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Cover photo by Rob Brown

36 9 Ways to Machine a Tenon

Learn all the options, so you can choose the one that's best for you. BY ROB BROWN

editor's letter

As woodworkers, techniques really are the backbone of what we do. Whether they're basic techniques like flattening a board or cutting it to length, or more advanced techniques like inlay or cutting intricate joinery, they all come together to create the projects we cherish for years to come. These techniques also bring us satisfaction when we're able to do them well. That's why I especially enjoy teaching techniques to our readers and the students I bring into my shop. I think every technique you learn will not only improve your work but increase your level of satisfaction in the shop.



rbrown@canadianwoodworking.com

If techniques are the backbone of the woodworking and furniture making world, then tools are the objects that bring those techniques to life. You may know how to accomplish a certain task, but the right tools are what makes it all possible. One is no good without the other.

Techniques

Since furniture was first made, one of the most common and strongest joints used is the mortise and tenon. It's great for so many reasons and isn't that difficult to make, especially with the right approach. The confusing thing about the mortise and tenon joint for a beginner woodworker is how to go about creating this fantastic joint, because there are many different paths to success. This can seem like a problem at first, but once you learn the intricacies of each approach, you start to realize this is an advantage to any furniture maker. Hand tools, power tools and machinery could all be used to make this joint. Even a mix of two or more approaches can be used. As far as I'm concerned, this is yet another reason why the mortise and tenon is such an important joint and should rarely be overlooked when designing or building furniture. In this issue we cover eight ways to machine a mortise, nine ways to create a mating tenon and many approaches to fine-tuning the joint like a seasoned pro so you can end up with a perfect fit.

Tools

On the tools side of the equation, get ready to learn about 23g pinners, chisel and flush planes, jigsaw blades, hearing protectors, a 3D printer, a dust extraction helper, and a wide range of "Hot Products" that are at home in any shop setting. We even have a tool you can make in your own shop: a V-block that will assist you with many future tasks.

Enjoy the issue and, as always, I'd love to hear from you. What other techniques would you like to master? What other tools would you like to harness the potential of? With so many options, maybe I should plan another "Tools & Techniques" issue for the near future.

—Rob Brown, Editor

Notes for members from the publisher

- ▶ If you haven't already, please complete our survey on topics for webinars: canadianwoodworking.com/webinar-survey
- ▶ Make sure we have your correct email address. Submit new email: canadianwoodworking.com/email-update
- ▶ Next issue coming in February 2027 will focus on projects

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Remembering dads and daughters



Thanks for the shellac advice

In addition to your great article and video on shellac, you were gracious enough to give me a lot of detailed advice via email regarding shellac. The general information I got from your website was also invaluable for this project. I thought I'd send you some photos of the completed hall table.

The case and legs are African mahogany. The top veneer is pommelle sapele. The top was inset to suggest the staggered appearance Emile Ruhlmann made famous. The legs were tapered on the table saw. There are about 10 coats of shellac on the case and legs, while I applied 15 to the top. This was the step I had been worried about, but it turned out great. You provided me with tons of useful and practical insight into using shellac and its unique application techniques. I should also mention Ted Hunter at Roarocket, who took a lot of his time to give me enough info for what amounted to a master's degree in panel veneering.

Thanks again, Rob!

Howard R.

Via email

I just stumbled upon one of your weekly columns from 2021 titled "How Accurate Do We Need to Be?" You mentioned your father, an accountant, was often far too accurate than he needed to be. Towards the end of the column you talk about making a simple set of outdoor cottage steps with your dad, and how he saw a fraction of an inch off as unacceptable, while you saw it as just fine for that specific situation. I got quite a chuckle out of the line "I could only handle that for so long before I left him to his own devices."

It reminds me of building the odd project with my 18-year-old daughter. In this case, I'm also the "perfect" dad, who not only wants to create a level, even set of steps that I can be proud of, but also wants to instill a certain level of accuracy into his daughter so she will understand how to work to tight tolerances. She often gets frustrated with me, especially when she thinks that a high degree of accuracy isn't needed in a specific situation.

I'm starting to think she may have a point. I'm guessing your father wished you would treat all projects with the same care, but I'm sure he would look at the work you do today and marvel at just how accurate and careful you are when you actually need to be. I'll go a bit easier on my daughter and try to be a bit more flexible when tight tolerances aren't actually needed. The last thing I want is for her to stop enjoying the builds we do together. And if we don't need to be perfect every step of the way, maybe we can tackle more of the jobs on my list.

Keep sharing your thoughts with us about the life of a maker. It's always enjoyable to get a look at what's going on behind the scenes in your own life.

Jason M.

Via email

I remember the day my dad and I built that back door entry step like it was yesterday, even though it was more than 25 years ago. My dad was patient while we worked. Maybe too patient. I was the one who wanted to wrap this project up so we could start on the next one, while he was after perfection. I often think about him while I'm working in my shop today. I'm sure your daughter will remember many of the builds you do this year. Enjoy the time you spend together and don't worry about the details in every one of the projects you work on.

I have two kids, aged 15 and 16. I encourage them both to get into the shop whenever they can, though it's not always easy. If your daughter wants to spend time with you working on these sorts of projects, you must be doing something right. Consider yourself a lucky man! — Rob Brown, Editor

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Tool Reviews

Laguna REVO 10-14 lathe

Engineered for precision turning in tight spaces, the REVO 10-14 brings the quality of the Revo line to a smaller footprint – without compromise.

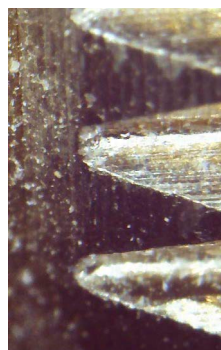


DEWALT DCN210B Brad Nailer

DEWALT's latest advancement in cordless finish nailing combines a more compact design, reduced weight and faster firing speed than previous models.



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



Micro Mystery

Can you guess this object commonly found in most shops? Follow us on Facebook ([Facebook.com/canwoodworking](https://www.facebook.com/canwoodworking)) and Instagram (@canadianwoodworking) to see more Micro Mystery challenges. We will post the answer to this one in our spring issue.

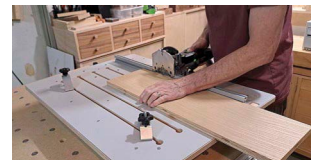
Previous issue:
A wooden
spokeshave



Fresh Cuts

Mastering the Festool Domino

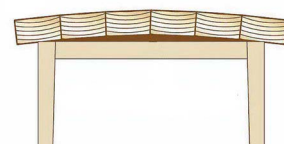
In this three-part series, we take a close look at the Festool Domino system, explore the capabilities of the new DF



500 RQ-Set, and examine accessories that can make this versatile machine even more useful in the hobby woodworking shop. **Part 1: The Festool Domino System** explores the Domino lineup, the joints it can create, how it compares with other joinery systems, and why it's become so popular with professional and serious hobbyist woodworkers. **Part 2** takes a deep dive into the DF 500 RQ-Set, while **Part 3** looks at Festool and aftermarket accessories that expand its capabilities and make it easier and more efficient to use.

Build for Movement, Not Against It

If you work with solid wood, you already know that wood movement is your constant companion, whether you welcome it or not. It doesn't matter if your furniture sits in a climate-controlled home with fairly consistent temperatures and humidity – wood will still expand and contract with the seasons. Most experienced woodworkers have learned to accept this. In this article we help you understand why wood moves and how you can design your projects to accommodate that movement.



View Fresh Cuts at:
canadianwoodworking.com/fresh-cuts

Keep in Touch on Instagram

Here's a mix of informative and entertaining social media influencers to check out.



Rosewood Studio

Instagram: @RosewoodStudioSchool
Follow all levels of students as they learn the craft of fine furniture making



Matt Artinger

@amattofmanytalents
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Andrew Szeto

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An eclectic Ottawa-based wood artist



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Events

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Hearing Protectors



Get the Most Out of Your Hearing Protectors

Put them on first

This might seem obvious but put them on **before** switching on noisy equipment.

Check the fit

Ensure the earplugs are inserted correctly or that earmuffs seal completely around your ears. This may entail removing eyeglasses or headwear or tying back long hair. Anything that breaks the cushion seal around your ears reduces protection.

Don't skimp

Don't compromise your hearing by using worn or damaged protectors. Replace worn ear cushions and disposable earplugs regularly.

Take care

As you should for all your shop tools and accessories, take care of them. Keep your hearing protectors clean and store them in a dust-free location. Regularly wash silicone earplugs with mild soap and warm water. Dirty earplugs can hold bacteria.

Keep them on

Another obvious point: don't remove your hearing protection while noisy machinery is still running.

Table saws, planers, routers and dust collectors — just about every tool in your shop that runs on electrical power produces noise, and often lots of it. Over time that noise will cause some level of hearing damage. The louder the noise and the longer the exposure, the greater the damage to your hearing. Unlike a cut to your finger, hearing loss develops gradually, making it easy to overlook until the damage has already been done. The simplest and most effective way for you to take care of your hearing is to wear hearing protection every time you use noisy machinery.

There are four types of hearing protectors available to woodworkers. **Standard earplugs** include inexpensive foam inserts that provide very good protection when inserted correctly. However, they're designed to be used once and thrown away. A better choice are reusable inserts. Typically made of silicone or rubber, they're more durable and can be reused for several weeks, or for several months to a few years if they're premium industrial or custom-moulded versions, and cleaned properly after every use. **Electronic earplugs** use internal

electronics to suppress loud noises. Some models include Bluetooth for streaming audio or taking calls. **Passive earmuffs** (also called headphones) use thick, acoustic foam inside rigid cups to physically block and absorb sound, making them a good choice for workshops with low to medium noise levels. **Electronic earmuffs** use built-in microphones and circuitry to reduce high-frequency noise but let through safe sounds, like conversation or tool alarms. You may also come across Active Noise-Cancelling (ANC) earmuffs. These are designed to reduce low-frequency noise and aren't recommended for shop use.

When buying hearing protectors, you'll want to pay close attention to the **Noise Reduction Rating (NRR)**. This number, expressed in decibels (dB), indicates how much noise the protector is designed to reduce. A higher NRR is going to give you greater protection, but only if the hearing protector fits properly and you wear it consistently. For most woodworking tasks, you'll want a hearing protector with an NRR of at least

22 to 30 dB. In a really noisy shop, where machines are run on a more constant basis, opt for higher-rated protection.

Types: Standard earplugs, electronic earplugs, passive earmuffs, electronic earmuffs

Pricing: Standard earplugs, \$6–\$30; electronic earplugs, \$120–\$550+; passive earmuffs, \$15–\$40; electronic earmuffs, \$90–\$500

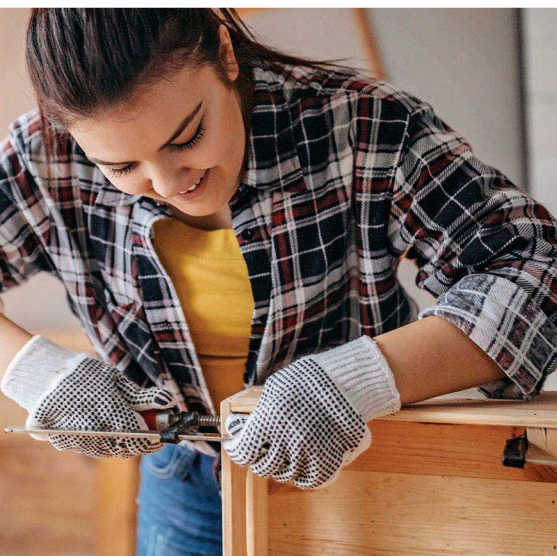
NRR range: 22 to 30 dB

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Top**10** Jigsaw Tips for Woodworkers

A jigsaw is a versatile tool capable of making curved, straight and intricate cuts in wood, metal, plastic and other materials. To get the best results, here are 10 essential tips and techniques to help improve your accuracy, control and overall performance.

BY ROB BROWN

1 Use the right blade for the job – No single blade works for every material. Choose a blade suited to what you're cutting and match the tooth-per-inch (TPI) count to the type of cut you need. Lower TPI blades (6 to 10) are ideal for fast, rough cuts in wood. Higher TPI blades (14 to 24 or more) are better for metal and plastic. For tight curves, use scroll blades. To reduce tear-out on the top surface, try down-cut or reverse-tooth blades.

2 Keep blades sharp – A dull blade can cause burning, inaccurate cuts and poor results. Always use sharp, high-quality blades and replace them as soon as they show signs of wear.

3 Check blade alignment – Don't assume your blade is square to the baseplate. Regularly check and adjust it to ensure accurate cuts.

4 Let the saw do the work – Apply light, steady pressure while cutting. Forcing the saw can cause the blade to deflect or produce a rough edge. Clamp your workpiece securely and keep the jigsaw's baseplate flat on the surface for better control and reduced vibration.

5 Minimize tear-out – Most jigsaw blades cut on the upstroke, which can chip the top surface. Cut on the "bad" side when appearance matters. Use painters' tape along the cut line or a zero-clearance insert to support the material and reduce chipping.



Down-cut blades are also effective at protecting visible surfaces. Also, don't be afraid to move the saw to the underside of a workpiece if that will help keep the visible surface free of chip-out.

6 Use a guide for straight cuts – For straight cuts, use a clamped guide or fence. While a steady hand and straight edge can work, a guide ensures cleaner, more accurate results. Avoid twisting the saw during the cut, as this can lead to blade deflection and angled edges. A thicker, stiffer blade can also help maintain straightness.

7 Drill pilot holes for internal cuts – When making internal cutouts, drill a pilot hole just large enough to fit the blade. This is safer and more effective than plunge cutting. For tight curves or corners, make relief cuts in the waste area to prevent binding or blade breakage.

8 Match speed to the material – Adjust your jigsaw's speed depending on what you're cutting. Use slower speeds for metal or intricate curves and higher speeds for softwoods or fast, straight cuts.

9 Adjust orbital action as needed – If your jigsaw has orbital action, set it according to the task. Use low or no orbital action for curves and delicate materials and higher settings for quick cuts in thick or soft wood.

10 Maintain your tool – After each use, clean around the blade housing to prevent dust buildup and overheating. Regularly lubricate moving parts to reduce friction, minimize vibration and extend the tool's life.



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Nick Mazerolle

...on working in a tiny studio, shaping wood and epoxy river tables.

BY ROB BROWN



Reception Desk – A custom reception desk for a wellness clinic, built from a mixture of white oak, sapele, walnut and brass. This was one of Mazerolle's more challenging builds, with a tight turnaround that demanded many long days, late nights and hours of lost sleep to ensure the piece was finished and installed in time for the clinic's launch.

How long have you been building furniture?
10 years.

What sort of furniture do you specialize in?
Tables, seating, case goods, desks, decor.

Tell us a couple interesting things about your personal life:
I am equally as passionate about music as I am with woodworking and am an award-winning music producer and songwriter.

If you weren't a furniture maker, what would you be?
An architect or web developer.

In order, what are the most important items in your shop apron?
Tape measure, pencil, 6" ruler, 4" engineer's square.

Do you prefer hand tools or power tools?
I love both but lean more toward power tools. Depends on the task.

Solid wood or veneer?
Solid wood all day.

Figured wood or straight grain?
Straight grain.

Inherited vintage Stanley Sweetheart or fresh-out-of-the-box Veritas?

It's an amazing feeling to take an inherited tool, tune it up and get it back in action. It is equally as amazing to open a box of a brand-new tool.

Flowing curves or geometric shapes?
I love curves and soft edges!

Favourite wood:
Walnut and ash.

Least favourite wood:
Pine.



Photos by Nick Mazerolle (Lead photo by Saxon Lencham)

Nick Mazerolle, 39
Company Name — Nick Mazerolle Studio
Website — nickmazerolle.com
Location — Fredericton, N.B.
Size of Studio — One-car garage

Education — Bachelor of Business Administration from University of New Brunswick; Certificate in Fine Woodworking from Selkirk College

quotes

My studio is a small, detached one-car garage with a 280-square-foot main room and two small storage rooms in the back: one mainly for offcuts and the other for bags of sawdust. It has been my workspace since 2019. It's my sanctuary, but I'm often frustrated by the lack of space.



I love shaping and sculpting wood. Time slips away when I have a spokeshave in my hand or when I'm standing at a lathe turning parts. I also love experimenting with different staining and finishing techniques, from ebonizing and oxidative finishes to shou sugi ban.



My work reflects a meticulous, detail-oriented personality with a soft spot for a bit of glam.



Epoxy river tables. Just eww.



I work quite closely with customers. Most of my projects are bespoke, one-of-a-kind pieces, which often involve an extensive design phase: consultations; gathering images of the space the piece is intended for; and ongoing communication throughout the process right up until they receive their item.



When someone first gets into a creative field, they often overdesign and go a little over the top, but as they mature, the philosophy of "less is more" starts to reveal itself.



In some cases, designing a custom piece of furniture can be nearly as time-consuming as building it.



A standout Canadian maker I love is Hamilton Holmes based out of Hamilton, Ont. I love the variety of work that comes out of that studio, from furniture to millwork and cabinetry. I'm a huge fan of the Danish furniture studio Overgaard & Dyrman; their blend and selection of materials are top tier and unmatched. I'm also a huge fan of furniture maker Michael Robbins based in upstate New York; I love his play with proportions and finishes.



Good design extends beyond being merely aesthetically pleasing. It solves a problem and brings together function, quality and style.



Most of the time, I work from a loose design and refine the finer details during the build.



Never stop being curious and continue challenging yourself. You don't need all of



Walnut Credenza — This is a custom credenza made of solid walnut with brass accents. Mazerolle was blessed with the best straight grained walnut for this project and really leaned into that as much as he could, when it came to wood selection and grain graphics for this project.

the tools to make beautiful things, and you don't need state-of-the-art equipment to do beautiful work.



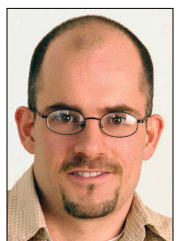
I've found it can be very difficult to get the price your pieces truly deserve. Striking a balance between completing a project quickly enough and still charging appropriately for the work is extremely challenging.



One of the pieces that I'm most proud of is a reception desk I built for a wellness clinic. It featured a solid sapele desktop with a waterfall end, a fluted walnut and brass front panel, and a white oak ledge running along the front and side. The turnaround was very tight, which meant many long days and late nights in the studio to get it finished on time. It really pushed my limits in the small space I work out of. At one point, with most of the components assembled, I was navigating narrow pathways just to move around the shop. It was frustrating at times, constantly shifting pieces and tools just to make the next cut, and it pushed me both mentally and physically. But seeing it installed in the clinic made the whole experience incredibly satisfying and absolutely worthwhile.

ROB BROWN

rbrown@canadianwoodworking.com



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VIDEOS: Visit our website to see a slideshow of Mazerolle's work.

RELATED ARTICLES: Jacques Breau (*June/July 2015*), Melanie Hamilton (*Dec/Jan 2023*), Robert Akroyd (*Dec/Jan 2017*)

What's the Difference?

BY CARL DUGUAY

Lumber Cuts: Flat-sawn, rift-sawn and quarter-sawn

All three come from the same log, but the way the log is milled determines the appearance of the grain, the stability of the boards and, to some extent, their cost.

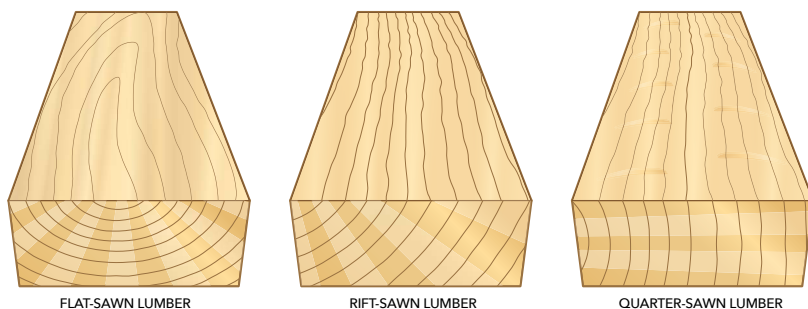
Flat-sawn lumber, sometimes called plain-sawn, is the most common and economical type of lumber. The log is sliced straight through in parallel cuts, producing boards with the familiar cathedral grain pattern seen on the face of the wood. This method of cutting a log results in the greatest amount of usable lumber with the least waste, making it the most affordable option. While flat-sawn lumber is perfectly suitable for most woodworking projects, it's more prone to cupping and seasonal movement across its width than the other sawing methods.

Rift-sawn lumber is cut so the growth rings meet the face of the board at approximately 30° to 60°, with the ideal angle being around 45°. This gives a very straight, uniform grain pattern with no cathedral patterns and very little, if any, ray fleck. Furniture makers, in particular, like rift-sawn lumber for its clean, contemporary appearance. It's a good choice for table legs, cabinet stiles and furniture components where consistent grain on all four faces is desirable. It's usually the most expensive of the three lumber cuts because it produces the most waste and the lowest yield from each log.

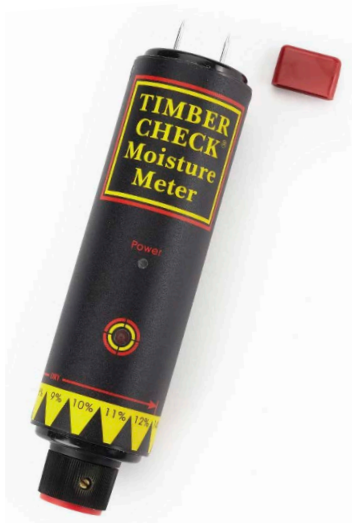
Quarter-sawn lumber is produced by first dividing the log into quarters and then sawing each section so the growth rings intersect the face of the board at roughly 60° to 90°. This creates straight, consistent grain and results in lumber that's more dimensionally stable, with less tendency to cup, twist or shrink across its width. In many wood species, including white and red oak, quarter-sawn boards display ray fleck patterns that most woodworkers find quite attractive. However, because quarter sawing is more labour-intensive and produces more waste, these boards usually cost more than flat-sawn lumber.

For many woodworking projects, flat-sawn lumber offers the best balance of appearance, availability and price. If perfectly straight, uniform grain is your goal, particularly for visible furniture parts,

Woodworking tools, terms and techniques can sometimes be confusing. Here, we help you make sense of the finer points of woodworking so you can make the right decision for your situation.



Lumber Cuts – Different cuts of lumber not only have different aesthetic characteristics, but also working characteristics.



Pin Moisture Meter – A pin moisture meter, like this Timber Check, has two pins on its end, which get pressed into the wood to take a moisture reading.



Pinless Moisture Meter – A pinless moisture meter, like this Wagner Orion 920, won't damage the wood, so it can be used not only on rough lumber but also on partially or fully finished workpieces and veneer.

rift-sawn lumber is hard to beat despite its higher cost. When greater stability or a more refined grain pattern is important, you'll want to consider using quarter-sawn lumber.

Pin and pinless moisture meters

Both of these moisture meters are designed to measure the moisture content of wood, but they do so in very different ways, and each has its own strengths.

A **pin moisture meter** has two small metal pins that you press into the wood. The meter then passes a tiny electrical current between the two pins to measure the amount of moisture in the wood. Because water conducts electricity, the meter calculates the wood's moisture content based on the electrical resistance between the pins. This method provides a very accurate reading at a specific location and for a specific depth, typically 1/4" to 1/2". However, you can measure moisture more deeply below the surface by using longer probe pins. The downside is that the pins leave small holes in the wood, making this type of meter less desirable for finished projects or expensive lumber.

A **pinless moisture meter** uses electromagnetic waves to scan the wood without penetrating the surface. A sensor plate is placed flat against the wood and the meter provides an instant moisture reading over a larger area than a pin meter. On average, these meters read down to about 3/4", though some models provide dual readings, typically a shallow depth of 1/2" and a deeper depth of 1" or more. Because there are no pins, it leaves no marks, making it ideal for finished furniture, flooring, veneer and lumber that you don't want to damage. It's also much faster when you have a lot of lumber to check.

The trade-off is that pinless meters are generally more sensitive to variations in material thickness, density and the presence of voids or knots. To account for this, you have to calibrate the meters for the specific wood species you're measuring. Pin meters are more convenient to use when you want precise readings at a specific depth or when you're working with thick stock.

For most hobbyist woodworkers, a pinless meter is a good choice for quickly checking lumber before beginning a project, while a pin meter is a better option when maximum accuracy at a specific depth is the priority. Some professional woodworkers keep both types on hand, using a pinless meter to rapidly scan boards and a pin meter to confirm moisture levels in areas that warrant a closer look.

Shop vacuum and dust extractor

A shop vacuum and a dust extractor may look similar, but they serve different purposes and are designed for different types of debris.

A **shop vacuum** is a general-purpose cleanup tool meant for collecting large debris, chips and liquids around the shop or jobsite. It uses a high-speed airflow to pull in material, but its filtration



Shop Vacuum – This King Canada shop vacuum is great for sucking up medium- and large-size chips, as well as liquids. It will also suck up small dust particles, but it doesn't necessarily filter them out and leave them in the container; they might get blown back into the air.

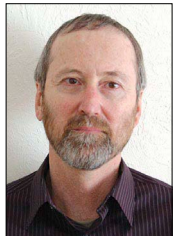


Dust Extractor – This Festool dust extractor can suck up large bits of wood, but it's especially good at sucking up fine dust particles and keeping them in the dedicated dust bags in the unit.

system is basic — fine dust usually passes through the filter and gets blown back into the air. Most shop vacs are designed to handle both wet and dry materials. They typically have a durable tank — often made of plastic or stainless steel — and a float valve or automatic shutoff mechanism that stops suction when the liquid level gets too high, preventing damage to the motor.

A **dust extractor**, on the other hand, is engineered specifically for woodworking and other applications that create fine, airborne dust. It generates lower airflow but higher suction pressure, allowing it to capture fine particles directly at the source, such as when sanding or cutting. Dust extractors also feature advanced filtration systems, often with HEPA (High Efficiency Particulate Air) filters that trap even microscopic dust, improving air quality and protecting your lungs and your tools. Connected to power tools, especially sanders and routers, they can remove substantial amounts of dust at the source, keeping your shop and the projects you're working on cleaner. Most dust extractors are designed for dry use, but some models can safely handle liquids, provided they're rated for wet and dry operations. These units have features like a moisture-resistant filter, an automatic shutoff float to prevent overfilling and a tank designed to handle liquids.

In short, shop vacuums are best for general cleanup, while dust extractors are designed for dust control during tool operation and for maintaining a cleaner, healthier workspace.



CARL DUGUAY

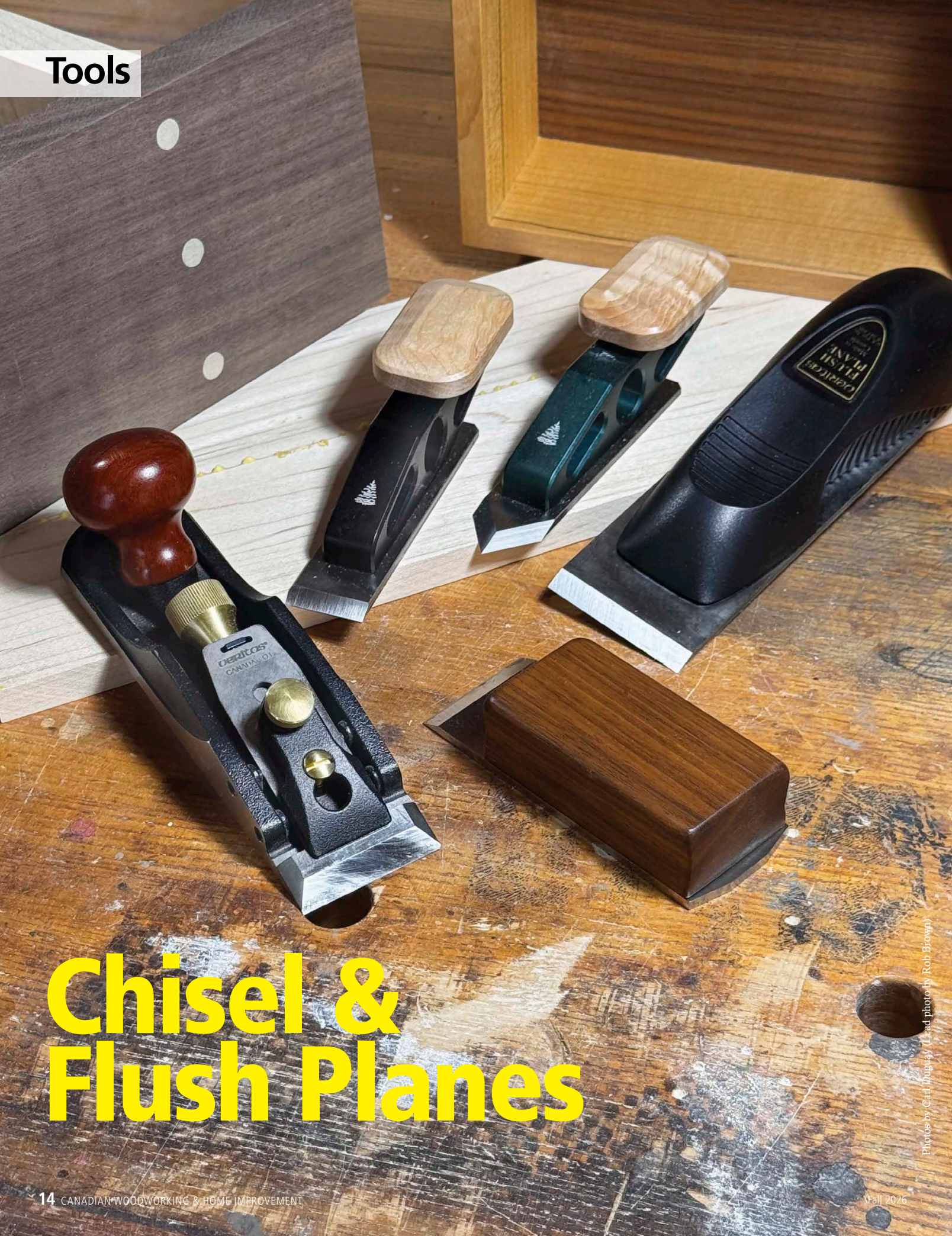
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Chisel & Flush Planes



Here's the tool to use when you need to trim wood flush, especially when working in tight or awkward places.

BY CARL DUGUAY

There are times when you need to trim wood perfectly flush in confined or awkward spaces. Examples are when cleaning up a joint, paring a proud tenon or removing glue squeeze-out in a corner. While a standard chisel (particularly a cranked-neck paring chisel), a card scraper or even a plane blade can sometimes get the job done, they come with risks. It's all too easy to gouge the surrounding surface or lose control when working in tight quarters.

A specialized tool is often the better choice – namely, a chisel plane or a flush plane. Either of these is sometimes referred to as a trimming plane. A third option, a bullnose plane, can be easily converted to a chisel plane which gives you the option of having a multi-purpose tool in your kit.

Both chisel and flush planes are designed with a blade that extends right to the front edge of the tool body, with no sole or bearing surface ahead of the cutter. This allows the blade to reach all the way into corners or up to adjacent surfaces. It's much like using a chisel, but with the added control, support and stability of a plane body. In both tools, the blade is the same width as the body and is mounted bevel-up for a fine, low-angle cut.

A **chisel plane** is essentially a plane with no toe (front section). The blade is typically set at a low angle, usually between 12° and 20°. A **flush plane**, by contrast, has its blade mounted horizontally and parallel to the base of the body of the tool, allowing it to trim materials exactly flush with a reference surface. The blade can have a straight, square cutting edge (as on the chisel plane) or a blade that tapers to a centred, pointed tip. The **bullnose plane** is a closely related tool. With the toe piece installed it performs as a shoulder plane, but once the toe piece is removed it functions like a chisel plane.

These planes are especially useful for tasks such as:

- Removing hardened glue squeeze-out along joints and in corners without damaging surrounding surfaces
- Slicing epoxy filler flush to a surface
- Paring dowels, tenons or dovetail pins flush with a surface
- Truing the face or shoulder of a tenon



Squeeze-Out – A chisel or flush plane will do a good job removing partially or fully dried glue from a joint.



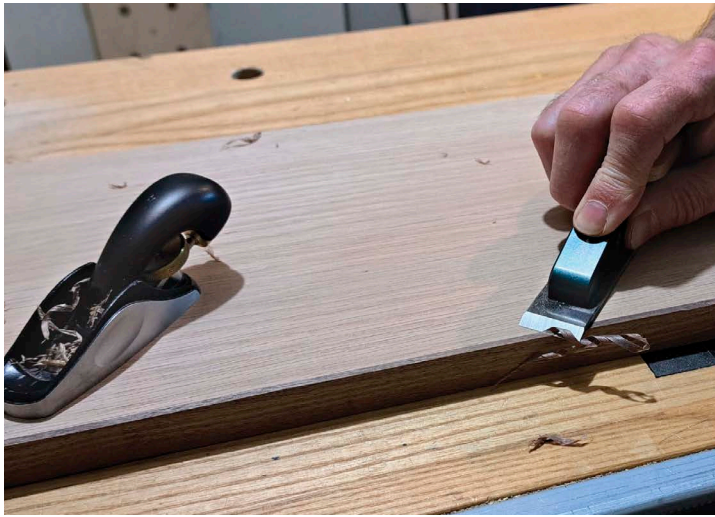
Flush Them Up – Trimming dowels or plugs is easy and accurate with a sharp chisel or flush plane. Here, the Veritas Cabinetmaker's Trimming Plane takes care of the task.

shopnotes

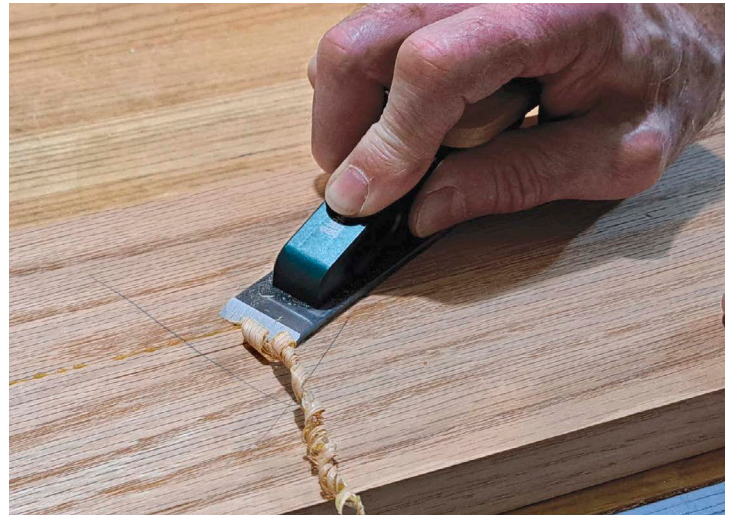
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Sponsored: Titebond Instant Bond Medium - Jet Black is a cyanoacrylate adhesive offering professional-strength, permanent bonds to most common materials. This rubber-toughened formula is extremely impact-resistant and ideal for hiding imperfections, repairing cracks, and filling knots/voids in wood materials. With a long working time of approximately 40 to 60 seconds, it allows for precise application for complex projects. It dries to a glossy black finish, ideal for inlays and spalted wood, and for accenting details in your projects. Learn more at Titebond.com.

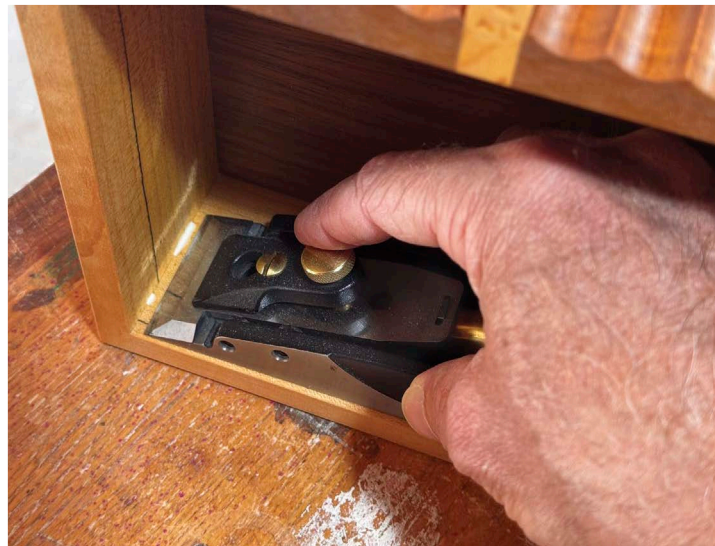




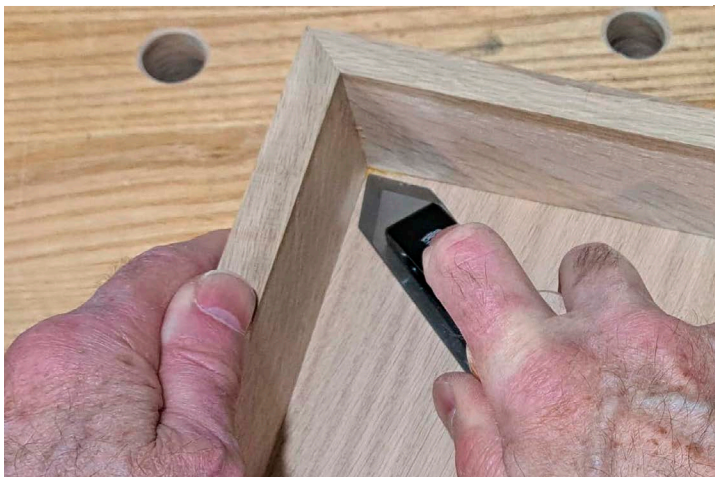
Shave Solid Edging – To flush solid wood edging with the face of a workpiece, Duguay first removes much of the waste with a block plane, then uses a chisel or flush plane to further refine the joint.



Level a Joint – These planes are also great at starting the joint levelling process after boards have been laminated. A careful touch, moving in the direction the grain dictates, will cleanly remove wood.



Get Into Corners – Reaching into inside corners to remove dried adhesive, like on this drawer, is one of the tasks a chisel or flush plane excels at.



Spearpoint Tip – A plane, like this Blue Spruce spearpoint offering, will do a great job at getting into tight corners. This plane is also available with a straight blade.

- Trimming one surface flush to another – for example, edge banding
- Getting into corners or confined areas where standard planes can't reach, such as the inside of cabinets or drawers
- Removing small nibs or imperfections from film-finished surfaces
- Fine-tuning mortise-and-tenon joints, rabbets or housings

While not essential for every woodworker, a chisel or flush plane can save time and frustration when precision trimming is needed, especially in tight spots. For anyone building fine furniture with exposed joinery, either tool can be an invaluable and efficient addition to the workshop. And besides, what woodworker worth their sawdust doesn't have a soft spot for clever little tools?



Veritas Cabinetmaker's Trimming Plane

\$169

Leevalley.com

While referred to as a trimming plane, this tool clearly falls into the chisel plane camp, i.e. a small plane with no toe. As you'll find with all Veritas hand planes, this Canadian-made tool is superbly



Clean Them Up – These planes can also be used to clean up a rabbet joint. Here, the Veritas Cabinetmaker's Trimming Plane is being used for that task.

crafted. Measuring 6-1/2" by 1-3/4", it fits comfortably in the hand. The heavy cast stainless steel body weighs a bit over a pound, giving it solid heft without feeling overly heavy.

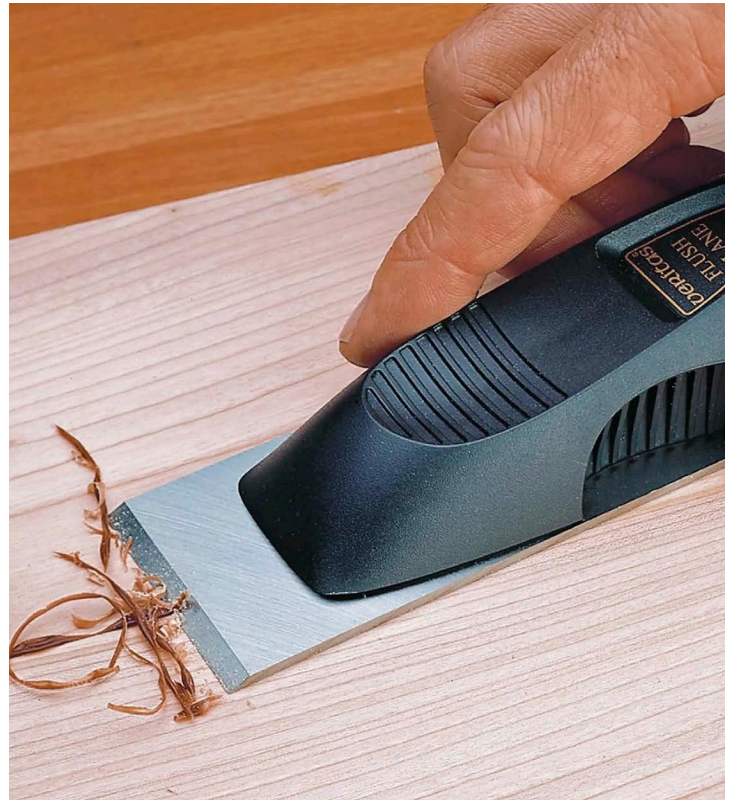
The 1/8" thick O1 steel blade holds a keen edge and is easy to sharpen. I was able to use the Norris-style adjuster to make precise, incremental blade adjustments. The blade sits in a 15° bed and has a 20° bevel, resulting in a 35° effective cutting angle — ideal for minimizing tear-out.

I found the plane comfortable to hold and use. The backward-tilted knob nests nicely in the palm, while the forefinger naturally rests on the brass lever cap knob for added control. Four strategically placed set screws help keep the blade centred. Once set, they virtually eliminate side-to-side blade movement and make blade removal and replacement for sharpening quick and easy.

Both the sole and the back of the blade are impressively flat and the blade arrives acceptably sharp. While the plane is ready to use out of the box, purists may prefer to hone the blade to razor sharpness for optimal performance.

Whenever possible, I like to use a side-to-side sweeping motion with this plane. This technique improves control, reduces the risk of tear-out and produces a finer surface finish. You can also use the Veritas Cabinetmaker's Plane on slightly contoured surfaces. Because of its heavier weight and wide sole it's easier to keep the plane steady on larger surfaces. That heavier weight and wider blade also mean it can't reach into some corners or very tight spots, especially where the sole would bottom out or the front housing would block access.

Similar to the Veritas model is the **Lie-Nielsen 97½ small chisel plane** (\$175 USD, lie-nielsen.com). It's roughly the same size as the Veritas, but with a gorgeous bronze body. The A2 steel blade has a 25° bevel and rests on a 12° bed giving essentially the same effective cutting angle as the Veritas. It lacks set screws for aligning the blade, but hey, it's a Li-Nielsen – an heirloom tool to share with the next generation of wood crafters.



Veritas Flush Plane – The Veritas Flush Plane is a cost-effective approach to owning a tool that will help you with all sorts of tasks around the workshop.

**No Jointer? No Planer?
No Problem. ✓**

Perfectly milled D4S lumber - ready to build.



**Cherry, Walnut,
Maple & More**



✓ Surfaced 4 sides

✓ Save time, space & tool costs

✓ Straight, square, consistent boards

✓ Ideal for small shops & hobbyists



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Blue Spruce Chisel Plane

\$89.99 USD

Bluesprucetoolworks.com

Blue Spruce Toolworks is a highly regarded maker known for precision, elegance and thoughtful design. Their chisel plane is no exception. The tool features a compact 5-1/4" by 3/4" anodized

aluminum body, available in black or green, and comes with either a flat or spearpoint blade. In my view, this blade option significantly extends the plane's versatility. While the company calls this a chisel plane, it's clearly a flush plane, as the face of the blade itself serves as the tool's sole.

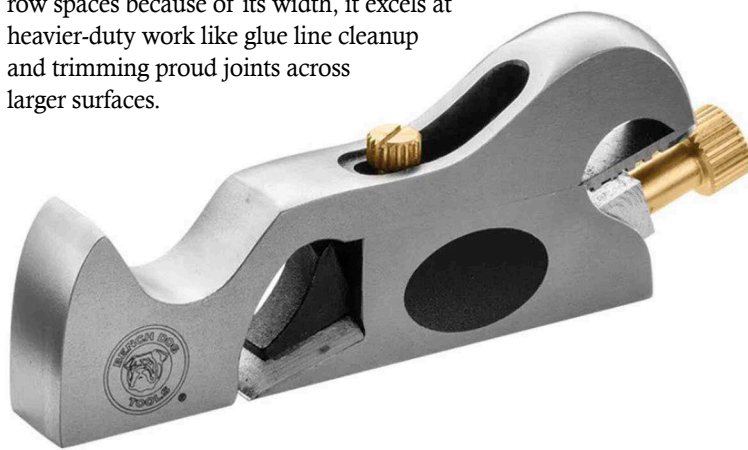
The 1" wide blades are made from cryogenically treated A2 steel, which offers greater toughness and edge retention than O1, though it does take a bit more effort to sharpen. The blades (\$49 USD) are interchangeable, so once you've invested in a single body, you can easily switch between blade profiles as needed.

Unlike the Veritas plane, the Blue Spruce chisel plane requires no setup or fine adjustment. The blade registers precisely to the sole via a locating pin and screw. Out of the box, my blade was perfectly flat, straight and had a beautifully polished mirror finish. It came ground to a 25° bevel, with a 5° micro-bevel added – a thoughtful touch that enhances edge durability. The spear-point blade allows for ambidextrous use.

At just under 5 ounces, the Blue Spruce chisel plane is feather-light, but its performance is anything but insubstantial. The resin-infused beveled maple handle is comfortably contoured, while the elongated finger holes in the body provide excellent grip and control during use. Despite its low mass, I never felt the tool was too light or hard to control.

As with many small planes, it works best when used at a skewed angle to create a slicing cut. Where it truly shines is in tight, awkward spaces – places where a larger-bodied plane, such as the Veritas, simply can't reach. While the narrow profile does make it less suitable for broad surface work or smoothing, when it comes to getting flush against an obstruction, it's hard to beat.

A comparable tool is the Veritas Flush Plane (\$49.90), which has a wider 2" blade and a 25° bevel. While it's less effective in narrow spaces because of its width, it excels at heavier-duty work like glue line cleanup and trimming proud joints across larger surfaces.



Bench Dog No. 92 Shoulder Plane

\$129.99 USD

Rockler.com

While the Bench Dog No. 92 isn't strictly a chisel plane, it offers dual functionality. By removing the front toe section, it converts into a compact chisel plane, giving it added versatility in the workshop. It won't match the precision or performance of a purpose-built chisel plane, but for occasional use, the conversion



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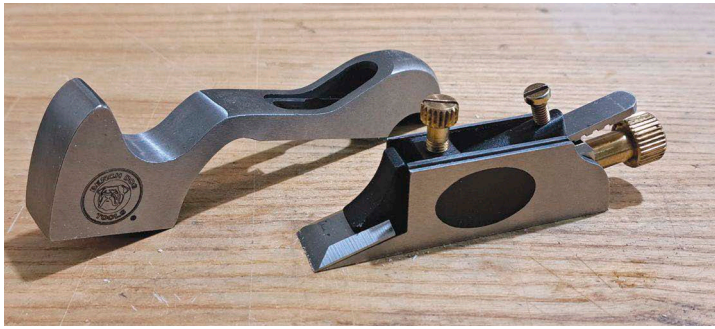



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Bench Dog Shoulder Plane – While not a true chisel plane, the Bench Dog Shoulder Plane plays two roles in a workshop. You can use it in shoulder plane mode or chisel plane mode by just removing or re-installing the front toe section. It's a versatile option.

feature adds real value. If you don't yet own a shoulder plane or chisel plane, this tool is worth considering.

At 5-1/4" long and 3/4" wide, and weighing just over one pound, the No. 92 has a solid, reassuring feel in the hand. I appreciate multi-functional tools in a small shop setting, and the No. 92 fits that philosophy well.

The plane body is made from cast iron and the A2 steel blade comes ground at a 25° bevel angle, bedded at 19°. This results in a 44° effective cutting angle that's slightly steeper than what you'd find on some shoulder planes and can cause the blade to dig in a bit more aggressively. With that in mind, I found it best to take light passes and work slowly, especially on end grain.

Blade presentation is adequate but not exceptional. The back of the blade was reasonably flat out of the box but the bevel benefited from a few minutes of honing to bring it to a truly sharp edge. The sole was dead flat. Compared to higher-end models from Veritas or Blue Spruce, the fit and finish are a bit rougher, but certainly serviceable for most users.

Blade adjustment is handled by a small screw mechanism that offers acceptable control, though it does have some backlash. While not as refined or precise as the adjustment systems on premium planes, it gets the job done with a bit of patience.

In chisel plane mode, the No. 92 feels very compact and stable. It fits nicely in the hand and provides a good sense of control when working in tight spaces or cleaning up corners. Converting from shoulder to chisel mode is quick and easy – simply remove the toe piece and you're ready to go.

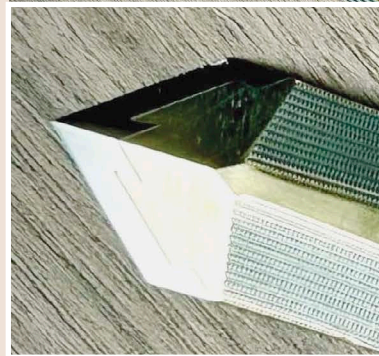
The Bench Dog No. 92 is a good value for woodworkers who occasionally need a chisel plane but don't want to invest in a dedicated model. It won't compete with premium options in terms of finish or finesse, but for most users – especially those just beginning to build out their hand tool collection – it offers solid performance and welcome versatility at a reasonable price.

Similar to the Bench Dog is the Veritas Bullnose Plane. It's a tad shorter than the Bench Dog and has a 1" wide PM-V11 blade. The bed angle is set at 15° and the blade has a 25° angle for a slightly lower 40° effective cutting angle which makes it somewhat more efficient when working end grain.

Choices, choices

Based on my own woodworking and teaching experiences, I'd recommend a flush plane if you frequently trim edge banding,

What About a Marking Knife?



Palm Pointer - A Premium Tool – The Palm Pointer from Zen-Wu Toolworks is a premium option for those who want the Rolls Royce of flush planes. At 5-1/2" long, and with a spear point, the Palm Pointer is a beautiful tool.

I occasionally reach for a marking knife when working in tight or narrow corners. They're also indispensable for fine-tuning joinery, such as cleaning out the sockets on dovetail pins or tracing around tenons. Of the many marking knives on the market, I recently had the chance to test out the Palm Pointer from Zen-Wu Toolworks (\$227 USD, zenwutoolworks.com).

Billed as a multi-purpose marking tool, the Palm Pointer goes well beyond simple layout work. It's designed not only for marking but also for light paring, trimming, slicing and even scraping, blurring the line between a marking knife and a fine-detail chisel or craft knife.

Measuring 5-1/2" in length, the Palm Pointer is 7/8" wide at the blade end and 1-1/4" at the handle. It weighs just 2-5/8 ounces, giving it a compact yet satisfyingly solid feel in the hand. The blade is made from Zen-Wu's proprietary ZW-C1 steel, a high-performance white-paper carbon steel that rivals traditional Japanese white steels in both hardness and edge clarity. It's laminated to a Magnacut titanium alloy handle, which offers superb wear and corrosion resistance. The handle material also contributes to the knife's light weight while maintaining a firm and comfortable grip.

Where this tool really shines is in its versatility. It performs all the typical duties of a marking knife with precision, but the larger, sturdier blade makes it equally effective for many of the light paring tasks you'd typically assign to a chisel plane. I found it quite useful for cleaning up joint shoulders, adjusting tight-fitting joinery and slicing thin shims. In this respect, it feels somewhat comparable to the Blue Spruce chisel plane, though the Palm Pointer is much more compact and maneuverable.

If you're looking for a marking knife that goes beyond marking, the Palm Pointer delivers exceptional performance and craftsmanship in a compact, beautifully designed package. While it sits at the premium end of the price range, it earns its place with both precision and multi-functionality. For woodworkers who value tools that can serve multiple roles without compromising on quality, this is a compelling addition to your kit.

Make Your Own Flush Plane



A Shop-Made Option – This is Editor Rob Brown's shop-made flush plane. Starting with a plane blade, he shaped and fit a wooden handle to the blade.

While a chisel plane is a bit more complex to make yourself, a flush plane is surprisingly simple. A block plane iron (i.e. blade) is a great place to start, though any plane iron could be turned into a flush plane. I have a dedicated plane iron for the flush plane I made, but since I used two magnets to hold the plane iron in place on the wooden handle, it's easy to remove and replace whenever needed.

Once you have the plane iron, the handle can be made around it. The wooden handle can be sized and shaped as you like. As long as it fits in your hand comfortably, and isn't too large, you're on the right track. A handle that's too large may interfere with you bringing the flush plane close enough to any mating surfaces, like within the interior of a drawer, for example. This plane isn't likely going to be used aggressively, so a smaller handle will likely be ample.

A plane iron typically has at least one groove that can be used to help secure it to the handle. Next, a small piece of hardwood can be shaped to fit snugly into that groove and be attached to the underside of the handle. It's important the small piece of hardwood doesn't protrude beyond the underside of the plane iron, or the plane iron won't sit flush on the workpiece. This small piece of hardwood can now be glued in place.

I added two rare earth magnets on the underside of the handle, in order to keep the blade attached to the handle. It's possible to drill a screw clearance hole in the plane iron and fix the blade to the handle more securely, if you feel that's needed. The magnets do a decent job at keeping the blade and handle together, though if you want to tilt the flush plane on even the slightest angle in order to apply a small amount of downward force on a workpiece at the front edge of the flush plane, the magnets aren't strong enough to keep the two parts together. Test out the feel of the flush plane, making sure no sharp or uncomfortable spots are felt on your hands, then apply a few coats of finish to the wooden parts.

— By Rob Brown



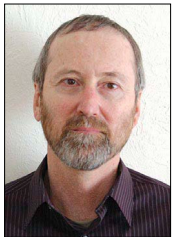
A Nice Fit – A wooden cleat stops the blade from rotating under the handle, while two rare earth magnets keep the blade and handle together during use.



Veritas Bullnose Plane – Like all Veritas products, this is a well-made tool that excels in function, fit and finish.

veneer, plugs or other delicate surfaces that need to remain scratch-free. Because it rides on the surrounding surface, it's much less likely to leave tracks at the edges and naturally limits the depth of cut. That's also why I think it's the better choice for novice woodworkers. It's easier to achieve clean, controlled results with less risk of damaging the workpiece.

For more experienced woodworkers whose projects involve joinery, trimming tenons or cleaning up corners, a traditional chisel plane is often the better option. In fact, many professional furniture makers keep both tools in their cabinet: a chisel plane for reaching into tight or awkward areas; and a flush plane for producing a clean, perfectly flush finish.



CARL DUGUAY

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Why a 23-Gauge Pinner Belongs in your Shop

Features that matter the most for hobbyists and furniture builders.

BY CARL DUGUAY

A 23-gauge pin nailer – usually called a pinner – is one of those small, unassuming tools that ends up being surprisingly useful in the shop. I reach for mine whenever I'm working on delicate trim, light assemblies or any situation where a visible fastener would ruin the look of the project. A pinner drives very fine, headless pins that leave almost no trace on the surface, making it ideal for attaching small mouldings, edging, thin parts and lightweight cabinet components. Because the pins are so thin and have no real head, they almost never split fragile stock. That's a big reason they're my go-to for tiny profiles, veneer repairs, narrow strips and other fussy pieces that would shatter under an 18-gauge brad.

Another bonus is that a pinner acts like a set of invisible clamps. The pins hold parts in perfect alignment while the glue cures, or lets me get some clamps on the assembly, allowing me to keep moving without wrestling half a dozen spring clamps onto the work-piece. For small parts, especially in furniture making, that's a huge time-saver.

Most 23-gauge pinners shoot pins from about 1/4" up to 1-1/2", depending on the model. Pins are usually bright steel or stainless steel, arranged in strips of 100 that slide neatly into the magazine. Pinners also fire in sequential mode only, meaning you have to pull the trigger for every shot. That's intentional: it's safer and far more accurate for such thin fasteners. Since they're headless, they sit nearly flush with the surface and usually need little, if any, filling before finishing.

The number of pins that a pinner can drive on a full battery charge will depend largely on the voltage and amp-hour capacity of the battery. Higher-voltage tools generally use more powerful motors that can work more efficiently, and higher amp-hour batteries store more energy, which translates directly into more shots per charge. That said, a few secondary factors also influence runtime, such as the efficiency of the tool's motor, ambient temperature, the hardness of the wood, and whether the tool is being used continuously or intermittently.

When comparing pinners, there are four practical features to keep top-of-mind:

- Easy depth-of-drive adjustment (especially important in hardwoods)
- Comfortable, well-balanced ergonomics
- Straightforward jam-clearing
- A magazine that loads smoothly without fighting the strip

Weight matters less to me because I only use a pinner in short bursts, but if you're doing trim installation all day, a lighter 12V or pneumatic model may feel better in the hand.

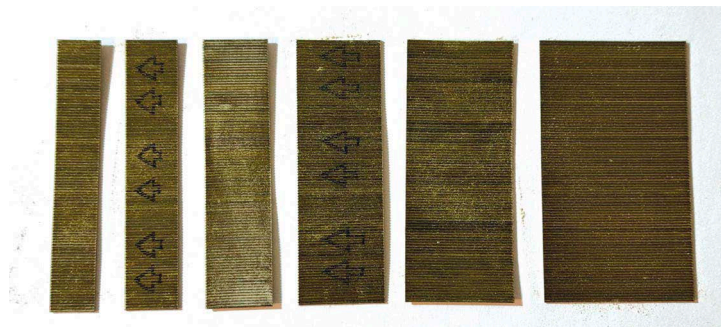
Safety-wise, don't let the small size fool you. A 23-gauge pin can ricochet if it hits a knot or hard grain line, so eye protection is a must. Keep your free hand well away from the firing path, too. These pins are so thin that you often don't feel them until they're already through your fingertip.

To get the cleanest results, I try to match the pin length to the job. The pins only need to be long enough to bridge the joint and give some holding power. Longer pins wiggle more in the wood and are more prone to fish-hooking – that is, bending inside the board and curling out the side. I always test on a scrap of the same species first to check depth. For permanent installations, I apply glue first, then pin, so the glue provides the actual long-term strength.

If you load different pin lengths, or go from softwood to hardwood, you'll need to re-check and re-adjust depth each time to ensure the pins sit flush (or slightly below) without bruising the surface. That's why many users – me included – test-fire a pin on a scrap piece whenever conditions change.

A bit of maintenance goes a long way. At the end of a job, I wipe down the nosepiece to clear dust and pitch, which helps prevent misfires.

It's important to remember that a pinner isn't a general-purpose nailer. It's not meant for structural joints or anything load-bearing. Instead, think of it as a precision fastening tool – excellent for trim, cabinetry, small parts, templates and detail work where clamps are awkward or a visible nail would ruin the finish.



A Wide Variety – 23g pins come in lengths between about 1/4" and 1-1/2", though this varies by brand. This range is more than enough to meet the needs of furniture makers and DIYers.



Almost Invisible
– A 23g pinner (lower right) leaves a very small imperfection in the wood and is almost unnoticeable in open-grained woods. An 18g brad nail is shown in the upper left. Porous woods can hide a 23g pin head even better than this maple.



Another Set of Hands – A 23g pinner won't provide enough strength to keep mating pieces together for good. These small pins are best for aligning the parts until the glue dries, while also being nearly invisible.

A 23-gauge pinner isn't something you'll use every day, but when the job calls for it, nothing else works quite as cleanly. It's one of those specialty tools that earns its keep by making delicate tasks faster, easier and a whole lot neater.

Tool comparison

I spent some shop time with two popular 23-gauge pinners, and what stood out to me is how similar they are in terms of core performance. Both drive pins cleanly, feel well balanced in the hand, and deliver the kind of finesse woodworkers are apt to look for in a pinner. As well, both include some version of dry-fire lockout, an important feature in my view, which prevents firing when you're out of pins. The differences are mostly in ergonomics, safety features and small usability touches.

The models I tested are sold as bare tools. If you've already invested in a particular battery platform, it makes sense to stick with the brand you own.

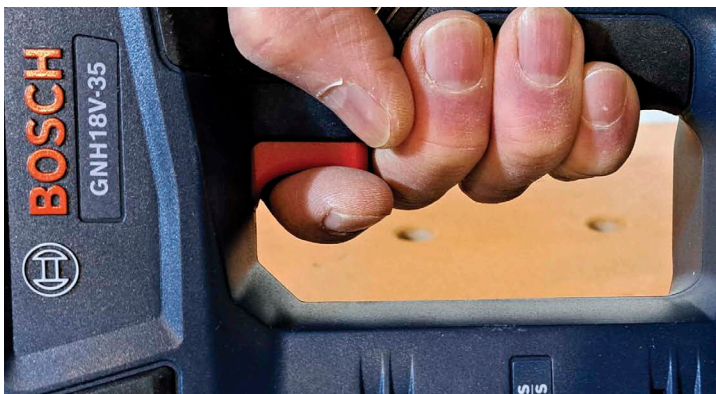
Cordless or corded?

A cordless pinner offers several advantages over a pneumatic model, especially for small jobs and work outside the shop. Because there's no hose or compressor to set up, a cordless pinner is ready to use immediately, which makes it ideal for quick repairs, light trim work or situations where you only need to fire a handful of pins. The absence of a hose also means the tool stays exactly where you place it, without any tugging that might cause the nose to shift on delicate mouldings. Cordless pinners keep the workspace quieter, too, since there's no compressor cycling in the background, and they eliminate the maintenance associated with air tools and compressor systems.

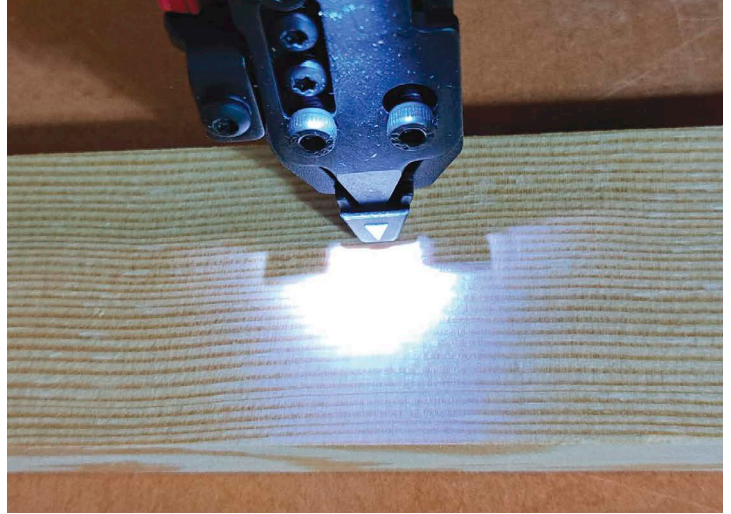
However, pneumatic pinners still have their strengths. They're lighter, often more consistent in their depth of drive and generally less expensive. They also avoid the need for battery charging or battery management. In the end, the choice comes down to how and where you work. If you value mobility and fast setup, a cordless pinner is hard to beat, while a pneumatic pinner remains a great choice for extended shop use and the lightest feel in hand.



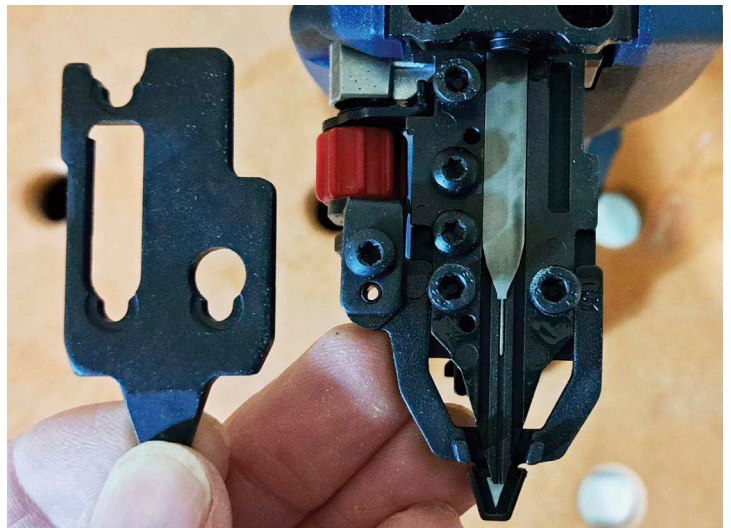
Corded vs Cordless—Corded tools are generally lighter. You don't need to recharge their batteries and are often more cost effective (if you already have an air compressor).



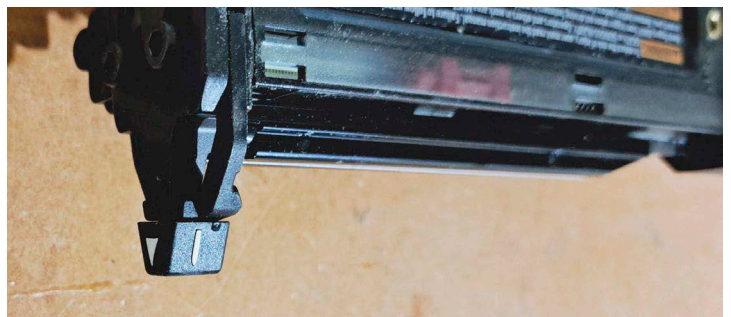
Press, Then Fire—The single trigger on the Bosch GNH18V-35N means the nose tip must be in contact with the workpiece in order to fire the pin.



Shine a Light—The front-focused light on the Bosch clearly illuminates the work area surrounding the tip.



Easy Access—The nose plate on the Bosch pinner is quick to remove when you need to extract a jammed pin.



Where Will It Fire?—The Bosch tip (upper photo) is black with white marks to locate the exact position where the pin will fire. It's a bit easier to visualize, compared to the DeWalt (lower photo), which is white on white.



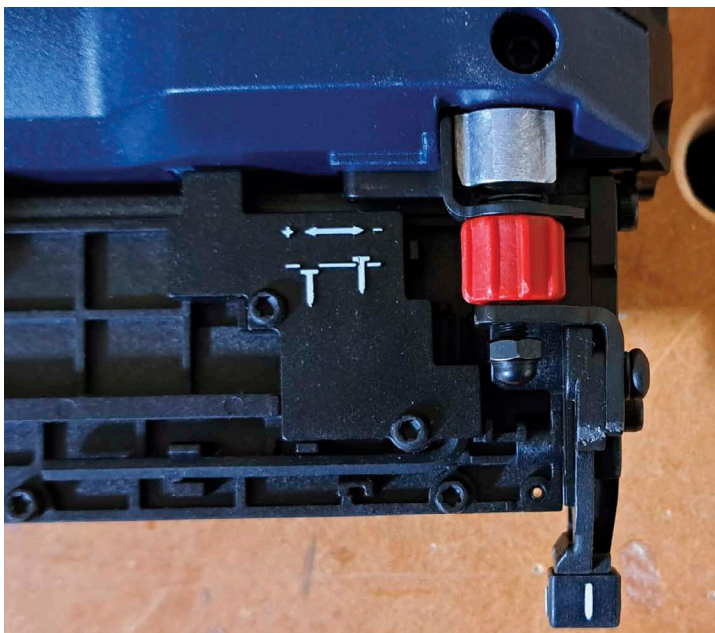
Bosch GNH18V-35N Professional

\$299

Boschtools.com

Key Features: 18V, brushless motor; 5/8" to 1-3/8" pin capacity; 3.7-pound weight; tool-free depth adjustment; dry-fire lockout; two non-marring tips; LED light; belt hook; five-year warranty.

Bosch uses a “contact trigger + sequential actuation” system, meaning you press the nose of the tool against the workpiece, then pull the trigger to fire. The LED light is at the front, near the nose, and I found it illuminates the nose area well. To clear a jammed nail, you back off three screws and then remove the nose plate (what Bosch calls the shot plate). The key is stored on the nailer and it only takes a minute or so to do it. The tool-free depth adjuster is conveniently located on the side of the tool. The Bosch has somewhat of an open magazine design that makes it easy to check your remaining pins at a glance. I like the large, easy-to-view triangle on the no-mar tip, which makes it easier to place the tip precisely where I want the nail to go. Ergonomically, the Bosch, like the DEWALT, is comfortable to use for the short, task-based work pinners are made for.



Quick Adjust – Tool-free depth adjustment is conveniently located on the side of the Bosch pinner.

Fish hooking

Fish-hooking is when a pin or nail bends inside the workpiece and exits the surface in a curved path – often sideways or back toward the surface – creating a “hook-shaped” blowout. It’s more common with brad nailers, but it can happen with 23-gauge pinners, even though pins are thinner, round and not wedge shaped, and have no heads. It occurs because pins follow the path of least resistance. If a pin hits dense latewood or a knot, it can deflect into softer adjacent grain. Longer pins flex more easily, increasing the chance of curling inside the wood. But even a slight tilt of the pinner can cause a long, thin pin to wander.

To reduce the likelihood of fish hooking keep the pinner square to the stock and the pinner nose pressed firmly to the work to reduce vibration. Always shoot pins with the grain rather than across highly variable grain lines and never pin into end grain or a knot. Only use the length of pin needed to get secure purchase. And finally, use premium pins from known brands. They’re straighter, harder and more consistent in quality. Cheaper pins often bend before they even enter the wood.



DEWALT DCN623B

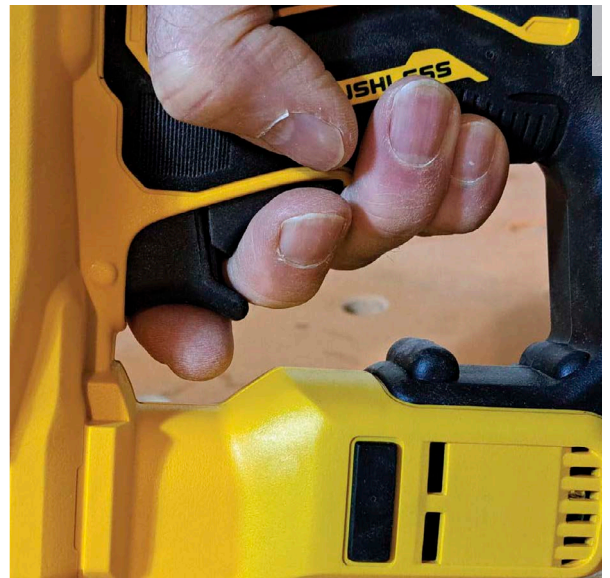
\$358

Dewalt.ca

Key Features: 18V, brushless motor; 5/8" to 1-1/2" pin capacity; 4.1-pound weight; tool-free depth adjustment; dry-fire lockout; one non-marring tip; belt hook; three-year warranty.



Flip the Cover – To use the depth adjustment knob on the DEWALT you need to lower the nose cover, which is quickly and easily done.



Two Triggers – The dual trigger mode on the DEWALT DCN623B eliminates the need to have the tip touching the wood to fire a pin. Once the lower trigger is pulled, the upper trigger will fire a pin. There are pros and cons to this approach.

DEWALT takes a different route with a “dual-trigger” setup – you squeeze a secondary trigger before pulling the main one. Because of this, the DEWALT can fire without the nose being fully compressed against the surface, which some people like for awkward angles, while others prefer the added safety of a mandatory nose contact system. Dual LED lights are at the back of the tool. I find that they illuminate a wider area than the Bosch, but less so around the nose. To use the depth adjuster, you need to lower the nose cover which is a tad inconvenient, but not a deal breaker. The DEWALT has a convenient dry-fire lockout light, which I like better than a nail window, as found on the Bosch. The line of sight is, as on the Bosch, excellent. If not careful, you can inadvertently fire a pin when carrying the pinner around the shop with your finger on the nail gun triggers. I do appreciate that both the Bosch and DEWALT can stand upright on their battery packs, which makes them easier to set down between pins.

Overall, neither of these pinner is a runaway leader. Each has smart design choices that suit slightly different preferences. For me, the decision would come down to battery platform first, then ergonomics, followed by sight-line clarity and depth adjustment. No matter which one you choose, both deliver the kind of precision work a 23-gauge pinner is meant for.



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Make a Simple, Effective **V-BLOCK**

Photos by Mark Salusbury (Lead Photo by Rob Brown)

Cradling and centring small- and medium-sized workpieces is made easy with this simple, shop-made fixture.

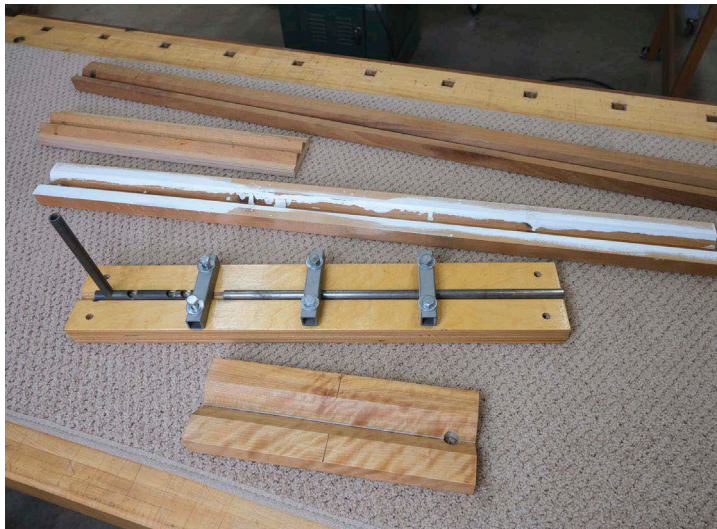
BY MARK SALUSBURY

A V-block is just the ticket when you need to hold or centre a squared or cylindrical shape for drilling, chamfering, cutting or even finishing. Easy to make and costing you virtually nothing, it's a strong spare pair of hands, valuable at the bench, drill press or bandsaw to craft pieces accurately.

At the bench, squared or tapered stock can be cradled so the edge that's pointed up can be eased with a sanding block or abrasives, or chamfered with a plane. At the drill press, the V-block can be centred under the drill bit and clamped in place on the table. The workpiece can then be cradled firmly to bore perfectly centred and square holes, or the table can be tilted at an angle, allowing you to bore precise angled holes. This approach also allows you to bore holes in cylindrical or tapered parts. At the bandsaw, a V-block will assist with all sorts of ripping and crosscutting operations.

Size it up

A V-block can be quickly made to any width or length to support whatever part you'd like to work on, from a small dowel to large bedposts. The only important detail when making a V-block is that after ripping 45° bevels down the centre of your blank, add an 1/8" × 1/8" slot down the centre of the 90° V for clearance of the edge to be cradled.



Assorted V-Blocks – Salusbury's most used V-block (bottom) sees regular use at his workbench and includes a removable stop block when planing the corners off square sectioned parts. Above it, a V-block with hold-downs to secure round rod or dowels is used with a fence and stop blocks at the drill press to bore perfectly spaced and centred holes. In the centre is a "workhorse" V-block used for less critical jobs. Second from the top is a V-block simply made by securing two triangular strips to a flat base block. The top V-block has the length needed to offer uniform support for long workpieces.



Main Support Block – This V-block is the best place to start. Begin with planed and jointed hardwood 1-1/4" thick, 12" long and 4" wide. Right down its centre, rip an 1/8" wide groove 3/4" to 7/8" deep, then rip 45° angles down both sides, leaving 1/8" of the groove at the bottom. The 90° angle supports square cross sectioned workpieces while the 1/8" deep central groove offers clearance for rough outside corners. This will provide ample support for many operations.

Down the road you may also find it helpful to create a V-block that's not at 90° to assist with non-square parts. This can be done on a need-to basis, depending on the workpiece you're machining.

To create the 90° cavity, set a table saw blade to exactly 45° using a digital angle gauge, then rip the blank in two centring passes. Ensure there is still enough material between the two halves of the blank to keep them together. Finally, reset the blade to 90° and rip the 1/8" slot, centred on the bottom of the V.

All that's left is to drill a hole through the V-block so you can hang it on the wall, ready for action.



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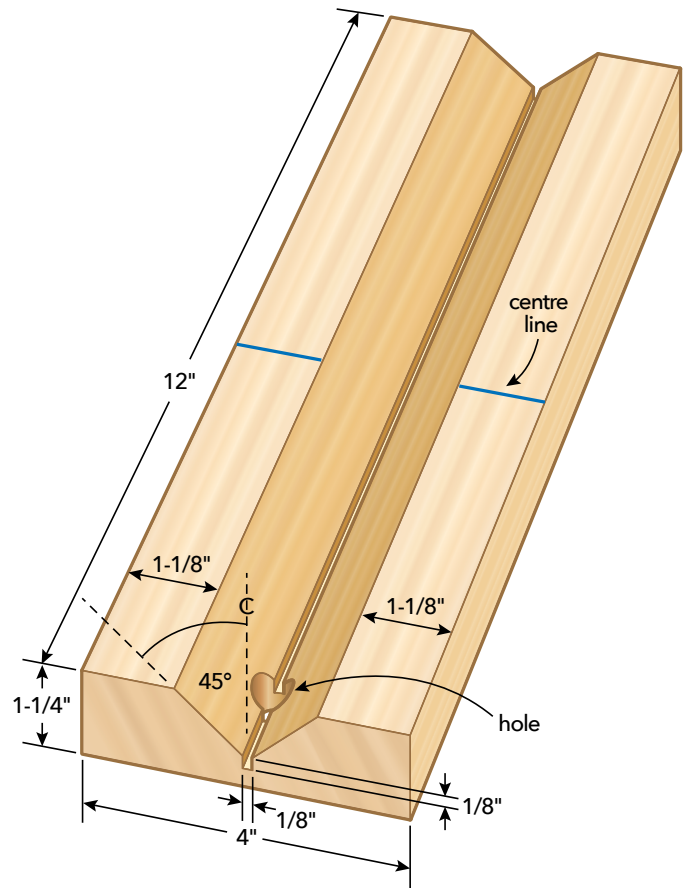


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Lots of Variations – It can be helpful to have a V-block with a few 'V's in it, all differing in width. This V-block can be clamped in a bench vise and the user can use whatever notch is needed. The stop at the end helps keep the workpiece in place during use. (Photo by Rob Brown)



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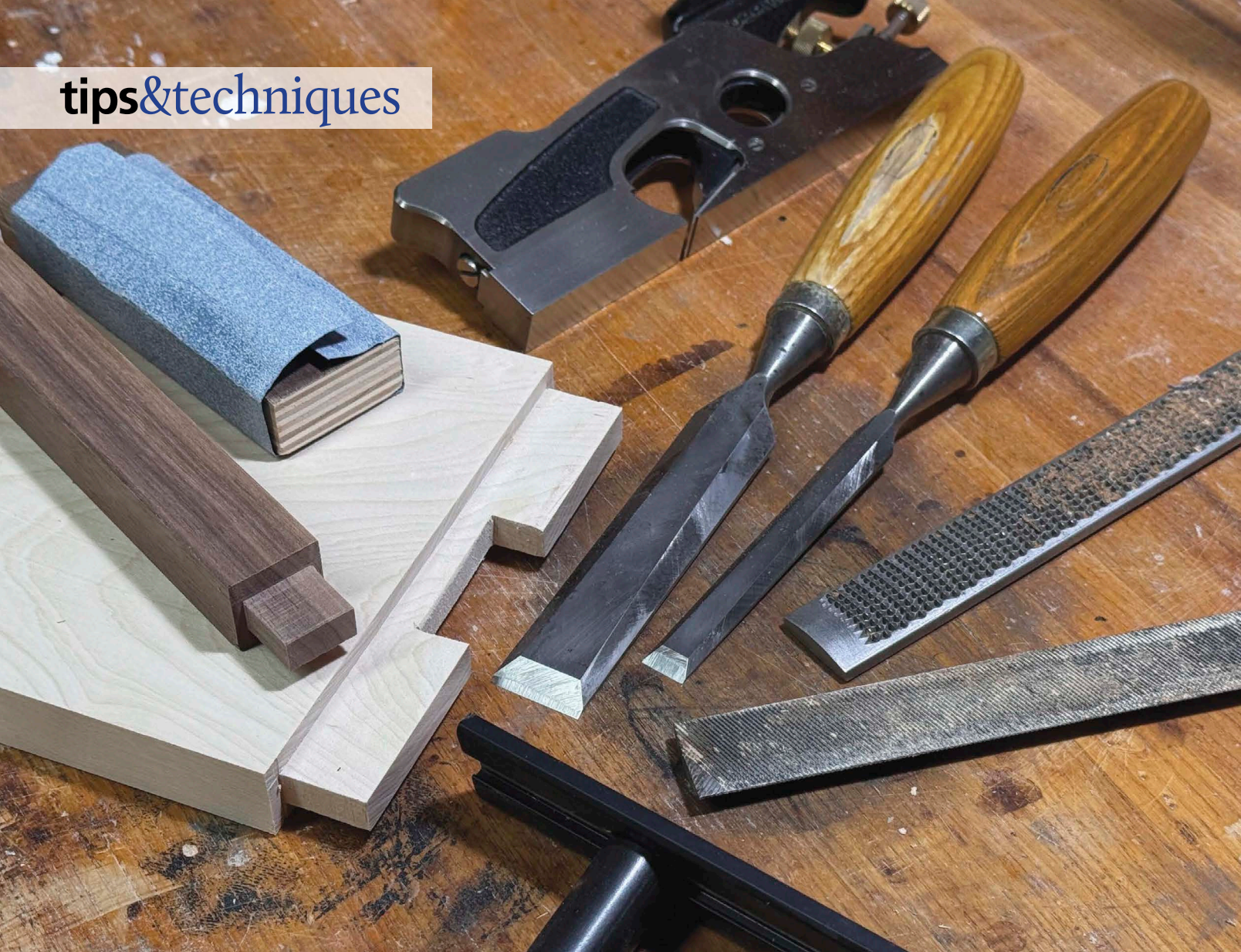
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PERFECT TENONS

Fine-Tuning Tenon Cheeks Like a Pro

Five ways to fine-tune tenons for a precise fit into a mortise.

Photos by Rob Brown

The integrity of a mortise and tenon joint depends on clean, tight-fitting components. Fine-tuning tenon cheeks ensures a precise fit in the mortise, critical for strong joinery.

Mortise and tenon (M&T) joints provide exceptional strength and durability, making them ideal for applications that require structural integrity. The large amount of surface area between the tenon and the mortise allows for a strong glue bond. You'll find M&T joinery used in a wide range of furniture projects: chair frames, legs and backs; on dining tables, coffee tables and side tables (where strong leg-to-frame connections are essential); for cabinet frames and doors; and in traditional bed frames, headboards and footboards. Both the mortises and tenons can be made with hand tools and/or common power tools.

I find it best to cut the mortise first and then fit the tenon to it, because it's easier to fine-tune a tenon to fit a mortise than the other way around. With some skill and experience, you may even find only very minimal (maybe even no) fine-tuning is needed to obtain a good fit, but even the best makers have to adjust the size of a tenon from time to time. To maximize strength, it's important to ensure the tenon faces are parallel to the sides of the mortise, and the fit is slightly snug rather than loose or forced.

At times, you may need to fine-tune the fit of your tenons, especially if you sawed them by hand. Sometimes, the face of a tenon has to be refined to fit inside the mortise, while other times it's the narrower edges of the tenon. Realistically, it's often both. Here are five ways to fine-tune your tenons.

Shoulder plane

When trimming a tenon, I almost always reach for my shoulder plane. I find a medium-width plane — around 1/2" — works well. Wider planes are longer and heavier, which makes them too prone to tipping, for my liking. Everyone has their preferences, though.

A shoulder plane has a full-width blade that extends to both edges, making it ideal for fine-tuning both the cheeks (the faces of the tenon) and the shoulders (where the tenon meets the main piece). Its flat, wide sole helps ensure a smooth, controlled cut when adjusting the fit. One feature I particularly like is most models allow for fine depth adjustments, enabling you to remove just the right amount of material without taking off too much. Set your shoulder plane to take very fine cuts and check the fit frequently.



Small Shavings – A shoulder plane is a good size and shape to trim a tenon to fit a mortise. It's built to take smaller shavings, where a rabbet plane excels at taking larger shavings. The blade of a shoulder plane extends right to the edge of the plane, allowing the user to get into the corner.

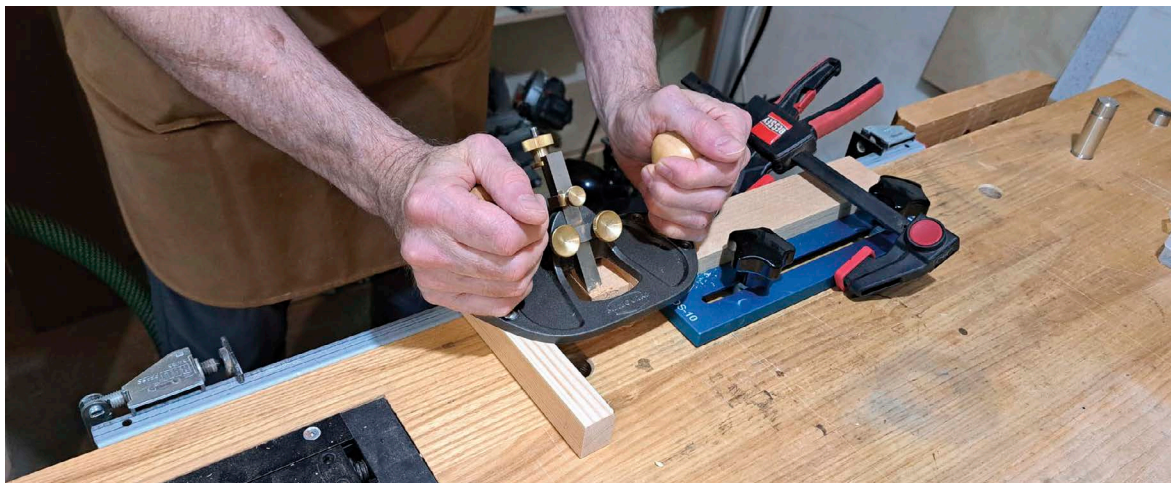
Alternatives to the shoulder plane include the rabbet plane and the bullnose plane. I find the rabbet plane harder to control for fine adjustments, while the bullnose plane lacks the full support of a shoulder plane for larger adjustments.

Router plane

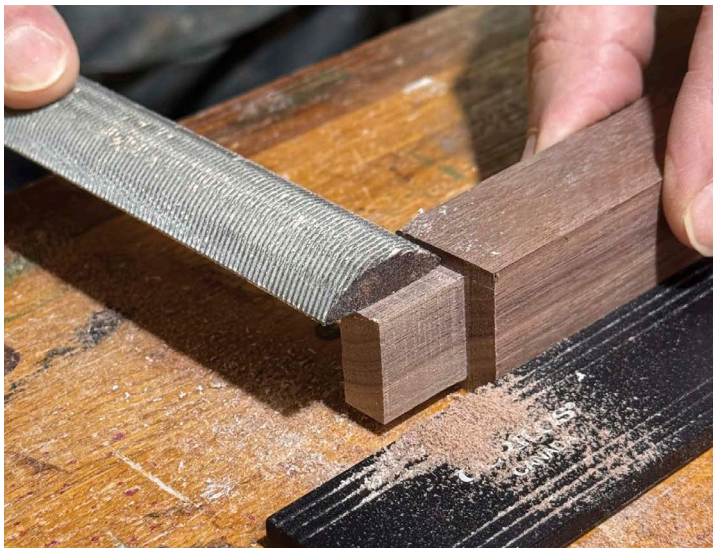
A router plane can help fine-tune tenon cheeks to a consistent thickness, especially if they need just a small amount of material removed. The flat sole helps maintain even depth across the surface, improving accuracy. I prefer using a 1/2" wide blade. You'll want to set the blade depth to remove thin shavings gradually to prevent over-cutting. Compared to rasps, rabbet and bullnose planes, a router plane reduces the risk of removing too much material. However, it's not as effective as a shoulder plane or a chisel for cleaning up tenon shoulders. For this, use a shoulder plane, chisel or rasp.

Float or rasp

A float, fine rasp or file can help remove material in controlled amounts. I prefer a float, which I find cuts a tad more aggressively than a fine rasp and leaves a smoother finish without tearing the wood grain. You'll want to use a safe-edged float, rasp or file to



Router Plane – Half of the bed of a router plane rests on the face of the workpiece while it's in use. It's possible to use a scrap the same thickness as the workpiece to support the other side of the bed. (Photo by Carl Duguay)



File It Away – A float, rasp or file will remove small amounts of material from the face or edge of a tenon. It can also be used to round a square tenon over, if you want to do so. Just be sure not to run the edge of the rasp into the face of the workpiece, causing visible damage.

avoid damaging the tenon shoulders. Go slow to avoid splintering at the edges. Also do your best to keep the tool flat on the tenon when removing material, so the tenon remains flat.

Chisel

A chisel is an excellent choice for paring down high spots of a tenon's cheek and paring shoulders to ensure a snug fit. Use it to square the shoulders to the faces and edges of the tenon. It's also helpful to use a support block to keep the chisel at 90° to the tenon face. The caveat is that the chisel should be super sharp. My preference is to pare the tenon cheeks with the grain, rather than against. Work slowly and check the fit often to avoid removing too much material.

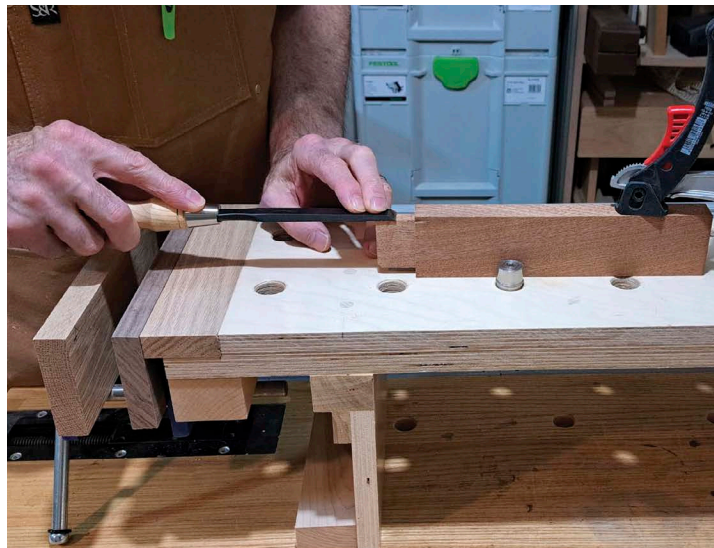
Sanding block

A sanding block with fine-grit sandpaper can smooth and fine-tune tenon cheeks without removing too much material. Because it removes material slowly, it's best for final fitting rather than major shaping. Hold the block flat against the tenon cheek to maintain a consistent surface and avoid rounding over edges.

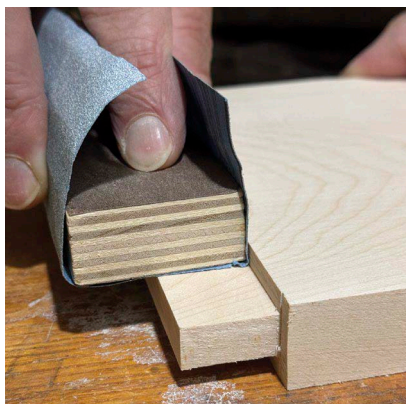
A few tips

In practice, a mix of these approaches is often appropriate. While a chisel will usually tend to follow the grain, a sanding block, file, float or rasp will not. A shoulder plane is great for fine-tuning a wide tenon, though it's not going to register on a small tenon very positively, resulting in an uneven cut.

I like to cut my tenons slightly thicker than the mortise, because it's easier to remove a bit of material than to add some. Attempt to insert the tenon into the mortise and note where the tenon is binding. Then, using your chosen tool (plane, chisel, file, etc.), carefully remove small amounts of material from both sides of the tenon cheeks, focusing on the areas where the tenon is binding. Check the fit again and continue test-fitting the tenon after each adjustment. You want to aim for a snug fit that requires slight hand pressure



Small Shavings – A sharp chisel will do a good job at removing small shavings from a tenon face or edge. A wide chisel is generally more appropriate for a wide tenon face, as it will help keep the face of the tenon flat and even, resulting in a better fit and stronger bond. Duguay often prefers to move the chisel in the direction of the grain, but working across the grain can be beneficial in some situations, too. (Photo by Carl Duguay)



Time to Sand – Sanding a tenon to fit a mortise is often a good approach. Rather than use a cork-backed sanding block, using a square-edged piece or scrap will allow you to get fully into the corners, keeping the tenon even and flat.

to insert. Try to ensure the tenon is square within the mortise. It's often easier to remove wood from only one face of the tenon in order to keep the other face flat and even, but each situation is different.

By following these simple guidelines, you can achieve a flawless fit for your tenon joints. A mortise and tenon joint is one of the strongest and most used joints in woodworking and furniture making, so becoming comfortable with how to fine-tune the joint for a great fit is a critical skill to have.



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VIDEOS: Mortise and tenon

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Pick the Right Blade Every Time

Photos by Manufacturers (Lead photo by Rob Brown)

Understand blade types, materials and brands to get the best results from your jigsaw.

BY CARL DUGUAY

When selecting a jigsaw blade, the most important factors to consider are the type of shank, blade material, tooth configuration and type of cut you intend to make. Choosing the right blade ensures clean results, more efficient cutting and longer blade life.

Match the blade to the job

Just like any other tool, one jigsaw blade won't work for everything. Blades are made for specific materials and jobs. Picking the right blade makes a big difference in how clean and effective your cuts turn out. For instance, wood blades are usually made of high carbon steel (HCS) or bi-metal. They have different tooth patterns, too. Some have big teeth for quick, rough cuts, while others have smaller teeth for precise, neat cuts. When you need to cut metal, high-speed steel (HSS) or bi-metal blades are better. They last longer and have finer teeth that make smoother cuts on tough materials.

When you need to cut laminate flooring or countertops, it's best to use a special blade with reverse teeth that face the other way. This blade cuts on the downstroke which stops the visible surface from chipping. If you're cutting plastic like plexiglass or polycarbonate, the blades are made to stay cool so they don't melt or crack the material. For tile, ceramic or glass, regular-toothed blades won't do the job. You'll need blades with carbide grit or diamond coating instead. These can grind through tough, brittle materials without breaking them.

Shank types: T-shank vs. U-shank

Most modern jigsaws use T-shank blades that allow for quick, tool-free blade changes. They're compatible with the majority of current jigsaw models. U-shank blades are generally found in older tools and are less common today. A U-shank blade isn't compatible with a T-shank jigsaw and vice versa.

Blade characteristics to consider

When choosing a blade, the material that it's made from matters. HCS blades are bendy and work best on softer stuff like pine wood or plastic. HSS blades are tougher and handle heat better, so they're a good pick for hardwoods or metals like aluminum. Bi-metal blades are a mix of both: they're flexible like HCS but tough like HSS, making them good for lots of different jobs. If you're cutting hard or gritty materials like tile, stainless steel or glass, blades with carbide grit or a diamond coating are the way to go.

How many teeth a saw blade has per inch, or TPI, and the shape of those teeth affect how well it cuts. A blade with fewer teeth per inch, usually 6 to 10, cuts fast but can be rough. This works well for soft wood. Blades with a medium TPI, typically 10 to 18, cut at a decent speed and leave a decent finish. They're good for wood, plastic and composite materials. Blades with a high TPI, from 18 to



Shank Type – A U-shank (left) was the common style of shank used up until about 30 years ago. The user needed an Allan key wrench to remove or install the blade. Today, most jigsaws accept only T-shank blades (right). These blades are installed in the jigsaw tool-free.

32, make very smooth, clean cuts. These are best for metal or other hard materials. Some blades have teeth that face backward, cutting on the downward push. This stops the wood from tearing on the top surface which is handy when cutting laminates or plywood with a veneer. Blades with progressive teeth have a changing TPI along the blade. This makes them very versatile, letting you make

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TPI Matters – A blade with low TPI, like the blade on the left (6 TPI), will cut quickly, yet leave a rough finish. The blade in the centre has a TPI of 10, meaning it will cut a bit cleaner, yet slower. Blades with a TPI above 18 are generally for metal.

both straight cuts and curves in different materials.

Blade width and thickness affect the cut quality and type. Thinner blades are more flexible and good for detailed cuts and tight curves, like those needed for scrollwork. On the other hand, thicker blades are stiffer and work better for long, straight cuts that need to be stable. Some blades have a sharp tip specifically for plunge cuts, letting you start cutting in the middle of material without drilling a pilot hole first.

Lots of Styles – From left to right; a narrow blade (used for making tight radius cuts), progressive blade (its mixed TPI gives it some qualities of both low- and medium-TPI blades), downward-cut blade (leaves the upper surface of the material chip-free), tile blade (used for cutting tile and similar materials), knife edge blade (used for cutting softer materials like cardboard, leather, carpet, insulation, etc.) and flush blade (for use while resting the side of the blade against a mating object and obtaining a cut that's flush with that mating object).

Recommended brands

When looking at blade brands, some are definitely better known for how well they work and how reliable they are. Bosch makes very precise blades and has a lot of different kinds. Diablo's blades are top-notch and last a long time. DeWalt has good, easy-to-find blades that most people can use. Professionals often pick Milwaukee because their blades are tough and built for heavy work. Lenox is well-respected for blades that cut metal and Makita has good, reasonably priced options for just about any job. If you use Festool's jigsaw systems, they have high-end blades made specifically for them, which is great for accuracy and quality.

Final tips

Keep a variety of blade types on hand to handle different materials and cut styles. Replace dull blades promptly; worn-out blades can overheat, wander off the cut line or damage your workpiece. Always pair the blade with the correct speed setting on your jigsaw. Use lower speeds for metal and delicate materials, and higher speeds for fast wood cutting.

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9 WAYS TO MACHINE A TENON



A mortise and tenon is a strong joint that's been used in quality furniture for centuries. Once the mortise has been created, there are several ways to machine a mating tenon. Learn about your options so you can master one of the approaches for your tooling, preference and enjoyment.

BY ROB BROWN

Cutting a tenon is generally more straightforward than cutting a mortise, but it's no less important. Because you're removing material from the outside of the joint, rather than the inside (as when hollowing out a mortise), it's slightly simpler and can be done with less specialized tooling.

I'm going to describe with a medium amount of detail the nine ways I've made tenons. There won't be a detailed "how to" for each approach, because that would make for a very long article, but this should give you the basics for understanding how to machine tenons and which method might be best for you and your situation.

It's important not to remove too much material from the tenon or the fit will be sloppy and weak. Because I am almost always machining the mortise first, then sizing the tenon appropriately, I aim for a very snug fit when machining the tenon, then fine-tune it with a shoulder plane or other hand tools. A mortise and tenon joint is strong, but only if the fit is good.

In terms of a general order of operations, I don't think it matters whether you machine the cheeks or shoulders first. Some operations will machine both at essentially the same time (table saw,



Saw the Cheeks – A carefully guided hand saw can create the cheeks of your tenon with ease. It's always a good idea to leave a bit of extra material on the tenon and fine-tune the fit with other hand tools.



Mark It Out

– Hand tools are enjoyable to use. The starting point is the layout, which needs to be done accurately. Marking all the parts of a joint will stack the deck in your favour.



Helping Hand – If sawing to a line is a challenge for you, you can scribe a line, then use a sharp chisel to remove some of the wood on the waste side of the scribed line. This gives you a small wall to butt your saw up to.

router table) while others won't. Consider the operation as a whole before you start, as you might want to cut one before the other in certain situations.

Hand tools

The traditional way to create a tenon is to use hand tools, and this is a calm and quiet approach that will have you using a wide variety of tools. This approach starts with the layout, which needs to be accomplished accurately. It's the foundation for all future cutting, paring and fettling as you create a tenon that fits with its mating mortise.

After some math to figure out how large the tenon needs to be, a marking gauge is typically the starting point and will allow you to mark the location of the cheeks. The face cheeks (typically larger)



Shave It to Fit – Hand tools can be used to remove fine shavings from the tenon cheek, sneaking up on a good fit with the mortise.



Almost There – Brown continues to make passes with his standard blade to remove the waste and create the tenon cheek. The resulting surface will be slightly rough, and should be smoothed to create a strong joint.

are first, followed by the edge cheeks (typically much smaller). These are marked on the end grain of the workpiece. Next, the length of the tenon needs to be marked, typically on all four sides of the workpiece. This determines the location of the shoulders.

At this stage, some makers will score a deeper line to more positively locate the shoulders. This can be done with a marking knife, while a chisel is often used to remove some of the material on the waste side of the shoulder line. This notch is only about 1/6" deep, but it provides a positive location where a hand saw could be guided.

Both rip and crosscut saws are then used to cut the cheeks and shoulders of the joint. There's nothing wrong with using guide blocks to help you saw as straight a groove as possible. Leaving a small amount of material on the joint, to be further refined and removed so the tenon fits the mating mortise, is next. This can be accomplished with a mix of chisels, shoulder planes and other



Standard Blade – With the rip fence set and a test cut made, Brown will then make many passes with a standard width blade to remove the waste and create each tenon cheek. Notice the tenon on this workpiece is off-centre, meaning once this tenon cheek is created, the blade will have to be lowered to create the other tenon cheek.



Dado Blade – Using the same general approach as with this standard width blade, Brown hogs away material with his dado blade to create the tenon cheek at a faster pace. The dado blade is preferred for making many tenons, when compared to the standard blade.

hand tools. The process of fitting the joint can be time consuming, especially if this is your first time creating a tenon by hand. A good approach is to check your progress often and try to figure out where material needs to be removed, as opposed to removing material from an entire face of a cheek.

Practice makes perfect is a saying that could refer to all wood-working joints, but I think it's even more true when using hand tools. It can be a very enjoyable process, and one that allows you to further refine your hand tool skills.

Table saw and mitre gauge

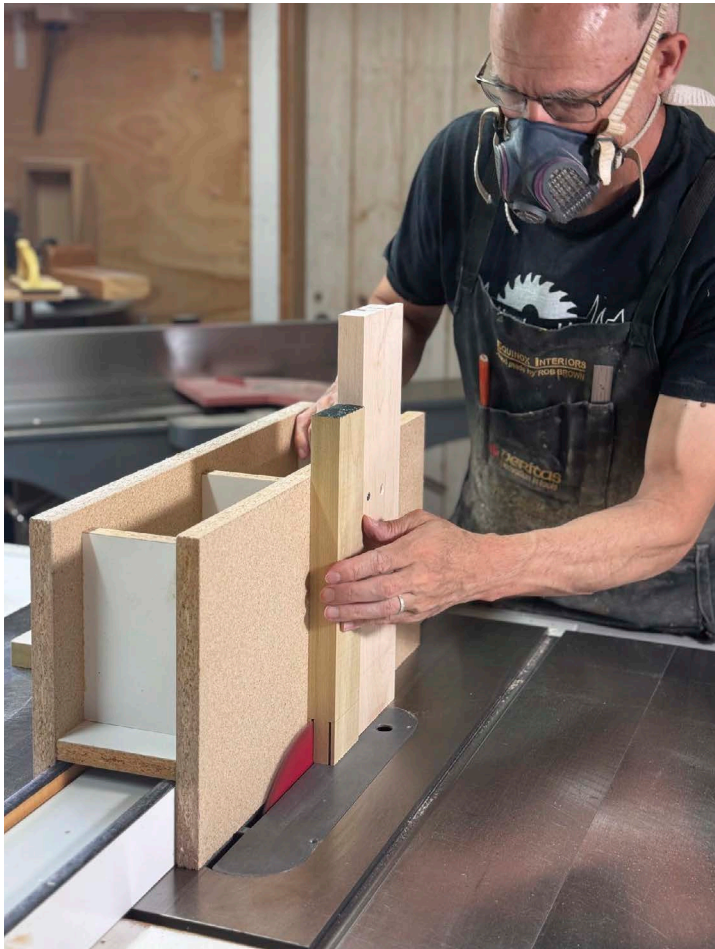
Using a mitre gauge in a table saw to remove the material from two large faces of a tenon to create each face cheek is another

common way to machine a tenon. A dado blade will remove material quicker than a standard width blade, but both approaches are essentially the same. This method has the added benefit of allowing the user to easily centre the tenon on the workpiece by flipping over the workpiece and removing the same amount of material from both sides. Alternatively, in order to end up with a tenon that's off-set on the workpiece, you can machine one face cheek on all the parts with the blade at one height, then adjust the blade height and machine the other cheek on all the parts.

Setting up the rip fence a certain distance away from the left edge of the blade will give you tenons with a consistent length. With a standard blade you will have to make many passes, moving the workpiece about the width of the blade before each pass. This will allow you to take small bites out of the workpiece and slowly create the cheek and shoulder of the joint. It's the same process when using a dado blade, except the distance you move the workpiece before each pass will be larger.

In order to machine the edge cheeks, you can adjust the height of the blade to suit your needs, tilt the workpiece onto its edge and run the workpiece across the blade.

If you're using a dado blade to remove the material to form the face cheeks, use a fairly slow feed rate, as that dado blade has to remove a lot of wood at once. This will be safer and leave you with a smoother surface.



Shop-Made Jig – Brown's jig will keep the workpiece perpendicular to both the table and the blade while he passes the vertical workpiece over the blade to create the tenon cheek.

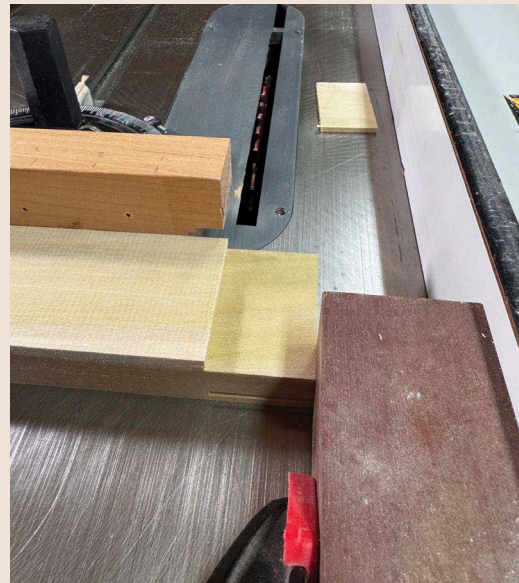
Tenon Shoulders: Safety First

As you can see, there are many ways to create the cheeks of a tenon. Some methods will leave you with a small piece of material that has to be removed. This operation will also create the tenon's shoulder. This is often done with hand tools or a router table, though my preference is to use a table saw. If you simply position the fence at the correct distance from the left side of the blade, adjust the height of the blade to only cut as high as the tenon cheek, then make the cut, the small offcut will get lodged between the spinning blade and the fence, causing the offcut to get ejected out the back of the saw. The work-around for that is to clamp a stop block to the rip fence, so rather than butting against the rip fence, the workpiece butts against the stop block before you make the cut. This approach will leave extra room between the blade and rip fence for the offcut.

As long as you're not leaving any offcuts trapped between the rip fence and blade, you will have no problems with offcuts dangerously ejecting out the back of the table saw. I only mention this because one of the basic rules about a table saw is to never use the rip fence and mitre gauge at the same time, but this is the most common exception to that otherwise important rule.



Danger! – If this workpiece was moved across the blade, and the small piece of waste removed from the workpiece was trapped between the rip fence and the blade, that piece would very likely get launched across the workshop.



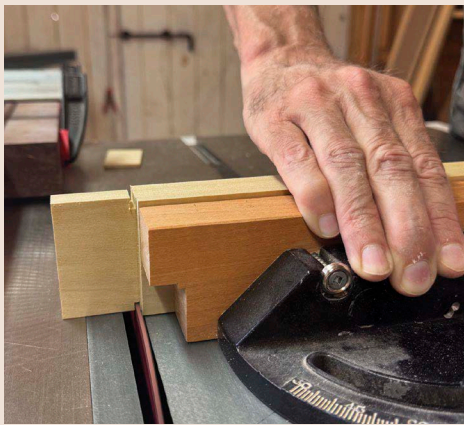
Much Better! – By clamping a piece of scrap to the rip fence, then setting the location of the rip fence to make your cut, you leave a space between the fence and blade for the offcut to safely occupy.

Cutting the Edge Cheek

The face cheek is the widest portion of the tenon, while the edge cheek is the narrow side of the tenon. The two face cheeks create the final thickness of the tenon, and will essentially be the same dimension as the thickness of the mortise; often between 1/4" and 1/2", though there's no true limit to how thick a mortise and tenon should be. The two edge cheeks determine the width of the tenon.

Most of this article discusses how to machine a face cheek, as well as the tenon shoulders, but the edge cheeks are not to be overlooked. I tend to machine them in one of two ways: either with the workpiece standing on its edge while moving it over the already set up rotating blade or bit; or by using a hand saw to crosscut the shoulder followed by a chisel or hand saw to remove waste to the sawn line.

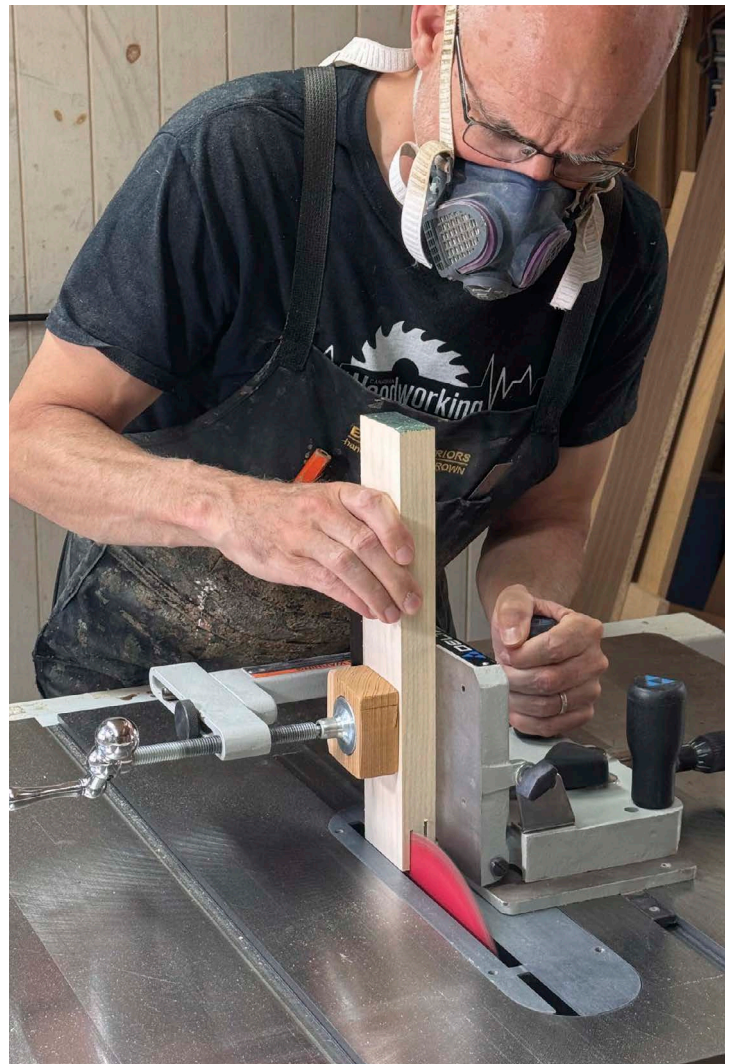
When it comes to fitting a square edge cheek to a rounded mortise edge—as when the mortise was routed, for example—I have my own way of dealing with that. Some folks feel the edge of the mortise and tenon need to be the same shape in order to mate nicely and be as strong as possible. I feel a mortise and tenon joint is almost always stronger than is needed and spending extra time fitting the tenon to precisely fit the mortise isn't time well spent. Any added strength is minimal, as the strength of this joint comes primarily from the face-grain to face-grain glue surfaces. The tenon's shoulders surrounding the joint assist in making the joint even stronger. The edges of the tenon mating nicely against the edges of the mortise adds virtually no strength to the joint. In fact, I sometimes prefer to have a small gap between the edges of the mortise and tenon so I can adjust the exact location of the two mating parts during assembly. Every assembly is different, though.



Hand Tool Option – Alternatively, you can use a hand saw to create the edge shoulder, then proceed to use a chisel to remove the material to form the edge cheek.



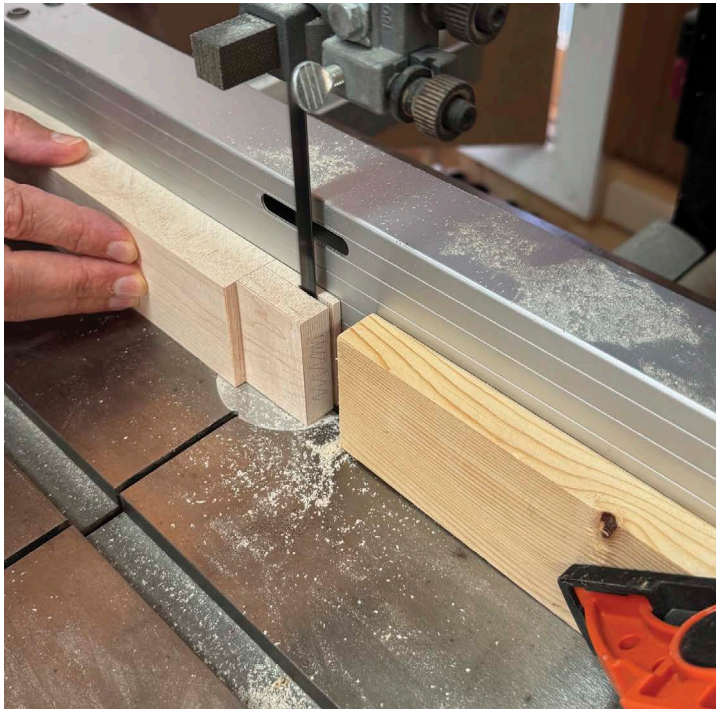
Edge Cheeks – In some of these tenon-making approaches, once you've machined the tenon face cheeks, you can rotate the part 90° and create the edge cheeks with no or minimal other adjustments to the setup. Here, Brown creates the edge shoulder before he begins the process of moving the workpiece slightly away from the blade, making a pass, then repeating the steps to form the entire edge cheek.



Store-Bought Jig – With many adjustments for angles, widths and thicknesses, a store-bought tenon jig can be a helpful addition to any shop.



Double Them Up – Using two blades and a spacer can save you time when you're making a lot of tenons, but setup can be tedious.



Bandsawn Tenons – A properly set up bandsaw will quickly and easily machine tenon cheeks for you. A stop block will determine the length of each tenon. Another approach will need to be used for removing the waste and creating the shoulder.

A slight variation of this approach is when you use a stop on a mitre gauge fence or crosscut sled instead of using the rip fence to determine the location of the shoulder. The rest of the operation remains the same, though.

Table saw tenon jig

Although this uses the same machine as the previous approach, it's a much different operation. You either need to have a shop-made jig or an aftermarket jig for this approach. Both will hold the workpiece at a right angle to the table saw's top surface in order to machine each face cheek. This means you will only be able to machine a tenon that's as long as the distance above the table your table saw blade can protrude. This is typically about 3" with most 10" table saws, which leaves you with a long enough tenon for most joints.

A shop-made jig will typically run on the rip fence, but there's nothing saying it couldn't be made to run in the mitre gauge slots in the table saw's top. Either way, it needs to have a side face that holds the workpiece parallel with the blade, a stop that supports the workpiece at 90° to the table and a way to secure the workpiece during the cut. On top of that, the whole jig must move in only one direction (forward and backward) during the operation. Any amount of side-to-side movement will mean the thickness of each tenon will not only likely be different but could also be uneven across its surface.

An aftermarket tenon jig runs in the mitre gauge slot on a table saw's top. There are ample ways to adjust the jig so the user can get the cut they want. An aftermarket tenon jig has the added advantage of allowing the user to adjust the angle of the workpiece, meaning you could machine angled tenons. This could also be accomplished in a shop-made jig, if the user wanted.



Router Table – A router table, equipped with a straight bit, can make quick work of machining tenon cheeks. A stop block will assist you in setting the shoulder location. As is always the case when using a router, remove only small amounts of material with each pass.

Both the shop-made and aftermarket jigs can be used with either a single blade or with two blades with a spacer between the blades. Using a single blade means two setups are needed – one to create each cheek. The only exception to this is when you're machining a tenon in the centre of a workpiece. In that case, rotating the workpiece 180° after the first cut will allow you to use the same setup for both tenon cheeks. Using two blades, with a spacer in between, means only one pass needs to be made to machine both tenon cheeks. When using two blades, they need to be the same diameter. The width of the spacer needs to be fine-tuned to give you the correct distance between the two blades, resulting in a tenon of the correct size. The double-blade approach is limited by how long the arbor on your table saw is, as two blades and the spacer have to fit safely onto the arbor, yet still allow the outer flange and the arbor nut to be properly located on the arbor. Using two blades is only worthwhile when you're machining a lot of tenons.

Bandsaw

A properly set up bandsaw, along with a wider blade, will create tenon cheeks fairly accurately. A fence will need to be used in order to ensure the cheek is parallel with the face of the workpiece. A stop can be used behind the bandsaw blade, so the cheek is only cut so far into the end of the workpiece. An even feed rate, which isn't too fast, is a good starting point.

Although it's possible to also cut the shoulder of a tenon on a bandsaw, it's likely best done on a table saw or by hand. This operation can be done before or after cutting the cheeks. If you crosscut the shoulders on the table saw after machining the cheeks on the bandsaw, ensure the offcut doesn't get caught between the blade and the rip fence, as it can be shot out towards the user. To avoid this, use a mitre gauge and either set up a stop block on the mitre gauge fence away from the blade to give you a repeatable cut, or clamp a block to the rip fence that protrudes from the face of the rip fence and butt the workpiece up to that block before moving the workpiece across the blade.

Too Thin? No Problem!

If you've carefully gone through all the steps to make a tenon that fits its mating mortise nicely, but once you go to test fit the tenon in its mortise is too tight, don't toss that workpiece in the scrap bin. It's surprisingly easy to fix a tenon that's too thin. All it takes is a bit of time and energy, so I hope you test fit each tenon before you put glue on the joint.

I use two basic approaches. The first is a quick-and-easy approach, but it's only possible if the tenon is only slightly undersized. Cut a thin piece of wood slightly larger (or equal to, if you're comfortable working accurately) than the face of the tenon. Using a flat caul to spread the clamping pressure out, apply glue to the surface of the tenon and clamp the piece in place. If you want to ensure the tenon remains centred on the workpiece, you'll need to do this for both faces of the tenon. I often use a piece of veneer for this, though the only downside to using solid wood is you have to remove more material once the glue dries. This is going to make using hand tools to remove the material a bit harder, as there's more material to remove. Once the added piece is dry, either use hand tools to fine-tune the joint, or set up the tenon to be machined in another way. With any luck, your machine setup will still be set up; just make sure to adjust the thickness so you don't end up with the same thin tenon for the second time.

If the tenon was machined so thin it now doesn't have the structural integrity needed to be a part of a strong, lasting joint, use a loose tenon approach. The first step is to trim the tenon off so all the shoulders are flush with each other. Next, select what approach you want to take to machine the loose tenon. If possible, it might be smart to use the same approach as you used for the mating mortise, as it's easiest when the two mating mortises are exactly the same thickness and width. Having the same tenon width makes the process even simpler. When the mortises are the same size, the loose tenon can be dressed to thickness, ripped to width, then cut to length, before being used to assemble the joint. If you do happen to have mortises of two different sizes, you can fit the loose tenon to the larger mortise, glue it in place, then use any number of methods to bring the other end of the protruding (yet glued in) loose tenon down to size, so it fits the mating mortise.

On the other hand, you should also think practically. If it's easier and faster to toss the piece with the undersized tenon in the scrap bin and remake the workpiece, go with that approach.



Add a Bit of Thickness

— If you've removed too much material from a tenon, you can glue on a piece of wood to the face of the tenon, then either use hand tools to bring the tenon to size so it fits the mortise, or re-machine the face of the tenon, with slightly different machine settings. A piece of veneer is usually enough, though solid wood is sometimes needed if the fit is very far off. Use a caul to spread the clamping pressure on the thin piece of wood so it comes in contact with the tenon across its entire surface.

Router table

This method is fairly similar to using a dado blade in a table saw, except a router blade doesn't remove material nearly as quickly as a dado blade, so you have to make slower passes and remove only a small amount of material with each pass.

A mitre gauge in the slot of a router table, along with some sort of stop to butt the workpiece up against to determine the location of the shoulder, will leave you with a clean tenon cheek and shoulder. The part can then be flipped upside down and re-machined to give you the completed tenon. Multiple passes are needed, unless the tenon is very short and the material is not too dense.

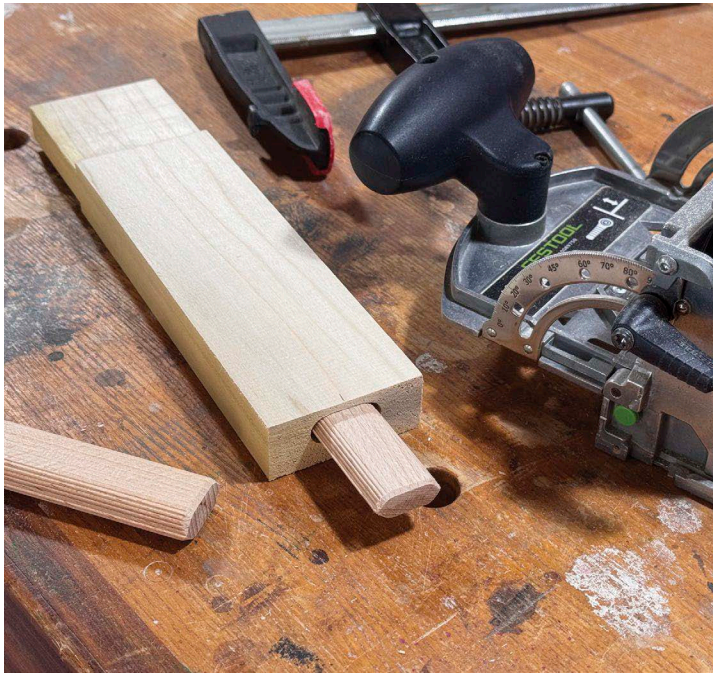
It's possible to use a router table fence to set the position of the shoulder, but the fence will need to be clamped in place so its face is exactly parallel to the travel of the mitre gauge. Otherwise, you'll end up with an angled shoulder. It's often easier to attach a slightly longer fence to the mitre gauge, then attach a stop block to the fence.

Router jig

There are many router jigs on the market that will assist you in cutting tenons. They usually hold the workpiece vertically, with the end of the workpiece that needs the tenon at the top. A flat surface sits just above the upper end of the workpiece. A groove in the surface will guide the router, which is equipped with a straight bit and template guide in its base. Different inserts are available to fit into the work surface, each giving a different size of tenon. Different diameter router bits will leave the user with different-sized tenons, too. Sometimes, the main surface of the jig is adjustable, allowing the user to size the tenon they need that way.



PantoRouter — A PantoRouter is a very flexible machine for making all sorts of joints. Here, David Bedrosian creates a tenon in his workshop. (Photo by David Bedrosian)



Loose Tenons – This approach has the maker creating two matching mortises, then creating a tenon that will extend into both mortises, bridging the gap between the two workpieces and creating a strong joint. A Festool Domino is a common machine used to create these mortises, though there's nothing saying you can't create these mortises using a router, hand tools or other methods.

PantoRouter

A PantoRouter is a brand of tool that combines the action of a plunge router with a pantograph mechanism. A guide bearing attached to an arm runs on a template, which helps guide the router along the same path as the template, though at a 2:1 ratio. The pattern is twice the size of the resulting joint. The user can machine not only tenons, but also mortises, dovetails, dowel and box joints, as well as use it for other tasks. It's a flexible, multi-functional system that works well in a small shop setting.

This design was first invented by Canadian Matthias Wandel, and then brought into production by PantoRouter.

Loose Tenons

A loose tenon is a tenon that's separate from the workpiece. It needs to have two mortises, one in each mating workpiece, to extend into. The piece of material that makes up the loose tenon can be shop-made from an appropriate species by planing down material to the correct thickness and ripping it to fit inside the mortise. Loose tenons can also be purchased, as is common with the Festool Domino. The Festool Domino is the most common power tool that works with the loose tenon principal, but it's also possible to create a pair of mating mortises to accept a loose tenon with pretty much any other method of mortise creation, such as a router, hand tools, slot mortiser, etc.

The Festool Domino can be adjusted to create mortise and tenon joints that are both straight or angled, all while working with workpieces of various sizes and shapes. While this approach to making a tenon might be the easiest (dress stock to a precise final thickness, then rip it to width), the downside is two mortises need to be machined for each joint, rather than just one.



Keep It Simple – Dowel centres are simple, cost effective and quite flexible. Everyone should have at least a few in their tool kit. They're commonly available in 1/4", 3/8" and 1/2" sizes.

Kreg's MortiseMate is a jig that helps users create mortises, then install a loose tenon in that mortise. It's a simple procedure to create what is essentially a tenon. Kreg also has their new Edge coming out this fall, which will work somewhat like the Festool Domino to create loose tenon joints.

There are other manufacturers that make and sell loose tenons that go with their system of machining mortises. While some are compressed, or have very small glue grooves in them, it's also possible to make your own loose tenons.

Dowels

While dowels aren't traditionally a true mortise and tenon joint, they're technically very close. The main difference is that a dowel joint doesn't have much face grain gluing surface, one of the reasons why a mortise and tenon is so strong. Think of a dowel joint as a light mortise and tenon, and not as strong as a traditional mortise and tenon joint. Like selecting any joint for a piece of furniture or woodworking, the maker needs to determine not only how much strength is needed, but what tooling capabilities they have, what joinery / assembly difficulties might arise, how good the completed joint will look and a few other factors, before deciding what joint to use. A dowel joint can still play a role in fine furniture making, though it's usually not a large role.

Fluted dowels or store-bought dowel rod cut to length can both be used in a dowel joint, though fluted dowels are usually more consistent and accurate in diameter, and therefore often create a stronger joint. Dowel centres are the simplest approach to using dowels and are commonly available in 1/4", 3/8" and 1/2" diameters (all in varying lengths), to suit the dowel diameter you want to use. A dowel centre fits into a hole the same diameter as its base, and its other end has a point centred on its diameter. Once the first dowel hole is bored, a dowel centre is placed in that hole and the



Tiny Centre Points – With the first holes drilled in one workpiece, and the dowel centres installed in those holes, line up the two parts and press them together. The indents left by the tips of the dowel centres show you exactly where to bore the mating holes for a joint that lines up precisely.

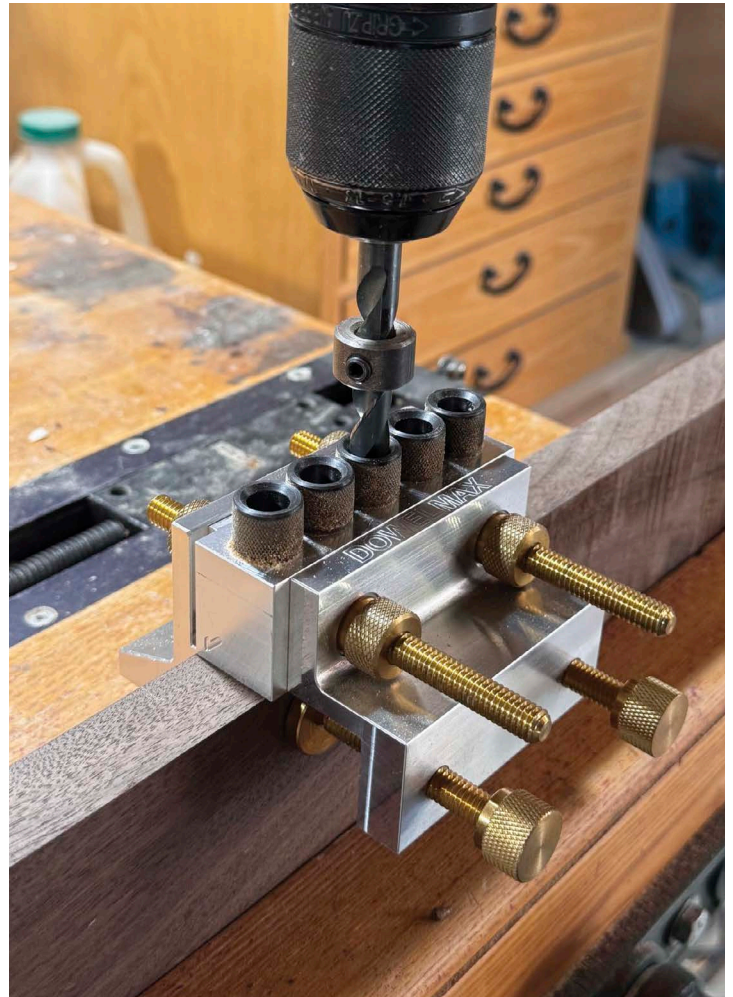
mating parts are brought together in the exact orientation as the finished joint. They're then pressed together, leaving a centre point in the exact location as the mating dowel hole. A drill bit is then used to drill the mating joint, usually freehand, though a drill press could also be used.

I find using a brad point bit is the best approach to boring dowel holes, as they cut a clean hole and, more importantly, have a centre spur that will be more easily inserted in the tiny impression the dowel centre leaves.

Many different types of dowel jigs are also available. They typically clamp to the workpiece and allow the user to drill one more dowel holes. These jigs have the adjustability to be used with a wide range of material thicknesses.

General thoughts

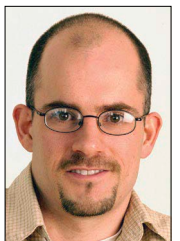
With most of these methods I aim for a slightly snug joint, then fine-tune the joint with hand tools. In the perfect world, once a machine is set up it should provide you with consistent results, but that's not always the case. If, for example, a tiny wood chip gets under a workpiece you're machining, the size of the tenon will differ. And it's possible each mortise you machined might not be perfectly uniform. Aiming for a perfect fit will often result in some perfect joints, some loose joints and some joints that have to be fine-tuned slightly. It's the joints that come out too loose that are



Dowel Jigs – There are numerous dowel jigs on the market, each with their pros and cons. These jigs will help you create accurate joints that assist you in bringing your next project together properly.

the challenge. This is why I aim for a snug fit, and fine-tune the joints with hand tools, as needed.

It's always possible to mix and match some of these methods when machining your next batch of tenons. For example, if you use the table saw and mitre gauge method to machine the face cheeks, you could easily turn to a hand tool saw to create the edge shoulder of the tenon, followed by a bandsaw to remove the waste and create the edge cheek. That approach technically mixes three different techniques but can leave you with a nicely mating joint that will stand the test of time.



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With the new **Festool TSC 55 KSEB-Basic (577991)** you can experience track saw precision without the hassle of a power cord. It has a brushless EC-TEC motor that delivers speeds up to 5,200 rpm, and a 1.6-mm thin-kerf 160-mm blade that provides clean, efficient cuts and helps extend battery runtime. A single 18V battery keeps the saw light and maneuverable, while the sensor-based KickbackStop helps reduce the risk of injury from kickback. Pair the TSC 55 KS with the new TBX 8 Tabless Battery for up to 31% longer runtime. With a cutting depth of up to 55 mm and bevel adjustment from -1° to 47°, the TSC 55 KS is the tool of choice for cutting sheet goods, solid wood, countertops and more.

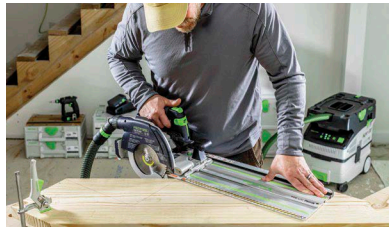
FestoolCanada.com



Versatility and Power for Perfect Cuts

If you like the convenience of a circular saw but want the accuracy and versatility of a track saw, the **Festool HKC 55 K Cordless Carpentry Saw (578303)** is the way to go. It's compact, easy to handle and powerful enough for a wide range of shop and jobsite tasks. A 6-1/4" blade cuts material up to an impressive 2-1/8" thick. You get up to 3x faster cuts with the new thin-kerf blades and the new TBX Tabless batteries. Pair it with an FSK guide rail and you can make quick, repeatable and precise crosscuts. The HKC 55 K also features KickbackStop technology and a spring-assisted plunge action for perfect control. For trimming sheet goods, cutting framing lumber or making installation cuts, the HKC 55 K brings precision and portability to the jobsite.

FestoolCanada.com



More Power. More Runtime. Less Downtime

The **Festool TBX 8 Tabless Battery (579271)** brings a noticeable performance boost to Festool's 18V cordless tools. This 8.0 Ah battery pack is designed for demanding jobs where long runtime and consistent power are important. Its tabless cell technology reduces internal resistance and heat generation, allowing the battery to deliver more usable power while improving efficiency and service life. Pair it with the SCA 16 AIRSTREAM rapid charger and get back to work in as little as 25 minutes. Bluetooth connectivity enables you to automatically start a paired Festool dust extractor. You can also get battery information through the Festool app. At only 2.2 lb., the TBX 8 offers serious cordless endurance without adding excessive weight.

FestoolCanada.com



Rapid Charging Keeps You Ready to Go

The **Festool SYS-MC 6/4 Rapid Charger (578501)** keeps your cordless tools working with minimal downtime. Compatible with Festool 18V batteries, it can charge up to four batteries simultaneously, making it a practical addition to busy jobsites and workshops. The compact design makes it easy to transport and store batteries. The charger can also be conveniently integrated into Festool's Systainer system, keeping your batteries and charging equipment organized and ready to go. For anyone relying on multiple cordless tools throughout the day, the SYS-MC 6/4 is a smart way to keep charged batteries close at hand.

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Big Dust Extraction in a Small Package

The **Festool CLEANTEC CT SYS Dust Extractor (575280)** packs serious dust-control capability into a remarkably compact, Systainer-style package. Designed for mobile use, it's easy to carry from one work area to another and convenient to store when space is at a premium. The CT SYS is the ideal partner for a range of hand-held power tools such as sanders, routers and saws. Collecting dust at the source keeps your work area cleaner. Its compact size makes it particularly useful for installation work, renovations and smaller jobsites where a full-size extractor can be cumbersome. With the CT SYS you get portability without giving up effective dust extraction. [Coming Winter 2026-27]

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When you want broad, uniform illumination for jobsites, workshops and installation work, look to the **Festool SYSLITE DUO-HI Hybrid Work Light (578514)**. Its high-output LED system delivers up to 10,000 lumens and a wide, even spread of light that helps reduce shadows and glare. You can position the light on the floor, mounted on a tripod or hung using its integrated hooks, making it easy to illuminate work from different angles. You can operate it from a Festool 18V battery or a standard 110-volt outlet, giving you flexibility wherever you're working. Built for the demands of the jobsite, the SYSLITE DUO-HI combines portability, versatility and plenty of illumination. [Coming Winter 2026-27]

FestoolCanada.com



Built for the Cut

The **King Canada KC-1435FXR 14" Wood Bandsaw** is built for woodworkers who want a lot of capacity but don't want to upgrade to a bigger stationary machine. With its excellent cutting capacity and a built-in resaw guide, it's an ideal tool for cutting curves, doing joinery, and cutting thick wood into thinner pieces. The resaw guide will help keep your pieces in line while you cut them, and the large frame will ensure smooth cuts. For hobbyist woodworkers who want their bandsaw to do more than one thing, the KC-1435FXR is a great tool to have in your workshop.

KingCanada.com



Slow and Steady Sharpening

The **King Canada KC-895LS 8" Low Speed Bench Grinder** is made for woodworking hobbyists who want full control of the process of sharpening. Slow speed is one of its major advantages that ensures less risk of overheating and damage to the finely honed edge of chisels, plane irons and other edged tools. Eight-inch wheels and built-in lights allow you to sharpen the tools more efficiently and with better illumination. The white aluminum oxide wheels deliver an excellent finish. This is a good choice for amateur woodworkers who need to keep their tools in proper condition.

KingCanada.com



Precision for Intricate Work



The **King Canada KXL-22 22" Professional Scroll Saw** was designed with woodworkers who work on complex projects that require precise control. With a massive 22" throat capacity the KXL-22

provides more than enough table space for large projects while making tight curves and intricate patterns quicker and easier to do compared to a bandsaw or jigsaw. For hobbyist woodworkers, a good scroll saw will take their woodworking experience to another level with projects such as fretwork, puzzles, intarsia or any other project that requires detailed accuracy and craftsmanship.

KingCanada.com

Compact Saw, Big Versatility

The **King Canada 8370NS 7 1/4" Sliding Compound Miter Saw** packs a surprising amount of versatility into a compact design. Its sliding action increases crosscut capacity, while the compound miter function makes it suitable for angled cuts, bevels and a wide range of trim and woodworking tasks. The smaller blade size, compact footprint and light weight also make it a good choice for hobbyist woodworkers and DIYers with limited shop space. Whether you're cutting moulding, building furniture or tackling home improvement projects, the 8370NS offers the convenience, flexibility and portability to handle many everyday cutting jobs.

KingCanada.com



Jobsite Versatility in a Compact Package

The **King Canada KC-5100NS 10" Jobsite Saw** is a good choice for woodworkers and DIYers who need the versatility of a table saw but have limited shop space. Its 10" blade handles a wide range of ripping and crosscutting tasks, while the folding stand makes it easy to set up when needed and tuck away when the job is done. That portability can be especially appealing in smaller workshops, garages or on the jobsite. For hobbyists tackling furniture projects, renovations or general woodworking, the KC-5100NS offers a practical combination of cutting capacity, mobility and convenience.

KingCanada.com



Clear the Air in Your Shop

Every workshop, no matter how small, needs to control dust in the air. The **King Canada KC-3105C 1200 CFM Dust Collector** is designed to help hobbyist and small-shop woodworkers keep their shops cleaner and more comfortable. With a 1200 CFM airflow rating, it offers the capacity to collect dust and chips from larger stationary machines such as planers, jointers and table saws. Its mobile design makes it easier to move where it's needed, while the collection system helps reduce the mess that can quickly build up during a busy day. For woodworkers looking for an economical way to improve dust management, the KC-3105C offers a practical and powerful solution.

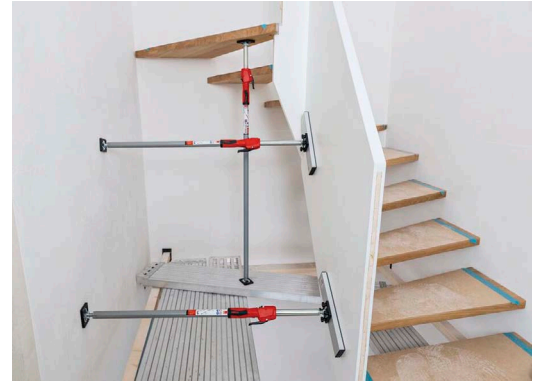
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Mastering Mortises: 8 Reliable Techniques

Whether you're cutting a single mortise or a full batch, there's a method to suit your tools, workflow and skills.

BY CARL DUGUAY

Mortise and tenon joinery is a fundamental technique that's indispensable in furniture and carcass construction. It offers exceptional strength, and resists racking and twisting forces better than most other joints, while also providing a generous glue surface for a strong bond. There are many variations of the mortise and tenon joint, but the most common is the stopped (or blind) mortise. Here are eight effective methods for cutting this classic joint — what I consider to be the “King of Joints.”

Mortises first, tenons second

I prefer to cut the mortises first, as it's easier to fine-tune tenons to fit an existing mortise than the other way around. That said, the sequence is ultimately up to you. Use the approach that fits your workflow.

1. Traditional method: chisel and mallet

The mortise and tenon joint dates back thousands of years and was originally cut with just two tools: a chisel and a mallet. This time-tested approach is still common today. Once you've developed a solid technique, chopping a mortise by hand can be surprisingly efficient, especially for small batches.

For anything beyond shallow mortises or softwood, a dedicated mortising chisel is a better choice than a bevel-edged chisel (see sidebar: Mortising chisels). You can make the process more efficient by using some basic layout tools like a ruler, marking gauge and pencil or marking knife to establish clean, accurate lines.

Mortising by hand

If you only have a few mortises to make, they can be easy to do by hand. Here are some guidelines to help you cut them quickly and efficiently.

- Accurately mark the mortise location and dimensions before cutting. A marking gauge, wheel gauge or marking knife will make clean, consistent registration lines that will guide your chisel when making the first cuts.
- Cut the depth of the mortise roughly three times the thickness of the tenon.
- Clamp your workpiece securely to the bench. Mortising involves heavy pounding and you don't want your work shifting.
- Start about 1/8" from each end and work toward the centre. Don't go all the way to your layout lines at first to avoid splitting at the ends. Finish by cleaning up to the end lines with light chops.
- Don't try to reach full depth in one go. Chop down in stages, removing chips as you go. For deep mortises, clear out waste frequently to avoid jamming or misalignment.



Proper Layout – Laying out a mortise is the first step when hand cutting the joint. A few hand tools – mainly a marking gauge, square, marking knife and pencil – will take you a long way. There's nothing wrong with marking both the location of the mortise and the adjoining workpiece. If you lay the mortise out using a marking knife or marking gauge, you can use those scored marks to set your chisel into down the road, making for an accurate mortise.



Remove Small Bits – Trying to remove large amounts of material at once is a sure-fire way to dull your tools, leave you with an inaccurate mortise and increase your frustration.



Almost There – With the mortise almost complete, you can fine-tune the edges and faces of the mortise by removing thin shavings of wood. Here, the chisel edge can be placed right into the shallow groove left by a marking knife.

Mortising Chisels

While you can use a bevel-edge chisel to chop mortises, a mortise chisel is much better suited to the task, especially for deeper or load-bearing joints. Mortise chisels are specifically designed for this kind of work. They have thick, robust blades that can handle heavy mallet blows, and their steep bevel angles and sturdy cross-sections make it easy to remove waste without the risk of bending or damaging the chisel. Bevel-edge chisels, on the other hand, are more delicate and better suited to fine joinery tasks like paring or dovetail work. However, I occasionally use one for chopping shallow mortises in softer woods.

If you plan to do traditional mortise-and-tenon joinery, especially in hardwood, it's worth investing in at least one good mortise chisel, typically in a common size like 1/4" or 3/8". Look for chisels with a thick shank to withstand heavy blows, a flat or slightly hollow back for easy sharpening, and a socket handle for easy replacement. Narex (northwestpassagetools.com) is a good entry-level brand. Premium brands include IBC (ibctools.com) and Veritas (Leevalley.com).



Mortising Chisels – A regular bench chisel (upper, left) is great for lighter tasks, but if you're hand-chopping many mortises a mortising chisel is a good investment. They're larger and more robust, enabling you to chop many mortises down the road.

- Ensure the mortise walls are square and perpendicular to the workpiece. It can be helpful to use a 90° block to keep your chisel square to the mortise walls.
- A sharp chisel is essential. Hone it well before starting. A dull chisel will crush fibres instead of cutting cleanly, leading to ragged mortises.



Ready for a Tenon – After many light mallet blows, and the removal of many small wood chips, you can move onto the tenon.



Bit Selection – The right drill bit will stack the deck in your favour when drilling out mortises. A brad point bit (top) is a great option, as is a Forstner bit (upper, middle). They both leave a clean edge, have a centre spur to help them run straight and leave a fairly flat-bottomed hole. A twist bit (lower, middle) isn't quite as good, as it can wander, though if you select a bit that's undersized enough, it can work out fairly well. A spade bit (bottom) is also a poor choice, as its centre spur sometimes protrudes too far past the mortise and exits the other edge of the workpiece.

2. Add some power: mortising with a drill press

Roughing out mortises with a drill press is both practical and efficient, particularly if you don't have a dedicated mortising machine. It offers more precision and repeatability than a handheld drill, which is key to accurate joinery. Here are the steps I follow:

Start with layout – Use a marking knife and square to lay out the mortise. A knife line gives you crisp edges and minimizes tear-out.

Choose the right bit – Brad point bits are a top choice. Their sharp centre spur allows for precise positioning and the outer cutting spurs score the wood cleanly as the bit drills, making them ideal for accurate, flat-bottomed holes that overlap consistently. They're particularly effective in hardwoods and for hand-drilled mortises using a drill press or handheld drill with a guide.

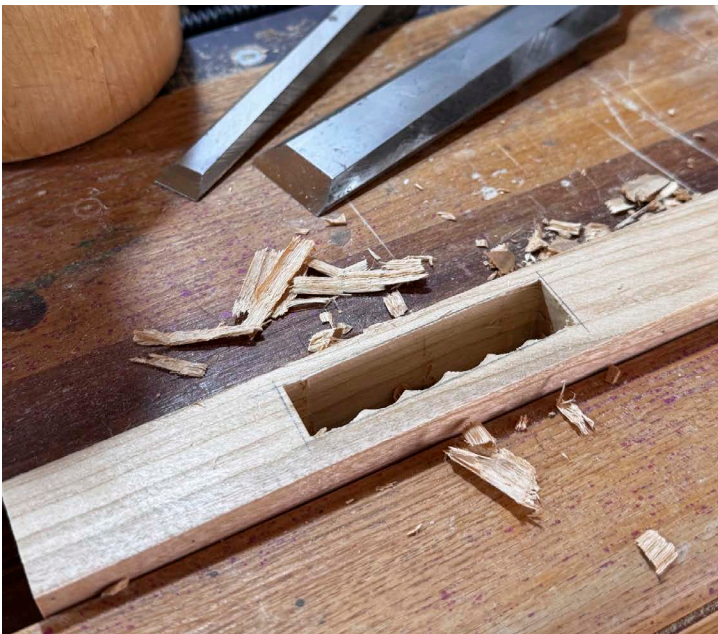
Forstner bits are another excellent option, especially when using a drill press. They create very clean, flat-bottomed holes and can overlap significantly without wandering, making them perfect for mortises that require tight tolerances. However, they require more force and aren't ideal for handheld drilling due to their tendency to drift without the controlled feed of a press.

The ubiquitous twist bit is a less ideal choice. It can work in a pinch but tends to wander when overlapping holes and doesn't cut as cleanly. It's better suited for through-holes than for controlled, clean-sided mortises.

Secure your stock – Use clamps or a drill press vise to hold the workpiece steady. Begin by drilling the end holes to define the mortise length, then work your way inward, overlapping each hole by a little less than half the bit's diameter.

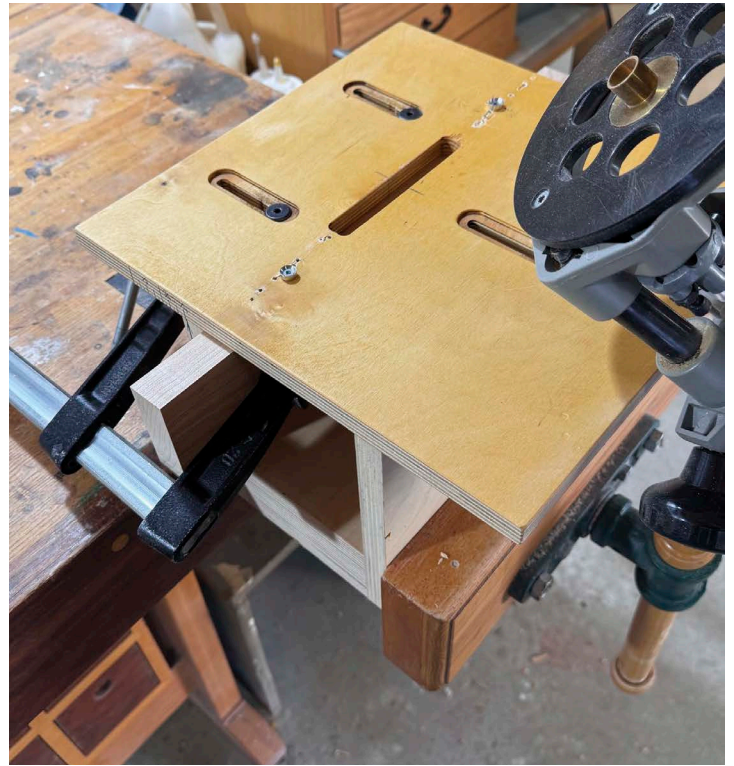


Drill Out the Waste – A drill press, equipped with a good bit, does a good job at removing material for an even mortise. This is true mainly with the use of a fence to position the workpiece and a stop block to give you multiple mortises of the same width.

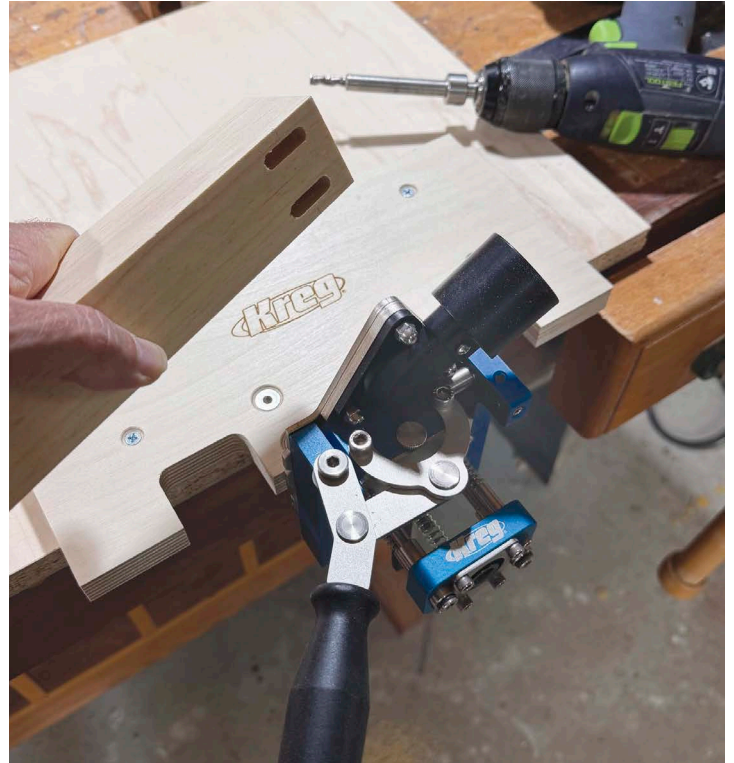


Trim the Edges – Used with care, a wide chisel will pare the inner edges of the mortise, removing the scalloped edge left by a drill press and drill bit.

Clear chips frequently – Raising the bit often helps avoid overheating and ensures a clean cut. Once the holes are drilled, use a chisel to remove the remaining waste and square the ends.



Shop-Made Router Jig – It's easy to make a simple router jig in your shop. You can clamp the workpiece to the inner cavity of the jig, then adjust the top to locate the mortise over the workpiece. Once the bolts are locked down, a template guide in the plunge router's baseplate will guide a straight router bit and create a mortise. Rout the full depth of the mortise in multiple stages, as a router bit can only remove so much waste with each pass.



Aftermarket Options – Store bought jigs, like the Kreg MortiseMate, allow the user to easily machine quick and accurate mortises. There are many options on the market.

Router Bits for Mortising

When milling mortises with a router, the best choice of bit is usually a spiral up-cut bit, as it offers excellent chip evacuation and produces clean, efficient cuts, particularly in deeper mortises. These bits, typically made from solid carbide, are ideal for both hardwood and softwood and come in common sizes like 1/4", 3/8" or 1/2", depending on the width of the mortise. Use a 1/2" shank when possible, as it reduces chatter and increases strength.

Mortising bits are also a viable option, especially for shallow mortises. They're more affordable but tend to be less effective at clearing chips, which can lead to burning or tear-out in deeper cuts. Mortising bits aren't to be confused with straight router bits. The latter have straight cutting edges and a flat bottom, while mortising bits have a shorter cutting length, stouter body and often a slightly up-shear cutting angle to improve chip ejection.

If you're milling through-mortises, a spiral compression bit may be the best option, especially if you're working with veneered or laminated materials. These bits minimize tear-out on both the top and bottom surfaces.

It's important to make multiple shallow passes rather than one deep cut to reduce strain on the bit and improve overall accuracy. I generally take 1/4" deep passes. Additionally, keep an eye on heat buildup, especially when using straight bits or working with dense hardwoods. This can help prevent burning and extend the life of the bit. Reputable manufacturers are known for producing sharp, durable carbide bits well-suited to mortising.



Straight Router Bit Types – A quality router bit, selected for the specific task at hand, will leave you with clean, routed mortises and stronger joints. At left, an upcut router bit will remove material from the mortise as it's being machined, which is a good thing. Second from left, a down-spiral bit is great for keeping the surface of the workpiece chip-free, but may leave burnt mortise cheeks. A compression bit is shown third from the left. These bits have an up-spiral blade at their tip, and a down-spiral knife on the rest of their cutting length. They can be used for mortising, but they tend to be more expensive and are typically used when routing the edge of a workpiece, as both the upper and lower surface of that workpiece will have less tear-out. The bit at the far right is a straight bit. This style of bit can be used to cut a mortise, but it also might burn the cheeks of the mortise, especially if the feed rate is too slow. They're reasonably priced, though.

No drill press: no problem

In lieu of a drill press you could use a portable drill press like the Milescraft DrillMatePRO or Woodpecker's AutoAngle drill guide. Another option is to use a dowel guide such as the DowelMax (dowelmax.com) or Woodpeckers CAM-A-LINE dowel guide.



Router Table Approach – It's possible to rout mortises on a router table. Because the mortise must be machined in stages so as not to stress the router and bit, and adjusting the height of a router often leaves the bit ever so slightly off-centre from the previous setup, a unique approach has to be taken. By setting the router bit to the final height, then using a sandwich of thin layers of material stacked onto each other and clamped in place, you can rout each mortise in stages by removing one layer after each pass, until you've completed the mortise.

3. For efficiency: use a plunge router and jig

Using a plunge router and a jig to rough out mortises is one of the best methods available, arguably better than a drill press, especially when you have a lot of mortises to make. It offers a high level of accuracy, repeatability and clean results, especially when paired with a well-designed jig that enables you to route multiple mortises in a row with minimal effort. Here's why it works so well:

A plunge router, especially when fitted with an upcut spiral bit or straight bit, produces extremely clean mortise walls and flat bottoms. The spinning bit shears the wood fibres rather than tearing them, so the mortise ends up clean and crisp with minimal chisel cleanup required. (see sidebar: Router bits for mortising)

When used with a good mortising jig, a plunge router becomes a repeatable, efficient mortising system. The jig controls the length, width and position of the mortise. You simply clamp your workpiece in place, run the plunge router through the slot in the jig, routing slightly deeper with each pass and you get a perfectly sized mortise every time.

Plunge routers come with built-in depth stops, so setting and repeating the correct mortise depth is straightforward.

There are many jig designs — some commercial, some home-made — that use guide bushings, edge guides or template guides. A simple shop-made jig with stop blocks and guide fences can be just as effective for basic mortising.

A major drawback to using a router is that they're loud and produce a lot of dust, so good dust collection and hearing protection are important. Also, because a router operates at high speed, there's always a risk of something going wrong. On top of this, small or narrow workpieces can be tricky to mortise safely with a router unless the jig holds them securely.

You can also use a router table to machine a mortise, though it



Hollow Chisel Mortiser

— A hollow chisel mortiser, like this King Canada model, can leave you with accurately located square mortises. The bit in the centre of the chisel removes much of the material, while the square-edged chisel squares up the four sides of the cavity. (Photo by King Canada)

The auger bit removes most of the material, while the hollow chisel creates a square hole around the hole that's being drilled. These two operations take place simultaneously. The result is a rectangular mortise.

Small shops typically don't have a hollow chisel mortiser due to its expense and the amount of shop space it takes up. But if you do a lot of mortises, this might be a good option for you.

5. Slot mortiser

A slot mortiser is essentially a router motor that's held vertically, coupled with an adjustable table that moves horizontally. With a bit in the router, and the router motor on, the workpiece can be fixed to the table while the table moves not only horizontally, but also inward towards the rotating bit. Stops can be adjusted to produce a wider, deeper or angled mortise, while the diameter of the bit will determine the width of the mortise.

Like the hollow chisel mortiser, few small shops use a slot mortiser, and for the same reasons. But if you use a lot of mortises in your work, this may be a good machine to have.

6. Festool Domino (FestoolCanada.com)

Like a hollow chisel mortiser and a slot mortiser, a Domino is a dedicated machine that essentially does one thing: cut mortises. A Domino machine is similar in looks to a biscuit joiner, but it has much more functionality. Available in two sizes, the DF 500 Q is the smaller of the two and can machine five diameters of mortises between 4mm and 10mm. The larger DF 700 EQ machines mortises between 8mm and 14mm, in 2mm increments.

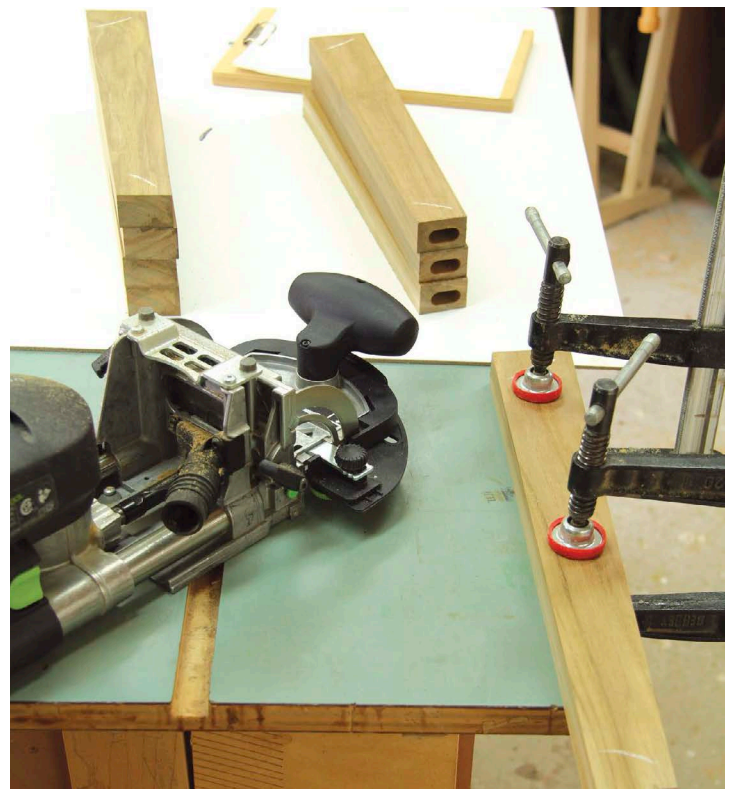


Slot Mortiser — David Bedrosian's slot mortiser is pictured here. He's able to quickly and accurately machine all sorts of mortises with this setup. (Photo by David Bedrosian)

needs to be accomplished in multiple passes, as no router bit can remove that much material in one pass. It's not always possible to move a router bit directly upward after each pass. This is because there's a small amount of play in most router bases each time they're adjusted. To counteract this, set the bit to the final height of the mortise depth, then use layers of sheet goods to raise the workpiece as it's being machined, removing one of the layers after each pass.

4. Hollow chisel mortiser

A hollow chisel mortiser looks and acts a lot like a drill press. The main difference is instead of using a standard drill bit, it uses a hollow chisel with a bit inside that's very similar to an auger bit.



Domino Magic — A Domino is a versatile system for machining mortises in workpieces. The location and angle of the mortise are both easy to change.

Dedicated router mortising jigs

There are a number of jigs that you can use to make cutting mortises a more repeatable and predictable process. Here are some of the dedicated jigs that we've used over the years and can recommend.

JessEM Pocket Mill Pro (jessem.ca/products/pocket-mill-pro-loose-tenon)

Kreg MortiseMate (<https://www.kregtool.com/shop/wood-joinery/mortise-tenon-joinery/mortisemate-loose-tenon-jig/KLTJ100.html>)

Leigh FMT Pro (leightools.com/fmt-pro-overview)

Mortise Master (mortisemaster.com)

Woodpeckers Mortising Jig (woodpeck.com/products/mortising-jig)



PantoRouter – This versatile machine allows the user to create mortises in many workpieces. It will also take care of machining many other types of joints, too. (Photo by David Bedrosian)

Dominoes are generally set up to machine mortises for loose tenon joinery, as Festool also sells Domino tenons of varying lengths and thicknesses, though there's nothing saying you couldn't machine tenons on the ends of your workpieces instead. A Domino doesn't take up nearly as much space as a hollow chisel or slot mortiser. They can cut straight and angled mortises, and are available with different jigs, fixtures and accessories to make them even more functional.

7. PantoRouter (Pantorouter.com)

A PantoRouter is a brand of tool that combines the action of a plunge router with a pantograph mechanism. A guide bearing attached to an arm runs on a template, which helps guide the router along the same path as the template, though at a 2:1 ratio; the pattern is twice the size of the resulting joint. The user can machine many joints with a PantoRouter, including mortises.

When used for cutting mortises, the PantoRouter allows the user to control the left / right motion of the router with a handle,



Drill Round Mortises – This setup by Mark Salusbury shows how he bores angled, round mortises in a recent project. This method can be very accurate. (Photo by Mark Salusbury)

moving slightly deeper into the mortise with each pass. As is always the case when using a router, a standard router and bit can only remove so much material per pass, so many passes are needed.

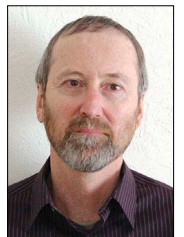
8. Drilling round mortises

Although some will see this as on the fringe side of a mortise and tenon joint, a dowel is essentially a round tenon, while the hole it fits into is a round mortise. A dowel joint will have far less face grain gluing surface, and also has much lower overall structural strength when compared to a standard mortise and tenon joint. On the plus side, they're very easy to machine, the tools to do so are relatively small and cost effective, and they can be used with either shop-made or store-bought jigs to provide a lot of woodworking joinery solutions.

Common examples of a round mortise and tenon joint include many of the joints in a Windsor chair and other types of seating.

Fluted dowels are commonly available in 1/4" and 3/8" diameters and lengths of between 1" and 2" long. Non-fluted dowels can be found or made in just about any dimension. Dowels can be used to strengthen many joints, but they aren't as strong as a standard mortise and tenon joint. They are best used when high strength isn't needed.

Whether you're cutting a single mortise or a full batch, there's a method to suit your tools and workflow. Hand tools, the drill press, or a router and jig each has their place in the shop. Choose the one that fits your project, your tools and your space.



CARL DUGUAY

cduguay@canadianwoodworking.com



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MAKE A VACUUM BENDING FORM

Photos by Steve Der-Garabedian

Using curved workpieces opens a wide range of designs and functions for your projects. Learn how to make a form for your next curved project.

BY STEVE DER-GARABEDIAN

There were two big moments that opened my eyes during my formal training at Rosewood Studio in Perth, Ontario. The first was realizing what sharp actually means. The second was learning how to veneer and bend wood. This approach to fine furniture making opens up many design and function opportunities.

There are several ways to bend wood. You could cut a curve out of a thick piece, but there may be lots of waste and possible short grain issues that could lead to a weak part. There is also kerf cutting, but I find the results vary. You could steam bend, which is fun, though the learning curve is steep. My favourite way to bend wood is with wiggle wood, or bendable ply, and veneers. Having a form is the first step in creating bent, veneered panels.

There's nothing to say you couldn't use this technique and form to shape solid wood bent laminations. The main difference is that a narrower form would likely be needed, and thin layers of solid wood would be pressed, instead of flexible plywood.

Start off strong

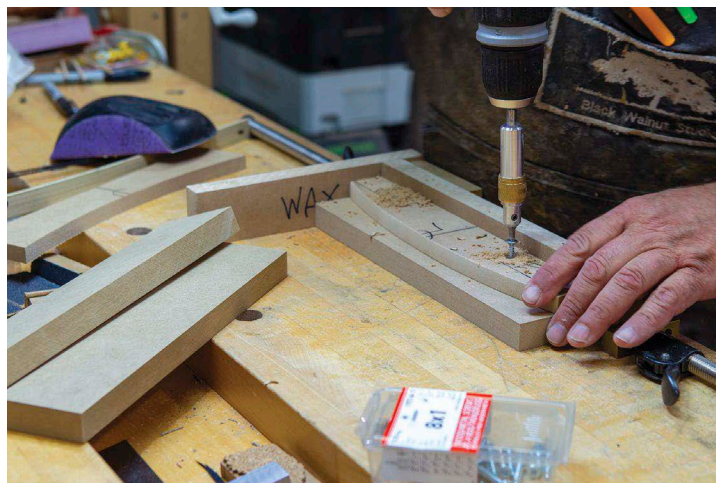
I usually make my bending forms out of 3/4" MDF, as I like to use a vacuum bag to apply my pressure. Regular clamps also work, but the significant and even pressure of a vacuum bag is hard to beat.

I use a drawing bow to mark up a piece of 1/2" MDF that will become my template. The curve pictured here is simple and not a tight radius, but radical bends are also possible. Once you've drawn your curve, head to the bandsaw and cut out the waste, leaving the line. An edge sander will help you take your bandsaw cut to the line and smooth it out. Take your time making the template, as it will be duplicated many times to give you your final shape. It's also important to keep track of the centreline on all pieces.

If the exact curve of your part is critical, make sure to do a bit of math before you make the initial template to machine the ribs to size. Once the ribs are all side by side in the form, a layer of flexible plywood gets applied over top of the ribs and glued into place. This layer helps spread out the pressure and leaves you with a smooth, even inner curved surface.

Pushed into the corner

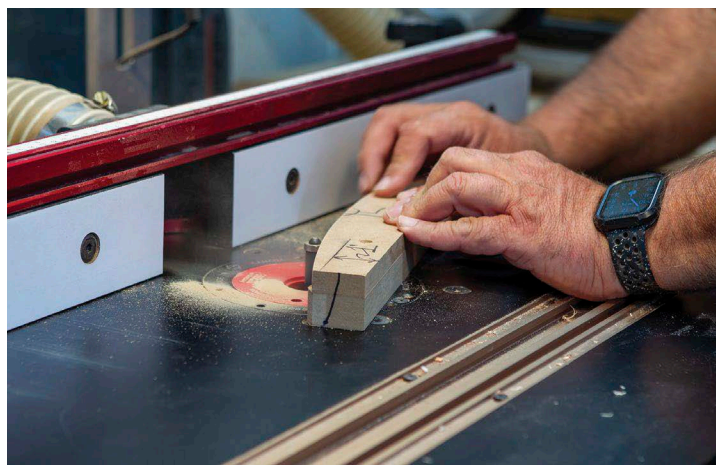
In order to be efficient, I cut as many ribs as needed to the exact length of the template but make them about 1/2" wider than needed. Next, I set up a corner jig on my bench and ensure it's at 90°. I also apply wax to the inside faces as you will use this jig to glue up the bending form.



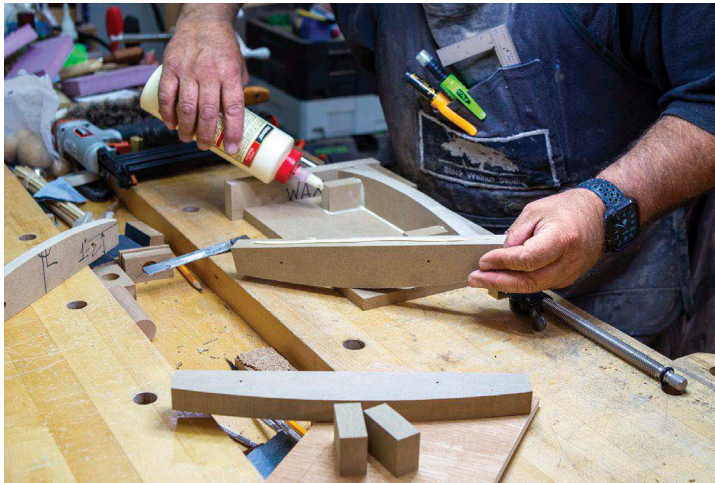
Keep It Square – Der-Garabedian uses two pieces of scrap to create a square section to butt the ribs and the base of the form up against while he's assembling the form. This helps keep everything square and in line. Here, he's using the square assembly to align the ribs on the template and screw the two parts together so the rib can be shaped.



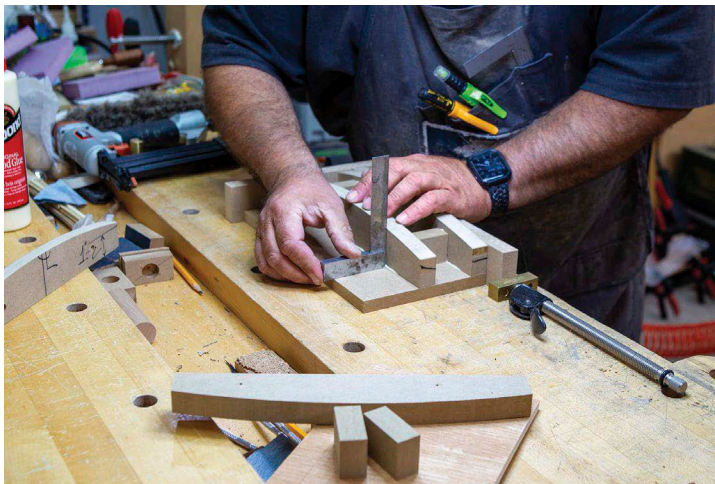
Rough Shape – Now that the first rib has been sawn to rough shape on the bandsaw, it can be taken to the router table to flush the rib with the template.



Route It Flush – When routing the rib flush with the template, Der-Garabedian is careful to remove only a small amount of material. He's especially careful around the ends of the template when starting and stopping the operation. Depending on the size of the parts, push sticks might come in handy



Start the Assembly – Bring the first rib into position on the base, and press both into the inner corner of the 90° setup. The next step is to add spacer blocks between the ribs, followed by another rib.



Maintain Accuracy – Checking for square in all directions as you build the form is always a good idea.

Register the template and blank rib in the jig and using a pilot/countersink bit, drill and secure the two with #8 × 1" screws. On a symmetrical curve I mark one side of all the ribs to help align them, just in case there are slight inconsistencies in the template. This will ensure no unwanted twists appear in the pressed panel. Draw a line approximately 1/8" away from the template onto the rib. Cut this line on the bandsaw, making sure not to wander into the template with your cut.

Once the parts are cut, set up your router table with a straight pattern cutting bit with a bearing. My bit happens to have the bearing on top, but other versions have the bearing on the bottom and a few have a bearing on both the top and bottom. Adjust the height of your bit to let the bearing ride on your template and cut only the rib.

Forming time

Place a 1/2" thick piece of MDF for the base into the corner jig and start gluing the ribs and spacers. Because of the high pressure involved, I like to keep my ribs spaced fairly close to each other. I don't want my form to deform. I use spacers that are no more than



Add the Top – A layer of flexible plywood is added on top of the ribs. Screw it in place at one end so it doesn't shift before putting the entire form inside a vacuum bag while the glue dries.

2-1/2" long and for this example I chose 2" long. They are just tall enough to not poke past the height of the ribs. The spacers are made out of leftover pieces of 3/4" MDF.

On this small form I only needed three ribs and four spacers, however, this can be expanded quite a bit. My largest form is 7' long and 20" wide with ribs spaced 2-1/2" from each other. Start off by gluing the first rib to the base and add a spacer near each end. Add more glue and the second rib. Check for square, both vertically and horizontally, along the base. To help keep things from sliding around I tack this and any following ribs with a 23g pin nailer. Keep working your way across the form until you have all the parts together. After you install the last rib, carefully turn the form over and tack it from below, as well as the first rib which was blocked by the corner jig.



Good Contact – The vacuum will provide the downward pressure to bring the upper surface of the form into good contact with the rest of the form while the glue dries.



Check the Pin Lengths – Pins will help you keep the parts in line while creating a vacuum inside the bag. If the pins are too long, they will create problems when it's time to press the workpiece.

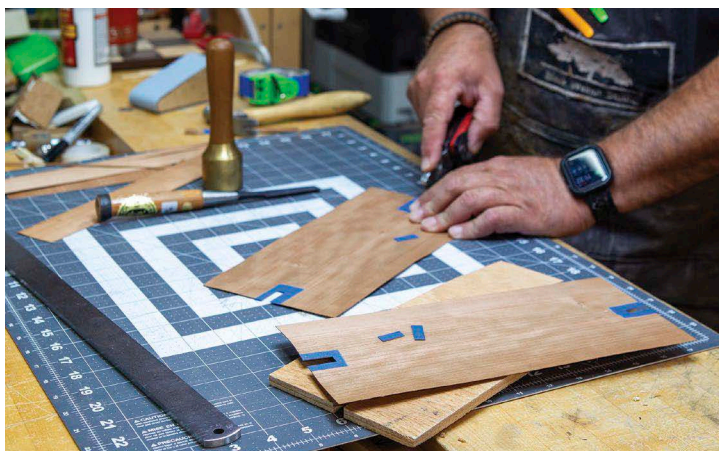
Topping it off

To create a flat surface along the curve I use wiggle wood cut to the size of the form. Sand the top edges and corners smooth in order to not damage your vacuum bag. Cover your bench with newsprint and drizzle glue on to the tops of the ribs. To make sure it stays square and doesn't shift around I drive a pair of #8 × 1" flat head screws through one end of this layer and into the outermost ribs. Make sure the screws are driven below the surface and go slowly as wiggle wood is very soft.

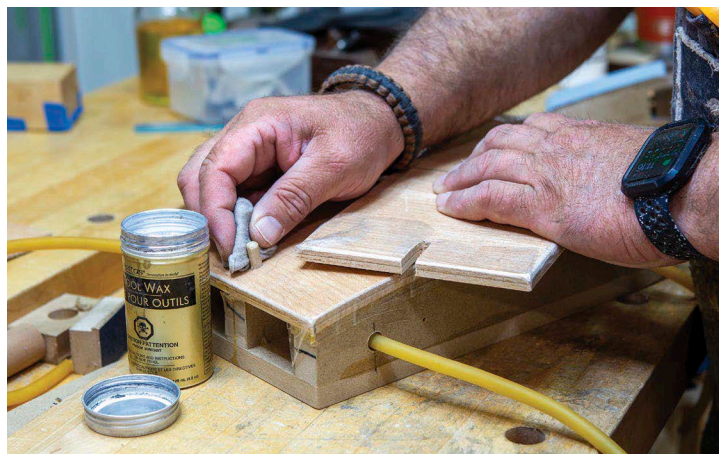
Slip this assembly into your vacuum bag, along with breather netting under the valve, seal it off and evacuate the air. I'm using a Roarokit Thin Air Press bag here which comes with a hand pump for this purpose. You can also buy an adapter that lets you use an electrical pump to do the same. I like to leave the form in the bag for at least six hours but longer won't hurt.

Some extra details

When it's time, pull the form out of the bag and let it sit overnight as glue will not fully cure in a vacuum. The next day, smooth out any sharp, dried spots of glue. Cover the top with overlapping pieces of packing tape to ensure the panel doesn't stick to the form. I also like to drill 3/8" holes near both ends of the form



Careful Notches – While preparing the core, face veneer and back veneer, it's important to account for pins if you've used them in your form.



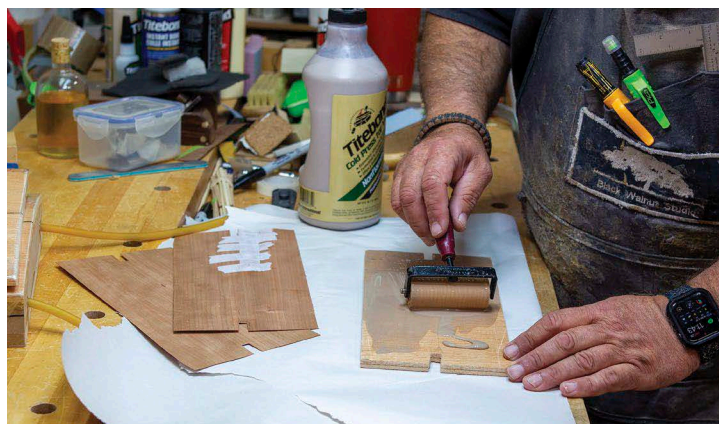
Wax It Up – A bit of wax will help ensure glue doesn't adhere the entire curved workpiece to the pins.

to accommodate surgical tubing, which acts as a third and fourth hand as the air is drawn out from the bag. It doesn't do the pressing but rather holds down the sandwich, preventing the bag from being drawn under the panel while the air is being removed. This is especially helpful with more serious or larger pressings.

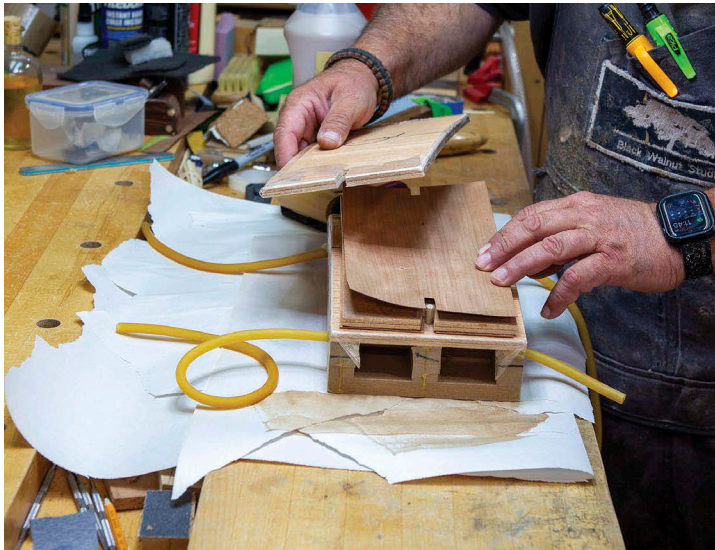
One other step I like to take is to create a key that stops the veneer from shifting or skewing on the form. This key is nothing more than a 1/4" dowel drilled into the centre rib. The height is determined by the thickness of the caul and core pieces of wiggle wood. I cut it just under this height and round the top with sandpaper. Inevitably glue squeeze-out will find its way onto the dowels, so a light coat of wax will ease the release of the panel. Just be sure to take into account the extra length needed when you're making the form and materials so you can remove the ends after pressing. Cut a piece of wiggle wood for the top caul and notch the ends so they fit around the dowels. This caul should not be much longer and wider than the panel you intend to press. Either make it the same size or no larger than 1/4" all around.

Ready for action

Now that we have our bending form, prepare your core and veneers. Use the caul as a template to cut out the notches for the dowels. Adding masking tape to the veneers before these cuts will help make sure they don't get damaged.



Apply the Glue – Apply an even layer of glue to all the parts. Applying glue to the veneers can cause instant challenges, as the water in the glue quickly causes the veneer to warp. It's often best to apply glue just to the core.



Bring It All Together – Quickly and carefully bring the parts of the curved workpiece together with the form and upper caul. Der-Garabedian likes to use surgical tubing to tie everything together. Tubing is especially helpful in large, complex glue-ups.



Helping Hand – Adding a bit of light pressure and ensuring the parts all remain in line with each other while the vacuum evacuates the bag is a good insurance policy.

Once more, cover your bench, add glue and lay down your veneers. Place the sandwich on the bending form and cover with the caul. Stretch and tie down the surgical tubing before slipping the whole package into the vacuum bag. Like before, add breather

netting, seal it off and pump out the air. Let this sit tight for at least six hours, if not longer. On more radical bends I usually leave it in the bag overnight.

Once the time is up, pull it out and let it fully cure before working on your panel. I have several saddles around made out of scrap MDF or plywood that let me prop up anything I have pressed in my vacuum bags.

Making forms, even larger versions, is not an arduous task. Accuracy and planning go a long way when making a form. Making them robust also lets you use them over and over and make quick work of bending wood. Like any other technique, practicing on a simple project will teach you a whole lot before you tackle a more complex project.

To read another article by Steve Der-Garabedian about how to use rigid insulation and a hot wire to make a curved bending form, visit our website and search for 'Make a Curved Form With Rigid Insulation'.

STEVE DER-GARABEDIAN
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Reviews

3D printers, such as the offering from Bambu Labs, can be a huge help in small shops. The SWITCHER-D from Flair Woodworks could make sanding and other dust-generating operations quicker and more efficient for you.

Bambu Labs P1S 3D Printer

BY STEVE DER-GARABEDIAN

My first 3D printer got my foot in the door with printing things out of plastic. I paid about \$450 for a device that was in the lower to middle range of hobby machines. At that time the technology was better than you thought but also left you craving more. Comparing our first cell phones to what we have now (remember the Motorola phone affectionally called the brick?) shows how technology gets better over time.

Late last year during a Black Friday sale I bought the P1S model manufactured by Bambu Labs. It was amazing to see the

Bambu Labs P1S

A 3D printer can help with many shop projects

Flair Woodworks SWITCHER-D

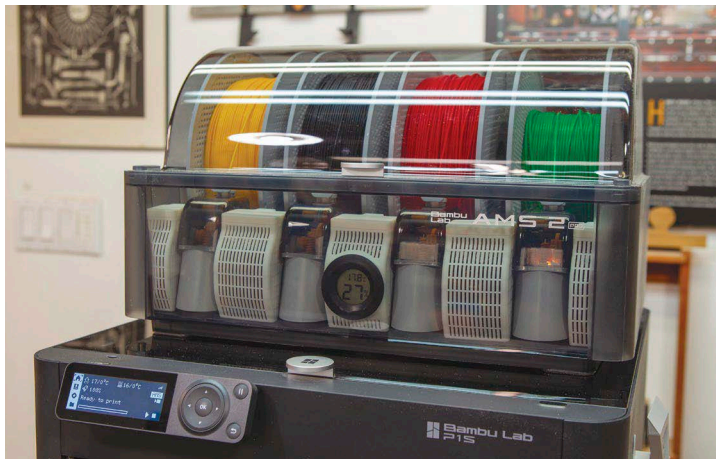
Upping your dust extraction efficiency



advances made over the years. I think the biggest advance was that prints just worked. This printer worked right out of the packaging. Failure rates are significantly down. Advances also included printing of what was once very difficult materials like carbon fibre, ASA, nylon and polycarbonates. All of these would require lots of adjustments to settings before you would succeed, if you did at all. Settings like nozzle and print-bed temperature as well as speed are improved. There is also a new set of patterns available for the internal structure of a 3D print.

All of the filaments I bought from Bambu Labs come with a RFID chip in the reel that tells the printer what settings to use.

Photos by Steve Der-Garabedian



Filament Options – This is the AMS 2 Pro, a multi-filament accessory that Der-Garabedian purchased.

Using other brands' filaments is possible, however, things work smoother with the same brand. Bambu Labs have set themselves up as one of the premier builders of 3D printers. During a Boxing Day sale, I also bought a multi-filament accessory that lets the printer draw on up to four different colours and filaments.

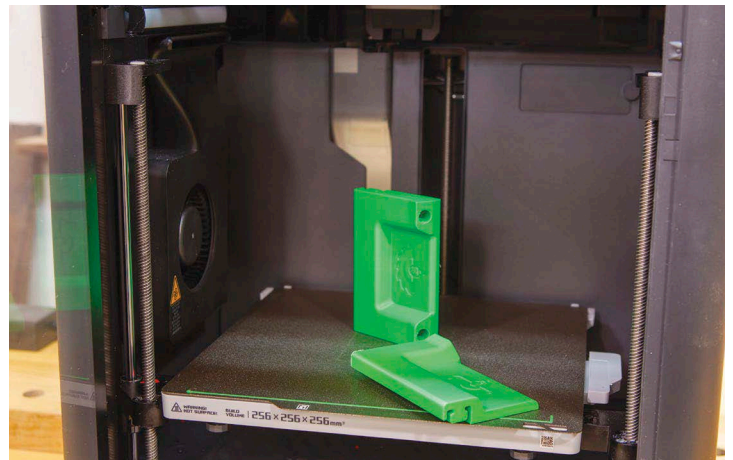
Specifications

A newer version of this printer is now available, but I was happy with all the features and cost of this older model. It has its own enclosure, which is better for printing certain filaments as the proper temperature is achieved regardless of blowing furnaces or a/c units. The chamber comes with an active carbon filter and keeps the noise down to an acceptable level. As a comparison, the newer version offers a better display, AI print failure detection, better enclosure temperature management, as well as easier maintenance and tool-less nozzle swap design. These features add another \$250 to the cost.

The P1S has a build volume of 256mm³ although much larger prints are possible after making segments and joining pieces together. There's a built-in light I wish was stronger and a stop motion camera that's mediocre compared to what's now available. However, it's adequate and allows you to monitor your print either on your desktop or a mobile app.



Wide Variety – A small collection of some of the prints Der-Garabedian recently completed: a container; sanding and clamping parts; a drill bit depth gauge; a centre finder; a drywall dust jig; and fingertip bit holders.



Fresh Off the Press – Here, freshly printed vacuum pads are ready to be put to use on Der-Garabedian's track saw rail.

This model can print filaments from PLA to much stronger filaments like ABS or ASA and even structural parts out of nylon and polycarbonate. There are also filaments that contain carbon fibre.

Bambu Labs has a software suite for both Mac and Windows with desktop and mobile components. The software lets you change project dimensions, positions, colours, filaments and many other aspects, as well as settings for the printer. It allows you to wirelessly send projects to the printer. The mobile app lets you do much of the same, but also lets you monitor the print anywhere you happen to be.

The P1S is a very capable 3D printer that has core features that compare very favourably to other printers from both Bambu Labs and other manufacturers. While having a fast printer was not a priority for me, it is just as fast as their flagship X1C printer. More expensive printers will ship with upgraded and hardened nozzles and other components, but I have changed some of mine to print abrasive materials, at a surprisingly reasonable cost.

The AMS 2 Pro multi-filament accessory sits on top of my printer. It holds four spools of filament allowing multi-coloured projects to be printed. This second-generation model can also dry filament that has absorbed moisture.



Track Saw Rail Accessories – An end cap deflector and a pair of rail clips are Festool track saw rail accessories Der-Garabedian has printed recently. He designed these with a free online CAD program called Tinkercad.

What do I use my printer for?

I've made things like phone stands, small parts containers, a rain shade for my RV camera and even an R.C. airplane. As for the wood shop, it's handy when you need shims in a specific thickness or spacers. I've made sanding blocks in sizes that fit the small areas I needed to get into. I've printed a centre finder for dowels and corner braces for strap clamps, as well as small bit holders that give you finger-tip control on fasteners.

One recent print that's very useful is a drill-dust collector. I hold this against drywall and as I drill dust falls into the chute rather than on my floor. Examples like this is where the printer shines.

Another print that saved some frustration was for my Festool track saw. I made a cord deflector that sits on the end of the track and guides the power cable and vacuum hose past the sharp end. Without it, the cord and hose ended up snagging and abruptly jerking to a stop in the middle of a cut. They may have improved this track saw over the years, but the one I have left a small section open and inevitably I would get caught on this. I sent the job to the printer and less than two hours later at a cost of around \$1.50, I had the end cap. It's full-width with a slot underneath so clamps can still be used. I'm also in the process of making a couple track vacuum clamps that will hold the track to any flat surface.

A good way of seeing uses for a 3D printer in your shop is to head to an online 3D maker site and query woodworking tools. There are several sites to check out, with the popular ones being Thingiverse and Bambu Lab's Maker World. Granted, some things are better bought than 3D printed. However, there are enough ideas to make you fall down a rabbit hole for at least an hour or two on your first visit.

Is a 3D printer right for you? Is this P1S right for you? After a lot of research settling on my model, I think the bang for the cost was well worth it. I also think the technology had reached a point where it made sense for me to replace my original printer. I've bookmarked enough projects to keep my machine working for the foreseeable future. Do a bit more research and see if it's right for you.

Tester: Steve Der-Garabedian

Manufacturer: Bambu Labs

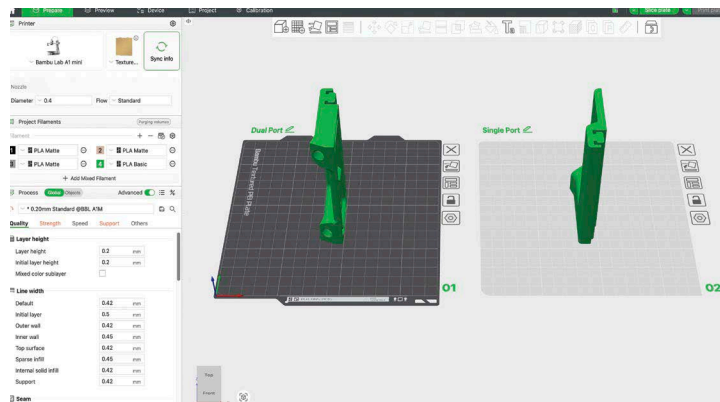
Model: P1S 3D Printer

MSRP: \$519 CAD

Website: BambuLab.com



STEVEN DER-GARABEDIAN



Screen Shot – A screen shot of the Festool rail vacuum pads in Bambu Studio.

Flair Woodworks SWITCHER-D Dust Extraction Split

BY CARL DUGUAY

If you've ever used a Y-splitter on a dust extractor or shop vacuum, you probably know the drill. Connect two hoses, fire up the extractor and you're good to go — or so you'd think. The problem is a conventional Y-splitter doesn't really give you control over where that suction goes, as the suction is actually split between two (or more) hoses and tools. That's where the Canadian-made Flair Woodworks' SWITCHER-D takes a different approach.

There are two SWITCHER models. The CT SWITCHER-D, which I tested, is designed specifically for Festool CT dust extractors (the CT 26, CT 36 and CT 48 series). It uses anti-static material, which is appropriate for Festool's anti-static dust-extraction system. The VAC SWITCHER-D is intended for general shop vacuums and dust extractors using nominal 2" (50 mm) hoses. It's made from impact-resistant plastic rather than the anti-static material used for the CT version.

At first glance, these direct-mount suction controllers look just like a compact version of a Y-splitter. But instead of simply dividing the airflow between the two outlets, the SWITCHER-D lets you control exactly how much suction each hose receives.

The idea is pretty simple. A sliding control on the front lets you adjust the airflow from one port to the other. Slide it completely to one side and you get 100% of the available suction at that hose. Move it the other way and the second hose gets it all. Stop somewhere in between and you can divide the airflow however you want — 50/50, 60/40, 80/20 or anywhere else along the way.

In my experience, that flexibility makes a lot of sense in a woodworking shop. Not every tool needs the same amount of airflow. A router or saw can benefit from substantial suction, while a sander may need considerably less. With a standard Y-splitter, the airflow



Quick Adjustment – When attached to a dust extractor, the switch between hoses, or even fine-tuning a ratio of suction between the two hoses, takes only a second or so.



Dial in the Suction – When the SWITCHER-D is moved all the way to one side, only one of the hoses receives suction. The ratio of what hose receives suction can be adjusted by positioning the slider towards the middle of the unit.

is simply divided between the two connected hoses. If both are open, both are drawing suction, whether you need it or not. Flair's controller lets you put the suction where it's doing the most good.

I also like the fact that you can leave both hoses connected. If I'm moving between two tools, I don't have to unplug one hose, find somewhere to put it and connect the other. I simply slide the control to direct the suction where I need it. That sounds like a small convenience, but anyone who spends time in a busy shop knows how quickly little interruptions add up.

There's another useful application. Some tools, particularly routers, can have more than one dust-extraction port. The

SWITCHER-D allows you to connect both ports and adjust the air-flow between them.

The compact, direct-mount design is another advantage. Rather than adding a bulky Y-fitting and extra hose length, the SWITCHER-D attaches directly to the front of the dust extractor. The "D" in the name stands for direct and the result is a much tidier setup. The precision taper on the unit provides a secure, tool-free, no-clamp connection.

There are two versions. The VAC SWITCHER-D is made from tough, impact-resistant plastic and works with most shop vacuums and dust extractors using nominal 2" (50 mm) hoses. The CT SWITCHER-D, which I tested, is the anti-static version, designed specifically for Festool CT 26, CT 36 and CT 48 dust extractors, and made from anti-static plastic with stainless-steel fasteners.

For me, the biggest appeal is that the SWITCHER-D is simple, effective and solves a major limitation of the traditional Y-splitter – variable suction control for each hose. That little bit of control makes for better dust collection, less hose swapping and a cleaner, more efficient workflow.

Tester: Carl Duguay

Manufacturer: Flair Woodworks

Model: CT SWITCHER-D / VAC SWITCHER-D

MSRP: CT model: \$99; VAC model: \$55

Website: FlairWoodworks.com



CARL DUGUAY

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New Life for a Forgotten Playground

Reducing, reusing and recycling is a great option. Especially when you can please your family and still have some fun using your trusty tools.

BY JAMES JACKSON

Normally, I'm the type of person who jumps at starting a new construction project. Oh, we need a new shed? That should be fun! Need help replacing your deck? I'm there (as long as you provide the pizza and beer).

So when I went to install our zipline in the backyard this summer (I actually didn't get around to it until the end of July—oops) I realized my two girls and the twin girls who live next door had all gone through a substantial growth spurt over the past year and the simple step ladder they'd been using as their launching-off point was no longer high enough to keep them from dragging their bums on the ground.

I raised the steel cable a few feet higher on the tree trunk and the kids briefly tried using a taller ladder, but it was just too awkward and dangerous, especially if they were playing unsupervised.

It was time to build a proper wooden platform, and based on their heights I figured it needed to be at least 4' off the ground. I researched various designs online and made my shopping list of concrete blocks, 4x4 posts, 2x6 boards, pressure-treated deck boards and exterior wood screws.

To help make my life just a little bit easier, I decided I would copy the design and angles of the stairs on our existing wooden playground structure that I built four summers ago (and which I wrote about for this column). Keen readers might recall that I opted to go with the pre-cut, pre-drilled cedar wood option available online, and I assembled it with the help of my dad and father-in-law.

You might also recall that the moment I finished putting it together I knew it was going to be too small for my oldest daughter, who was seven at the time. I was right, because after just a few summers the girls stopped playing on the set and it's just been sitting in the yard unused ever since.

I grabbed my tape measure and was checking the angles and height of the stairs to see if they'd be suitable for my zipline platform when I decided to also cannibalize the small climbing wall, rope ladder and metal climbing handles for the new project.

But as I stood there looking at the playground, it dawned on me I could just drag the entire thing over to the zipline, make a few modifications (so long, swings and slide!), and I'd have the perfect platform that I knew would be stable, secure and the ideal height.

First and foremost, I'd save a lot of money doing this. Secondly, I'd be able to reuse an underutilized play structure that was just slowly rotting away. I called my wife, who was driving around doing errands with our girls, for final project approval. She endorsed the idea and – to my shock – the kids loved the plan, too. They hadn't used the playset in years, but they're also strangely nostalgic for items from their childhood and sometimes it's hard for them to let things go.

"You could even sell the slide and the swings!" my eight-year-old exclaimed from the back seat of the car. I laughed. She's a hustler, that one. With a family-wide stamp of approval, I got to work. The first task was to remove the slide and swings, and the moment my drill loosened the first bolt an army of earwigs scurried out from between the seams. They knew their eviction was at hand.

As I worked, I'd occasionally give the structure a little shake from side to side and I'd do a little jump test to assess the sturdiness of it without the stabilizing presence of the slide and swings. Each time I did, I'd quietly say under my breath, "Oh ya, this is still plenty sturdy," the same way a confident dad loads the roof of the car with camping supplies or a Christmas tree, then gives the rope a good yank and proclaims (to no one in particular), "That isn't going anywhere!"

So, I disassembled the playset into two sections – a smaller, lower deck

that was 3' off the ground, and the larger upper deck – and dragged them across the yard one piece at a time. After a quick lunch break, the reassembly took less than an hour.

The girls got home later that afternoon and were immediately excited to try it. They spent nearly an hour taking turns with the girls next door and recording their adventures on my phone.

Now the kids have a safe and secure way to use the zipline that doesn't require adult supervision, and at the same time I saved a couple hundred bucks and still managed to use my power tools and get my hands dirty.

I smiled as I watched the girls zip along with screams of joy, then recoiled slightly when one of the twins screamed in terror from the top platform, "Eww! An earwig!"



JAMES JACKSON
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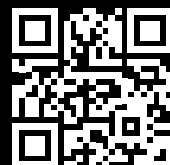
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Nick Mazerolle

Blackened Ash Stool

This stool is one of a set of four, custom made from blackened ash with brass accents. Mazerolle says the seat was the most demanding part of the build. “The seat was shaped first with a series of somewhat questionable router jigs,” he explains, “then refined entirely by hand.” The seat features an inlaid brass handle at the back. The project began with a half-scale mock-up of the stool, followed up by a full-scale mock-up of the seat to dial in the shape and placement of every element. Mazerolle finds it difficult to fully translate complex, organic forms and compound angles in sketches or CAD, so he often relies on physical mock-ups for chair components before committing to the final build. No CNCs here.



Turn to page 10 for more quotes.*