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Campeche chair p44

Shaker sewing cabinet p52

Making hook knives p38

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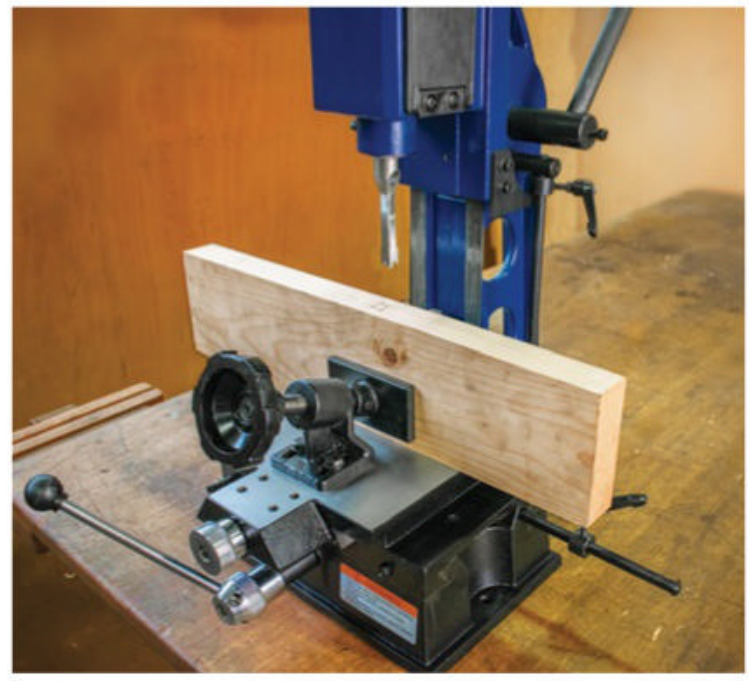

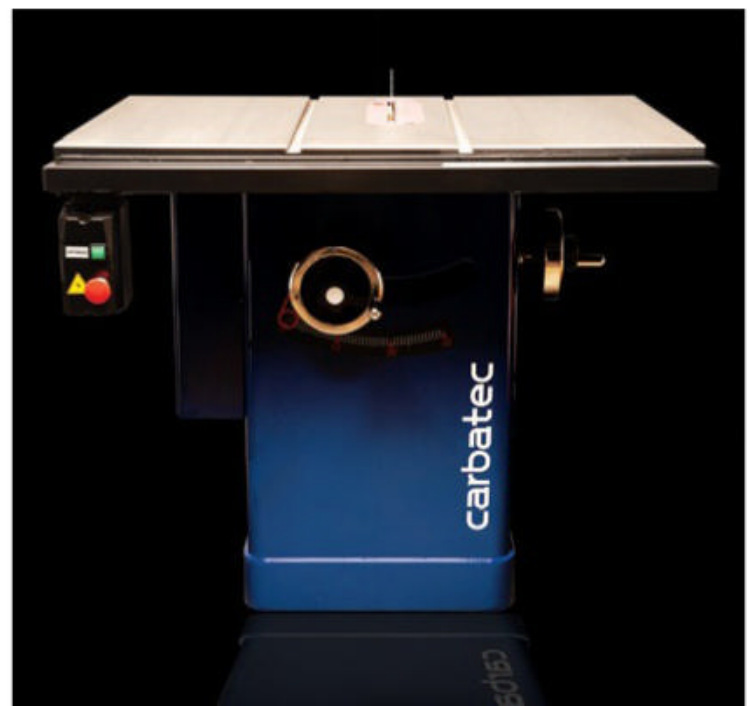

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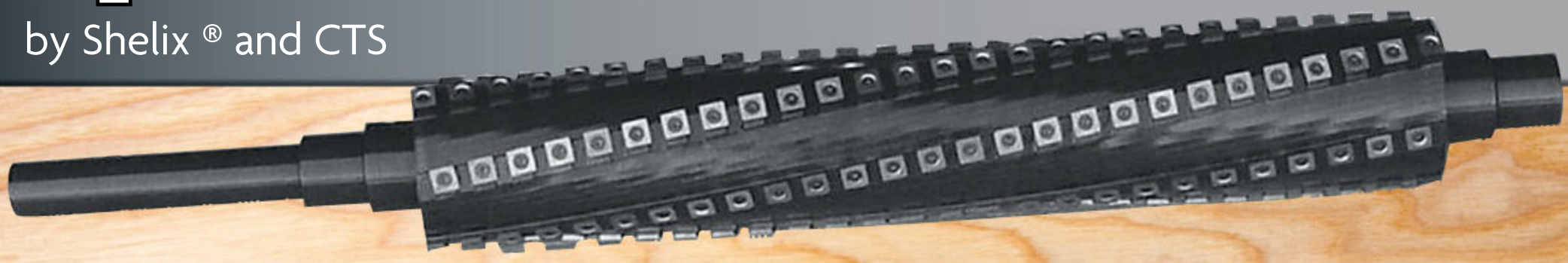

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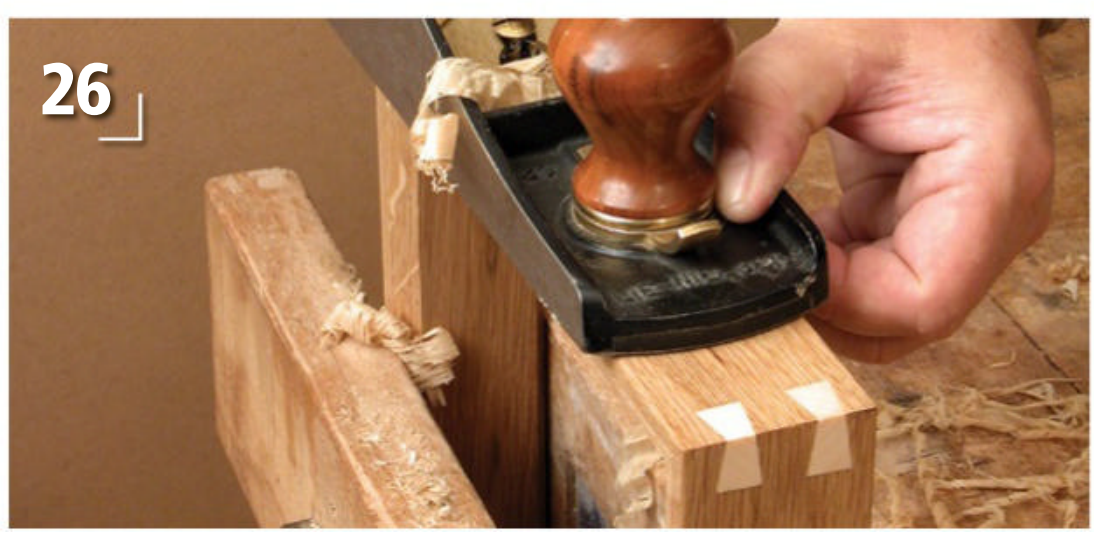

Departments

Projects

from the editor

Sawdust

The installation of auto blast gates at the Robertson Men's Shed has been more than a year in the making. On page 16 we take you through the journey that has smiles all round for the guys at Robertson.

Men's Sheds are another great Australian invention. In retirement the family house is often sold and the couple downsize into an apartment or a retirement home. The bloke in the relationship can find himself at a loss without his shed or garden to tend. The wife will still be able to create in the kitchen and mend and make in the lounge room. This was an observation made by occupational therapists dealing with the early deaths of men in retirement homes. Creating a shed in the retirement community was a game changer, men also got to make and mend, have a cup of tea and bond over projects. There are now more than 1,000 Men's Sheds thriving across Australia and welcoming a wide range of age groups. Some have opened up to female membership, others are places for Aboriginal and Torres Strait Islanders to pass on knowledge. Even if you are lucky enough to have a shed, the local Men's Shed is bound to have a better table saw and other capital tools too large for your workshop. It will also be a place where you can get advice on practical problem solving. The motto of the Men's shed movement is "Shoulder to Shoulder" and reflects the way men tend to work together and communicate. If you visit Men's Shed online you will not only find one close to you, you will also read that they have a foothold in the UK, Eire, Canada, New Zealand and the US.

Happy woodworking!

Chris Clark, Editor

Australian Woodsmith *acknowledges the Cammeraygal people, Traditional Custodians of the land on which this publication is produced, and pay our respects to their Elders past and present. We extend that respect to all Aboriginal and Torres Strait Islander peoples today.*

Australian Woodsmith GO On-Line Extras

This symbol lets you know there's information online at: www.australianwoodsmith.com.au. There you'll see bonus cutting diagrams, articles on techniques, jigs and a lot more. If you don't have access to the internet, contact us on (02) 9439 1955.

TIPS FROM OUR READERS

Tips & Techniques

FINEST FINISH

After I had sanded up through the grits and put the final coat of finish on the platter I took a leaf out of Jennie Alexander's book *Make a Chair from a Tree*. Instead of sanding the platter with platter shavings, I did one last sanding with kraft paper. The paper has just enough abrasiveness to create a smooth surface and consistent sheen.

Phil Huber

QUICK TIP

SURGICAL TUBING CLAMP

Necessity is the mother of invention. I came up with this clamping solution when trying to glue up a bandsaw box, which had tapered and curved edges. The tubing can be stretched and wrapped to fit any shape, while the latex provides a sure grip. After wrapping tightly, the tubing can be tied off at any length you need for that project.

Chris Fitch

AUSTRALIAN Woodsmith

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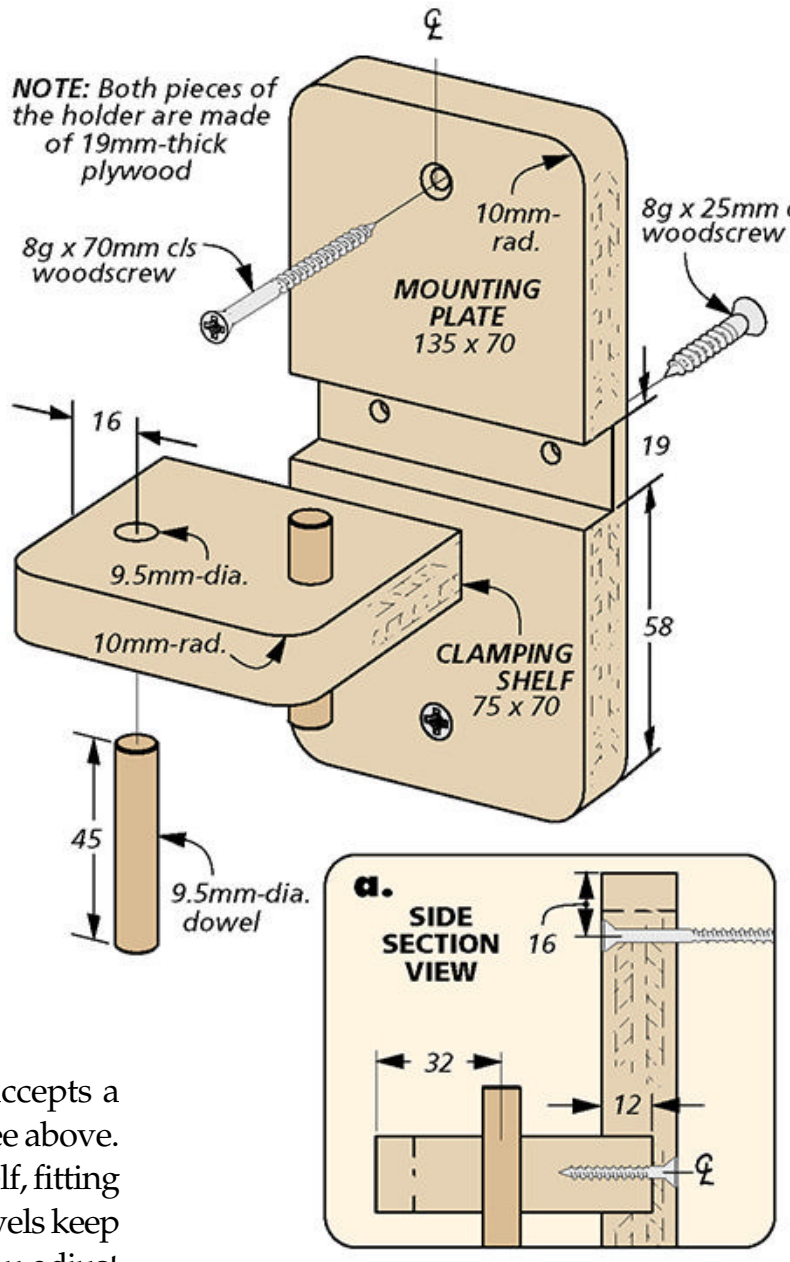
SAFETY IN THE WORKSHOP

Safety devices, such as riving knives, guards on table saws and guards over router bits have been deliberately left out of the line drawings in Australian Woodsmith projects in order to make them easier to follow. It goes without saying that where safety devices have been supplied by the manufacturers you should use them. We encourage the use of push sticks as good work practice.

Exercise vigilance and the greatest of care when using power tools, whether stationary or portable. Keep all your tools sharp and well maintained. Wear protective eyewear, a dust mask and a hearing protector when appropriate. By limiting distractions and developing safe work practices you will go a long way to avoiding workshop accidents. So, work safe fellow woodworkers. -Editor



CLAMP-ON LIGHT HOLDER

Sometimes I like a bit of extra light in my workshop, but there isn't always a good place for a lamp. To solve this problem, I devised a holder for a clamp-on lamp that can be placed almost anywhere. The holder is made of 19mm plywood. A trench in the mounting plate accepts a small clamping shelf, as you can see above. The clamps grasp the plywood shelf, fitting around the pair of dowels. The dowels keep the lamp from sliding off when you adjust the angle.

Guy Gerrard

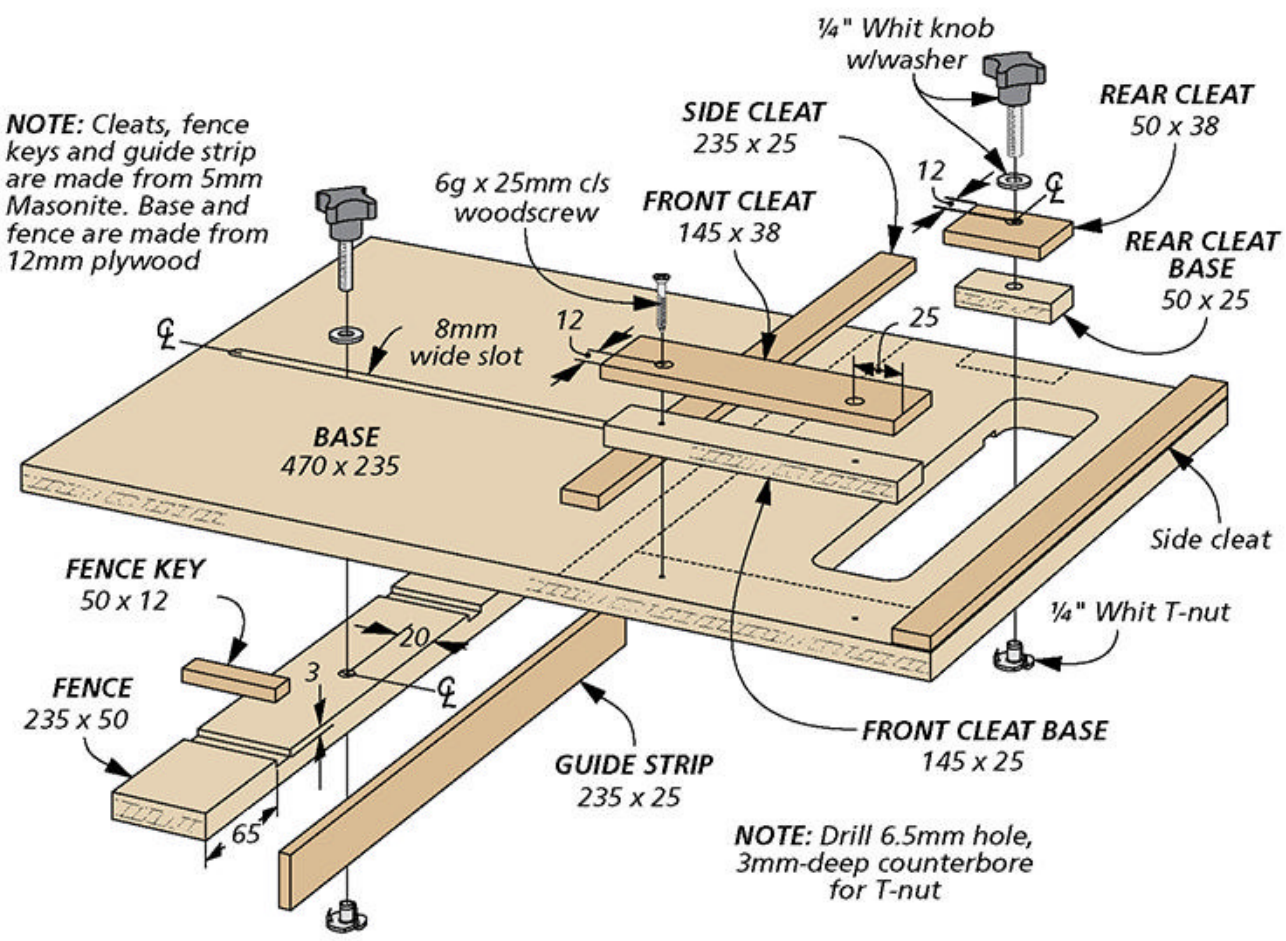
CIRCULAR SAW EDGE GUIDE

It's not always easy to get a straight cut with a circular saw by hand. After building this workshop-made guide, you'll be making consistent rips and crosscuts easily.

PLYWOOD BASE. This guide starts with a 12mm-thick plywood sheet for the base. The base should be 50mm wider than your saw's base, and the cutout in the plywood base should match your saw's cutout. A long slot in the base allows a fence underneath to be adjusted depending on how wide you need your cut to be. To finish the base, cut two 3mm-deep grooves in the bottom for the fence keys. These grooves will span from the end of the base to the cutout.

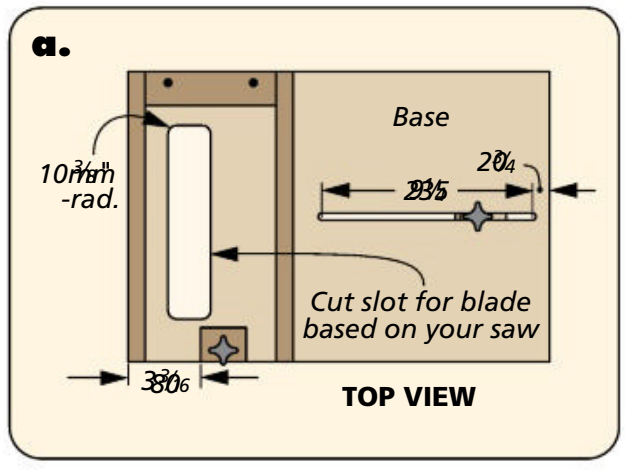
SECURING CLEATS. The cleats here frame the saw, keeping it in place while you make your cut. Measure out where the two side cleats need to be for your saw's base and attach them. The front of your saw base will slip underneath the Masonite lip of the front cleat while the rear cleat, held in place with a threaded knob and T-nut, can then be tightened down to secure the back of the saw. The base of each cleat is simply made from scrap to match the height of the saw base.

▲ The only limit on cutting capacity is the size of the base. This version can make up to 250mm rip cuts.



FENCE GUIDE. Finally, add a 50mm plywood fence with two grooves in the bottom for the fence keys. A guide strip is added for a smoother surface to ride against the piece while cutting. The keys keep the fence parallel to the blade, and as long as the fence stays flat against the workpiece, your cuts will stay straight.

Rob Petrie

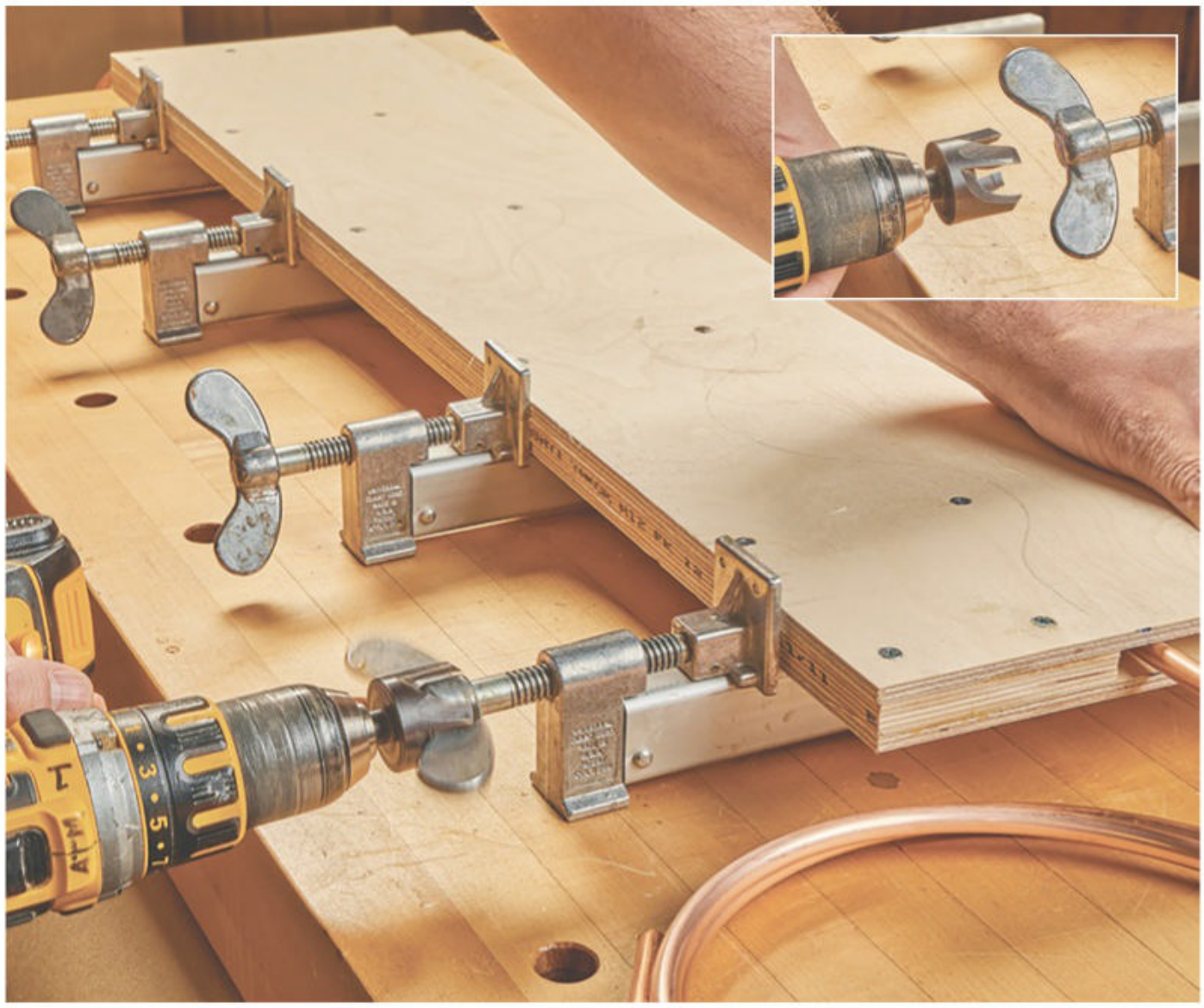


QUICK TIP

COOKING OUT THE WATER

When I realised that the dowels I was about to use had swollen in the humid weather and wouldn't fit in the holes for the dowel joints, I had an idea! I decided to cook them in the mircrowave in 30-second increments to dry them back to their normal size.

Dana Myers



PLUG CUTTER CLAMPING

I was using a bending form to shape pieces of copper, which meant tightening, untightening and tightening those bar clamps over again. Then I noticed a 2.5cm plug cutting bit collecting dust. The gaps in the teeth were large enough to fit around the clamp handle. By chucking the cutter up in a drill, I could quickly loosen or tighen my clamps, saving some significant time.

John Doyle

Next issue of *Australian Woodsmith* on sale 7th April 2022 - Issue 169

In our next issue we take a look at helical cutting heads and do the maths on why more cutters are better than less. We visit the new Japanese Tools Australia workshop and see how Christian Timbs uses a potter's wheel to flatten the backs of blades. In our techniques section we give you the rundown on flattening large surfaces. We also look into micro sanders and see what doors they can open up. The weekend project is focused on kitchen tools while the workshop project is a mitre saw station. The designer project is a challenging curved dovetail box and the heirloom project is an elegant tall clock. The turning challenge is an awesome asymmetrical lidded jar. As usual we feature clever tips and techniques from our generous readers.

BRISA ULU BLADE

Ulu blades have a 4,500-year history as a knife used by the First Nations people of Canada to skin and dress animals. Today this style of blade is most often used to chop herbs.

Knife making is a hobby that has grown in popularity in recent years. It is a hobby that takes up little bench space and rewards its maker with a tool that can be used every day. One path into knife making is to purchase a kit from Nordic Edge and see if the skill set required to assemble the knife gives you a sense of challenge and achievement.

The Scandi grind stainless steel Ulu kit is one way to start your journey into knife making. You can purchase the blade itself and supply your own scales and rivets, or you can purchase a kit that has all the parts you need.

The kit comes with a super sharp ulu blade ground on both sides to 23° (a Scandi grind) and two matching scales predrilled to accommodate three ¼" brass Corby bolts. What you need is some slow-setting epoxy to glue the scales to the blade and then elbow grease, a file and some abrasive paper to file the Corby bolts flush and the scales smooth. The blade itself comes to you with a cardboard cover. After inspecting the blade, you need to return it to the sheath while attaching the scales.

I chose the Extreme Grade curly birch scales in my kit, however you can purchase the blade itself (and three Corby bolts) and use your own special stock for the scales if you like.

Knife making is a rewarding pastime. You start with a kit, get the bug and then start forging your own Damascus steel blades!

Available from Nordic Edge (nordicedge.com.au).

Boys' Toys, Books & Gear

DS300 BENCH DISC SANDER

Disc sanders have undergone a makeover in recent times. If you do a search for disc sanders, you will notice most now have a cover that only exposes a quarter of the face of the disc. The issue here is that accidents and injuries have occurred when the user was not paying attention to the upward rotation of the opposite side of the disc. The downside of this "safety" guard is that it limits the utility of a disc sander.

Disc sanders work best if the whole upper face is exposed. The machine will have an arrow that indicates the direction of rotation, communicating to the user that stock to be sanded needs to be placed on the downward side of the disc rotation. Marking the centre of the bed and cross hatching the upward rotation side is simply done with a marking pen.

Gliding stock across the downward side of the disc at a slight angle allows you to sand wider sections of stock without it catching on the upward rotation.

The DS300 is an economical and versatile direct drive sander that can sit on your bench and solve lots of sanding problems. The cast iron table tilts through to 45° and accommodates a cross slide so you can repeat angles over and over again with confidence. The handy brake allows you to stop the disc in a moment when adjusting angles, while the dust port tucks neatly under the table, ready to be connected to your extraction system.

Available from Hare & Forbes Machinery House (machineryhouse.com.au).

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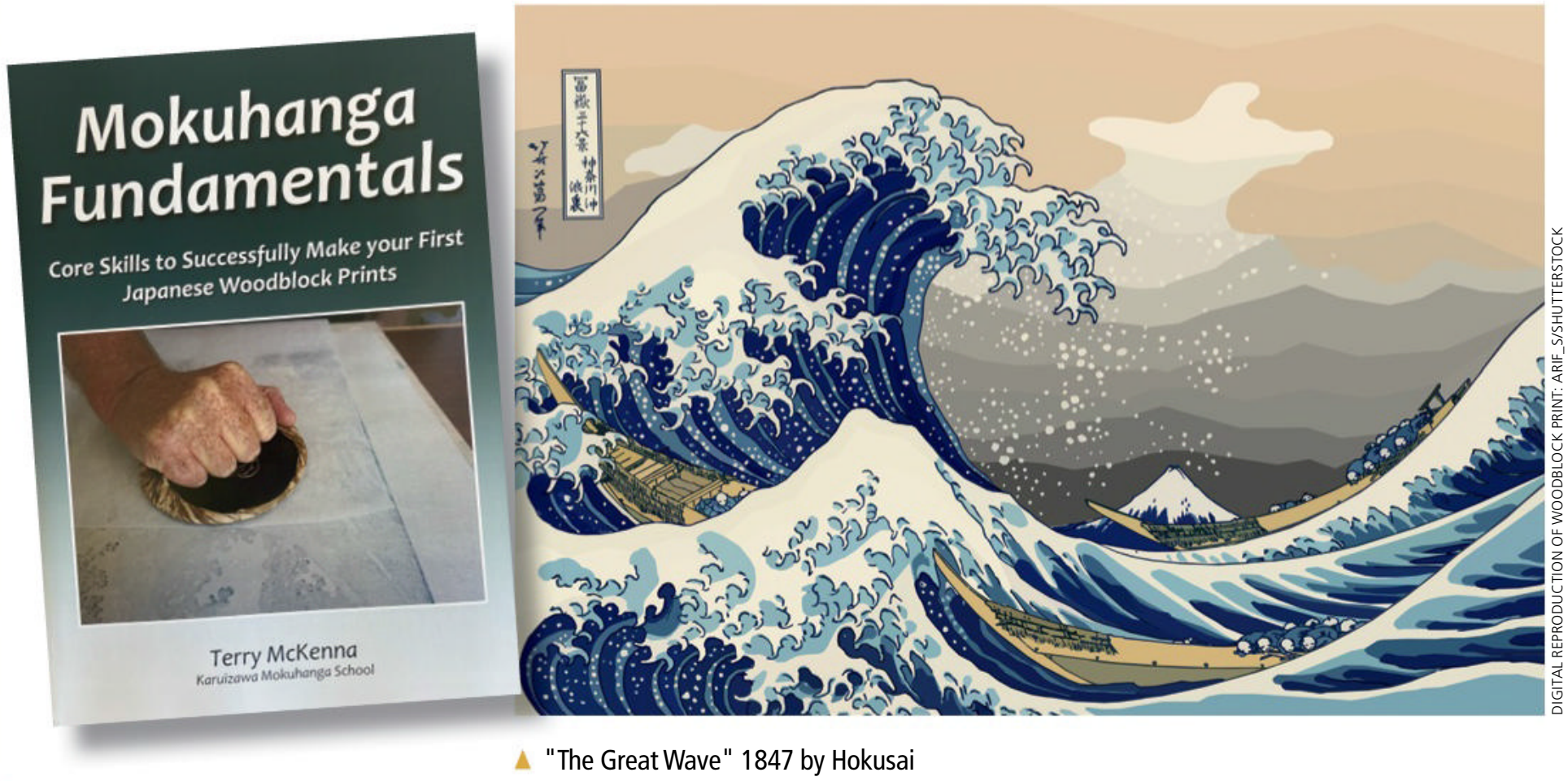

DIGITAL REPRODUCTION OF WOODBLOCK PRINT: ARIF_S/SHUTTERSTOCK

▲ "The Great Wave" 1847 by Hokusai

MOKUHANGA FUNDAMENTALS

By Terry McKenna

Mokuhanga translates as wood + board + picture or woodblock printing. One of the most famous woodblock prints is *The Great Wave* by Hokusai. Terry McKenna points out on page 12 of his very informative guide to the craft that Hokusai was the artist who drew the iconic drawing, however it was a group of highly-trained Edo-period artisans who carved the wooden blocks used to transform the artwork into a print.

Terry is an Australian artist who now runs the Karuizawa Mokuhanga School in Japan. The school hosts online courses as well as residency programs, all aimed at promoting the craft.

Typically, with all Japanese woodworking skills, tool sharpening is paramount. Terry has a chapter dedicated to sharpening chisels and gouges. This chapter is complemented by tutorials on the schools' YouTube channel (mokuhangaschool). I recommend these free tutorials for anybody interested in keeping a keen edge on any chisel or gouge.

The full title of the book includes "Core Skills to Successfully Make Your First Japanese Woodblock Print". Terry takes you step-by-step through the process of woodblock printing and even gives you a design to trace for your first attempt at this craft.

The book introduces the reader to mulberry fibre paper (washi) and explains why Western cotton and wood fibre-based papers are not appropriate for woodblock printing. Terry is a visual person with a gift for clear instructions (via drawings, photos and video) happily opening doors that will allow others to be swept away by this delightful craft.

At the end of the book Terry lists Japanese Tools Australia as the best place to purchase carving chisels (they also stock his book and a selection of washi). Available from Japanese Tools Australia (japanesetools.com.au).

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Max. cutting capacity on upper table	55mm

**Can be connected to an extraction unit, hose or wood not included*

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Installing Auto Blast Gates

Robertson Men's Shed's state-of-the-art dust extraction system is a team effort that has paid off in spades!

Robertson Men's Shed, in the Southern Highlands of NSW, held their first meeting in 2017 and officially opened their brand new shed in February 2021.

Part of the construction grant funding was used to install a state-of-the-art dust extraction system. To save money the plan was to design and build the system inhouse.

RESEARCH

Members, led by President John Kennis and committee member Mark Keech began the research.

Part of this process involved visiting Helensburgh Men's Shed to have a look at their dust extraction system. Helensburgh shed had recently updated their system installing components from Auto Blast Gates Pty Ltd (ABG).

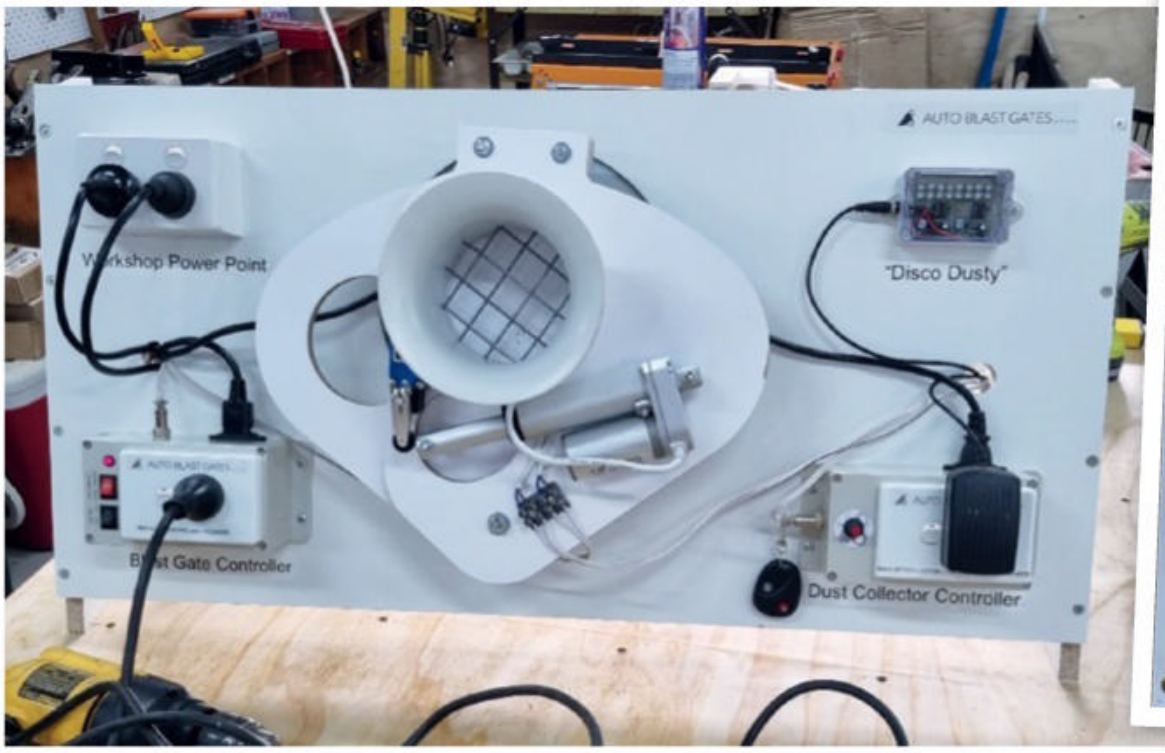
Mark Keech contacted ABG and began designing the dust extraction system calling on their wealth of experience and knowledge (see *Australian Woodsmith* Issue #157). They had an answer for every question and a solution for every problem that was encountered.

As a result, the shed purchased a Clear Vue Cyclone CVMAX extractor, many, many metres of 250mm and 150mm PVC pipe, boxes of pipe fittings and connectors and 12 auto blast gates and associated electronic 'black boxes' (including a clever VFD). The system was built around a 250mm spine stepping down to 150mm pipe for each auto blast gate closer to each machine.

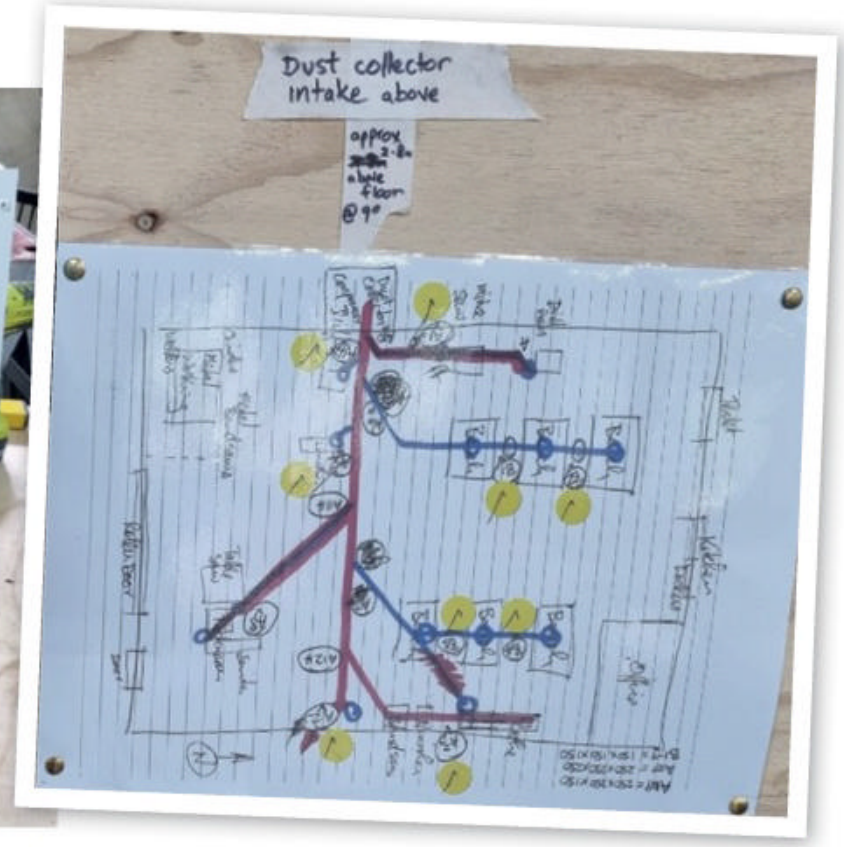
Standard 100mm machine dust outlets were modified to accept 150mm connections.

The 150mm and 100mm automated blast gates the shed used are made in Australia using laminated marine ply and PVC ducting. Unusually, the electronic blast gate controllers are also made by Auto Blast Gates in Australia.

▲ The thicknesser has a direct connection to the 150mm extraction hose.



Auto Blast Gate's demonstration board. The blast gates open when the machine it is connected to is switched on and close when it is switched off.



The "mud map" drawing that was used to plan and plumb the sytem. Red indicates 250mm-dia, blue 150mm.

INSTALLING THE SYSTEM

This high volume system was made even more efficient as the auto blast gates only open when a machine is turned on. The blast gates close when the machine is shut down, maximising the efficiency of the system at all times. Additionally, turning on any machine connected to an auto blast gate activates the dust extractor. The extractor itself was housed outside the shed in its own insulated hut.

ABG explained to the team that they needed to mechanically connect the ducts due to vertical runs for example, they should use screws such as euro screws that do not penetrate the inner PVC duct and hence create a potential static discharge point. Galvanised strapping was used to support the PVC ducting and also earth the ducting to the shed's steel frame.

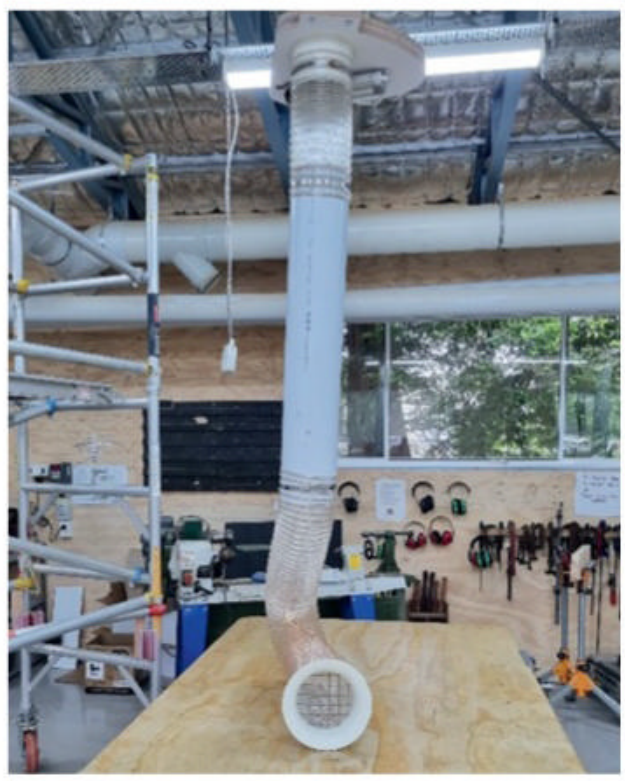
The most amazing "black box" that Auto Blast Gates suggested was a Variable-Frequency Drive (VFD). This clever box of tricks controls the speed of the fan in the dust extractor, allowing it to be put in quiet mode (40Hz) on the weekend and full power (60Hz) weekdays.

A VFD also allows you to run most 3 phase machines on a single phase supply which is often a much cheaper option than having a 3 phase supply connected to the workplace.

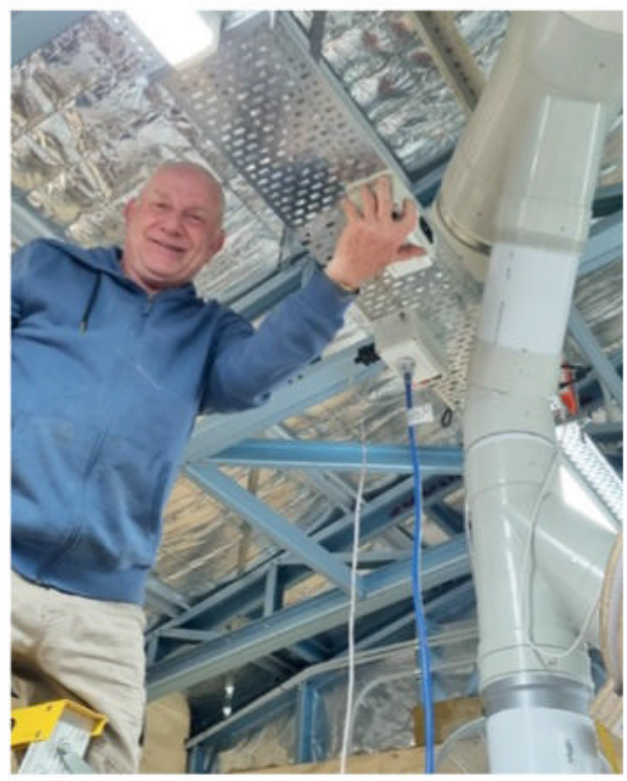
One of the underlying design principles behind the Auto Blast Gate system is that each gate and associated controller is a stand-alone unit. This means you could start your home shed extraction system with just one gate and then expand your system, with additional gates, in the future. This system can be installed with basic tools, there is no need for an electrician. All components plug straight into your workshop power outlets.

ABG's automated blast gate system and their insight into dust extraction systems were a godsend for the shed! W

The jointer required a 150mm step-down fitting to connect to the system.



Bell end bench sweep on the sanding bench. There is also a manually operated floor sweep.



Shed President John, up the ladder, installing a gate controller

Best Abrasives

Christian Timbs has handed over the management of Best Abrasives to a mate.

Dust Busters (not Ghost Busters) Christian and Ryan have clever solutions for your dust problems.

The Mirka flexible file board is perfectly suited to boatbuilding and can be adjusted to match the profile of a hull.

Twenty years working in a high-pressure IT role in the banking industry had Ryan Benson looking for a different career. He quit his job in IT security and started working pro bono for HalfCut.

HalfCut is appalled that half the world's rainforests have been logged and that something needs to be done to stop the Daintree from following suit.

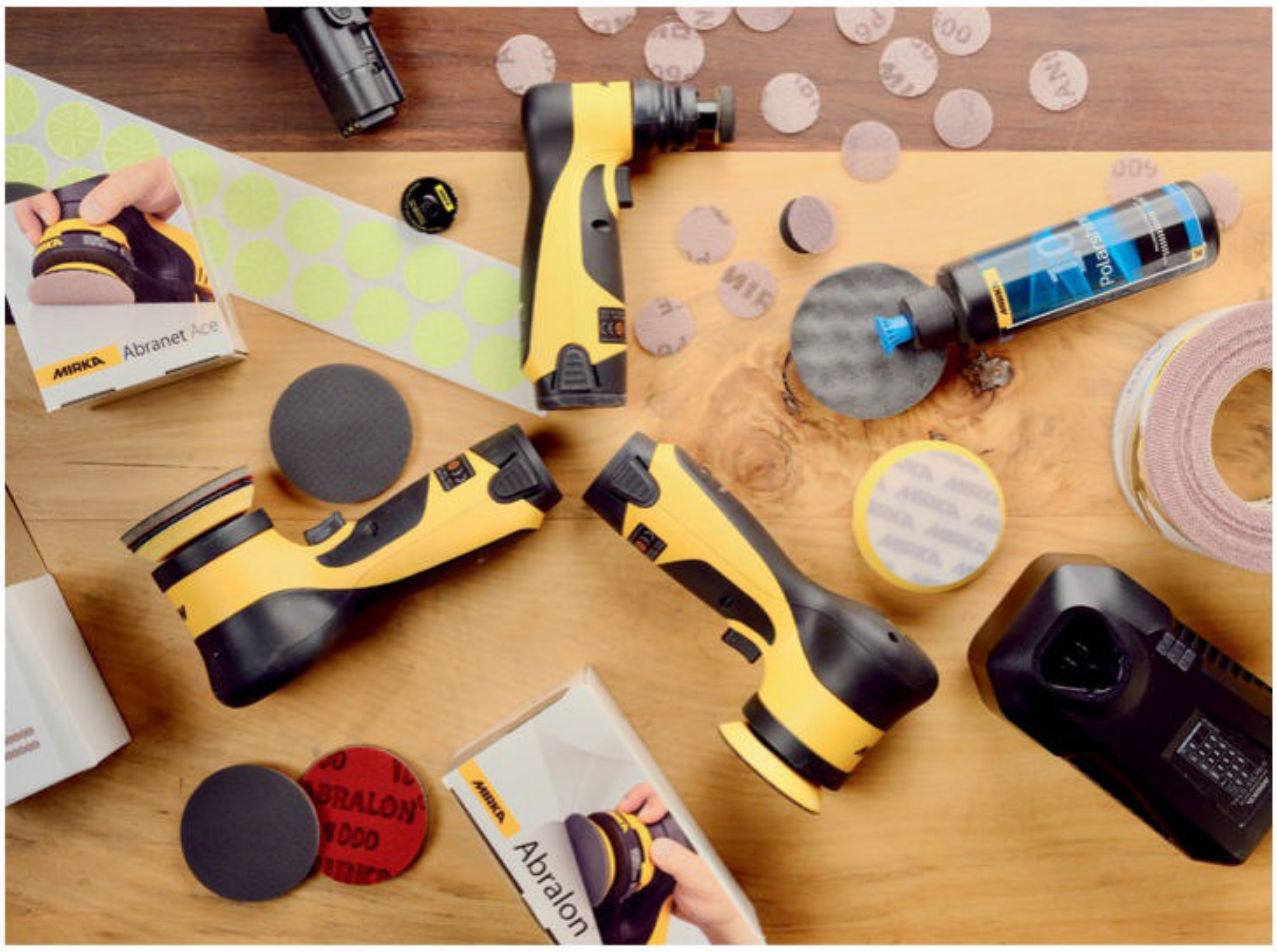
Fast-cutting Iridium and waterproof Novastar are two new "cutting edge" abrasive types developed by Mirka.

The Daintree is the oldest rainforest in the world and deserves to be returned to its indigenous traditional owners and gifted to future generations. A noble cause that Ryan dedicated himself to for 18 months.

Christian asked Ryan to have a look at both of his businesses to give him some management advice. The end result was Ryan taking over management of Best Abrasives so that Christian could focus on Japanese Tools Australia (JTA). Both businesses will continue to run from 29 Production Ave, Kogarah with Best Abrasives taking up the left quarter of the workshop.

Whenever I visit JTA I feel like I have gone to some type of woodworker's version of heaven. There is always a couple of new tools to review and sharpening techniques to learn.

In my last visit Christian introduced me to Ryan and the new tools that Mirka has to offer. The flexible file board



Mirka brushless micro sanders are excellent for spot repairs. These rechargeable sanders allow you to sand and polish in tight spots.

Systainers clip onto the Mirka workstation and can be used to store discs as well as the sanders and sanding pads.

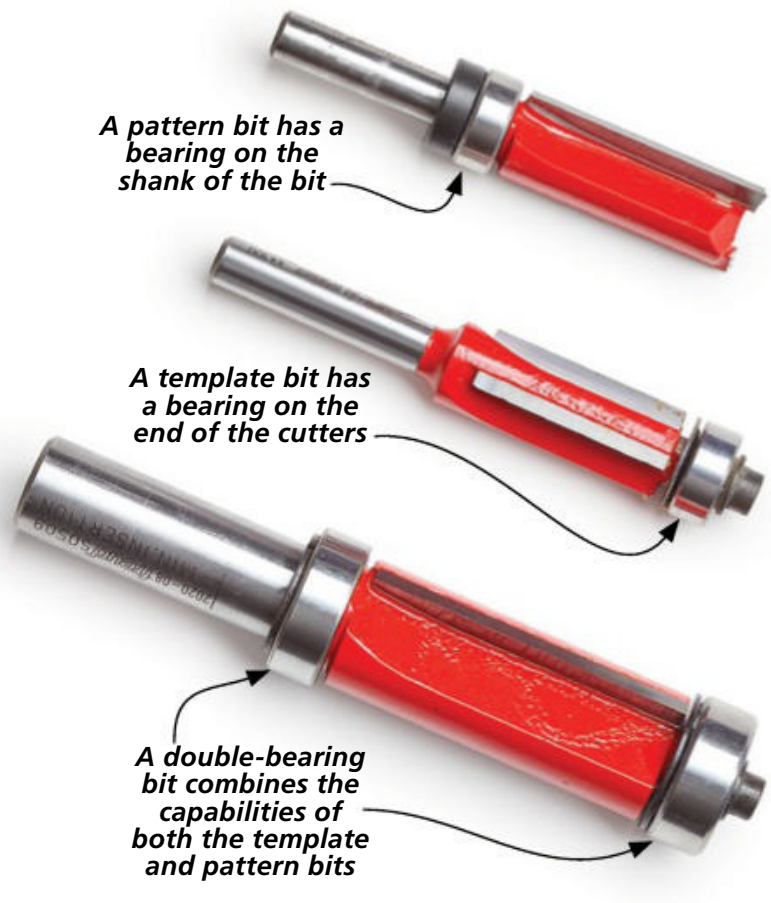
The Mirka workstation has a sock that keeps the power cord out of the way and a holster to house a Deros sander.

explains itself, however the Leros wall sander Christian is holding in the photo on the facing page needed some explaining. It is designed to sand plaster walls effortlessly flat and smooth.

Mirka is a Finnish company that has been manufacturing premium sanders for industry for decades. They continue to develop new types of abrasive systems, always with a focus on dust control, and the efficient use of time. Abranet, Novastar and Iridium have quickly won fans the world over. Abranet cuts quickly and is structured so that dust does not pill. Iridium is a new abrasive that uses a mixture of ceramic and aluminium oxide particles to sand wood to perfection. Novastar uses similar particles on a waterproof film base and is designed for the boat industry. The brushless rechargeable micro sanders are a versatile solution to tight sanding and polishing problems. Whatever your sanding challenge, Mirka will have a solution for you. Drop in if you can and chat with Ryan. W

Mirka sanders set the standard when it comes to dust extraction. Here you see the reason why. The square, round and delta Deros sander pads are full of holes.

Flush Trim Bits



▲ The three basic bits above will cover the bulk of your flush-trimming needs. Start with a template and add from there to meet your needs.

When I first started woodworking, I didn't have a router and created "identical" parts one at a time, measuring, cutting and shaping them one by one. I kept my fingers crossed that they'd match.

After getting my first router and bit set, I was able to create identical parts by making a template and trimming my rough-cut workpieces with a flush-trim bit. Over the years I learned a few tips and techniques for getting the best results.

These tips don't require any specialised bits. For the majority of my work, I use the three basic bits you see at left. My workhorse bit is the flush-trim bit at the top. Its bearing is attached at the end of the bit and I use it in my router table, so I can see the bit in relation to my template, as you can see in the main photo above.

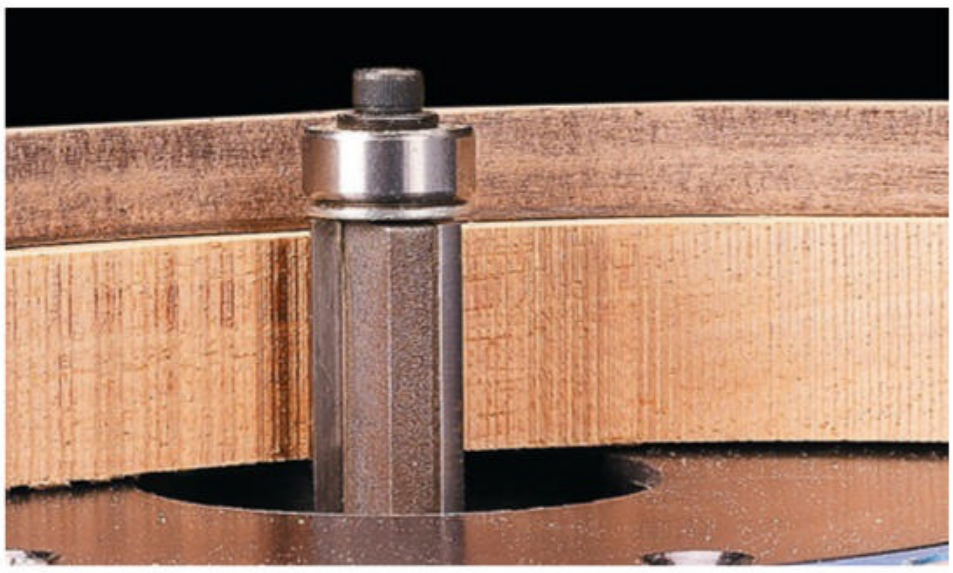
If I need to do hand-held work, I often switch to the pattern bit in the centre. It's where the bearing is attached to the shank. Again, I can more easily see how the bearing and pattern are working together. The third option is to buy a double-bearing bit (bottom). This style allows you to use the bearing that best suits the task at hand.

A TEMPLATE FOR SUCCESS. The whole point of flush trimming is to make a precisely-shaped workpiece using a template as a guide for the router bit. So the results are only as good as the template.

One often overlooked consideration is the thickness of the template. I like to use 5mm Masonite-because it's easy to shape and has a fine consistency.

The challenge is that flush-trim bits have a gap between the bearing and cutting edges. If the template is too thin, it may not allow you to raise the bit high enough to make a full cut while keeping the bearing in contact.

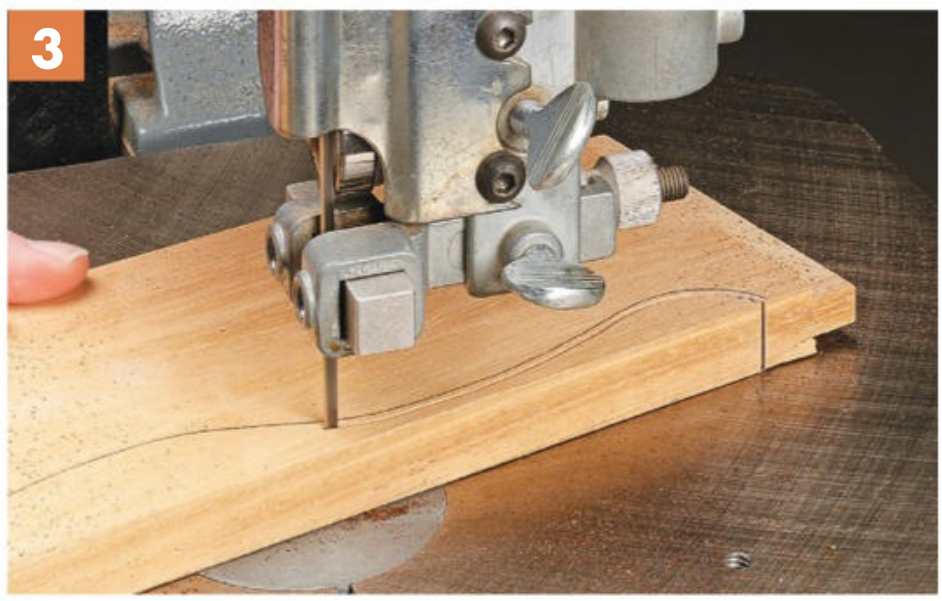
The solution is to glue two layers of Masonite together. The resulting template is still easy to shape and provides a wider



▲ An extra-thick template keeps the entire cutting edge of the bit engaged with the workpiece while the bearing is still fully supported along the edge of the template.

Smooth Start. The shape of your workpiece is going to match the template. This means you'll want to spend extra time sanding the edge as smooth and even as possible.

Accurate Tracing. Once the template is exactly the shape you want, you'll use it to trace its shape onto your workpiece. Use a sharp pencil to make an accurate mark on one face.



A Close Cut. At the bandsaw, remove the bulk of the waste by cutting close to the layout line. The less waste you have to trim away with your flush trim and router means smoother results.

edge for the bit (upper left photo).

SMOOTH AS SILK. Any irregularities in the template will transfer to the edge of the workpiece. So it pays to take extra care and make the template as smooth as possible (upper right photo). Time spent smoothing the template means less work later on your actual workpieces.

▲ To secure the template to the rough-cut workpiece you can't beat double-sided tape. A single strip or even a few shorter pieces is all it takes to make sure the template doesn't shift as you work.

LESS IS MORE. Before you start routing, there's another important thing to keep in mind. It has to do with the amount of waste material you need to remove. To avoid spoiling the workpiece, it makes sense to stay away from the line as you remove the waste. Removing the remaining material in one pass, however, puts a lot of stress on the router bit and can cause the wood to tear.

The solution is simple. After tracing the template (lower left photo above), aim to leave just 3mm of waste, as shown in the lower right photo. This is easily handled by the router and is quicker than routing in most cases.

ATTACHING THE TEMPLATE. The final step before routing is to attach the template to the workpiece. Double-sided tape is the key here, as you can see in the photo at left. It securely holds the template in place while still making it easy to remove and reuse for the next workpiece.

ROUTING

With the template taken care of and securely attached to your workpiece, you're ready to create a perfectly matched part. Here are the tips I follow for success.

THE BASICS. Trimming a workpiece flush is a simple matter of making a smooth, steady pass along the edge (photo at right). Straight sections and areas that are gently curved are easy to take care of this way.

As you do this, it's best to take a look at the amount of waste that needs to be removed. Sometimes, I'll end up straying away from my layout line when I'm using my bandsaw to remove the bulk of the waste. The result is having to rout away more material than I'd like to. In situations like this, I find it best to take some skim cuts first. This way, I can knock down the high spots before making my final pass with the bearing running against the template.

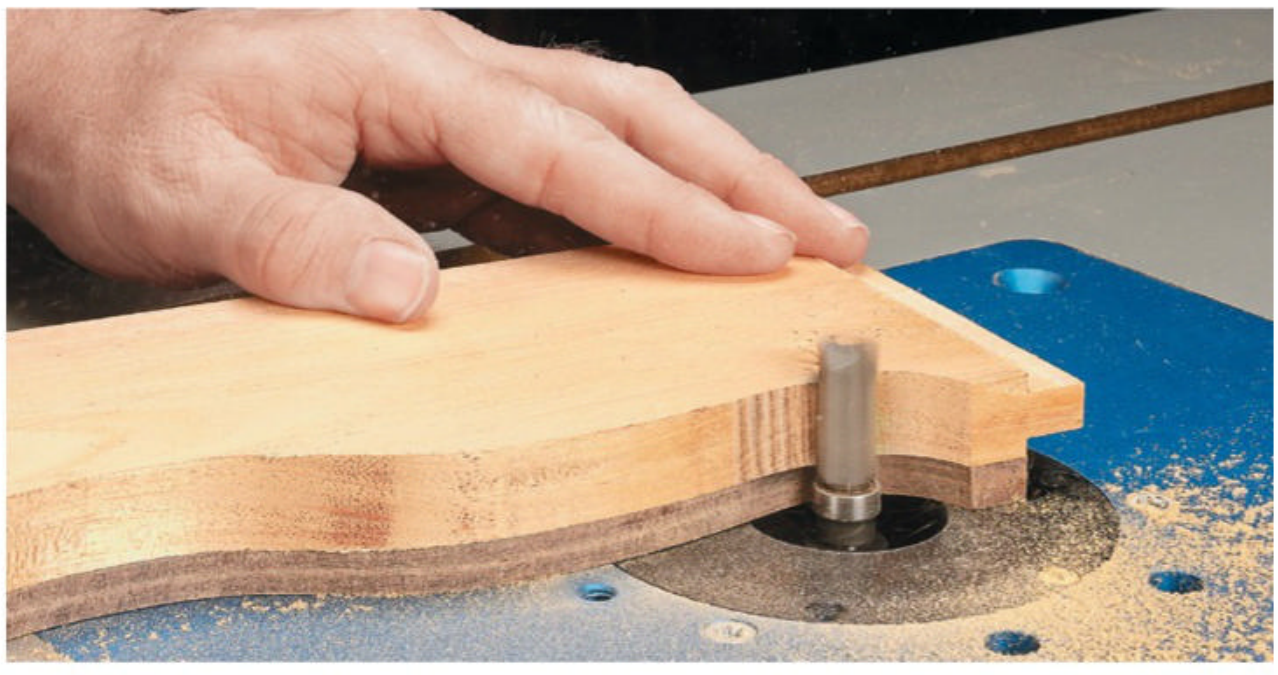
After adjusting the bit height so the bearing rides along the edge of the template, creating a matching part is easy. Make a steady pass along the workpiece with the bearing firmly against the template.

CURVES & GRAIN. Another thing to pay attention to as you're routing is the grain direction of the wood. You can see what I mean in the photo below. On certain sections of a curved workpiece, you may find you're routing "uphill" against the grain. Because the wood fibres aren't supported, the wood can tear as the bit trims away the waste.

There are a couple of options for dealing with this. The first is to take light, freehand passes, similar to knocking down the high spots. This reduces the amount of waste being removed, so there's less chance of tearout. But this does require careful routing and a steady hand.

PATTERN BIT. A better option is to switch to the pattern bit I mentioned earlier. Since the bit's bearing is on the shank, you'll need to flip the workpiece and template over. This means you'll approach the cut from the opposite direction, and the wood fibres will be supported. Having to swap to a pattern bit to do this is a small price to pay to get a clean edge. For another smooth edge option, no matter what type of flush-trimming you're doing, check out the box below.

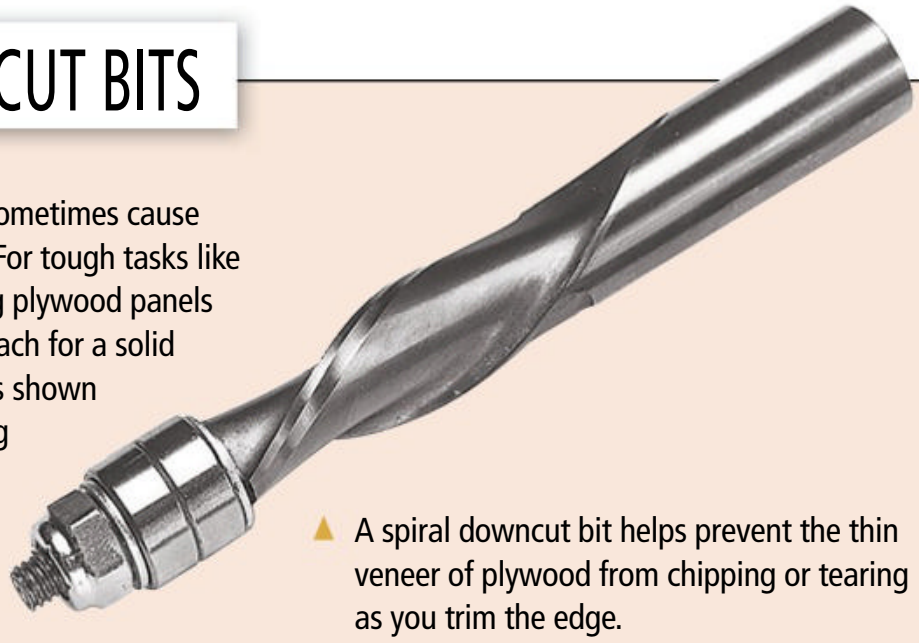
Using these tips as part of your routing approach will yield better results and parts that fit (and look) better. And that means a better-looking project. W



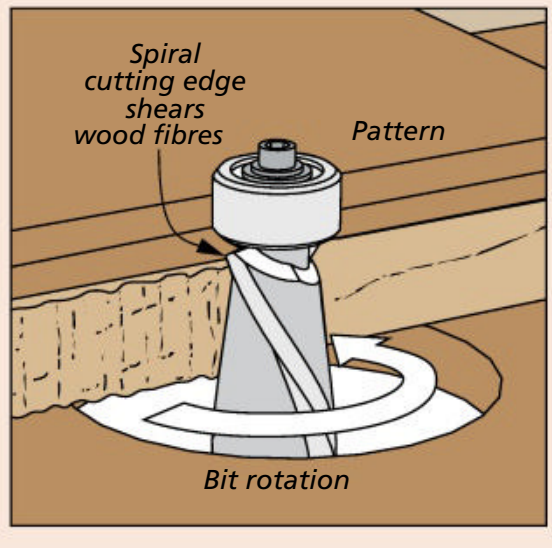
To avoid tearout in tight curves it's best to switch to a pattern bit. This way you can flip the assembly and rout with the grain for a smooth cut.

SPIRAL DOWNCUT BITS

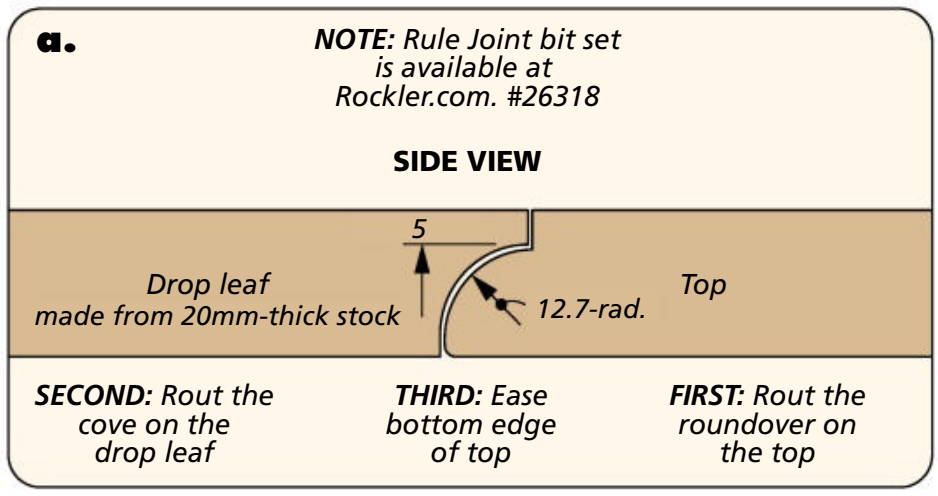
Ordinary flush-trim bits can sometimes cause tearout or leave burn marks. For tough tasks like routing end grain or trimming plywood panels to size (drawing at right), I reach for a solid carbide, spiral downcut bit, as shown at right. The downward slicing action of the cutting edges prevents tearout and leaves a perfectly smooth surface behind.



A spiral downcut bit helps prevent the thin veneer of plywood from chipping or tearing as you trim the edge.



Adding hinges to a Rule Joint



Using a rule joint between a fixed top and a moveable drop leaf ensures that the two pieces will align perfectly and operate smoothly for the life of the table. As you see in detail 'a' above, a rule joint consists of two profiles that you'll create with a matching set of router bits.

ROUNDOVER FIRST. The first profile is a roundover that gets routed on the edge of the top. Note that the roundover is recessed from the top, creating a ridge on the upper portion of the profile. On the drop leaf the profile is inverted, it's created with a cove bit. It has a flat spot that matches the ridge on the top and adds rigidity to the edge of the drop leaf. As for the cove on the drop leaf, sneak up on that by routing the edge in multiple passes.

I chose to rout both profiles at the router table. You don't want any fluctuation in the depth of either profile that would lead to the joint not operating smoothly. So I used the router table fence and featherboards when routing both pieces. Now you're ready to install the hinges that bring the rule joint together.

TWO MORTISES. To make the rule joint work smoothly without binding, drop-leaf hinges have to be installed properly.

As you can see in the drawing below, the hinge barrel isn't centred over the joint line. It sits back from the edge of the top and is mortised in along with the short hinge leaf. The long hinge leaf extends across the joint line. What this means is that you'll need to cut shallow mortises for the hinge leaves and then a deeper mortise (or pocket) for the barrel.

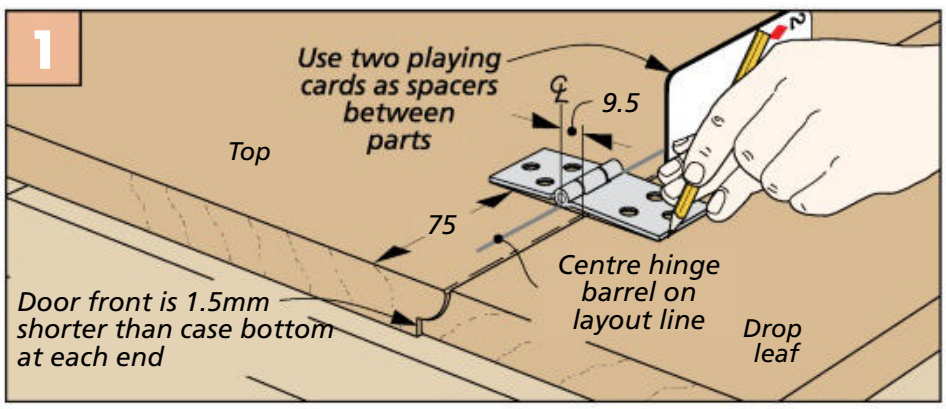
CAREFUL LAYOUT. The first step is to lay out the mortises for the hinge leaves, as in Figure 1. Start by marking the side-to-side position of the hinges on the top and drop leaf. Then measure back 9.5mm from the edge and mark a line locating the centre of the hinge barrel.

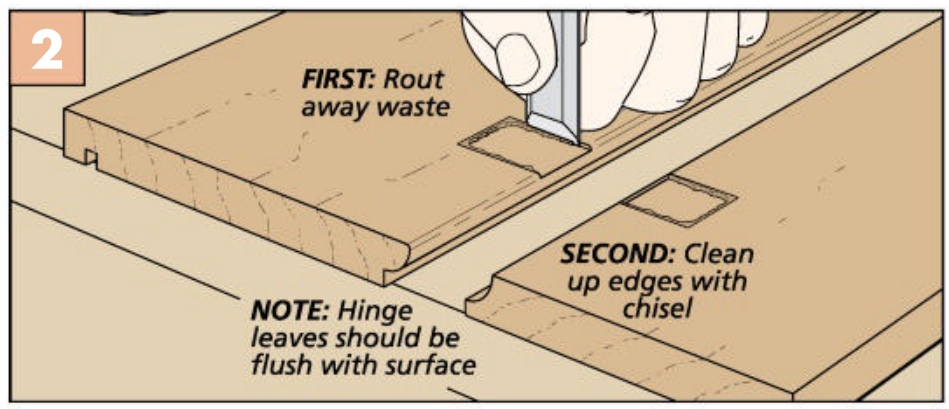
Next, slide the top and drop leaf together with a couple of playing cards between them as spacers. Lay the hinge in position (barrel up) on the layout marks and use it to mark the outline of the mortises in the case bottom and door. Just make sure the barrel of the hinge is centred over the layout line.

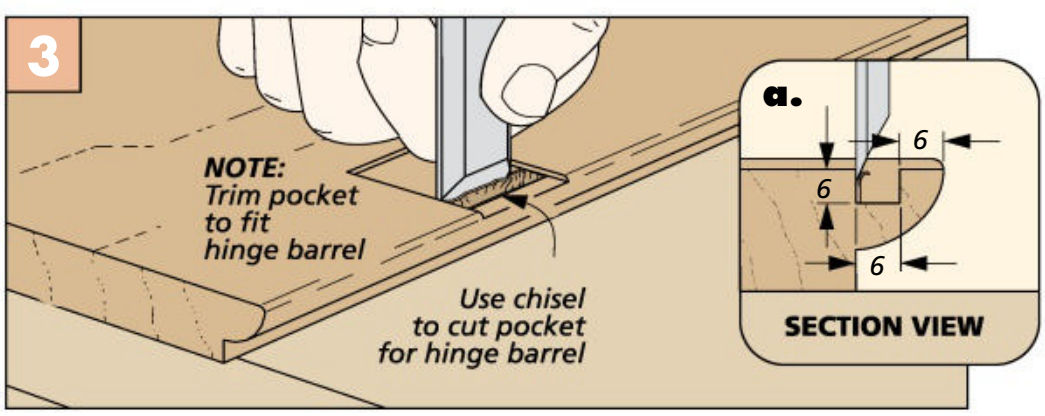
THE LEAF MORTISES. With the layout complete, I got out my router and installed a straight bit. This allows you to quickly rout away the bulk of the waste from the shallow mortises. You'll get a consistent depth and a flat bottom. Finish the mortises by using a chisel to clean up around the edges (Figure 2).

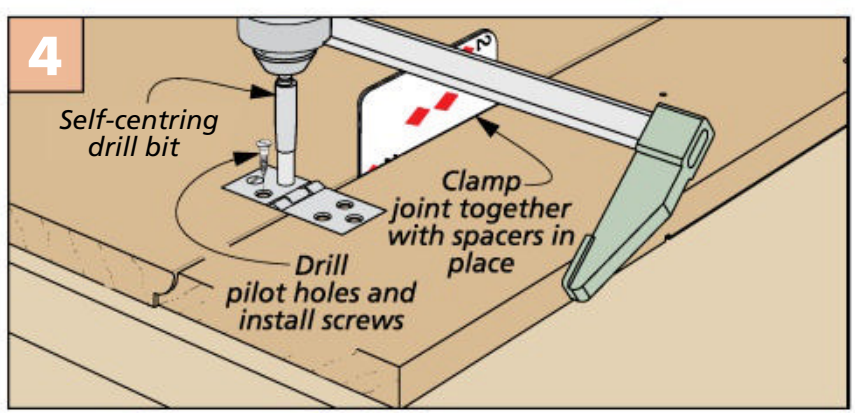
THE BARREL MORTISE. Now, you need to cut a pocket for the hinge barrel (Figure 3). This won't show, so a perfect fit isn't necessary. You can get the job done quickly with a pair of chisels. Again, just make sure the pocket is positioned accurately, as shown in Figure 3a.

ASSEMBLE THE JOINT. Once the pockets are cut, you can fit the hinges into the mortises and assemble the joint. A self-centring bit makes drilling the pilot holes easy (Figure 4). Then simply install the screws.

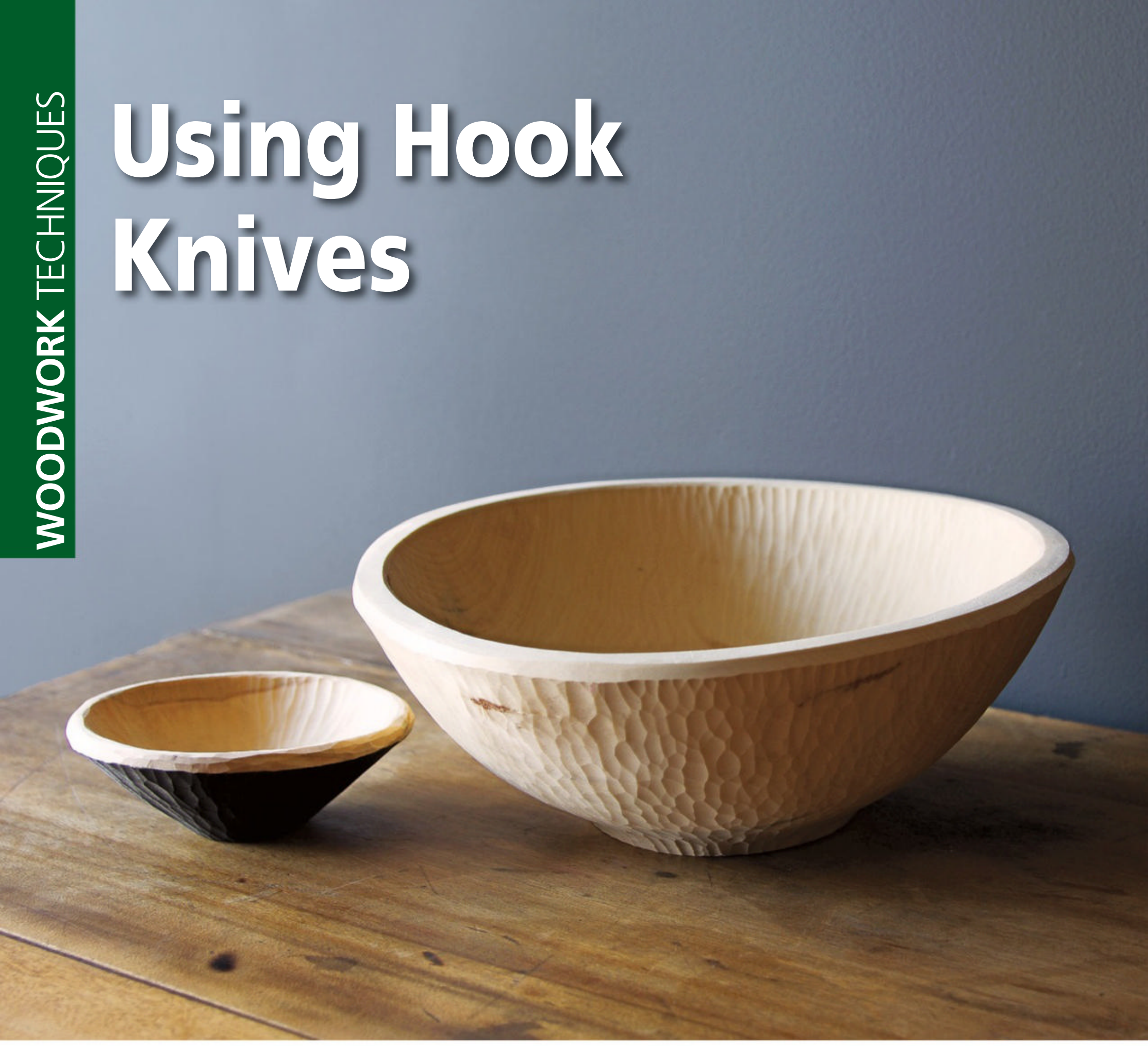








Using Hook Knives



Hook knives do a great job of creating concave shapes and, depending on their design, could be used from start to finish when hollowing small, shallow bowls. You could even start your cuts with a gouge then move on to the hook knife only when your gouge stops performing well. This uses different muscle groups and helps prevent fatigue and injury.

THUMB AS A BRACE

To create a shallow bowl like the one made with a bent gouge, but with a hook knife, again start by taking a cut across the grain in the centre of the hollow. Use your thumb to brace against the side of the blank to create leverage and maintain control.

A left-handed hook knife (with the sharp edge on the right side of the blade) can be pushed by a right-handed carver (photo A on the next page) or pulled by a lefty, and the opposite for the right-handed blade (with the sharp edge on the left side), which is pulled by a righty (B) and pushed by a lefty.

When pushing the blade, your non-dominant thumb acts as the safety, offering support behind the blade and never loses contact with it. When pulling the blade, your dominant thumb is the safety. The squeeze of your hand toward your thumb will drive the cut, while your thumb will provide the stability to offer some resistance and allow you to engage the edge of the tool throughout the entire cut, making slight changes to accommodate the various shapes.

TEXT & PHOTOS COURTESY OF DANIELLE ROSE BYRD

TECHNIQUE PREVENTS INJURY

So how do you avoid cutting into your thumb? Practice, awareness and the type of grip used are all factors in avoiding this nasty little injury. If you extend your thumb far enough away from the hook's cutting trajectory or on a different plane, while taking heavier cuts, the natural squeeze of your grip usually doesn't allow for the hook to reach your thumb.

Adopting this safe grip early on will help to make it a habit. Some cuts can be made while your thumb is very close to the cutting edge, and just as with many things, it requires skill and technique to avoid injury. This type of cut is made when only a small amount of material needs to be removed, and so not much movement is necessary.

The grip starts tight with your hand choked up on the handle, (C) and small squeezes are all that's needed to allow for subtle movements of the tool edge (D). By choking up on the handle of the tool, you're automatically limiting its range of motion, which decreases the chance of injury as well.

PUSH/PULL TECHNIQUE

Continue working as deep as the hook knife will allow without chattering. Skew the blade slightly in different directions to see which will give you the smoothest cut.

As you go deeper, you'll expose more end grain on either end of the bowl. The relationship between end grain and long grain poses similar grain difficulties as in previous bowls no matter what tool you're using, so working end grain on either end of the bowl (either inside the hollow or outside) will take more force than cutting with the long grain.

This is where the push/pull method becomes particularly important. Establishing an anchor allows you to both exert the amount of force needed to get through the end-grain cuts, and the resistance needed to avoid gouging another part of the bowl once less force is required. A considerable amount of skill and control is crucial to ease off the tool while still engaging the knife's edge for a continuously smooth cut.

▲ Working across the grain allows you to remove material quickly. Use the thumb on your other hand to drive the blade forward.

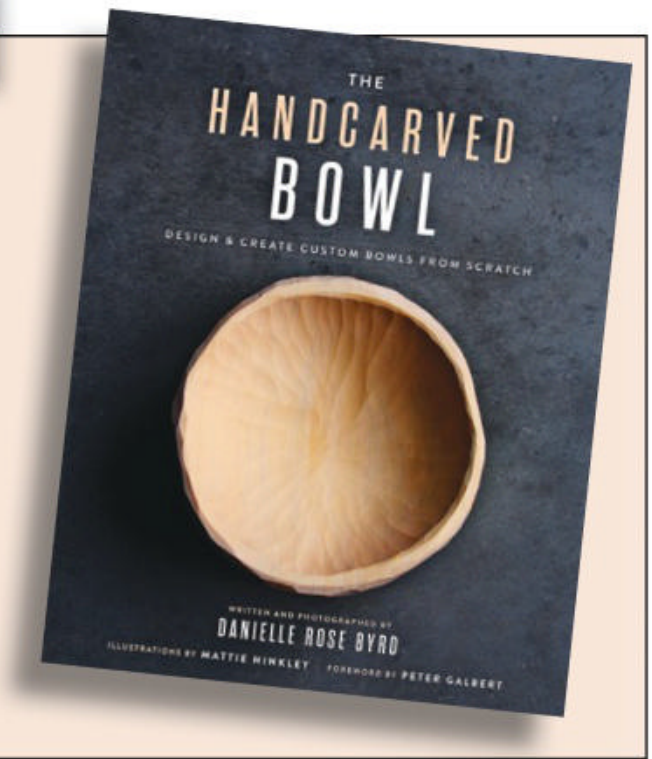
▲ Another option is to pull the knife using your dominant hand. Keep your thumb tucked below and away from the path of the blade.

▲ For fine, trim cuts, extend your hand with your thumb protected. Choke up on the handle for maximum control.

▲ Slowly squeeze your hand together to make the cut. Sweep into and out of the cut to make crisp, blended cuts.

HAND TOOLS & BOWLS

Creating wood utensils like bowls, spoons and cups connects many woodworkers to the material like no other project. Using a handmade utensil is just as personal.
In her new book *The Handcarved Bowl*, Danielle Rose Byrd presents woodworkers with a tree-to-bowl look at the process. In addition to several bowl styles, you'll find an in-depth discussion of tools and sharpening.
This article is excerpted and adapted from the book with permission.

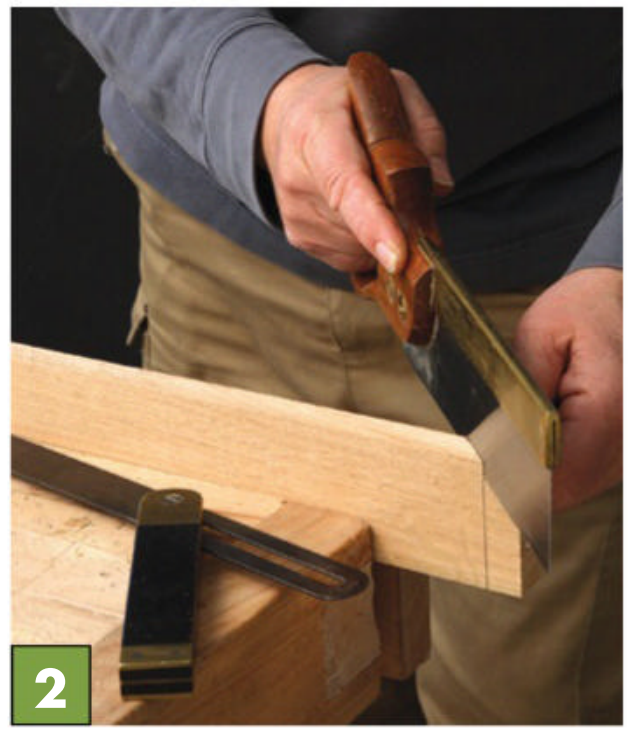


Spline Joints

John Bullar reveals a great method for fixing mitred joints.

PHOTOS: JOHN BULLAR

1



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4

A spline is the traditional name given to a long thin strip of wood. The spline joint works by holding the mitred corners of a frame together with one or more splines. These are glued into slots cut through both sides of the corner.

In this article I'll show you how to make simple lightweight spline joints using hand tools. Simple spline joints can be used for small-scale work but they do not have much strength, so I'll also look at making a sturdy alternative called a keyed spline joint, made with basic power tools – a mitre saw and a small router fitted with a dovetail cutter.

Preparation

1 First, all the wood needs to be planed straight and square before marking out or cutting spline joints. When you plane narrow edges, pinch the front of the tool between fingers and thumb so as to guide it underneath with the fingernails – this keeps the plane central and the edge level. To plane the wider faces, grip the front knob of the plane. Remember to press down the front and support the weight of the back of the plane at the start of the stroke, and press down the back, supporting the plane's front, at the end of the stroke.

Simple spline joints

2 After marking 45° lines across the edges and right-angled lines across the faces, saw carefully down the lines to produce a mitre joint. Alternatively, use a mitre box to guide the tenon saw blade, or use a mitre saw with its own adjustable frame to guide the blade automatically to the correct angle.

3 With both sides of the joint sawn to 45°, clamp them so the mitred ends are butted together in alignment to make a right-angled joint. Now make a series of saw slots, or kerfs, across the pair of ends, slanting the saw one way and then the other.

4 The spline itself is a thin strip of wood sawn along the grain direction. This needs to be cut to match the thickness of the kerfs – quite a tricky job. Cut a strip of spline, and then try to fit it in the slot. If it is too tight or too loose, adjust the next one accordingly. Alternatively, set up a bandsaw with the fence adjusted close to the blade, so you can run off strips of wood to make splines.

Glue-up

5 Squeeze PVA glue into the kerfs from the nozzle of a glue bottle. Press the nozzle tight against the wood so the glue is forced into the slot. Don't apply glue to the strips of spline as this would just scrape off as you pushed them in, making a mess outside the joint.

6 Slide the splines into the slots, easing them by rocking from side to side as they work their way in. The glue will act as a lubricant, but work fairly quickly once you have applied it, as water from the glue will swell the wood and soon make it tight.

7 Once the glue has set but before it is too hard, pare away the surplus wood from the splines outside the joint, using a razor-sharp chisel. Remove any traces of glue from the chisel immediately as the water in it will pit the steel.

Keyed spline joints

8 Modern benchtop mitre saws make cutting joints like this at 45° – or any other angle – a piece of cake. The skill comes in accurately setting up the saw and then using it safely.

9 Once the machine has been set up, copying the mitre angle time and again is easy. Ensure the wood is tightly held against the fence. Use clamps to secure it if necessary, particularly when the wood is short.

Get it taped

10 An additional check on the accuracy of your 45° mitres comes when you butt the ends together as a joint. Any error in the adjustment of the mitre saw will be doubled when you join two ends together to make a right-angle corner. This error would be multiplied by eight when you joined the last corner of a square frame.

11 Use sticky tape around the outside of a mitre joint to bind it together while you cut the splines. This might sound crude but it is a very effective trick, so long as the wood is dust-free and the tape can stick.

12 Tape securely stuck across the outside of both halves of the joint is stretched as you fold the mitre together, keeping the outer corners tightly in alignment, ready for the next stage.

QUICK KEYS

Dovetail keys lock a mitre tight and are a quick and efficient way to make a cabinet full of drawers in an afternoon.

Once you have tweaked your mitre saw to perfection and dressed your stock square, all it takes is a stop set to the depth of the drawer and off you go. Flipping the stock after each cut reduces waste and minimises the number of mitres you will need to cut. Once you have your sides cut, set the stop to the length of the drawer front and repeat the process.

After you have glued and tapped the first drawer (and checked it for square) you can use it as the datum for the rest. Each time you assemble a drawer you should pop it on top of drawer No 1 and tweak it so it is square.

By the time you have finished assembling your drawers the PVA will have "gripped" and you can get on with the job of routing the spline joints.

When all the joints are cut you can slide the splines in place and dress them flush. The last step would be to route a rebate for the drawer bottom and insert a base.

In the vice

13 Use the front vice on a workbench or alternatively a Workmate-type vice. Measure the distance from your router base to cutter centre. Clamp a straight-edged offcut of wood alongside the vice jaws and perfectly parallel to them. This offcut will act as a fence to guide the router cutter in the gap between the vice jaws.

14 Clamp the taped-up mitre joint in the vice jaws at 45°, with the corner just level with the top of the jaws.

Routing the keyways

15 Adjust the router so the full cutting length of the dovetail bit just protrudes through the router base. Now route a keyway slot through the taped-up mitre joint that is clamped in the vice. This needs to be cut in one slow, steady pass with the motor running full speed. The visual balance you want to strike is to have the keys set a little over a quarter of the board width.

16 Lay a straight-edged offcut alongside the fence to shift the router across, ready to make a second keyway slot through the taped-up mitre joint. Or you could remove the frame from the vice and rotate so that the second key is located exactly the same distance in from the side.

Fitting keys

17 Use the same dovetail cutter bit to shape both sides of the edge of a piece of contrasting coloured wood. This will form a tapered key suitable to fit the keyway slots in the joint. This calls for a careful clamping arrangement to make the key fit the slot and to avoid the router marking the vice.

18 After shaping with the router, the key material is sawn off the edge of the wood and then sawn into short lengths. These are suitable to act as spline joints fitted in the tapered slots cut in the mitred corners.

19 With the slots glued, the tapered keys or splines are all fitted and the frame clamped tightly together while the glue sets. Next, cut the excess length from the keys to make them flush with the outer faces of the frame.

20 Finally, plane the frame flush so the tapered keys are revealed as a butterfly patterned feature, enhancing the appearance of the joint and displaying its excellent strength.

WEEKEND PROJECT

Bathroom Storage Cart

This little bathroom cart is the perfect solution to any area that needs a little extra storage. The stainless steel accents add a modern twist to the overall design.

Storage needs in a bathroom are pretty minimal — a few toiletries, towels and a handful of rolls of coveted toilet paper are the normal things to keep at hand. In a bathroom that features a pedestal sink, storage for these types of items is usually lacking. And it was that need for storage that led us to the storage cart you see here.

CLEAN, SIMPLE STORAGE. As you can see in the photo at right, the cart features three shelves that pack in storage that's easily accessible. A pair of stainless steel rods guard each shelf to keep the items in place if you roll the cart around. The top of the cart not only acts like a shelf as well, but it also features two small stainless steel rods that do double duty — they can serve as handles to move the cart, or the perfect place to fold up and hang a small hand towel.

The cart itself is small, compact and perfectly sized to slip between a pedestal sink and the wall. But, don't let its size fool you. It's a fun build that packs in some great woodworking that you can take with you and apply to other projects. So, let's head to the workshop and get started.

▲ The stainless steel rods are a good contrast to the walnut used on the cart. The rods on the top of the cart do double duty — they can serve as handles or a place to hang a towel.

▼ Notch and tenon joinery creates not only a strong, rack-free joint, but also one that looks great as well. The mortised-in castors allow you to roll the cart out to access the shelves.

Start with the SIDES

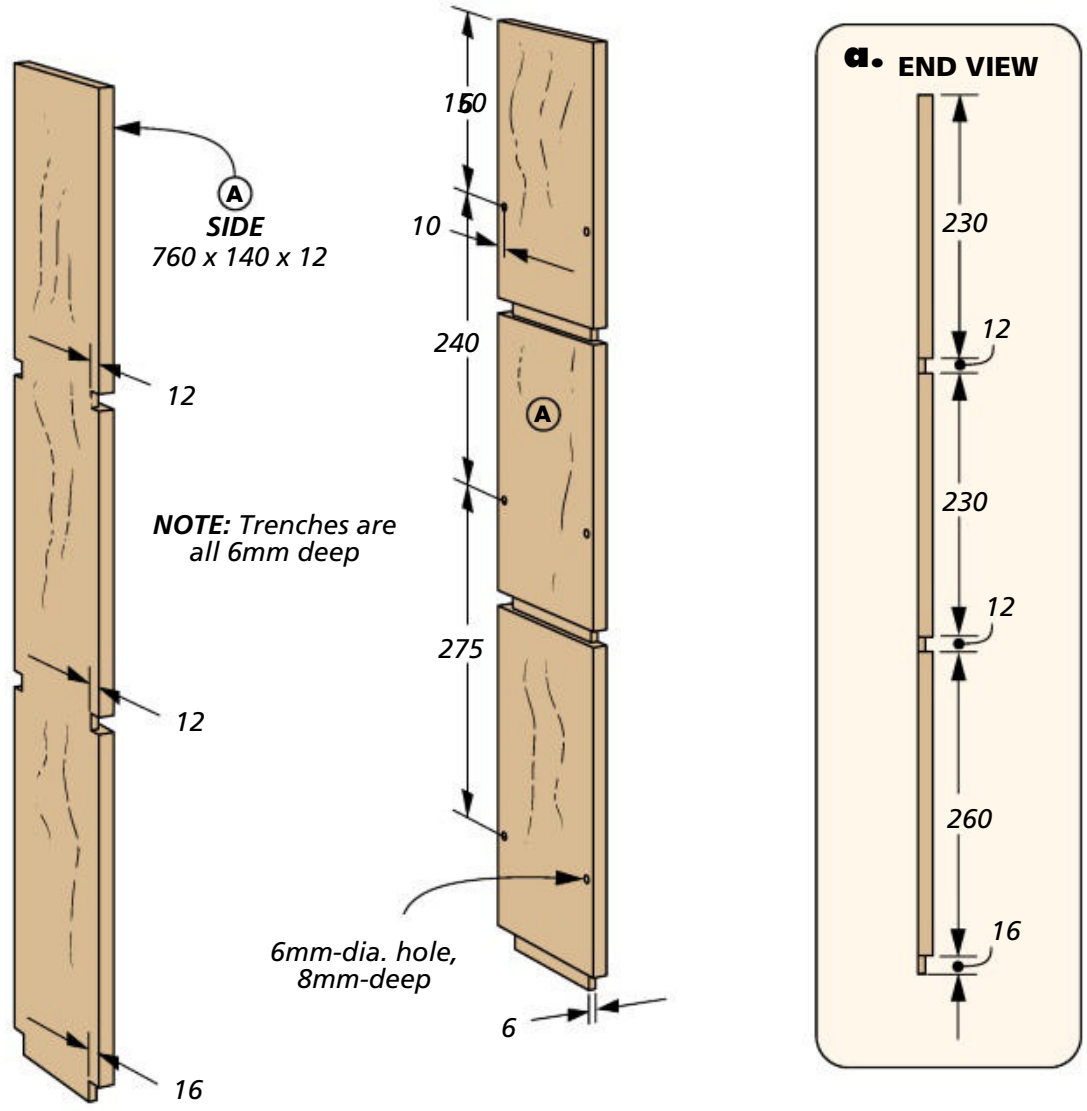
The cart construction starts with the sides. They have a series of notches and trenches cut in them to accept the shelves. Because of the small size of this cart, it's a good chance to use some material that you might not normally use. In this case, we used walnut.

STOCK PREP. After selecting your stock, spend time squaring it up. Joint one face and edge, then rip it to width. Next, plane the stock to thickness and cut it to final length. I know someone will shame me for it, but I make most of my finished cross cuts at the mitre saw. In my experience, it will give you just as clean of a cut as a table saw if you use a sharp blade.

NOTCH & TRENCH. Now, cut the joinery in the sides. As I mentioned before, these are trenches and notches. You can see these in the main drawing and detail 'a.'

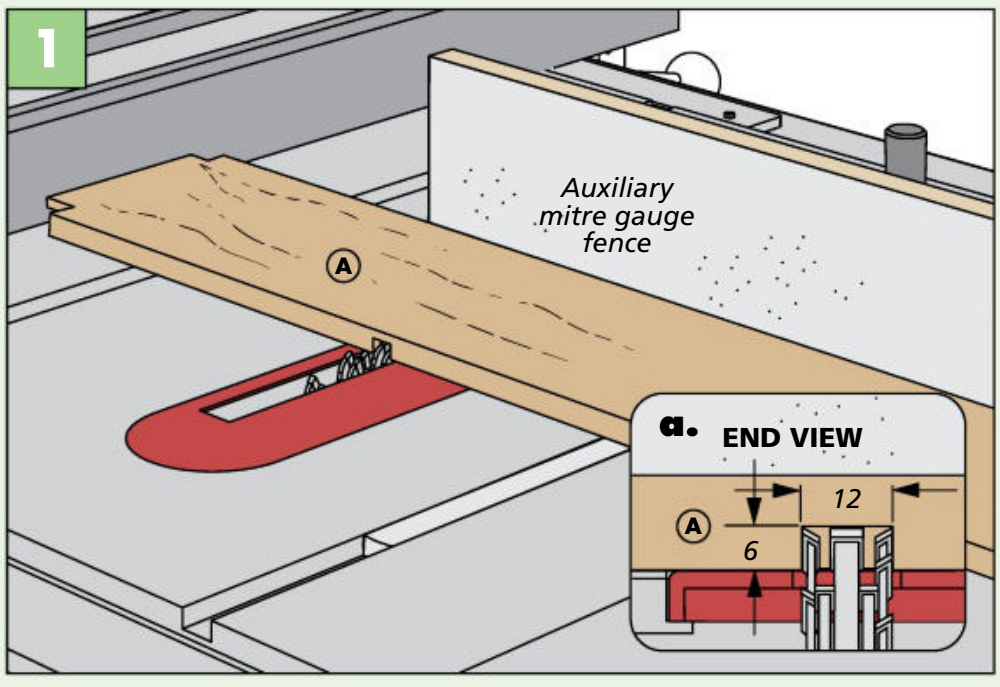
To cut these, set up a dado blade in your table saw. Set the rip fence as a stop and guide your workpiece with the mitre gauge to make the trenches (Figure 1).

After making one trench, flip the workpiece on edge and cut the notches (Figure 2). You'll make these cuts in both workpieces before adjusting the position of the fence for the next trench. Note that the bottom trench is wider. Because it's on the end, it forms a rebate and you'll need to set up an auxiliary fence to make this cut.

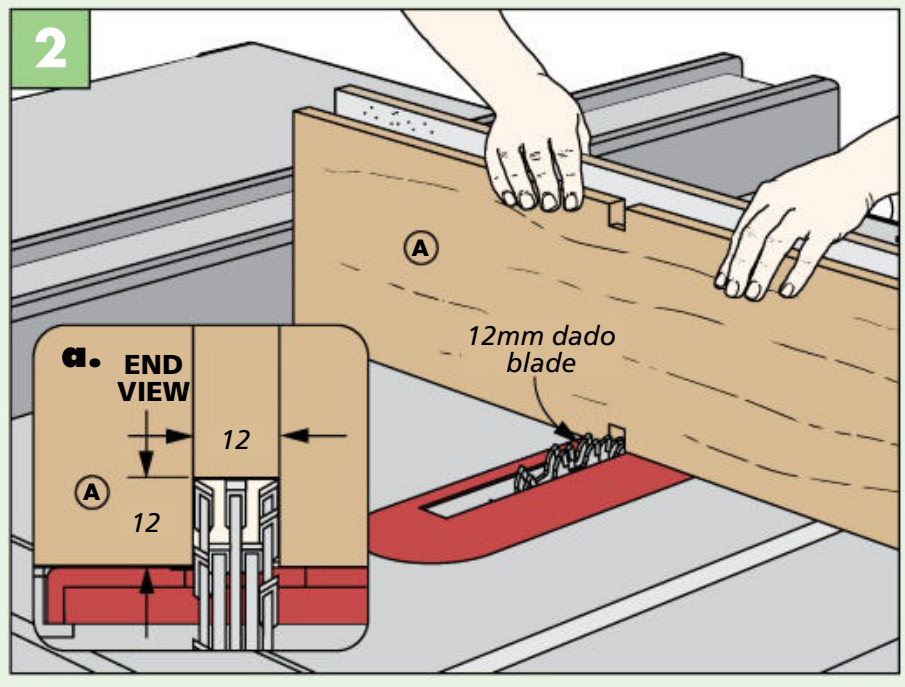


ROD HOLES. The last step before moving to the shelves is to drill the holes for the stainless steel rods. Do this at the drill press with a brad point bit.

CUTTING THE TRENCHES



Trenches First. Use a dado blade to cut the trenches in both of the sides. Use the fence as a stop and guide the piece with the mitre gauge.



Notches. Before moving the fence between cuts, flip the workpiece on edge and create the notch, again using the fence and mitre gauge.

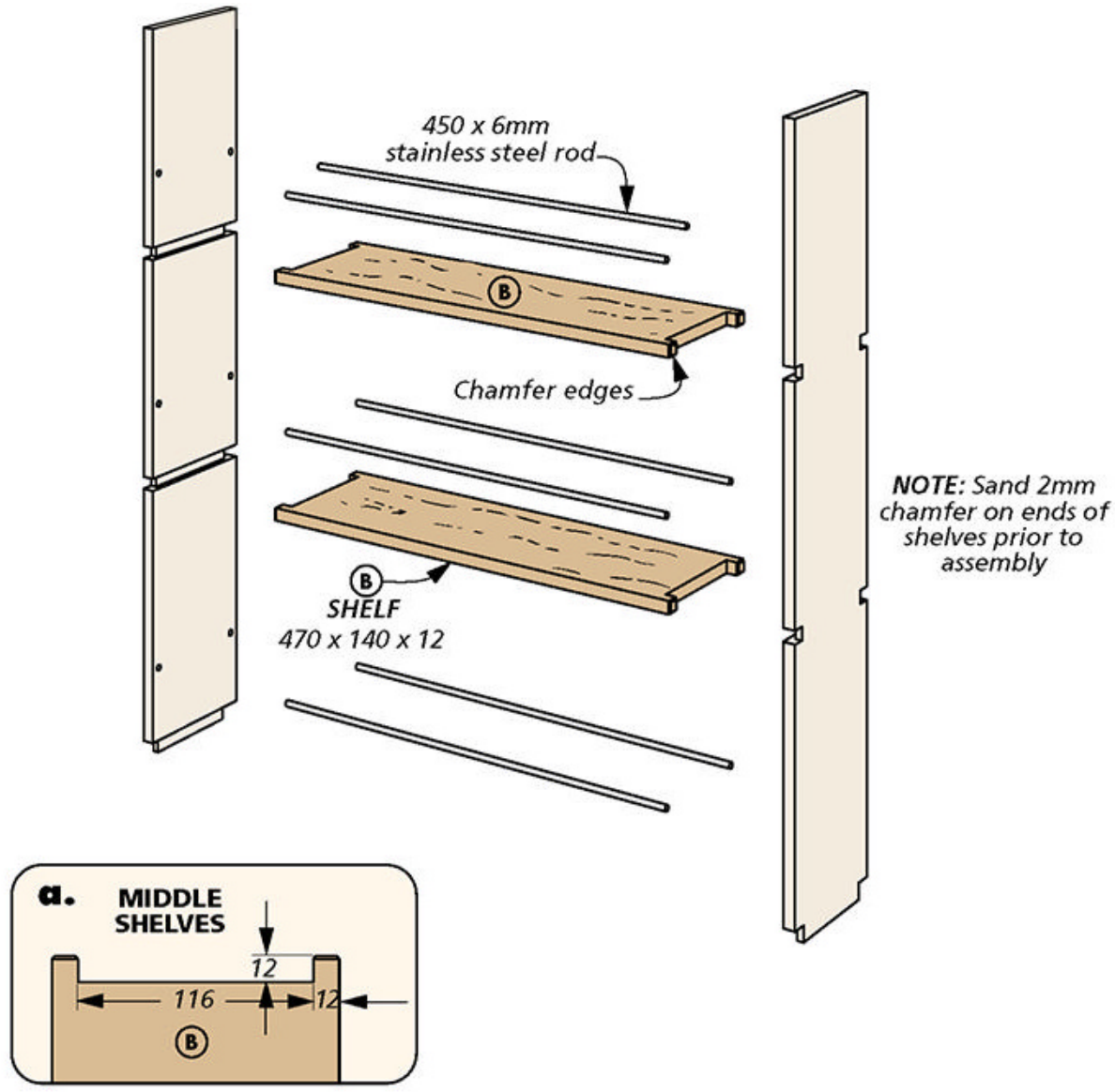
SHELVES

The two middle shelves and the bottom (shown later) are made from one solid piece of stock. They have tenons on each end that fit into the notches on the sides. You'll make all three of these parts now, but the bottom gets installed a little later.

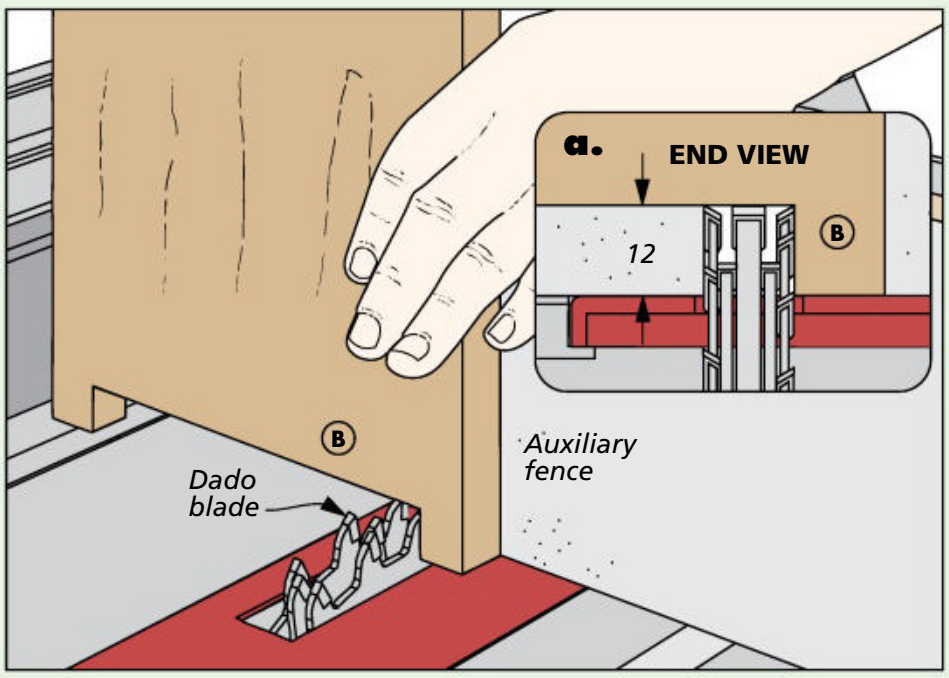
TWIN TENONS. To make the tenons on the end of the shelves, you'll stand the workpiece on end and use a dado blade to cut away the waste between them. However, the tenons are exposed through the sides, so you'll want a snug, clean fit. To achieve this, start removing the waste from the centre of the shelf. As you get towards the tenon edge, set the rip fence as a stop. Then, you can make a pass with each edge against the rip fence (Figure 1) and test the fit. Then, it's just a matter of sneaking up on the perfect, gap-free fit.

STAINLESS STEEL RODS. Before slapping glue on the tenons and getting the shelves glued into the sides, you'll want to have the stainless steel rods ready. These can be cut to length with a hacksaw in a vice (Figure 2).

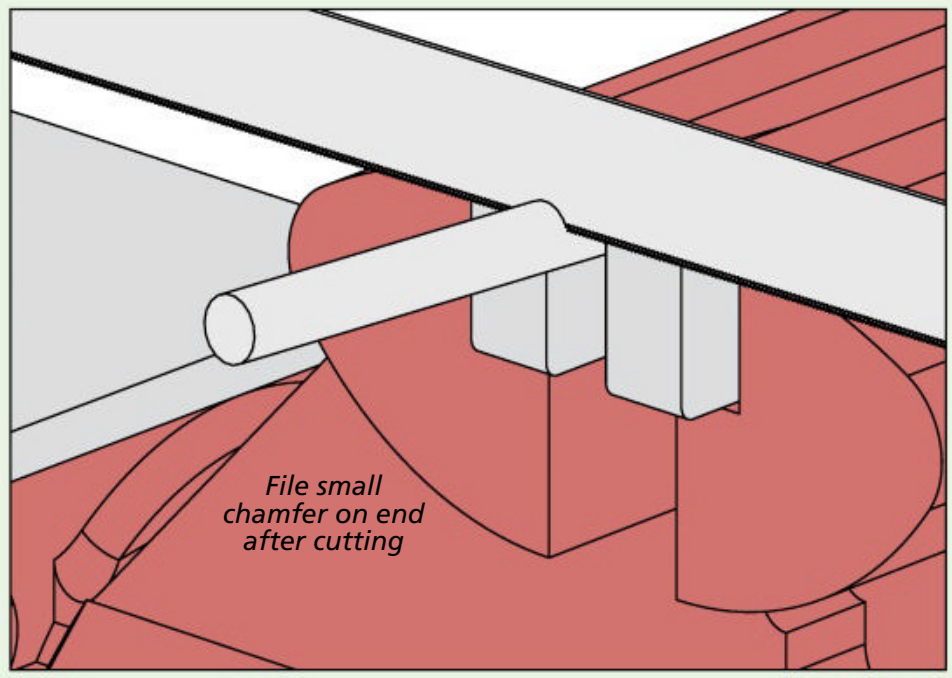
A SMALL ASSEMBLY. With the bottom set aside for now, you can assemble the two centre shelves and the sides. Apply glue to the trenches and inside of the tenons, and insert the shelves into one side. Make sure to get the stainless steel rods in place as well (even the ones for the bottom shelf). Then, apply glue to the other side and get it in place. The trenches and notches should be pretty self-squaring, but it never hurts to check the assembly while the glue is wet and make any necessary adjustments. Now it's onto making the top and installing the bottom.



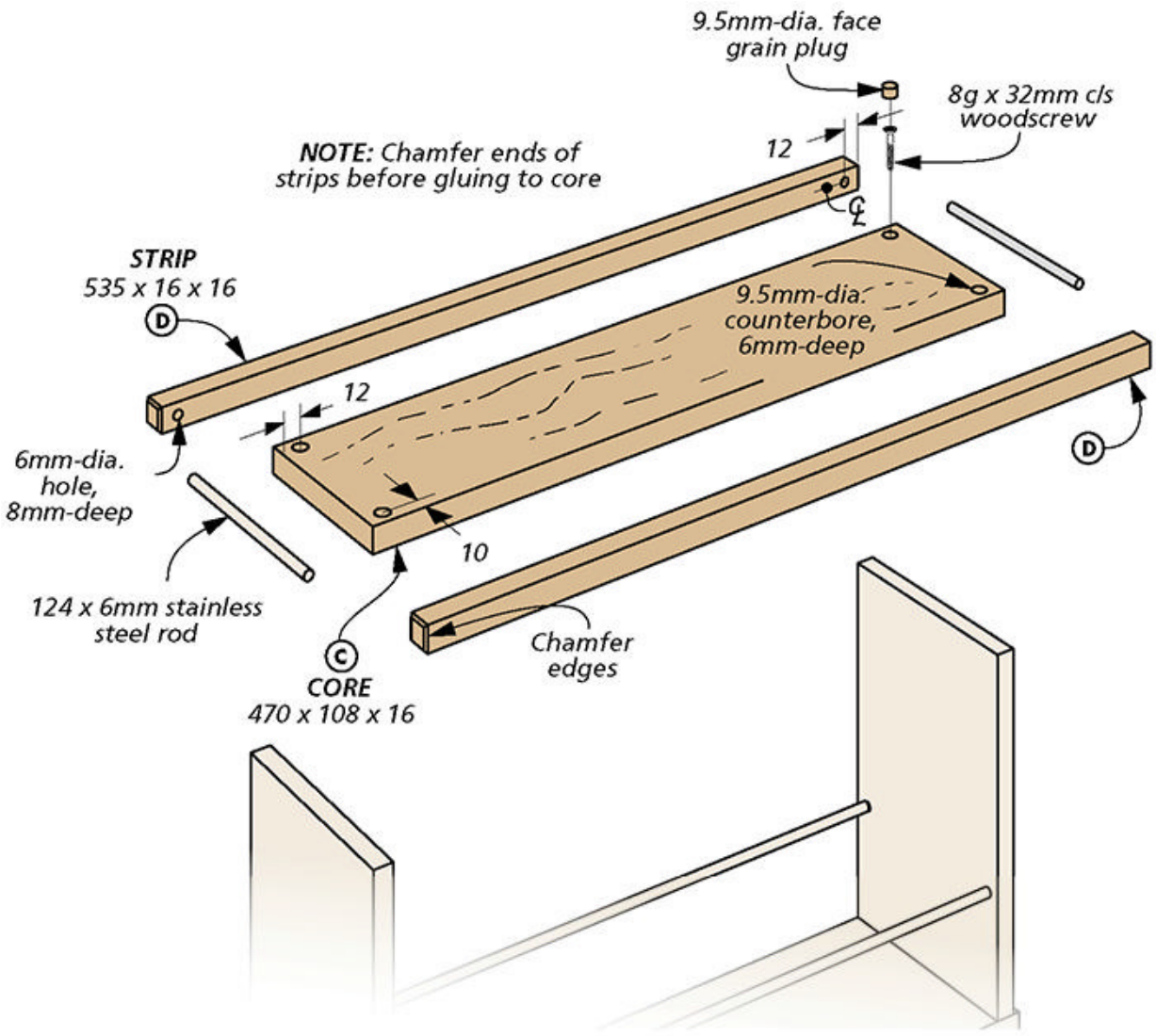
SHELF & ROD DETAILS



Tongues. Stand the shelf stock on end and hold it firmly against a tall auxiliary fence on the mitre gauge. Cut away the waste with a dado blade.



Stainless Rod. Hold the stainless steel stock in the jaws of a vice and mark the length. Use a hacksaw to cut the rod to length.



Cap it with a TOP

The top is the same design as the shelves and bottom in appearance, but with a slightly different construction method. When you cut the notches on the shelves, you may have noticed that the dado blade can leave a rough surface. It's not a problem when that surface is hidden. But on the top, it's visible, so here we'll take a little different approach.

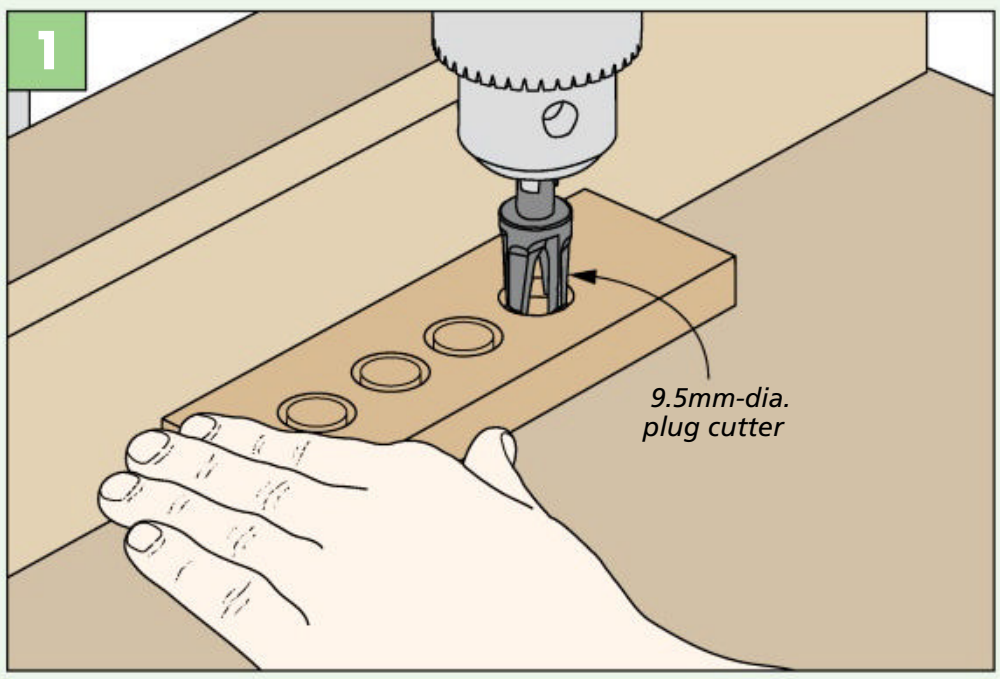
STRIPS. As you can see in the drawing above, the "tenons" on the top are actually made from strips that are applied to a central core. This creates a clean look on all surfaces, and also allows you to install the stainless steel rod at each end of the top.

Start by cutting the strips and core to size. Spend a few minutes at the drill press and drill the rod holes on each end of the strips. Finally, cut the stainless steel to length.

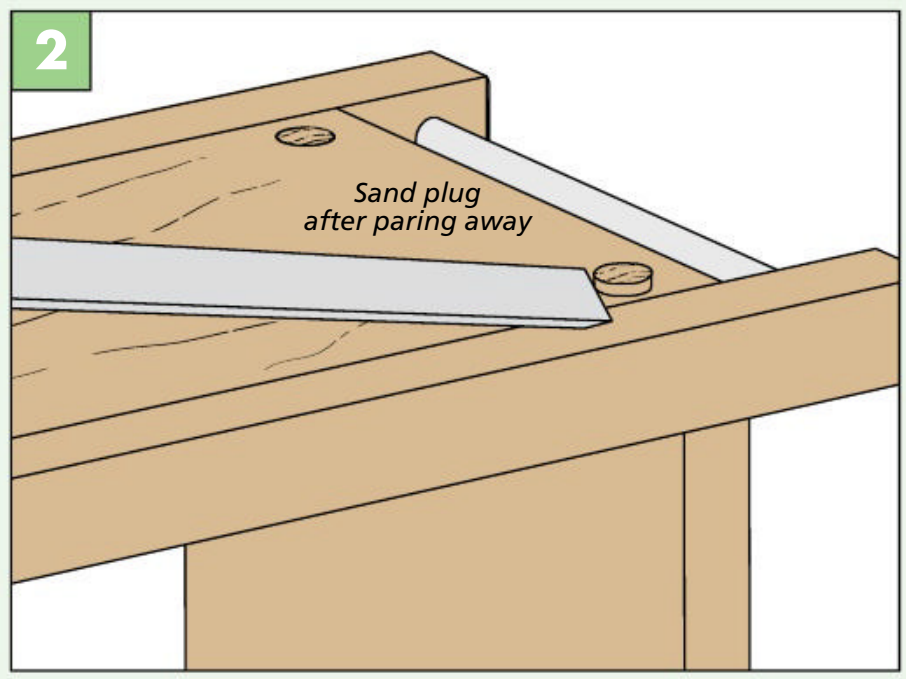
Now, the top can be assembled. There's no huge secret here. Put the stainless steel into place on the strips and apply a bead of glue to both edges of the core. Clamp everything together, keeping the top surfaces as flush as possible. When the clamps come off, you can clean up any squeezeout and level out the joints with a card scraper.

PLUG THE HOLES. As you can see in the main drawing, the top is simply screwed into place. To hide the screw holes, you'll use some matching plugs. These are pretty easy to make at the drill press (Figure 1). Select some stock that has similar grain to the top when making the plugs. After popping the plugs free, screw the top into place and glue the plugs into the holes, keeping the grain aligned.

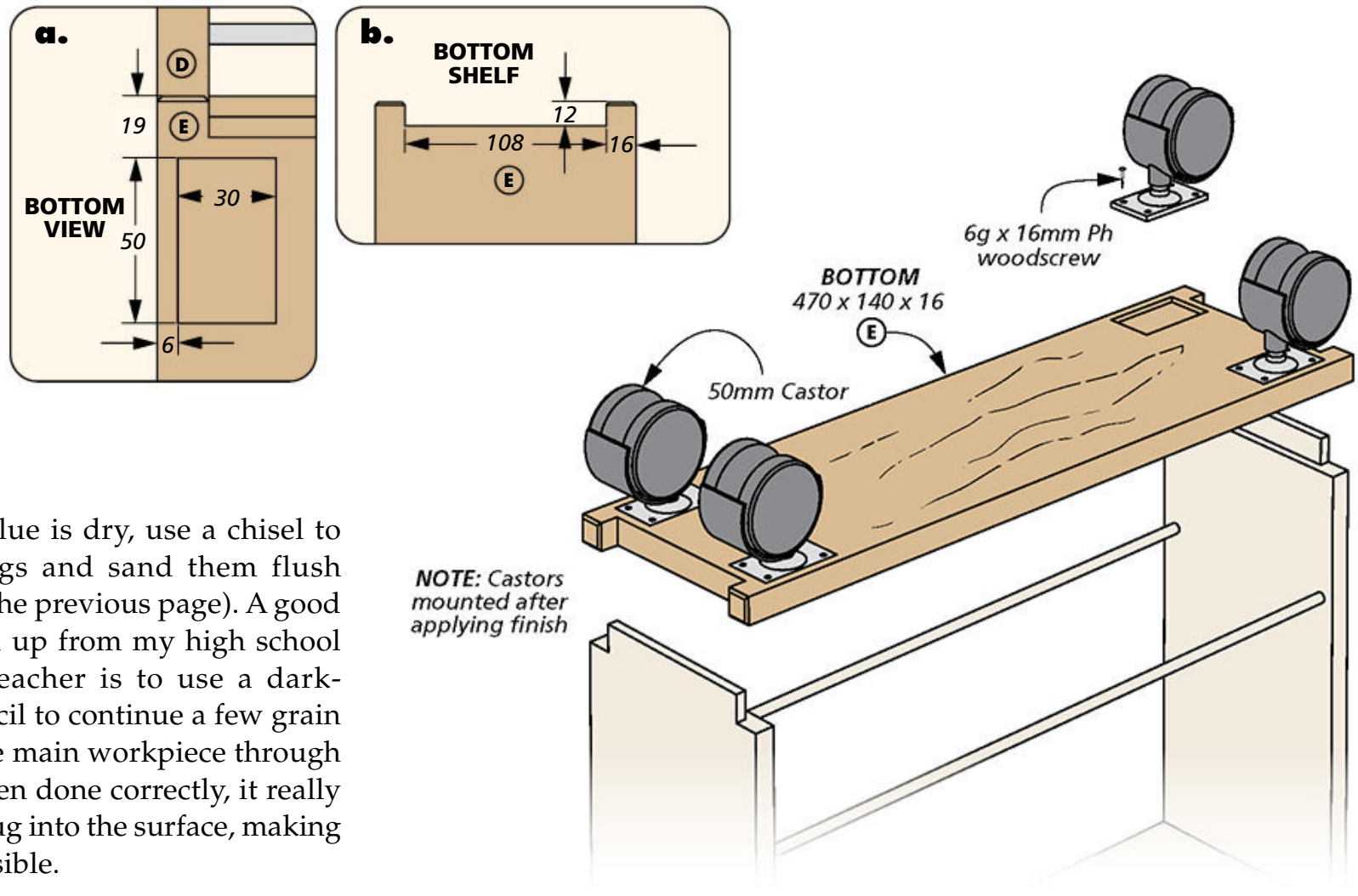
HIDDEN SCREWS



Custom Plugs. Using a plug cutter, cut plugs from the same stock used for the core. Pick grain that closely matches the grain used on the core.



Flush Plugs. After gluing the plugs into place, use a chisel to pare the plugs down, flush with the top. Sand them until they're smooth.



Once the glue is dry, use a chisel to trim the plugs and sand them flush (Figure 2 on the previous page). A good trick I picked up from my high school woodwork teacher is to use a dark-coloured pencil to continue a few grain lines from the main workpiece through the plug. When done correctly, it really blends the plug into the surface, making it nearly invisible.

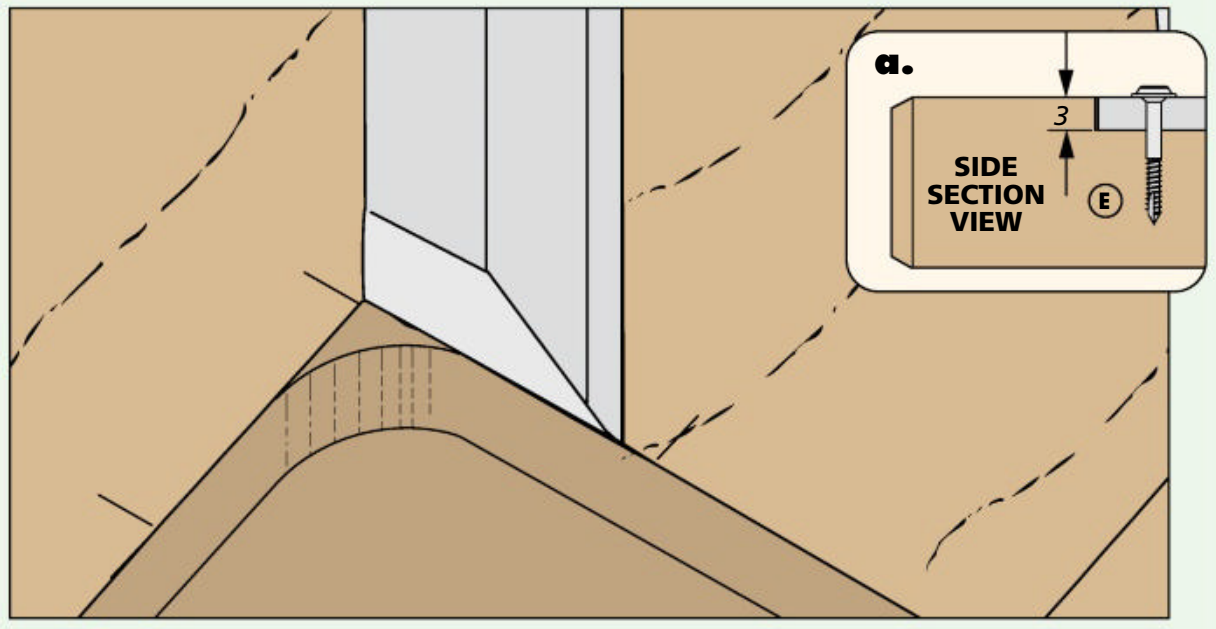
ADD THE BOTTOM

Now, we can circle back to the bottom of the cart. The final thing to take care of on this piece is to mortise in the castors. This can be done a few different ways. If you're using a friendly wood, you can chisel the outline and use a router plane to remove the waste. Otherwise, you can use a Forstner bit to remove the bulk of the waste and clean up any leftover bits with a chisel. Once the castor mortises are done, you can glue the bottom onto the cart.

APPLY FINISH. With construction wrapped up, the only thing left to do (other than screwing on the castors), is to apply finish. For our cart, we first applied a coat of shellac. This can be applied by brushing, wiping or spraying. I love traditional methods, so I sprayed the shellac on. Any over-spray that lands on the stainless steel rods can easily be wiped off with a little bit of methylated spirits on a rag.

Once the shellac was dry, I applied a couple of coats of lacquer just for extra protection. Don't worry about avoiding the stainless steel rods here — the lacquer won't be noticeable on them. After screwing on the castors, your cart is ready to go to work in your bathroom. W

CLEAN UP MORTISES



Square the Mortise. After removing the bulk of the waste with a Forstner bit or router, square up the corners of the mortise with a chisel. Then, mount the castors after applying finish.

Materials & Supplies

A	Sides (2)	760 x 140 x 12
B	Shelves (2)	470 x 140 x 12
C	Core (1)	470 x 108 x 16
D	Strips (2)	535 x 16 x 16
E	Bottom (1)	470 x 140 x 16

- (4) 6mm-dia. x 900mm Stainless Steel Rods
- (4) 9.5mm-dia. Plugs
- (16) 6g x 16mm Ph Woodscrews
- (4) 50mm-dia. Castors

Hook Knives

Inspired by traditional knife styles, these unique knives offer a sweet addition to your carving kit.

Spoon carving occupies a curious corner of our craft. Within the last five years, I've seen more and more woodworkers make at least one. Some are hooked, and one of those would be me. Carving a spoon or small bowl forms an interesting diversion from my typical straight, flat and square projects.

You can carve a spoon with just about any sharp knife. My very first were shaped with my trusty Swiss Army Tinker. The only tool-related obstacle is forming the bowl. A straight-bladed knife gets you only so far. What you need is a knife made for diving in. Crooked (or hook) knives feature blades with varying degrees of sweep along the length. The versions with a gentle curve excavate material easily. Sharply curved blades extend your reach to deep recesses and tighter forms.

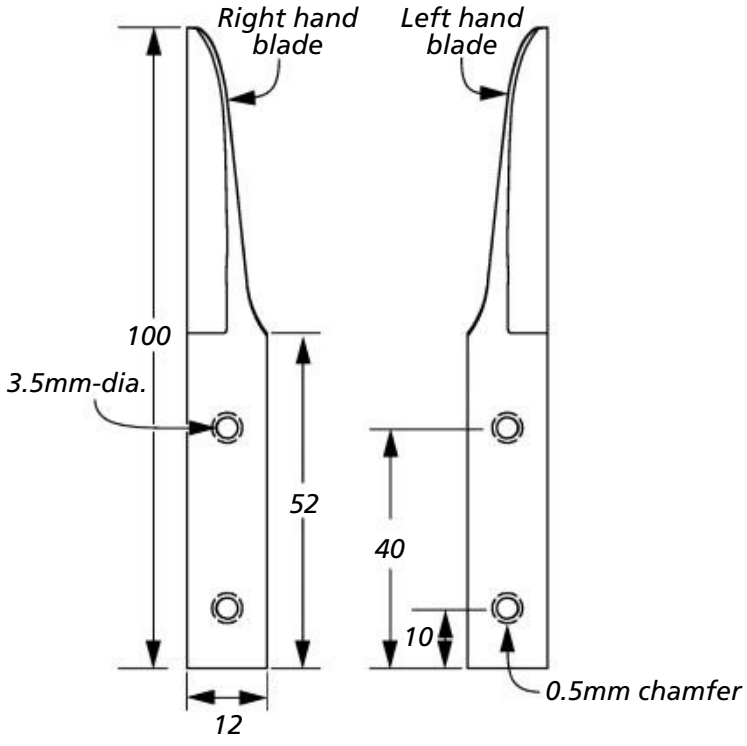
Thankfully, Creative Director Chris Fitch serves as both our resident carving expert and blacksmith. The knife concept quickly sparked his curiosity.

There are really two mini projects inside each knife: making the curved blade and then the handle. Chris found a simple blade-making solution for those of us who don't have a full blacksmith shop.

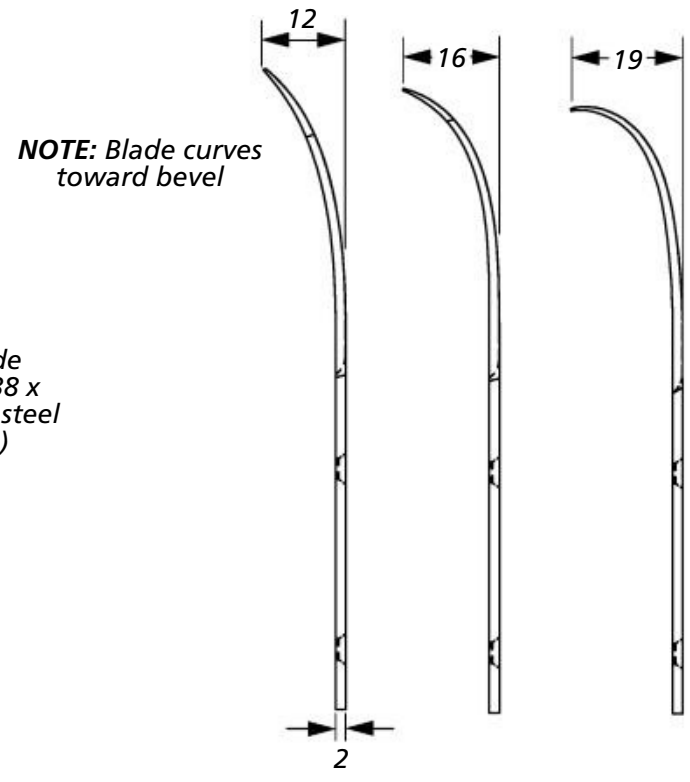
The wood handle offers up some solid carving practice on its own. There are three handle patterns shown here that you can choose from. The key is to spend a little time whittling, filing or sanding the handle to suit your hand and comfort.

The handle is where you turn this carving tool into a custom creation. We show three styles to get the ball rolling: horned, oval and whale shaped. Even the handle material is up to you.

BLADE PATTERNS



***NOTE:** All blades made from a billet of 330 x 38 x 2mm 1084 carbon knife steel (nordicedge.com.au)*



***NOTE:** Blade curves toward bevel*

Making the HOOKED BLADE

Making knives goes from difficult to easy, metal to wood. But don't take that to mean the process is time-consuming or fraught with peril. Only that working with metal requires a different set of steps that you don't use when making something from wood.

START WITH GOOD STEEL. My initial thought of making the knife blade conjured images of hammers, tongs and fire. Chris's version starts with a 330mm-long blank of 1084 carbon knife steel from Nordic Edge. The 38mm-wide 2mm-thick stock can be transformed into nine straight and hooked blades.

PICK A PATTERN. The drawings above show three different sweeps for the blades. You can easily get all three from the stock listed. However, make only what blade you want. In any case, the process for shaping is the same. Start by cutting the blade blank to length and width. The drawings in the box below take over from here.

Use a punch to mark the two rivet holes that secure the blade to the handle. You also need to form an ever-so-slight chamfer on the holes, as shown in Figure 1 below. This allows the copper rivets to grip the blade when they're peened.

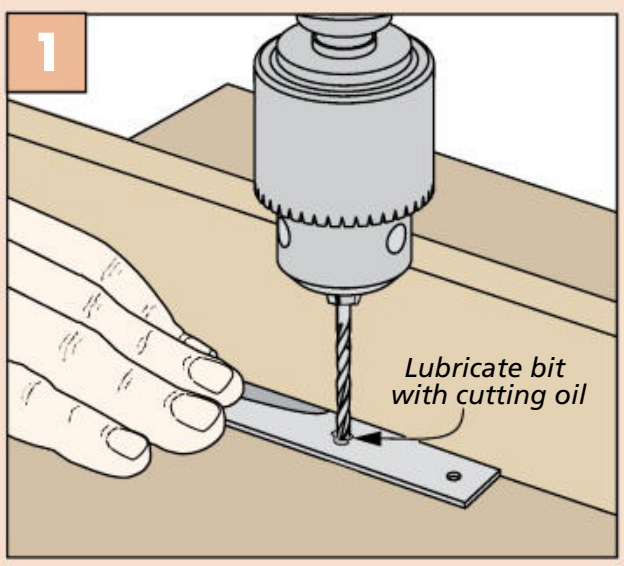
The steel blank comes annealed but it's still a good idea to drill with a slow speed and to use cutting fluid for a smooth hole and to carry away chips.

The basic shape of the blade can now be cut with a hacksaw, as shown in Figure 2. Follow as close as possible to the pattern you mark on the blank.

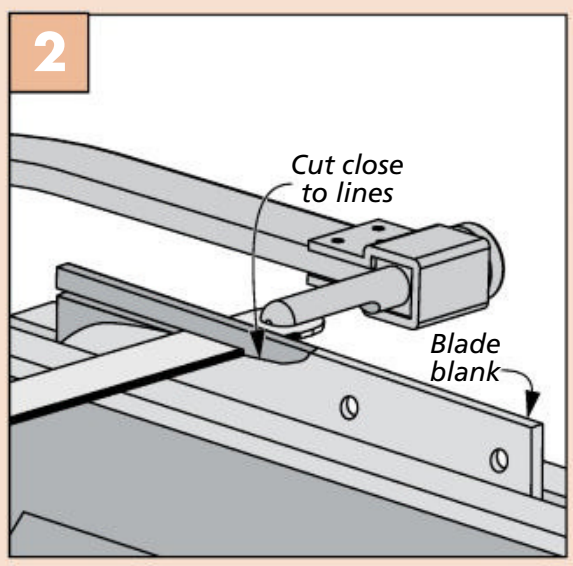
Refining the shape and working down the layout lines comes next and depends on your equipment. You can get it done quicker with a grinder or disc sander. Keep a cup of water nearby to cool the blade as necessary.

However, a couple of files work just fine, too. Getting a smooth, even profile is much easier now than when the blade has been hardened later. So slow down to get it right.

ROUGH SHAPING THE BLADE



Cut the Blank to Rough Size. Mark the blade profile and mark, drill and countersink the mounting holes.



Shape the Blade. A hacksaw takes care of the bulk of the waste. Then using a file, work to the layout line.

BEVEL & CURVE

To go from a blank of steel to a carving tool blade, you need to shape a cutting bevel. You can do this with files or a small grinder. A grinding wheel in a rotary tool,

like a Dremel, works very well here, as you can see in Figure 1 at right. Another option is to use a narrow belt sander.

This isn't your final cutting edge, so your focus is on establishing the bevel, not creating a razor-sharp edge.

To add the curve to the bevel side of the blade, gently form it with hammer blows over the horn of an anvil, an iron pipe clamped in a vice or around the curved top of the jaws of a machinist vice, as in Figure 2.

Once again, take your time here. You want to avoid work-hardening the metal with too many heavy blows. This can lead to the blade becoming brittle and breaking.

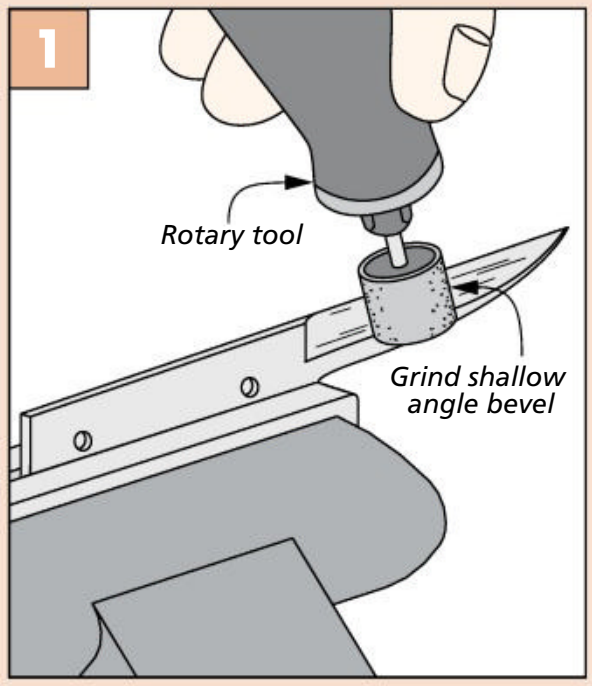
HARDENING THE BLADE. The bevel you formed will cut wood at this point. The problem is the blade won't hold that edge for long. What's needed is to transform the blade from soft(ish), annealed steel into a hard tool.

To add toughness, heat the blade with a torch until it is no longer magnetic (this is the austenitic phase). A magnet on a stick is the easiest way to check that the steel has entered the hardening range of temperatures. A trial run will have you also notice the change in colour that occurs at this temperature. You can do this with a propane torch, though I find that a MAPP gas torch works quicker and helps you heat the entire blade more uniformly.

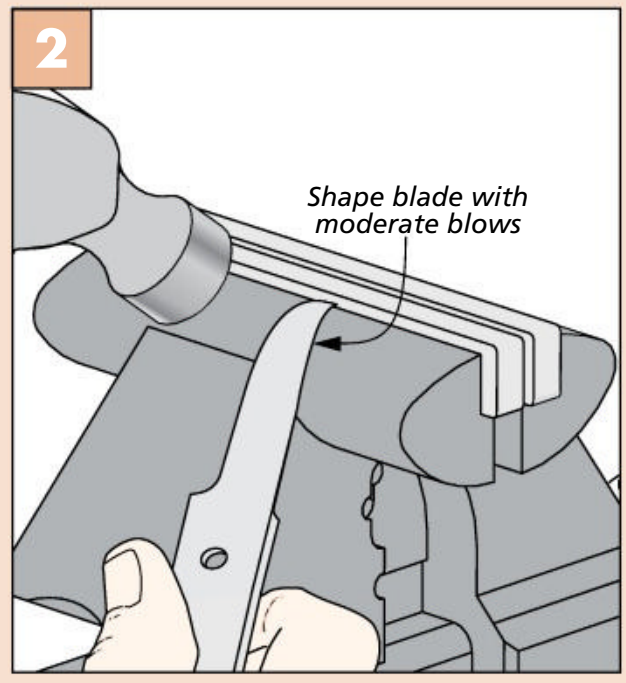
Clearly, the blade is going to get hot, so hold it with locking pliers to keep your hands safe. I like working in a slightly darkened room to better monitor the colour of the blade as it's heating.

Once you've reached an even colour, it's time to lock in the hardness. This is done by quickly quenching the blade in oil (Figure 4).

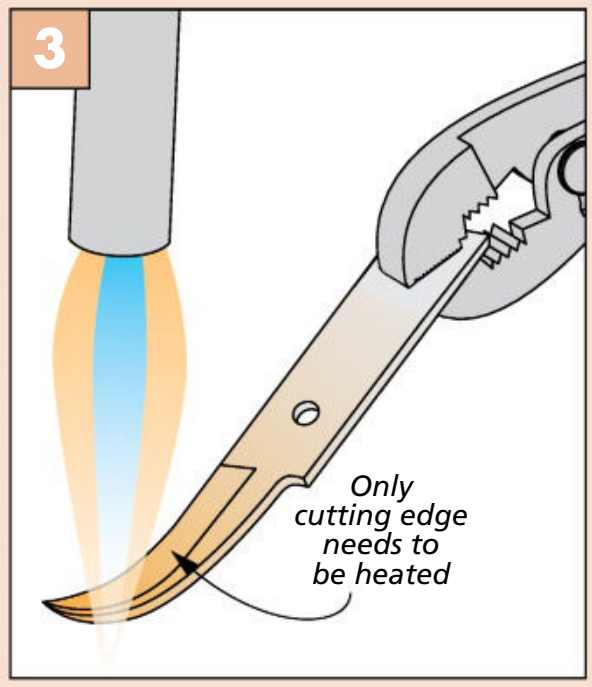
COMPLETE THE BLADE



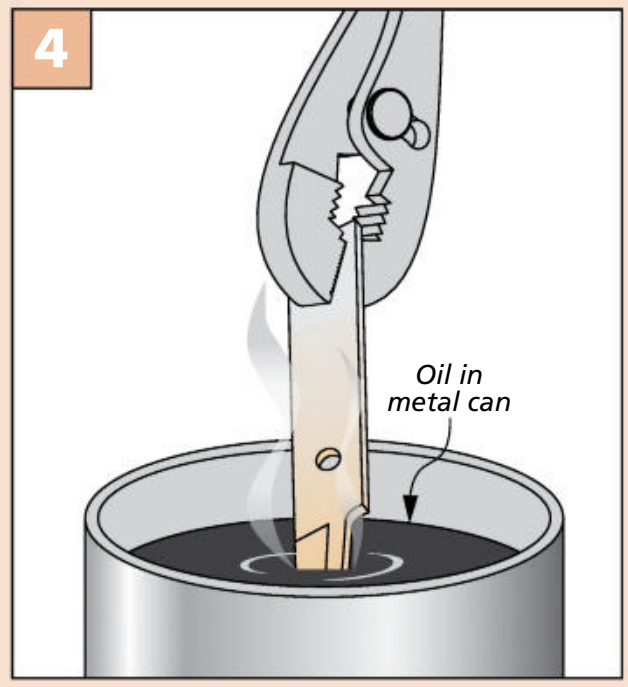
Grind the bevel. You can use either a rotary tool with a grinding wheel, a selection of files or a narrow belt sander.



Cap it. Gently hammer the blade over a curved surface such as the horn of an anvil or the curved jaws of a vice.



Heat it. Sweep a propane torch back and forth along the cutting edge of the blade until it is no longer magnetic.



Quench it. Dip the blade in a can of used warm canola oil. Finish by heating the blade in a 180°C oven for two hours.

Chris likes using a can of warm canola oil as a quenching medium. Swirling a hot piece of iron in the oil to warm it to 40-60°C will magically make the quenching oil cool the blade more rapidly.

Quenching makes the blade quite hard. The downside is that it's now brittle and tough to sharpen. What we want to do at this stage is dial back the hardness, while making it tougher. So let's head to the kitchen.

TEMPERING. Preheat the oven to 180°C. Place the blade in the oven for two hours until it takes on a uniform straw colour. Then remove the blade and allow it to cool.

SHARPENING. If you look closely, you can see that the blade still has the grinding and file marks from the initial shaping. You can polish and refine the face and bevel of the blade until you run out of patience. Sharpen the edge, too.

We'll leave the final sharpening and honing until after the blade is mounted to the handle. The completed knife is easier to hold for honing and you have a better sense of how sharp it is with test cuts.

A custom HANDLE

The handle forms the woodworking part of this project. Nearly any wood will work for the handle. Chris used maple, beech and oak for the ones shown here.

BLADE MORTISE. The starting point is to make a home for the blade on the bottom face of a handle blank. Place the blade on the handle and scribe the perimeter with a marking knife or a utility knife, as shown in Figure 1.

Then create a shallow mortise. I used a router plane. Another option is to drill out the waste and clean up the mortise with a chisel (Figure 2).

The point is that the blade fits snug in the mortise and is flush or slightly recessed in the handle. Use the holes in the blade as a guide for drilling the through holes in the handle.

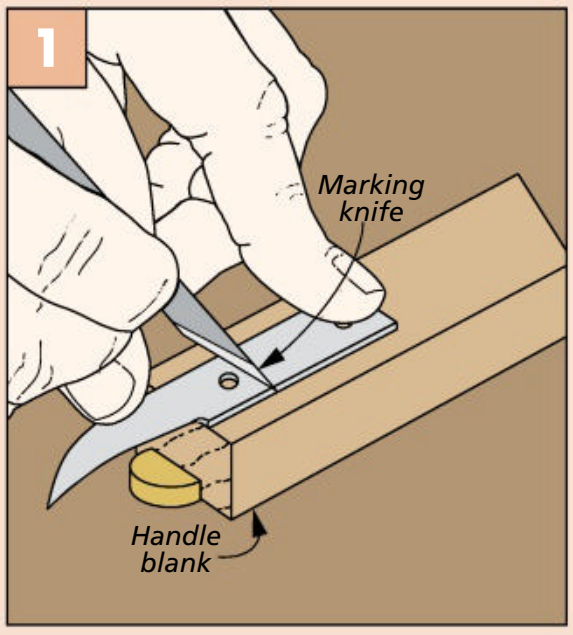
HANDLE SHAPING. Transforming the handle from a square blank into something that's comfortable to grip is up next. I've included the three styles of handles that Chris came up with on the next page. Of course, you are encouraged to create a handle shape entirely on your own.

As much as I like carving, I do like to get the bulk of the material out of the way quickly. So I copied a pattern and taped it to the top and side of the blank. At the bandsaw, cut close to the pattern lines. Then with a knife, files and sandpaper, refine the shape until it's comfortable in your grasp. I find that a little texture offers better grip and control.

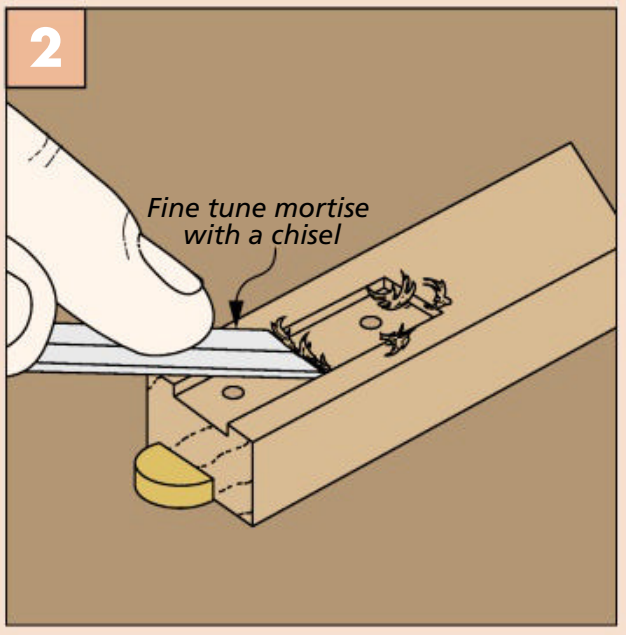
JOIN THE BLADE & HANDLE. Time to bring the two parts together into a custom carving tool. The box below covers the steps. Insert the blade into the mortise and slip a pair of rivets down through the handle. Cut off any excess until there's a scant 4mm past the blade.

To lock the blade and handle together, we'll use the relative softness of the copper rivet to our advantage. Place the handle on a flat metal surface, like the anvil of a machinist vice. Then strike the end of the rivet with the flat side of a ball-peen hammer. This swells the shaft of the rivet to fill the hole in the blade and handle. You should be able to see this happening.

CREATE THE BLADE MORTISE

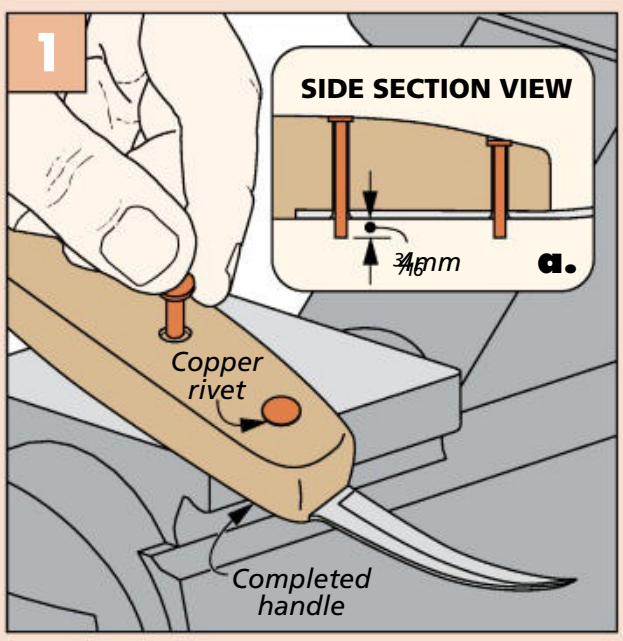


Scribe. Trace the perimeter of the blade with a knife then mark and drill the holes.

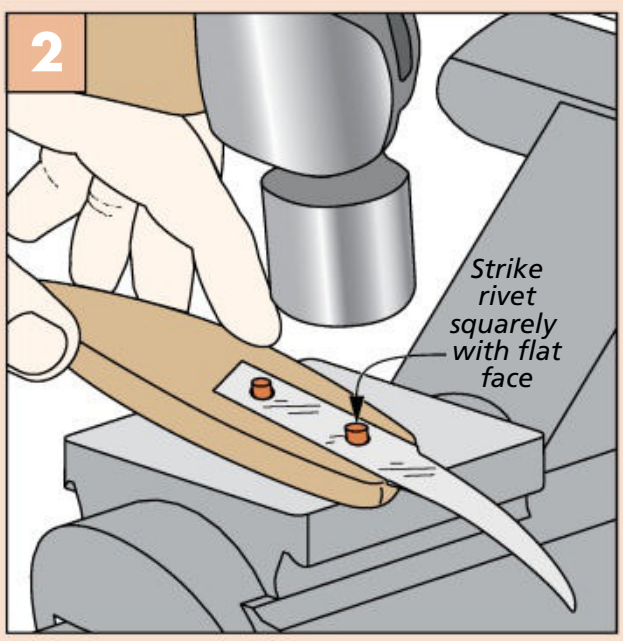


Mortise. Create the 2mm-deep mortise by drilling out the waste and cleaning up with a chisel.

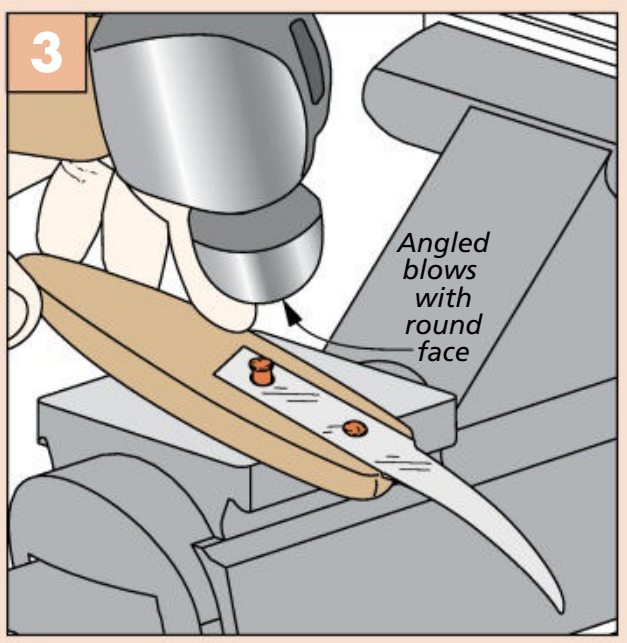
SECURE THE BLADE TO THE HANDLE



Set Rivets. Install the blade and slip copper rivets through the handle. Cut the rivets leaving 4mm past the blade.



Hammer. Using the flat face of a ball-peen hammer, swell the rivet inside the handle and blade.



Peen. Peen the rivet, locking the blade in place with the round face. File the excess smooth.

Then flip the hammer head around, and use the rounded side to peen the rivet, flowing the copper into the countersink. This isn't time to channel your inner Norse god. These are medium blows meant to work with the metal. Once you see that the countersink is filled, you can pick up a file and dress the excess rivet flush with the surface.

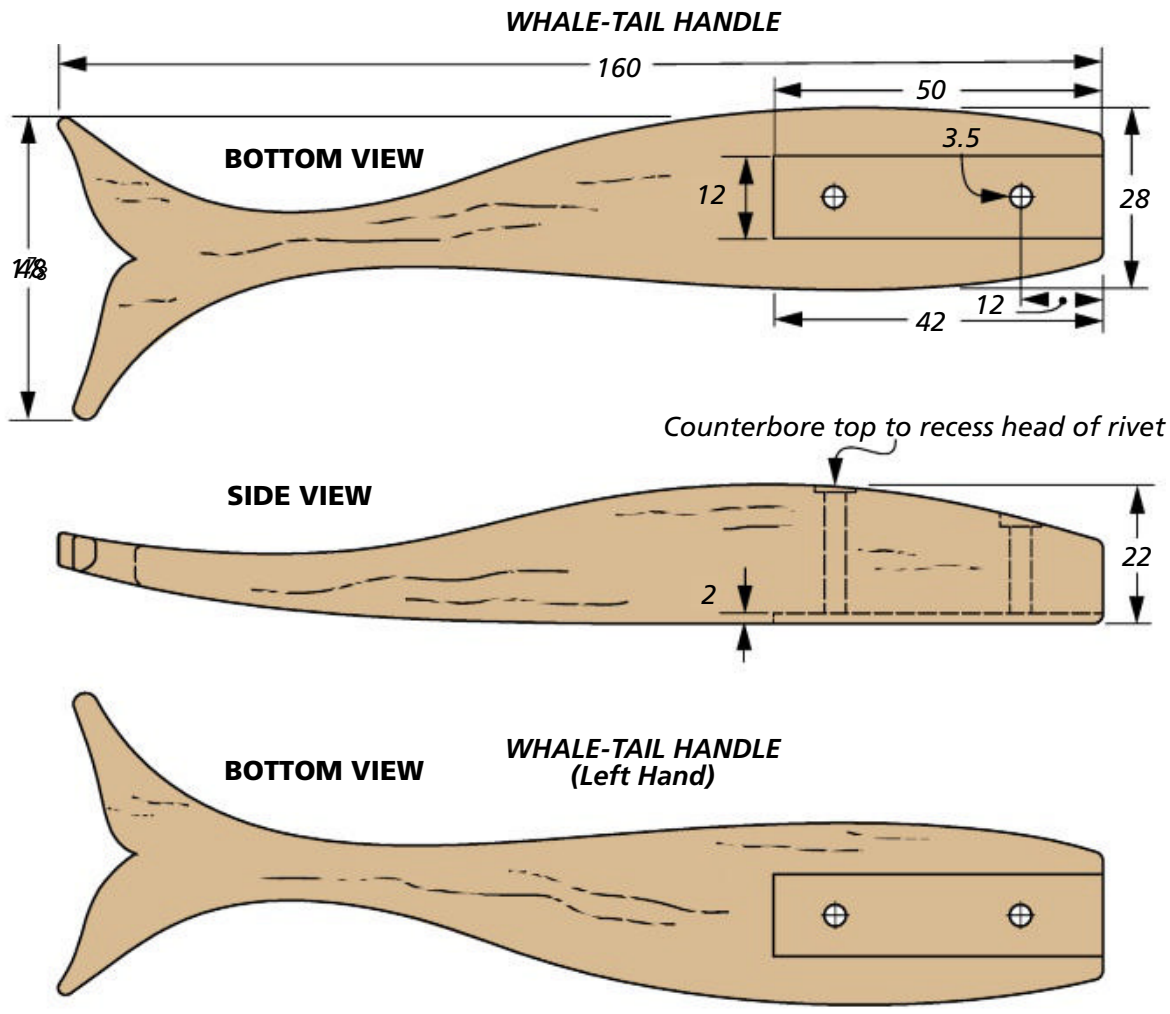
All that's left now is to give the blade a final honing. With it on the handle, you can get a much better feel for the sharpness by making a test cut or two.

Apply a finish? Maybe. I like a coat of boiled linseed oil or perhaps a little bees-wax. Maybe even some paint to dress up the look. The best finish is the worn patina of an oft-used, well-loved tool.

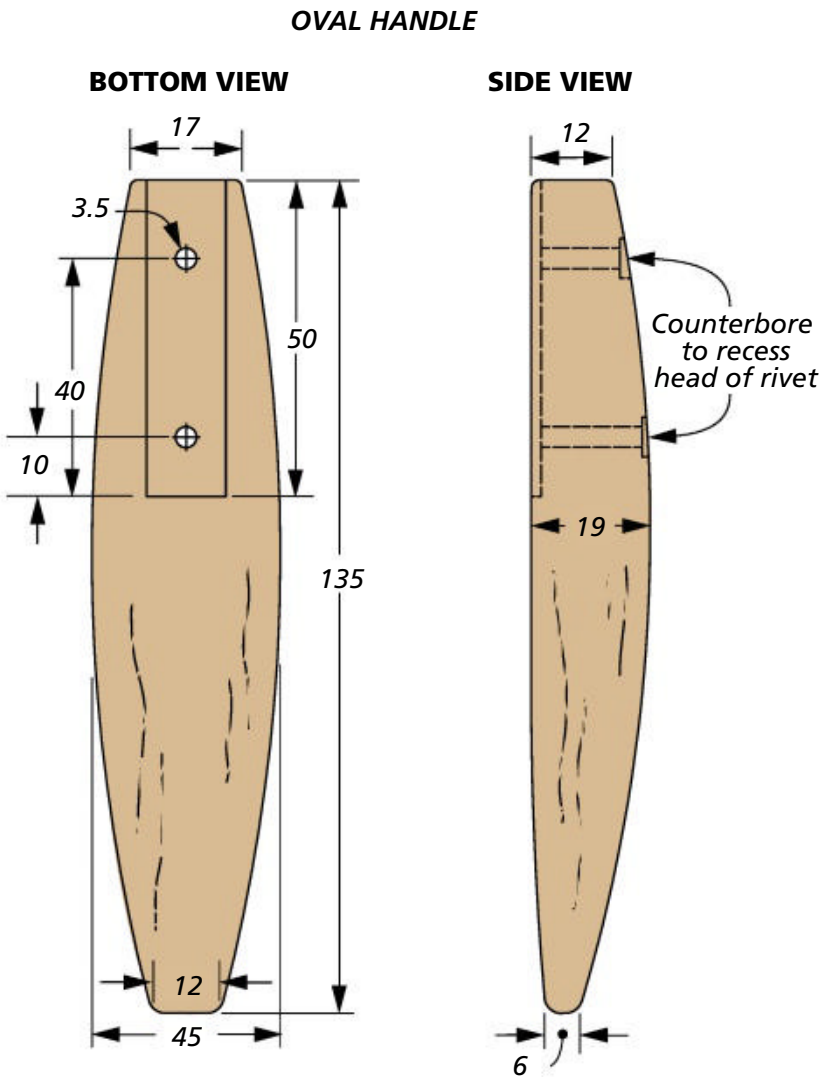
Australian Woodsmith GO On-Line Extras

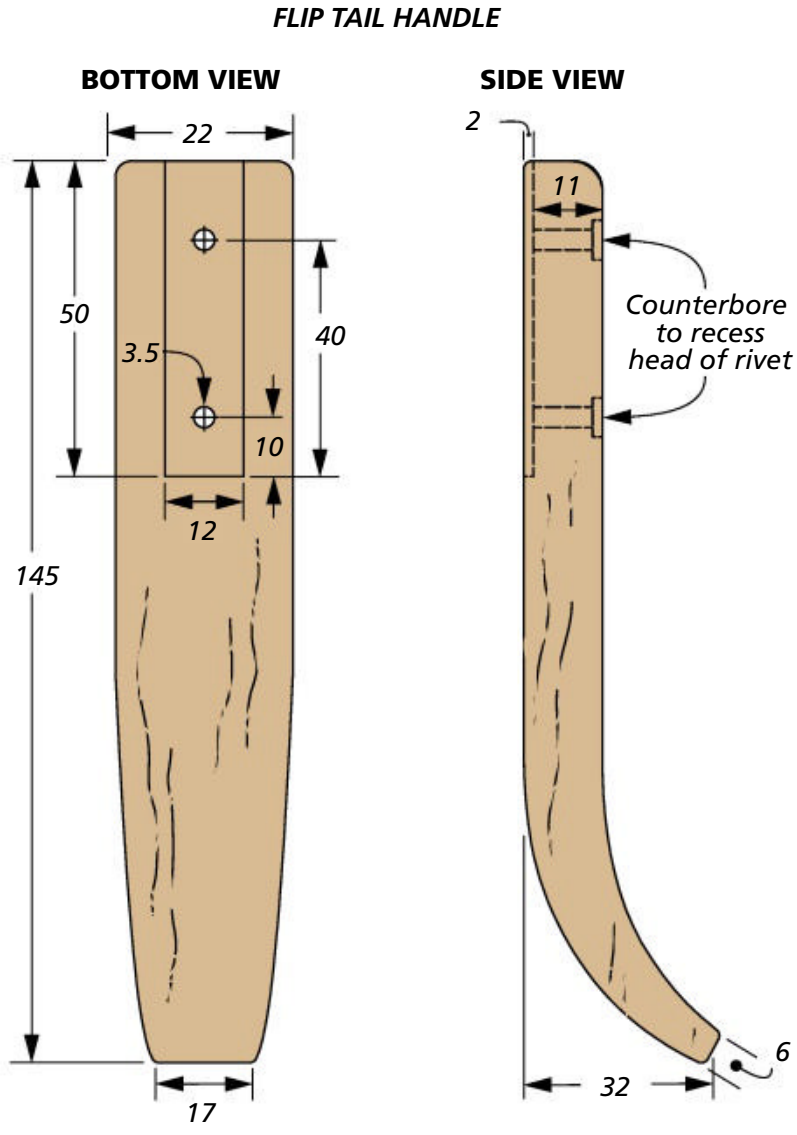
For full-size handle patterns visit our website at **australianwoodsmith.com.au**

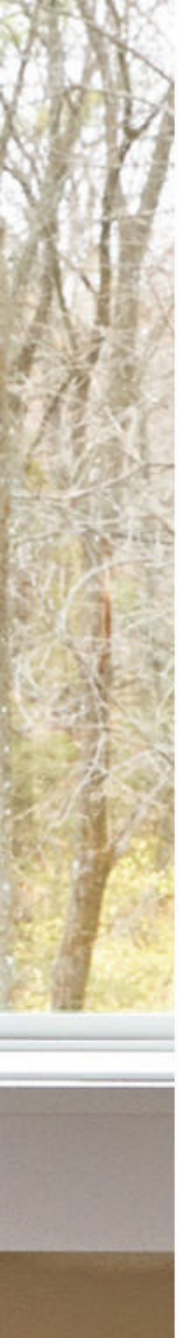
Handle PATTERNS



NOTE: *3.2mm-dia. x 25mm copper rivets from*







Campeche Chair

Combine centuries of solid service with an elegantly simple design and you get this — a chair from the Caribbean that's loved by all.

The Campeche chair is a Spanish interpretation of a Roman curule chair. The curule chair was a piece of campaign furniture that was knocked down for transport between camps. The Campeche chair is locked tight with tenons and does not get knocked down.

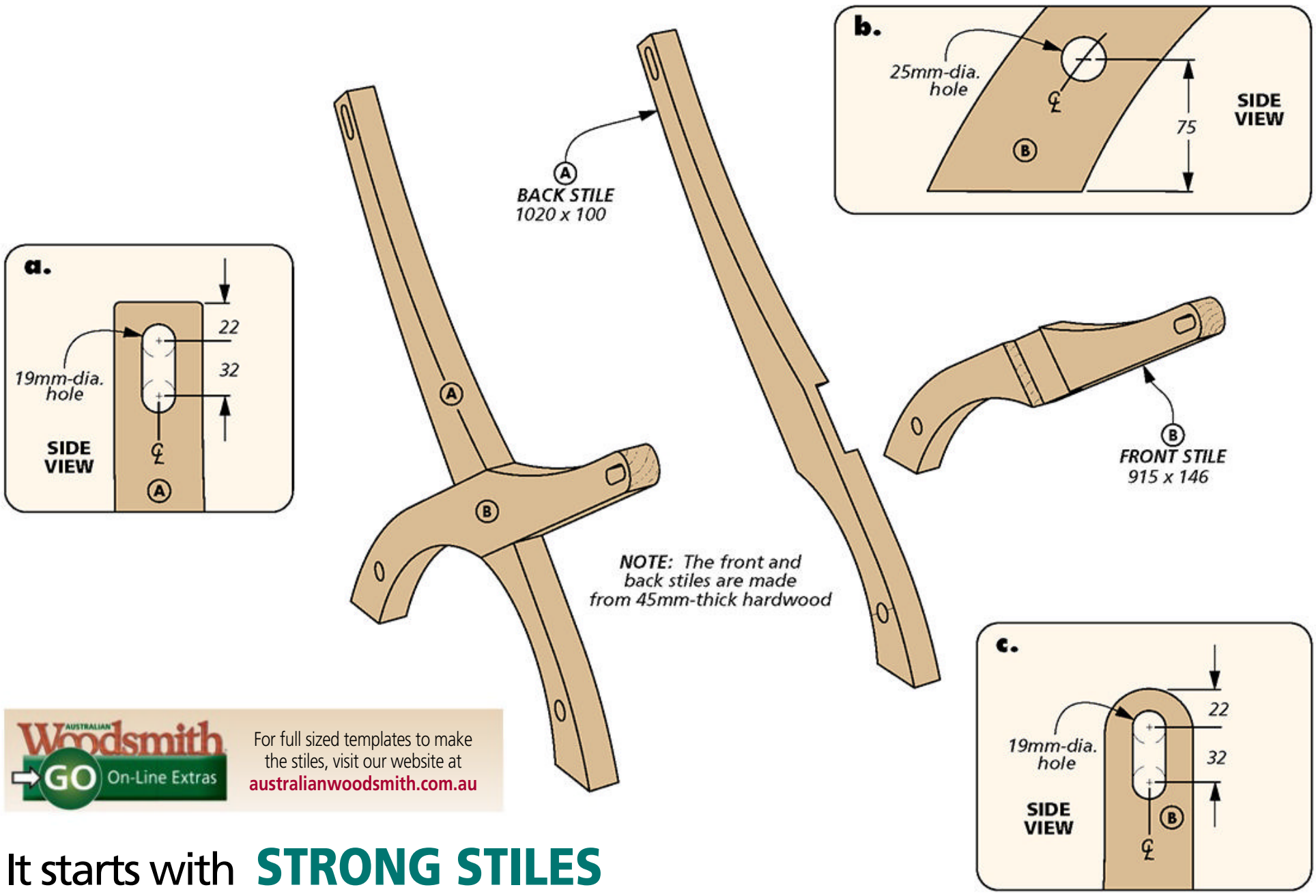
This strong, lightweight chair by legend hails from the port town Campeche, located on Mexico's gulf side. Right out of the gate, you can see that this is not a conventional project. To build a chair out of eight pieces of wood (20 if you count the wedges) is a testament to good design. Other iterations sport a wide variety of seating options, from tooled leather to humble wood slats. Dillon Baker, the designer behind this project, has streamlined the look of his version. He chose rugged duck canvas for the seat.

Mahogany is a Caribbean commodity that was in abundant supply at the time. It's used here as an homage to the chair's legacy. Plus, it's easy to work with and so beautiful when finished.

EFFICIENT JOINERY. As you see in the main photo, one big lap joint where the side stiles intersect is the foundation of the chair. The sides are then brought together with mortise and tenons. The tenons on the rails and stretchers are rounded to echo the other curves in the project. Enough said, let's hit the workshop.

The decorative nails used to hold the canvas sling in place are called clavos nails. Although they're decorative, they have plenty of strength to do the job required. The large, round heads add a nice accent to the chair.

The tapered rails are turned on the lathe (they could be shaped with a spokeshave) and reflect and echo the curves that make this chair so organic and inviting.



AUSTRALIAN Woodsmith GO On-Line Extras

For full sized templates to make the stiles, visit our website at **australianwoodsmith.com.au**

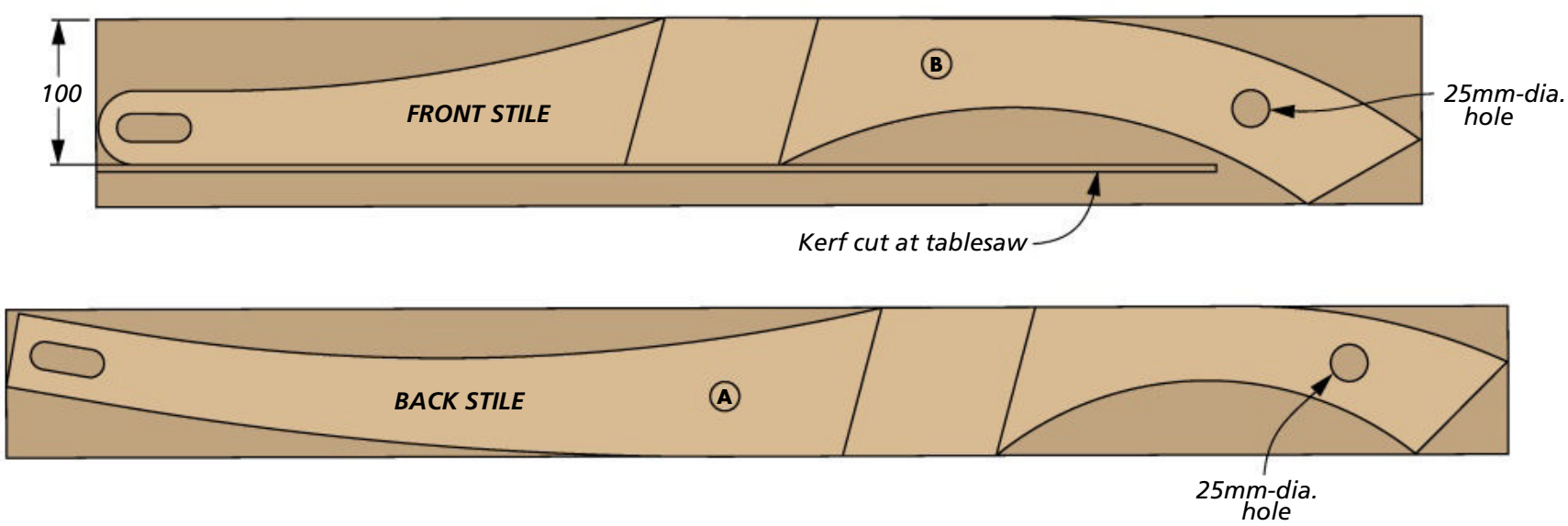
It starts with **STRONG STILES**

Milling large workpieces like these stiles is a lot of fun, especially when they flow together like they do here. The stiles have a split personality that's intriguing as well. Like how the back stiles are also the front legs. While the front stiles are the back legs. All this is due to the use of a large lap joint to make the sides.

We'll get to the lap joint after we shape each of the stiles. For now, the process starts by milling the four blanks to thickness. Then trim them to length at the table saw. You can see the overall size of the blanks in the drawings below. I want to give you a heads-up at this point about shaping the stiles.

Ultimately, when the stiles come together, they form the scissor-like sides that you see in the main drawing above. To keep the chair wobble-free, the mortises in the ends of the stiles need to align perfectly to its partner on the other side. If they don't, well, it's a shame to spend this much money for firewood.

TEMPLATES. Not to worry though, full-size templates will lead the way. Normally, I would make one template and use it on multiple workpieces. Here though, I chose to make a template for each stile. There are two benefits in doing this. First you can guarantee the templates are identical to each other. Second, this allows you to leave the templates on the workpiece



during the milling process, ensuring that there are no errors in moving the template from one piece to another.

The full-sized templates are online at *australianwoodsmith.com.au*. Each pair of 5mm Masonite templates can be held together with double-sided tape while you're making them. Before pulling them apart, there's one more thing to do. It's critical that you use a square to mark the locations of the half laps on the edges of the templates. With that, you're ready to shape the stiles.

SHAPING THE STILES. Use double-sided tape to hold the templates on the workpieces. It's best to attach the templates to the outer face of the stiles. You'll see why shortly. As shown in Figure 1, the process starts at the bandsaw. Cut as close as you can, but not into the template.

The router table is the next stop for the stiles. Figure 2 shows how a flush trim bit will make quick work of smoothing all of the edges. When starting, go slow with this step and be wary of the potential of chipout.

MORTISES. Figure 3 shows drilling the mortises for the crest rail. Here's why it's a good thing to orient the templates on the outside face of the stiles. Any blowout that you might have, which shouldn't be much, will be on the inside face of the stiles. As the template will show, you'll need to swap out to a larger Forstner bit to drill the mortises for the stretchers.

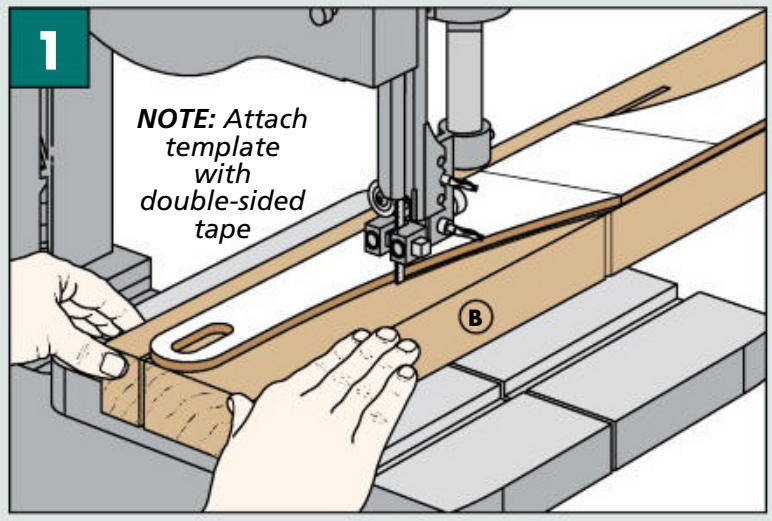
HALF LAPS. The simple jig you see in Figure 4 will align to the marks you transferred from the templates to the stiles. After the router is put away, you can glue up the stiles.

When the glue is dry on the sides, you can sand smooth the lap joints. Now you can turn your focus to the parts that bring the sides of the chair together — the rails and stretchers.

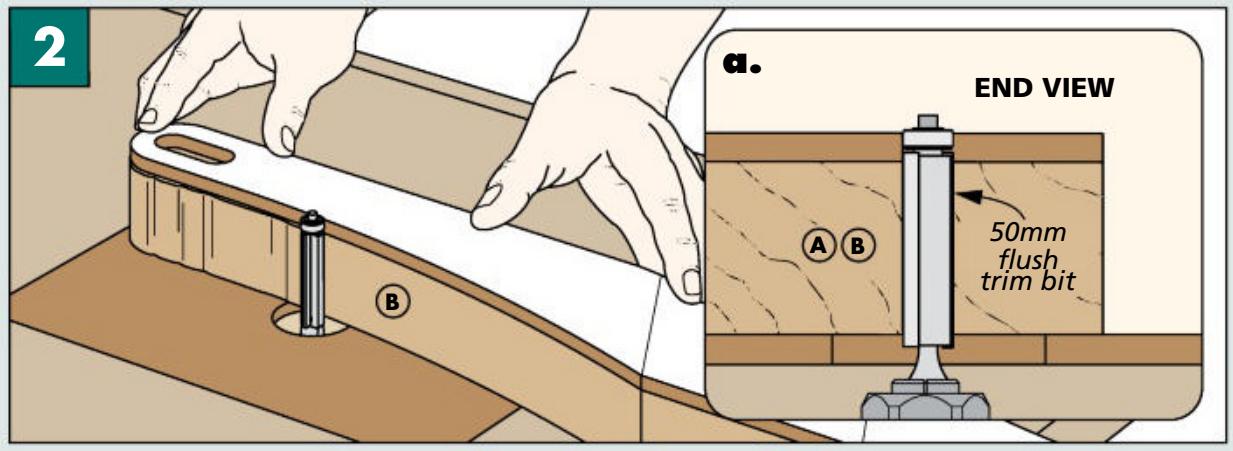
Australian Woodsmith GO On-Line Extras

Note: Jig plans are on the last page of the *Full sized templates to make the stiles*, visit our website at **australianwoodsmith.com.au**

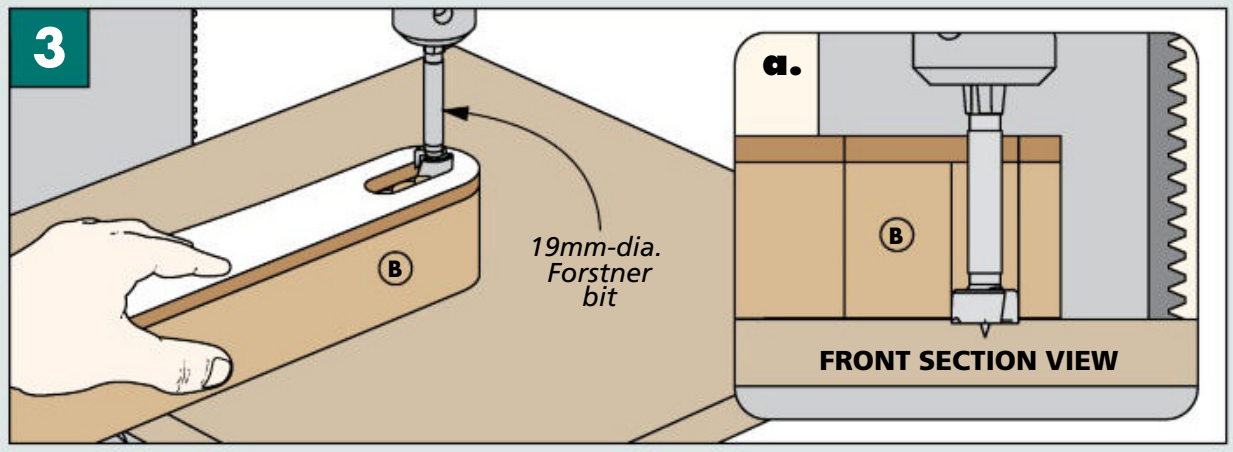
PERFECTLY MATCHING STILES



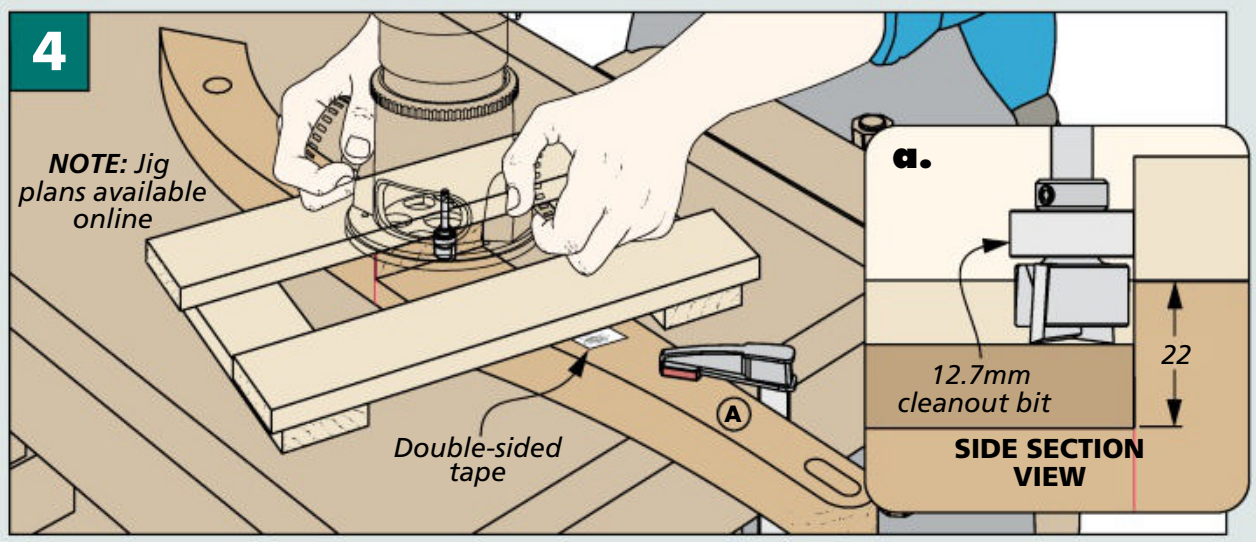
Rough Shaping. Start by ripping the straight sections at the table saw. Then attach the templates to the stiles with double-sided tape and head over to the bandsaw. Here, you want to cut close to the template in preparation for the next step.



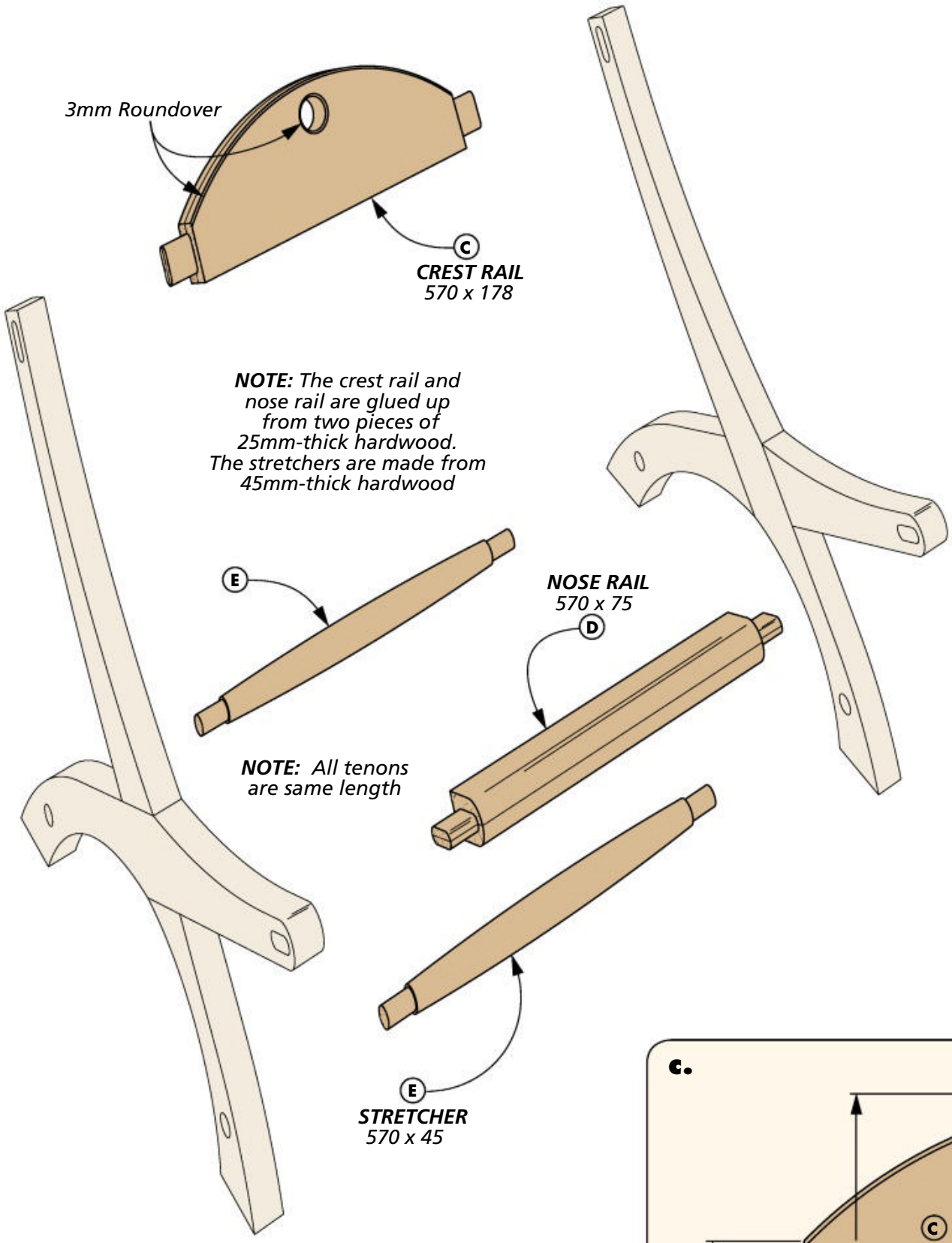
Smooth Shaping. Your router table and a flush trim bit will complete the shaping of the stile profiles. Don't remove the templates after this step is done.

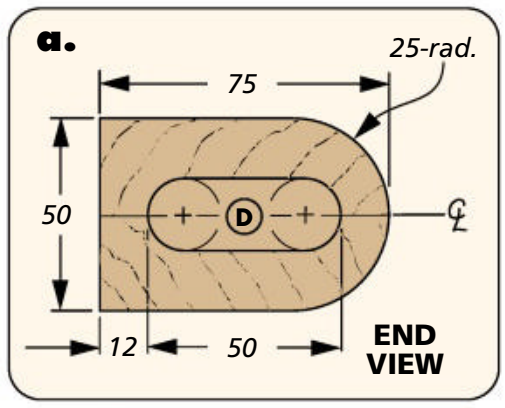


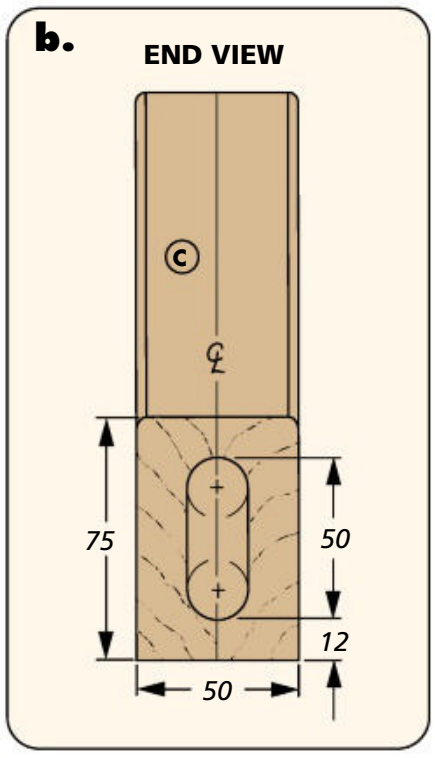
Drill the Mortises. Drill the mortises for the crest rail first. Then switch over to the larger Forstner bit to make the mortises for the stretchers.

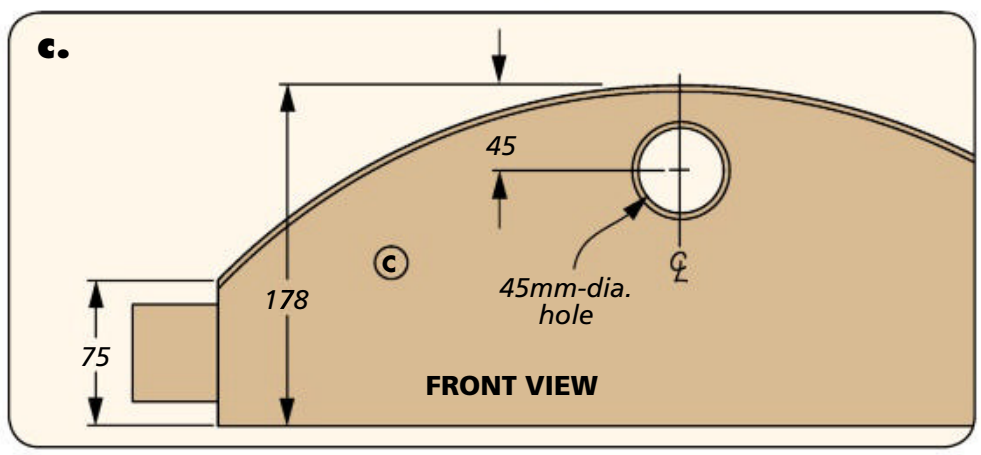


Routing the Half Laps. Before removing the templates, mark the locations of the half laps. Then rout the trenches in multiple passes with the jig shown here.









Next up are **RAILS & STRETCHERS**

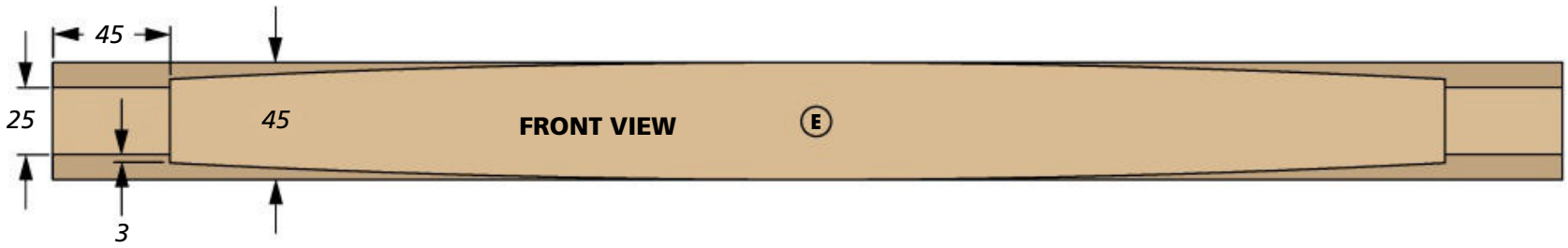
Now you can address the remaining pieces of the chair. These four parts (two rails and two stretchers) are more conventional than the sides you just completed. The main drawing above shows how the rails bring the sides of the chair together. The stretchers do the same at the base of the chair. Later, I'll turn the stretchers at the lathe. I started with the rails.

THE RAILS. The sides of the chair are 50mm wide where the mortises are located for the crest rail. (Likewise at the nose rail on the front end of the chair.) Instead of trying to find hardwood thick enough for the rails, I face-glued the parts up from 25mm stock. While the glue was drying, I planned my strategy for shaping the crest rail.

CREST RAIL. The crest rail at the top of the chair is arguably the focal point of this piece. What minimal decoration the chair has resides in the arc you see in detail 'c' above. Making the arc is a little more calculated than you might think. If you flip back to the first page in this article, you'll notice that the shoulder of the arc ends exactly at the top of the chair sides. So you'll want to be mindful of that junction when making the crest rail.

The box on the next page shows how to cut the joinery on the crest rail. After shaping the tenon in Figures 1 and 2, hold the crest rail against the sides and confirm the starting position of the arc.

Now, you can confidently rough out the shape of the arc at the bandsaw (Figure 3) and sand it smooth. Follow this with drilling the hole that's centred at the top of the crest rail.



TENON. Matching the shape of the tenons to the mortise openings is next. At the router table, with a 9.5mm roundover bit, shape the ends of the tenons. Be careful here, as you know, router bits can get grabby, so ease the tenon into the bit just enough to shape the outer edge of the tenon, Figure 4 shows how to do this. Back at the bench, finish shaping the tenons up to the shoulder (Figure 4a).

THE NOSE RAIL. The process for making the nose rail (detail 'a,' previous page) is a little different. After sizing the glued-up blank, shape the tenons in the same manner as you did on the crest rail. From there, you should dry fit the nose rail to the chair sides to confirm the profile on the rail blank.

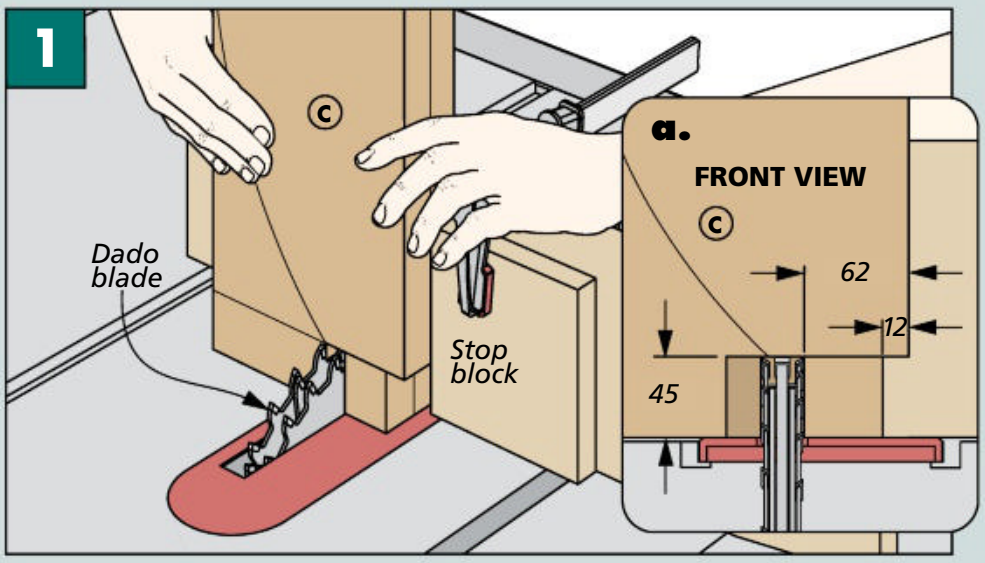
Then it's just a matter of roughing out the shape of the rail at the table saw (with the blade set to 45°). Then back at the router table, sneak up on the final shape of the nose rail with a 25mm roundover bit.

THE STRETCHERS

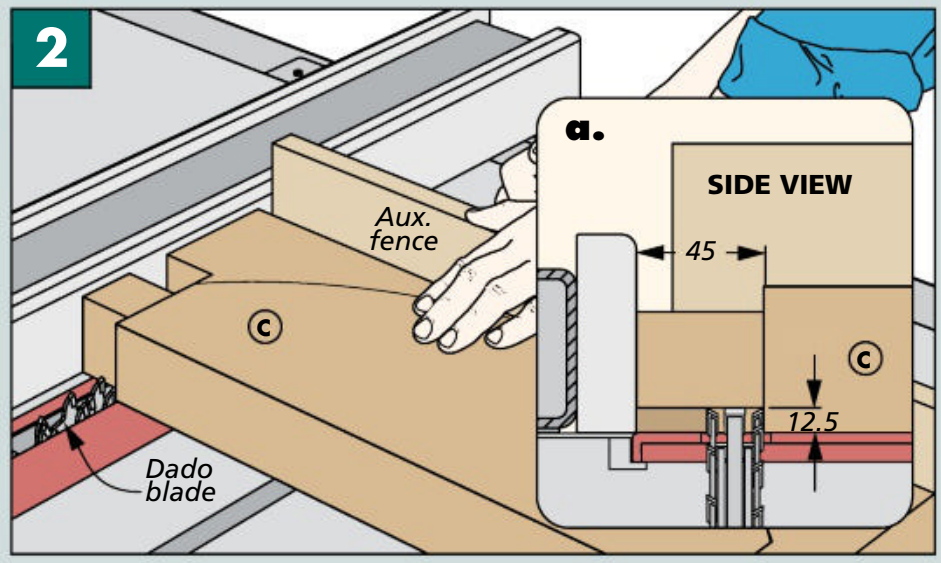
The stretcher you see in the drawing above is almost boring compared to the parts you've made so far. Not really, I always love an excuse to make shavings at the lathe. The two stretchers required for the chair didn't take long to turn and sand smooth.

There's a little more work to do before you can assemble the chair. It involves cutting a slot in the tenons and making some wedges. All of this information is on the next page.

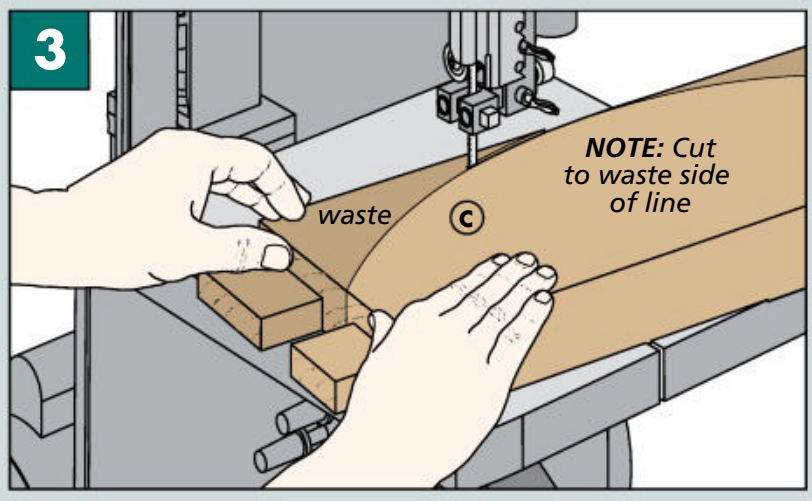
MAKING & SHAPING THE TENONS



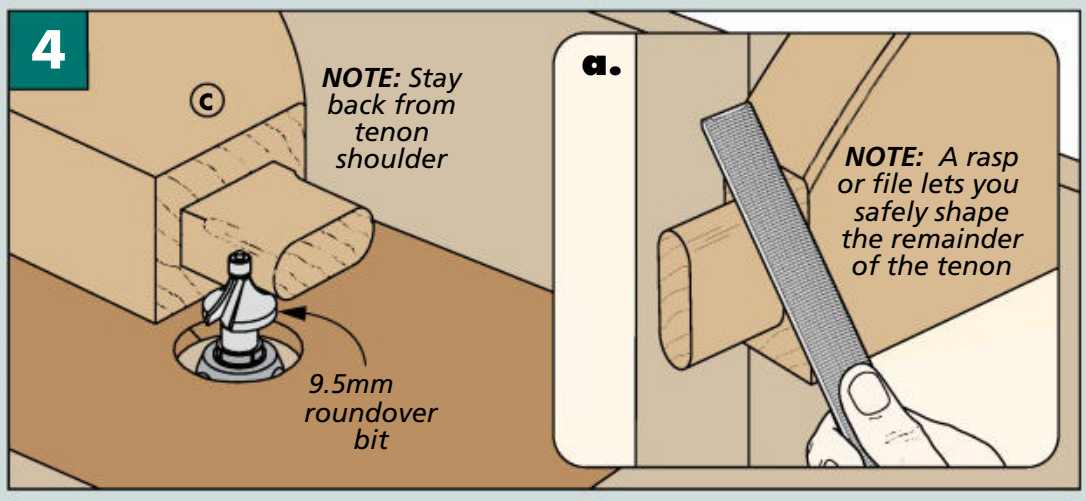
Locate the Tenons. The table saw with a tall auxiliary fence attached to the mitre gauge is how to start the tenon. Stand the rail against the fence to define the upper shoulder.



Cut the Shoulders. To finish roughing out the tenons, lay the crest rail flat and use the rip fence as a stop block. The mitre gauge will support the rail while making the cut.



Shape the Arc. Shaping the arc that's on top of the crest rail begins at the bandsaw. Sand smooth the marks from the bandsaw blade.



Roundover the Tenons. A roundover bit installed in your router table will shape the tenon to match the mortise. Use files and rasps to complete the shape of the tenon close to the body of the crest rail.

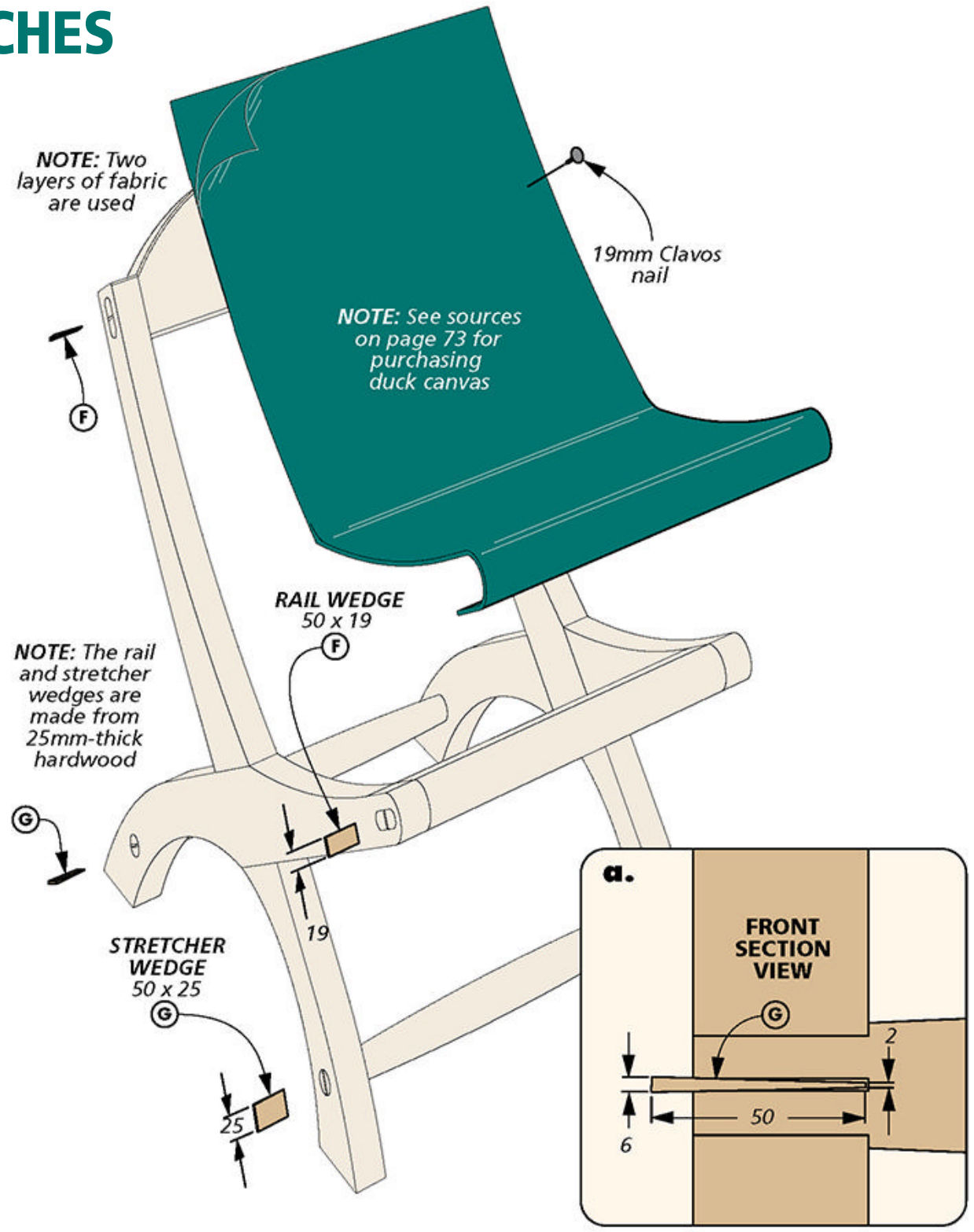
Some **FINISHING TOUCHES**

The finish line is within sight for this lovely little chair. There are just a few things left to do — make some wedges, glue up the chair, install the wedges, finish the chair, sew the seat and attach it to the chair. Do six or seven things qualify as a few? Who knows? At any rate, I started with the last bit of work needed on the rails and stretchers — cutting a slot for the wedges.

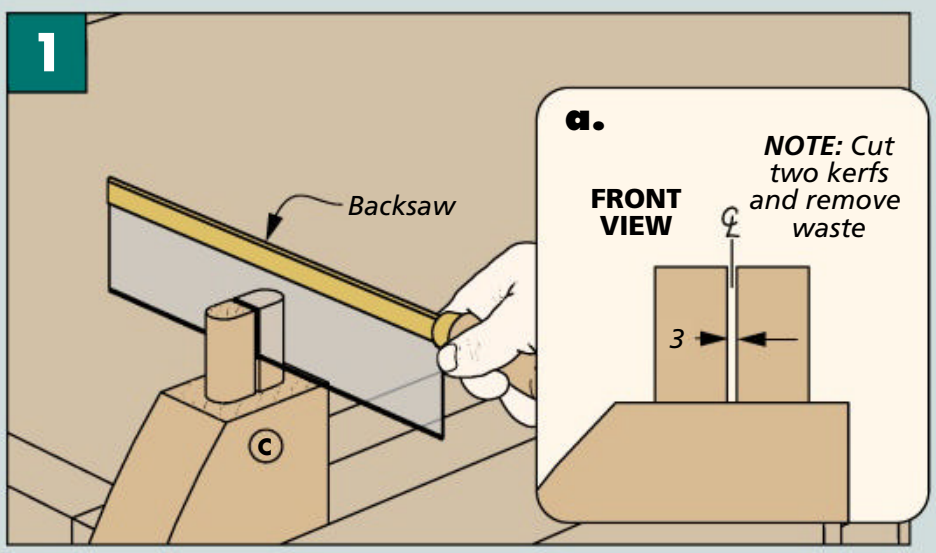
KERFS IN THE TENONS. Figure 1 below shows the kerfs being made with a backsaw. I like using hand tools as often as possible. Plus, it's easier to work on the turned stretchers with the aid of your bench vice.

GLUE UP. To avoid anxious moments during a multi-piece glue-up I do two things. A dry run comes first. This will reveal any bumps or ill-fitting parts ahead of time. And I use slow-set glue to give me some fiddle room. So, with one side of the chair face down on the bench, fit the rails and stretchers in their openings. To keep a consistent look, I rotated the stretcher so the groove for the wedge runs parallel to the grain. Now slide the other side in place. Flip the chair upright and clamp it up.

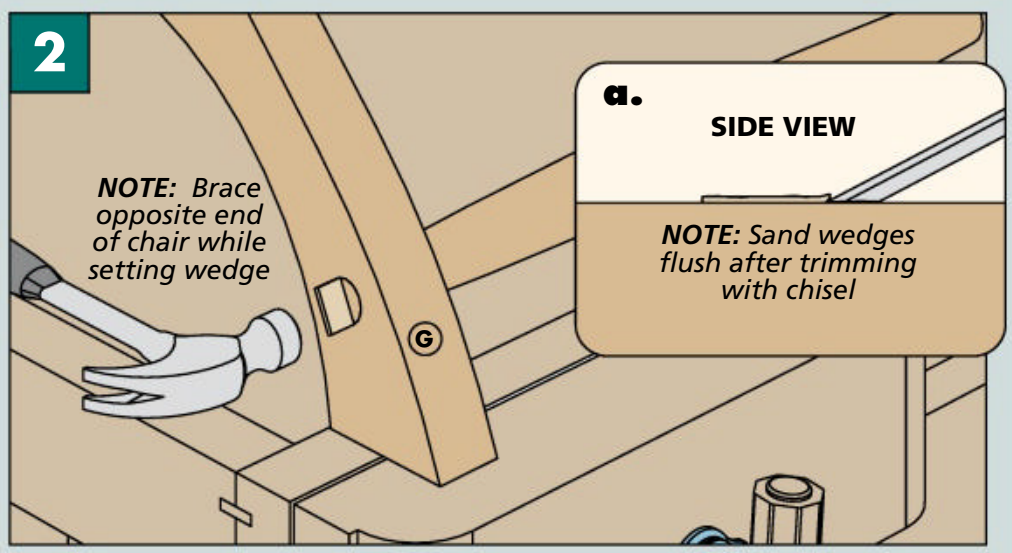
THE WEDGES. You'll notice in the main drawing on the previous page, that there are two sizes of wedges. The narrow wedges are for the rails. While the wider wedges are for the tenons on the stretchers. Both sets of wedges are made at the bandsaw. With glue and hammer in hand, you can install the wedges. When



ADDING WEDGES TO THE TENONS

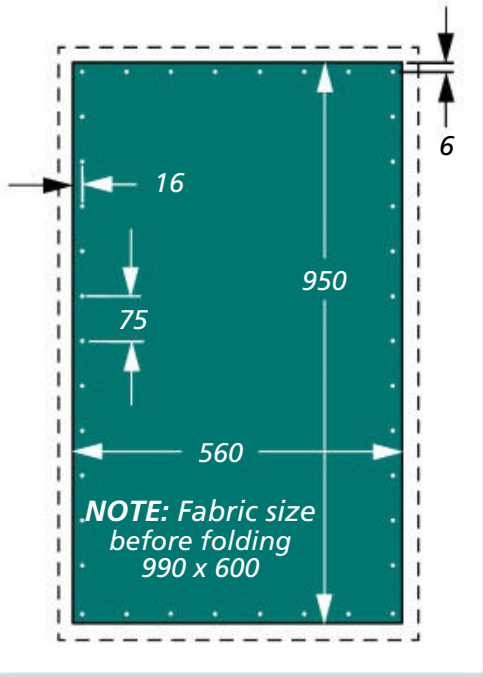


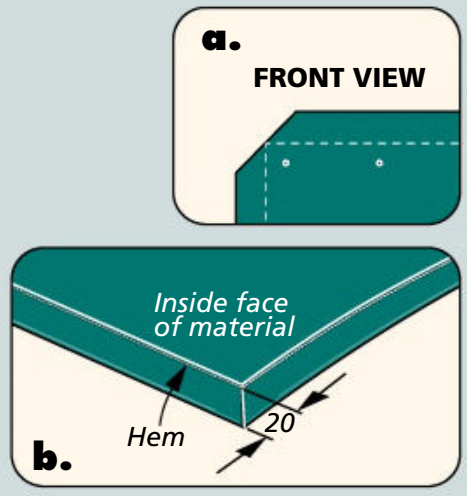
Slots for Wedges. A backsaw is a good choice for making the slots in the tenons. To avoid cutting into the face of the workpiece, be careful as you near the shoulder.



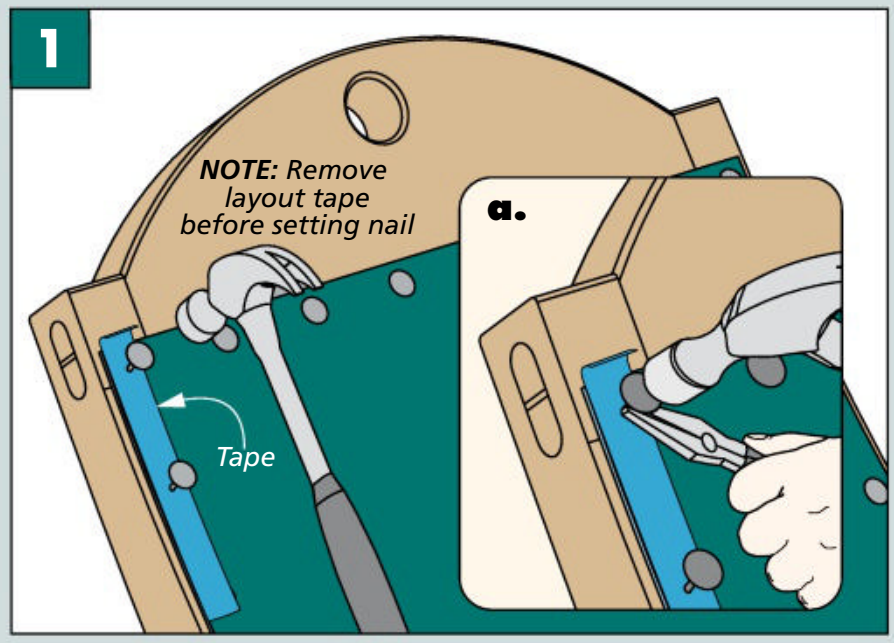
Installing the Wedges. After the chair is glued up you can tap the wedges in place. To trim the wedge flush, a chisel will do just fine. Then a little sanding will yield a flawless look.

MAKING & ATTACHING THE SEAT





Shaping the Seat. A thick hem in the canvas brings the two layers together and guarantees years of worry-free relaxation.



Spacing the Nails. Installing the nails is a two-step process. First hold the nail steady with needle nose pliers. Once it's set, drive it tight to the canvas material.

they're dry, cut the wedges flush to the surface and sand smooth (Figure 2, previous page). It's time to ease all the edges with a 3mm roundover bit. A sanding block takes care of the tight corners where the bit won't reach.

Before installing the seat, the chair needs to be finished. That called for two coats of Feast Watson Wipe-On-Poly. Next is the seat.

THE SEAT

Having an upholstered seat isn't practical in a humid environment such as the Caribbean. In keeping with that insightful position, Dillon employed a dyed cotton duck canvas. As you see in the drawing above, two layers with a folded seam will make a long-lasting seat. Hemming the seat is going to require a machine with some muscle. A local sewing and alteration shop will be able to do the job properly for a modest fee.

Figure 1 above shows how to install the seat. The tape lets you lay out and mark the location of the nails evenly across the seat (detail 'a'). Before setting the nails, pull the tape from underneath.

This has been a fun build. You'll find it's a good idea to hold on to those templates, and the half-lap jig for the stiles. I have a hunch that once friends and family have a chance to try out your Campeche chair, there's a good chance you'll get called to make more. W

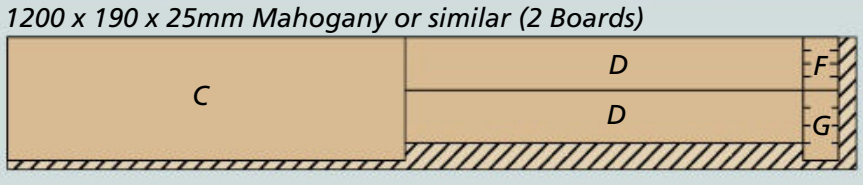
▲ Clavos nails are good-looking fasteners that add style to the chair.

Materials, Supplies & Cutting Diagram

A	Back Stile (2)	1020 x 100 x 45	**E**	Stretchers (2)	570 x 45 x 45	• (2) 990 x 600 10 oz Duck Canvas
B	Front Stile (2)	915 x 146 x 45	**F**	Rail Wedges (4)	50 x 19 x 6	• (38) 19mm Clavos Nails
C	Crest Rail (1)	570 x 178 x 50	**G**	Stretcher Wedges (4)	50 x 25 x 6	
D	Nose Rail (1)	570 x 75 x 50				

2100 x 150 x 45mm Mahogany or similar (2 Boards)

1200 x 190 x 25mm Mahogany or similar (2 Boards)



Shaker Sewing Cabinet

Simplicity often gets overlooked in these hasty times. That's sad, take a look at what hurried people miss.

Cherry and poplar perform together well. The contrast between the drawer sides and the rest of the cabinet make looking at the cabinet as enjoyable as using it. A clear lacquer finish lets all the wood shine.

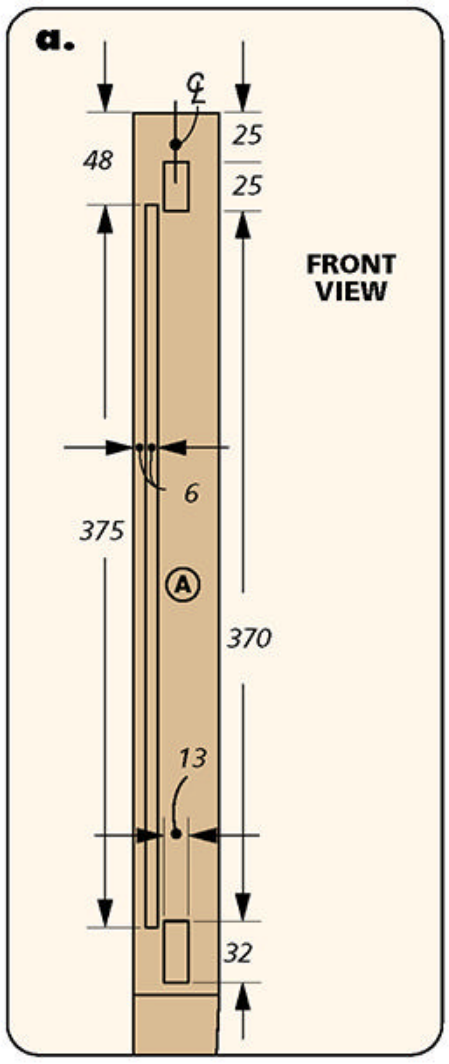
Rule Joints Rule. Do you see the brass hinges that hold the drop leaf to the top? No, you don't, and that's the beauty of a rule joint. A rule joint does the double duty of smooth operation and hiding hardware.

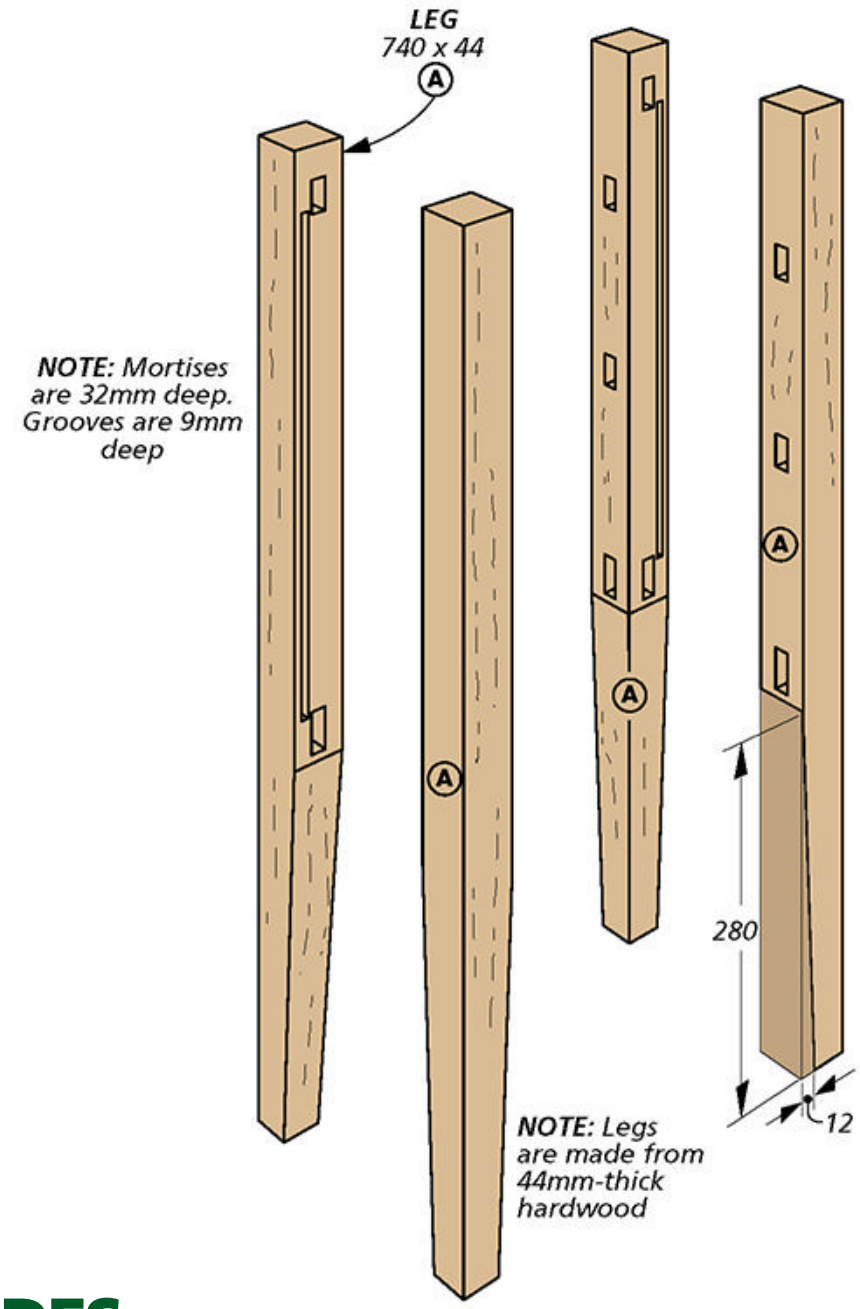
The drop leaf support you see here works unseen underneath the top. The support glides easily and effortlessly in the bracket that holds it to the top of the cabinet. A thumb and index finger is all it takes.

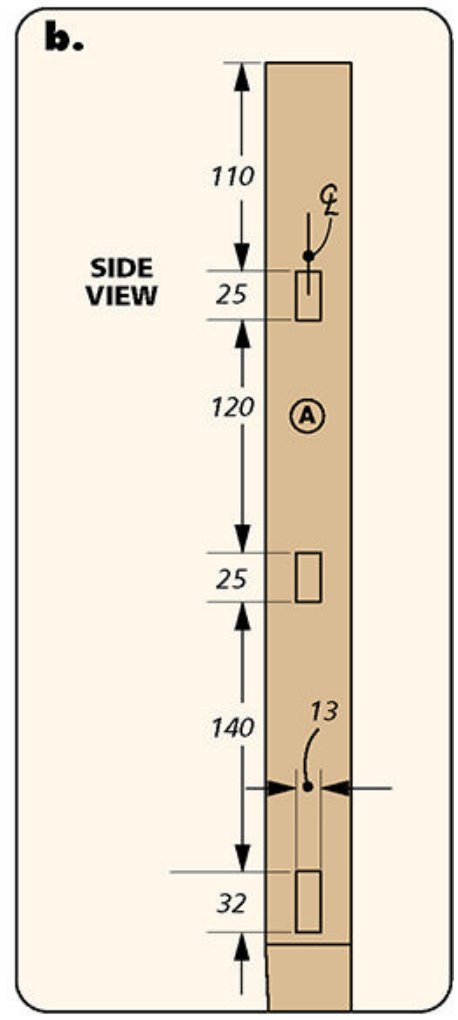
The original cabinet that inspired the one you see here came from the Shaker colony that once thrived in Hancock, Massachusetts. The formal description from antique dealers would be "A four-over-two-over-one sisters sewing cabinet." The drawer count is clearly important to today's audiences. The Shakers, though, saw things with a more holistic eye. The relation of their buildings to the land, the rooms to the buildings and the furniture to the rooms, were all governed by a precise set of intentions — the singular mission of simplicity. This cabinet's clean, clear and organised geometry echoes all of this.

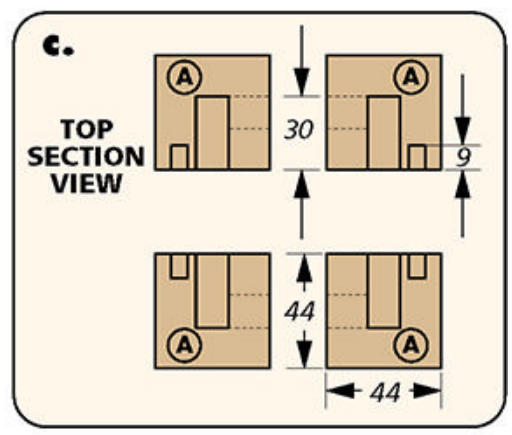
Gorgeous cherry glows all over this project. With pine serving as a pragmatic supporting cast for the drawer shells and cabinet back. Plywood humbly works as drawer and cabinet bottoms.

If you've been meaning to brush up on your joinery skills, this project will get you flexing in no time at all. It starts with a handful of mortise and tenons to bring the side assemblies together. Those steps are a warm-up for more mortise and tenons you'll tackle in the rails and stretchers. (Throw in dovetail tenons on the top rails for some spice.) Then you'll spend some time making dovetail drawers. The project winds down with making a rule joint for the top and drop leaf. A full plate of woodworking indeed.





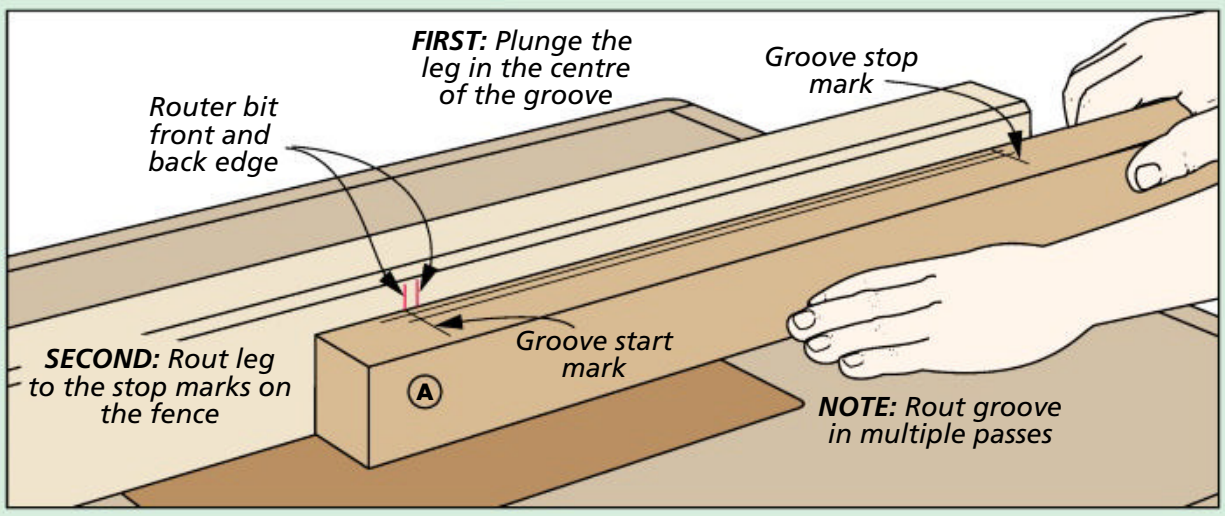




Start with the **SIDES**

The four legs you see above are made from 190 x 45mm hardwood. They are tied together front to back with equally thick rails. As you see, the legs and the rails have grooves that hold rebated hardwood panels securely in place. Legs are the foundation and often the cornerstone of cabinet projects. So getting the details right on the legs will go a long way towards smooth sailing for the rest of the project.

PLUNGE ROUTING



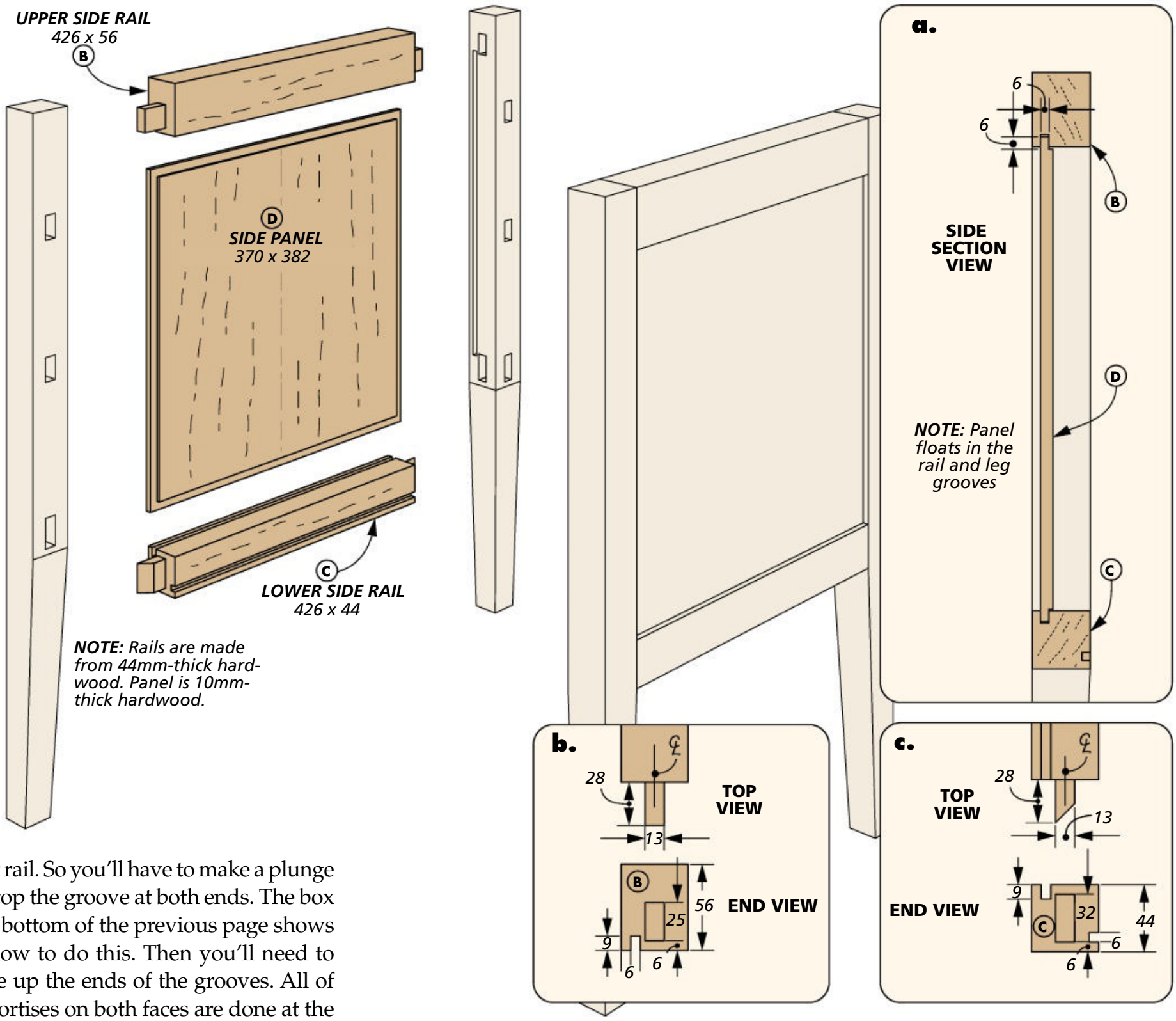
Making a Stopped Groove. It's easy to make a stopped groove in the legs. Install a straight bit in your router table, then mark the front and back edges on the fence. Once you've plunged the leg onto the bit, the marks will show you where to stop.

LEG GEOGRAPHY. The front and back legs are mirror images of each other. Detail 'a' shows the faces that hold the side panels and rails. They have two mortises for the rails and a long groove for the side panels.

The faces that join with the front and back rails have three mortises (detail 'b') to accommodate them. Eventually, there will be dovetail sockets at the top of each leg to join with the top rails. Creating those notches happens a little later in the process. For now, we'll work on the grooves and mortises that will hold the rails and panels.

GROOVE & MORTISES FIRST. Start by cutting all the parts to length. It's a good practice to mark the top of the legs to keep them properly oriented. Detail 'c' shows this, along with a look at the mortise and groove locations.

I routed the grooves at the router table. You don't want the grooves to show at the bottom of the legs. And you don't want to weaken the wall of the mortise for the



upper rail. So you'll have to make a plunge and stop the groove at both ends. The box at the bottom of the previous page shows you how to do this. Then you'll need to square up the ends of the grooves. All of the mortises on both faces are done at the drill press, then squared up as well.

TAPER THE LEGS. The main drawing on the previous page shows the subtle tapers that are on the inside faces of the legs. Over at the table saw, a simple sled with cleats supporting the leg will make the tapers uniform on the legs. Follow this up with your plane or sandpaper to smooth the surface. Now you're ready to tackle the rails and panels.

RAILS & PANELS

As you see in the drawing to the right, the rails that hold the panel in place, and bring the legs together, are thick, no-nonsense rails. The tenons in the upper rails are square and easy enough to do at the table saw.

The tenons on the lower rails start out the same, but notice in detail 'c' that they're mitred. Since they're adjacent to the tenons on the front and back lower rails this compromise allows the rails to fully seat in the mortise.

I cut the overall shape of the tenon in the same manner as I did on the upper rail. But, to make the mitre, I clamped the rail in my vice at the workbench and trimmed the end with a hand saw.

When making cuts like this, I'll switch up the choice of saws to use for the task. I've got a cabinet on the wall of my workshop that houses a generous complement of hand saws. I chose my trusty Dozuki saw for this job. It's a well-known member of the family of Japanese hand saws that are available. And it's the most similar to a western back saw.

There's one thing left to do on the rails — the grooves for the side panels. You can rout those over at the router table. Then turn your attention to the panels.

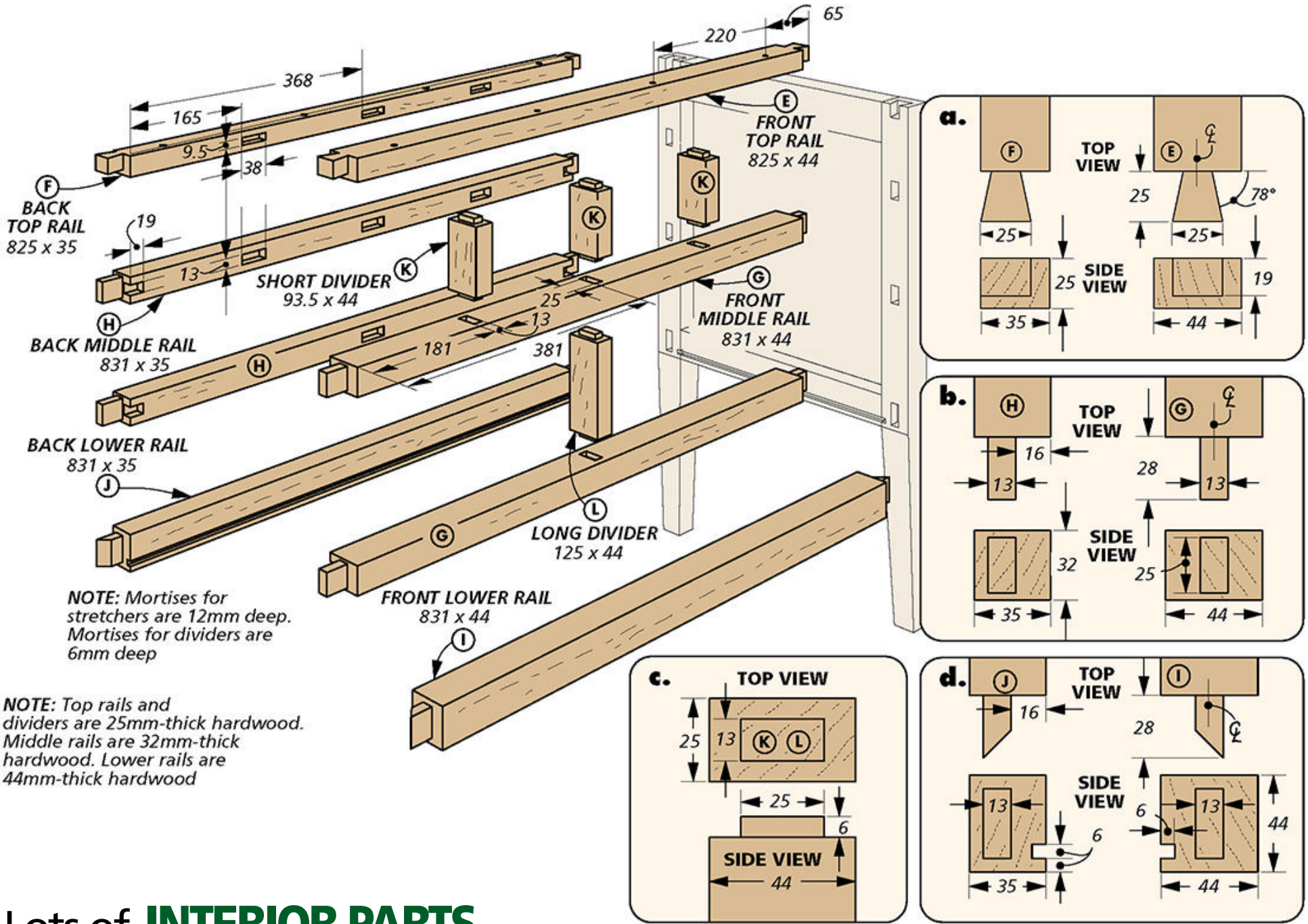
PANELS ARE NEXT. The main drawing above reveals that the panels are glued up from two 10mm-thick cherry pieces. I planed 12mm material to thickness for the panels.

I used cauls and light clamping pressure to help keep the panels flat during the glue-up.

But if they do have a curve to them when the clamps are removed, not to worry. After you cut the rebates in the edges, and move on to assembling the sides, the grooves in the legs and rails will flatten the panel.

GLUE UP THE SIDES. Gluing up the sides calls into play the standard operating procedures. Check for any squeeze-out and clean it up with a warm, wet rag.

With that, you can set the cabinet sides out of the way and focus on making more rails, stretchers and drawer guides. The mortise and tenons you've done here are a great warm-up for what's on the next few pages.



Lots of **INTERIOR PARTS**

Lots of internal parts haunt the inside of the sewing cabinet — two top rails, four middle rails, two bottom rails, four drawer dividers, eleven stretchers and fourteen drawer guides. If you lined up all these parts end to end you would realise that you're avoiding the task at hand, and should probably focus on making some mortises and tenons. I suggest you start with the rails you see in the drawing and details above.

TENON DETAILS. Start off by sizing all the parts. Note that the top rails are 6mm shorter than the rest. From shoulder to shoulder, all the rails are the same length. Detail 'a' above shows that the dovetail tenons are not as long as the other tenons.

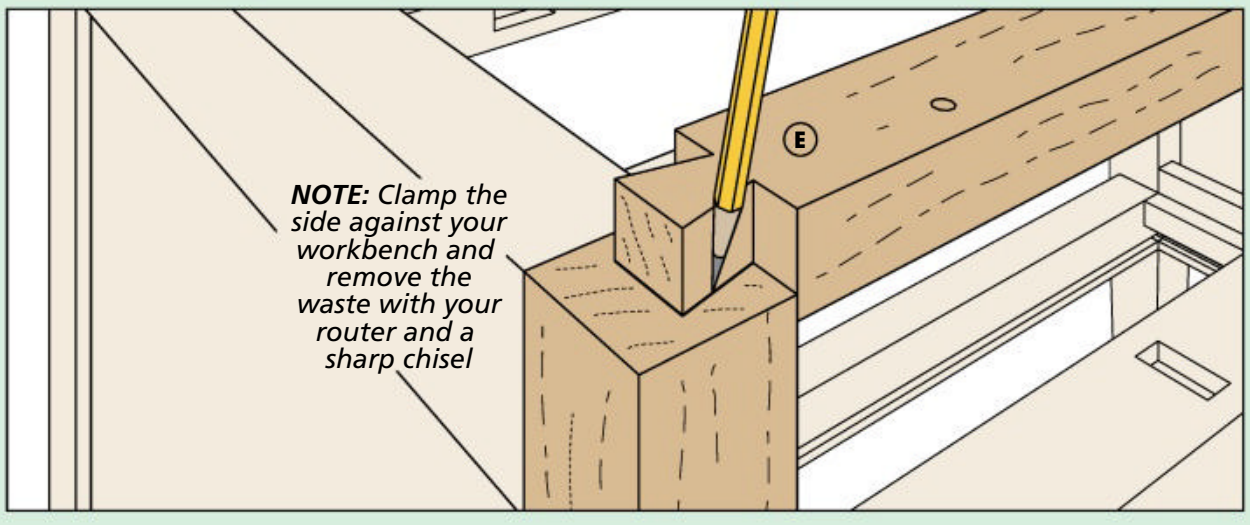
You can cut them to size and shape the dovetail on the end however you see fit. I did mine at the bandsaw followed by a little sanding by hand.

The tenons on the four middle rails (detail 'b') are all the same size. Lastly, the two bottom rails have mitred tenons like the ones you did for the sides.

DOVETAIL SOCKETS. When the tenons are completed on all of the rails, you'll need to do a dry assembly with the sides you glued up earlier. This dry assembly is needed to perfectly locate the dovetail sockets in the tops of the legs.

Bring together the sides with the bottom and middle rails in place. Now, lay the rails on top and trace the dovetail profile onto the leg. The box to the left shows what this looks like. Then you can waste away the material for the dovetail. Also, drill the holes and counterbores for attaching the cabinet top.

DOVETAIL SOCKETS



Dry Assembly First. With the middle and lower rails fit to the sides, set the upper rail on top of the legs. Then trace the profile of the dovetail onto the top of the legs.

MORTISES ON THE RAILS. So many mortises. The inside faces of the rails have mortises to hold the stretchers. I laid these out with the front and back rails clamped together to ensure they lined up.

You also have some mortises in the front upper and middle rails for drawer dividers. You better get drilling and chopping. To complete the rails, rout the groove in the bottom rails for the plywood bottom.

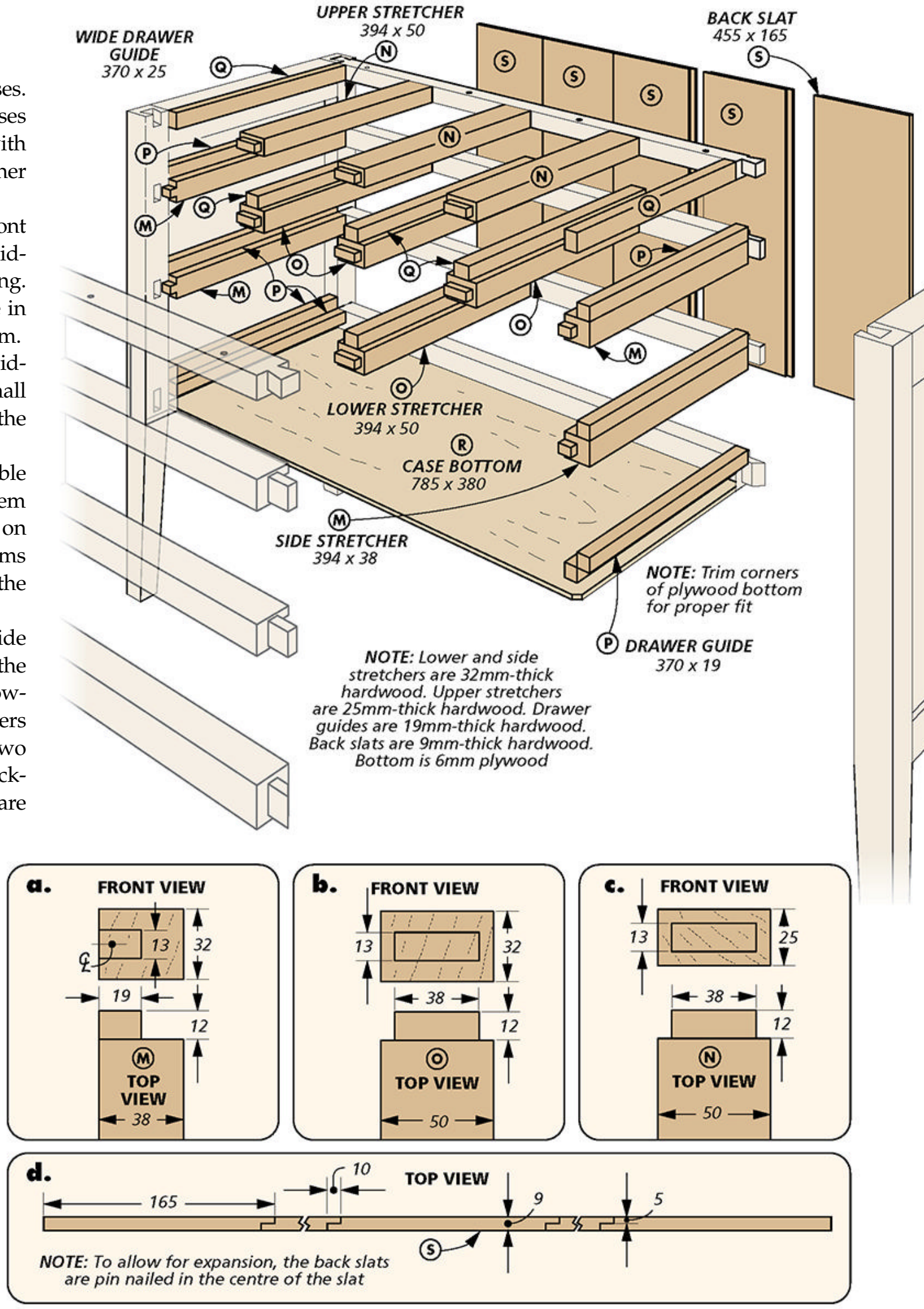
DIVIDERS. Next up is making the dividers. There are three dividers for the small drawers, and one longer one between the middle drawers.

This calls for spending time at the table saw crafting the tenons and fitting them to their mortises as you go (detail 'c' on the previous page). This exercise warms you up for your next task — making the stretchers.

STRETCHERS. First, make the four side stretchers that have tenons offset to the inside of the cabinet (detail 'a'). Following those parts are four lower stretchers with centred tenons (detail 'b'). These two groups of stretchers are the same thickness. The remaining upper stretchers are thinner than their counterparts (detail 'c').

DRAWER GUIDES. There are two sizes of drawer guides. The guides ride piggy-back on the stretchers and are glued in place after assembly. The main drawing above shows where they go. The last part you need to make before assembly is the plywood bottom. Then you can gear up to assemble the case.

ASSEMBLE THE CASE. There are 26 parts involved in the glue-up for the case. So, unless you have a brainy pet octopus that loves puzzles — you're going to need help. Also, the helper needs to be willing to do a rehearsal glue-up where everything is staged and within reach.

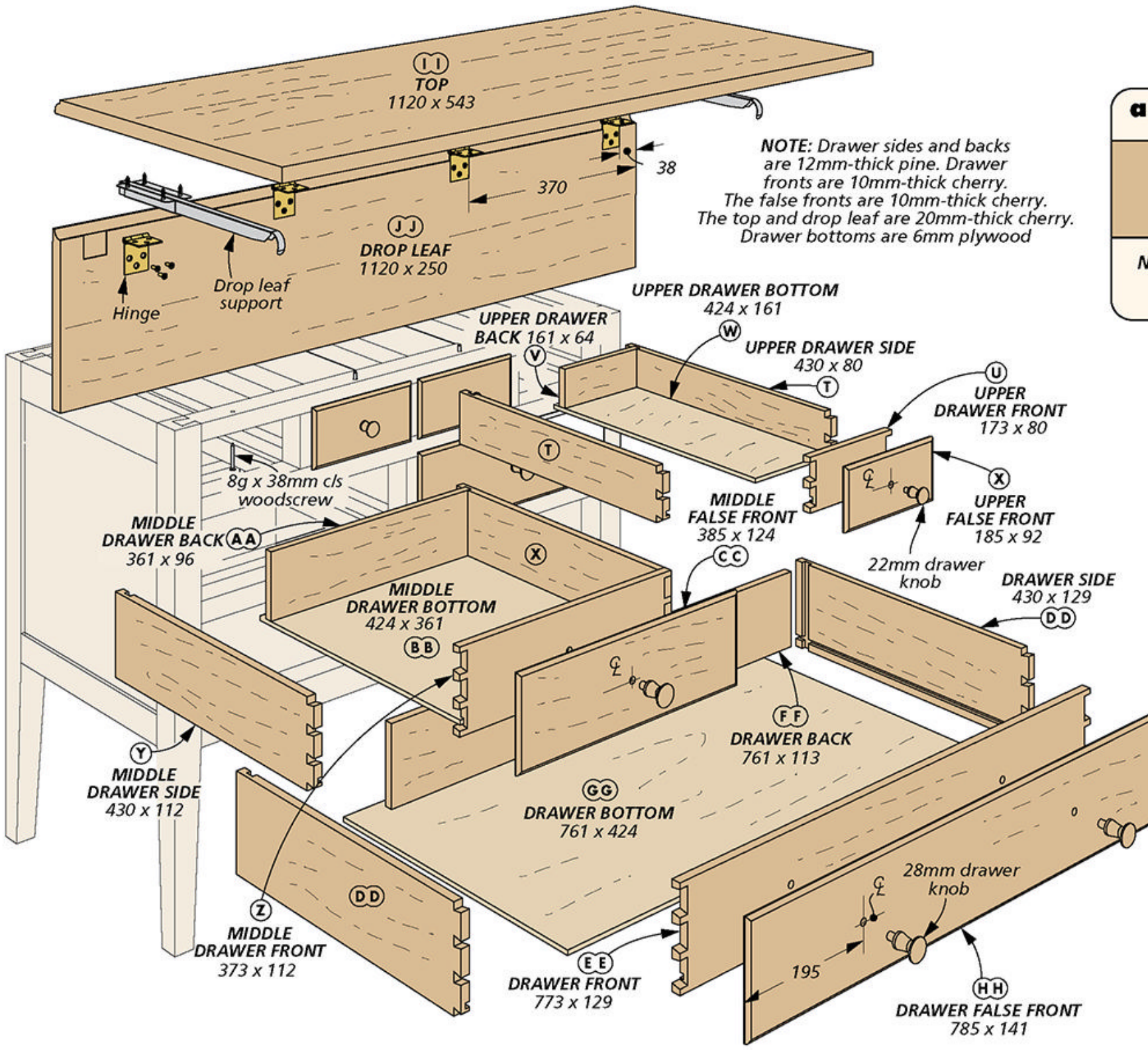


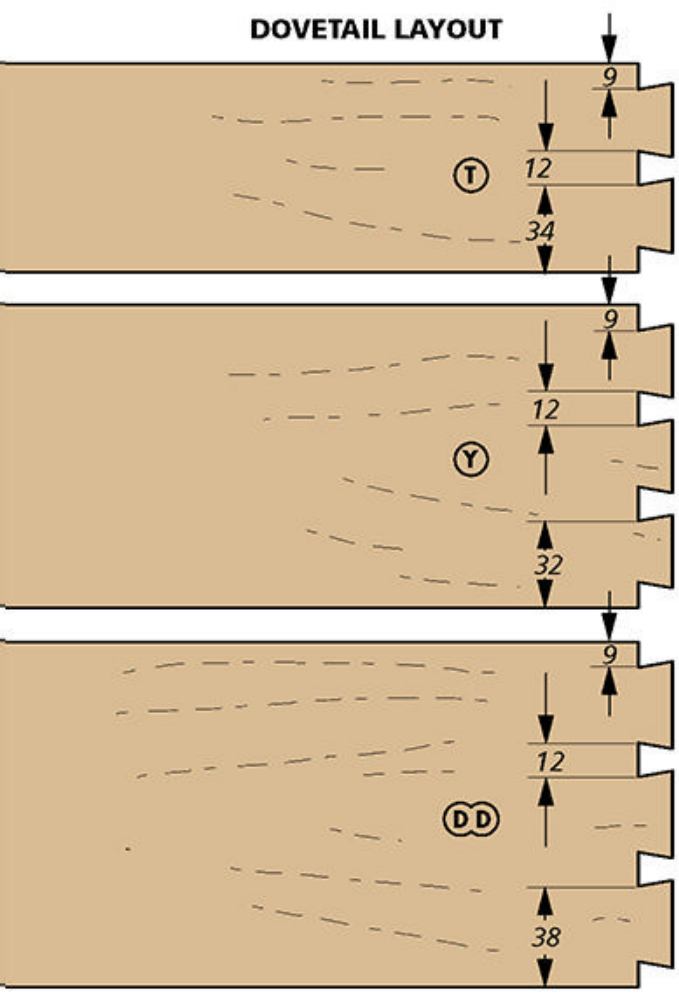
Doing a dry run shows the weak spots in the plan and gives you an opportunity to iron things out. If you have your clamps pre-gapped, a bucket with warm water and rags close at hand, the glue-up will be a breeze.

DRAWER GUIDES, PART 2. When the debris from the glue-up is packed away, you can prepare the finishing touch to the interior of the cabinet — the drawer guides. Notice that the square guides sit on the outer stretchers to guide the bottom and middle drawers. The remaining guides are a little wider and are attached to the inner stretchers and side rails. With the guides in place, you need to make the back for the cabinet.

THE BACK. The back is a classic example of Shaker pragmatism. Just five pine boards are inset to the frame of the cabinet. As you see in detail 'd,' the boards are joined with half-laps. Like the side panels earlier, I planed these boards to thickness from 12mm stock. Then I made the rebated edges at the table saw.

Pin nailing the back in place completed this stage of building. Now you can move on to making the drawers and the top.





Slide home making the **DRAWERS & TOP**

There are plenty of storage options with the drawers that are housed in this cabinet. Four drawers across the top of the cabinet allow for all the small things that are called for when sewing. The middle and bottom drawers below provide generous storage space. The interiors are made of pine, a secondary wood that was called into duty for cabinets like this. The joinery of choice is the classic dovetail joint for long life. A cherry false front (and drawer front) brings the look of the drawers back into the fold of the cabinet.

DOVETAILS FIRST. After sizing all the parts, you could, as the Shakers most likely did, cut the dovetailed drawers by hand. But the article on page 26 shows you how to use dovetailed splines to build the drawers.

GROOVES NEXT. When you've finished the dovetail work, cut the groove for the plywood bottoms on the table saw. After assembly, you can make the false fronts (detail 'c').

FALSE FRONTS. The cherry false fronts are straightforward. To act as a stop for the drawers, they are 12mm longer and wider than the drawer itself. Next, add the roundover on all the edges and drill the hole needed for the knobs. Attaching the false fronts to the drawers was just a matter of applying glue to the back and clamping them centred on the drawer.

THE TOP

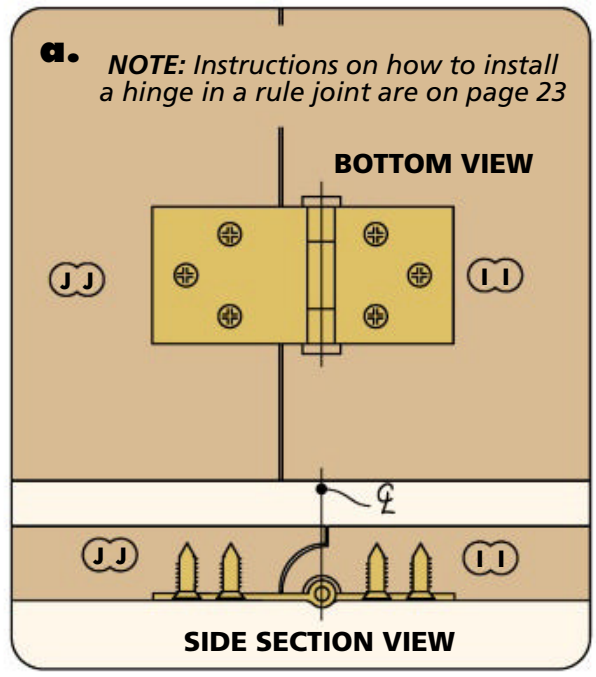
The top is a glued-up hardwood panel that attaches to the cabinet through the rails. Notice in the drawings above that the

drop leaf is on the back of the cabinet. This allows you to expand the worksurface yet maintain easy access to all the tools and materials you need for your sartorial journey. The leaf is attached to the top with four hinges that are hidden in a rule joint.

RULE JOINT. Using a rule joint between the top and the drop leaf ensures that the two pieces will align perfectly and operate smoothly for the life of the table. A rule joint consists of two profiles that you'll create with a matching set of router bits (detail 'a' on previous page). Turn to page 23 for instructions on making a rule joint.

When the rule joint is done, and the mortises for the hinges are completed (detail 'a') screw the hinges in place so you're ready to install the top. The top is centred on the cabinet side to side and overhangs the front by 50mm. Screws through oversized holes in the front and back rails hold the top in place. Lastly, screw the leaf supports to the underside of the top. The photo on the first page shows that they're snug to the sides and flush with the back of the cabinet.

FINISH. Cherry mellows with age in a way that no stain can match. So just two coats of lacquer — it would be a crime not to let that cherry shine.

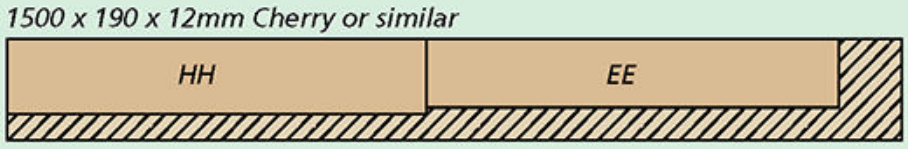


Materials, Supplies & Cutting Diagram

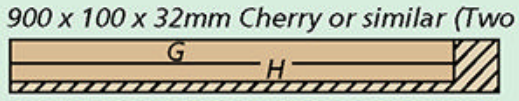
A	Legs (4)	740 x 44 x 44
B	Upper Side Rails (2)	426 x 56 x 44
C	Lower Side Rails (2)	426 x 44 x 44
D	Side Panels (2)	370 x 382 x 10
E	Front Top Rail (1)	825 x 44 x 25
F	Back Top Rail (1)	825 x 35 x 25
G	Front Middle Rails (2)	831 x 44 x 32
H	Back Middle Rails (2)	831 x 35 x 32
I	Front Lower Rail (1)	831 x 44 x 44
J	Back Lower Rail (1)	831 x 35 x 44
K	Short Dividers (3)	93.5 x 44 x 25
L	Long Divider (1)	125 x 44 x 25
M	Side Stretchers (4)	394 x 38 x 32
N	Upper Stretchers (3)	394 x 50 x 25
O	Lower Stretchers (4)	394 x 50 x 32
P	Drawer Guides (8)	370 x 19 x 19
Q	Wide Drawer Guides (6)	370 x 25 x 19
R	Case Bottom (1)	785 x 380 x 6 ply
S	Back Slats (5)	455 x 165 x 9
T	Upr. Drawer Sides (8)	430 x 80 x 12
U	Upr. Drawer Fronts (4)	173 x 80 x 10
V	Upr. Drawer Backs (4)	161 x 64 x 12
W	Upr. Drwr Btms. (4)	424 x 161 x 6 ply
X	Upr. False Fronts (4)	185 x 92 x 10
Y	Mid. Drawer Sides (4)	430 x 112 x 12
Z	Mid. Drawer Fronts (2)	373 x 112 x 10
AA	Mid. Drawer Backs (2)	361 x 96 x 12
BB	Mid. Drwr Btms. (2)	424 x 361 x 6 ply
CC	Mid. False Front (2)	385 x 124 x 10
DD	Drawer Sides (2)	430 x 129 x 12
EE	Drawer Front (1)	773 x 129 x 10
FF	Drawer Back (1)	761 x 113 x 12
GG	Drawer Bottom (1)	761 x 424 x 6 ply
HH	Drawer False Front (1)	785 x 141 x 10
II	Top (1)	1120 x 543 x 25
JJ	Drop Leaf (1)	1120 x 250 x 20

- (4) 28mm-dia. Drawer Knobs
- (4) 22mm-dia. Drawer Knobs
- (8) 8g x 38mm c/s Woodscrews
- (4) Hinges w/screws
- (1 pr.) Leaf Supports

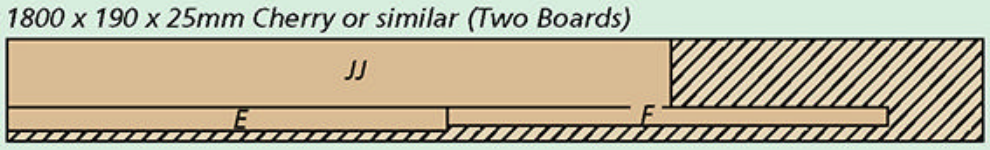
1500 x 190 x 12mm Cherry or similar



900 x 100 x 32mm Cherry or similar (Two Boards)

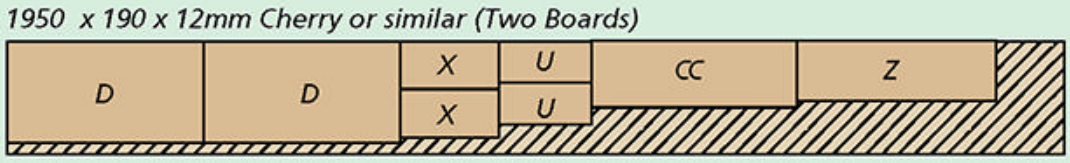


1800 x 190 x 25mm Cherry or similar (Two Boards)



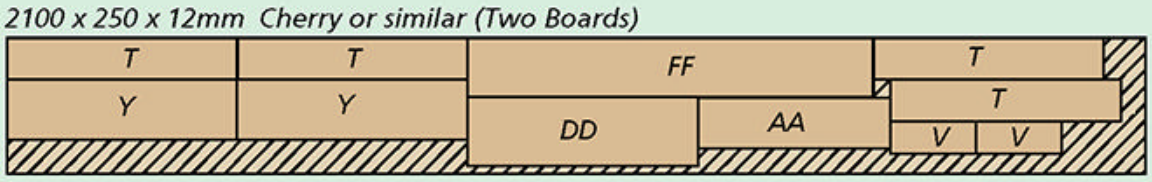
900 x 100 x 32mm Pine (Two Boards)

1950 x 190 x 12mm Cherry or similar (Two Boards)



ALSO NEEDED: *One 1200 x 1200 Sheet of 6mm Plywood*

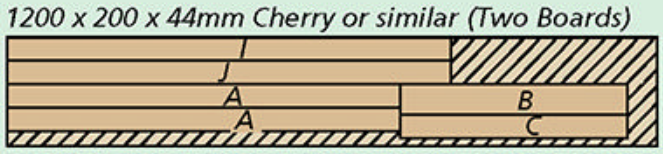
2100 x 250 x 12mm Cherry or similar (Two Boards)



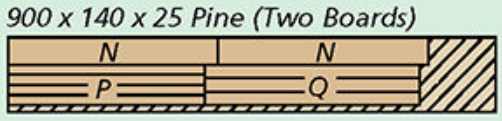
SOURCES:
Horton-brasses.com
Large Cherry Knob....WK-7
Small Cherry Knob....WK-5

Rockler.com
Brass Plated Hinge...29256
Drop Leaf Support...30006

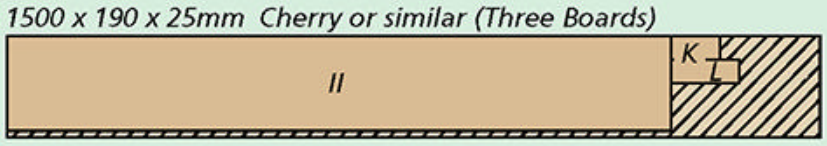
1200 x 200 x 44mm Cherry or similar (Two Boards)



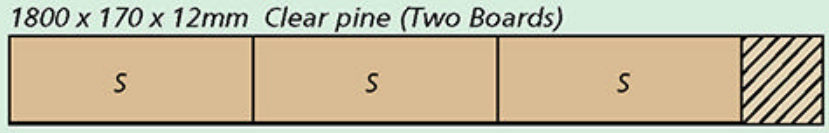
900 x 140 x 25 Pine (Two Boards)



1500 x 190 x 25mm Cherry or similar (Three Boards)



1800 x 170 x 12mm Clear pine (Two Boards)



Turning Drawer Pulls & Door Knobs

Richard Findley introduces the basics of turning furniture accessories.

Many pieces of furniture feature a pull or knob. Anything with a door or drawer has a need for some sort of handle, and while trends and fashions change, turned wooden knobs have been with us for centuries and continue to feature on modern furniture.

A search of almost any furniture, kitchen or bedroom manufacturer's catalogue – online or otherwise – will show a huge array of variations on the classic style. Over the years I must have turned hundreds of them and while the basic design is similar, it's surprising how small changes in diameter or the addition or removal of a fillet or other detail, can totally change the look and feel of the pull. There are also variations in the fixing method of the pulls and grain direction. In this article I will show the basic turning operation for two knobs in a classic design – one will be end grain, one will be cross grain. I will also explore work holding and fixing options.

WORK HOLDING

As with any turning job, one of the first decisions to make is how to hold it on the lathe. My natural inclination is to work between centres for spindle work, which is fine, leaving just a small parting-off nib to remove by hand at the end. I have also turned cross-grain knobs in this way without a problem. Depending on the design, a very good alternative holding method is a screw chuck. The problem with most commercial screw chucks, however, is that they are designed to hold a bowl blank in the initial roughing stages, so usually have large coarse threads designed for that purpose. This, of course, is total overkill for a small item such as a knob or pull, so a homemade version is the best way to go.

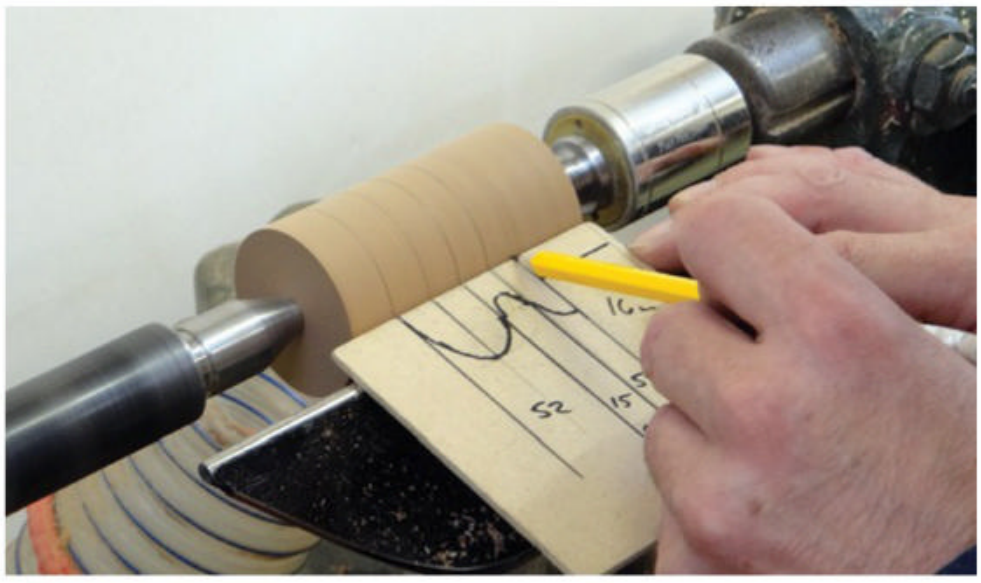
MAKING A SCREW CHUCK

The great thing about making your own screw chuck is that you can use a screw that will suit the job in hand perfectly. I often use a coach screw, which is strong with a relatively coarse thread. These are available in diameters from 6mm upwards and in assorted lengths. It is always useful to know how the finished product will be fixed, because it may be that the size of screw used won't matter, but in some cases, it could be important. If the intention is to use a fine screw through the drawer front or door, a smaller diameter screw is needed in the chuck. For this job I made a screw chuck using a number 8 or 4mm-diameter screw.

PHOTOS: RICHARD FINDLEY

▲ Almost any screw can be used to make a screw chuck.

▲ The screw chuck ready for action.



▲ Marking out with a storyboard.

▲ Sizing the fillets.

Making the screw chuck is quite straightforward. I turn a scrap of hardwood between centres and form a chucking spigot on one end. Any offcut of wood would be fine but if you intend to reuse the chuck repeatedly in the future, a good hardwood is best, I use sapele as it is strong and I always have plenty of offcuts lying around. The length of the wood used for the screw chuck is mostly down to the length of screw you decide to use. Here I'm using a 60mm-long screw as it's what I have to hand, and there is rarely need for more than about 20mm of screw protruding to hold the work, so around 40mm of wood works well here.

I hold the turned block in the chuck and use a Jacobs chuck to drill a pilot hole through the centre. The screw can then be driven in, using a generous blob of epoxy resin to secure the screw permanently. Sometimes, when you run the lathe with just the screw chuck, the screw appears to wobble. This used to really bother me but I've found that, unless it's really bad, it isn't worth worrying about. It is possible to hold the screw chuck by the screw and lightly true up the chucking spigot to bring it all into alignment, although there is too much flex with this size of screw to be able to do this effectively.

TURNING

I'll start with the end grain, or standard spindle-turned knob. The design of this pull has a spigot or tenon to allow fixing. As with any production job, I begin by making a template or storyboard, showing all of the important diameters and the positions of all the details. With this made I can rough down the sapele blank to a cylinder and mark the details.

If I was making three or more, I would set up my duplicating fingers, but as this was a one-off for the article, I simply use Vernier callipers with my beading and parting tool to size the tenon and the fillets which guide the curves of the base and grip part of the knob.

After cutting the 16mm-diameter tenon, I use the tip of my beading and parting tool, just as you would a skew chisel, to slice down the end grain of the base of the knob to ensure a clean and tear-free surface with a slight undercut. This ensures the knob will sit neatly against the drawer front or cabinet door, once installed.

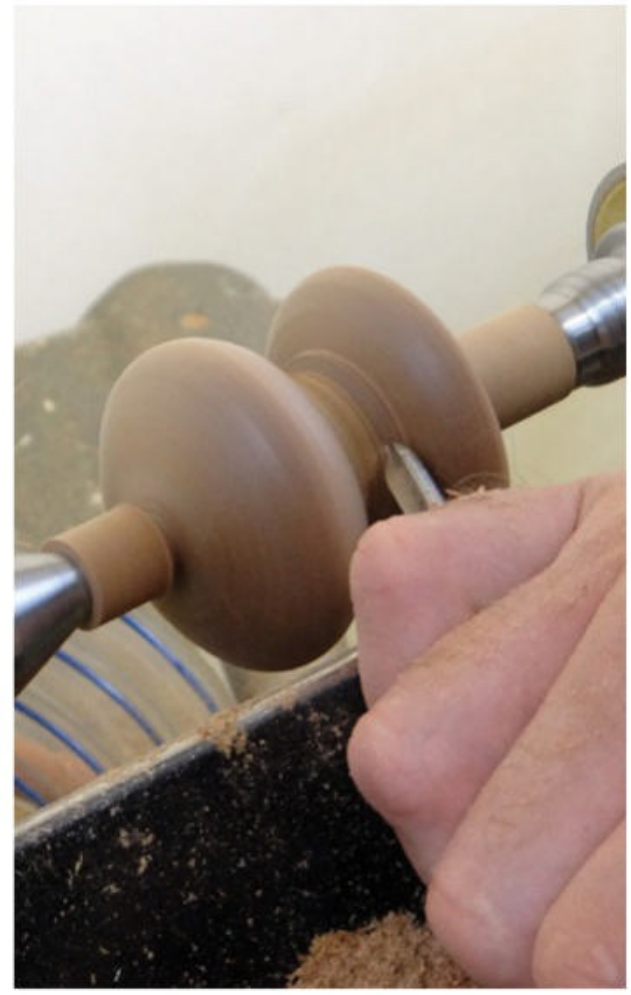
Having blocked out the shape, I can switch to my 10mm spindle gouge to form the curves. The only tool swap I have to do after this is to my 6mm spindle gouge to form the deep, narrow cove. The waste at the end is reduced to a small nib, just big enough to drive while I sand with 240 and 320 grit. Satisfied, I can part it off, which can be done with any tool, but I choose to continue using my 10mm spindle gouge.

PARTING TOOLS

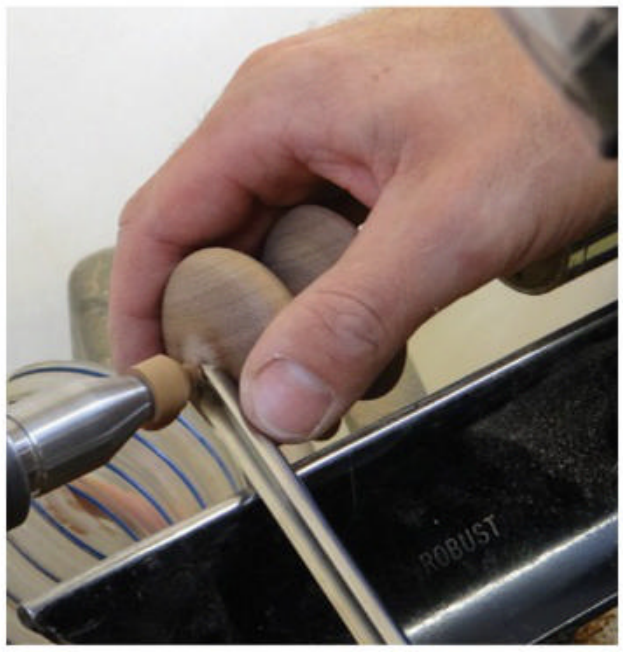
Either a skew chisel (in my case I use my beading and parting tool as a skew) or spindle gouge is fine for parting. Oddly, a standard parting tool isn't the best tool for parting as it leaves a torn finish on end grain because of the way it cuts. I would generally recommend that parting is done with the same tool as the shaping – that way there is consistency in the cut. If a different tool is used, the pressure applied to the work can be different and the way the tool cuts is slightly different, leading to pressure marks and potentially different textures on the wood.

▲ Slicing the base of the knob to form a clean undercut.

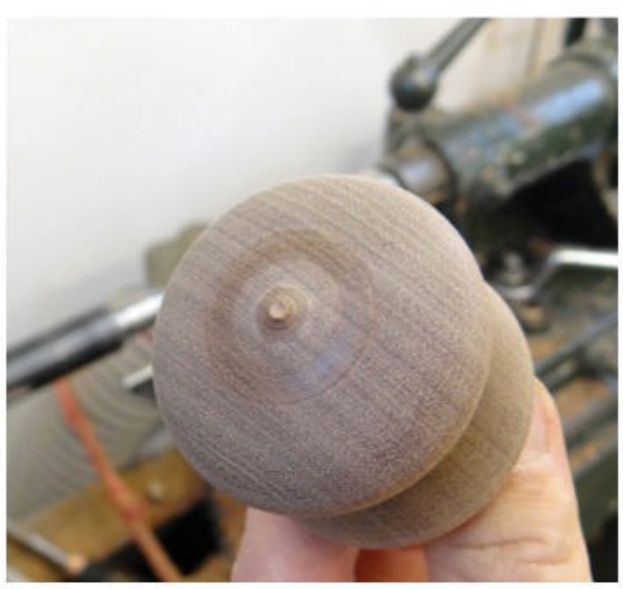
▲ Shaping the knob.



▲ Forming the narrow cove.



▲ Parting off with the spindle gouge.



▲ A small nib can be pared off and sanded smooth.

PARTING OFF

You might notice the knob is held with its face at the drive end of the lathe. This may seem counter-intuitive but allows safe and simple parting. As I cut through the nib, the knob simply stops turning and drops into my hand, leaving just a small amount of tidying work to smooth the face of the knob. If the knob is mounted the other way around and is parted, the knob continues to be driven but without tailstock support and so results are much less predictable.

Having safely parted the knob from the lathe it is a simple case of paring away the nib with a sharp chisel and hand sanding and blending anything that remains into a smooth and blemish-free face. If I have made a large batch, I might mount a sanding arbor in the chuck and power sand away the nib. This works well but it goes almost without saying that care needs to be taken with this approach to avoid misshaping the face of the knob against the powered sanding pad.

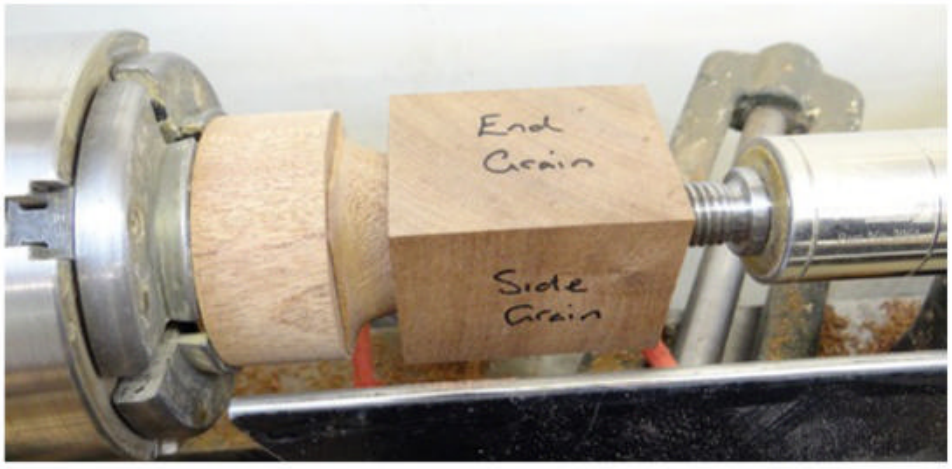
CROSS-GRAIN KNOB

The difference between the two styles of knob is subtle in this sapele, although in timber with a stronger end grain pattern, such as oak, the difference is easier to spot. The main purpose of a cross-grain knob is to keep the grain patterns across the front of a set of drawers or cabinet doors all the same, without the difference in grain pattern attracting undue attention. End grain also tends to end up a much darker colour under a finish, whereas the side grain will remain more consistent with the rest of the furniture. Some timbers have attractive figure, such as the rays in quartersawn oak or a ripple in sycamore, which shows up only in the face grain and would be lost if only the end grain was showing.

A screw chuck is a good option for a cross-grain knob as screws always bite and hold better in side grain than end grain, meaning the final fixing is often a screw as well, so the hole left by the screw chuck acts as a guide for this – as long as you haven't used too big a screw in your screw chuck.

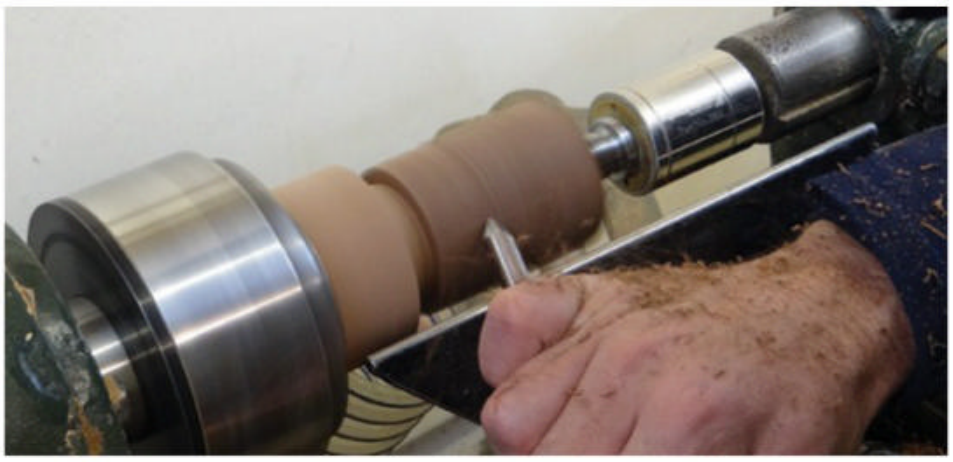
I realised that I had left too much of the screw protruding from the screw chuck so added a waste spacer and turned this down out of the way. If the base of the knob has a specific diameter, the waste block can double as a sizing block too, saving the need to measure.

Because of the grain direction, the forces involved in the turning are

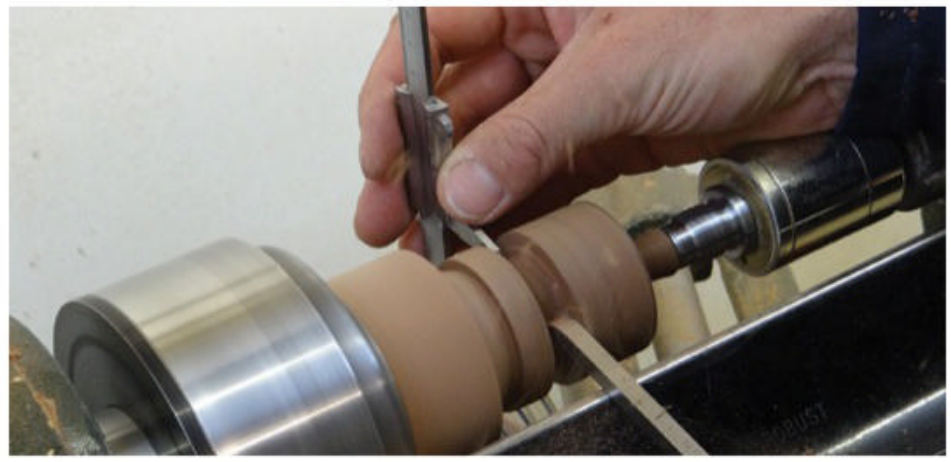


▲ Cross grain knob mounted on the screw chuck.

▲ The cross-grain knob and screw chuck, showing the spacer block.



▲ Roughing out with the spindle gouge.



▲ Sizing the fillet with a scraping cut.

higher, with alternating end and side grain passing the cutting edge of the tool, rather than the more consistent surface of normal spindle turning, so I continue to use the tailstock for additional support. There is a risk initially that the force of the cut can cause the blank to spin on the screw chuck, making it impossible to turn, so a little caution is advisable at the start.

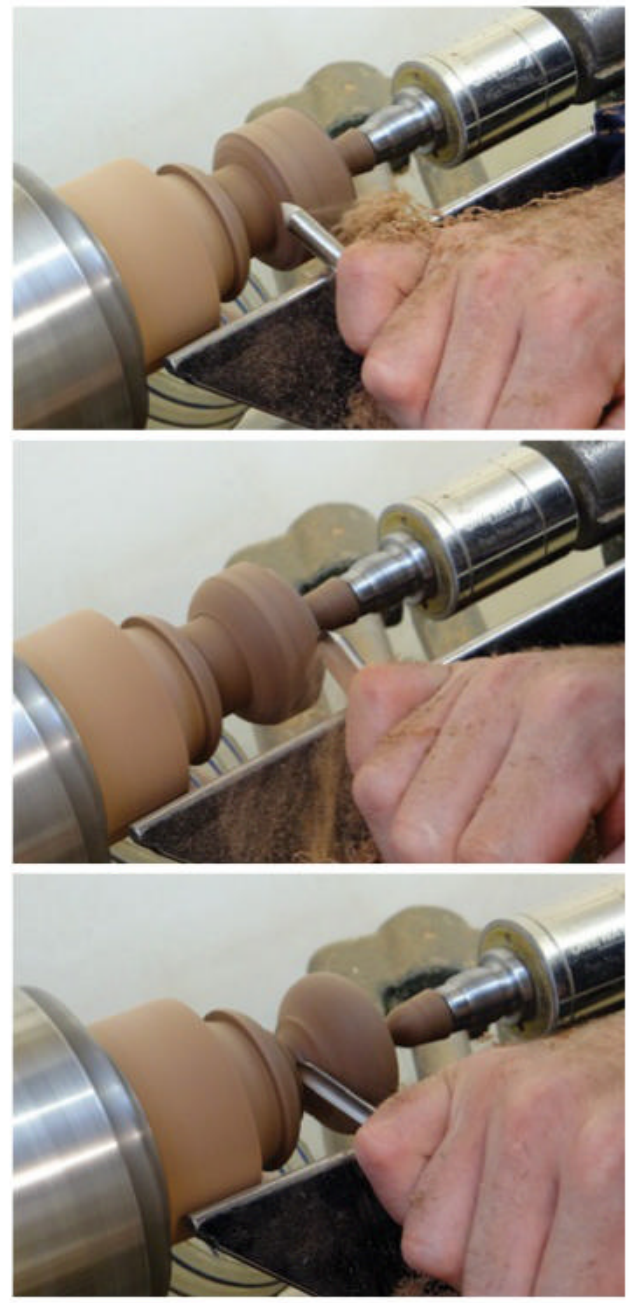
I find it best to rough the blank down to a cylinder with a spindle gouge rather than a roughing gouge as the cut is a little more gentle and the tool can be presented in such a way as to slice the waste away cleanly and quickly. Once it is round and to size, I once again mark it with the storyboard and can begin shaping.

The biggest difference between end grain and cross grain is the way that you approach the cut. End-grain knobs are normal spindle turning, so shapes are formed from the toolrest down to the centre of the spindle – downhill. Cross-grain knobs are essentially tiny bowl blanks, so cutting in the same way would be working against the grain and would most likely result in tear-out. To form the shapes in cross-grain blanks, the gouge needs to be rolled on its side, and the wing of the tool used to draw the cut with the grain, apparently uphill – although it is in fact still downhill, it's just that the top of the hill is now in a different place.

I still begin shaping by cutting the fillets, but the cut with my beading and parting tool is much slower and carefully taken and is actually a scraping cut – the tool becoming a negative rake scraper – rather than a normal peeling cut with a chisel. Once to size, the rest of the shaping can continue as described above, using the wing of the tool.

Cutting the cove can be challenging as the initial cut has to be into the wood and somewhat against the grain, but can soon be adjusted to the drawing cut with the wing of the tool. It is important to keep the tool rolled on its side so the cutting edge is presented in a trailing cut to avoid any chance of a catch.

Once I'm happy with the shape I can remove the tailstock and the waste, blending the curve of the face with my gouge before sanding. The great advantage of using the screw chuck is that it gives full access to the face of the knob and allows easy blending and sanding without the need for hand work at the end.



▲ The shaping process of the cross grain knob with the wing of the spindle gouge.

Cleaning the face.

Sanding.

The difference between the cross grain (top) and end grain (bottom) knobs.

FIXING METHODS

There are many options for attaching the knob or pull in place. The most simple, and perhaps crude, being a screw driven through a drawer front or cabinet door and into the base of the pull. This relies entirely on the screw holding the knob in place and I'm sure most people have experienced that, over time, the knob will begin to work loose, coming unscrewed. Once this has happened it is only a matter of time before the thread entirely strips and it is largely irrepairable.

An improved method is to have an insert fitted into the base of the knob and a machine screw passed through the drawer or door and screwed into place. This is commonly found on many commercial/mass-produced kitchens and is considerably more reliable than a simple wood screw. I find the inserts tend to grip best into side grain rather than end grain, but have successfully used them in both.

A fixing method that alleviates the need for screws and commercial fittings is the use of a turned tenon. Usually this is simply glued into a drilled mortise and gives a very neat result but is reliant on the glue to hold. An improvement on this is to make the tenon a through-tenon and add a wedge. I love the simplicity and natural strength that a wedge gives. By cutting a saw kerf roughly three-quarters of the way down

Fixing methods for knobs and pulls.

The wedged tenon before fitting.

▲ Cross section of a wedged tenon fixing.

▲ Replacement threaded knobs.

the length of the tenon, a wedge can be cut and, once the knob is in place and correctly positioned for grain direction, the wedge can be driven into the kerf, spreading the tenon and permanently holding the knob in place. The addition of glue to the tenon and the wedge will only make the whole thing stronger and more effective. Care should be taken to ensure the kerf is cut in the correct direction, so when the wedge is driven in, it doesn't split the timber of the drawer front along the grain.

The final method of fixing that I have used is a screw thread cut into the turned tenon. This is mostly seen on antique mahogany furniture and works extremely well. I have to make replacements from time to time, but the fault is usually with the base of the knob breaking, rather than there being a problem with the thread. Originally the workshop that made the furniture would have had a tool called a thread box, which is essentially a block of wood with a small V-shaped cutter fixed into it, so when a knob with a turned tenon of the correct size is screwed into it, it cuts a perfect thread, which would correspond with a matching tap, allowing the cabinetmaker to easily and quickly make matching threads. The trouble for a restorer (or at least a turner who dabbles with restoration, such as myself) is that I don't have the tap and thread box sets of the old cabinetmakers so I have to do my best to match the threads of the old, damaged knobs as best I can.

There are a few ways to form the threads by hand, but with trial and error I have settled on a combination of a wood carver's V-tool and a triangular file. I set a pair of dividers to the pitch of the thread I am trying to replicate, i.e. the distance between the high points of the threads. I then use this to mark out the spiral pattern. It is a little like setting out for a barley twist, but because the size is so much smaller, the marking tends to be fairly approximate, as the tools are used to cut the threads, the rough lines are tidied, straightened and made more crisp. Luckily, these threads are quite coarse and the fit is not as critical as a metal machine thread. As long as it engages and seats properly in the fully done-up position, they will work. W

THE THREAD BOX

Thread box sets comprise of a thread box and a matching tap. The smallest thread box on the market is ½", increasing in ¼" increments up to 1½" diameter.

You could use a ½" thread box to cut the threads on a large knob. Smaller knobs are best held in place with a wedged tenon.

Once the threads have been cut (either by hand or using a thread box) it is a good idea to coat the threads with Super Glue to reinforce the short grain.

New Gifkins Techniques

Centreline dovetails put a Japanese spin on this dovetailing king.

Japanese carpenters and joiners use a taut ink-soaked string to strike a centreline datum on the stock they are working with. The paradigm shift for a Western woodworker is that the stock could be round, warped or even a raw branch from a tree. In the West we dress an edge and use it as the datum for all future measurements.

While setting up the Gifkins dovetail jig to make drawers for a bench toolcase I had a light bulb moment. Why not mark the centres of each side and a centre on the jig itself? As you can see, that is exactly what I did, and the system worked fine.

Over the last twenty years I have always used the edge of the stock to set up the Gifkins jig. The process of cutting the pins, changing the cutter, setting the height and then cutting the tails follows. If your drawers are different widths, you have to change the set-up and go through the same process of cutting pins and tails.

The advantage of working from a centre line is that you can cut the pins on all your stock regardless of width, swap out the cutter just once and then cut the tails on the reverse comb on the jig. The centreline datum proved to be a much simpler and quicker way to make drawers. If I was not constrained by the case size I would have planned to make the drawers so that they looked more conventional (like the centre drawer with half pins on the edge).

▲ Working to a centreline instead of a face edge is a mind shift that speeds up drawer construction time.

▲ The router cutter only needed to be changed over once, reducing time and increasing accuracy.

▲ You can never have too many drawers in a workshop!

The mitred front and back strips hide the shelf trenches and blend perfectly with the grain.

MAKING SMALL CHESTS

The Gifkins dovetail jig can be used to make more than just boxes and drawers. The Jumbo jig can be used to make cabinets up to 480mm in depth.

A technique I use when making small chests of drawers (with the Jumbo jig) is to machine my stock perfectly square and then use a pencil to mark each face with a V, V1, V11 and V111. The next step is to rip 7mm-wide strips from the sides of each piece, making sure that the face marks are visible on the strips.

At this point I am ready to use the table saw to cut the trenches that will accommodate the drawer shelves.

The next step is to cut the dovetails and the pins on the Gifkins Jumbo jig, assemble the case and insert the drawer shelves.

One other technique I use when making small drawers is to rip 7mm square strips of stock and glue them in position. These strips support the drawer bases.

When the glue has dried I mitre the 7mm-thick strips and return them to their point of origin. I then cut 10mm-wide cover strips for the drawer shelves and fit them in place with masking tape.

After sanding through with 80 to 180 grit papers I sealed all surfaces with a coat of shellac. Another light sand, then two coats of Wipe-On-Poly and it was time to attach the drawer pulls. W

Wooden "hydrogen atoms" from a science kit made excellent drawer pulls. All they needed was a screw and an M6 nut as a spacer.

The case to the left is designed to sit under the printer in my study, while the case to the right is proportioned to store A4 paper and other stationery.

The drawer pull geometry is key to making the cabinets look good. The red hydrogen atoms proved to be a perfect match.

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The winner of the block plane from Henry Eckert Toolworks in Issue 165 is Brian Clayton of Mollymook, NSW. Congratulations!

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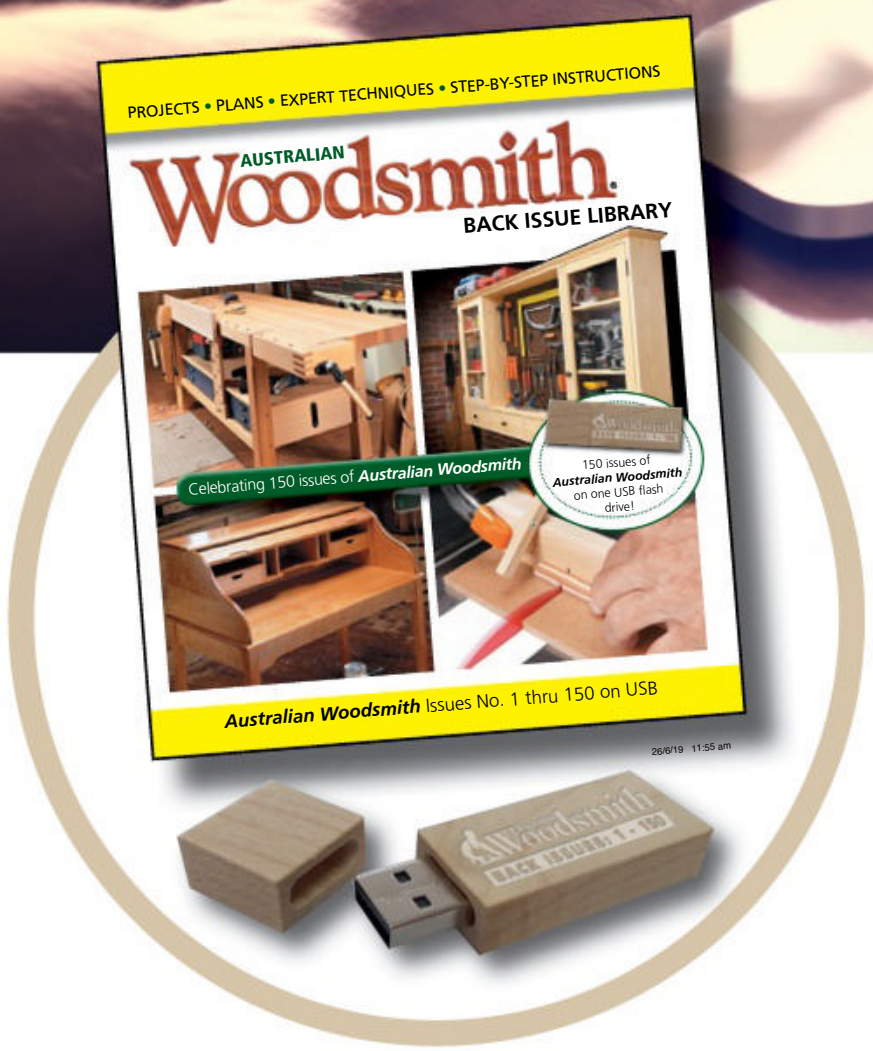

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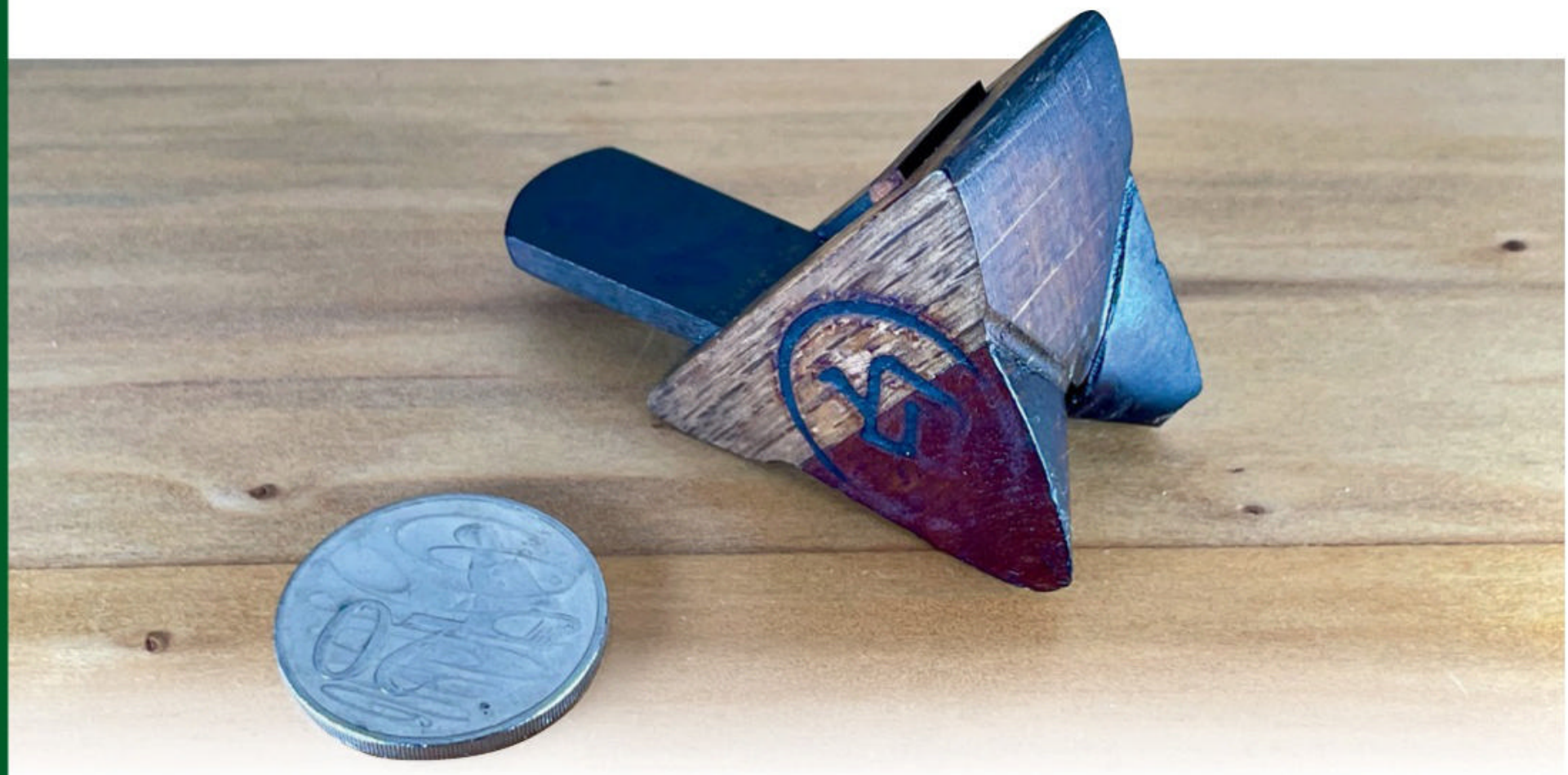

Sumimaru Kanna 隅丸鉋

This amazing little plane had me puzzled until I sent a photo off to Hiroshi Yamaguchi. It is an inside corner rounding plane used for creating chamfers on Shoji doors.

A country mate (who is always on the hunt for bargains on eBay) called me out of the blue a couple of years ago and suggested I take a look at a box of Japanese planes going for just $230.

I logged on, inspected the images of the planes as best I could, put in a bid and was surprised that it was successful.

A week later a box arrived at the door containing an assortment of 27 Japanese planes.

At that time I was building a bookcase that would act as an extension to a bay window and needed a 19mm-dia coving plane to craft a matching profile to nest against the 100-year-old bull-nosed windowsill. The kit of planes had five beading and five matching cove planes. The nominal sizes of the hollows and rounds were 6mm, 9mm, 12mm, 18mm and 25mm. The reason I bought the box was that it contained an 18mm coving plane.

The planes themselves looked like they had not been used for 20 years, the blades were a little rusty, the wooden bodies dusty. I wiped them all down with a cloth and then sprayed the lot with a mist of camellia oil. A day later I misted them again before wiping them down with a cotton cloth. This was when I noticed that they all had the same stamp burnt onto them (the owner's name translates as "White").

At the time I was only interested in tuning the 18mm coving plane so I could plane a cove in the 25mm-thick celery top pine I was using for the top of the case.

I have had the pleasure of attending several courses run by Hiroshi Yamaguchi at the Japanese Tools Australia workshop and followed his technique for dismantling the cove plane. It only had four parts: the body, pin, chipbreaker and blade. I tapped the heal of the plane with a Japanese hammer to loosen and remove the blade. The blade was surprisingly sharp and only required its back to be honed on a series of finer wetstones (400, 1000 and then 2000 grit).

After the plane was assembled I set the blade so that it cut a fine shaving and went ahead with a practice cut. It was smiles all round when the top of the bookcase sat snug against the bay window.

The smallest plane in the kit was identified by Hiroshi as a sumimaru inside aris plane (隅丸鉋). I popped the name into Google and found one for sale for $218! My box of planes was indeed a bargain. W

▲ The 18mm-wide coving plane in the kit did a great job cutting the matching profile to the windowsill.

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RULE JOINTS

The drop leaf on the Shaker sewing cabinet pivots on six rule joint hinges. The principle behind the rule joint is that the barrel of the hinge sits flush with the rebated lip of the table top (take a close look at box 3 on page 23). This means that the hinge itself is not symmetrical. The longer leaf of the hinge reaches across the cove so it can be screwed down into the drop leaf. Rockler can supply a rule joint bit set (26318), drop leaf hinges (29256) and the drop leaf supports (30006).

HOOK KNIVES

Making your own hook knives is a hardening and tempering challenge. Using a magnet to isolate the phase change in the metal and then locking the crystal structure down by quenching in canola oil is the key step. Nordic Edge is the place to go for the 2mm-thick 1084 carbon steel. Nordic Edge also has a range of cutler's rivets that you can use to lock the blade down onto its handle (as well as 25mm-long copper rivets).

BATHROOM STORAGE CABINET

The 6mm-dia. marine-grade stainless steel used in this project is available online from RS Components (stainless steel rod 6mm diameter). The 50mm-dia. castors can be found at your local hardware store.

CAMPECHE CHAIR

Duck canvas is available from Spotlight as well as online. The decorative clavos nails are also available online and at Bunnings (Pinnacle Antique Bronze Daisy Head Upholstery Nails).

SHAKER SEWING TABLE

The rule joint router kit, hinges and support are listed above under "Rule Joint". The turning challenge in this edition is to make your own drawer pulls. The drawer pulls used in this project were purchased from Horton Brasses (large cherry knob-Wk-7, small cherry knob-Wk-5).

GIFKINS DOVETAIL JIG

We have been using a Gifkins dovetail jig in our workshop for more than 20 years. Four years ago, we bought Col Hosie's router table and have not looked back. It stands next to the main workbench and acts as a spare table when not in use. The Triton router it is designed for is easy to adjust and wonderfully reliable. Call Col or Pam on 0411 283 802 for more information.

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If you have made an *Australian Woodsmith* project, we'd like to see it. Email a quality image to us at julie@paragonmedia.com.au
Make sure the photo's resolution is high, the light is good and the project is free of clutter. Also, tell us what timber you use.

Final details

► *Shaker Sewing Cabinet.* Simplicity often gets overlooked in these hasty times. That's sad - take a look at what hurried people miss. Step-by-step instructions start on page 52.

▲ *Campeche Chair.* Combine centuries of solid service with an elegantly simple design and you get a chair from the Caribbean that's loved by all. Turn to page 44 to learn more.

▲ *Hook Knives.* Inspired by traditional knife styles, these unique knives offer a sweet addition to your carving kit. All you need to know begins on page 38.

▲ *Bathroom Storage Cart.* This little bathroom cart is the perfect solution to any area that needs a little extra storage. The stainless steel accents add a modern twist to the overall design. Plans begin on page 32.

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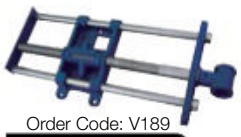

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