



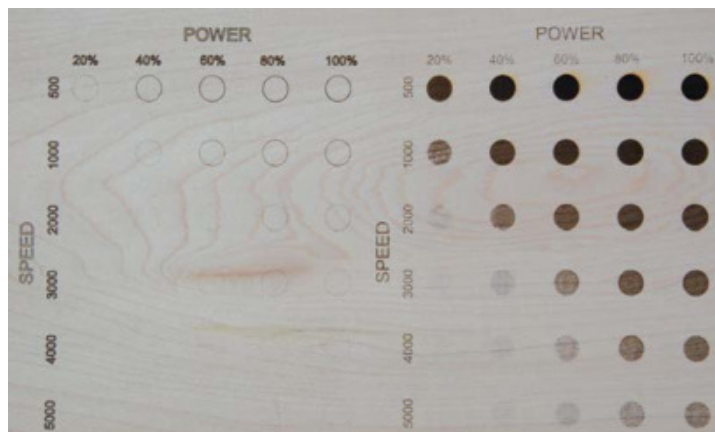
Laser Cutting – Consumer lasers are capable of cutting a variety of material up to 1/2" thick. Woodworkers and model makers have adopted lasers for their precision and speed. (Photo by Trotec Laser Canada)

wood, plastics and acrylics. The type of material you’re using will have a significant impact on your laser’s performance. Physical characteristics like grain orientation and knots also will impact the overall performance of your laser. With lasers you also need to be acutely aware of the chemical composition of your material. Lasers burn material, which is a chemical process that often produces smoke. Generally, unfinished natural materials pose limited risk to users. However, adhesives, finishes and manufactured products that contain polyvinyl chloride may release chlorine gas when lasered. So, under no circumstances, should you use a laser on material if you’re unsure of its chemical composition. If you have doubts about the suitability of material for lasering, laser suppliers may be able to provide material safety data sheets for various materials.

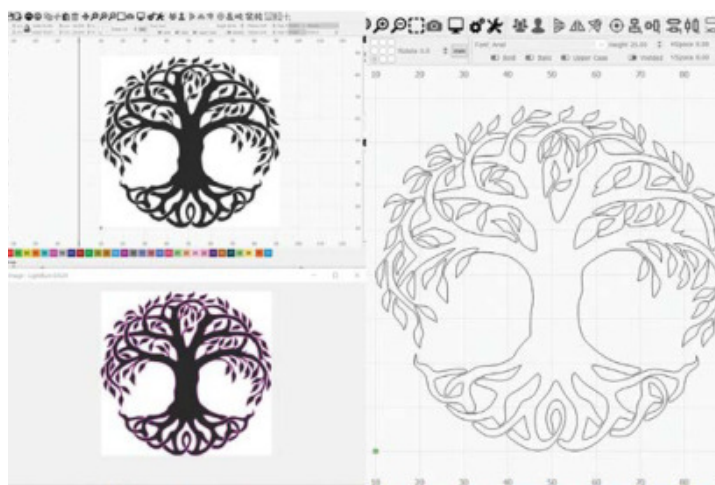
How to use lasers

All lasers utilize a form of computer numeric control (CNC) and have a similar workflow. When working with any CNC environment, it’s important to understand the two main graphic files used by computers: raster or bitmap; and vector images.

A raster or bitmap image is composed of small dots called pixels,



Laser Test Board – Dialing in the settings for your laser will require trial and error. Many users develop test boards for specific materials to help them determine power and speed settings.



Converting an Image to a Vector File – There are multiple options for converting an image into a vector. Shown here is LightBurn’s Trace function. The upper left photo shows the original raster image imported into LightBurn. The lower left photo shows the trace tool settings and preview. The photo on the right is the resultant vector image.

which are arranged to produce the design somewhat like building blocks. These images are the most common file types available online. Raster images are most often manipulated using photo editing software. Some of the most common file types are jpg, gif, png, tif and bmp. If you were to attempt to laser these types of images you would actually not cut smooth lines, but produce sawtooth-like steps. Most CNC machines can’t work in raster mode and in order to machine a raster image you’ll likely need to convert it to a vector image.

A vector image, on the other hand, is composed of smooth lines that are scalable. This means that however large or small you make the image, it will maintain its line characteristics. Most graphical design software titles (Adobe Illustrator, Corel Draw and Microsoft Publisher) will produce vector images with common output types such as eps, ai, cdr, wmf, emf. Additionally, most computer-aided design (CAD) software titles are capable of producing vector files; dxf files being the most common type.

There are two primary laser work types: engraving (“burning”)



Lasers are Excellent for Detailed Work

– Lasers are ideally suited for detailed work that may have been traditionally accomplished using other techniques. (Photo by Trotec Laser Canada)



Stacking Layers – By stacking multiple layers of cut material you can achieve unique artistic effects to portray depth. Shown here is a gift that I received. It's an example of three layers of 1/4" hardboard painted and stacked to provide depth.



Personalizing or Branding Items

– Lasers make it extremely easy to personalize your projects to add that extra bit of consideration. Shown here is an example of how engraving text on different materials can really add to a project. (Photo by Trotec Laser Canada).

or cutting. Lasers can either “burn” image files (jpg, tiff, png, etc.) directly onto a variety of materials, or can either engrave or cut vector files which have defined boundaries.

In order to engrave an image, you must first import your image file into the laser software or print to the laser from a compatible graphic design software (like Corel Draw or Adobe Illustrator) and establish its characteristics like size and orientation. (If working with transparent material, it's preferable to invert all files and work on the back of the material.) When ready to run your project, the software will scan the image and alter the laser's intensity to reproduce a monochromatic version of the image on your desired material. While the software calculates the laser intensity values, you'll have the ability to adjust the maximum laser strength. Typically, it's recommended not to run a laser at more than 80% of its maximum power, as this will decrease the lifespan of the laser. You can alter the laser speed as well to affect the project's overall intensity. Generally, the slower the speed, the darker the image. There is definitely a “sweet spot” of settings which, with experimentation and experience, you'll find for your machine. Typically, users will create test boards showing the results of various settings.

If you're looking to engrave or cut a project with a defined edge, a vector file will produce the best results. You can choose to do this from scratch using a palette of drawing tools common to most computer design software, or you can use an “image to vector” conversion tool which can be done in the same laser software or as a dedicated application. Using one of these tools is as simple as opening your image file, selecting the colours or shades you want to define your shape, and pressing a button. The software creates a vector approximation, or “trace,” of the image. At this point you can preview your job and determine if any touch-up work is required.

What will you make?

The final and most important consideration when using lasers is, what are you going to make? Lasers have an incredible accuracy with almost no kerf. This makes lasers capable of some extremely delicate and intricate work. When cutting remember that, depending on your laser's power, there is a maximum thickness that you'll be capable of cutting. I suggest stacking layers of material to achieve cumulative thickness which also allows for multiple artistic planes. Lasers provide an easy and quick way to brand or personalize all manner of projects that could make excellent gifts.

In speaking with countless laser users, I have heard time and time again of how they never could have imagined all of the different projects they accomplish with a laser. It reminds me of the saying, “If all you have is a hammer, everything looks like a nail.” The same applies for a laser. Once you complete one project, you'll quickly see how your imagination is the only limit to a laser's possibilities.

Chris is a curriculum consultant with a background as a technology education teacher, an architectural technologist and a contractor. He's a CNC enthusiast using both additive and subtractive tools in his projects.

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PX12 Benchtop Planer

Laguna's new **PX12 benchtop thickness planer** features the QuadTec I cutterhead with 26 four-sided solid carbide inserts that deliver a superior finish on domestic and exotic hard or soft woods, no matter how wild the grain pattern. The 2 HP 15-amp universal motor delivers a feed rate of 26 FPM with power to thickness stock up to 6" thick. With the PX12 you can plane stock up to 12-1/2" wide and as short as 10", down to 5/32" thick. Setting cut depth is easy with the hairline depth-of-cut gauge. The planer bed is 10-1/4" long and with the two folding infeed/outfeed extensions you get a total bed support length of 32-3/4". There is a 4" dust port for use with a dust collector and a 2-1/2" step-down should you wish to connect it to a dust extractor. If you're looking for exceptional cut quality, then look to the Laguna PX12. Lagunatools.com

Beeswax Furniture Polish

A favourite of renowned furniture maker James Krenov, **Clapham's Beeswax Furniture Polish** is a fine, museum-quality polish based on an old family recipe from England. It's made with or without lavender essential oil, from beeswax with a little carnauba wax and deodorized mineral spirit. It can be applied over any cured finish including waterborne or solvent-based varnish, polyurethane and lacquer as well as penetrating oil finishes. You can also apply it directly to bare wood – you'll get a gorgeous, soft beeswax shine that will become part of the patina as the years go by. Apply the polish very thinly over the surface using a cloth. Wait for about 5 minutes, then buff lightly with a different cloth to bring out the shine. Available in 50g/1.75oz, 200g/7oz and 1134g/40oz sizes. Claphams.com



Salad Bowl Finish

Made in beautiful British Columbia, **Clapham's Salad Bowl Finish** is a non-toxic, food-safe finish. It's made of beeswax, carnauba wax and mineral oil. You can use it on any wooden kitchen utensil or surface, including countertops, butcher blocks, cutting boards and salad bowls. It's also the perfect finish for baby cribs and children's wooden toys. The finish helps protect wood from the elements and gives it a soft lustrous shine. Apply thinly with your hand, cloth or paper towel. It may take some time to dry depending on the temperature and humidity of your home or workshop, but the piece can be used immediately. When dry, buff to a light shine. Available in 50g/1.75oz, 200g/7oz and 1134g/40oz sizes. Claphams.com

Hemp Wood Wax

Clapham's newest, cleanest and greenest wood wax finish, **Hemp Wood Wax** is 100% food-safe, completely non-toxic and contains no petroleum by-products. Hemp seed oil conditions and protects wood leaving it with a nourished sheen finish. It's the perfect finish for all wooden surfaces such as charcuterie boards, butchers' blocks, countertops, tables, utensils and even children's toys. Apply the wax thinly with your hand, cloth or paper towel. Once dry, buff to a light shine. The piece can be used immediately if needed but it's suggested to allow 12 hours between application and use. Available in 50g/1.75oz, 200g/7oz and 1134g/40 oz sizes. Claphams.com



Variable Speed Plunge Cut Track Saw

Track saws are designed to deliver consistently clean, chip-free cuts in both solid wood and sheet goods. The **KC-8365** has a 6-1/2" blade and a 12 amp soft-start motor with constant torque that delivers variable speeds from 2,000 to 6,000 RPM for optimum performance in a variety of materials. When installed on a track it has a cut capacity of 2-1/8" at 90° and 1-1/2" at 45°. The bevel angle range is 0° to 48°. The flat blade housing design allows you to cut as close as 11/16" from the wall, while a depth stop feature delivers splinter-free cuts. A mode selector enables fast, easy settings for major functions, such as blade removal, free

plunge cutting and making scribe/scoring cuts at 0.1" deep. Included is a very effective dust collection bag and chute to keep the work area clean. There are a range of accessories for the KC-8365 including a 50" extruded aluminum track, track connector kit for joining two 50" tracks, track clamps and track storage bag. KingCanada.com



The Best Way to Control Dust While Sanding

If you want a cleaner, healthier workshop, then you need to collect dust at the source with a downdraft sanding table. They're portable, durable, quiet and powerful. SandMan Products LLC has tables to suit the needs of hobbyists, small woodworking shops, and large production facilities. For objects too large for sanding tables, there's the **Sand Pro Sanding Booth SBP108**, a complete self-contained 9,300 CFM backdraft unit. With the Sand Pro Inspection Light you can easily see scratches, swirl marks and other imperfections before the material is finished. Sandmanproducts.com

A Woodcarving Set in Your Pocket

The 6-Blade **Carvin' Jack (JKN91)** is the world's first folding multi-tool for woodcarving. It's equipped with two scorp, straight gouge, hook knife, chisel and detail knife. You also get a slip strop, bar of Flexcut Gold polishing compound to keep your blades sharp, and leather belt-mounted sheath that looks good with jeans or even your better pants. Flexcut.com



Flexcut Micro-Palm Carving Set

With the industry's greatest selection of micro-tools, Flexcut offers Flexcut's Palm Tools, perfect for carving small projects such as wood carvings, netsuke and linoleum blocks. The **FR804** set includes FR800, FR801, FR802, FR803. These tools are especially adept at carving small items, making this box the perfect starter kit for people trying to get into wood carving. Flexcut.com

Flexcut Mini-Palm Carving Set

The **FR604** set includes four mini-palm tools. The tools are extremely sharp and require no extra honing before use, and the sturdy handles allow for easy gripping and maneuvering. The set comes in a sturdy wooden box specifically designed to provide you with a wide range of capabilities applicable to different types of carving. Includes FR600, FR601, FR602, FR603. Flexcut.com



High Velocity Air Mover

With three user-selectable speeds of 420, 490 and 550 CFM, the **KC-8500AM** delivers serious air movement to dry floors, carpets, walls or ceilings. There are two on-board 120V outlets that enable you to connect up to three Air Movers together for bigger jobs. And the stackable design with interlocking intake guards makes it easy to bundle multiple units together. The KC-8500AM features three operating positions, thermal overload protection, a 10-foot power cord for longer reach, and a convenient top handle for power cord storage and portability. KingCanada.com



Dust-Free Routing

Handheld routers are notorious for kicking up a lot of dust. The **Oneida Air Systems Dust-Free Router Hood** captures nearly all the dust, chips and shavings generated by portable routers. The router hood features both a universal baseplate that fits nearly any make and model of portable router as well as an upper dust dome and lower chip cover that combine to fully encapsulate the router bit. The upper dust dome and lower chip cover freely rotate as the router moves so you can work unimpeded. The lower chip cover can be removed quickly without use of tools for inner plunge work and can be replaced by the included shallow cover for tighter edge work. The router hood installs easily in minutes using the router's existing hardware and includes a quick-release hose connection port for simple storage. Moulded from clear polycarbonate, the

router hood offers both excellent clarity and superior durability. **Oneida-air.com**

Premium Whiteside Router Bits

If you use a router or CNC machine for woodworking, then you need **Whiteside bits**. These router bits are used in a variety of applications, including cutting decorative edges, adding joints like rabbets, dadoes and grooves, and hollowing out an area within wood. Whiteside bits are manufactured in the U.S. with high-quality steel and solid carbide for reliable, consistent performance. Each bit features a micro-grain carbide tip. KJP

Select Hardwoods offers a wide selection of Whiteside spiral, straight and form router bits to suit your woodworking needs. They also carry accessories like flat washers, steel router collets and more. Stock up on router bits to make your next piece look sharp, precise and unique. **Kjpselecthardwoods.com**



Cutting Board Packs



Making a cutting board is the perfect introductory woodworking project. If you don't have access to machinery, you can still start a new hobby using KJP Select Hardwoods packaged **cutting board packs**. Choose from pre-made packages or design your own pack by purchasing individual blanks of different pre-cut wood species and sizes. Laminate the boards in any pattern of your choice – all you need are clamps and glue. Complete your board by applying a nourishing wood finish such as KJP's locally made Honey Bee's Wood Cream to help protect your new creation. Don't feel like using individual blanks for a cutting board? Check out their live edge craft and charcuterie boards. **Kjpselecthardwoods.com**

Affordable CNC Routing

Since early 2016, Waterloo, Ont.-based Sienci Labs has been developing CNC machines for small wood-working shops, hobbyist woodworkers and crafters. The **LongMill** is their flagship three-axis CNC router capable of cutting 2D and 3D designs. With a starting price of around \$1,500, the LongMill is one of the most affordable and easiest-to-use CNC machines in its category. A comprehensive set of resources and guides help new users go from opening the box to starting their first job in an easy step-by-step manner. The LongMill comes in a kit that takes a couple of hours to assemble and includes free software options for designing and running the machine. Sienci also provides excellent customer and technical support while you take your first steps as a CNCer. If you're thinking of adding a CNC router to your shop, then think LongMill. **Sienci.com**



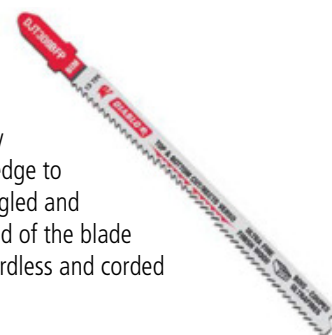
The FEIN MULTIMASTER – For Almost Unlimited Application Solutions

Regardless of which challenges you face when woodworking, with the MULTIMASTER and the right accessories, you will master just about any task – from sawing flush with the surface, to plunge cutting, and to sanding in tight places. The **AMM 500 TOP** set offers you a tool with all the versatility and freedom that cordless provides, with the power of a corded tool. The AMM 500 features variable speed control, an innovative anti-vibration system, three-second accessory changes, and the Starlock mounting system for

maximum transfer of power from the tool to the accessory. The set includes over 30 accessories for cutting in wood and metal, removing grout, sanding, scraping and more – all packed neatly into a carrying case. **Fein.ca**

Diablo 4-5/8" 13 TPI T-Shank Jigsaw Blades

Diablo's **bi-metal teeth jigsaw blades** (#DJT308BFP5) are specifically designed for maximum durability, cut quality and longer life in ultra-fine finish wood applications. These high-performance blades feature an ultra-hardened cutting edge to deliver up to five times longer life than standard blades. The optimized blade design provides precise cuts in straight, angled and intricate curved cutting applications. A bi-directional tooth design features teeth facing in opposite directions at each end of the blade to deliver ultra-fine finishes on the top and bottom of the wood. The T-shank design fits all combo and most U-shank cordless and corded jigsaws. Diablotoools.com



Diablo 3-1/2" Universal Fit Oscillating Blade

Diablo's **universal fit bi-metal oscillating blades** (#DOU350RBGP) feature application-specific designs that deliver maximum durability and longer life in general-purpose cuts: nail-embedded wood, clean wood, metal and plastics. These high-performance blades feature an ultra-hardened cutting edge to deliver up to five times longer life than standard blades. Curve contact edge creates a pilot for precise, clean plunge cuts with less vibration. Black ICE (Industrial Cooling Element) keeps the teeth cool and buildup-free for fast, clean cuts. The blade's universal fit, adapter-free design easily attaches to most tools, with the exception of Starlock tools. Diablotoools.com



Festool Cordless Track Saw

The new Festool **TSC 55 K cordless track saw** sets the standard in precision panel processing. The combination of a brushless EC-TEC motor and dual battery system makes the TSC 55 K as powerful as any corded track saw while giving you the freedom of full mobility. With the newly designed Festool saw blades and the concentrated torque of the TSC track saw, you'll be able to work up to twice as fast without having to sacrifice cutting performance or quality. User safety is greatly enhanced with a unique kickback feature that stops the saw blade in the blink of an eye, minimizing the risk of hand injury. With the TSC you get a full 2-1/8" (55mm) cutting depth at 90° and 1-11/16" (43mm) at 45°. The bevel range is from -1° to 47°. You can use the TSC with the

included cloth dust bag or, for optimal dust control, pair it with the Festool CT line of dust extractors. The TSC is available in three models, starting at \$649. The Basic model (#576717) includes the saw, blade, splinter guard, dust bag and Systainer. The Plus model (#576718) adds two batteries and a rapid charger. With the Plus-FS model (#577008) you also get a 55" guide rail. There is a wide range of accessories to go with the TSC, including eight different track lengths from 32" to 197" (800 - 5000mm), a choice of six saw blades, and an edge guide for making guided, parallel cuts without using a track. All models include Festool's three-year, all-inclusive, wear-and-tear warranty – once product is registered online. Festool.ca

The Ultimate Template-Guided Joinery System

The **PantoRouter** makes woodworking joinery fast, accurate, easy-to-use, repeatable and fun! Mortise and tenon has never been easier with over 150 perfectly fitting sizes using their patented tapered templates. You can set up and cut angled or compound-angled joints in minutes, virtually dust-free due to the incredibly effective dust collection hood. Go from setup to glue-up in under five minutes in most cases.

Box joints and dovetails can be variably spaced, and custom templates can be shop-made to produce the perfect size and shape for your project. Hobbyists and custom furniture makers use the large table and numerous clamping positions as a convenient platform for custom jigs and fixtures so the tool never limits their design.



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You can now upgrade your DeWalt DW735 thickness planer to a spiral cutterhead with the **Sheartak S00512** replacement cutterhead. The S00512 features a high-tensile strength alloy steel cutter block with 40 four-sided interchangeable carbide inserts that deliver a super-smooth finish with no tear-out. Each insert sits at a slight angle and produces a shearing cut for exceptional smoothness. Carbide inserts will give you more than 10 times the work life than you get from high-speed steel blades. Installation is straightforward. The S00512 comes with 40 carbide inserts along with five extra inserts and screws. The cutter block has a one-year warranty. **Sheartak.com**



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Build an Angled Picture Frame



This picture frame can be custom sized to fit any artwork or photograph. An attractive frame like this can accentuate a piece of art without overpowering it.

BY ROB BROWN

My general approach to making furniture is especially important when making a picture frame: keep it simple. We've all seen ornately carved and gilded frames, but I think these frames take away from the art in my house. Having said that, I know everyone has their own unique taste. However, if you're a "simple is best" kind of person like me, this might be the perfect mix of simple, but not too simple.

Interesting angle

The four angled parts of this frame provide a unique look without going overboard. Though it's possible to make each frame piece out of thicker stock, then cut an angle onto the outer front face of each piece, that would require fairly thick stock. This method also keeps the grain continuous around the frame. Although it can be made with pieces as thin as about 1/2", I opted for a thicker frame and used 3/4" thick pieces.

Photos by Rob Brown

Continuous grain

There's a breakout technique to obtain continuous grain through the four corners of a frame or box. To start with, using quarter cut material will help keep the grain even straighter. For this frame I broke out one piece of lumber that was long enough to get one side and one top or bottom (along with some extra just in case), and wide enough to be able to resaw the part and get two blanks out of it. My blank was about 2-1/4" wide and 2" thick.

Keep in mind the side frame pieces will have to be longer than the height of the art or photo you're framing, as the miters extend well past the art. Same with the top and bottom pieces. Add at least double the distance that the frame pieces are wide to the length of the artwork when determining the length of the wood parts. Making your blank 6" longer than needed is good insurance when laying out and cutting the miter joints.

Next, rip it down its center. Those two freshly bandsawn faces will be the outer faces of the four frame parts. Mark them so you don't lose track of how they relate to one another.

Dress the two lengths to final thickness, being careful not to remove much wood from the two faces. The more wood you remove from these two faces, the less the grain will match. Next, joint an edge of each of these two workpieces and rip them to width. Mark the outer face and inner edge of the blanks so you can clearly see where the two side parts and the top or bottom parts are going to be cut from these two blanks. When marking the blanks keep in mind that for the grain to be continuous, the four corners of the parts have to be made up of parts that were close to each other in the initial piece of lumber.

Lay the two blanks on your bench face up and with the inner edges facing each other. From there, work your way around the two blanks in a circular direction, marking "top," "right side," "bottom" and finally "left side" where the parts will be cut from the two blanks.

Draw the angles

Although you can use different angles to set the four parts, I chose 20°. Keeping in mind which is the inner edge of the blank, mark the end grain of one of the parts to show the inner and outer edge of the blank cut at 20°. I added a 1/4" x 1/4" rabbet, also set to 20°, to the end grain drawing as well. The rabbet you add can vary in size, depending on the needs of your artwork. Ensure the rabbet is far enough from the outer face of the frame members so that the inner edge of the frame isn't weakened too much. Be as accurate as possible with this diagram, as you'll be working from it to set up the next few cuts.

Cut the angles

The next step is to machine the rabbets and cut the two edges of each workpiece on a 20° angle.

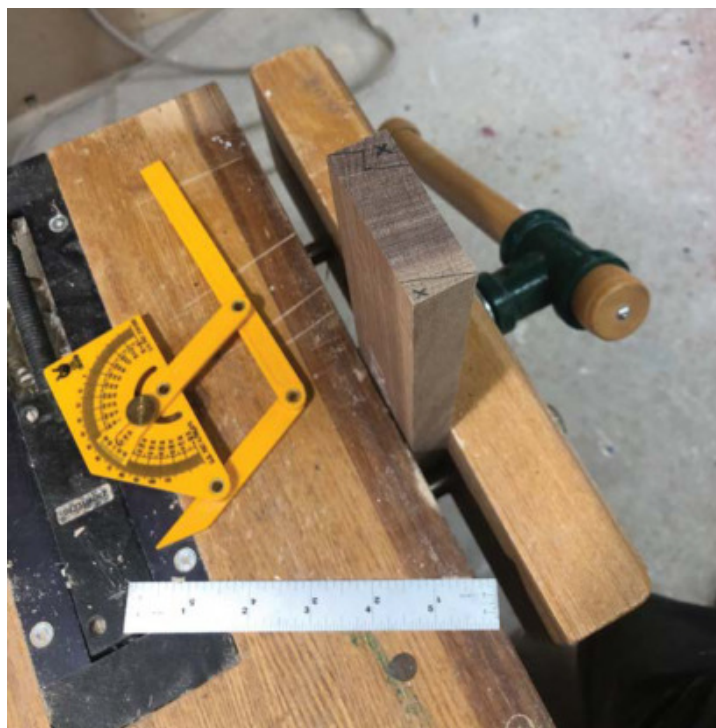
Using the end grain drawing as a guide, set up the rabbet joint and machine it. With a rip blade, cut angles on both sides of the two workpieces. If you set up the rip fence so the first cut leaves a 1/16" wide flat on the edge of the workpiece, you can just rotate the workpiece and cut the other side without adjusting the rip fence.

Support strips

Machine a 30" long strip of wood to the correct thickness so when your workpiece sits with one of its rabbets propped up on that strip, the angle of the piece is 20°. This will take some trial and



Continuous Grain – These two pieces were cut from a single piece of lumber, then had their inner faces both dressed lightly. Next, Brown removed material from their undersides to bring them to 3/4" thick. Brown also marked their ends and faces so he knew how their grain related to each other



Careful Layout – Adding angled lines on the end grain of the workpiece and drawing in the rabbet will allow you to more accurately set up the table saw properly.

error. Cut it in half and securely fix each piece to the inner corners of your miter sled. These pieces will act as supports and stops so they need to be fairly solid.

An important safety check is to ensure the inner face of the rabbet is in contact with the support strips secured to the miter gauge. If it isn't, the workpiece will likely become airborne while cutting the miters, as it may shift backwards. The workpieces need to sit positively against the support strips while mitering the corners.

It's miter time

Keeping your layout marks on the workpieces in mind, place one edge of the workpiece up on the support piece and cut the first miter on one of the parts.



Cut to the Lines –
This is what the same end grain looks like after the parts have been machined.

The simplest way I could determine what length to cut the four parts was to clamp the piece in my vise and mark on the inner edge, directly beside the rabbet, what length I needed. When marking this distance, I kept in mind the piece of art I was framing and measured accordingly. The art would protrude about 3/16" underneath each rabbet, so this had to be taken into account. The line you draw must be visible while mitering.

Place the workpiece on the miter sled, align the line with the blade and make the cut to trim the first workpiece to length. When in doubt, cut the piece slightly long, then fine-tune the piece to length with additional cuts. I started with the longer piece, as I knew if I made a mistake and cut it too short, I could use it for a shorter frame piece. Repeat these steps to cut all four parts.

Start cutting from the same ends

This is a finer point for keeping the grain as continuous as possible, and it's one that's hard to describe with words. Keep in mind that you likely cut the initial blank a good 6" longer than you needed to at the start of this project. In order to match the grain as best as possible, it's best to start at the same end of each of the two blanks when cutting the parts from the blank, as the 6" (or so) of waste will be trimmed off. If you start cutting at one end of one blank, and the other end of the other blank, the grain will not match as closely.

Assembly

To test the fit, I taped the parts together in order by stretching the tape across each of the corners on the 3/4" wide edge that was cut to 20°. I then wrapped the four parts together to check for gaps in



Mark the Length – The frame parts will have to be marked carefully, then cut to length. Keep in mind the size of the artwork the frame will house, and the fact that the artwork will fit into the rabbets surrounding the inner edge of the frame.



At an Angle – A strip of wood needs to be cut to the right size and attached to your miter sled securely in order to support the workpieces at a 20° angle while they're being mitered. Brown sized the strip to fit into the rabbet in each piece.

the miters. If there are gaps, it will likely be because one (or more) of the parts is slightly longer than the part on the opposite side of the frame. Trim it to length and reassemble the frame with masking tape.

I sanded the face of the four parts before assembly, as I thought it would be easier than trying to do it with the frame assembled.



Test It Out – After using masking tape to hold the first three corners tight, Brown wraps the four frame pieces together and tapes the final corner. If any gaps are showing, trimming one or more of the parts is necessary.



Cut Kerfs for Strength – After testing to make sure the piece of veneer would fit the saw kerf nicely, Brown cut four kerfs into the corners of the frame and added veneer to them.



Retaining Clips – Brown bored 1/2" diameter holes to accept the retaining clips he used to secure the piece of art in the frame. These clips come in different depths, and are also easy to cut down if needed.

With the parts taped together once again, I applied a light coat of glue to the miter joints and rubbed it in, then added another regular coat of glue to the joints. Wrap the frame together, ensure it's square and flat, then let it dry.

Add kerfs

Miter joints aren't the strongest joints, so adding a thin veneer key in each corner will add a lot of strength. After testing different pieces of contrasting veneer in a few hand saw kerfs, I settled on a saw and matching veneer sample. I drew a line parallel with the length of the four frame pieces, then added a pencil line 1" from the ends on each side of the four joints. This gave me something to cut four kerfs to.

Cut four pieces of veneer, add some glue to a kerf, coat a piece of veneer and press it into position, making sure it seats nicely at both corners. After repeating this three more times, allow the glue to dry and trim the waste off with a chisel.

Hardware

I placed the assembled frame upside down on my drill press table, set the depth and bored four shallow, flat-bottom holes to accept the retaining clips. These clips come in different depths, so getting one that will work likely won't be hard. You can also follow in my footsteps and trim them with side-cutting pliers if your math is off. The exact location isn't critical, as long as the arm of the clip extends onto the rear of the art to hold it in place. I then drilled a pilot hole to accept the #4 x 1 1/2" long screw to secure the clip in the frame.

There are many options for picture frame hanging hardware. Most depend on how heavy the frame and artwork are. Routing a keyhole slot or using a pair of eyes with wire strung between them are two options. I opted for an even simpler approach, as this was a light piece of art and a fairly small frame. I drilled two holes to accept small nails that would secure a metal sawtooth hanger to the frame.

Finishing it off

After sanding the frame and breaking the edges, apply a finish of your choice. There's no need for extreme durability in this situation. A finish for a frame mainly needs to look good, so test out different finishes on the wood you've selected and apply the finish to your frame. I sprayed on a few coats of a Watco lacquer. Their aerosol spray cans are easy to use, and provided a nice-looking finish on black walnut.

Attach the hanging hardware, have a piece of glass cut and secure everything in place with the retaining clips. I used a drywall anchor and screw to hang the frame, but finding a stud is the strongest approach. Hang it up and I'm guessing you'll enjoy the frame even more than the beautiful artwork it showcases.

ROB BROWN

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BUILD A QUARTO GAME

Easy to learn, yet hard to master, Quarto is a game for all ages. It also makes a great gift for someone with kids or adults who enjoy a fun challenge.

BY ROB BROWN

Quarto is a game invented by Blaise Muller, a Swiss mathematician, in 1991. It's distributed by Gigamic (gigamic.com), which also sells many other board games. The two-player game has 16 unique pieces that are played in one of the 16 locations on the 4x4 board. In the original game each of the game pieces has four characteristics:

- Tall vs. short
- Solid-topped vs. hollow-topped
- Circular vs. square in cross section
- Dark vs. light in colour

In reality, any four attributes can be used, as long as they are distinct from each other. For creative woodworkers, this is a great opportunity to try a few new techniques, such as laminating different species of wood or types of veneer, or adding texture, carving or pyrography to

Photos by Rob Brown

the 16 game pieces. Not only can this be a lot of fun, it makes for a one-of-a-kind game.

I chose these four attributes:

- All solid wood vs. contrasting veneer laminations
- Square vs. octagonal in cross section
- Tall vs. short
- Textured vs. smooth top

First, the game pieces

The hardest part of this project was just keeping the unique attributes of the pieces straight in my mind. I started with four 16" long blanks from which to create the pieces. My finished pieces are 1-1/4" square and either 3-1/2" or 2" high. The exact dimensions aren't important, as long as the difference in height is easily recognized by the two people playing the game. One thing to consider at this point is the size of large drill bit you have on hand. Rather than purchase a large drill bit to accommodate the size of the game pieces, size them to the diameter of drill bit you already have. I used a 2-3/8" diameter bit, but anything around that size will do. Even if you only have a 1" drill bit you can make it work, but remember you need to create pieces that will fit into the hole created by your drill bit.

The 1st attribute: solid wood vs. contrasting veneer

The first two blanks were simple 1-1/4" x 1-1/4" solid pieces, 16" long. The other two had to be laminated with alternating light / dark / light layers of veneer glued at their center. I chose walnut for the main species. To create the two blanks with contrasting veneer down their center, I ripped four pieces of 5/8" wide x 1-1/2" thick walnut. I then used a knife and straightedge to slice oversized pieces of maple and mahogany veneer for the contrasting veneer species, then applied glue to the layers and clamped the two blanks up.

When they were dry, I used a knife to remove most of the veneer waste, then dressed all four of the blanks down to 1-1/4" square. At this stage two blanks had contrasting layers of veneer running down their center while the other two blanks were solid wood. This took care of the first attribute.

The 2nd attribute: square vs. octagonal

Next on my list was to machine half of the blanks octagonally in cross section and leave the other half square. This is where it starts getting slightly tricky, as you can't choose just any two of the four blanks to cut into octagons. You have to choose one of the solid wood blanks and one of the blanks with contrasting veneer running down their center.

With those two slightly differing blanks in your hands, there are a few options for chamfering the four corners to create the octagonal cross sections. A router table with a large chamfer bit is an option. A hand plane to remove just the right amount of material is another option. I chose my table saw, with the blade tilted to 45° and a sub-fence attached to my rip fence. I angled the blade and clamped a 3/4" thick plywood fence to my rip fence so its lower edge was a little below the center line of the blank. This left me with a gap of about 5/8" between the lower edge of the sub-fence and the upper surface of my table saw. Any off-cuts could remain in there and not be shot out of my table saw when cut free from the blank. Adjusting the rip fence in or out to leave me with



Cut Veneer Strips – To offer a visual difference between two halves of the game pieces, Brown cut contrasting strips of veneer with a knife and straightedge to sandwich them between the outer solid walnut layers.



Glue Them Up – With glue on all the joints, the pieces can be clamped up to create two of the blanks. Notice no glue was applied between the two blanks – just to the veneer layers.

An Even Octagon – Brown set up his table saw to make the 45° cuts, then moved the rip fence in until the cut facets were the same width as the remaining flat surface between the facets.



an even octagonal cross section was the final step.

At this point I ran the two blanks across the saw four times each, leaving me with two 16" long octagonal blanks. This took care of the second attribute. Before moving onto the third attribute, use a belt sander or other sander to smooth the edges of all of the blanks. It's easier, faster and safer to do it now, before the players are all cut to length.

How to Play

Each player selects a piece for their opponent to place on the board, and they alternate turns. A player wins when they're able to place a piece on the board that forms a vertical, horizontal or diagonal line of four pieces with the same attribute (i.e. all four with textured tops or all four with an octagonal cross section). Because of the fact that you choose a piece for your opponent to play means this game is as much about defense as it is about offense.



We Have a Winner! – The person who places the piece that creates a line of four pieces with matching attributes is the winner. Here, the winner is about to place a piece that would create a horizontal row of four pieces with textured tops as their shared attribute.

The 3rd attribute: tall vs. short

This was an easy one. I marked lines on all four of the blanks so the parts would finish at either 3-1/2" tall or 2" tall. The important part of this was that each of these four blanks had to be divided up so they produced two long parts and two short parts. After taking all four of the blanks to my miter saw, I cut the parts to length. Third attribute complete.

The 4th attribute: texture vs. smooth

The fourth and final attribute needed extra care in order not to ruin all my work up to this point. Texture had to be added to half of the pieces, but not just any eight pieces. I organized them on a work surface so the square pieces were on the right and the octagonal pieces were on the left. I further organized them so the tall pieces were farther away from me, and the shorter pieces closer to me. I then put them in pairs, with the solid pieces together and the pieces with contrasting veneer down their center were side by side. I then took one of each of these pairs and brought them over to my workbench.

A pencil line, added freehand with my middle finger running against the edge of the pieces to act as a guide, was added to give the texture a border. Once a square was added to the tops of the



Four Passes Per Blank – Once the setup is complete, four passes can be made, rotating the blank 90° between each pass. The offcuts remain between the rip fence and the blade until the saw is turned off and they're removed.



Organized Chaos – As you work on the 16 game pieces, it's important to keep them organized. Here, they're awaiting the final attribute (texture) to be added. With squares on the left, tall players towards the back, and the pieces separated into solid and contrasting veneer groups, Brown was able to choose one part from each pair to add texture to their upper surface.

square pieces, and an octagon was added to the tops of the octagonal pieces, I used a sharp V-gouge to add the border. Then, with a small, round carving bit in my Dremel rotary tool, I added an even texture to the center area of the tops.

The board

Like the game pieces, there are dozens of ways to create the board needed to play the game. I chose to use a two-layer approach, so I could bore 16 holes in the upper layer, then glue it to the lower layer, giving me very positive locations to position the pieces.

I enjoy making a small project like this with exotic woods, so I chose pomelle bubinga veneer (very bold and figured) for the upper surface and bird's-eye maple for the edging. I made the lower layer with an upper surface of flat-cut maple veneer so the colour matched the solid edges. Plywood was used for both the upper and lower core.

Although I used a vacuum press for much of the pressing in this project, the parts aren't so huge you can't easily use clamps and cauls to apply pressure across the two panels that make up the board.



Not Too Much – Add glue to the underside of the upper board layer, doing your best to keep glue away from the circular openings. Too much glue will make an ugly mess when it squeezes out.



Add the Texture – Although many different techniques could be used to add texture, Brown opted for a rotary tool and small cutting burr. He textured the center area of the tops on the inside of the border.



Textured Border – Once a pencil line has been added, Brown uses a V-gouge to create a border for the texture. Accuracy isn't critical, as a slightly imperfect look shows it was made by hand, not machine.



Layout is Important – With the diameter of large drill bit you have in mind, lay out the locations for the centers of the 16 holes on the 1/4" thick plywood upper layer.

I trimmed the 1/4" thick upper board layer and the 3/4" thick lower board layer oversized by 1" in both directions. I then cut one exotic face veneer, one flat cut maple face veneer and two back veneers the same size as the plywood cores. Best practice calls for all veneered panels to be balanced, meaning if you veneer one side of a panel you should veneer the other side, too. I applied glue to the parts and pressed them up.

Trim and cut 16 holes

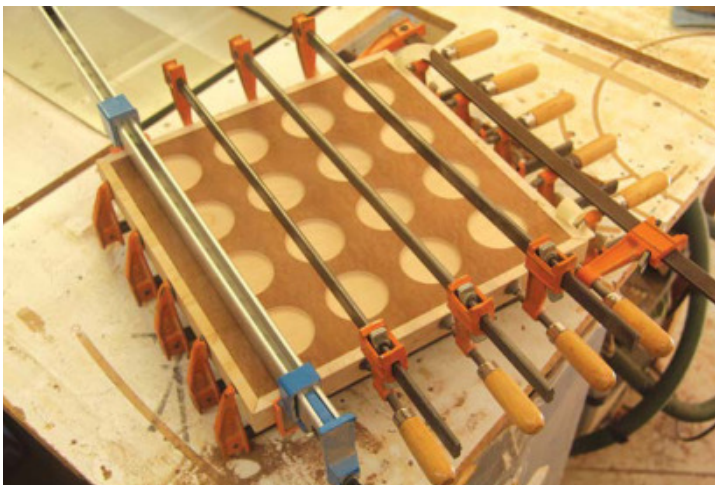
Now I trimmed the two board layers to within 1/4" of their final size. This was because I had to glue them together before trimming them to their final size. With the two layers close to their final size, I laid out the 16 holes on the 1/4" thick upper layer so the gaps between the holes, as well as the gaps between the holes and the edge of the board, were the same. Math is a beautiful thing when it works out.

shopnotes

Shaper Origin

Sponsored: Shaper Origin is a hand tool that makes CNC precision more affordable, accessible and adaptable than ever before. Origin uses an onboard camera to scan a workpiece and plots tool paths for users to follow. Its spindle's active motion control and automatic retract keeps cuts clean and precise. And because it's a hand tool designed with woodworkers in mind, it's especially well-suited to anyone whose woodworking experience is greater than their patience to learn CNC programming. There's no programming required or fussy workflows to adapt to. Users keep their hands on the tool throughout the cut, guaranteeing quality outcomes. And now, with the introduction of Shaper Workstation, precision cutting on a variety of projects is easier and more efficient than ever before. By combining Shaper Origin and Shaper Workstation, users can quickly and efficiently set up customized workholding for an enormous variety of projects. Visit ShaperTools.com for more information.





Add Edging – Solid wood edging can be cut then adhered to the sides of the game board to protect the board and enhance its look.

With the hole centers marked, I used my drill press to create all the holes. I drilled slowly, not wanting to have a lot of tear-out as the bit exited the other side of the 1/4" plywood.

Before assembling the two layers I sanded the inner edge of each hole smooth and broke the upper edge so it would be easy on the fingers during use.

Next, sand the show veneer on the lower layer, apply glue to the underside of the 1/4" layer, bring the two layers together and press it up. You don't need a lot of glue, as the layers won't really be



Ready for a Finish– Sanding the visible surfaces of the game board is the first step in applying a quality finish.

forced apart during play, and you want to avoid unsightly squeeze-out. When dry, cut the board to size, keeping in mind the location of the holes and trying to keep them spaced evenly.

Add edging

Solid wood edging protects the board and adds a visually pleasing finished look. Rip the four strips to size, miter their ends and glue them onto the board. I used a table saw miter sled for the cuts as I find it easy to shave an extra 1/64" off a part to fine tune its length.

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Easy Application – An aerosol spray can will make quick work of all the small game pieces, not to mention get into all the textured surfaces on their tops.

It leaves me with a smooth cut and I find it quite safe.

The solid wood edges were machined slightly oversized, and they finished a bit proud of the upper surface of the game board. Rather than try to sand the solid edging down and risk sanding through the exotic face veneer, I first chamfered the edges. This removed some material from their upper edge. Then I used a sander to flush the solid edges. It was a lot easier with less material to remove. Because the edges weren't applied perfectly even and the chamfers were also uneven, I re-chamfered the four edges to ensure they were even. At this point I sanded the edging and readied the board for a finish.

Apply a finish

A finish will help protect wood, but I think in this case its main function is two-fold. The parts of this game have to look good and feel nice to the touch. This is a high-end product, after all, and it increases the pleasure of playing the game if these two aspects are enjoyable.

Finishes look and feel different when used on different species of wood. I recommend testing a finish on the species you're using before committing to the whole project. I used an aerosol can of Varathane Professional Polyurethane to coat the game pieces and board with four coats of finish. I allowed each coat to dry thoroughly before sanding and applying another. I also took extra care to coat the end grain of the 16 pieces, so no grain showed through. When fully cured, some wax and #0000 steel wool created a very pleasing surface to both the eye and hand.



ROB BROWN

rbrown@canadianwoodworking.com



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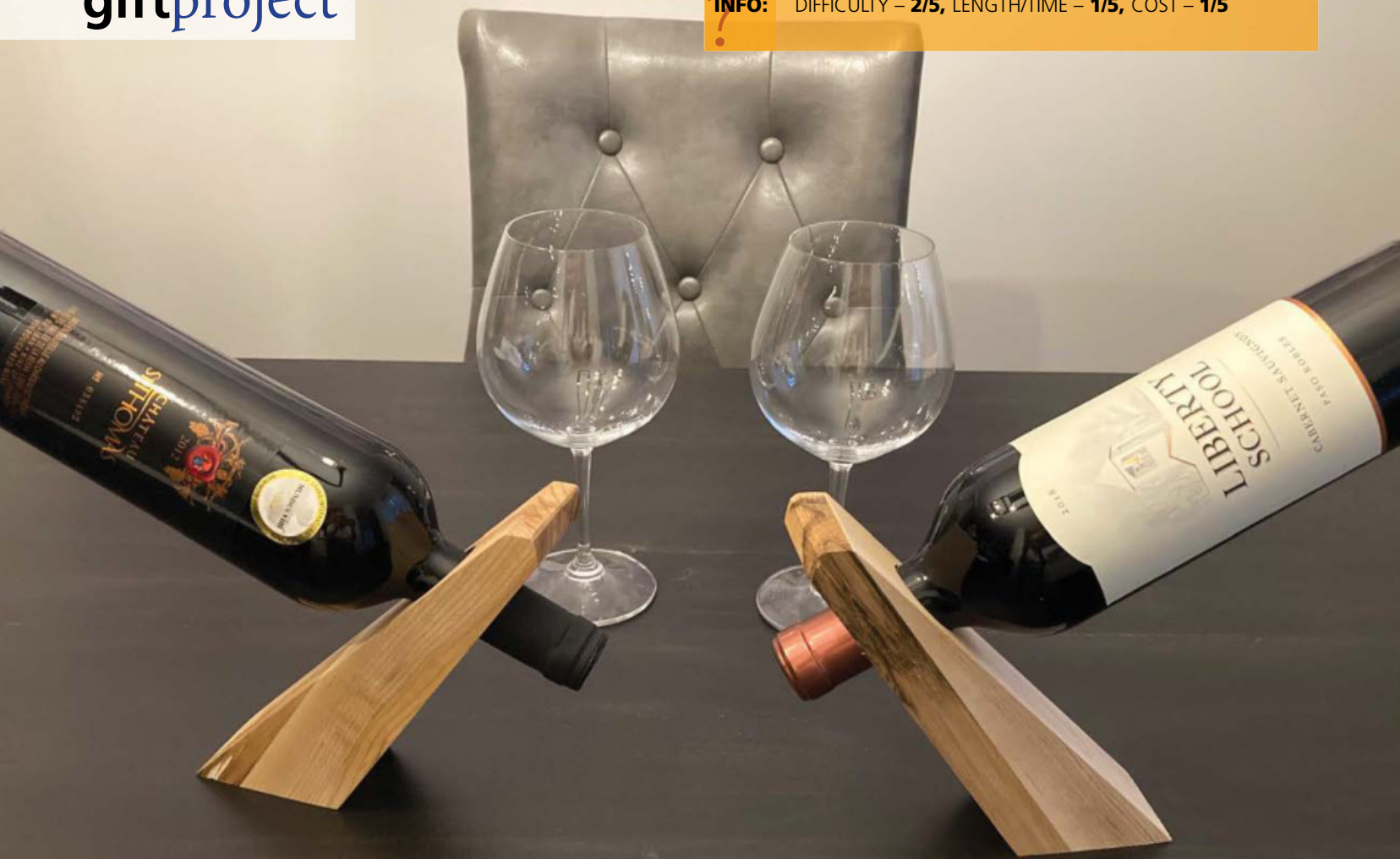


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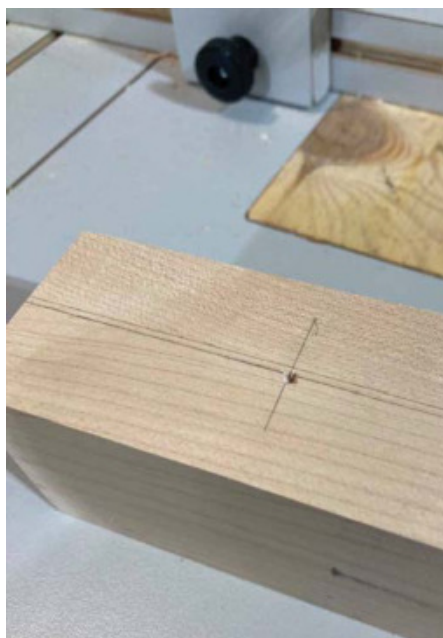
Photos by Robert Zakarian

This dining table centerpiece displays the evening's wine and showcases your shop skills at the same time.

BY ROBERT ZAKARIAN

I think this is the perfect gift idea for someone who enjoys wine. It's also the perfect project idea for a woodworker with scraps of hardwood. I had a lot of maple scraps lying around the shop I wanted to use and this was the perfect project.

For a while I have been looking to make a wine bottle holder to use as a centerpiece for our dining room table. I have seen many on the market, but none that really stood out. The best thing was to design one myself. Although it looks simple, there is a certain level of skill, layout and proper tools required to make this.



Center of the Hole – Marked on the center of the lower face of the workpiece, this will be the center point of the hole that accepts the neck of the wine bottle.

Mark some lines

The base is a rectangular block 10" long $\times$ 2-1/2" thick and 1-7/8" wide. Mill a blank to this size. Decide on the upper surface, but keep in mind a large portion of this upper surface will be trimmed off on the bandsaw down the road, so the grain will look a bit different. Also keep in mind that if you laminate two thinner pieces to make this blank, the glue line will likely be visible in the finished holder. Making this project from a single thick piece of wood will look better unless you're going for a more rustic look.

Mark a line 2-3/8" from the top end.



Lay Out the Angled Bottom – A 35° line is drawn from the very end of the upper face towards the lower face of the holder.

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An Even Cut – A miter saw will leave you with a straight, even cut. This is important because the holder will balance on this cut face while in use.



A Nice, Straight Hole – Bore a 1-3/8" diameter hole in the holder on your drill press.



Create a Wedge – After marking the cut, trim the waste off on your bandsaw.

This is for the bottle neck hole. Mark a center line on this first mark. These measurements should be marked on the lower face of the workpiece.

To lay out the miter cut, mark a 35° line on the sides, at the bottom end of the blank. This line should start at the bottom corner of the upper face and extend away from the bottom end of the blank.

The cuts

Bore a 1-3/8" diameter hole through the blank. This hole will accept the neck of the wine bottle. Be sure to do this from the lower face of the block, as the upper face will eventually get sawn off and any tear-out will be removed.

Next, make the 35° cut on your miter saw.

You can also make this cut with a hand saw, but ensure the cut is as flat and even as possible as this cut face is what the holder will balance on when in use.

Draw a line from the far end of the miter cut to the top, leaving 5/8" on the top end of the holder. On the bandsaw, cut off the waste to form a large wedge-shaped object. To clean up the cut I made one pass on my jointer, as the piece is just long enough to be jointed. Just ensure the grain is running "downhill" so there's no tear-out. If you don't have a jointer or you prefer a quieter approach, you can use a hand plane to flatten the freshly sawn face.

As an added personal touch, you can chamfer the 5/8" wide top or add whatever profile you'd like to accentuate the piece.

I heavily chamfered the two corners. This can be done on a miter saw or with a hand saw, then smoothed with a block plane or sandpaper.

Sand the piece up to 150 grit and break all the sharp edges. I used food-grade butcher block oil to finish the piece, but just about any finish will do, as this holder isn't going to see a lot of wear.

It makes a great dining table centerpiece and a great gift idea, so be sure to make multiple holders.



ROBERT ZAKARIAN
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shopnotes

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To: Granny

Wooden Gift Tags for the Holidays

The perfect addition to any gift, these customized gift tags designed and created by two young woodworkers are a great project for beginners.

This is the first of what we hope will be many more articles by young woodworkers. If you know of someone between ages 10 to 20 with a project to share contact rbrown@canadianwoodworking.com



Rip on the Bandsaw – A bandsaw is a safe way to rip thin strips of wood off a large piece of wood. Set the fence to about 1/16" thicker than you want your tags to finish at.

These small gift tags add the perfect touch to a present. They are easy to make and will add a great personal touch to your gifts. You can also make them with minimal tools and machines, which is great for new woodworkers.

The basics

Draw your idea on a piece of paper, then decide the size of the tag and write it onto the page. You can even draw the tag to scale if you think that will help you visualize the project better. We made our tags 4" long × 3/4" wide × 1/4" thick, but feel free to adjust the sizes of your tag.

Pick two types of wood to use. We chose black cherry and maple because they're both light enough to see the writing on and are closed-grain woods that are easy to write on. Our dad also had a few cherry and maple offcuts we could work with. Pine, spruce and basswood would also work well.

Start cutting

Break out lengths of wood about 2' long, 1" thick and around a few inches wide. A hand saw will do a great job at cutting a few pieces to length. The wider the board you use, the more tags you can make from it. Joint one face smooth and then joint one edge true on both pieces of wood. Dress them to a thickness of 3/4" with a thickness planer.

On the bandsaw, set up the fence so it rips slightly thicker than the final thickness and rip one strip of wood off the edge that was jointed. After the rip on the bandsaw, return to the jointer to true the freshly cut edge before returning back to the bandsaw to make a second rip. Repeat until you have enough strips.

Use the thickness planer to dress the strips to final thickness, ensuring the smooth face is placed downward on the thickness planer's surface for each pass. If you don't have a thickness planer you can make some passes with a hand plane to smooth the band-sawn surface. Because these gift tags are short, their faces don't need to be perfectly parallel or flat.

Sand the two faces and the two sides by hand. A small electric sander might also work, though it's not easy to keep the sander flat on the small surfaces of these tags while sanding. Ease the four



Cut to Length – Although a miter saw and table saw can also cut wood to length, a hand saw is the safest, especially when cutting small stock like these tags.

long edges with a block plane and a hand sanding block. Using a hand saw with a crosscut jig to cut the tags to their final length is a safe and accurate approach. A scroll or bandsaw could also be used to cut the tags to length, though be sure to keep your fingers away from the blade while cutting these small pieces.

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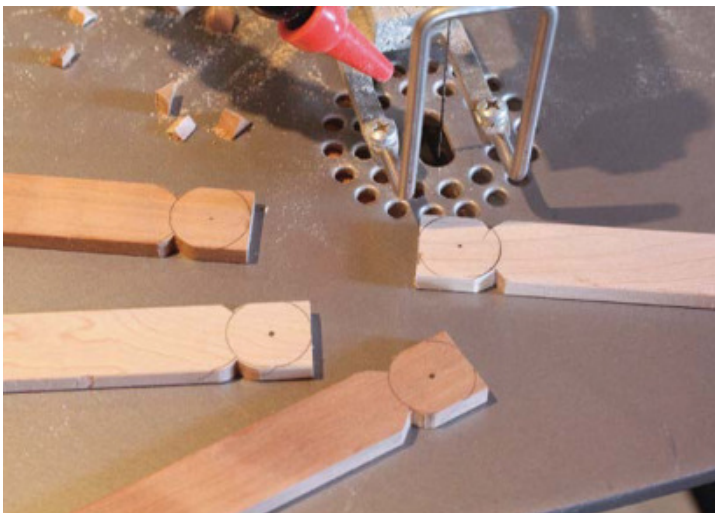
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Remove the Notches – After drawing the design on the tags, cut the two V-notches out on each tag. Patience and accuracy now will pay off with a nice-looking gift tag down the road.

Shape one end

Draw the circular pattern onto the wood. We traced a 3/4" diameter Veritas offset wheel gauge. Mark the center point at this time, too. We moved the gauge about 5/8" towards the center of the tag and added two more short arcs.

Use the scroll saw to cut out the two small “V” sections in each tag. Be as patient and accurate as possible with this step because it’s



Round the Corners – A disk sander allows you to remove the material from the two outer corners of each tag. Another sander could also work, as would cutting most of the material off with a scroll or bandsaw, then using a hand sanding block to smooth the curve.



Bore a Hole – A drill press will drill a straight hole into wood. Make sure to hold onto the workpiece while drilling so it doesn’t catch and start to spin with the bit. Placing the workpiece against a piece of wood clamped to the drill press’s table is also an option.

hard to fix afterwards. You can use a bandsaw for these cuts, but a scroll saw leaves a smoother surface and will be a bit more accurate. A coping saw, or even a hand saw used to make short, straight cuts, will also work, but you’ll have to round those edges a bit afterwards with a file or sanding block.

Next, use a disk sander to shape the outer corners of the circular portion. A disk sander removes wood surprisingly quickly, so be careful with this step, too. If you don’t have a disk sander, a belt sander turned on its side would also work. If you have neither of these tools, remove most of the material with a scroll saw, bandsaw or coping saw, then use a hand sanding block or file to smooth the arc.

On the drill press, bore 3/16" diameter holes for ribbons into the circular part of the wood. We used a brad point bit because it





Name Names – Although you could use a regular pen or pencil, we chose to label the tags with a pyrography pen.

would leave a cleaner hole. Next, use a sanding block to sand all the surfaces, as well as the sharp edges and corners.

Add names

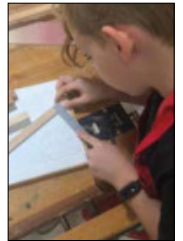
There are a few different ways to add names to your tags. The simplest approach is to just write the name on the tag with a pen, pencil or Sharpie marker. A more complex approach is to draw the names

on the tags with a pencil, then carve them out with a V-gouge. A third approach, and the one we took, is to lightly draw the names in pencil then use a pyrography pen to burn the names on.

Once the tags have been labelled you can apply a coat of finish. Just about any clear coat will do, but we chose to wipe on one coat of OSMO Top Oil. Finally, cut and tie ribbons through the small hole.

Rob's 10-year-old son enjoys woodworking. His 11-year-old daughter is a bit less excited to get into the shop, but she did well once she learned a bit more about each tool or machine being used. She's also a great writer. They teamed up to make this article happen. Rob's son did most of the building and his daughter did the note-taking and writing. If you know any kids between the ages of 10 and 20 who would like to write an article for us, please contact Rob.

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Reviews

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Oneida BenchTop DC Dust Collector
Clean the Air You Breathe

Festool TSC 55 KEB Track Saw
Quality, accuracy and portability in one saw



Oneida BenchTop DC Personal Variable Speed Dust Collector

TESTER: ROB BROWN

We know it's the finest dust particles that cause the most damage to our lungs, as they're able to get deeper into our lungs and are more likely to stay there. There are lots of ways to keep your lungs safe, and one of them is collecting ambient dust particles immediately after they're made. Oneida Air Systems has come up with a new solution to an age-old woodworking problem with their BenchTop DC Personal Dust Collector.

The idea is to create a vacuum directly in front of the unit that sucks all of the finer dust particles into the two-stage filter, safely trapping it there, away from your lungs. All this is accomplished directly where you're working, as the unit is portable. I used it for a recent texturing session on some mahogany with a rotary tool and I found it worked well.



Where'd the Dust Go?

– Mask-free work can be accomplished when you're working near the Oneida BenchTop DC.



Replaceable Filters – The replaceable filter can be purchased at your local hardware or building store, though it will likely take a while before that's needed.

Photo 5 by Oneida, Photos 6 and 7 by Rob Brown

The tricky thing about workshop dust is that most of us do our best to contain the larger particles with on-tool or stand-alone dust collection methods, but it's the tiny bits that we can't even see that are the biggest threat to our health. Making a few cuts on a scroll saw, using a rotary tool to remove small amounts of wood or breaking the sharp edges of a workpiece with a sanding block don't create much dust, but they all create the finer dust that becomes airborne and settles deep into our lungs. But if we're only doing it once in a while it can't be a real threat, can it? Sadly, it all adds up.

What's it for?

The purpose of the Oneida BenchTop DC isn't to collect all of the chips from your jointer or planer. Nor is it to scrub your shop's air of all ambient dust. Think of it as an at-source fine dust collector that's portable enough to move between machine, power tool and hand tool operation when needed. Essentially, this unit is for the smaller dust collection tasks that otherwise get ignored.

The first thing I noticed about the BenchTop DC when I unpacked it was that it's very well made. I can easily see this collector lasting decades without a problem. Setup was quick and easy, and the fit and finish was very good. When I plugged it in and turned it on, I was impressed by the amount of airflow. It was then that I realized it was only on medium. A knob allows you to adjust the

speed according to the level of airflow you need for the task. When set to maximum the BenchTop DC did a really great job at filtering my work area in front of it.

While working in front of the collector, I found it handy to have an integrated receptacle on the side of the unit to plug any tools into. Also handy, the pre-filter, which extends the life of the MERV 15 filter, removes some larger dust particles, and can easily be rinsed out with tap water. When the useful lifespan of the main filter is reached, third-party filters can be purchased from your local hardware or building store so you don't skip a beat. Oneida has purposefully made the filter non-proprietary so the user can easily purchase cost-effective filters for years to come.

The Oneida BenchTop DC takes care of a lot of the finest dust particles woodworkers create. We do a good job at controlling the large, obvious dust particles in our shops, but this portable dust collector will now make it easier to clean our workshop air of the tiny, more dangerous dust particles that pose the biggest health risk to us. Your lungs will thank you.

Oneida BenchTop DC Personal Variable Speed Dust Collector

MSRP: \$849

Website: Oneida-Air.com

Tester: Rob Brown



Festool TSC 55 KEB Track Saw

TESTER: RICH KELLER

I recently had the chance to check out the latest version of Festool's track saw and I was pretty impressed. I've owned a track saw for a long time, so I was interested to see what's new with Festool's new model, TSC 55 KEB. If you don't currently have a track saw, and you think it's a luxury you can't afford in a small shop, I would suggest re-thinking that idea. Working by myself, I use a track saw for all sorts of jobs that would be awkward at a table saw. Track saws are great for sheet goods, and if you work with sheet goods at all you really need a



Dust Collection –

A dust collection bag on the saw does a good job at collecting dust. It's also easily emptied.



Cleaner Cuts – The

Festool track saw now has zero-clearance support on both sides of the blade, ensuring cleaner edges on both sides of the kerf.

track saw. It's far safer and easier than trying to maneuver a heavy sheet of plywood through even the best of table saws. But the uses don't stop there. I also use my track saw for ripping thick 8/4 hardwoods down to size. This is another job that's challenging to do on a table saw.

There were a couple of things that stood out for me with this new saw. First is the fact that it's cordless. I've had a corded track saw for years and, like with all corded tools, you spend time fighting with the cord. I've always found that's especially true with a track saw cord. For whatever reason, the cord seems to get caught on everything, and when you're trying to move the saw 4' to 8', it highlights the problem. Being cordless is a huge plus. If you're thinking

of moving to a track saw in the future, I strongly recommend getting a cordless model.

Despite being cordless, the Festool saw had no lack of power. After making a few cuts, I felt that this saw cut faster and easier, and with more power, than my old corded one. Cordless technology has come a long way in the past few years and this saw packs a brushless motor, so it has lots of torque.

The TSC 55 KEB uses thinner kerf blades, which makes sense for a cordless machine. A thinner blade uses less power, giving you more run time. That also makes this saw cut faster than my old, corded saw. Most manufacturers have been using thinner blades on their latest cordless products in the past few years, whether it's a circular saw or reciprocating saw. This makes cordless tools cut quicker and batteries last longer. I know some may see this as a cause for concern. Theoretically, a thinner blade could wobble more and maybe not cut as well. I was quite happy with the quality of cut from this saw, but with a new sharp blade I wouldn't expect there would be any issue with cut quality, regardless of kerf. Like most woodworkers, I've been using thin kerf blades on my table saw for years and I really don't think about full kerf vs. thin kerf very often there, so I expect a thin kerf blade on this track saw would also not be a problem.

One change on this model that surprised me is the removal of the riving knife. This model has electronics to detect kickback and will rapidly stop the motor if the saw is kicking back. I like the addition of kickback detection to the saw, but I wonder why they removed the riving knife. The lack of riving knife does make it somewhat easier to change the blade on this saw, and perhaps this was the reason for its removal.

The other advantage that comes with being cordless is a high degree of mobility. I did some work out in the yard and it was nice not to worry about a cord. I built a new deck a few months ago, so I used the track saw to trim all the boards to length. As the project inevitably was spread out over several days, it was convenient to be able to just grab the saw and a track and go work rather than lose time setting up.

I also like that Festool has zero-clearance support on both sides of the blade. Most track saws provide zero clearance support on the track side of the blade, but nothing on the other side. When working with expensive veneer plywood it's nice to waste as little as possible. With zero clearance support on both sides of the blade, there's zero tear-out or chipping along both cut edges. You can usually get good splinter-free cuts in veneer with a sharp blade, but once a blade has a few miles on it, you really need zero clearance support to keep a crisp, tear-out-free edge.

Overall, I would recommend this saw if you're in the market for a new track saw. I would also recommend a cordless saw over a corded version. I like the power of the Festool and the speed at which you can cut. I also like that it has zero clearance support on both sides of the blade.

Festool TSC 55 KEB Track Saw

MSRP: \$649 (saw, blade, Systainer), \$909 (saw, blade, Systainer, charger, two batteries), \$1039 (saw, blade, Systainer, charger, two batteries, 55" guide rail)

Website: FestoolCanada.com

Tester: Rich Keller



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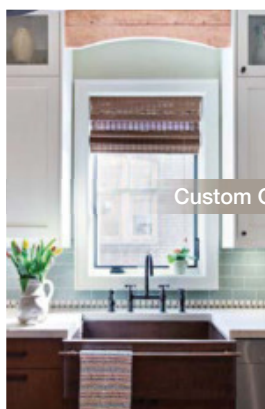
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Beware the Woodworking Mirage

Sometimes the projects you think you see in scraps of wood aren't really there.

BY JAMES JACKSON

You've likely heard of the phenomenon called a mirage – when light bends, or refracts, to create a false image along the horizon. The classic example is when light reflects off the desert surface and resembles water in the distance. But you didn't turn to the back page of this magazine to read about optics or refraction. So, what has this got to do with woodworking?

In early August my dad demonstrated what I've come to call the woodworking mirage – when you think you see a potential project or idea in a scrap of wood that maybe, probably, isn't really there.

We spent a few days pulling tree limbs and branches out of the woodlot on my grandfather's farm to cut and split into firewood for the winter. A professional logger had cut down the trees we were removing, but it was still hot and gruelling work to cut them into smaller pieces and carry them out of the forest using the tractor.

A few hours into the first day, my dad paused and started eyeing up some of the smaller treetop branches that we'd been ignoring – they were only about four inches in diameter or smaller, so not really large enough to salvage for firewood – and I could see the gears in his head turning.

"You know," he said excitedly, "I could cut these a few feet long, then cut them in half lengthwise and flatten the bottom, and they would make a nice centrepiece or candle holder."

A few seconds later he shook his head, as if he was talking himself out of the idea he had just proposed. "No. What am I talking about? I've already got enough wood."

The affliction must be genetic, because I've repeatedly caught myself exhibiting similar symptoms.

In late February, my wife and I decided to get new carpeting and baseboards in the upstairs of our home, so I started ripping out the 70-year-old baseboards.

They had been there for so long, and secured to the wall using some pretty large nails, so I had to use my oscillating multi-tool to

cut them into smaller, more manageable lengths that I could pry away from the wall without punching big holes in the wall.

As I removed the boards – approximately two inches tall and about a quarter inch thick – I started thinking about all the ways I could reuse the material. It was still in good condition, and they could be turned into picture frames.

I collected the pieces in a large Rubbermaid container and lugged them downstairs, but before I could get them out to the shed my wife, Becky, asked what I was doing.

I told her my plan and she just scoffed. "You're just like your dad," she said.

I added the baseboards to a pile of old 2x4s I had saved from my shed demolition last summer with the goal of turning those into decorative blanket ladders.

But sometimes the mirage truly has the potential to become a great woodworking project.

Just a few days after my dad and I were done salvaging the branches in the woods, we started cutting the large chunks into more manageable pieces that we could split into firewood. That's when we came across a beautiful teardrop-shaped piece of oak.

The stump was about 2' thick, and the top was over 2' feet long and a foot wide. There was virtually no rot inside.

"That would make a fabulous table!" my dad cheered after the chainsaw split it into two pieces.

I nodded along in agreement. "Yeah, Dad, I think you're right."



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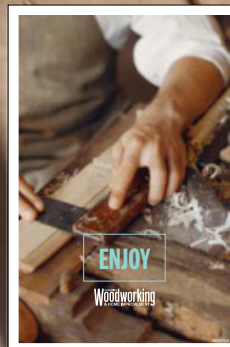
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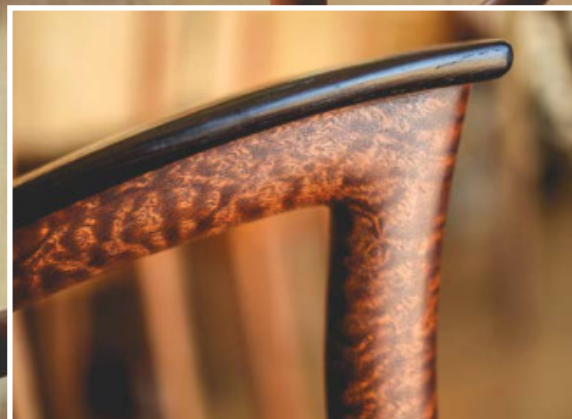
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Stéphane Dumont

“Crac” Rocking Chair

Quebec has a long history of rocking chairs, and this inspired Dumont to make one of his own. The first rocker took him about three months to build, but after making about 70 jigs and templates to speed up the process, a rocker of this design can now be made in three weeks.



Turn to page 12 for more quotes.
(Photo by Julie Houde-Audet)