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ISSUE #131
APRIL/MAY 2021

CANADIAN Woodworking & HOME IMPROVEMENT

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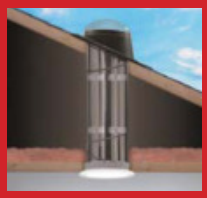

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Cover photo by Rob Brown

editor's letter

Making A Big Impact

rbrown@canadianwoodworking.com

In general, woodworking, DIY and home improvement projects are on the rise right now. COVID-19 has played a big role in that, namely because people are at home, but it's not the only factor. People also have more access to knowledge, due largely to the Internet, the publications available and a host of other reasons. We may have a bit more free time on our hands, and can now finally get to those projects that we've been putting off for years. Many of the tool manufacturers and woodworking-supply companies I've talked with are busier than ever. Woodworking and DIY are in a growth phase right now, even though COVID-19 has thrown a wrench into our lives. Hopefully, we at *CW&HI* can act as one of the woodworking, DIY and home improvement "hubs," sharing not only project inspiration and technical information, but new product announcements and stories from within our community. Check us out on Facebook, Instagram and Pinterest, as well as our woodworking and home improvement forum online, where you can stay up to date, ask all types of woodworking questions and get great advice from experienced people.

Speaking of growing sectors, the impact drill is one of the most sought-after power tools on the market today, and that's why we're featuring these powerful tools in this issue. With loads of torque for driving large fasteners, they're needed for nearly every project someone takes on, especially on the home improvement side of things. We take a close look at why you need an impact driver, introduce you to a wide range of impact-ready accessories, review five impact driver kits for under $200 and take a deep dive into three different types of impact drivers available in Canada.

We've also included lots of other articles for you. The modern sliding door bookcase pictured on our cover offers storage and strong visual appeal, and our regular Top 10, Know Your Tools, Canadian Quotes, Wood Science and Beginner's Journey columns offer fun and informative reading. We've even included another free Workshop Poster, this time discussing the impacts of moisture on wood, and how you can determine the moisture level of the solid wood in your shop.

Like I mentioned, I believe *CW&HI* is a bit of a hub for all things woodworking and home improvement related. If you have a question, I'm sure we can help answer it one way or another. Get a hold of us. We're here to help. After all, that's what friends are for.

— Rob Brown

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CANADIAN Woodworking & HOME IMPROVEMENT

Issue #131

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Print and digital subscription in Canada (plus tax)

1 year	6 issues	$27.97
2 years	12 issues	$49.97
3 years	18 issues	$64.97
Single copy		$6.97

Inspiring media

Canadian Woodworking & Home Improvement
is published by Inspiring Media Inc

PO Box 808, Niagara on the Lake, Ontario L0S 1J0 Canada
Telephone 519 449 1221
Facsimile 647 370 0864
Email publisher@canadianwoodworking.com

Canada Post Publications Mail 40035186
ISSN 1921-6432 (print) ISSN 2371-9028 (online)
HST 85195 6862

We acknowledge the support of the Government of Canada

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letters

Free Education Subscriptions

Would it be possible to have the students in my shop class register for the free subscription? I teach a basic woodworking shop in Dorchester Penitentiary. The level of competence varies from a couple guys who can only sand and paint to some very skilled workers. My goal is to help all the people I teach reach higher levels of skills, whether they're going to become tradespeople or not. All of them would appreciate getting a subscription to *CW&HI.*

I think what you're doing is excellent, especially for the type of students I work with. None of the people I work with have access to a computer with Internet connection, but I can certainly register through my office.

Gary Jonah
Basic Skills Shop Instructor

Hi Gary,
Yes, we'll send copies for your students. Canadian Woodworking provides free print and digital subscriptions in Canada for qualified woodworking instructors and enrolled students, thanks to the sponsorship of King Canada. Register at canadianwoodworking.com/learn. — Michael Fox, Publisher, CW&HI

More Illustrations, Please!

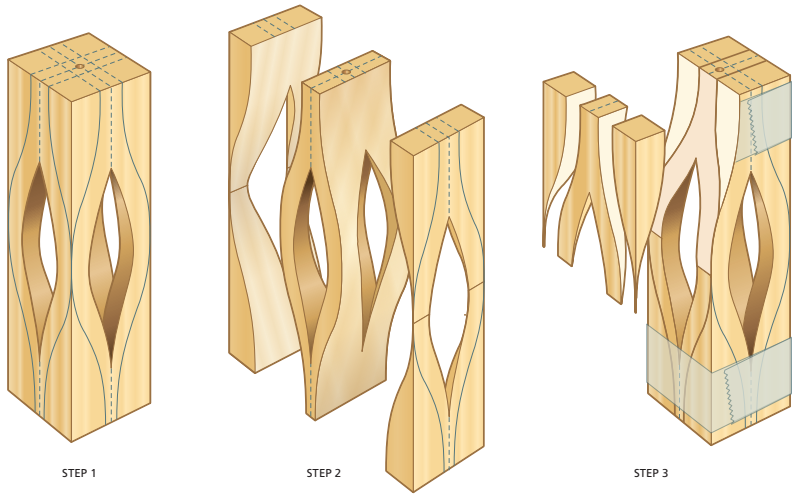
Rob,

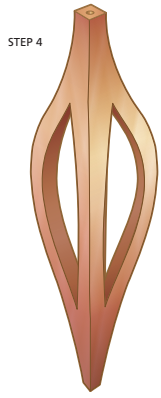
First, let me say that I have enjoyed reading the magazine for a long time. I have noticed and been frustrated that, while the articles detail each project, there aren't illustrations available for each project. The latest issue (Dec/Jan 2021) is a great example of projects that I would like to make, but there are no plans. No layout for the cribbage board, no plans for the necklace stand and especially no plans for the Christmas ornaments. I would love to make these projects, but I do not have the skills to take the photos and make a set of plans.

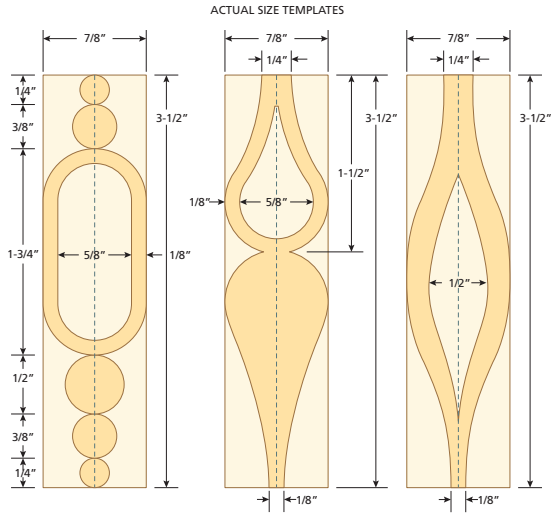
This is the only criticism I have of an enjoyable read.

Fraser H.
New Lowell, Ont.

Hi Fraser,
I will take a closer look at what projects I include an illustration for from now on and include them more often. I've had a detailed illustration of the Christmas ornament created, and it's now posted with that article online. The cribbage board template can be purchased from Lee Valley for a couple of dollars. We didn't have the right to publish their template and, to be honest, it's so complex and busy with all of the hundreds of holes, their template will make the drilling portion of the cribbage board project go much smoother. — Rob Brown, Editor, CW&HI







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Tool Reviews

Castle 110 Pocket Cutter

The Castle 110 Pocket Cutter bridges the gap between a manual pocket hole jig and a fully automated floor standing machine. It's the affordable, portable, easy-to-use pocket hole cutting machine. It cuts a shallow 3° hole, even lower than the 6° hole you get with commercial machines. This virtually eliminates shifting when assembling joints. The Castle 110 is a huge time-saver that gives one-person woodworking shops and hobbyist woodworkers an easy and affordable way to create low angle pockets. Read the full review on our website and visit **CastleUSA.com** for more product information.

Find more new products at:
canadianwoodworking.com/**reviews**

Events

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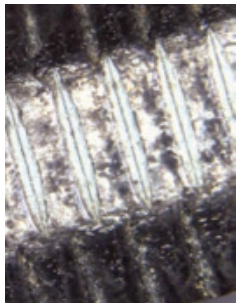
woodshows.com/virtualwoodshow

Product Watch

Based in Shallow Lake, Ontario, Fusion Stone is a manufactured concrete, 1-1/4" thick stone veneer. It can be user-installed on wood frame, steel stud, masonry and pre-cast wall sections. Installation is quickly and easily done with stainless steel clips and screws. This ensures that, even with movement in the walls, the stones stay in place. It's maintenance-free and doesn't require sealing – the stone is manufactured with an integral water-repellent agent that inhibits water absorption throughout the stone. Fusion Stone will last a lifetime and is backed by a product lifetime guarantee. **fusionstone.ca**



Micro Mystery

Can you guess this object commonly found in most shops?

Follow us on Instagram and Facebook to see regular close-up photos of common workshop tools and objects.

We will post the answer to this one in our June/July issue.

Previous issue: Router bit cutting edge

Best Build

Check out the **Woodworking** section of our forum for our latest "Best Build" thread – an electric guitar. This month's winner, John Kingma, wins a **Gift Certificate** 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

Levitating Shelf

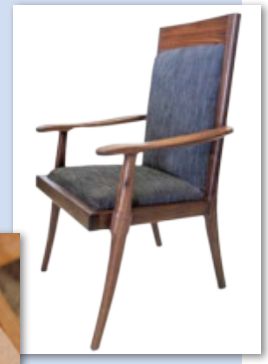
Whether you need a simple shelf near your bed or the front door, this fun project will serve you well.
canadianwoodworking.com/free-plans

Video Links

canadianwoodworking.com/**videos**

Canadian Quotes: Andrew Hunter

A video of furniture maker Frank Strazza



Forum Thread

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

- **Painting less-than-smooth walls: question for airless sprayer users** – Will spraying on a coating solve some challenges of painting a few less-than-perfect walls? The devil is in the details.
- **Basement window replacement** – When it comes to replacing a basement window, the type you need depends largely on whether the opening needs a lintel or not. Our forum members discuss a few scenarios.

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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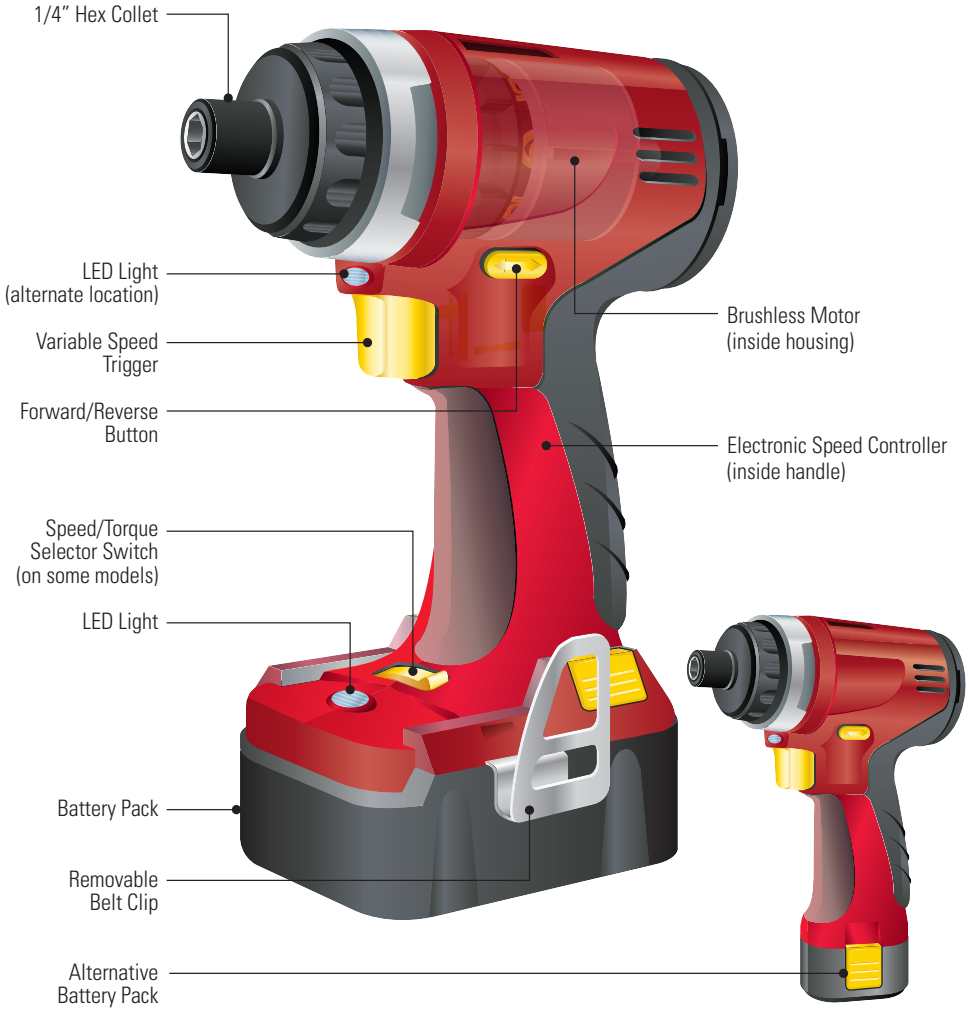
Impact Drivers



A **drill / driver** applies rotational force, a **hammer drill** applies percussive force, and an **impact driver** applies both rotational and impact force, making it superior for directing force downward. It does this by means of an internal spring, hammer and anvil. As the motor turns the shaft, a spring simultaneously compresses and then releases, driving a hammer against the anvil at a rate of more than 50 strikes per second. An impact driver delivers significantly more torque than a drill / driver, and is less likely to twist your wrist when the fastener stops or binds. It's also much less likely to strip the head of the fastener, though you can shear it off. Impact drivers have a spring-loaded, quick-release chuck that accepts 1/4" hex shank impact-rated driver bits and sockets. You can easily drive lag bolts up to 1/2" by 6" (longer for smaller diameter bolts) into structural lumber. Some models incorporate a switch that enables you to set the speed / torque level (low, medium or hard) to match the task at hand. You can purchase an impact driver as a tool only (if you already have extra batteries from the manufacturer), in a kit that consists of one or two batteries and charger, or as part of a kit containing other power tools. If most of the work you do is small-scale, where you'll be using 8- to 10-gauge screws in shorter lengths, opt for a 12V model.

Price: $80 to $500 (tool + battery)
$150 - $545 (kit)
Battery Platform: 12V, 18V (20V MAX)
Speed: 0 - 3,300 RPM
Impacts Rate: 3,100 - 4,000 IPM (impacts per minute)
Torque: 975 - 1,832 in-lbs
Weight: 2.1 to 3.3 pounds

Get the Most From Your **Impact Driver**

Use Impact-Rated Bits

Bits designed for use with drill / drivers are likely to break when used with an impact driver. Use driver bits and socket sets that are impact-rated.

Predrill Screw Holes

To avoid wood splitting, particularly split-prone wood, and when screwing near the end of a board, it's best to drill a pilot hole before sinking the screw.

Choose the Right Torque

Impact drivers can deliver considerable impact force. If your impact driver has a torque/speed switch, use it to match the size of screws you're sinking – lower torque for smaller diameter and shorter screws.

Feather the Trigger

Impact drivers don't have clutches. Learn to feather the trigger by pulling on it in short spurts. This protects the screw from the full torque of the impact driver, making it less likely to shear off the head of the screw.

Get a Second Battery

If your impact driver comes with a single battery, buy a second. You'll always have a fresh power supply ready to go.

Photos by Rob Brown Illustration by Len Churchill

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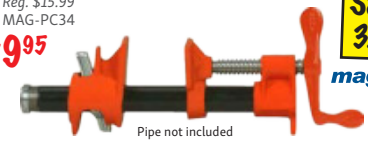

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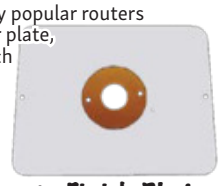

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Top 10 Joints Intermediate Woodworkers Should Learn

As a follow-up column to our "Joints Beginner Woodworkers Should Learn" from a couple of years ago, here's a list of 10 joints to help take your joinery skills to the next level. They don't all need to be in your arsenal, but practising some of them will result in stronger, more beautiful furniture.

BY ROB BROWN

1 Edge – Although this joint was first mentioned in my "beginner" column, it might be time to refine this incredibly common joint now that you have the basics. Aligning boards so their grain and colour are matching, making sure your glue-up results in a flat panel, and doing the little things so your glue lines are less visible in the future are your next challenges.

2 Pegged Rabbet – Pretty much the same as a standard rabbet joint, a pegged rabbet joint includes a number of dowels (1/8" to 1/4" in diameter) inserted through bored holes that help keep the joint together. This is a common method to secure Japanese drawer fronts to sides.

3 Stopped Dado – When building carcasses, a stopped dado is sometimes used to create a joint that will resist downward pressure (usually from drawers), while not showing through the front of the piece of furniture. It's usually the forward inch or so of the joint that isn't extended to the outer edge.

4 Mitre with Key – Start with an accurately machined mitre joint, then assemble it. When dry, use a jig to add a groove across both members of each mitre and cut and insert a solid wood key to further fix the two pieces together.

5 Through Mortise and Tenon – Extending a tenon through the mating workpiece is often stronger, but the main reason most woodworkers do it is because it will be visible. Taking it one step further and using wedges to secure the joint is a nice visual addition.

6 Loose Tenon – This finished joint can look just like a regular or through mortise and tenon joint, but it's made differently. Two mortises are made in the workpieces, then a loose tenon (a strip of wood the same width and depth of the mortises) is added to locate and secure the two workpieces together. It's a strong joint with lots of room for embellishment. This approach is very similar to using a Festool Domino.

7 Sliding Dovetail – By far my favourite dovetail joint, a sliding dovetail is the unsung hero of the dovetail family. The dovetail groove is often made with a freehand router and the tenon is machined with a router in a table. As long as you have a healthy amount of patience when setting up the router height when making the tenon you will be rewarded with a bombproof joint that is fairly easy to make. When using a large router bit, it's sometimes helpful to remove some of the material with a smaller bit (either straight or dovetail) before making the final pass with the larger bit.

8 Through Dovetail – The pinnacle of joinery for both woodworkers and the general public, the through dovetail has been used for centuries and remains a symbol of quality today. Hand cutting dovetails is a common approach, but dovetail router jigs also make very fast work of the joint, and as long as setup is dialed in, they create surprisingly strong, gap-free joints.

9 Half-Blind Dovetail – Often used to join a drawer front to drawer sides, this joint is popular because it's not visible on one side. It can be trickier to produce than hand-cut through dovetails, but router jigs also make quick work of this joint if that's the approach you'd prefer.

10 Box Joints – Very similar in strength to dovetails, but they can be made with a table saw or router. In fact, with the strong adhesives of today, I'd put my money on a box joint if strength is the main question. A box joint jig has to be made, but once it's dialed in, you're off to the races!

ROB BROWN
rbrown@canadianwoodworking.com

Go Online for More

VIDEOS: Subscribers can view in-depth videos of 11 critical woodworking joints on our website.
RELATED ARTICLES: Joints Beginner Woodworkers Should Learn *(Feb/Mar 2019)*, Make a Table Saw Mitre Spline Jig *(June/July 2020)*.

Photo by Rob Brown

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Andrew Hunter

…on woodworking books, the Internet and the smell of zebrawood.

BY ROB BROWN

Walnut Dresser – When designing the two upper drawer fronts, Hunter initially experimented with matching a solid piece that had the handle cut into it. This was a disaster, but shortly after, while he was on vacation, a pipe burst in his shop, ruining those parts. This turned out well in the end, because the updated version has a nice grain match and an integrated pull on the back of the lower edges of the upper drawer fronts. Hunter also had to cut the legs down about 2" due to the water damage and is now much happier with their height.

How long have you been building furniture?
Professionally for about six years, and on my own for four.

What sort of furniture do you specialize in?
I love to make all kinds of furniture.

Tell us a couple interesting things about your personal life.
I have been playing music since I was very young and really love to play drums, guitar and bass and I sing pretty terribly. I'm also a new father.

If you weren't a furniture maker what would you be?
I think about this fairly often and still have no idea. All I think about is furniture.

In order, what are the three most important items in your shop apron?
I don't think anything is more important than my mechanical pencil, a 6" ruler and a square.

Do you prefer hand tools or power tools?
I prefer power tools. My chisels are certainly my most used hand tools, and only a few times a month do I use my hand planes. I like the consistency and reliability of power tools and I wasn't taught much hand tool use after school, so I don't make much time for it.

Solid wood or veneer?
I work likely 90% in solid wood, but I love the consistency of veneer. I would like to get a vacuum press one day and start sawing my own veneers.

Figured wood or straight grain?
I prefer straight grain, both for workability and because sometimes heavily figured wood is too loud for my taste. I work primarily with wood, but think more about the piece and its shape and colour than I do wood textures. That being said, I definitely select my boards carefully and take time with board layout and matching.

Inherited Vintage Stanley Sweetheart or fresh-out-of-the-box Veritas?
I have the best of both worlds! I inherited fairly fresh Veritas planes from my dad.

Flowing curves or geometric shapes?
Both are groovy! As for my own work, I think I use more geometric shapes.

Favourite wood?
I like white oak with a light finish. You can't beat a classic!

Least favourite wood?
Though I use mostly domestic hardwoods, I worked in zebrawood once and found that sometimes boards smelled almost chocolate-y, but that other boards smelled like a wet horse when cut. I still think about that smell sometimes.

Photos by Andrew Hunter

Andrew Hunter, 29, Halibut Woodworking, halibutwoodworking.com
Location and size of studio – My studio is located in Stratford, Ontario. My shop is about 800 sq. ft. with a small office at the back. I also rent a retail space in downtown Stratford in partnership with a really great retail shop called La Osa.
Education – I earned a degree in cabinet and furniture making from Algonquin College in 2012. After graduating I worked for Robert Akroyd in his Toronto studio for about a year and a half.

quotes

In addition to my studio I spent time last year with two friends renovating a very old hotel lobby in downtown Stratford into a retail space. I now have some pieces on display there.

I like laying out and cutting joinery, but lately I just reach for the Domino mostly.

Books profiling designers like Borge Mogensen or George Nakashima are great. Recently I got the Vitra Design Museum's *Atlas of Furniture Design* and I think that's just about all you need. It's so incredible.

If something is going to be tricky, I make layout sticks and sometimes full-scale drawings on plywood, especially for chairs.

Make sure you're making sturdy, durable furniture. Make it as reliable and permanent as you can, and then try to make it as beautiful as you can. Then, try to make the next one better.

I think there are a lot of young people woodworking. I think so long as there's wood, there will be people making nice furniture out of wood.

I don't place as high a value on my time as I likely should. I'm sure I'll figure it out one day.

In Canada there are so many great people making some of the best furniture around, likely in the world. I really like my old boss Robert Akroyd's work, Heidi Earnshaw makes incredible furniture, The Woodshop on Fogo Island, Kastella in Montreal and all of what mjolk sells.

Internationally there are so many great makers. I like all of the great Danes so much, great Japanese makers, lots of people in Brazil making great furniture, so many in Australia, Neri and Hu.

My dad always had a woodshop for hobby purposes, and almost 10 years ago I signed up for college on a whim. It might have been luck, but it's been a real passion of mine ever since.

When I'm building furniture for myself or as gifts, I like to build without much more than an idea.

I caught a lot of breaks and I live in a very tight community that responds well to people working creatively.

Tambour Door Cabinet – This was the first time Hunter used tambour doors in a piece, and he did a lot of research before building them. What you see is actually the second set of tambour doors, because he cut the first pair to size in a sled and didn't account for the 3/4" piece that positioned the strips evenly during glue-up. The first set of doors ended up 3/4" too short. The second set turned out nicer than the first set, because Hunter took more time to match the strips for colour and grain.

Making furniture seems like it's becoming more than just a boys' club and that's nice to see in any industry. I think most of the furniture I like is more often than not made by people who don't fit the bill of the typical woodworker.

I think I've been my own boss for so long that I'm not sure I could have a boss anymore. It's become the only thing I think I can do!

I think Canada is becoming more welcoming for makers. Having said that, I know Toronto has had a lot of its great makers pack up and move in the last few years, so we'll see what happens when people are farther away from the wealth bubble.

I think often about how greatly the Internet has connected and contributed to so many people making such great furniture. I can spend all day looking at new stuff being built all around the globe and feel like I'm contributing to the big picture of craft.

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Softwoods: Structure and Growth Rings

Softwoods have been common in less formal furniture for centuries, and are often great for hidden structural components. Learn more about this wood and how you can best use it to your advantage when in the shop.

BY PETER MAC SWEEN

Ancient Wood – After a very close inspection, the annual growth rings in this piece of eastern white cedar are incredibly narrow, telling the tale of a very slow-growing tree. The pith of this tree formed around 1460 A.D.

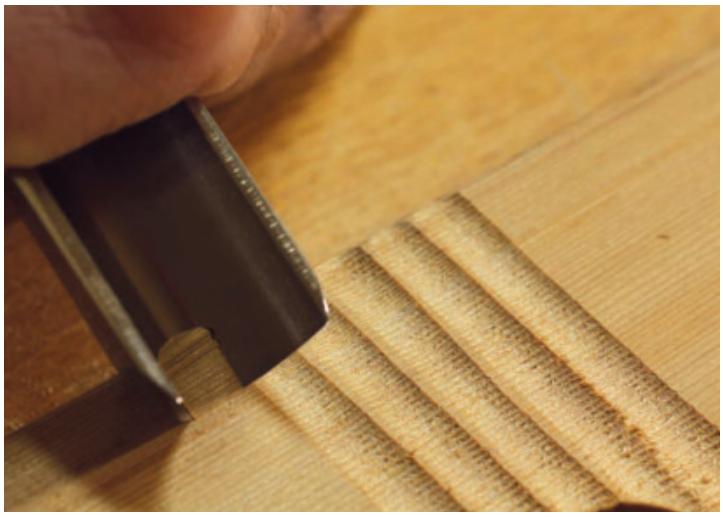
I have a small cross section of an eastern white cedar tree. Barely 8" wide, it's certainly not imposing, but a closer look at the wood reveals an incredible number of small growth rings. In fact, this ancient cedar is more than 560 years old. Most woodworkers are familiar with growth rings and the fact that they can tell us the age of a tree. However, growth rings also offer clues as to how a particular wood will act when machined, sanded and finished, and as to what its final appearance and durability will be.

The way softwoods grow determines not only the architecture of their growth rings but characteristics such as texture, grain, strength and figure. Softwoods are gymnosperms, which means they produce naked seeds. They are mostly coniferous, which tells us their foliage is needle-like. Softwoods are thought to be the first trees to evolve.

Tracheids

The internal structure of softwoods is simple when compared to the hardwoods. Most of the tree is made up of longitudinal cells called tracheids. Up to 95% of the wood in a softwood tree consists of tracheids. They're usually 100 times longer than their diameter and their fibrous nature is utilized to make paper. Tracheids are dual-purpose cells; they conduct sap as well as supply mechanical support for the tree.

Photos by Ella Mac Sween



Carving Softwood? – Though some softwoods are even more consistent in their earlywood / latewood densities, this piece of western red cedar is fairly even, making it somewhat decent for carving. Varying densities between earlywood and latewood make carving hard. (Photo by Rob Brown)

Tracheid diameter will vary between species and within the growth rings of an individual tree. The small diameter tracheids found in eastern white pine give that wood a fine texture. Redwood, with its large diameter tracheids, is considered a coarse-textured wood. If you're a carver you prefer the fine-textured woods, as they will hold more detail but will also yield to a knife or chisel with more consistency.

The thickness of the tracheid cell wall also affects the density and strength of the wood. Thin-walled cells are weak and lighter in colour. Tracheid cells that have thick walls are stronger and darker in colour. This is because the thicker cell walls have more cellulose and lignin, two compounds that give the cell structural strength.

Like all trees, growth in softwoods occurs at the cambium layer. The cambium layer will continue to produce new growth as long as favourable environmental conditions are met. The cambium layer grows outward, leaving a layer of newly formed wood cells behind while also depositing new cells in front of the cambium layer that are added to the bark. The tree increases in girth and volume as the cambium migrates outward, away from the pith. This process occurs yearly and forms the annual rings that we're familiar with.

Earlywood and latewood

In temperate regions, there is usually a period of growth followed by a dormant period. This affects the growth pattern of the tree and is revealed by distinct and visible layers in the growth rings. Early in the growth season, sap conduction is prioritized so the softwood tracheids are large and thin walled. Wood from this time is called earlywood and is weaker and lighter in colour. As the growing season progresses, smaller diameter cells with thicker walls predominate. This area of the growth ring is called latewood. What we're interested in as woodworkers is the relative proportion of earlywood to latewood, as well as how distinct the transition is.

Let's consider eastern white pine again. The transition from earlywood to latewood is gradual with an even grain produced from tracheids of a similar diameter. The resulting wood is consistent in how it works and wears. Southern yellow pine has a very distinct transition between the early and latewood. In fact, the latewood is three times as dense as the earlywood. The wood is unevenly grained and difficult to machine. Carvers will notice that their tools will slice through the earlywood with ease, then will require more effort in the dense latewood. The colour difference will be more pronounced, too, with the darker latewood predominating.

Growth rings also reveal clues to the overall strength of a given piece of wood. Fast-growing trees, growing either in open areas without much competition or on a plantation, produce very wide growth rings. The wood is inherently weak because much of the growth ring is made up of a higher percentage of large, thin-walled tracheids.

Trees with small growth rings, like my sample of eastern white cedar, produce stronger wood. This is because there are more of the thick-walled tracheids present, yielding a denser, stronger wood. This is why old-growth softwoods make ideal soundboards for musical instruments. They can be carved thinner without sacrificing strength, yielding a more responsive soundboard.

Sanding and finishing softwoods

Looking at the growth rings can also help us in deciding how to finish our projects. Softwoods with distinct growth lines can be difficult to sand. This is because the soft earlywood will yield when being sanded before the tougher latewood, producing a scalloped surface, especially if you sand by hand. Always back your sandpaper with a flat surface to avoid this problem.

Likewise, problems can arise when staining softwoods. When you apply a stain to softwoods, the earlywood will soak up more stain than the latewood. The earlywood will become darker and the overall colour pattern of the wood is reversed, not unlike a photo negative. I would caution against using stains on softwoods for this reason, especially if they're wiping / penetrating stains.

If you have put pencil and paper aside, and have finalized the design of your next project, you're now in the realm of wood selection. Selecting wood requires balancing its visual appeal and its structural nature. Learning how to read the end grain of lumber will always give important clues to help make this decision easier. By simply learning how to read the growth rings in the end grain, every piece of wood will reveal its beauty and strength, and offer clues as to best practices for working and finishing.

Peter's woodworking journey began with a career in carpentry followed by a decade buying and selling veneer. His spare time is spent abusing his guitars and exploring the great outdoors.

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Impact Driver Accessories

Photos by Rob Brown

Impact drivers need impact-ready accessories for maximum performance.

BY CARL DUGUAY

Impact drivers are extremely popular with carpenters, electricians, plumbers, HVAC technicians, maintenance workers, renovators and avid DIYers. Stands to reason, as these power-packed tools pack a punch, with speeds upwards of 3,600 RPM, striking power of up to 4,000 impacts per minute (IPM) and twisting force (torque) as high as 1,800 in-lbs.

The downside is that these intense percussive forces put more stress on impact driver accessories – drill bits, driver bits, nutsetters and the like – than a conventional drill/driver does. So, it's not uncommon for standard accessories to wear out prematurely or even break during use.

You're much better off purchasing accessories specifically designed for use with impact drivers. Fortunately, there are lots of impact-ready accessories to choose from. And, of course, you c an use any of them with your standard drill/driver.

Just about any accessory you would typically use in a drill/driver is now available for an impact driver, including drill bits, driver bits, hole saws, step bits, nut drivers, drill chucks, clutch tip holders, sockets and socket adaptors, nutsetters, right angle adaptors, and a range of bit holders and extensions.

All impact-ready accessories have a 1/4" hex shaft that fits into the 1/4" hex chuck on the impact driver. To use some of the non-impact-ready accessories that you may have on hand for your drill/driver, you'll likely need to purchase a few adaptors.

Almost all the leading power tool manufacturers have impact-ready accessories in their inventory, and most use a moniker to distinguish them from standard drill/driver accessories. For example, Bosch uses the handle "Impact Tough", DeWalt uses "FlexTorq", Irwin styles their accessories "Impact Performance", Makita labels their products "ImpactX" and Milwaukee accessories are tagged "SHOCKWAVE".

Like a Snap – These drill bit adaptors from Snappy Tools give you the option to use your own drill bits in a 1/4" hex chuck. They're available in a set of seven, from 1/16" to 1/4".

All these products seem to be described in similar terms: minimal breakage; maximum strength; and durability. This likely means that the brand you choose is largely a matter of personal choice, product availability and brand loyalty.

While you can purchase individual pieces, sets are usually a more economical choice, especially if you'll be using an impact driver on a regular basis. And sets often come in a durable case that makes it convenient to organize, transport and store the accessories.

Drill bits

If you have a basic set of drill bits that you use with your drill/driver and want to use them in your impact driver, one option is to purchase a separate adaptor for each size of drill bit. Unfortunately, adaptors are only available in a limited range of bit sizes, typically to fit 1/16", 3/32", 1/8", 5/32", 3/16", 7/32" and 1/4" twist bits. Snappy Tools has a set (#40020) that accommodates all seven of these bit sizes. You simply insert a bit into the appropriately sized adaptor, tighten a grub screw and it's ready to use. A nice feature on this set is that the adaptors come with drill bits.

A second option, which is probably the best approach if you're heavily invested in a variety of twist drill bits and step drill bits, is to purchase a keyless conversion chuck adaptor such as the Titan #16207 or the DeWalt #DW0521. Both have a three-jaw chuck that enables you to use drill bits up to 3/8" diameter.

Just remember, when using non-impact drill bits, select the lowest impact setting on your impact driver (or feather the trigger if your impact driver doesn't have an adjustable torque setting) to avoid breaking the bits.

Because impact drivers aren't the power tool of choice when it comes to drilling, there isn't a large selection of impact-ready twist drill bits, especially in the smaller sizes. Most sets contain drill bits from 1/16" to 1/2". The DeWalt set (#DW1956) consists of 16 titanium-coated bits that feature a "Pilot Point" tip – a cutting point on the tip of bits 3/16" and larger, which predrill holes to keep the bits from wandering. The Milwaukee set (#48-89-4632) has 29 titanium-coated bits and features a "Quad Edge" tip that incorporates a 135° split point tip and four cutting edges.

Titan & DeWalt Chucks – These chucks by Titan and DeWalt both fit a 1/4" hex chuck and will hold a wide range of driving and boring accessories.

Right to the Point – The DeWalt DW1956 drill bit set includes 16 bits between 1/16" and 1/2". The larger bits also include "Pilot Point" tips to keep the bits from wandering.

"**Quad Edge" Tip** – This Milwaukee set (#48-89-4632) covers a wide range of sizes and features a "Quad Edge" tip that incorporates a 135° split point tip and four cutting edges on the larger bits.

Driver Bits – Impact driver bits include a torsion zone towards their center. This allows the bits to flex slightly, instead of snap, during heavy use. Compare the standard driver bit on the left with five impact driver bits on the right. Some of these bits have magnetic tips, so if this is something you prefer read the labels carefully.

Driver Bit Sets – There are many different types of driver bit sets on the market. This set from Bosch includes multiples of the most common bits in a variety of lengths, taking care of virtually all standard driver bit needs.

If you drill a lot of large holes in wood, you're in luck as there is a wide range of hole saws (from 3/4" to 1-1/2"), spade bits (from 1/4" to 1-1/2" diameter) and step bits (from 1/8 - 1/2" to 13/16" - 1-3/8"). You'll find individual bits and sets from Bosch, DeWalt, Irwin and Milwaukee.

Driver bits

This is where impact drivers really shine. They sink standard screws and lag screws much more quickly than drill/drivers. If you use only a few types of screws, then it's probably more cost effective to purchase individual driver bits. Otherwise, a kit that contains a range of driver bits is the way to go.

Many of the higher-quality driver bits incorporate a torsion zone (a.k.a. shock zone) – the middle section of the bit is narrower than the tip or shank, enabling it to flex when torque is applied to prevent the bit from snapping.

Sets comes in a wide range of configurations. For example, Bosch offers a three-piece driver set (#ITV203) of 2" long bits that consists of the ubiquitous #2 Robertson and #2 Phillips bits and a T25 Torx bit. If you need a wider selection of driver bits, a set like the Makita 50-piece set (#A-98348) is worth considering. It consists of a range of 1" and 2" bits in all three common sizes along with a couple of bit holders, a socket adaptor and some nut drivers. For a smattering of everything there is the Milwaukee PACKOUT kit (#48-32-4082) with an assortment of 100 square, Phillips, TORX, Slotted and hex bits.

For those of you who use Torx (the ones with a six-point star-shaped pattern head) or Pozidriv (with a head similar to a Phillips)

Quality Bits, Small Case – Wera offers a wide range of Torx and Pozidriv bits and a quality adaptor, all in a handy carrying case. They offer different sets that also include Robertson and Phillips bits.

Bit Holders – Though they look very similar, bit holders are available in a range of options. Some have magnetic tips, while others include a sleeve that can be extended over the fastener to ensure it gets driven in straight and that it doesn't fall off the driver bit. Length of bit holder is also something to consider.

Wera Rapidaptor – Press a bit into the Rapidaptor by Wera and it will be held in place until the user manually removes it by pulling back the outer ring of the holder to pop the bit out. It's a good solution to both holding the bit in place during use, and allowing the user to easily remove the bit after use, even if they have gloves on.

DeWalt Impact Clutch – The #DWHJHLD bit holder from DeWalt has an integrated clutch designed for drilling in metal. It goes a long way to stopping the screw head from stripping.

screws and bolts, special impact-ready driver bits may be more difficult to source. Wera has one of the widest ranges of impact-ready specialty drivers, along with nutsetters and adaptors. If you're tempted to use a Phillips driver with a Pozidriv screw – don't. The driver will probably cam out of the screwhead before it's fully tightened.

To make it easier to swap out driver bits most kits include bit holders. Basic holders, like the Milwaukee #48-32-4502, rely on a permanent magnet that holds the bit in place. Those that incorporate a quick-release collar along with a permanent magnet, like the Wera Rapidaptor #052502, lock the bit firmly in place until it's manually released. The DeWalt #DWHJHLD has a bit holder with an integrated clutch designed for drilling in metal. This bit holder clutches out as soon as the screw is set, which prevents the bit from breaking or the screwhead from stripping.

Nuts and bolts

To deal with nuts and bolts, there are both socket adaptors and nutsetters. Socket adaptors enable you to use non-impact-ready sockets you may already have on hand. They're widely available for the three common sizes of sockets (1/4", 3/8" and 1/2") and come in lengths from 2" to 12". Of course, you're better off purchasing impact-ready sockets if you're using them often. There is a wide range of choices available in singles and sets from Bosch, DeWalt,

Socket and Adaptors – You can purchase impact ready socket adaptor and socket sets, like these offerings from Makita and DeWalt. Sets include a varying number of sockets, so select one for the type of work you do.

Ryobi Adaptors – If you already have a socket set, and want to use it with your impact driver from time to time, an impact-ready adaptor set is a good approach. This set from Ryobi includes three adaptors in 1/4", 3/8" and 1/2" sizes.

Nutsetters – Ready for action, nutsetters can be purchased in a range of sets. Some are even colour-coded according to their size to make them easier to find.

Husky Extension Set – This torque-limiting impact extension bar set from Husky will ensure your fasteners are tightened enough, yet not too much.

Exchange-A-Blade Set – This impact-ready set from Exchange-A-Blade includes a small number of the most common driver bits, nutsetters and adaptors. It's a quality set.

Exchange-A-Blade, Makita and Milwaukee.

Nutsetters are also available in a range of metric and imperial sizes. For use around the shop or home, a set that includes 1/4", 5/16", 3/8", 7/16" and 1/2" nutsetters is likely all you'll ever need.

If you do a lot of work on machinery, then you might want to get a torque-limiting impact extension bar set, like the Husky #H2DTRQEXT5PCC, which has five 1/2" drives in 65, 80, 100, 120 and 140 ft lbs. These drives stop applying torque when they reach the specified torque setting.

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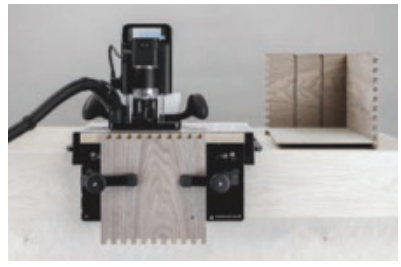

Ryobi Set – This large set from Ryobi (AR2040) includes multiples of most driver bits, as well as a selection of nutsetters and adaptors.

Milwaukee Set – This combo set (48-32-4006) includes at least one of the most common bits and nutsetters, and also includes a few drill bits that might get you out of a jam one day.

Combo Kits

Combination kits or sets are an attractive choice for hobbyist woodworkers and avid DIYers because they offer a range of commonly used accessories, typically at a lower cost per unit ratio than purchasing accessories separately. Each manufacturer will have a slightly different assortment of accessories in their kits, which may include bit drivers, drill bits, nutsetters and bit holders. Most are packed in a modular storage case. You'll want to make sure that the set you purchase has the accessories that are most applicable to the work you do.

The 41-piece EAB set (#76700) consists of an assortment of 36 1" and 2" Phillip, Pozidrive, square and Torz driver bits, three nutsetters and a standard bit holder. For a larger assortment of bits, the Ryobi set (AR2040) comes with a mix of 60 Phillips, slotted, square and Torx driver bits, six nutsetters, three sockets and standard bit holder. Along with 31 1" and 2" Phillips, slotted, square, hex and Torx driver bits, the Milwaukee 40-piece set (#48-32-4006) has three drill bits, along with three nutsetters, two sockets and a standard bit holder.

Right-Angle Driving – This modular 4-in-1 system from DeWalt offers compact right-angle, standard right-angle, right-angle flexshaft and straight flexshaft operation.

To extend the reach of any impact-ready accessory there are bit holder extenders available in lengths from 3" to 12". Some feature a quick-release magnetic locking head, others use grub screws to secure the accessory to the bit extender.

Sources: boschtools.com, dewalt.ca, exchangeablade.com, homedepot.ca (husky), irwin.com, makita.ca, milwaukeetool.ca, snappytools.com, www-us.wera.de

Extra Long – Bit holder extenders, like these from Makita and DeWalt, come in a range of lengths. They also vary in how they hold the bit. There are also extra long impact-ready driver bits available.

CARL DUGUAY
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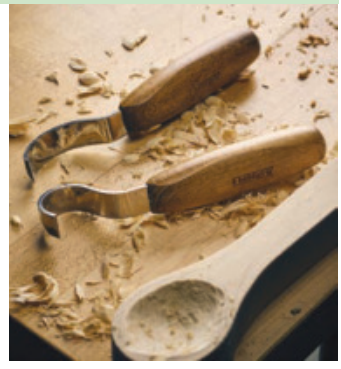
Narex hook knives at Lee Valley Tools



Sponsored: Used for hollowing concave forms, these hook knives are designed to take a paring cut, permitting excellent control. The steel blades come sharpened and honed to a keen edge, and the thick 4-1/2" long beech handles have an oval shape that fits comfortably in the palm. The roughing blade has a more pronounced curve (approximately 1/2" radius) for rapid material removal; the shallow-cutting blade is curved to a 1-1/4" radius for finishing cuts. The sets are offered with one roughing knife and one shallow knife in right-hand and left-hand models. You may need only the version that suits your dominant hand, although they are complementary, since having both gives you greater flexibility to accommodate changes in grain direction. For more information, visit **LeeValley.com**.

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5 IMPACT KITS FOR UNDER $200

Photos by Rich Keller (Product photos by manufacturers)

With so many impact drivers on the market, where's a woodworker or DIYer supposed to start? We take a close look at five kits, and let you know the pros and cons of each before you buy.

BY RICH KELLER

These days, when it comes to selecting an impact driver there's a long list of options to consider. I've taken a look at five impact driver kits, comparing the similarities and differences of the impact driver in each kit, plus torturing them a little bit to see how well they performed on some of the toughest fastening applications I could find.

Why did I include just kits, even though I only tested the impact driver in each kit? Good question. Though most of these impact drivers can be purchased separately, the value is so high when buying impact drivers in a kit we assumed the majority of readers would likely opt for that approach. In most cases it's an extra 20% or so to get a drill or another power tool in a kit, and sometimes another battery is also included. Kits offer serious value.

Before getting into the five products we selected for this article I want to mention the impact drivers we left off the list. With such a wide range of impact drivers on the market we couldn't possibly include every option you'll find on the shelves of your local dealer. Some of you are already familiar with the serious benefits impact drivers bring to the shop and worksite, but for those of you who aren't up to speed on what sort of "impact" these tools can make, we decided staying under the $200 ceiling was a good place to start. For some readers, spending an extra $50 or so might make more sense, but for others, a more basic tool will pretty much meet all of their needs.

The test

The main function of an impact drive is to drive medium and large metal fasteners like screws, lag bolts and many others. Having said that, I wanted to push these drivers past their comfort zone to see how they fared. It wasn't all about how much torque they had. Other factors such as how they feel in the hand, how balanced they are, what type of chuck they have, how large they are, and on-board lighting are also important.

One job I occasionally use an impact for is to take anchors out of concrete. Usually these 3/8" anchor bolts rust in place after a few years in concrete. In the past I haven't found an impact driver compact enough (such as the ones here) to take these out. The other tough job I run into is driving self-tapping screws through plywood into a steel beam. This job is tough because once the screw is through the plywood, the impact driver has to keep enough torque and RPM to then drill through the steel, while having all the friction of the plywood on the screw threads. These screws are a lot harder to drive than a typical screw into just wood. All the impacts I tested were able to drive the self-tapping screws just fine, and I was actually surprised to find an impact that could pull these anchors out of concrete.

Testing, Testing – These self-tapping screws are used to anchor plywood to steel. They require a fairly good impact driver to be able to drive them all the way in.

Craftsman CMCC2002C2

$189

Includes impact driver, drill, two batteries, charger, tool bag

The Craftsman impact was well balanced over all. One thing I liked about it was that you could push a driver bit into the chuck with one hand and have it lock in place. With some impacts, you have to push or pull a release collar to get the bit into the chuck. I find it slightly tricky to hold the drill with one hand, the bit with the other hand, and then hit the release on the chuck on those models. In terms of size, the Craftsman was one of the longer tools overall, which means you might not be able to get it into tight places. That may or may not be a problem, depending what kind of work you do. This tool would be fine for general construction, and it's still smaller than a typical cordless drill.

Lots of Torque – Many machines in Keller's shop are anchored to the floor. These anchors go in easy, and all these impacts can do that. But only one of them could get any anchors back out after a few years rusting away in the floor. The Craftsmen was this driver.

King 8020L/8022LK

$169

Includes impact driver, drill, two batteries, charger, tool case

The King impact was pretty well balanced overall. Even though it was the longest impact I looked at, it didn't feel awkward or top heavy. It had all the typical stuff that you see on impacts these days: fuel gauges on the batteries; a light on the tool; and a belt clip. One thing I noticed with the King impact is that it has a lower RPM range than the others. The top speed of the King impact is 2200 RPM while most I tested were 2800-2900 RPM. Even though it doesn't seem like it would make a big difference, it was noticeable. This difference is a bit of a double-edge sword. On one hand, driving the self-tapping screws did take longer than other impacts; but the King was still able to do it, though, which is pretty admirable.

If the RPM of the tool drops too low, the screw won't be able to drill through the steel beam, and you'll never be able to get the screw in all the way. On the other hand, I felt that the King impact was a bit more sensitive for speed control on the low end. This is an advantage when working with really small screws.

Shed Some Light – The King impact driver sheds a healthy amount of light on the task at hand with a series of LEDs surrounding the chuck.

DeWalt DCK278C2/DCF809B

$199

Includes impact driver, drill, two batteries, charger, tool bag

The DeWalt impact felt a bit top heavy, which was surprising because the head of the tool was the smallest of all I tested. The DeWalt battery is quite light compared to some of the others, so this is probably why the balance feels different. The DeWalt impact also has a one-handed chuck, where you can lock the bit in place without moving a release collar first. The DeWalt impact was able to take the odd concrete anchor out for me, which was a bit of a surprise. The top-of-the-line model I personally use day-to-day can only take out the odd anchor. I usually have to use a pneumatic impact to complete that job. Quite frankly, the DeWalt impact I tested is one of their entry-level tools. They do make more powerful models, so I'm impressed that it can compete with something higher end. This DeWalt model is also brushless, which means the motor is more durable and will get better battery runtime compared to a similar brushed model.

Size Sometimes Matters – There's quite a bit of difference between the longest and shortest drivers Keller tested. For general use this might not matter, but if you're trying to get into tight spots, a smaller impact would be a better choice.

Ryobi PSBID01K

$129

Includes impact driver, two batteries, charger, tool bag

The Ryobi impact has a physically bigger battery than the other tools I tested. I found that it was pretty stable when I set it down on the bench. Many cordless drills tend to be top heavy and tip over with a little breeze so I didn't mind the fact that the Ryobi could stay upright on a wiggly bench. The Ryobi had a noticeably more aggressive impact sound than the other drivers tested. It was a bit faster driving the self-tapping screws. I'm not sure if this was because of the faster impact rate, because the RPM on the Ryobi was slightly higher than most of the other drivers, or both. The Ryobi also had a fairly small head to the tool, allowing you to get into tight spots. This model is also brushless, which means increased power transfer, among other things.

Stability – Although it's not overly heavy and feels good in the hand, the Ryobi impact has a big base that allows it to sit stably on a bench.

Ridgid R96021

$179

Includes impact driver, drill, two batteries, charger, tool bag

The Ridgid also has a one-handed chuck for both inserting and removing the bit. You can press the bit in with one hand, and it will click in place. You can pull the release with one hand, and the bit will actually shoot across the bench. The Ridgid also has a convenient switch on the handle for the work light. In most impacts, the light comes on when you pull the trigger, but it's rather helpful to see where you're going before you hit the gas to get there.

I hope this article provides some insight into impact drivers, and what features to look for when you're comparing the dizzying array of drivers on the market. The top features I look for in this type of tool are a compact physical size, along with a brushless motor. Brushless motors are much better than the older brushed technology, delivering more power and runtime out of the same batteries that brushed tools use. Other features, such as work lights, belt clips and battery gauges, seem to be pretty standard fare on this type of tool these days. It's also important to find a tool that feels comfortable in your hand. Just like not every tool is the same, not every hand is the same. Pick up a few different models to see what they feel like in your hand to get an idea of what you prefer.

Flick of a Pinky – The light on the Ridgid can easily be turned on with the switch located towards the bottom of the handle.

Easy Bit Installation – Some chucks are easier than others to insert a bit into. The Ridgid allows one-handed use; you just push the bit in.

RICH KELLER
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INTRODUCTION TO **WOODWORKING**

Moisture Meters

Considerations/Tips

- Moisture meters read moisture content in the 5% to 30% range.
- Low moisture readings are in the 5% to 12% range; moderate moisture is in the 13% to 17% range; high moisture is above 17%.
- Pinless meters are generally not affected by temperature. For pin meters that don't have temperature corrections built in, you will need to make manual corrections.
- Ensure there is no metal embedded in the wood you're testing.
- Take multiple readings at different locations on the wood – moisture may be distributed unevenly in a piece of wood.
- A moisture meter is usually calibrated for one type of wood (typically Douglas fir). If your meter doesn't have built-in species correction capability, use a species correction table when scanning different wood species.
- Regularly check the accuracy of your moisture meter.

Pinless Meter

Pinless meters emit electromagnetic radio waves that scan wood to determine its moisture content. Unlike pin meters, they don't damage the surface of wood. Some meters scan at dual depths (1/4" and 3/4"); others up to 1-1/2" deep. Meter readings are affected by the specific gravity of the wood. A wood species with a higher specific

Moisture Level to Aim For

Wood will almost constantly be either accepting or giving off moisture. The only time wood isn't doing this is when the relative humidity levels of the air align with the current moisture content of the wood. When this happens, the wood is said to have reached "equilibrium moisture content," but this state rarely lasts for long, as the relative humidity in the air will surely change soon.

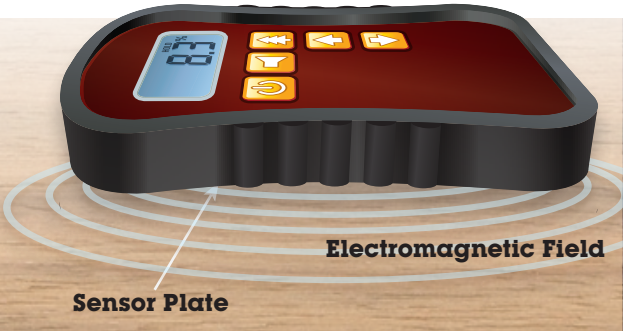
You want the wood in your shop to reach, or be very close to, its equilibrium moisture content before using it.

As humidity increases, the moisture content in wood increases, causing wood to expand. As humidity decreases, the moisture content decreases, causing the wood to shrink. The table below shows the ideal moisture content for your wood at various humidity levels.

Humidity Level in Your Shop	Ideal Equilibrium Moisture Content Level for Your Wood
19-25%	5%
26-32%	6%
33-39%	7%
40-46%	8%
47-52%	9%

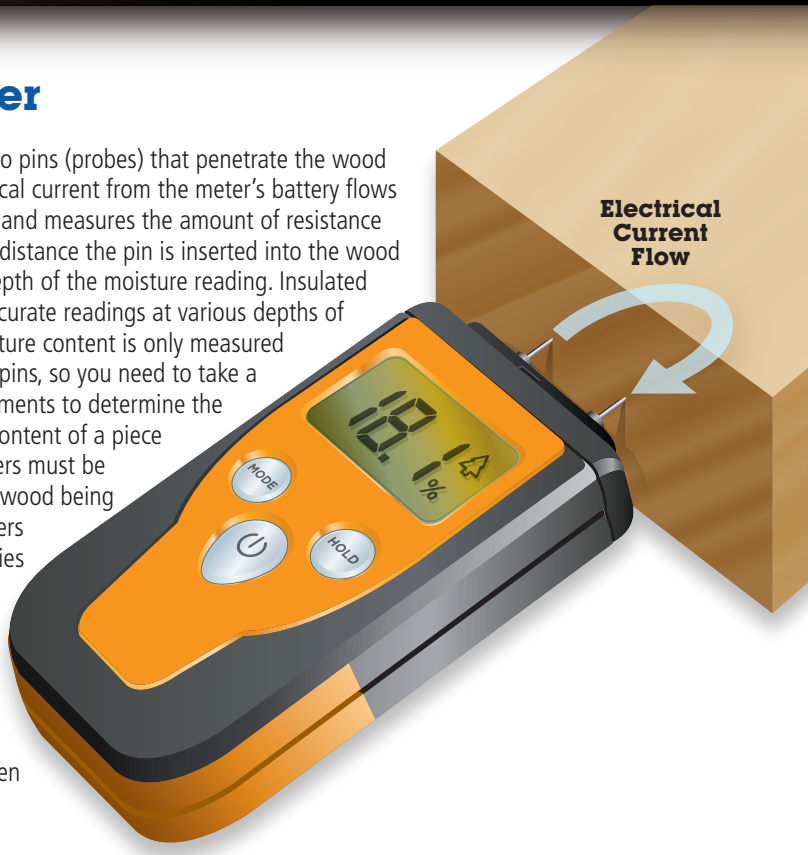
Source: Wagner Meters

gravity will display a higher moisture reading than a wood species with a lower specific gravity at the same moisture content, so corrections for species need to be made. Some meters have built-in species corrections; otherwise, you need to calibrate the meter for the specific gravity value of the wood you're scanning. Some pinless meters are Bluetooth-enabled. Others have built-in temperature and humidity sensors. Pinless meters are better for scanning large, flat surfaces or when you don't want to damage the wood surface with pin holes.



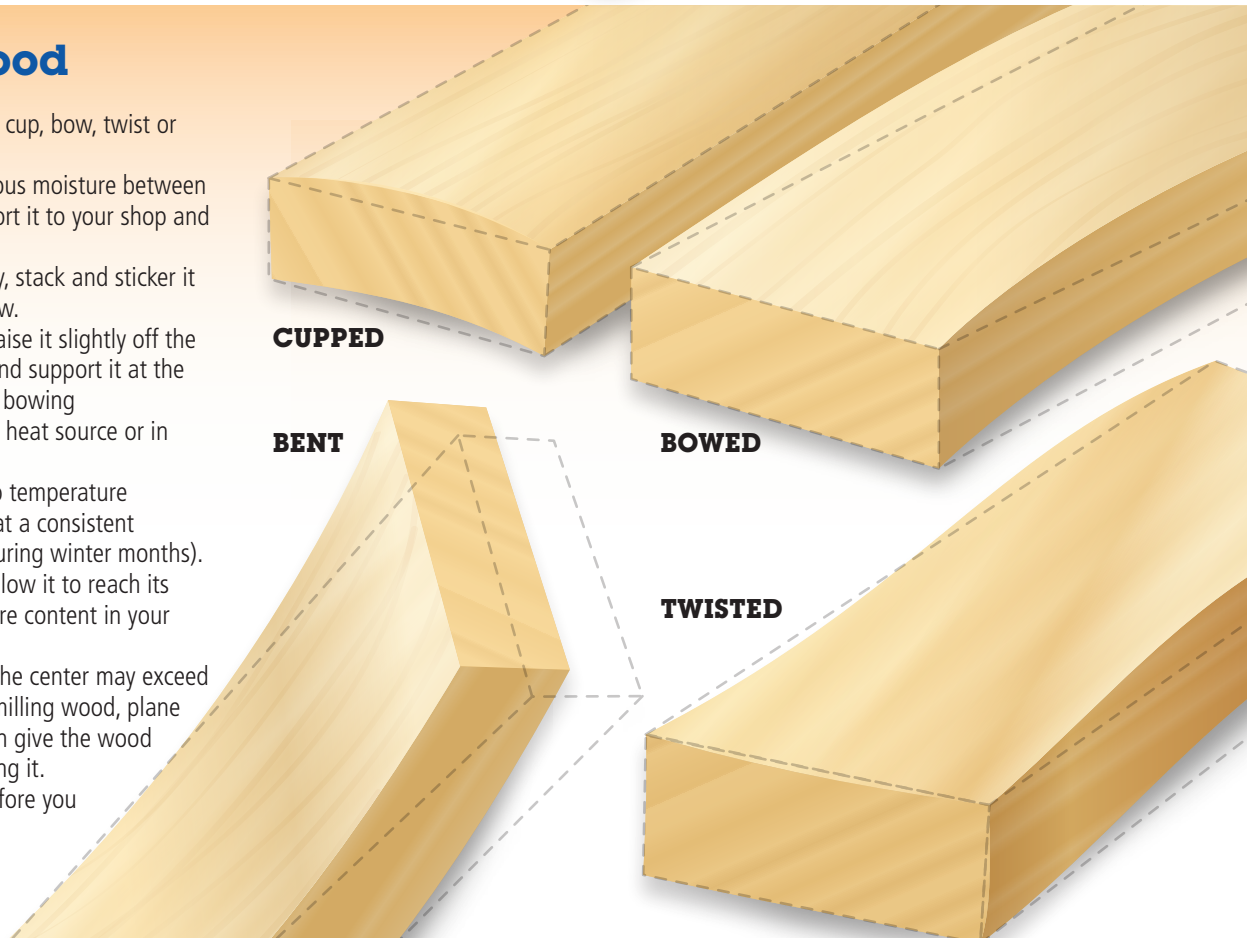
Pin Meter

Pin meters use two pins (probes) that penetrate the wood surface. An electrical current from the meter's battery flows between the pins and measures the amount of resistance encountered. The distance the pin is inserted into the wood determines the depth of the moisture reading. Insulated pins give more accurate readings at various depths of penetration. Moisture content is only measured between the two pins, so you need to take a range of measurements to determine the overall moisture content of a piece of wood. Pin meters must be calibrated for the wood being tested. Some meters have built-in species corrections; otherwise, use a species correction table. Pin meters are better suited for testing rough lumber with uneven surfaces.



Acclimate Wood

- Improperly dried wood can cup, bow, twist or bend.
- Wood can pick up extraneous moisture between the time you buy it, transport it to your shop and then use it.
- If storing wood horizontally, stack and sticker it to provide adequate air flow.
- If storing wood vertically, raise it slightly off the floor to facilitate air flow and support it at the top and bottom to prevent bowing
- Avoid placing wood near a heat source or in direct sunlight.
- Don't subject your wood to temperature extremes (keep your shop at a consistent temperature, particularly during winter months).
- Before milling the wood, allow it to reach its optimal equilibrium moisture content in your shop.
- Moisture content close to the center may exceed that at the surface. When milling wood, plane both faces equally and then give the wood time to stabilize before using it.
- Do any final milling just before you use the wood.



INFO: DIFFICULTY – **3/5,** LENGTH/TIME – **3/5,** COST – **3/5**

Build a WALL CABINET with a SLIDING DOOR

This simple wall cabinet is easy to build, and the single sliding door offers a good opportunity to add colour, texture or another decorative touch.

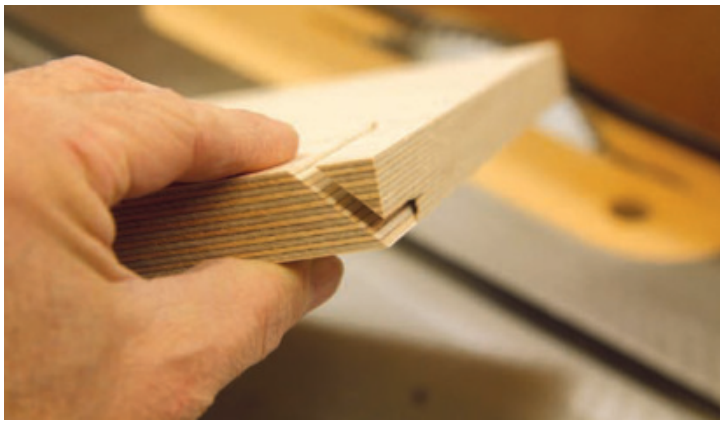
BY ROB BROWN

My kids read a lot, and they wanted somewhere to store a few books. As they're not paying customers, I didn't want to spend forever on this project, but I did want to be able to add a unique detail to each cabinet and make them a piece of furniture they would be proud to have for the rest of their lives. I let each kid decide on the colour, and type and pattern of texture they would like to give them a bit of a say in what their cabinet would look like.

Materials

Plywood is super strong, and can be very easy to work with. Some people much prefer to work only with solid wood, but I think plywood is especially

Photos by James Dobson Illustration by Len CHurchill



Careful Setup – Brown cuts the parts to finished size, then bevels the ends of the gables, top and bottom. Set-up takes a few tries to dial in properly. The bevelled portion should extend out of the workpiece at exactly the same point where the 3/4" wide edge and the outer face of the workpiece meet.

Time to Bevel – Once set up, the gap below the sacrificial fence provides a space for the offcut to go. The parts can now all be bevelled with this single set-up.

great for casework. I will often use solid wood to protect the edges of plywood cabinetry, door frames and other structural and decorative parts.

As is typical for sheet goods, plywood is usually available in 4' x 8' panels. As you can imagine, these dimensions make transporting and working plywood difficult. I opted to order the plywood for this project online from Home Depot. They offer Columbia Forest Products sheet goods in 2' x 4' panels, making machining much easier. They even delivered it to my front door, which was super handy. It's available in many face and back veneer species, and also a few different core types. I chose a Baltic birch core with maple face and back veneer. I used solid maple to cap each cabinet's four front edges and sliding door.

Design

Since I knew the plywood was going to be 4' long and 2' wide, I designed the cabinets to work within these dimensions. The overall width was going to be just under 4', the depth and height were both just under 12". I wasn't concerned with the exact finished dimensions of the case, which made it easier. Between kerfs and trimming the perimeter of the plywood to create a perfectly smooth finished edge, the finished cabinets measure about 47-3/4" long by 11-3/4" deep and high.

I like the visual simplicity of a bevel joint, so I opted for that approach for the four corners of the case. Sliding dovetails, which are exceptionally strong, secure the divider to the top and bottom. A simple glued bevel joint can be slightly on the weaker side, but the divider provides a lot of strength, so even if the cabinets are full of books there will be enough strength to hold things together. The 3/4" thick back provides some strength to support the books and provides a solid way to secure the cabinets to the wall.

Start with the case

I ripped the panels in half to break out the top, bottom and gables. I then rotated them 180° to made a trim cut on the other edge to create two perfectly clean edges. This used up 2-1/2 sheets. I used half of the remaining half sheet for the dividers. Another sheet was ripped in half to provide me with the two backs.

In hindsight I should have glued the 1/4" solid edging to the front edges of the top, bottom and gables at this point. The solid edges could have been trimmed to length and bevelled at the same time as the plywood panels. I applied it after.

There are many approaches to cut the four bevel joints to secure the four corners of the case. Use whatever method you have tooling for and are comfortable with. I used a method I've written about before in CW&HI that involves cutting the parts to be bevelled to size, then tilting the table saw blade to 45° and setting up a sacrificial fence to guide the workpieces. See the information at the end of the article to find more information.

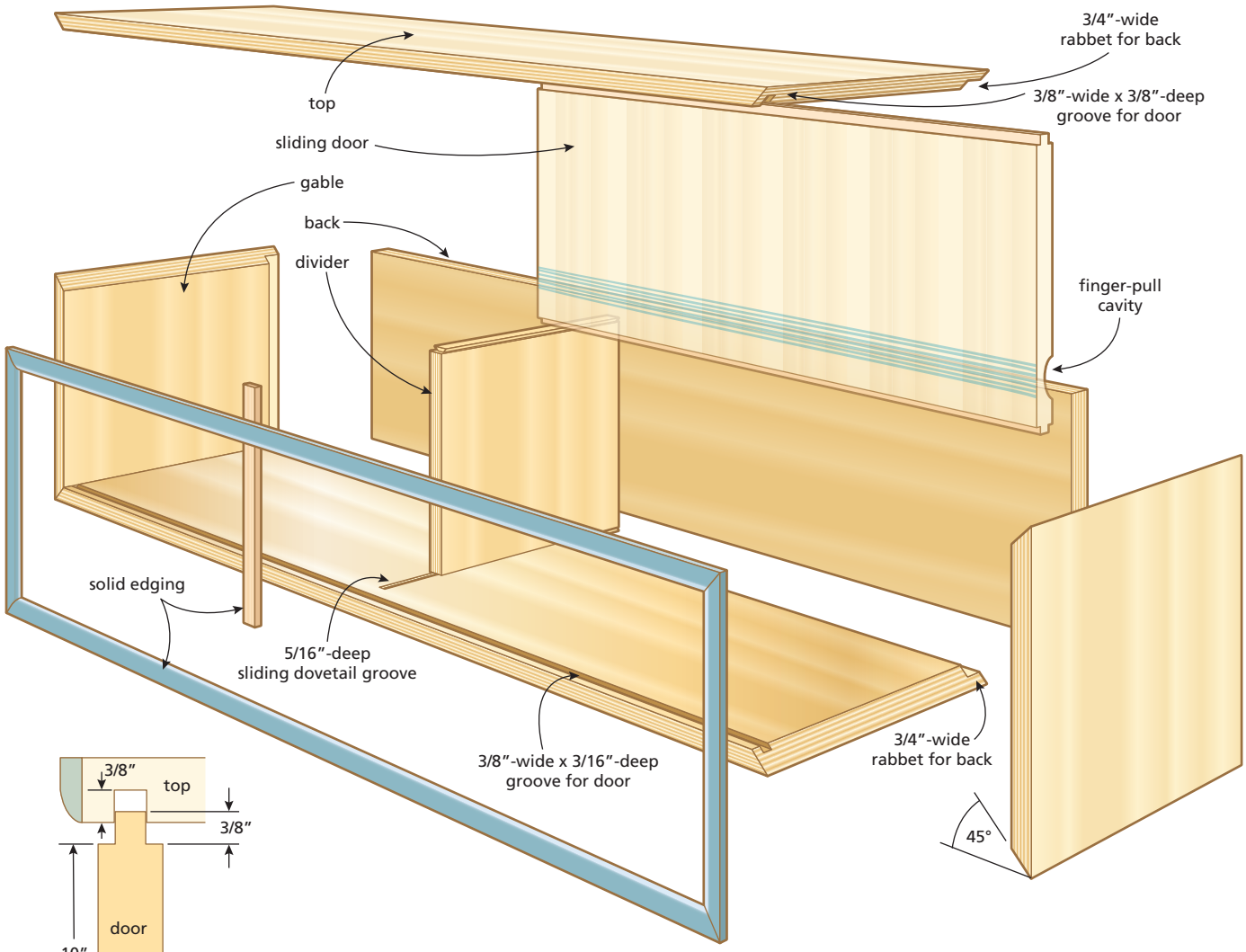
I cut the tops, bottoms and gables to finished length, then used the technique to bevel the ends of these parts.

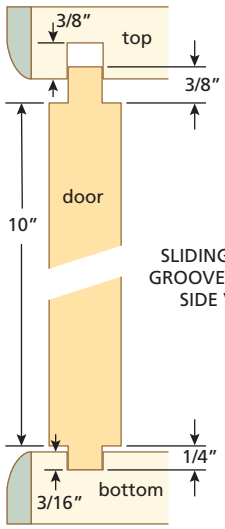
Apply solid edges

As I mentioned, I should have applied the solid edges before bevelling the case parts, but my approach wasn't overly difficult. I machined the edges, cut them to rough length and applied them. For the short gables I just used masking tape to clamp them in place while the glue dried. For the longer top and bottom panels, I used a few strips of masking tape to hold the solid edges in place, then brought two parts together, solid edge to solid edge, and clamped them. This uses a lot less tape and was slightly faster.

When dry, I removed the tape, scraped the glue and used my router to trim the solid edges flush with the faces of the workpieces. To do this I installed a 3/4" straight router bit in my router, then attached a simple plywood jig that covered just under half of the router's base. Once the base height was adjusted so the bottom of the bit was perfectly flush with the underside of the plywood base, I was able to run the base on the workpiece while the bit machined the solid edging flush with each workpiece's face. The most important detail was to ensure the router didn't tip while flushing the solid edges. If it even tips a few degrees it will dig into the plywood face, causing a mark that will likely be impossible to sand out without going through a layer of plywood.

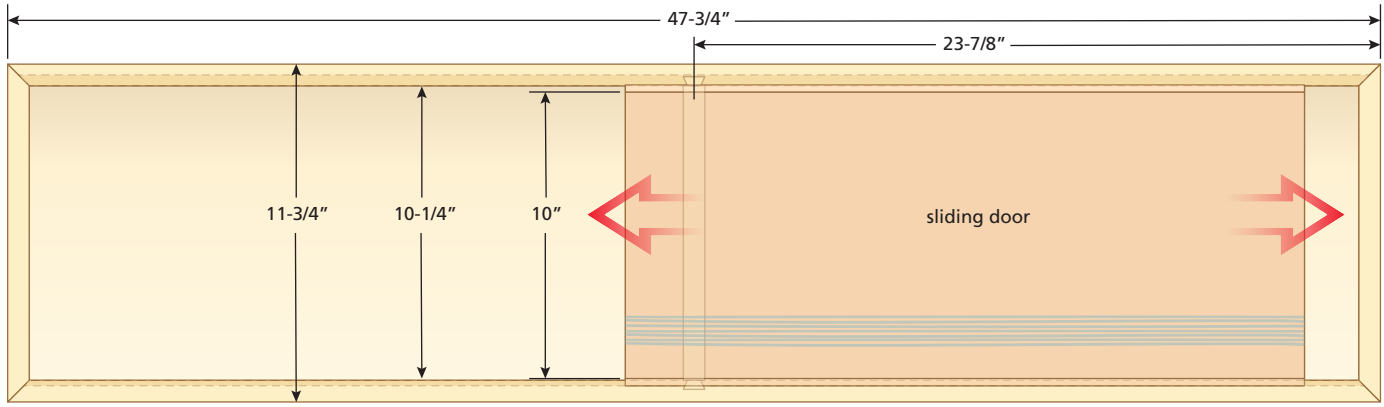
Using a Japanese flush-cut hand saw, I trimmed the solid edges flush with the bevelled ends of the plywood workpieces. I made sure to press the saw into the bevel in order to keep the cut in line with the bevelled edge. If any solid wood remained proud of the bevelled plywood edge, a sharp chisel would save the day.





SLIDING DOOR
GROOVE DETAILS
SIDE VIEW

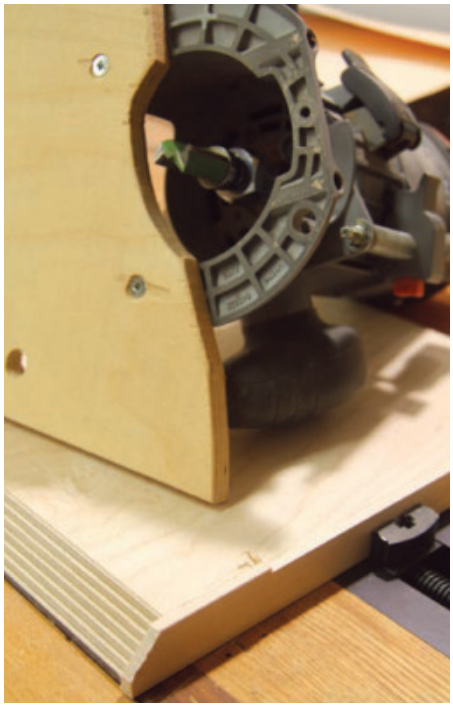
You can download this diagram by Len Churchill as a SketchUp file at canadianwoodworking.com/cabinet.



FRONT VIEW

Materials List

Part	Qty	T	W	L	Material
Top	1	3/4	11-3/4	47-3/4	Baltic birch
Bottom	1	3/4	11-3/4	47-3/4	Baltic birch
Gables	2	3/4	11-3/4	11-3/4	Baltic birch
Divider	1	3/4	9 3/4	To Fit	Baltic birch
Solid Edging	5	1/4	3/4	To Fit	Solid maple
Back	1	3/4	To	Fit	Baltic birch
Door	1	3/4	23-5/8	10-5/8	Solid maple



Flush on All Sides – With the edges flush with the faces of the workpieces, Brown uses a flush-cut hand saw to trim the ends of the edging flush with the bevelled edges. If he had applied the edges before bevelling the parts, this step would have been done automatically at that stage.

Trim the Solid Edges – With the solid wood edging adhered to the front edges of the workpieces, Brown uses a router equipped with a straight bit and a very simple plywood jig covering just under half of the footprint of his router to help trim the solid edges flush with the face of the workpiece. The critical part is setting the bottom of the bit flush with the bottom of the plywood jig.

Edge profiles

Although there's nothing wrong with leaving the solid edges square, I thought a partial round over was the most visually appealing approach. I set up a 1-1/2" diameter round over bit in my router, adjusted the height and machined the solid wood edging on the tops, bottoms and gables.

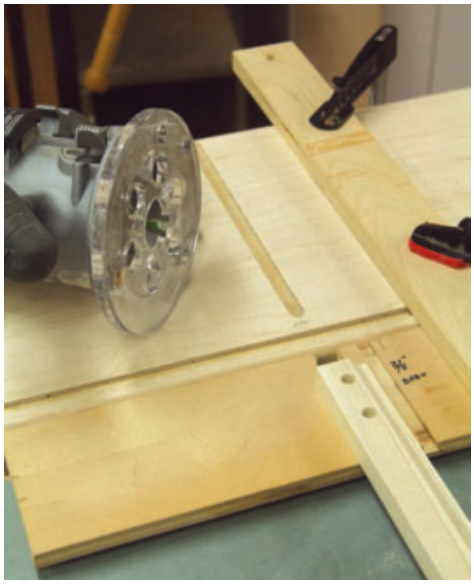
Add some grooves

The sliding door in each cabinet slides in a pair of grooves; one shallower groove in the bottom and one deeper groove in the top. These grooves should be machined now. Their exact width and depth aren't critical, but I machined them both 3/8" wide. The depth of the groove in the bottom is 3/16", while the depth of the upper groove is 3/8". The upper groove must be deeper, because the tenon in the upper edge of the door will fit into it and slide upward, allowing the lower door tenon to be positioned over the lower groove, then the entire door can be lowered into position. Because the upper tenon is longer, it will still be engaged in the upper groove when the door is in position.

Rabbets to accept the back can now be machined in the top, bottom and gables. I made the depth of these rabbets just over half the thickness of the material. The width of these rabbets fits the thickness of the backs.

Edge Profile – Though no edge profile needs to be added, Brown opted to add a portion of a large diameter round over to the front of the four outer case parts.

Some Math – A pocket layout square assists Brown in marking the location of the sliding door groove. It's important to keep in mind both where the front edge of the cabinet is, and how far forward the divider comes, as the door should be between both of those points.



Dovetail Grooves – With a simple L-jig and a screwed-on piece of wood to act as a stop, Brown routed the sliding dovetail grooves in the top and bottom to accept the dividers.

Divide and conquer

Sliding dovetails are very strong and not overly hard to machine as long as you take your time with the dovetail tenon setup. I used a simple right-angle jig to machine the dovetail grooves, and a router table for the dovetail tenons. Start with the dovetail grooves in the tops and bottoms, then fit the tenons to the groove.

The grooves go in the center of the top and bottom, and are about 5/16" deep, though the exact depth doesn't matter much. Too deep and the entire workpiece will be weakened. Too shallow and the mechanical aspect of a dovetail won't be realized. Generally, I would aim for a bit less than half the depth of the material you're working with. The dovetail bit you chuck into your router also can't be wider than the thickness of your workpiece. I used a 1/2" wide bit.

I marked a very light line in the center of the length of the tops and bottoms, then measured the width of my router's base. I then offset the line by half of that amount, and added a more visible line that distance away from the first line. This line is what I used to align the right-angle jig with.

Next was to position and clamp my right-angle jig to the workpiece in line with the darker line I just added. The dovetail groove was stopped, meaning it only exits one side of the workpiece – the rear. And since the rotation of the router bit will cause the router to push one way while machining the joint, ensure the right-angle jig is on the left side of the router while it's being pushed.

The final thing to consider when using the jig is that the alignment half of the jig (the arm registering off the edge of the workpiece) is registering off the front edge of the workpiece, not the back edge. This allows you to screw a stop block to this arm to stop the dovetail groove at the correct spot. You might even have to make another one of these simple right-angle jigs with the alignment arm on the opposite side of the guide arm. Not a big deal, as they're easy to make, and once you realize how useful they are you will need multiples down the road. Different situations require different jigs. Lay out the location of the door, then leave a 1/4" gap between the door and the front edge of the divider. Stop the dovetail groove about 1/4" away from the front of the divider. Finally, ensure your router (especially the handles) will clear the clamps and jig while it's running along the edge of the jig. Rout the dovetail grooves in the workpieces.

Dovetail tenons

Move the same dovetail bit you machined the grooves with into your router table and set the height so it's a good 1/32" lower than when it machined the grooves. At this point some math will tell you how long to cut the dividers. The formula is the distance between the inner bevels on the ends of the gables, plus twice the height of the router bit in your router table.

My first pass on all the parts was only about 1/8" deep, and was just to score the outer edge of the joint. This reduces tear-out. I then gave the faces near the joints a slight sanding to remove any burrs. From here, I moved the fence in slightly, made another pass on one of the workpieces, and snuck up on the perfect fit. Don't cut too far or you will need to glue a piece of solid wood to either side of the dovetail tenon and re-machine it. A perfect fit will slide together with very little force. I find when the joint is glued it goes together a fair bit tighter, and the last thing you want is a joint that won't go together during glue-up. Machine the front ends of the

Dovetail Tenons – When the sliding dovetail grooves are complete, chuck the same bit into your router table. Set the height so the dovetail groove is about 1/32" deeper than the tenon is long. This eases assembly and ensures the joint seats properly. Sneak up on the proper fence position when setting the tenon thickness.

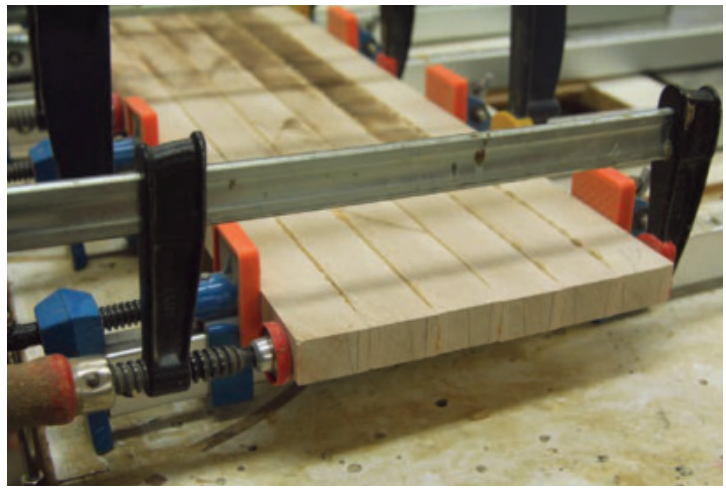
Trim the Tenon – Although you could adjust the router table fence to make a deeper cut, Brown prefers using a hand saw to trim off a bit more of the dovetail tenon. The more you remove, the further forward the divider will slide during installation.

dividers, too, so you have an edge to cut to when fine tuning the front edge of the joint with a hand saw and chisel.

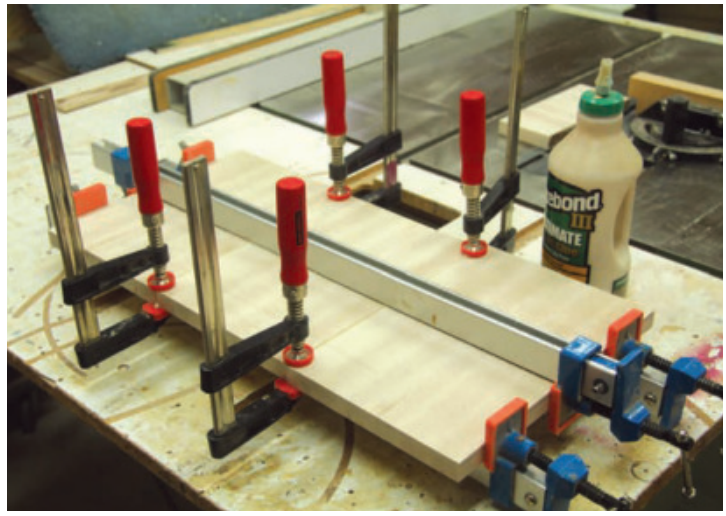
Assembly

Sand the interior faces of the top, bottom, gables and dividers. Best to smooth the front edge profile now, too. In hindsight, I should have also applied a thin layer of finish to the inner faces of the four outer parts, as well as the divider at this stage. It would have been easier to apply a smooth coat right into the corners before assembly. Just be sure to not get any finish on the joints, as that will weaken the glue bond. I'd recommend a few light coats of shellac. It's easy to apply, dries quickly, provides enough protection for an inner surface like this, and is also easy to keep off from surfaces that will be glued. Pad it on, then when dry, hit it with some #0000 steel wool and wax.

Tricky Maneuver – The four outer case parts are positioned end-to-end, face down, on a long, flat surface, and then taped together. The tricky part is flipping them all inside-face-up in unison. Brown clamps them together with a few long, thin cauls before carefully flipping them. If a bit of the masking tape breaks, you can add a few more strips over a joint afterwards.



Two-Step Door Glue-Up – Though it's not necessary, Brown likes the simple visual look of thin strips of quarter cut material on the face of the door. To do this he first rips strips from a 6/4 plank, rotates them 90° and glues them together (top). When dry, he trims the two edges, crosscuts the sections to length and re-glues them to form the wider door panel (bottom).



Setting aside the divider for now, place the outer case parts face down on a flat surface in the order they will need to be joined (for example, top, gable, bottom, gable). Although it's hard, try to keep all four parts on one plane. Butt the bevelled edges up against each other so they're touching and stretch several pieces of masking tape across each of the joints.

Turning these four parts over at the same time is a bit of a magic trick. I clamped a piece of scrap across the parts so they would all move in unison. It still wasn't easy to do without pulling some strips of tape off, though. If only a few pieces fall off, you can add them back on shortly. If an entire edge falls off or breaks, start over.

Apply glue to the bevelled edges. Too much and the joints will be harder to close, and there will be squeeze-out everywhere. Carefully wrap the four parts together, adding strips across the final joint when you're done. Insert the divider while the assembly dries to ensure it will fit. Set aside to dry, ensuring it's square. When dry, apply glue to the dovetail grooves and tenons and slide the divider into place. A mallet and block will likely be needed. Next, cut and install the back panel, ensuring it's properly glued and clamped in place. It will take all of the weight, as it's what will be attached to the wall.

Sliding door

There are many options for the style of door you can add to this cabinet. A standard frame and panel door will work wonderfully. A veneered panel door works well, too, and will allow you to feature exotic or figured wood on its outer face. I opted for a solid wood door. There's nothing wrong with hinging a door, but because I like the look of a sliding door, and enjoy the function, that's what I went with. It also allowed me to add some decoration to its face.

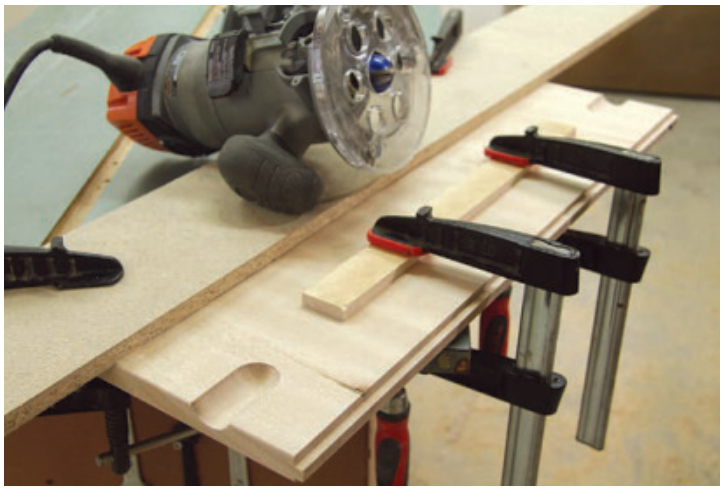
I could have edge-glued flat sawn boards together to form the sliding panel, but the grain wouldn't be harmonious. I ripped 1" wide strips of dressed 6/4 lumber, rotated them 90° and glued them into a panel. The finished look is very simple and will show off the texture and colour I planned to add.

Once the panel was dry, I cut it to size. The height of the door needed some consideration, as stub tenons will be machined into the top and bottom edges, and the door had to fit the grooves properly to work. The height was equal to the distance from the upper face of the bottom to the top of the upper groove. This would allow for quite a snug friction fit, so I removed another 1/16" to allow the door to be installed more easily. I left the door panel wide until the tenons were machined.

Sliding door tenons

I centered both tenons on the thickness of the door. The lower tenon was easy. The length of the tenon should be equal to the depth of lower groove, plus 1/16". The extra 1/16" is to provide a visual gap between the bottom of the door and the case bottom. That can be machined now.

The upper tenon isn't difficult, but you should test the fit as you go. The distance between the bottom edge of the lower tenon and the upper tenon shoulder should be about 1/32" less than the distance between the case bottom and the case top. This will allow the upper tenon to slide into the upper groove, while the lower



Two Finger Notches – Rather than visually clutter the sliding door with hardware, Brown routed a notch in either end of the rear face of the door. A long straight piece of sheet stock guided the router straight, while a second piece of wood clamped between the notches stopped the travel of the router. The notch farthest from the camera in this photo has to be started with a plunge cut to avoid climb cutting.

edge of the tenon can be moved into position over the groove, then lowered into place.

If this all sounds confusing, use a piece of scrap plywood or particleboard to machine the tenons and test the fit. Even using a piece of scrap solid wood a few inches wide and cutting tenons on its ends will work well as a test piece.

The tenons should move freely in the grooves, otherwise the door will be difficult to slide. The door will also move with seasonal changes over the course of a year, so this is one time when erring on the loose side might be a good idea.

At this point I cut the door to width, and ensured both edges of the door were parallel to the respective gables. I also added a chamfer to the sides of the door to match the gap at the bottom of the door.

Handles

Creating a finger-pull cavity in the face of the door, installing hidden hardware on both edges of the door and attaching a wood or metal peg or small pull on both ends of the doors, then machining the gable to allow the pull to disappear into it are all options. I opted for one of the most concealed and simplest approaches: machining a rounded finger notch in the back of either side of the door so the user can grasp the door to slide it. Without the notch the user can't fit their finger between the edge of the divider and the back of the door.

I accomplished this with a core box router bit chucked into my router, a long straight edge to guide my router and a piece of wood to act as a stop. Once completed, I added a bit of texture with a rotary tool to the finger notch to aid in grip.

Textured and coloured doors

You don't need to add this detail to your project, though you can also modify it dozens of ways. Texture is a great addition to a piece of furniture, and colour also provides a certain level of energy. I let my kids choose the colours, so please…go easy on me! For what it's worth, I love the hit of colour on these otherwise fairly simple cabinets.

Sealer Coat – To stop the blue from bleeding into the grain around the carved area of the door, Brown applied a few coats of the finish he was eventually going to use to coat the entire cabinet. It was applied to the area where the hand-cut grooves were to be carved.

After testing out a few techniques to see how the final approach would work, I decided I needed to apply a few coats of clear finish to the wood before carving, as that would help prevent the colour from bleeding into the grain of the wood on the doors, causing a less than appealing look.

I applied a few coats of Watco aerosol lacquer to the area of the face of the door where the carving was going to be. This sealed the wood from the colour bleeding into the grain after carving. Next, I used a V-gouge to add grooves across the door face. A sharp

Getting Groovy – Brown added a set of pencil lines to guide him, then used a sharp V-gouge to carve the grooves. The grooves needed to be slightly on the deep side, as down the road the entire face of the door was going to be heavily sanded to remove all the clear finish.

A Bold Edge – After masking the interior edge and cutting a piece of scrap to contain the overspray, Brown applied a couple light coats of Rustoleum aerosol finish to the four edges of the cabinet.

gouge is the key here. With the grooves complete, I applied a coat of Rustoleum Painter's Touch 2X Ultra Cover in a colour called "Seaside" over the carving, making sure to not get any colour on the areas of the door that weren't sealed with Watco lacquer. To prevent the colour coat from bleeding into the wood fibres, I applied one very thin sealer coat first, let it dry and then applied a regular coat for full coverage. When that was dry, I scraped off most of the colour, and then used my belt sander to remove the final bits of colour on the outer face of the door, leaving it only in the carved grooves. At this stage the doors were ready to be finished with lacquer clear coats. Practising this technique on scrap wood before you start work on the doors would be a great idea.

Add a finish

It's really four finishes, as the front edges of the case get a coat of the blue, then a light coat of shellac is wiped on the blue edges to seal in the colour and help with compatibility between the blue and the lacquer. For the third finish, the entire case gets about four coats of lacquer. The fourth finish is a coat of shellac, as I didn't apply one to the inner surfaces of the case when I should have, right before assembling the case.

After making sure the surfaces were sanded, and all edges were eased, I applied the colour to the edges. This was a bit tricky, as I didn't want any overspray to get on the rest of the project. I masked both the inner and outer areas immediately around the edges with masking tape to help with containing the colour. I applied paper to the cabinet's interior to further contain the spray. To spray a coat only took a minute. Rather than flood the surface of the edge, I applied two light coats as I thought that might better stop any bleeding. Pleased with the results, I'd recommend this approach. Coverage with this product is really great.

When dry, I removed the tape and paper. Because I wasn't positive the lacquer would properly adhere to the sprayed coats of colour, I padded on a few thin coats of shellac over the coloured edges. When this was dry I applied the lacquer to the exterior of the cabinet. Coats of lacquer were applied to both faces and edges of the door. Even the tenons got full coats of lacquer to help create a door that slides easily.

A bit of wax on the door tenons and inside the grooves, and the door was sliding smoothly. I also used #0000 steel wool and wax to buff the entire cabinet smooth.

I used three #10 × 4" screws to fix the cabinets to studs, then let my kids put some books inside their cabinets and a few other things on top of the cabinets. They were both very happy with their new additions, and really liked the small but strong hit of colour their rooms had.

ROB BROWN
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Scrape It Off – A sharp scraper removes most of the blue spray paint around the grooves that would have otherwise clogged the belt sander belts. Next, a belt sander removes the final bit of finish.

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WHY YOU NEED AN IMPACT DRIVER

There's no doubt that the impact driver is one of the most popular cordless tools on the market today, second only to the drill. Learn how you can benefit from having one on your shelf.

Photos by Rob Brown

BY RICH KELLER

Today, most manufacturers produce a drill and impact driver kit that offers great value, even when compared to the single drill kit options on the market. But why do you need to own two "drills"? They all do essentially the same thing, right? What is all the fuss about? Is an impact just a drill with a handy quick-change chuck made to take screwdriver bits? The answer is no, it's not a gimmick to get you to buy another drill with a different chuck.

Impacts were designed for a different reason, and there's also good reason why pretty much every manufacturer today offers a kit with both tools inside. Even though impacts have been on the market for years now, there's still a bit of confusion around the differences between impact drivers and drills.

Eons ago…

Way back in the dark ages of woodworking, I used to buy cheap hardware store screwdrivers and smash the handles on them so I could put the blade into an electric drill and drive screws. Of course, the electric drill had no variable speed, and there was a bit of a coast downtime, so you had to stop a little before the screw was all the way in. And, if you needed to take it back out, it was back to hand tools. There was no reverse.

When cordless drills first came on the market, I don't think I was the only one to start using one to drive screws. And around the same time, 1/4" hex bits started showing up on store shelves, too. With variable speed and reverse, driving screws got a lot better with cordless drills. Now you could slow down at the end and not accidentally bury a screw into your project. And you could also take something apart if need be, as these drills had a reverse setting. The only problem remaining was that cordless drills really didn't have enough torque to drive big screws. Bits would frequently slip, jump or strip out the heads of big, long screws.

Fortunately, a solution for this problem came along. Cordless impact drivers are essentially a small version of what your mechanic uses on your car. Until recently, they weren't as powerful as what your mechanic uses.

Bring the noise

Impact drivers typically operate at a lower RPM than drills, but provide more torque. They also have a hammering action, as the name impact implies, which allows them to drive screws with ease. This hammering action helps keep the fastener rotating by jarring it rather than just turning it.

Most modern impacts will usually rotate the fastener at a high speed until there is some resistance to the rotation, then they will slow down and start impacting. Because of the hammering action, bits also tend to stay put in the screw head rather than slip or spin out. This hammering action also produces quite a bit of noise. A few manufacturers have remedied this problem by using an oil-filled impact mechanism to substantially deaden the sound. An example of this would be the Makita DTS141Z, which they call an "oil impulse impact driver," while Milwaukee calls their model "SURGE". Ryobi and Ridgid also offer oil-filled impact drivers.

Because of the popularity of impacts, users have come full circle now, purchasing impacts because of their compact size and adapting them for drilling holes. Impacts have gained so much popularity

Great Value – Purchasing an impact driver as part of a kit will give you great value for your dollar. Often, for only a little extra money, you will get a drill, or another power tool in the kit, and potentially extra batteries, too. (Photo by King Canada)

Heaps of Power – Impact drivers excel when dealing with large metal fasteners. You can use an impact driver with impact-ready screwdriver bits, as well as chuck nutsetters and other accessories into your driver, and sink lag bolts and a host of other fasteners.

that manufacturers are starting to make drill bits with 1/4" hex shanks to go in these tools, but this is a less than optimum setup. Impacts can get into some smaller spaces than drills can, but their low RPM and hammering action means that holes are rough, and bits have shorter lifespans. Manufacturers have greatly improved drill bits for impacts in the past few years, but the impact driver is still rotating at a lower RPM, meaning it won't bore a hole as fast or evenly as a standard drill will.

Why have two drills then?

Drills were never designed for driving screws. That's why they bear the name "drill". It's not that a drill can't be adapted to driving screws, but that doesn't make it the best tool for the job. Impacts, on the other hand, weren't designed with making holes in mind. I think all users of cordless tools would be best served to have both a drill and an impact driver in their tool box, especially given the low entry cost in most cordless platforms today.

Unless you are strictly drilling holes or strictly fastening, there is a good reason to own and use both a drill and an impact driver. I keep both handy in my shop. I use a drill for any drilling and the impact driver for large fasteners. I do still use a regular cordless drill

Perfect Fasteners – Medium and large fasteners are what impact drivers are designed for. Longer #8 and larger screws and lag bolts are what comes to mind first, but there are many other types of fasteners an impact driver will sink.

Maybe Not – Shorter #8 screws, as well as smaller screws, might best be installed with a standard drill. An impact driver may provide too much power for fasteners like this. The risk of stripping a small hinge screw is high with an impact driver.

for small screws like #4 and #6. I even generally use a regular drill for short #8 screws. This is one exception where a drill is better, as there is not a lot of torque required for tiny screws found in hinges and other cabinet hardware that I frequently deal with.

The next time you're in the market for either a drill or an impact driver, do some comparison shopping on the kits available. I think you'll really like what you see and will also appreciate having both a drill and an impact driver on hand at all times.

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INSTALL A SUN TUNNEL

Installing a sun tunnel to bring natural light into an interior room or closet is easier than you think, and adds natural light to an otherwise dark area.

BY ALLAN BRITNELL

A sun tunnel, also known as a tubular skylight, is an affordable, relatively easy-to-install means of bringing natural light into a room or closet that doesn't have any windows. Essentially, rather than having to go through the hassle and expense of building a light shaft for a traditional skylight, you simply cut small holes in the ceiling and roof, then connect the two with a metal tube.

At its most basic, a sun tunnel consists of an acrylic dome or flat glass cover that attaches to a roof-mounted flashing kit. Flashing kits are available for low to steeply pitched roofs. (Sun tunnels are not recommended for flat roofs.) A sheet metal tube – and any elbows required for angling around obstacles – that make up the tunnel slide into place through the flashing kit once it's installed. The bottom of the tube then attaches to a diffuser mounted in the ceiling that casts the light around the room.

Some manufacturers also have energy-efficiency kits that install within the tunnel, and integrated electric kits so you can use the tunnel as a ceiling light after dark.

Probably the most challenging aspect of this job is that you have to do part of it on the roof. Unless you have a very low-pitched roof you should use a fall-arrest harness when working at heights. Granted, that's not a tool most of us have laying around, but you can rent them.

This article will give you the broad outline of the key steps involved, but you'll definitely want to follow the instructions that

Photos by VELUX

come with the model you bought for product-specific features. You do read instructions, don't you?!

The job requires a few basic tools, plus a hole saw to cut through the ceiling (assuming it's drywall) and a reciprocating saw or jigsaw to cut through the roof.

Planning process

Step one involves getting up into the attic to see if there are any obstacles preventing you from installing a sun tunnel – you definitely don't want to be cutting into roof trusses, for example. Once you've confirmed you have a relatively clear path, take a rough measurement from the top of the ceiling to the underside of the roofing so you know what length of tunnel to order.

Note that you should always wear protective gear when working around attic insulation, including long sleeves, gloves and a dust mask.

Back on the ground, do your comparison shopping of the various makes and models available. Velux, Solatube and Columbia Skylights are the big names on the market with each offering a variety of lengths and diameters of the opening. The larger the diameter, the more light you get.

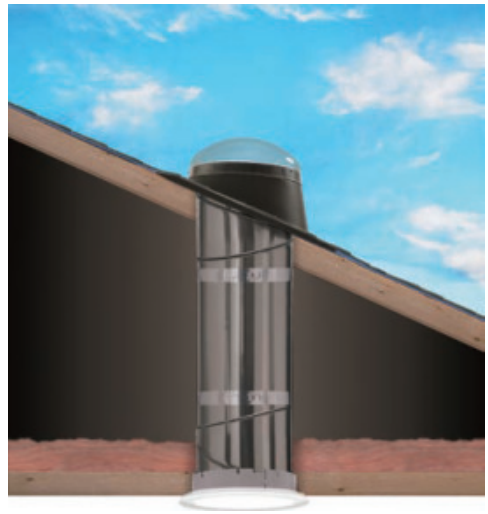
Two main types

There are two basic types of tunnels – rigid and flexible. A highly reflective rigid tunnel will bring in more light through a straight run from roof to ceiling, but you might need to use some elbows to work your way around obstacles in the attic. A flexible tunnel makes it easier to work around obstacles but will draw less light to the room.

The standard flashing kit that comes with a sun tunnel is designed to work with asphalt shingles or cedar shakes. There are also flashing kits available for use on tile roofs. If you have a steel roof or some other covering, contact the skylight manufacturer to see if their models are compatible with your roofing material.

Opening up

Start inside the room that you're trying to illuminate. Find the location where you'd like it to go – ideally, in the centre of the room – and drive a nail through the ceiling into the attic. Get back up in the attic and move the insulation out of the way to find your nail. Once you've located it, run a string from the roof deck directly to the nail. If you have an unobstructed line, drive a nail through the roof deck to the outside. If there are any obstacles in the way



Cross Section – This mocked-up cross section of a typical sun tunnel shows the dome and flashing above a shingled roof, the sheet metal tunnel extending between the roof and the ceiling, as well as the diffuser at the bottom of the assembly.

(wiring, ductwork, etc.) adjust your location, or plan on using elbows or a flexible tunnel to get around those.

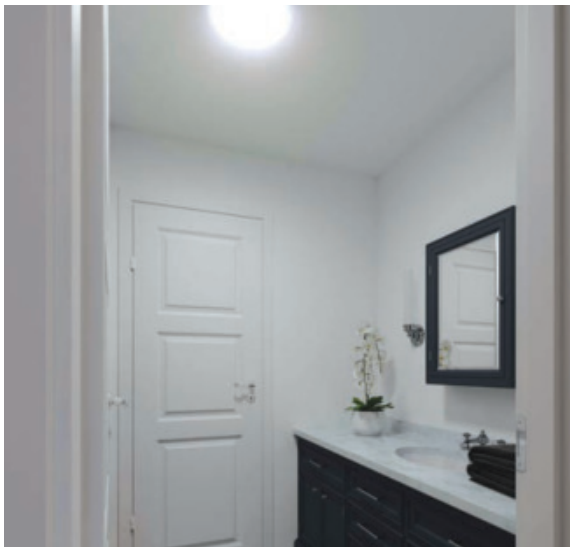
Before you start making holes, get up on the deck to find your marker nail. You want to install your tunnel at least a couple of feet away from any valleys or ridges to avoid leaks. If you're too close, you'll have to adjust the location. (Don't forget to seal the

Before and After – Once you get some natural light into an otherwise dark area of your home, the difference is stark. This walk-in closet is a great example of what a bit of sunlight can do for a situation.

shopnews

Sutherland and Welles "Millie's" Tung Oil from Woodchuckers

Sponsored: Millie's is totally botanical, made from all biodegradable, all natural and plant-derived ingredients, and is available from Woodchuckers. It's formulated with pure polymerized tung oil, Di-citrusol (a citrus-derived solvent) and beeswax. There are no petroleum distillates or driers added to Millie's formulation. Great for turnings, this finish can also be used for furniture and other large and small woodworking projects. Visit **Woodchuckers.com** for more information on this, and many other woodworking products.



Small or Dark – Rooms that are small or dark are a great option for a sun tunnel. Bathrooms, closets and hallways are obvious choices. Adding a sun tunnel to these areas will provide natural light year-round.

Main Areas, Too – Areas of your home that get used a lot, such as kitchens and family rooms, are also great options for a sun tunnel. Even though they may not be dark, more natural sunlight in these areas of your home will only make them more functional, bright and welcoming.

nail hole you just made in the shingles.)

Once you're satisfied with the location, it's time to make some holes. Start by opening up the ceiling. Use a scribe to mark the hole for the ceiling ring, or centre the ring over your marker nail and trace around the outer diameter. Use a hole saw to cut out the opening.

The specific connection steps will vary slightly by manufacturer so follow the steps in your installation manual here. Install and secure the ceiling ring for now, and then cover or plug the hole to prevent any debris from cutting the roof opening from falling into the house.

All Finished – A properly installed sun tunnel will keep the rain, snow and sleet out, and not be an eyesore.

Back up on the roof, centre the flashing kit over your marker nail, then trace the outline of the opening. Use a flat pry bar to loosen two or three courses of shingles above the flashing kit, then use your jigsaw or recip saw to cut out the opening, removing the shingles and roof decking. As you finish, use your marker nail as a handle to hold on to so the cutout doesn't fall into the attic.

Lift the edges of the remaining shingles and apply roofing mastic between the shingles and the roof, then slide the flashing in place under the shingles. Screw the flashing to the roof deck and seal the screwheads to prevent leaks. Lay the shingles back down over the flashing.

Depending on the distance between the roof and ceiling, you may need to cut the tunnel section to fit, or use multiple tunnel pieces to bridge the gap. Once your tunnel is assembled and cut to length (again, following the manufacturer's specific instructions), slide the tube down through the opening in the flashing. Note that the tube components are covered in a protective film. Do not remove this until immediately before installation. If exposed to the sun uncovered, the sheet metal can become hot enough to burn you.

The final steps involve connecting the tunnel to the ceiling ring, sealing all the joints with tape, redistributing the insulation, and connecting the interior light diffuser to the installed tunnel.

Now, sit back and bask in the – literal – glow of your latest successful DIY project.

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Reviews

Our staff writers review new tools and products on the market that are ideally suited to the woodworker and DIYer.

Photo by King Canada

Comfortable and Balanced – Keller found the King impact driver was nicely balanced, and therefore comfortable in the hand during use. (Photo by Rich Keller)

Shed Some Light – Three LED lights come on when the trigger is pulled, shining excellent task lighting on the immediate area where you're working. (Photo by Rich Keller)

King Canada 8022L Impact Driver

It's funny, when I have my own tools in my hand I'm quite careful with them. But when someone gives me a tool to try, I always pick the worst possible jobs to try it out on. I like to push a demo tool to the absolute limit. I took this driver head-to-head with four others in another article in this issue. You can flip there to see how the King impact performed on those particular tasks.

My first impression opening up the box for the King impact was that it's a little bit on the big side for this type of tool. Having said that, it doesn't feel awkward or overly heavy in the hand. It has a good balance front-to-back and side-to-side. It feels like the center of gravity is right in the middle of your hand when you hold it, and that makes it fairly comfortable to use. The included batteries for this kit are 1.5 ah. This is a compact battery which will have a shorter runtime due to the lower cell capacity, however that's pretty typical for a kit in this price range. I didn't find the overall runtime on the King was short, by any means. I was able to do my normal course of work without constant interruptions to change batteries.

One thing I noticed with this impact is that it has a lower RPM than most, at

2200 RPM. I found that it was fairly sensitive on the trigger, and it has a good low-speed range, well suited to finer work. I tried it on a bunch of short machine screws that normally I would not use an impact on, and I was able to control the tool and not damage anything. I also gave it a go on some heavier bolts and on a gear puller and found that it worked decently at higher torques. It does have a lower maximum torque than the driver I normally use day-to-day, so I found that using it on the gear puller pushed it to its limits, which is what I mentioned above about pushing it to its limits. I would be cautious about using it in an application like this a lot—where you have to apply maximum torque for a few minutes at a time. This definitely doesn't represent normal fastening applications for impact drivers, where the time the tool has to work at the absolute maximum output is very short. In terms of normal operations like driving and large screws it worked well.

Overall, this King driver impressed me. It's a bit longer than average, so there's a chance it might not fit into the tightest of situations, but for most users this is a rare necessity. Because of the brushed motor and lower torque output, I wouldn't use it for super-heavy applications a lot, but I think it would work well for occasional heavy usage. I did like the low speed control, and the driver felt well balanced in my hand. This would be a good tool for bench work, doing assemblies or disassembly of projects. It was also good for the standard use of driving assorted larger screws into wood. It has three bright LED lights on it, too, good for working in dark corners.

King Canada 8022L Impact Driver
MSRP: $169 (Only Available in a Kit - 8020L/8022LK - Impact driver, drill, two batteries, charger, case)
Website: KingCanada.com
Tester: Rich Keller

Milwaukee M12 Surge

The drill I use for making furniture on a daily basis is a Milwaukee 12V 2401-20. I've used it for the past eight years or so, and it's still going strong. I only do a small number of home improvement tasks, but spend a lot of time in my studio building custom furniture. I find it's balanced nicely, is very comfortable to use, can be maneuvered upside down and in tight areas with ease, and has enough power and torque for the vast majority of furniture construction tasks.

Photo by Milwaukee

Drills have come a long way in the past eight years, and impact drivers are also slightly different beasts. The thought of using a loud impact driver in my (relatively) quiet shop didn't sound too soothing, but I was also keen to learn what I was missing out on. Using

Easily Sinks Screws – When compared to larger 18V options, the M12 Surge wasn't super-fast when it came to sinking large screws, although it had no trouble driving loads of #10 x 2-1/2" long screws into solid red oak. (Photo by Rob Brown)

Some Good Options – A press of a button toggles the user through the four settings: three for speed / power and a fourth mode for driving self-tapping screws.
(Photo by Rob Brown)

Milwaukee's Surge for a few days made me realize I should free up a place on my drill storage rack for a small impact driver.

My first impression – right out of the box, just holding it in my hand – is that it feels very similar to my old Milwaukee drill, though it's a bit heavier. This added weight won't be a problem, as it's far from being a heavy driver. It's a fair bit shorter than my old 12V drill, tip to tail, and that will certainly come in handy from time to time to get into tight areas for both furniture making and home improvement applications. The Surge is 5-1/8" from the end of the chuck to the rear of the driver. Overall, it's well balanced and, turning it upside down or driving screws on an angle, feels very comfortable.

Next, I installed a driver bit to see how it performs. The chuck allowed me to simply press a 1/4" hex accessory into place and pull the trigger. Many 1/4" hex chucks need to have the collar pulled forward in order to allow a bit to be installed, but this system is much easier. There are four settings on the upper back of the body. Milwaukee calls this "Drive Control." There are three levels for speed / power and a fourth mode for driving self-tapping screws. This fourth mode protects the user from overdriving and stripping screws when working metal studs, or similar applications.

Now, to put it to work. I reached for a handful of #10 x 2-1/2" long flat head screws, and drove them into the side grain of 8/4 red oak. This driver could sink these large screws on the highest setting, though I wouldn't say it accomplished the job quickly. If speed is of utmost importance, a larger 18V version is your answer. Having said that, the Surge wasn't slow and it got the task done nicely. It takes a surprising amount of torque to drive screws this size into this dense hardwood, so I was pretty impressed with the results. The brushless motor will transfer lots of power to the chuck, and will do so well into the future.

As far as filling my studio with noise, it wasn't as loud as I thought it was going to be. I didn't feel an immediate need to reach for hearing protection, though if I were going to use this driver to sink a hundred large screws, I think I might. Impact drivers are fairly loud, but this new-generation version doesn't have metal-on-metal contact when it comes to the percussive aspect of the driver. Some new models (this Surge included) use fluid and its hydraulic properties to reduce the noise, yet still provide strong force to drive large fasteners. "Fluid-Drive," the Milwaukee label for this technology, is the difference between the need for hearing protection to drive a dozen screws, and not. In my mind, this is a game changer. Whether you're doing an interior residential or commercial installation with people nearby, or are in a shop all alone, this is a nice feature to have.

The bottom line is that as long as you don't want to drive a lot of massive fasteners, I think you may have found yourself an impact driver. I know I have.

Milwaukee M12 Surge

MSRP: $189 (bare tool), $239 (kit, including two batteries, charger and case)

Website: MilwaukeeTool.com

Tester: Rob Brown

Makita DTD171Z

I'm no carpenter. Nor am I a tradesman, needing to quickly sink large metal fasteners by the hundreds every hour. I also don't work outdoors, wrestling with the elements while trying to do my job. If you happen to be any of these types of people you should seriously consider this Makita impact driver, as it covers just about every one of your needs. If you're not one of these people, but you'd just like to get your hands on a beast of an impact driver, I sure wouldn't blame you. This is a nice driver.

First, let's get this out of the way. Power. It's got loads of power. I completely buried a series of 2-1/2" long x #10 flat head screws into solid red oak quickly and effortlessly. I then grabbed a nutsetter and sunk a 3 1/2" long x 3/8" diameter lag bolt in that same red oak hardwood. Without skipping a beat, this impact driver buried it up to its head. Did you catch that? It was 16/4 solid red oak. Up to its head. Didn't skip a beat. Yeah. Pretty good.

The Makita DTD171Z has a whole lot more than power and torque going for it, though. It has a host of settings for different applications. There are four stages for impact driving force, depending on the amount of speed and torque you need. There are also four additional application assist modes; wood mode (slower rotation at first, then when the screw is started, increased speed), bolt mode (rotation automatically stops when loosening bolts once the bolt tension is very low) and two self-tapping screw modes (ensuring metal screws aren't over-driven in thin or thick metal). The impact driving modes can be toggled through with a number of glove-friendly buttons at the base of the handle, or a main button just above the trigger can be used to select one of the four main application modes. These eight modes can be used by a wide range of tradespeople and DIYers to fine-tune the driver for the application they're working with, giving them a quicker, better and more predictable result.

Although I almost exclusively use my tools indoors, if you do any exterior home improvements, or work on construction sites, this impact driver offers an incredible level of protection from the elements. Keeping sand, dirt, oil, water, etc. away from the inner workings of the driver has been taken care of. Gaskets and solid construction have been used to their fullest. Even the air ventilation ports have been designed in a way that the driver would have to be turned almost upside down to allow any water in. This approach to engineering and construction will go a long way to ensuring this drill won't let you down when you need it the most.

This impact driver is a bit louder than the smaller 12V impacts, but I doubt these drivers are going to see much action in a quiet home-shop setting too often. From construction sites to basement remodels, these are the locations where the Makita DTD171Z will shine. Whenever a large metal fastener is needed, I'm pretty sure this driver will lead the way.

This is a very nice, extremely capable impact driver, which I'm sure you'd enjoy using for years to come. I'm a bit jealous of all you carpenters and tradespeople who would be able to use this driver on a regular basis. Having said that, maybe I will have to do more projects around the house to justify this beauty. Better make the purchase first, then see what projects I should tackle.

Makita DTD171Z
MAP (Minimum Advertised Price): $249
Website: Makita.ca
Tester: Rob Brown

Loads of Power – Huge lag bolts, like this 3-1/2" long × 3/8" diameter beast, were sunk into solid red oak without any problems whatsoever. (Photo by Rob Brown)

Quickly Toggle – A handy button directly above the main trigger allows the user to quickly toggle through the four main driving levels. The levels are easily visible at the base of the handle. (Photo by Rob Brown)

Construction Adhesives

For construction and renovation work, construction adhesives are what hold things together.

Photos by DAP

BY CARL DUGUAY

As the name implies, construction adhesives are used primarily in construction and renovation for adhering building materials (sheathing, dimensional lumber, drywall, tile, moulding and the like) together. They have several features that make them more suitable than traditional glues for these applications, and in a variety of situations can be used in place of mechanical fasteners (screws, bolts, nails and the like).

Construction adhesives are very tacky, so they grab fast and set up (dry) quickly, typically within about 15 minutes, though full curing can take up to 24 hours. Clamping isn't required (a few well-placed fasteners will keep parts from shifting), so you can move on to the next task without any downtime. The adhesive is the consistency of thick, gooey cake batter, which makes it good for filling gaps up to about 1/4" wide. And because the adhesive tends to remain somewhat flexible after drying there is much less chance of the material shearing under load or joints creeping

Lots of Options – Manufacturers have formulated lots of options so you can select a construction adhesive perfect for the task at hand.

Waterproof Adhesives – Polyurethane adhesives, like DAP Polyurethane and Lepage PL Premium are not only strong, but waterproof. (Photo 2 by Lepage)

Construction Sealants

Sometimes called "construction adhesive sealants," these products are used when you need to fill exterior gaps, joints and cracks up to about 1/2" (13mm) deep on concrete, masonry, metal and wood. They produce a permanent yet flexible waterproof seal. However, they lack the adhesive strength of construction adhesives. Examples include DAP's Premium Polyurethane Sealant and Sika Pro Select Construction Sealant.

under continuous stress. You'll also find that construction adhesives are cost-effective – they're quicker to use than mechanical fasteners and don't require any ancillary operations like drilling or tapping holes.

Using construction adhesives when installing drywall will reduce (even eliminate) nail and screw popout. On floors it prevents "squeaks and creaks". It's quicker, easier and cleaner to use than mortar for installing backsplashes, brick veneer and tile. The same goes for rigid foam insulation. And, it's great for any kind of trim work – baseboards, chair rails, wainscoting, crown moulding – because you use fewer metal fasteners.

Three main types

There are three types of construction adhesives. Traditional solvent-based adhesives cure when the solvent in them evaporates. Water-based latex and polyurethane adhesives cure when the water in them evaporates; these adhesives are also ultra-low or have no VOCs (volatile organic compounds) and are virtually odour-free. While all adhesives are water- and weather-resistant, polyurethane adhesives, like LePage PL Premium, are waterproof.

General-purpose adhesives, such as DAP's "Multi-Purpose", work well for a variety of common indoor building materials. Some adhesives are solely for outdoor use, while others can be used both in and outdoors. There are high-performance adhesives for jobs that require high shear and peel strength, like DAP's Max Strength adhesive, as well as specialty adhesives formulated for use with masonry, foamboard, drywall, panelling, glass, tile and roof tiles.

Gun types

Construction adhesives are typically sold in 10-ounce (195ml) and 28-ounce (825ml) cartridges for use in caulk guns. Unless you'll be using a single tube of adhesive, opt for a premium caulking gun like the Tajima Convoy, which has a durable cradle rather than rails to hold the tube, and uses a smooth-rod dripless feature that requires less squeezing pressure to dispense adhesive. Caulk guns are available in thrust ratios from 3:1 up to 26:1. The thrust ratio is the amount of force you apply to the trigger in relation to the force that pushes the adhesive out of the tube. For adhesives with a thick consistency choose a gun with a thrust ratio of at least 18:1.

Anyone working with adhesives on a regular basis will find it considerably quicker and easier to use a cordless caulking gun. The Makita DCG180ZC, for example, has a feature that prevents adhesive from dripping when the trigger is released, along with a variable speed dial that enables you to vary the application speed and a variable speed trigger to control application precision.

Cordless Caulking Gun – If you're applying a lot of caulk on a regular basis, and want the job to go more easily and quickly, a cordless caulking gun is a great solution. (Photo by Makita)

Caulk Guns – Unless you plan to use it only once or twice, a quality caulk gun will assist you in easily putting down just the right amount of caulk. (Photo by Tajima)

On your next renovation or new construction project get a firm, lasting hold on things with construction adhesives.

Sources: dap.ca, lepage.ca, makita.ca, can.sika.com, tajimatool.com

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Bin There, Done That

This hideaway fence took just a few hours to complete, and hides the view of our ugly trash bins from the road.

BY JAMES JACKSON

For the past few years my better half, Becky, has been asking me to either buy or build a garbage hideaway to help block our trash and recycling bins from view on the driveway.

She was tired of staring at the ugly black garbage bins and overflowing blue bins every time she pulled up to the house, and I didn't blame her. The rest of the neighbourhood doesn't need to see just how much takeout we've been getting during the pandemic or the number of ketchup bottles my kids seem capable of consuming on a fairly regular basis.

I decided I couldn't put it off any longer since I've had a lot more spare time on my hands over the past few months, and a few extra bucks in my pocket due to working from home (not buying gas or the occasional lunch really adds up). I started looking at ideas online.

We didn't want an inexpensive plastic one because I was worried it would eventually wear out and break down, so we opted for wood. Unfortunately, the ones we liked started at around $1,000 and I can say for certain that I don't buy *that* much coffee or sandwiches, so the price became a sticking point for us - especially since we had just paid about $2,500 for a new backyard shed.

It was also around the same time I was demolishing the old shed to make way for the new one when I had what I considered to be a great idea - I'd reuse the wood from the old shed to build the hideaway. The plywood siding would work great for the sides and roof, and the 2 × 4s would be the perfect framing material.

Becky was less enthusiastic with the idea of me building one, especially using decades-old building materials, and she again asked me to just buy one instead.

But I insisted I could do it, and that it would look great when I was finished.

The only problem was just how "overbuilt" the old shed was, which required me to demolish rather than dismantle it. It left me with very little usable building material in the end.

So, I modified my plan. Instead of a fully framed structure with a lid that could open and close, I'd build a wooden fence to act as a visual shield. Becky was a little more on board with the idea of a fence, because it…well…aligned a little more closely with my actual building skills.

I bought eight 10' long treated deck boards and two 4" × 4" posts and got to work. The boards were the perfect length and I only needed to cut the eight-foot long posts in half to make the fence the perfect height.

I tied the posts into the existing fence with deck screws and used these as a frame for the hideaway. It actually took a lot less time than I expected, and I was done in just an afternoon.

And the small 4" notch I cut into one deck board with my jigsaw to fit around a portion of the existing fence is my favourite little touch. Heck, I even remembered to leave a couple of inches of space at the bottom to help water drain away, and left a 1/4" space between each board to help them dry.

I opted against making a lid (partially because I worried it would be too heavy and partially because I just didn't want to) and bought two small motion-activated lights to help guide the way during late-night visits and to hopefully scare away skunks and raccoons.

It was a small project, and one that didn't take too much time or very many materials, but it's yet another item off my to-do list. It helped make the house a little more visually appealing, and it buoyed my spirits by getting me away from the computer screen for a few hours to complete another project with my two hands.

Plus, my wife loved it, and I can't always say that about my other DIY projects at home.

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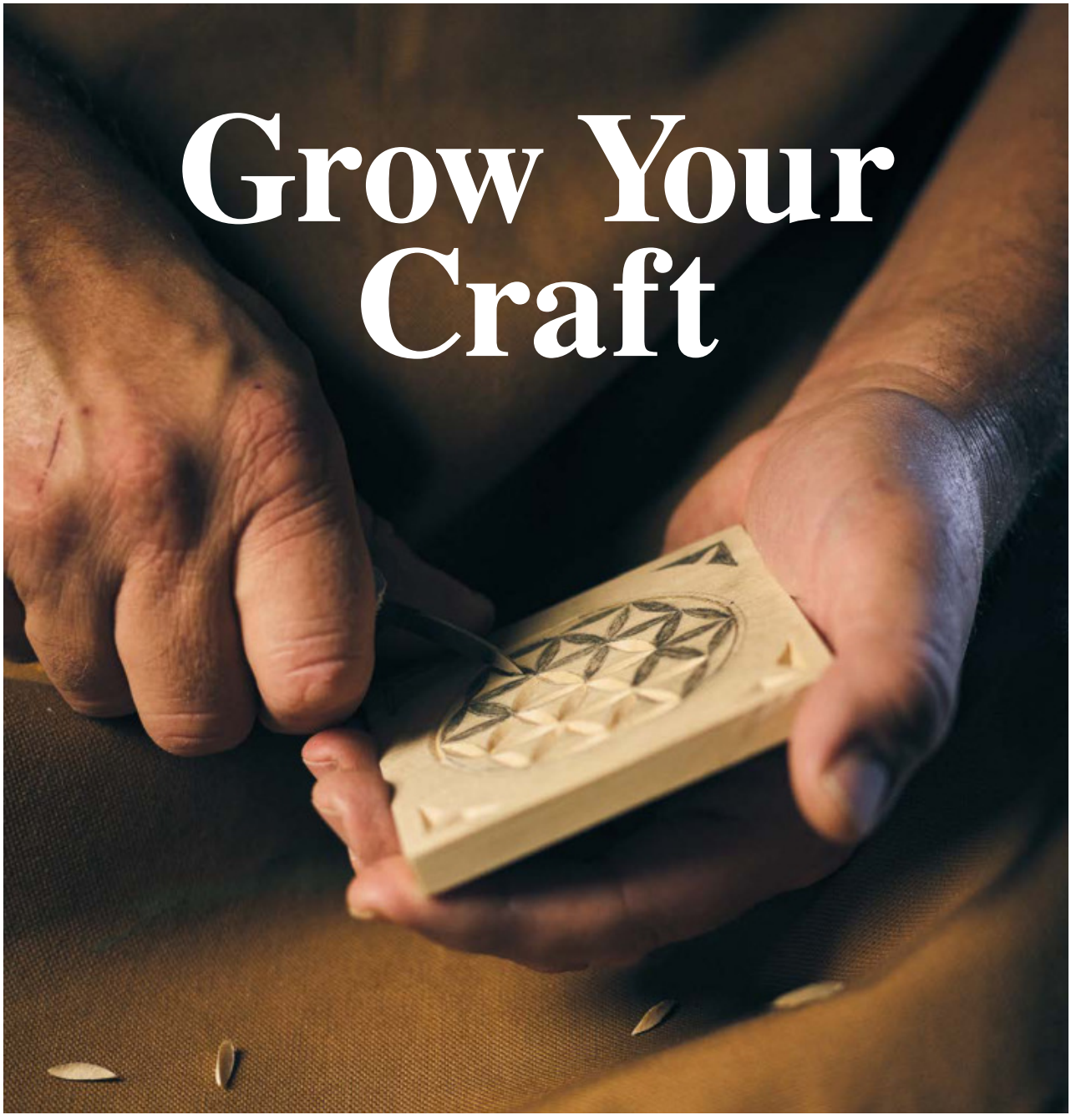
Illustration by Mike Del Rizzo



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Andrew Hunter

Tall Dresser

Hunter was able to get most of the material for this dresser out of a very large, clear, live-edge slab. This kept the colour and grain consistent throughout the piece, as well as allowed for many book-matched parts. The most challenging thing about this build was getting the front of the cabinet to stay square, as there are not many structural frame members on the front. Since the door will be closed most of the time Hunter utilized a catch that pulled it very slightly into square when closed.

Turn to page 12 for more quotes.
(Photo by Andrew Hunter)