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- Chisel tips
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Native beehive p32



Backgammon board p42



Hall bench p36

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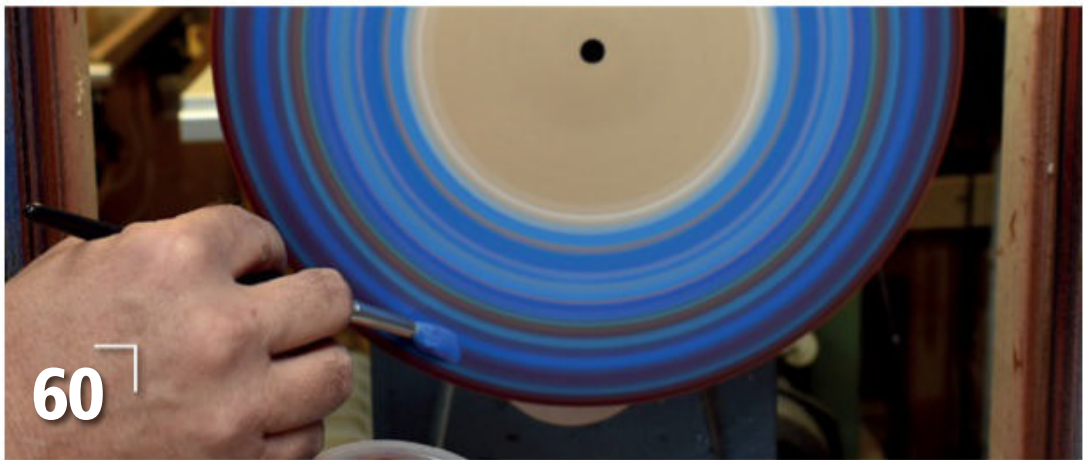
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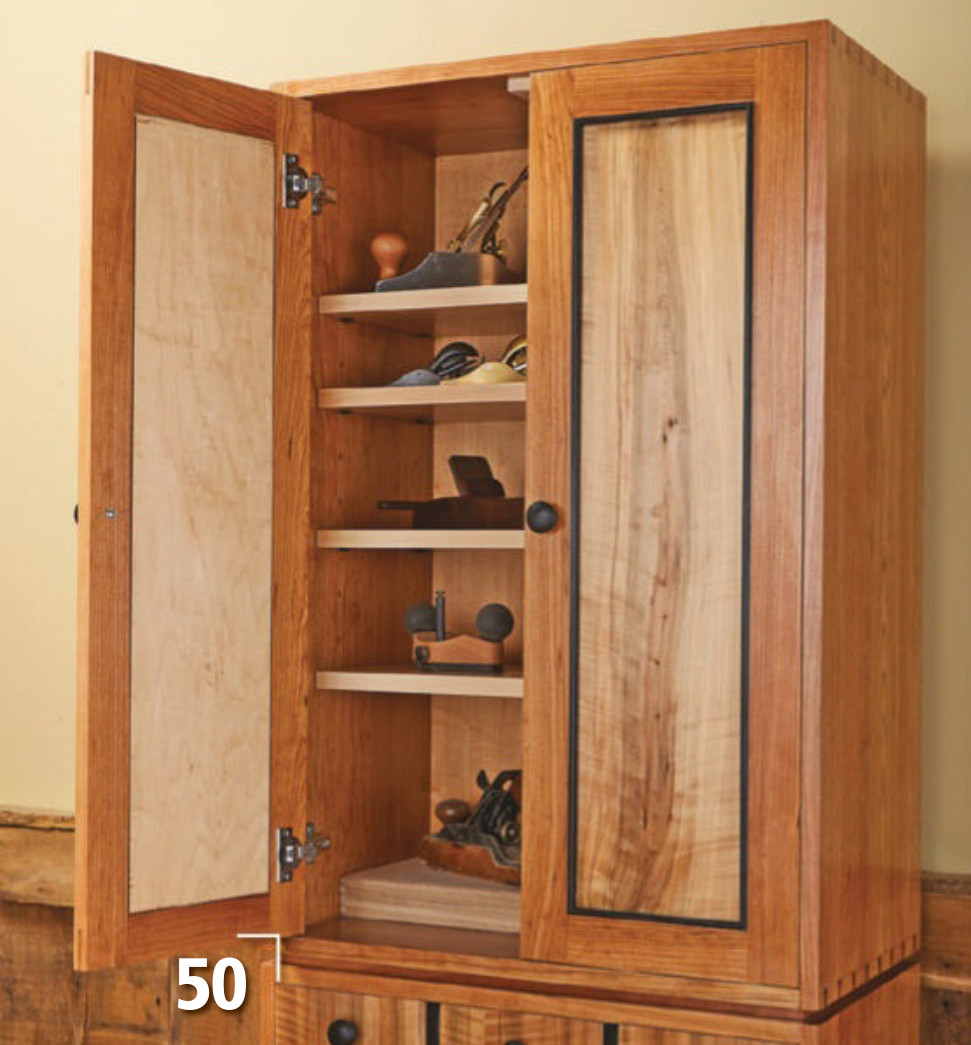
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Spirals and splotches never looked so good.



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The highlight of the year so far has been building a Japanese river boat under the watchful eye of Douglas Brooks. You can read all about the adventure on page 26. What was so interesting in the build was how the planks were wedged in place with stays so that saw fit joints could be cut. Seeing is believing. It was incredible how quickly a watertight joint could be created between two 4m-long planks of Japanese red cedar. That was just the start. Using the same stays to flex the hull while we nailed the gunnels in place created an elegant hull that just slipped through the water.

The use of dovetailed wedges to conceal the boat nails and twin dovetailed splines (Chigiri) to reinforce the joints added a huge amount of visual appeal to the boat. Dovetails in any form are a delight to the eye. On page 50 you can find an "over the top" tool cabinet that features exposed dovetails and then on page 72 you can see the spline jig we built in our workshop that allows you to install dovetail splines into mitred carcass cabinetry. You might like to build your own splining saddle and use it to create a budget version of the fine tool cabinet in plywood instead of solid timber. It would be a simple process of building a mitred carcass, applying Titebond glue, strapping the box together with tie down straps, checking diagonals and then installing dovetail splines to reinforce the joint when the glue dries.

Happy Woodworking!

Chris

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.



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.

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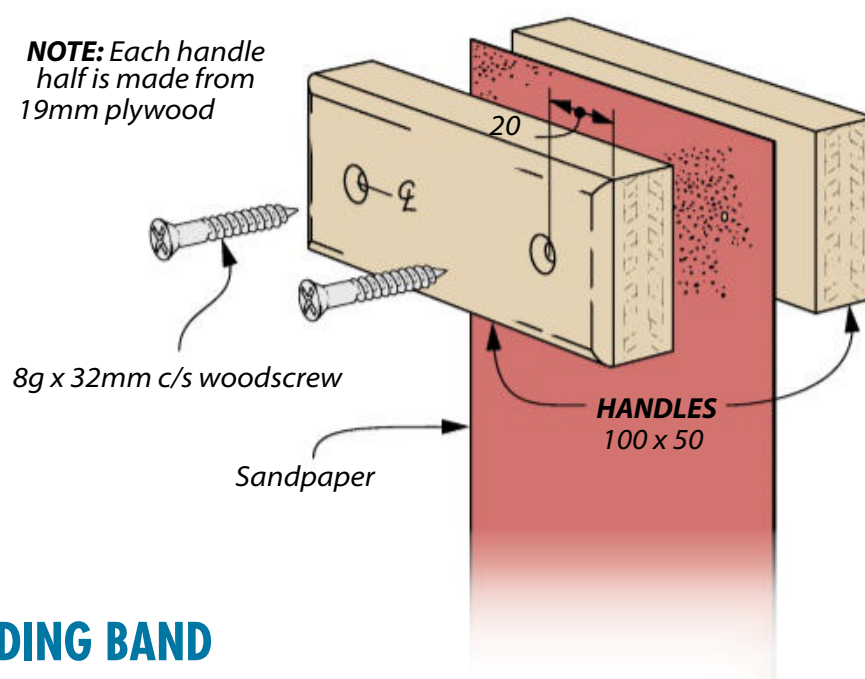
SAFETY IN THE WORKSHOP

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

Tips & Techniques

NOTE: Each handle half is made from 19mm plywood



SANDING BAND

Sanding oddly-shaped pieces like the cabriole leg pictured above can be a pain (even more so than an average sanding session). Matching the contours can be difficult and time-consuming, but this sanding belt makes hitting those curves much easier.

The belt itself is from a belt sander, measuring 100mm wide and cut down

to 400mm long. The handles on the ends are pieces of 19mm plywood. The plywood is screwed together, sandwiching either end of the belt. After that I chamfered the corners of the handles for a smooth, easy grip in my hand. When one belt wears down, I just attach the handles to a new belt.

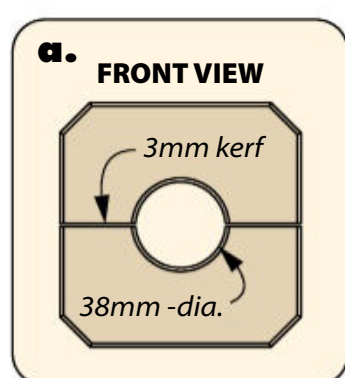
Travis Hahn

ARCHED CAULS

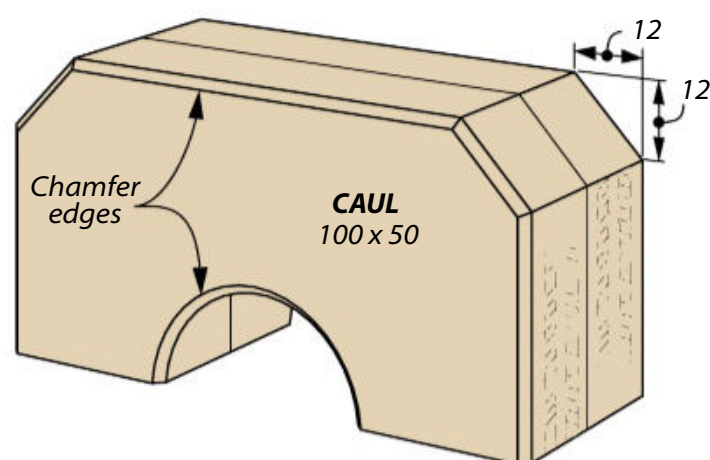
When gluing up a panel from multiple boards, keeping them all aligned can be stressful. Wet glue has a tendency to make boards shift when pressure is applied. However, a couple of sets of cauls clamped along the joints ensures the panel surfaces stay flush. The ones pictured here are arched to keep the glue off.

Make the cauls from two glued-up blocks of plywood, chamfering the edges and cutting off the corners. From there, bore a hole through the centre for the arch and chamfer the hole. Cut the block in half, and you're left with two cauls.

Anthony Saldana



NOTE: Make from one blank, then cut in half to complete

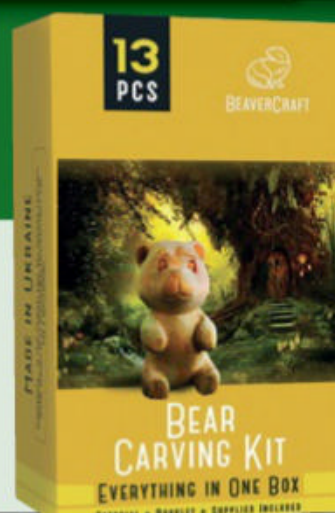


NOTE: Cauls are made from two 100 x 103 pieces of 19mm plywood



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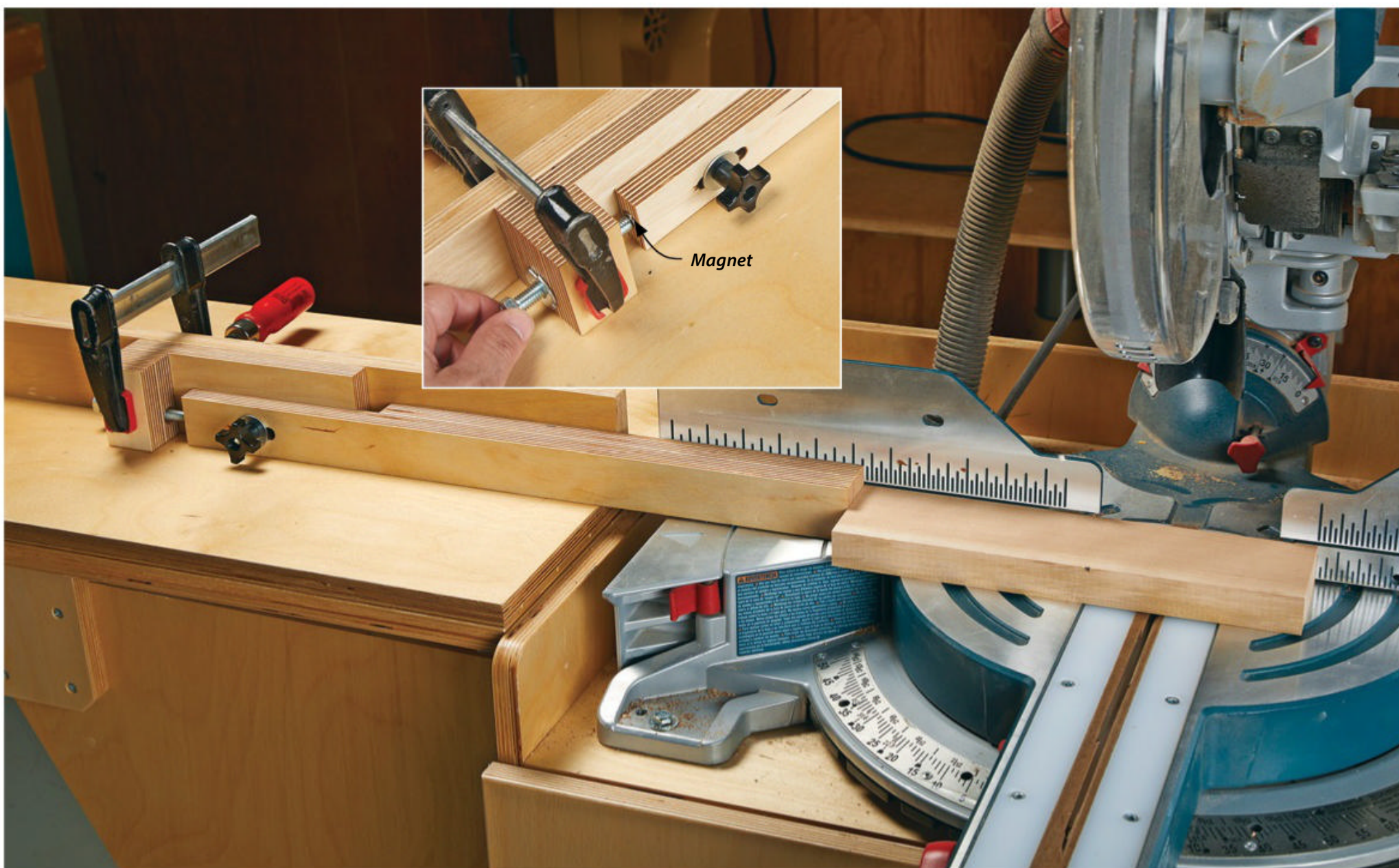
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MITRE SAW MICRO-ADJUSTMENT STOP

The mitre saw is my main crosscutter, but making small adjustments on the piece being cut isn't easy. The stop you see here was my answer. Since clamping a stop block to the fence is difficult on short pieces, the stop is long and attached to a plywood fence.

The stop is simple: two pieces connected

by a couple of bolts for adjustability. The mounting block is L-shaped, with one hole for a hex bolt to finetune the stop block and another for a coach bolt to lock it in place. The coach bolt is counterbored, while the hex bolt threads into a T-nut.

The stop block is a long piece with a cut-out for the mounting block at one end and

a chamfer for dust relief at the other end.

A recessed rare-earth magnet keeps the stop block attached to the hex bolt as it moves. A slot along the side accepts the coach bolt. A washer and knob thread overtop and tightening the knob locks the stop block in place for a cut.

Dan Martin

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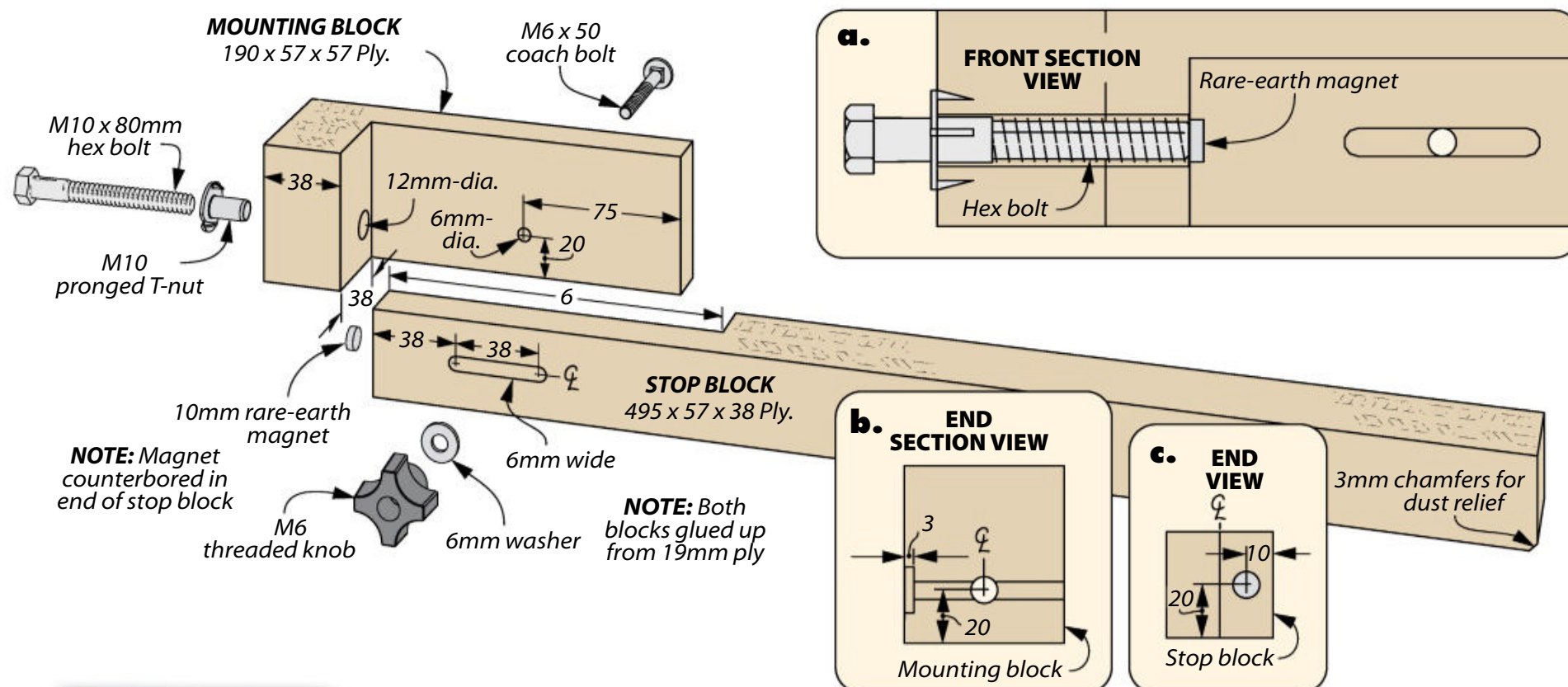
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QUICK TIPS



LAYING OUT PIPE LENGTH

In a moment of insight I thought up an easy way to mark pipe or dowel. Wrap a piece of paper evenly around the pipe, line it up with the length I need and wham! I have a flexible ruler. A permanent marker marks out a consistent line around the pipe's circumference.

Chris Benda



BAR SOAP MARKING

A technique I would like to share is to use a white bar of soap to make layout lines more distinct on dark woods. After marking out the baseline for dovetails with a marking knife, I rub the soap over the line, then wipe away the excess to leave a distinct line.

Scott Grove



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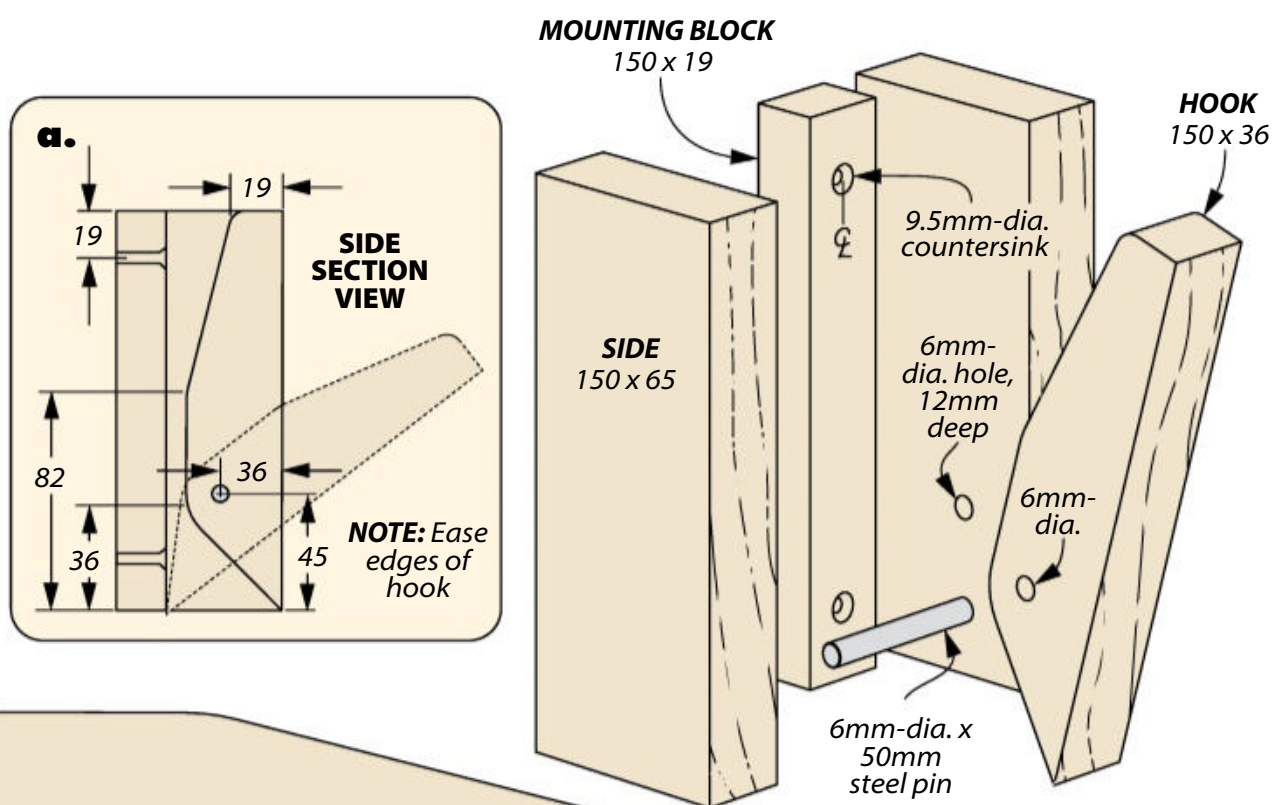
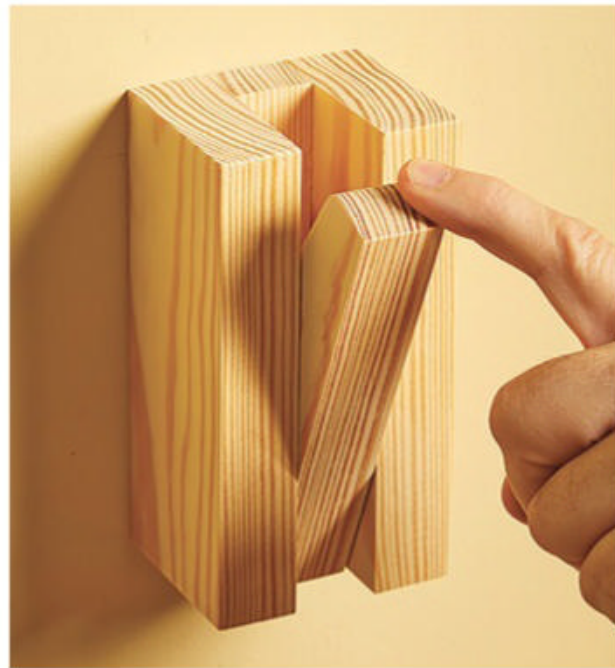
FOLD-DOWN APRON HOOK

When I'm in the workshop, I almost always use an apron. It helps keep my tape measure, steel rule and pencils handy, plus it keeps the sawdust out of my pockets. When I first started wearing one, I realised I'd need a hook to hang it, and I figured, why not make one instead of buying one?

The apron hook you see at left is what I came up with. It's pretty simple, using only four pieces of 25mm-thick pine. First, I cut all the pieces to size, then I drilled out the holes for the pivot pin, as well as the countersunk pilot holes for mounting the hook on the wall. After that, I shaped the hook. I did the initial shaping at the bandsaw, then moved over to the edge sander to ease it into the shape I wanted. The exact final shape isn't critical, so long as the hook holds your apron.

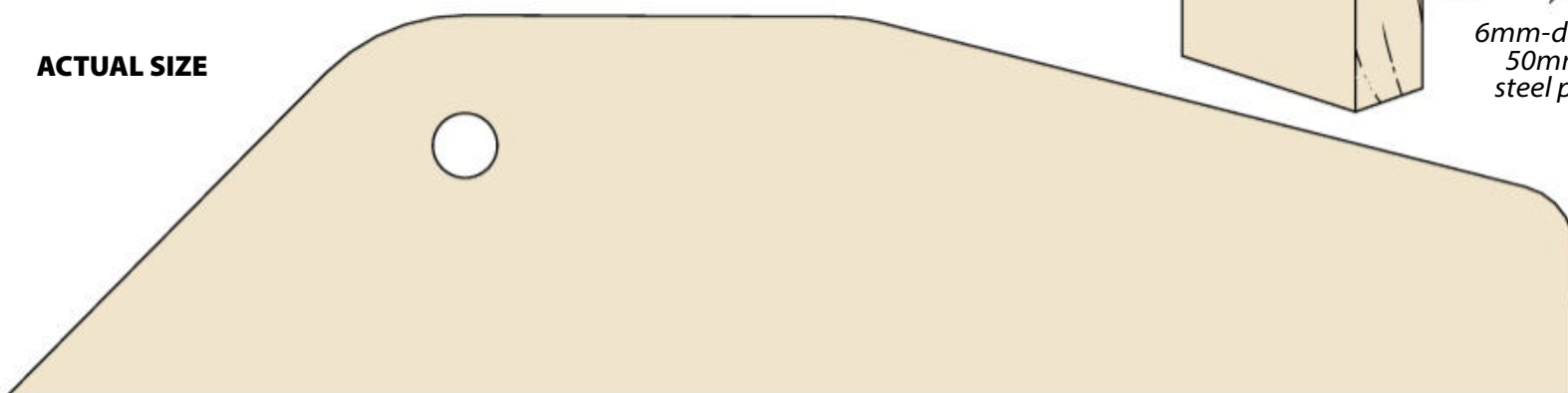
To assemble this project, just apply glue to the sides of the mounting block, sandwich the sides on with the hook in between (on the pivot pin of course). Now screw the assembly onto the wall. The top screw can go in straight, but you'll need to angle the lower one.

Barry Waphulkuhn



NOTE: All parts are 25mm-thick hardwood

ACTUAL SIZE



Next issue of *Australian Woodsmith* on sale 8th June 2023 - Issue 177



In our next issue we showcase the Wootha Prize Exhibition and congratulate the winner of the Tiny Treasures exhibition. The workshop technique that we dive deep into is how to use a reversing glueline bit to create a seamless tabletop. We also show how to make custom cabinet doors. The weekend project is yet another amazing puzzle that looks impossible - a spliced dovetail joint. The designer project is a distressed casual coffee table while the heirloom project is a serpentine chest of drawers full of elegant lines and delightful curves. As usual we feature clever tips and techniques from our generous readers.



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Cool Tools, Books and Gear

MELBOURNE TOOL COMPANY SPOKESHAVES

The Melbourne Tool Company (MTC) already has a range of planes in their growing stable of tools. The latest addition to the tool chest is a set of flat and curved soled spokeshaves.

The first thing you notice out of the box with these spokeshaves is the delightful anthropomorphic nature of the design. The knurled brass adjustment wheels on each side look like eyes, while the centre adjustment dial looks like a snub nose, leaving the mouth of the spokeshave to look like a mouth!

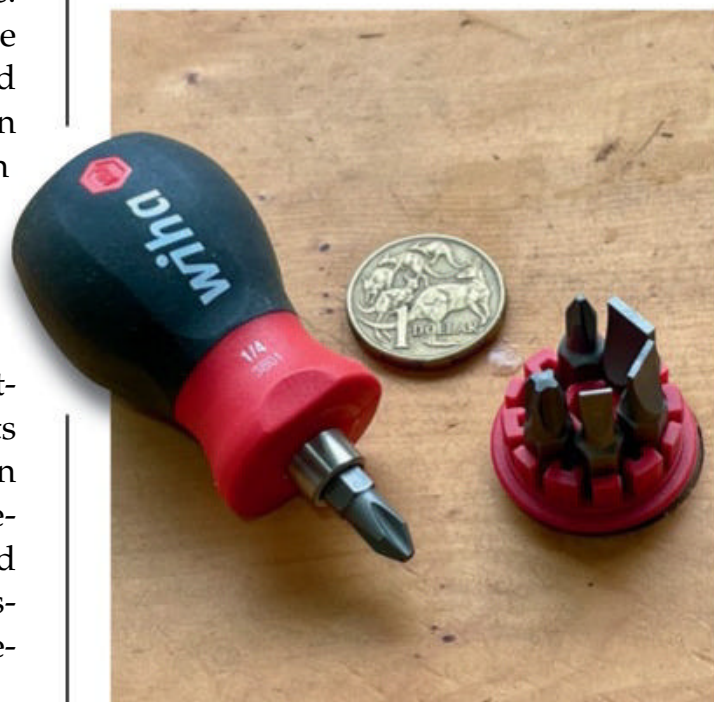
In the hand the spokeshaves have more heft to them than any other spokeshave on the market. This is because the body of the spokeshave and the cap iron are made from cast stainless steel. This bodes well for a long life in a coastal workshop exposed to salt air. It also means that the spokeshave should survive a fall from the bench and a bounce on

the concrete floor (cast iron spokeshaves can easily break if dropped).

The ergonomic design has your thumbs naturally finding the space just below the adjustment wheels to rest. The generous size of the knurled adjustment wheels makes fine adjustment of the blade a breeze. Talking of the blade, it is a handsome 3.2mm. This block of M2 High Speed Steel is treated to hold an edge when crafting the hardest of Australian hardwoods. The detail in the stainless-steel cast cap iron speaks volumes about the build quality of all MTC products. The combination of a 3.2mm-thick blade and a tight-fitting cap iron creates a tool that cuts clean and chatter free. If you are in the market for a spokeshave you really should do yourself a favour and try out these modern gems of industrial design. Available from Timbercon (timbecon.com.au).

WIHA STUBBY MECHANIC SCREWDRIVER

The photo shows it all. This little screwdriver conceals 6 blades in the cap and is perfectly proportioned to sit in your apron pocket as well as in your hand. The bits are magnetised so the screw you are working with can be navigated into a tight corner or withdrawn without the fear of them falling into a crevice. The reason I added this little European wonder to the page is that it is perfect for adjusting concealed European hinges (see page 22). Available from Bunnings and other hardware stores



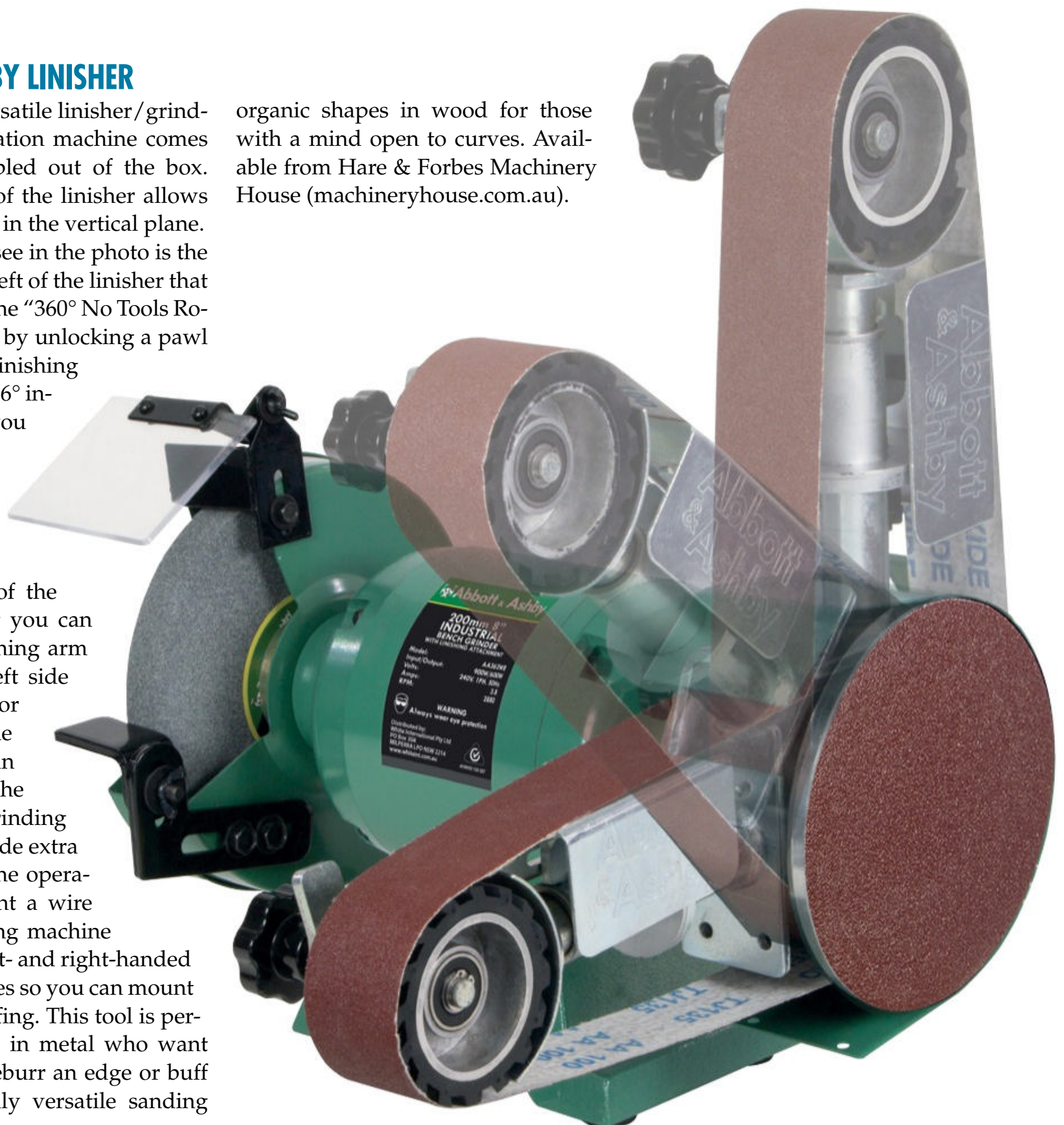
ABBOTT & ASHBY LINISHER

This clever and versatile linisher/grinder/sander combination machine comes completely assembled out of the box. The 360° rotation of the linisher allows it to be used flat or in the vertical plane.

What you can't see in the photo is the geared ring to the left of the linisher that features 60 teeth. The "360° No Tools Rotation" is achieved by unlocking a pawl and moving the linishing arm up or down in 6° increments. When you are happy with the angle you lock the pawl back in place. No tool to get lost!

The symmetry of the design means that you can swap out the linishing arm so it sits on the left side of the 0.6kW motor and the 200mm fine abrasive wheel can sit on the right. The housing for the grinding wheel has been made extra wide just in case the operator wants to mount a wire wheel. The linishing machine also comes with left- and right-handed M16 x 2mm spindles so you can mount cloth mops for buffing. This tool is perfect for fabricators in metal who want to clean a weld, deburr an edge or buff a face. It is equally versatile sanding

organic shapes in wood for those with a mind open to curves. Available from Hare & Forbes Machinery House (machineryhouse.com.au).



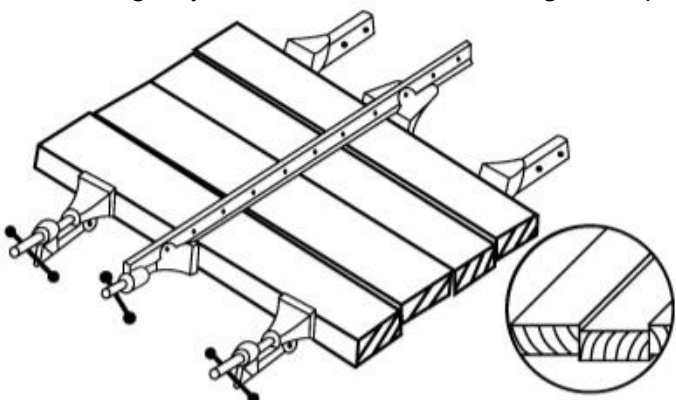
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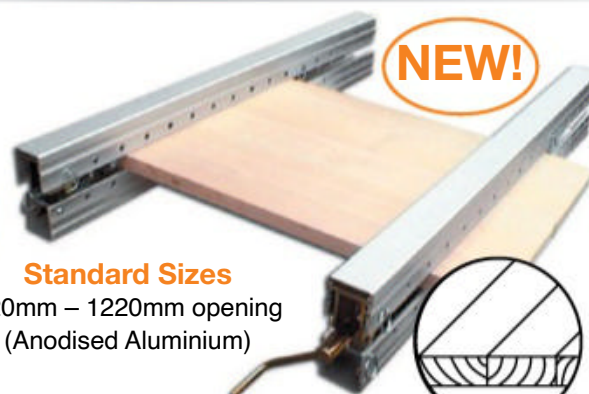
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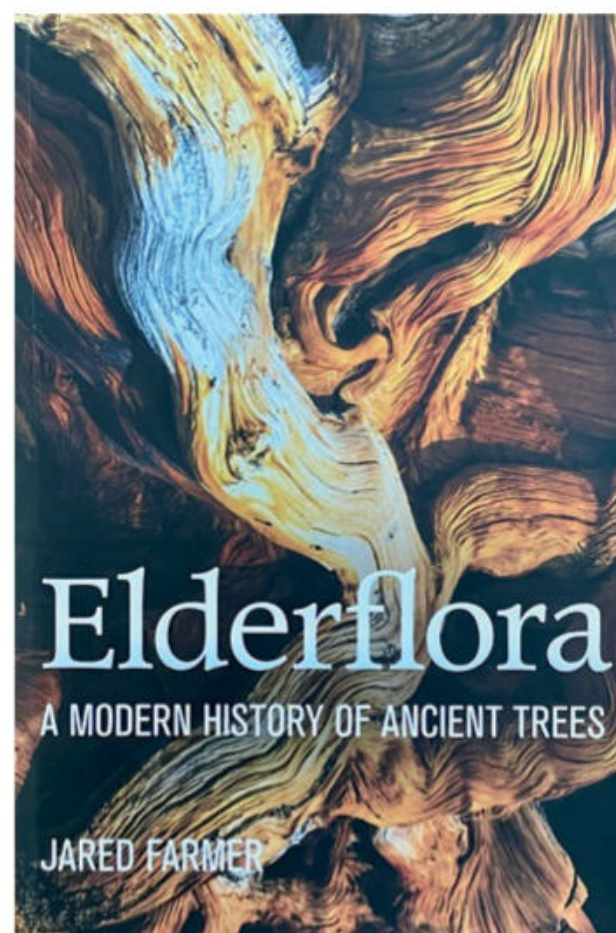
ELDERFLORA

Jared Farmer takes the reader on a journey through deep time in this beautifully written 432-page tome. This book deserves to be read slowly, one tree at a time, in order for the depth of research and amazing insights to be appreciated. Jared points out that we think of the age of dinosaurs as an epoch from the past but don't appreciate that some of the trees that sheltered the megafauna in the past were themselves megaflores then and are still with us now.

We have a tendency to think that the oldest trees on earth must be the biggest. The cover photo is of a gnarled 5,000-year-old Great Basin bristlecone pine from the White Mountains of California. It is a natural bonsai that has avoided the lumberjack's axe because it is high in the mountains and of little commercial value (as timber). Jared travelled the world in search for

elderflora and documents his findings in mesmerising prose. His chapter on Wollemi pine and Huon pine are insightful and worth the purchase price of the book.

I was surprised to read that a stand of Huon pine was found to be a clonal forest that represented a single genet. 10,000 years ago a male Huon pine sent out suckers that produced new trees. Being bachelors meant they could not reproduce via seeds but had to rely on runners. The forest of Huon pines all shared the same exact genes and so was one of the oldest organisms on the planet. That tale is just one of many. Chapter one tells the tales of the Cedars of Lebanon, Olive, Ginkgo, Pipal and Baobab trees. Each one is a fascinating read when you take into account the way these trees have been intrinsic to the human story. Published by Picador.



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METABO START/STOP CORDLESS CONTROL

This clever little gadget is a real game changer! One feature of a workshop dust extractor is that you can plug your power tool into the extractor itself and set the function dial to automatic. The extractor will switch on when you power up your router, sander or saw and then phase out five seconds after you switch your tool off. The phase out time empties the dust in the hose. Very clever but useless when it comes to cordless battery-powered tools!

This is where the clever Metabo Start/Stop switch comes in. You plug the Cordless Control into a power point and then plug your dust extractor into the Cordless Control and the hose onto the tool you are about to use. Next step is to strap the wireless vibration sensor onto your power

tool and press the transmit button. A green light flashes on the button and a blue light responds on the Cordless Control. When the cordless tool is turned on the sensor reacts to vibration and sends a signal to the Cordless Control. It then powers up the dust extractor so it can duct away the dust and cuts off the power three seconds after the vibration sensor records zero vibration (that is when the cordless tool has been switched off).

The sensor can be worn on the wrist and operated manually; no need to walk across the workshop and switch the dust extractor on and off. The Cordless Control system has a range of 25m and will work with any 240v dust extractor. Available from Total Tools (totaltools.com.au).

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Douglas Brooks

Boatbuilder, writer and researcher.

Douglas Brooks is a gifted writer and teacher as well as a highly skilled maker of Japanese wooden boats. He was recently in Australia as a guest of Japanese Tools Australia.

Douglas had just finished running a two-week Japanese boatbuilding workshop at Harvard University and was keen to repeat the well-honed practical component at the Australian Wooden Boat Festival in Hobart and then again in the JTA workshop at Kogarah, Sydney. Douglas had nothing but praise for the Wooden Boat Centre in Franklin, TAS who hosted the first build and was awestruck by the tools on offer at JTA.

He and his wife Catherine enjoyed Australian hospitality, sailing on Sydney Harbour and catching up with old mates. Two very fortunate groups of students had the pleasure of building a Japanese river boat with Douglas and came away awestruck by the simplicity of construction and how watertight a saw fit joint can be!

TARAIBUNE

Douglas had a Japanese roommate when he was at university who was keen for him to come and visit Japan when they graduated. Douglas was soon busy lofting (a skill he taught him-



▲ A taraibune was the first Japanese boat Douglas was apprenticed to build.

self) and renovating boats for Maritime Museums. However, during a period between commissions, he got a letter from his friend Nobu with an invitation to visit and a plane ticket! You can read about his 1990 adventures in chapter 9 of *Japanese Wooden Boatbuilding*. Within a month he was on Sado Island in the Sea of Japan being mesmerised by the tub boats in the harbour and had the good fortune to be apprenticed to build one with a local boatbuilder (who was just about to retire).

An earthquake in 1870 had lifted the seabed 5m and created a new shore of exposed reefs and jagged rocks. Taraibune were designed to navigate in amongst the new shoreline. Being a "tub" and not a boat meant that they avoided being taxed. This allowed wives to supplement the larder and the family income by fishing for abalone, kelp and shellfish.

Douglas wrote up his experience in English and Japanese language editions of *The Tub Boats of Sado Island*. This book was the first ever to reveal the techniques that a master would share with an apprentice. It opened the door to a whole new generation of Japanese bucket and tub builders who referred to it for cooperage insights and techniques. Since then, Douglas has visited Japan 25 times and been apprenticed to nine Master boatbuilders (mostly aged between 70-80) building at least one boat with each master. Douglas has

done the world a favour by documenting each build.

MASTER AND APPRENTICE

Japan is an archipelago of 6,852 islands. Wooden boats have formed the mainstay for transport and fishing for more than a thousand years. Besides island traffic and fishing, canals in rice paddies and between towns created a need for even more river craft. This led to most communities needing to have a resident boatbuilder.

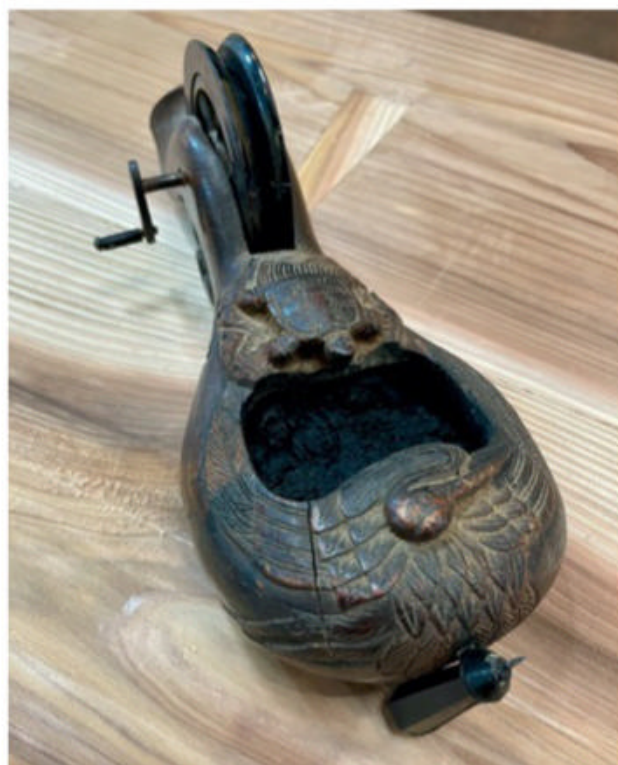
The boatbuilder would occasionally take on an apprentice. The apprentice system in Japan is arduous and tough, no talking, no radio, no questioning during work hours and no textbooks or schools to learn from. When the master thought you had observed enough, he took the broom from you and handed you the tool in question. If you failed to live up to expectations you were handed back the broom! After maybe 10 years you could be judged by your master to be capable and allowed to hang your own shingle over your boatshed, however most only referred to themselves as a master after their mentor had died.

SUMITSUBO

Douglas travels with all the tools he needs to run a class and build a boat. The oldest and most precious of these is a temple carpenter's sumitsubo. If you look carefully at the image below you will see a pin on the end of a post. The post itself is attached to a string line that



- ▲ Douglas in his element explaining the advantages of using braces and blocks to craft the keel of a Japanese wooden boat. (Inset) A profound distillation of Japanese boatbuilding techniques documented for the first time by Douglas.



- ▲ The precious sumitsubo that was gifted to Douglas by a Japanese friend.



- ▲ The sumitsubo is an ink pot and line used to set a boat's centre datum and sheer lines.

passes through cotton wadding (dosed with ink) and onto a spool. It is a refined chalk line-style marking tool used to set the centre datum for a build. In the west a craftsman might build a tool chest to showcase his skills, in Japan it is the sumitsubo that is used to showcase the skill of its owner.

A BOAT BUILDING SCHOOL

The fundamental issue at hand in Japan is that most of the master boatbuilders are now in their 80s and 90s. What is needed is a wooden boat school that can distil the knowledge of these men and hand it onto future generations. Douglas has a dream that a school could one day become reality. Turn to page 26 to read about the building of a Japanese river boat and page 73 to buy his book. [W](#)

All Dust is Dangerous

Silicosis is on the rise. Manufactured stone is not the only source!

Building the Japanese river boat over five days in the Japanese Tools Australia workshop was a real hoot.

JTA also shares their workspace with Best Abrasives. At the end of a hard day's work, I got talking to Ryan Benson from Best Abrasives about the modern tragedy of silicosis and young tradesmen falling victim to this incurable disease. The main culprit being the silica dust liberated when manufactured stone benchtops are cut, drilled and polished.

Manufactured stone benchtops could have a silica content of up to 95%. When these imported sheets are cut to size and bored to accommodate taps and fitting, almost invisible particles of silica are liberated, they just hang in the air waiting to be breathed in by whoever is standing near. Not only are young tradesmen being di-

agnosed with debilitating silicosis, office workers in the same building are finding out that they too have been exposed to the dust and have permanent lung damage.

SafeWork NSW and WorkSafe VIC are working together to help tradies and others who are afflicted. They have a lot of important information on their websites and have had legislation changed so the victim does not have to prove that it was the workplace that exposed them to the silica. The push to ban the product is gaining momentum, however it will take time to get the message out that all

stone products that contain silica are potentially dangerous.

WORKSAFE REBATE

SafeWork NSW has a \$1000 small business and sole trader rebate available for the purchase of workplace health and safety items. All you need is an ABN number!

There are conditions that you need to address (it is available once every 5 years and you need to have less than 50 employees) but that means you can update your workshop dust extraction system to keep dust at bay.

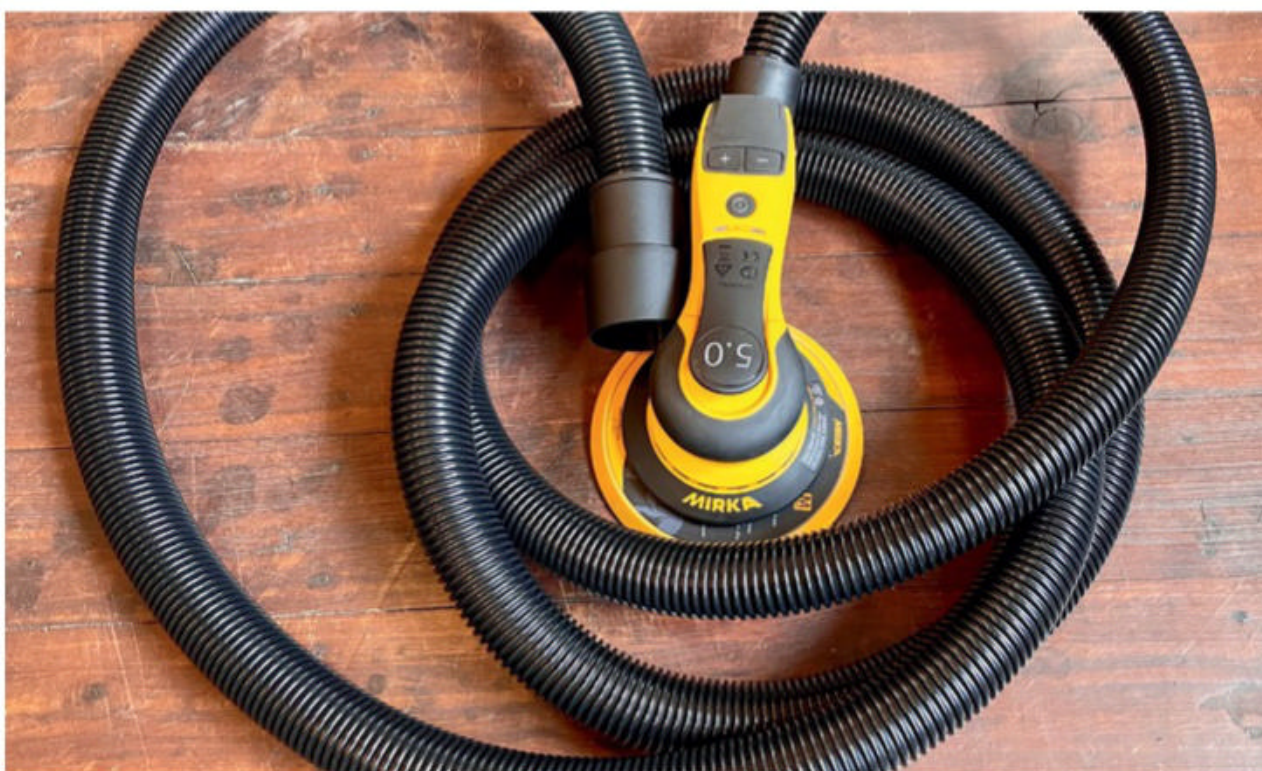
With that information at hand, it might be time for you to compare the L, M and H dust extractors on the market.

In the L, M and H code the letters stand for Light risk, Medium risk and High risk.

High risk dust extractors remove 99.99% of the dust, mould and other fine particles in the air and are mandatory when working with manufactured stone and asbestos products.

Medium risk dust extractors remove 99.95% of the dust, mould and other fine particles in the air. This is the standard that most workshops should strive for because it accommodates the machining of both hardwoods and softwoods.

Light hazard dust extractors remove 99% of dust in the air and are the appropriate choice if you are machining most softwoods.



▲ The tapered extraction hose from Mirka is a real game changer.



▲ The hose sleeve is another clever innovation from Mirka. The sleeve stops the ribs on the hose from being caught on edges while also storing the cord.



▲ Holding the ends of the dust extraction hose side-by-side makes the size difference obvious.

INNOVATIONS

In our workshop we have a range of Festool, Mirka and Makita dust extractors and find each one has its advantages. However, over time I have come to appreciate how innovations from the Mirka range of dust extractors eventually find their way into other extractor systems.

The latest innovation from Mirka is the tapered extraction hose. The hose tapers from the dust port on the extractor (57mm-dia) down to 27mm-dia at the working end. The tapering allows for a maximum amount of dust flow and improved suction at the point where you need it most. Tapering also reduces the chances of chip and detritus building up and getting stuck in the hose. The information to the right sits on the side of the Mirka DE 1230 AFC extractor and charts this relationship well. The smaller the hose, the higher the suction, the larger the hose the higher the volume that can be filtered.

Another innovation is the Auto Filter Cleaning programming. The AFC system cleans the filter at constant intervals, allowing the operator to concentrate on the work at hand. The AFC system also has a flow indication that will sound if the extractor is losing suction and needs the bag emptied, the filter replaced or an obstruction removed.

The hose sleeve looks simple enough but it too is an innovation. The sleeve also allows you to work seamlessly around a project without the ribs in the flexible hose getting caught on an edge. It also cleverly conceals the power cord and keeps it from getting tangled up with the hose itself.

ACACIAS

The relatively high silica content of acacias like Tasmanian blackwood and gidgee means that they should also be

treated with caution. We are only talking about 0.004% silica in these timbers, but over time, the exposure to wood dust can build up concentrations in the lungs.

The bottom line is that there is no safe level of wood dust exposure. All wood dust, especially the fine particles you can't see, are potentially dangerous. Nasal and throat cancers as well as lung disease can be caused by wood dust. PPE and a modern M-class dust extraction system is the first step. The second is to make sure all visitors to the workshop wear a mask. **W**

D (mm)	Ø21	Ø27	Ø32	Ø36	Ø38
Vmin (m ³ /h)	25	41	58	73	82
Neg. p. (Pa)	21000	19100	17100	15000	13700
 8999100411  x5 8999100211  x5 8999110311					

▲ The diameter of your extraction hose determines the volume of air that can be filtered.

Chisel Tips & Techniques

It's tough to think of tools that get more use than my chisels. And while it's tempting to just pick up a chisel and start whacking, you can get better, more consistent results by using the right technique.

I've picked out five everyday workshop tasks that give you a good overview of some basic chisel techniques. The principles apply to other chisel uses.

SQUARING A REBATE

I often use a router to create an opening for a cabinet back. But the router leaves rounded corners. With a chisel, you can square them up in a snap. This first technique provides a good starting point for mastering your chisels. The first step, though, is to define the corners with layout lines. In the lower left photo you can see what I'm talking about.

CHOPPING CUTS. Vertical, chopping cuts define the corner. Make your first cut across the

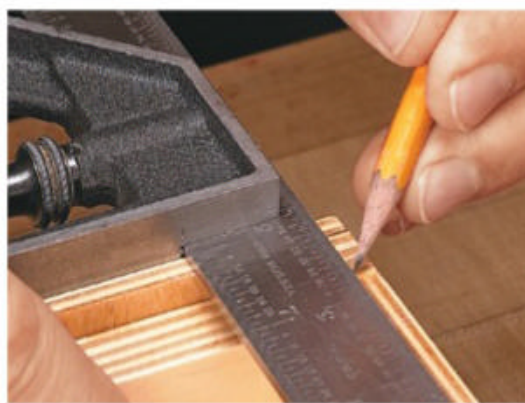
grain of the wood to prevent a split. A wide chisel provides a bearing surface to keep the cuts in line with the rebate's shoulder (main photo). I find holding the chisel on the blade offers greater control.

PARING CUTS. The second cut is horizontal, paring away the waste (lower right photo). My left hand steers the chisel and the right hand provides the power. The chisel is positioned bevel up. With the handle clear of the workpiece, the flat back keeps the rebate even.

GLUE SCRAPER

Removing dried glue squeeze-out is a common task, but it's no picnic. The photos at the top of the facing page highlight two approaches.

When glue has dried in a corner, like the drawer you see in the above left photo on the facing page, I use a bevel-down grip to pop the glue out. The bevel acts as a safety to keep the



▲ Lay out the corner with a pencil and a combination square (above left photo). Define the corner with a vertical cut (left photo), then remove the waste with a paring cut (above right photo).



- ▲ To remove glue from the corners of assembled drawers, hold the chisel bevel down. Along an edge joint, a vertical, scraping cut eliminates glue and protects the surface (inset photo).



- ▲ To trim end-grain plugs, make cuts from all sides to avoid breaking off the fibres. On face-grain plugs, cross-grain paring cuts keep the wood from splitting.

edge from gouging the workpiece.

Squeeze-out on edge joints calls for a different approach. Here, you want to hold the chisel nearly vertical and pull it along the glue line (inset photo). It's a scraping action that shears off dried glue. This is one job you may want to assign to a specific chisel. It saves wear and tear on chisels with a keen edge.

TRIMMING PLUGS

Wood plugs and pins reinforce joints and conceal the heads of screws. The challenge is trimming them without damaging the surrounding surface.

The first thing to do is cut off the plugs close to the surface with a hand saw. A



- ▲ Draw the chisel along the edge of a square to score a line in a workpiece. Use a light touch to avoid digging into the surface.



- ▲ The flat back of the chisel registers on the surface for a final paring cut to trim the edging flush.

chisel comes in battling clean-up.

END-GRAIN PLUGS. A section of dowel can be used to make an end grain plug for a screw hole. But it's difficult to make a smooth chisel cut across the dowel's end grain. To trim the plug flush, I start with scoring cuts around the perimeter (upper right photo). Then gradually increase the depth until the plug is nearly flush. A last bevel-up cut trims it smooth.

FACE-GRAIN PLUGS. Face-grain plugs are simpler. You want to avoid splitting off the plug below the surface. To prevent this, I take thin cuts across the grain, working down to the surface (inset photo). Finally, you can touch up the plug and surrounding wood with light sanding.

MARKING KNIFE

The sharp edge of a chisel also stands in as a versatile workshop knife. To use a chisel as a marking knife, hold the back against the square and tilt it up so the edge won't catch. You can use this same grip to cut veneer, cardboard and leather.

TRIM EDGING

Trimming edging flush to the end of a panel isn't much different than trimming an end-grain plug. Start by cutting the edging with a hand saw. Then with a horizontal cut, make thin passes to bring the edging flush. Avoid tearout by cutting from both edges towards the centre. A final, light pass levels out the slight hump in the centre. **W**

Installing Concealed Hinges



▲ Concealed (European-style) hinges combine a simple installation with after-the-fact adjustability. This will simplify door installation on most projects.

My latest project was a small cabinet built in the Scandinavian modern style. Near the end of the construction, I reached a decision point about the hardware.

The door pulls found themselves. I came across rectangular pulls that matched the proportions of the case. The hinges were harder to settle on.

By nature, I lean more traditional than modern. So butt hinges stayed near the top of the list. However, the sleek design of the cabinet seemed to ask for something less visible. John Doyle, one of our designers, fancies concealed or European hinges, like the one shown at left. As you'd guess, the hardware is invisible from the outside. (They are somewhat bulky when the door is open.)

He also promised me that installing the

hinges and fitting the doors is a simpler process than mortised-in butt hinges. I bit; he was right.

This style of hinge divides the process of hardware and fitting into separate processes. Build the doors to suit the opening (with appropriate gaps). Then install the hinges. Once in place, you can tweak the door position easily.

INSTALLING THE HINGE

When installing concealed hinges, I prefer to start with the door. This way, the hinges will serve as a gauge to help you locate the mounting plates in the cabinet. There's no harm in working the other way around, though. Kind of like pins-first or tails-first dovetails.

DID YOU READ THE INSTRUCTIONS? Concealed hinges usually come with a set of installation instructions. If your experience with

concealed hinges is limited, it's a good idea to give them a quick read-through — I'll wait.

Another good idea: check the manufacturer's website for any updates. On a recent project, I found that the instructions had an error. I was able to print an update from the internet.

UP & DOWN. The vertical location of the hinge is entirely up to you. My recommendation is to pick a nice round number and use that for the centrepoin of the hinge anytime you work with concealed hinges. For me, it's 75mm. Keep in mind that the farther apart the hinges are, the more stable the assembly.

SETBACK REQUIREMENTS. The amount the hinge cup hole is inset from the edge of the door depends on the hinge and application. The dimension is listed either to the centrepoin of the hole or from the edge of the hole (again, instructions). Centrepoin just work better in my head, so I'll do a little maths if necessary.

I set an adjustable square to the setback distance from the edge of the door and scribe a line parallel to the edge. Then, use an awl to mark the hole centres to help position the drill bit.

YOU NEED A BIT. Concealed hinges originated in Europe and are metric based. The size of the hole you drill is 35mm.

It's best to purchase a 35mm Forstner bit to do the job, an imperial bit that is nearly right will not work. It's likely you'll be drilling a lot of holes with this bit, so the modest investment is worth it. I use a car-



▲ A carbide Forstner bit lasts longer than high-speed steel bits. I find that running the bit at 1000-1500RPM results in a smooth, clean hole.

bide bit for longer life.

CHOOSE YOUR ADVENTURE. There are two ways to drill the hole: at the drill press or with a dedicated jig. While freehand drilling is technically possible, either the drill press or a jig improve the consistency of the process.

The set-up at the drill press is pretty simple. Use a fence to locate the bit using the dimple you made earlier. Just align the

spur of the drill bit with the centrepoin and then lock the fence in position.

When drilling the hole, you're aiming for a depth of 13mm. Setting the drill depth stop adds reliability.

The box below shows the Kreg version of a concealed hinge jig. No matter which jig you have, be sure to read those instructions, as well. Then make a test in some scrap to get the feel of the jig.

KREG CONCEALED HINGE JIG



Kreg Jig. The grey adjustment cams on the jig allow you to control the setback of the bit in relation to the edge of the door.



Drill the Hole. Position the jig using the scale. Then clamp it in place to keep the bit from wandering.



Drill the Pilot Holes. The Forstner bit and guide come off so you can drill the mounting screw holes.

INSTALLING THE HINGE. In addition to the cup hole, you need to drill pilot holes for the hinge's mounting screws. The key here is to install this hinge component so it's perpendicular to the edge of the door.

If possible, I like to use my square to align the hinge plate when installing the hinge in the door, as shown in step 1 below. Just keep in mind that the shape of the hinge may not allow you to use a square this way. A self-centring drill bit makes it easy to drill the pilot holes for the mounting screws.

INSTALLING THE PLATE

Now you can turn your attention to installing the mounting plate inside the cabinet. As before, taking the time for careful measuring and layout really pays off.

VERTICAL POSITION. When it comes to locating the mounting plates on the side of the cabinet, the goal is for the plates to line up perfectly with the hinges you just installed on the door.

The trouble is, you can't simply use the same offset dimension that you used on the door. That's due to the gap at the top and bottom of the door.

A straightforward approach is to simply factor the gap in when locating the mounting plate.

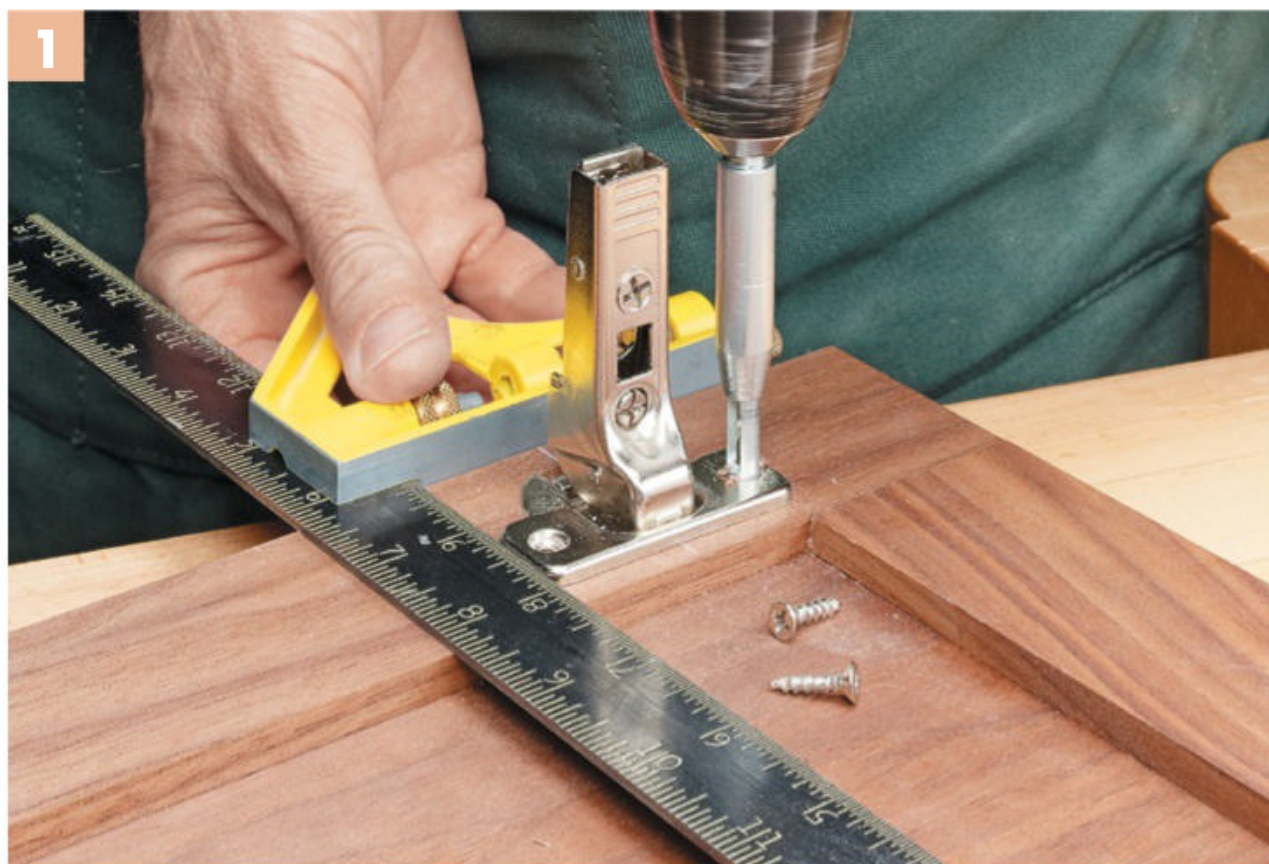
Rather than measure from the top and bottom of the cabinet opening to position the mounting plates, another option is to measure from the centrepoint out. This guarantees that the door will be centred in the opening and leaves an even overlay (or gap) when the door is installed on the cabinet.

THE SETBACK. Unlike no-mortise hinges, or butt hinges, a concealed hinge sits back from the edge of the cabinet. (It's called a concealed hinge for a reason.)

For overlay doors, the setback distance from the front edge of the cabinet is already determined — 38mm. This distance is a standard for a lot of contemporary cabinet work based on the 32mm system. That alone is worth an article or two. For the purposes of this subject, it's helpful to note that with exceptions, the setback is fixed from hinge to hinge.

The biggest exception is when your design includes inset doors. For an inset door, the setback distance is 38mm plus the thickness of your door. This means that for a 19mm-thick door, the total setback distance is 57mm. The combination square is the tool of choice once again for laying out these centrelines.

NO-FUSS INSTALLATION. To install the mounting plate in the case, centre the screw holes over your layout lines. Then drill the pilot holes with the self-centring bit and install the screws.



▲ A square aligns the hinge so you can drill the pilot holes for the mounting screws. A self-centring bit comes in handy for proper alignment.



▲ After marking the vertical location of the centrepoint of the hinge, you can mark the offset based on whether the door is inset or overlay.



▲ A small piece of double-sided tape helps hold the plate in position while you drill pilot holes. While you want to do careful work, the hinge is easy to adjust so don't sweat it if you're off slightly.

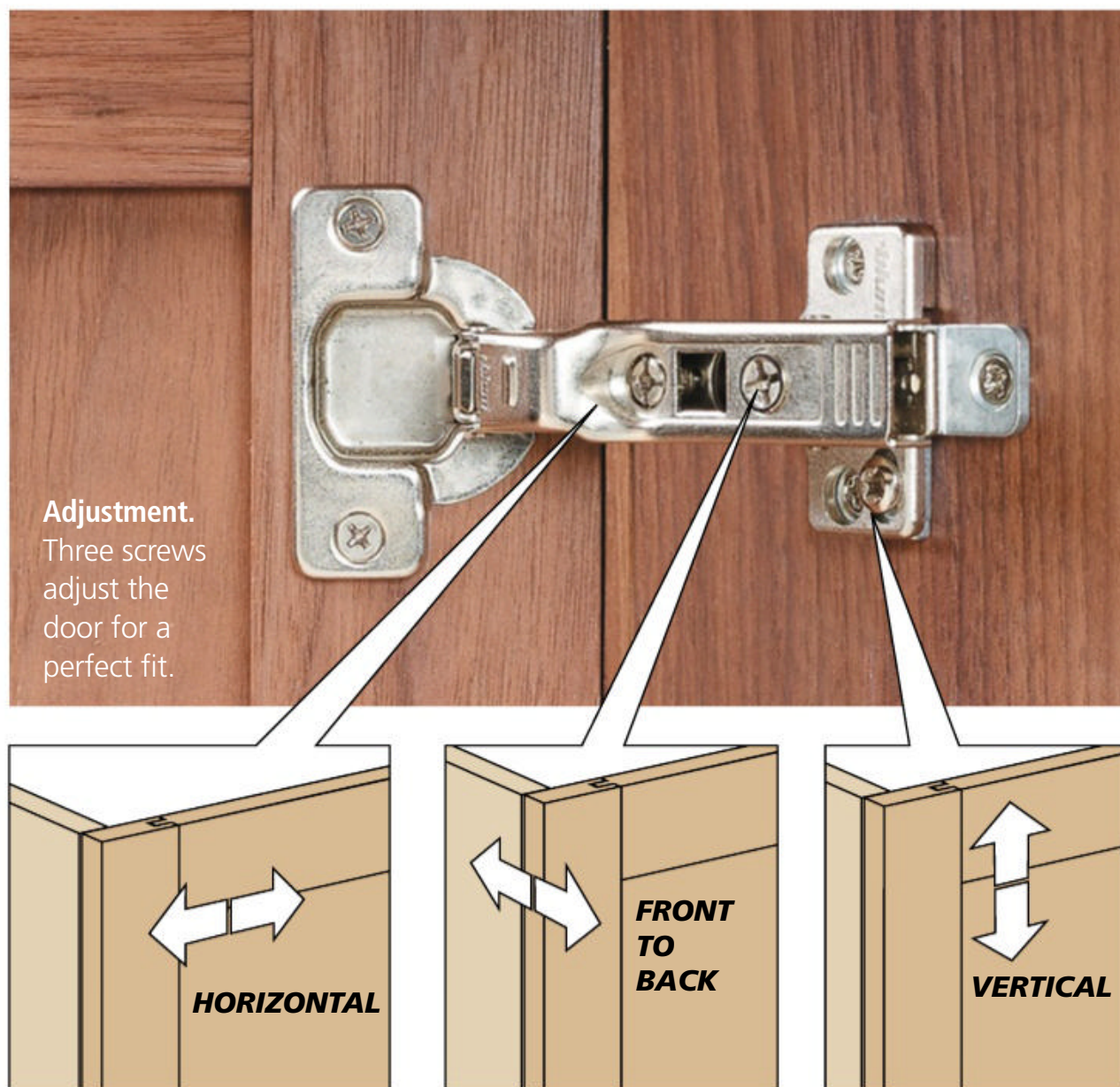
When I have several doors to install, I like to make a Masonite template. The template has a fence to establish the setback and it's sized to locate the hinge vertically in the cabinet.

EASY ADJUSTMENT. The two parts of the hinge clip together. At which point, you can make some adjustments to the fit. And this is where concealed hinges can really shine.

The photos and drawings at right show three screws located on the plate that allow you to finetune the door's position in three directions. A screw near the front of the hinge allows for side-to-side adjustments.

Slightly farther back is another screw. This one controls the projection of the door in its opening or (in the case of an overlay door) its distance from the case itself.

A screw near the mounting screws shifts the hinge up or down. On some hinges, you may need to loosen the mounting screws to adjust the vertical position. With a few minor tweaks, you can align the door perfectly for a professional look. **W**



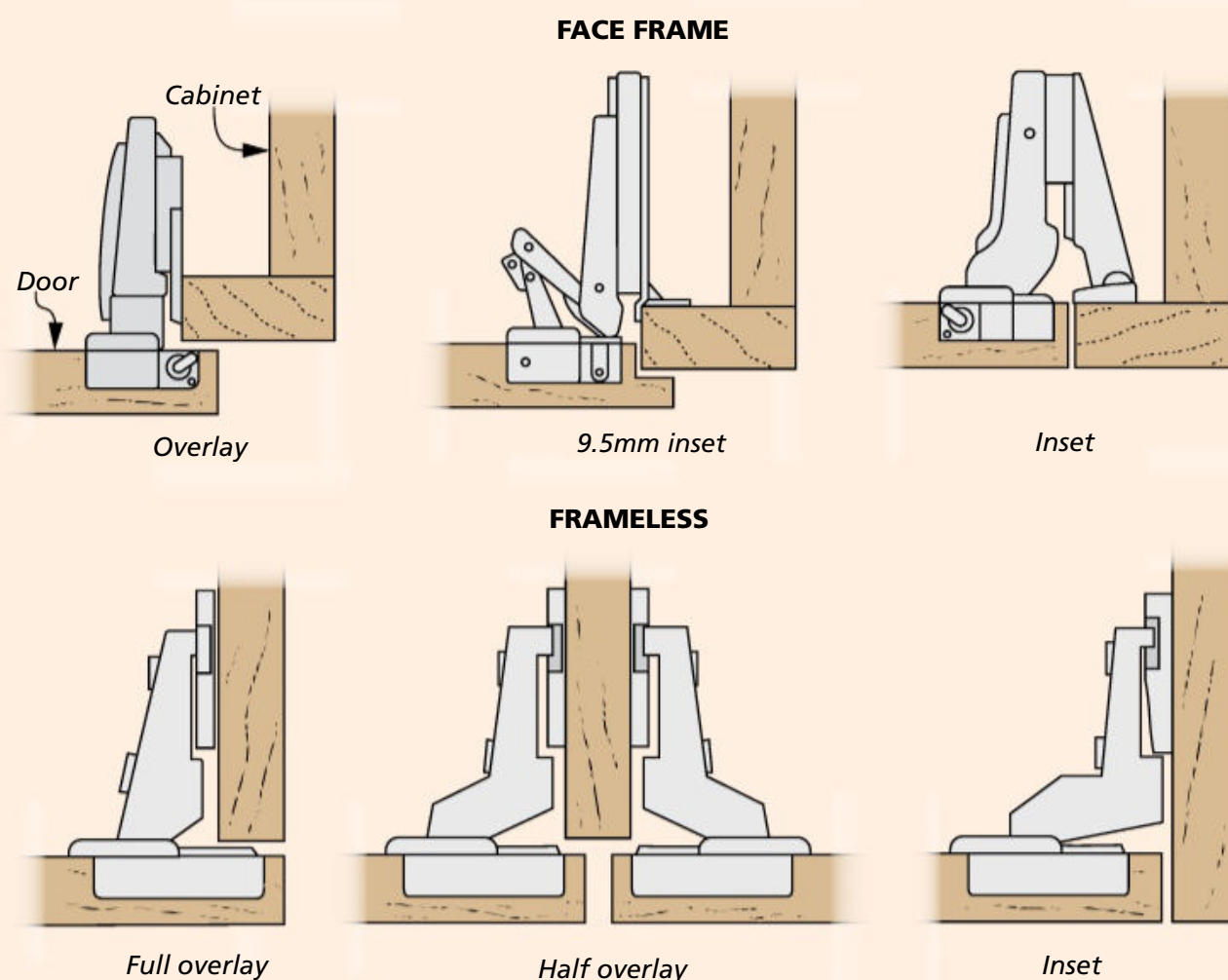
CONCEALED HINGE OPTIONS

Unlike a butt hinge, the concealed hinge you use in a project depends on the application rather than the appearance. The drawings here provide a broad overview of the choices you have.

Case Construction. Consider the type of cabinet you're building. Does it have a face frame or is it frameless?

Door type. Next, think about how the door relates to the case. The door can rest within the opening. Or it can overlay the case sides with a half overlay or a full overlay projection.

Gotta Swing. Your final consideration is the extent that the door opens. A 95° swing is bare bones. A hinge with 120° of swing is what I consider a minimum.



Crafting a Japanese River Boat

Douglas Brooks wrangled a team of novice woodworkers over five days at JTA, supervising the transformation planks of Japanese red cedar into a river boat!



Japanese Tools Australia sponsored the internationally renowned Douglas Brooks to share his insights and skills in a five-day workshop that saw the planks to the left woven together with simple tools and deep insight into a watertight Japanese river boat.

Mitch from JTA organised the importation of a container of Japanese red cedar (Sugi) because no equivalent Australian substitute in 300 x 30mm could be found (at an acceptable price).

Sugi has a story behind it. Japan is home to more than 4,000 species of timber. The firebombing of Japan in World War Two burnt down millions of traditional wooden homes. After the war the government decreed that terraces used for the growing of vegetables and

some rice paddies be planted with the fast-growing boatbuilding timber Sugi. These ubiquitous forests were soon being harvested to supply stock for building whole new towns and cities.

The Sugi river boat above is propelled by a sculling oar that allows the boat to navigate the narrow canals found in rice paddies. The suburbanisation of Japan has seen most rice paddies near large towns filled in for urban development. These days a narrow barge powered by a Tohatsu outboard is used when the rice paddies are flooded. Building the boat out of Japanese red cedar meant that traditional Japanese boatbuilding tools could be used and the techniques Douglas has mastered could be applied with an expectation of success.

1 The keel for the river boat was made using two 4m planks of 300 x 30mm-thick Japanese red cedar. The timbers were bookmatched to balance the stresses in the timbers and mated side-by-side on 90 x 45 framing timbers. Previous to the class arriving, Mitch and Christian had built three sets of frames to support the bracing timbers used in traditional Japanese boatbuilding (a Japanese boatshed would have sturdy rafters for just this purpose). The planks were laid as close as possible before a pull saw was used to "brush" the nearly closed joint. A saw fit joint relies on the set of the teeth to sweep away imperfections in the joint. Narrow wedges kept the boards less than 1mm apart.

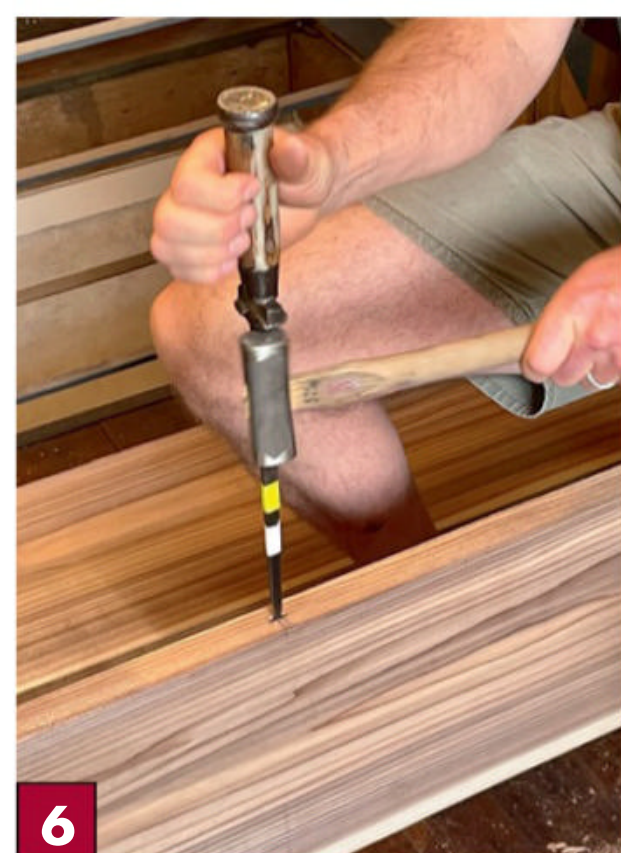
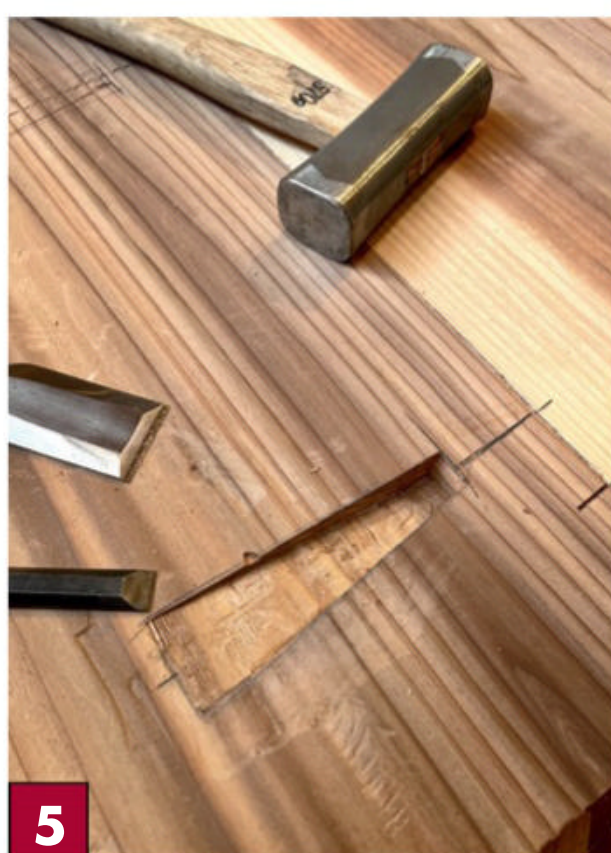
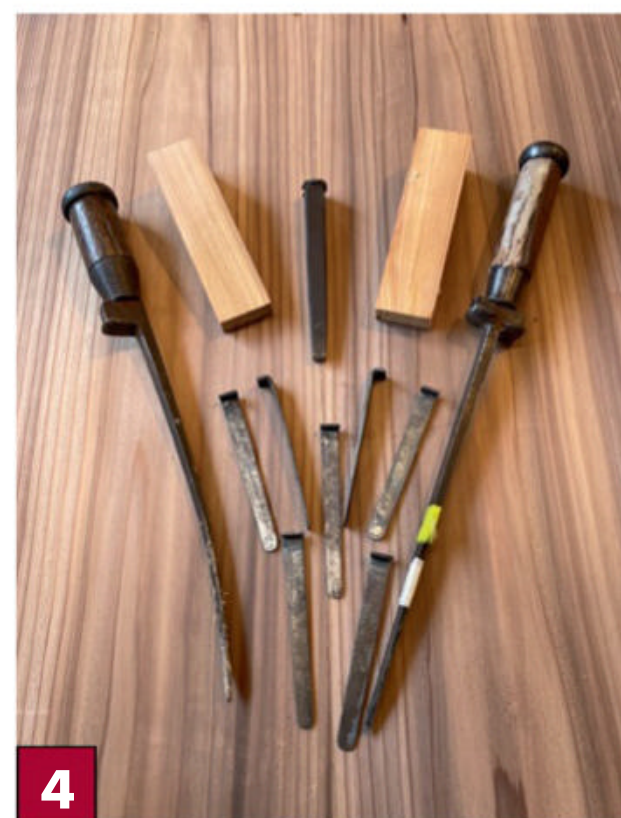
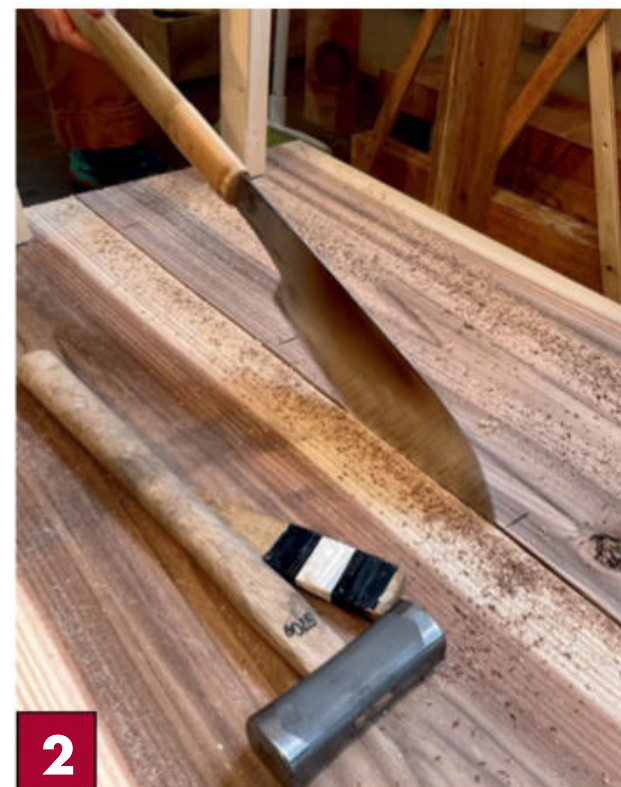
2 When no light could be seen through the joint the vertical kerf marks were saw brushed away with a different sawing action. This time the saw was drawn across the grain, producing a ripping instead of a cross cut pattern in the kerf. This stops the ingress of water along an otherwise vertical kerf pattern.

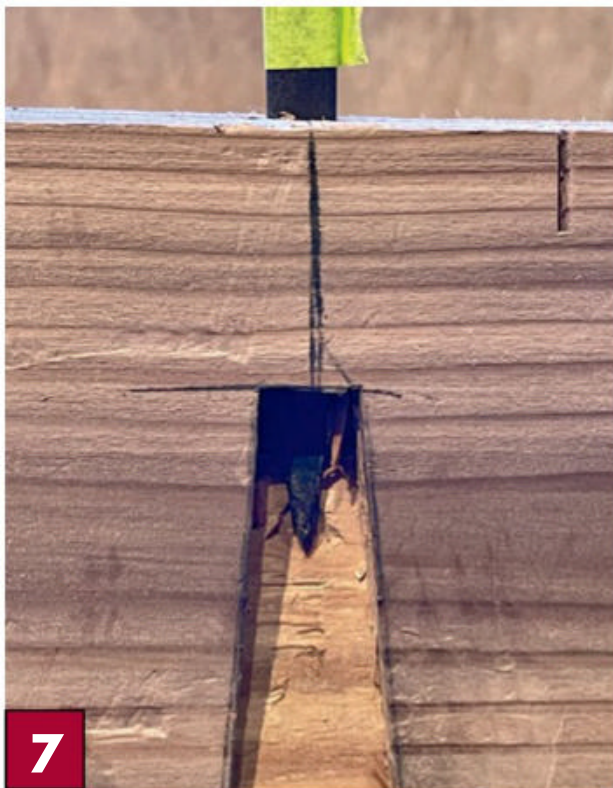
3 When the boards were released from their stays they were mounted vertically and the horizontal kerf pattern checked (and in some cases carefully corrected).

4 Here we see wide clenched boatbuilding nails and tsubanomi tools that are used to create the path for the hand-wrought nails to travel along (a little like chisels, however they separate the grain instead of removing it). Plus solid wood wedges cut at 4.5° to conceal the nails.

5 Nail centres were then marked out before the wedge shapes were traced and then carefully cut out. The wedge depth is half the thickness of the plank.

6 With the wedge mortise cut, it was time to chase the future nail path back to its origin. Here you see the straight tsubanomi being hammered in and then out of the nail path. The hilt on the sides of the bolster accepts the removal blow from the hammer on its upward stroke.





7



8

7 The straight tsubanomi had done its job and can be seen penetrating the base of the wedge. When the nail is driven home, the distorted grain will want to return to its original place, locking the nail and the boards together and producing a waterproof seal.

8 "Killing" the timber is a standard practice in a lot of Japanese wood-working. Here you see the slightly curved peen of the Japanese hammer being used to hollow out the middle of the planks. The next step was to run a bead of urethane glue down the centre of one plank and then mist the matching plank with water before clamping them together. Killing the centre creates a seamless joint.



9



10

9 When the glue was dry the clamps were removed and the board returned to the vertical. The curved tsubanomi was then driven home into the second board, creating a path for the hand-wrought boat nail to follow. The nail itself was bent slightly (with hammer blows to its outer face) before being driven home with a hammer and then set with a punch.

10 The sloped mortise was then smeared with glue and the matching wedge hammered home. When the glue was dry the wedge was cut flush with a pull saw.



11



12

11 To add extra strength to the joint long chigiri blocks were cut with the same 4.5° slope as the wedges. These double-ended dovetail splines are immensely strong as well as being a delight to the eye. The bulk of the waste was drilled out before the chisels went to work. Great care was taken to leave more than just the pencil line on the plank. This meant the chigiri formed a friction fit and would not shrink in the future and fall out.

12 Japanese boatbuilders are a pragmatic bunch, if urethane glues existed one hundred years ago and were as cheap as they are today, they would have used it. The chigiri joint was smeared with glue and the trench misted with water before it was driven home.

13 Traditionally a Japanese boat-builder would choose a tree in the forest and have it milled to thickness. The length of the container meant that the boards had to be cut down to fit, hence a scarf joint needed to be used to weave them back together again. One advantage of the scarf joint was that a slight "kick" in the board could be achieved. This reduced overall waste in the board.

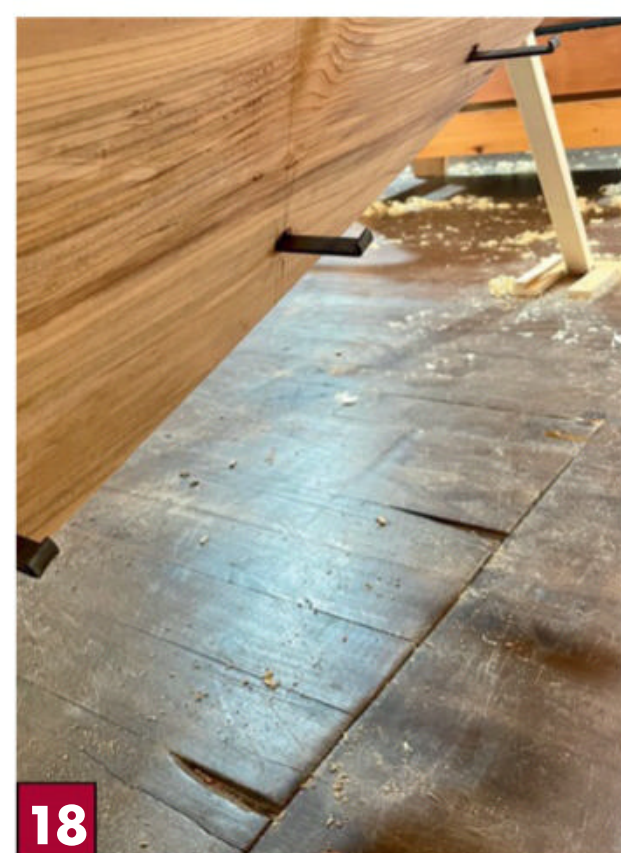
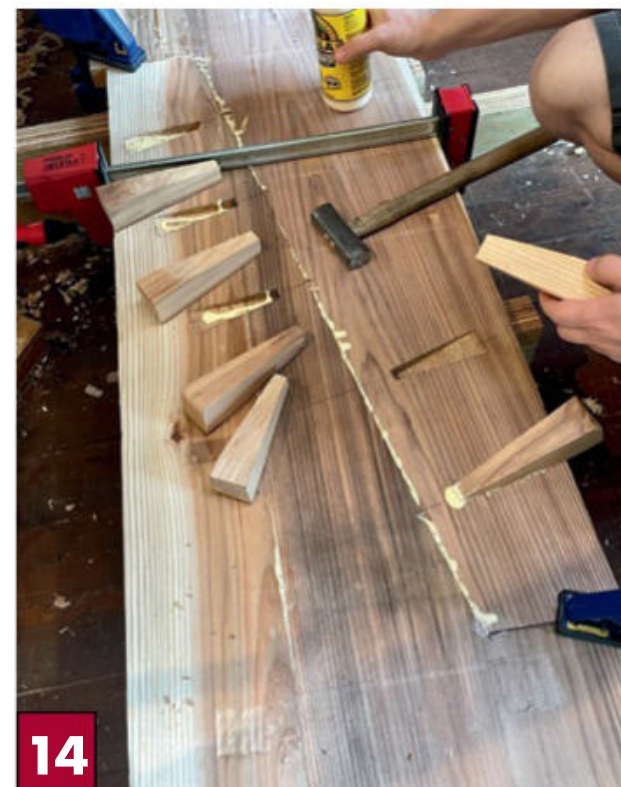
14 The scarf joint took two teams a whole morning to saw fit into position. Once the joints were perfect the gunnel boards were glued and clamped together. Then the wedge trenches were cut, the tsubanomi used to map the path of the nails and then the nails themselves driven home and set. Wedges were then glued and hammered in place.

15 The river boat featured two transoms (we would call one the bow and the other the stern). The transoms relied on a tongue and groove joint for strength. This joint was also a major saw fit challenge. The angle was right when it matched the template.

16 Notice the 20kg weight in the middle of the keel and the brace timbers flexing the keel to the correct curve. What you can't see are the blocks under the ends of the keel that set the bend in the keel.

17 It was all hands to the deck in the image that you can't see! The hull with the gunnels clamped in place was inverted and a felt tip pen run along the intersection of the hull and the overlapping gunnel. The waste was trimmed, then a 6mm splay was planed on the gunnels, before it was reassembled and saw fit to make it watertight.

18 The tsubanomi was used yet again to create the path for the boat nails that locked the gunnels onto the keel and the transoms. Before the nails were driven home a small mortise was cut to conceal the clenched head of the nail.

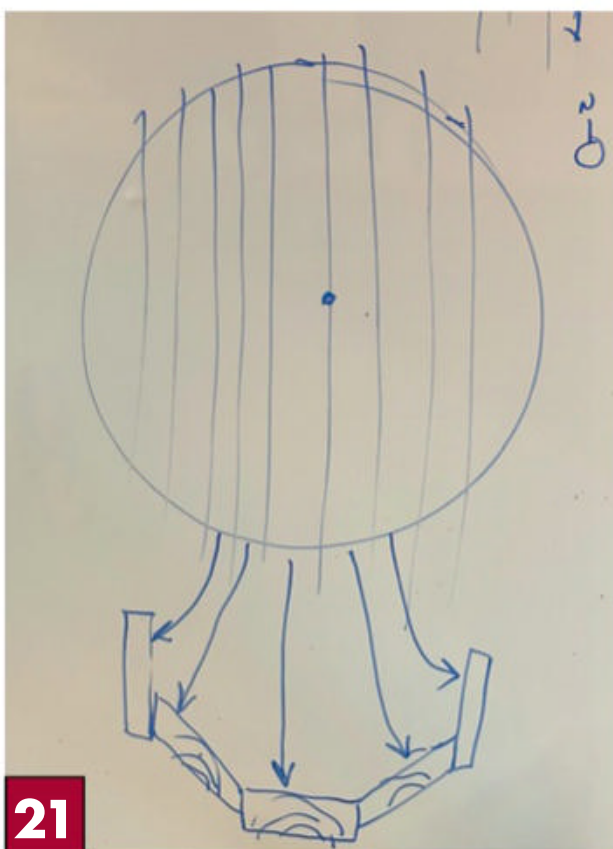




19 The reason for planing a 6 x 30 mm splay on the mating face of the gunnels was to allow saws to access the intersection of the keel and gunnels without the handles of the saws getting in the way. This is one of many insights that Douglas has published and shared with future Japanese boat-builders. Knowledge was power, it was hard won and precious in a culture that didn't publish text books, or have boat-building schools to share and disseminate knowledge. There is a lot to see in this photo. The string is stretched fore and aft then aligned with a single known height marked amidships on the planking. Keeping one's eye in alignment with the string and the mark one can set marks the length of the plank for the shape of the gunnels.



20 The planar sheer line shadow points were then joined together in a seamless curve with the help of a flexible 38 x 19mm length of timber. This line was then roughly cut before being planed to true by hand. At this point the brace timbers were removed and the weight lifted from the centre of the keel. The graceful lines of the boat became evident when the gunnels were planed smooth.



21 The hallmark of Japanese boat-building and carpentry is that every part of the tree is honoured, waste is kept at a minimum, curved branches and trunks are utilised and the stresses in a log are balanced when it is milled into boards and assembled into a temple, a teahouse or a boat. The key to this different approach to working with wood is that a string line is used to mark the centre datum of all stock. In the west we create a flat face or side and use it as a datum. Using a centre datum is a real game changer.



22 The sculling oar lock on the stern and the bow block were a challenge to mark out and then cut. Douglas knew how to project the lines from the boat onto a block and then cut it to shape, however the teacher in him had the team resolve the issue...themselves.

23 Two mortises were then cut into the gunnels to accommodate a thwart brace. Next step was to cut lapped dovetails onto the ends of the seat thwarts and then trace the matching dovetails onto the gunnels. The seat thwarts were then glued and screwed in place and all edges arrised with planes.

24 The final couple of steps in the making of the boat saw it inverted so that the outside edge of the gunnels could be planed smooth. The bow and stern sections of the gunnels were planed flush, while the keel sections were left with a 6mm overlap. This overlap not only gave the boat sleds to sit on when it was on a hard beach, they also helped to keep the boat on track when it was sculled in the water.

25 The final step was to cut out any loose knots that might allow water to find its way through the hull and insert friction fit blocks that penetrated 15mm into the 30mm-thick timbers. These blocks were then planed flush and again all edges were arrised to soften them and reduce the chance of the timbers splintering.

26 The team of seven. We all came with different skill sets and an expectation that we would learn something new. Douglas proved to be an excellent teacher who was always keen to share knowledge and explain why things were done the way they were. After having spent five days learning how to perfect a saw fit joint we were left with nothing but admiration for Japanese boatbuilders who crafted marvels in wood with the most basic of tools and equipment. Electricity did not make it to many country towns until 1964. Most of the master boatbuilders that Douglas apprenticed with started their careers building boats without any power tools.

27 After a short Shinto launch ceremony we all got our feet wet as we launched the boat and climbed onboard. **W**



B&B House

Invite bees and butterflies to your garden with this attractive habitat.



▲ Flip-up doors with slots provide refuge for butterflies and give you access for cleaning.

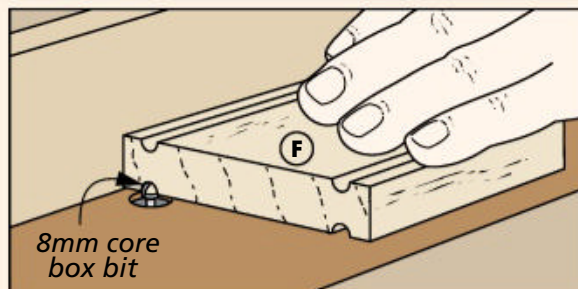
TWO GROOVES EQUALS ONE HOLE

Just outside my workshop window lies my little vegetable patch. This project aims to provide a place for all my insect helpers while combining my woodworking with my gardening passion.

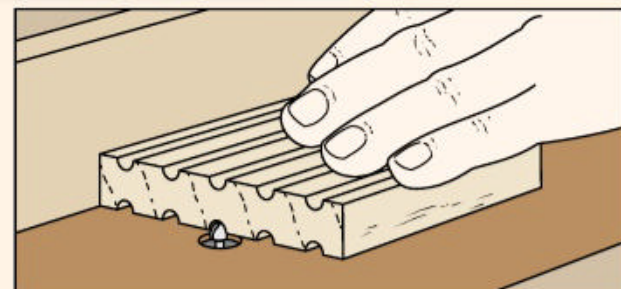
CENTRAL TOWER. The house is made in three sections: a tall central tower flanked by shorter additions. The drawing below shows the construction details. The sides and floors feature housing joints (detail 'c'). The rear edge of the sides is rebated for the back, as in detail 'd.'

The top ends of the sides are cut at 45° for the gable roof. Detail 'b' shows the two-piece roof is connected with a tongue and groove joint. You can assemble the sides, floors and roof with waterproof glue. This assembly determines the final size for the back.

BEE TUNNELS. Several species of bees raise the next generation in tunnels. I used two workshop-made solutions as well

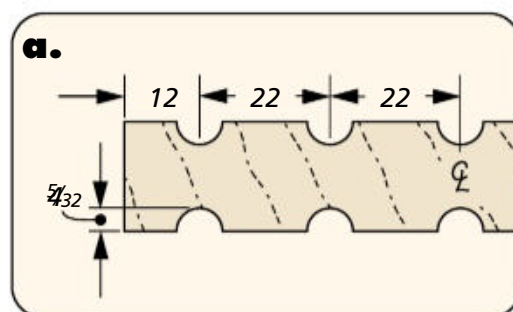


Symmetrical Set-up. With just two fence set-ups, you can rout the two outer rows of grooves on the blocks.



Centre Groove. Finally, centre the bit on the workpiece and rout the remaining grooves on all the parts.

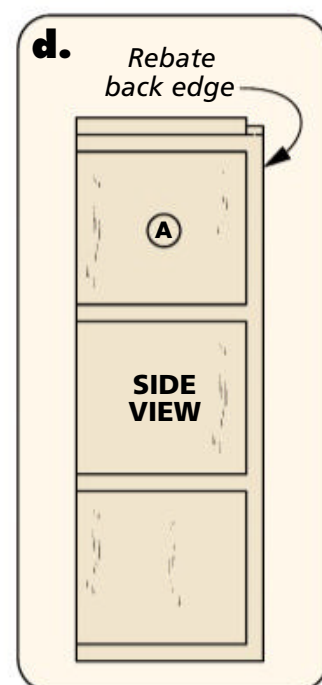
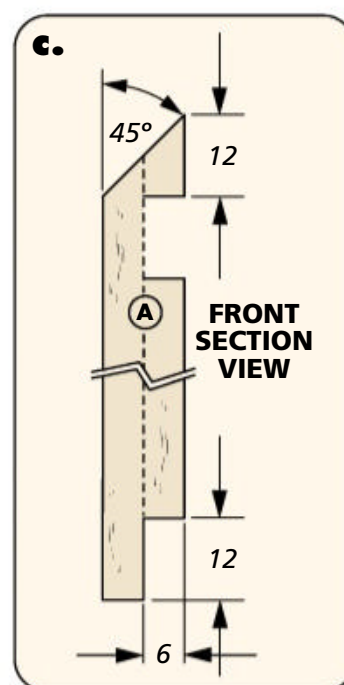
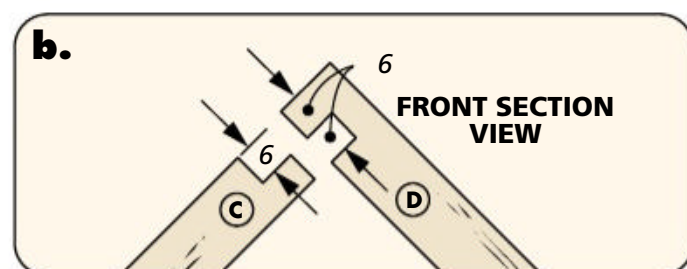
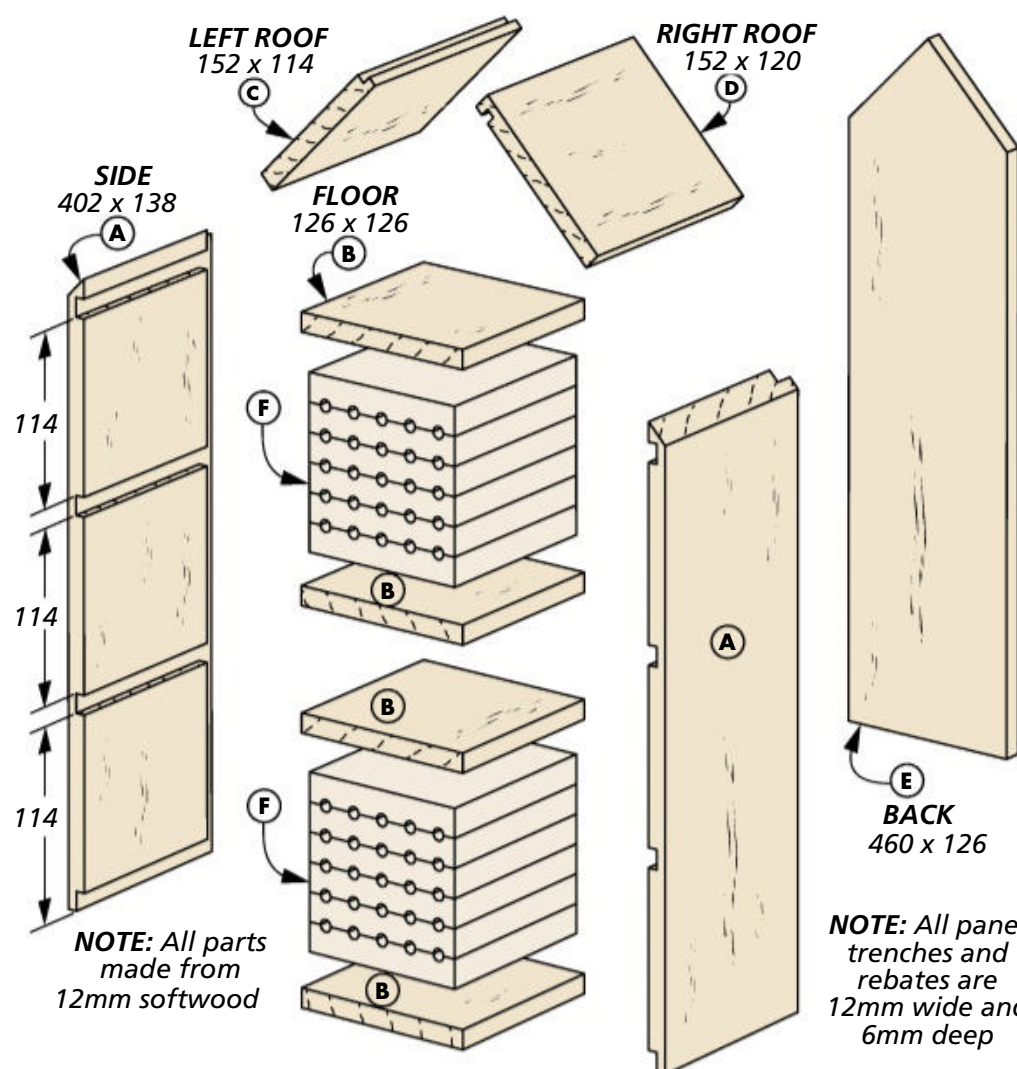
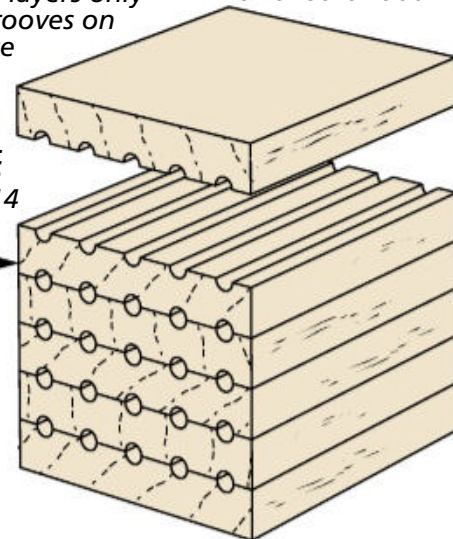
as purchasing tubes (refer to Sources on page 73) to fill the openings in the house. At right you can see one solution. This allows you to create deep holes without needing a long drill bit. The box above shows the steps to take at the router table.



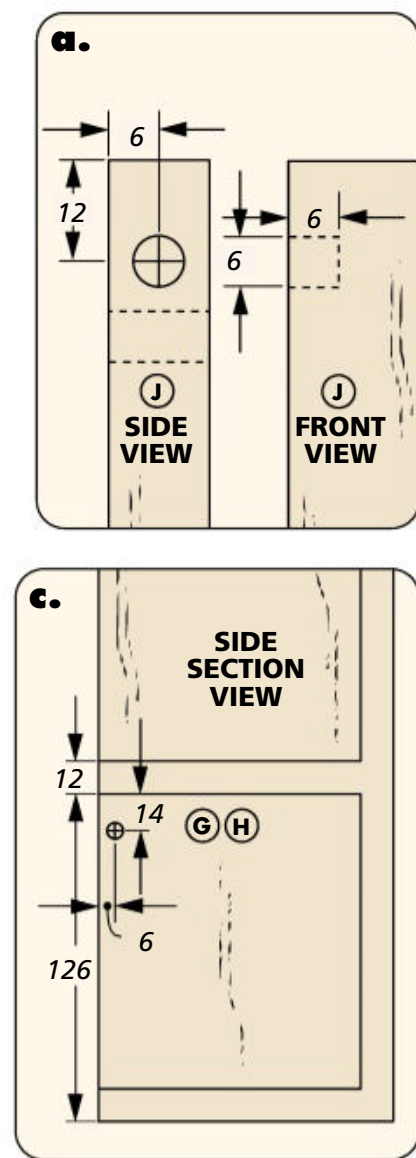
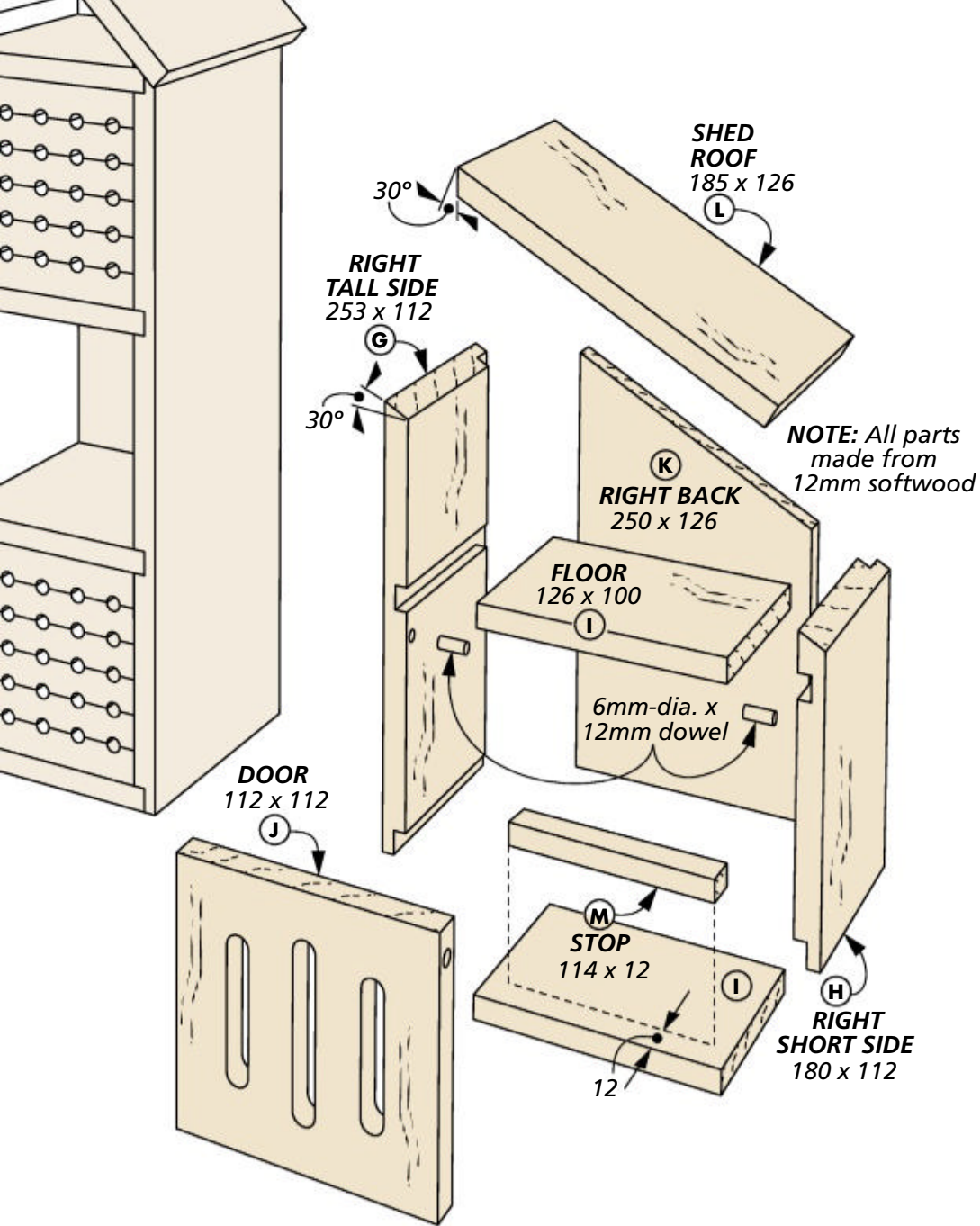
NOTE: Top and bottom layers only have grooves on one face

NOTE: Blocks are 19mm thick softwood

TUNNEL BLOCKS
126 x 114



NOTE: All panel trenches and rebates are 12mm wide and 6mm deep



Additions for a **GROWING FAMILY**

Nothing is holding you back from placing the completed tower in your garden as is. But if you've come this far, might as well go all the way.

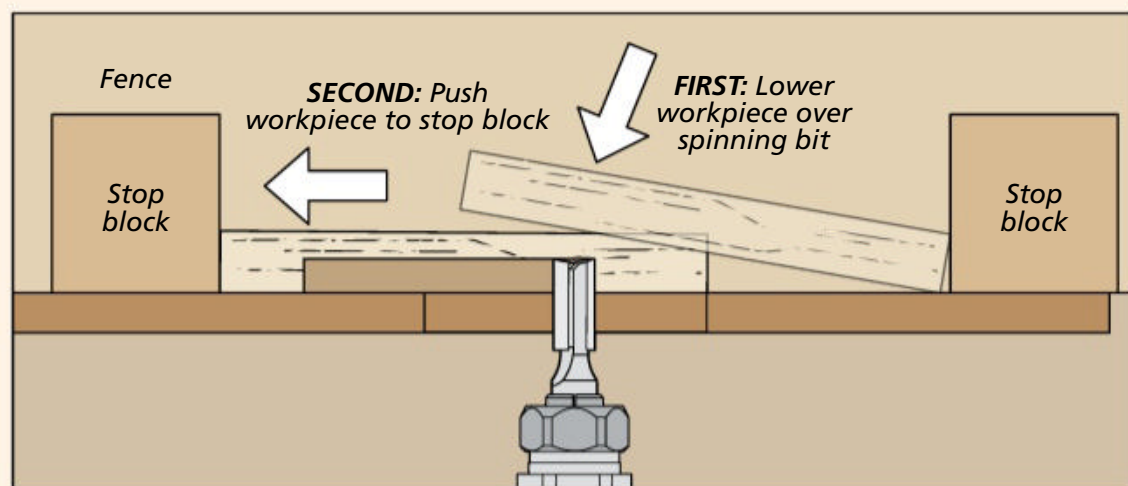
A shed roof addition on each side of the tower gives you more space for nesting tubes as well as the opportunity to invite butterflies to take up residence in your garden patch.

FAMILIAR CONSTRUCTION. Take a look at the drawing above and you'll notice that the general construction for the additions is the same as the tower: trenches and rebates. I do want to point out a few differences.

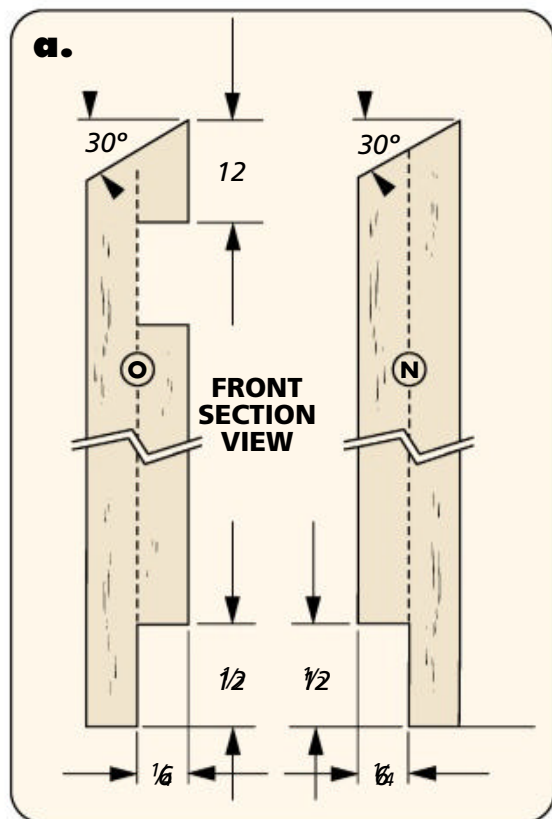
The first item to note is that the sides are different lengths. The top ends are cut at a 30° angle to accommodate the roof panel.

BUTTERFLY DOOR. How you arrange the interior of the house is up to you. To include a space for butterflies, I added a swinging door. The door has entry slots (detail 'b' and the box below). The door pivots on wood pins installed in the sides, as shown in details 'a' and 'c.' After gluing up the addition, glue on a stop just behind the door.

SIMPLE ROUTED SLOTS



Stopped Slots. Use layout lines on the workpiece to locate stop blocks to the router table fence. Set the bit to cut slightly more than half the thickness of the workpiece. Brace the piece against the right stop block and lower it over the bit. Slide the piece until it contacts the other block. Flip the piece over to complete the cut.

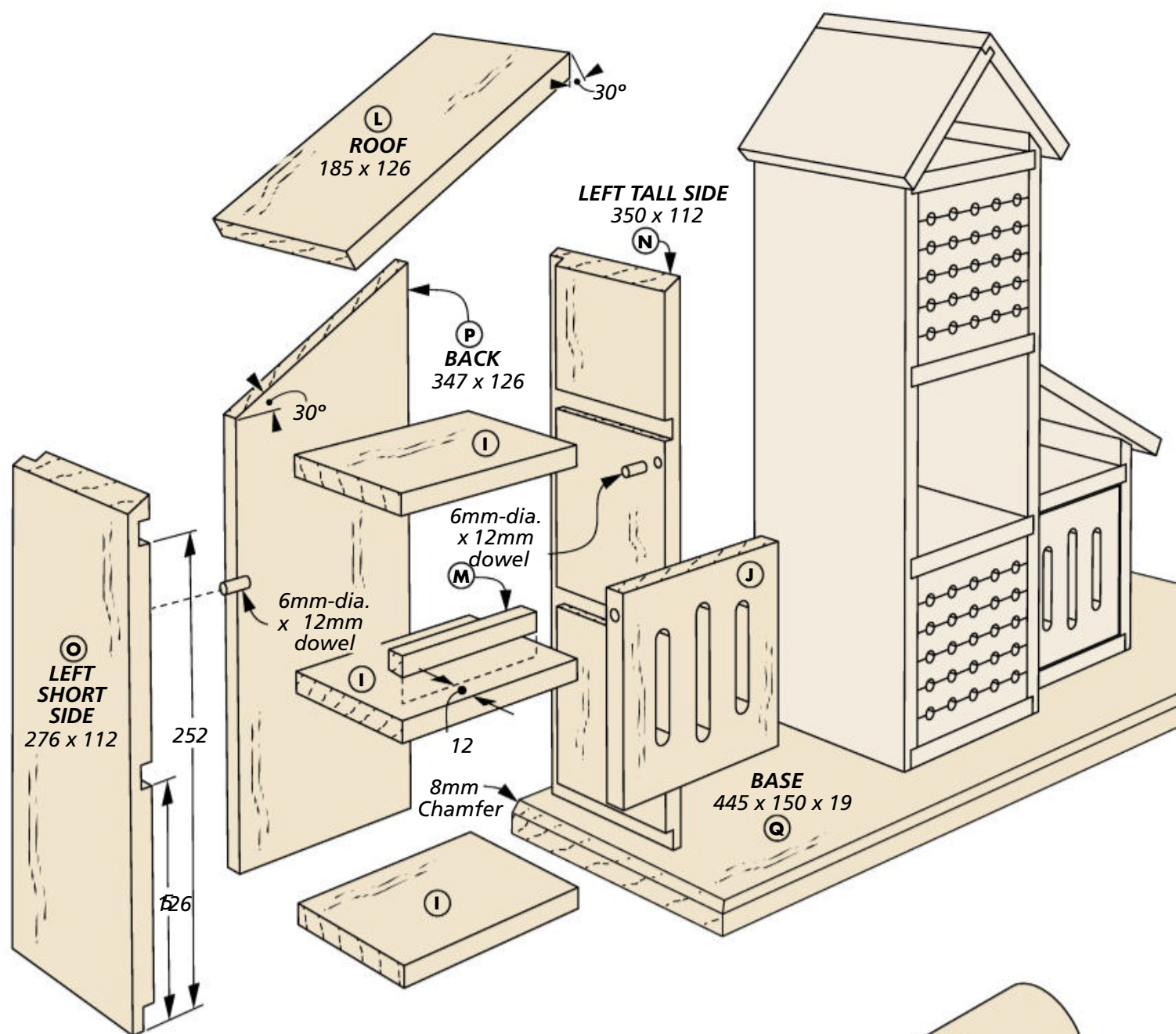


LEFT ADDITION

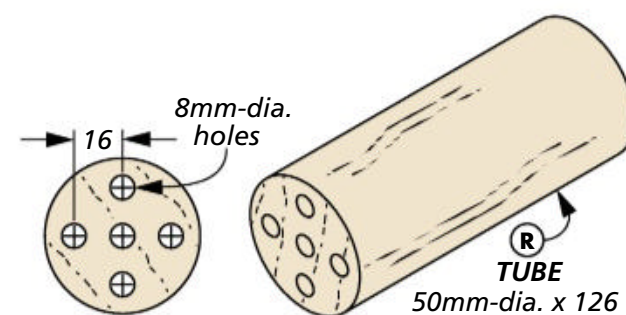
As you can see in the drawings on this page, the other addition is a bit taller than the right side. I included a second butterfly door in the centre compartment.

NESTING TUBE. There's one other nesting option to show here. I made a nesting tube from a large diameter dowel with a series of holes.

BASE & PAINT. The last part is a base to



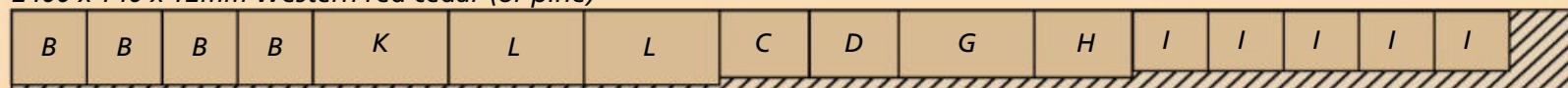
anchor the sections. The base features a chamfer on the front and sides. Then you can apply some paint (refer to Sources on page 73), and enjoy the show. **W**



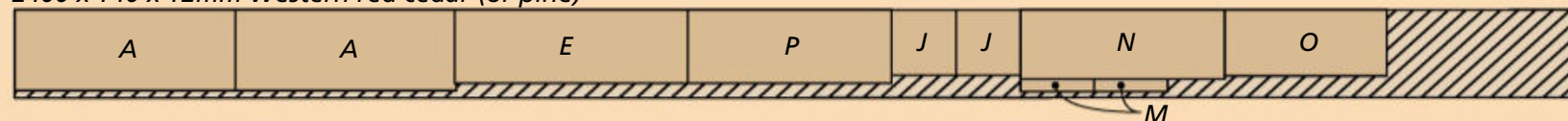
Materials, Supplies & Cutting Diagram

A Sides (2)	402 x 138 x 12	H Right Short Side (1)	180 x 112 x 12	O Left Short Side (1)	276 x 112 x 12
B Floors (4)	126 x 126 x 12	I Floors (5)	126 x 100 x 12	P Left Back (1)	347 x 126 x 12
C Left Roof (1)	152 x 114 x 12	J Doors (2)	112 x 112 x 12	Q Base (1)	445 x 150 x 19
D Right Roof (1)	152 x 120 x 12	K Right Back (1)	250 x 126 x 12	R Tubes (7) 50mm-dia. x 126mm Dowel	
E Back (1)	460 x 126 x 12	L Shed Roofs (2)	185 x 126 x 12		
F Tunnel Blocks (12)	126 x 114 x 12	M Stops (2)	114 x 12 x 12		
G Right Tall Side (1)	253 x 112 x 12	N Left Tall Side (1)	350 x 112 x 12		

2400 x 140 x 12mm Western red cedar (or pine)



2400 x 140 x 12mm Western red cedar (or pine)



2400 x 160 x 19mm Western red cedar (or pine)





▲ The angled, tapered legs are up to the task of providing sound support for this bench. Also, the large roundover on the front edge guarantees it's a comfortable resting place.



Elegant Hall Bench

Most hall benches live a quiet life of service, which is fine. But as you see here, that service doesn't have to be lived without style.

It seems odd that the term "mid-century modern" didn't exist before the mid-1980s. But that's when it surfaced as the title of a book by Cara Greenberg that covered a lot of the post WWII trends in architecture, furniture and accessories.

At the heart of this Scandinavian-influenced movement was a passion to distill all things to the essence of its function, but not abandon style in the process. "Functionally elegant simplicity" is the ongoing manifesto of the mid-century modern movement.

The secondary goal was affordable, well designed furniture. But, as with the Arts & Crafts period that preceded it, the original pieces from this movement can set you back some serious cash.

That's where we can help out, at least if you're in need of a handsome hall bench. The bench you see here ticks all the boxes when it comes to the standards of the mid-century ethos.

What you don't see, though, is some serious mortise and tenon joinery going on where the seat and legs join. Also unnoticed is the finger-jointed bracket that ties the back to the seat.

It's a fairly long list of diverse materials that are used under the umbrella of the mid-century movement. We chose to stick with one of the favoured woods — walnut. It's got a subtle depth and a coolish warm glow that plays well with the clean design. What are you waiting for? Let's dive in.

First, shape the LEGS

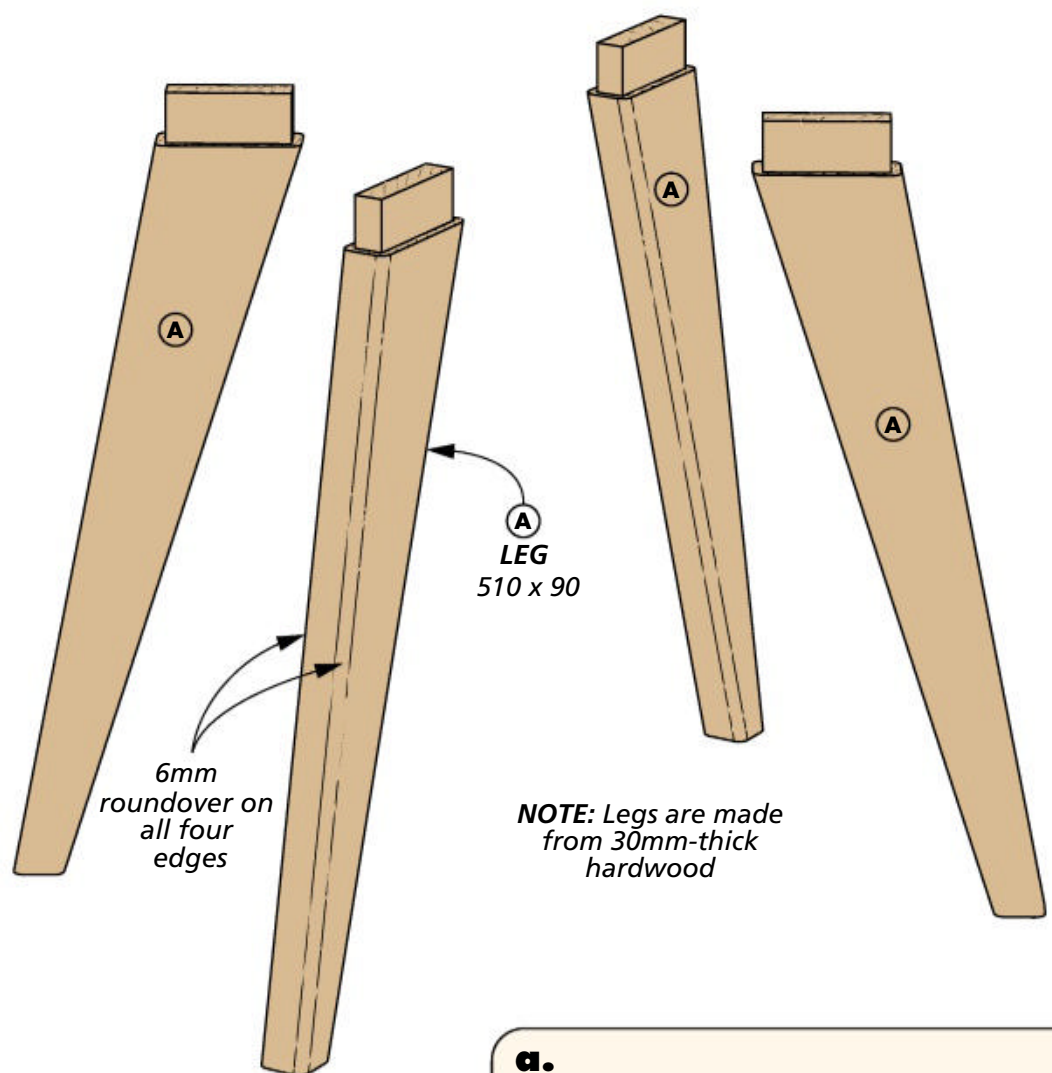
I love it when function and form dance together as they do here. Just take a look at how this leg performs both parts flaw-

lessly. Let's start by examining the tenons at the top.

BIG TENONS. It's a noble cause to aim for sleek, simple designs but you had better make sure your joinery is capable of carrying the load. The tenons you see at the top of the legs in the main drawing are up to the task.

First, they're almost as tall as the seat is thick. And look at how thick and wide the tenon is (detail 'a'). Then throw into the mix all the love and support the shoulders are providing. It's a slick trick that all this

function is mostly happening out of sight under the seat.

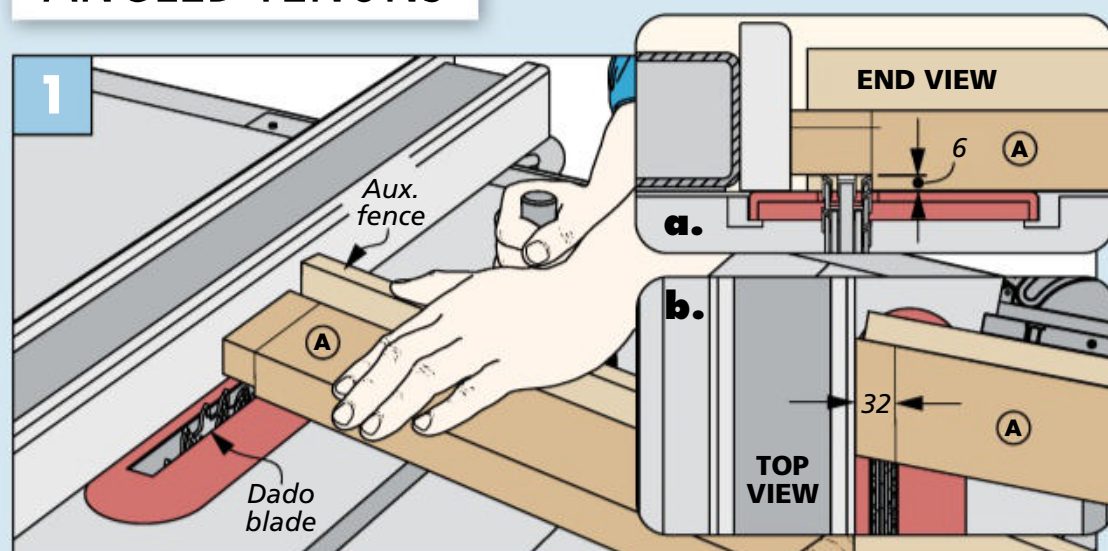


TAPERS. Form says, "But wait, there's more!" And with one stroke adds the taper you see in the detail to the left. This lightens the visual load as the legs come into view and makes them seem almost thin when they meet the floor. But at a 30mm square, the foot is strong.

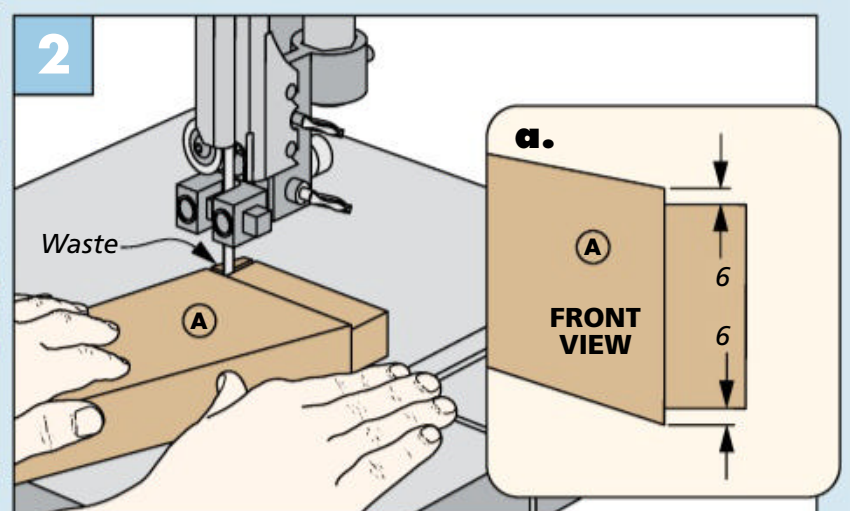
I'm not sure if this dance would be called a tango, samba or the watusi, for me dancing is a spectator sport (unless primed with some cold beers). But this strong, sleek leg is a sight to see. Maybe

we should make four of them. After laying out the blanks, head to the table saw. The box below shows how to make the tenons. The short shoulders and leg tapers are done at the bandsaw. Now it's time to make the seat that partners with the legs.

ANGLED TENONS



Tenons First. An auxiliary fence attached to your mitre gauge that's set at the proper angle is how you create the shoulders for the leg tenons. Nibble away the waste before heading to the bandsaw.



Finish the Shoulders. The bandsaw is the perfect tool for the short shoulders on the tenons. Pare away any rough edges with a sharp chisel.

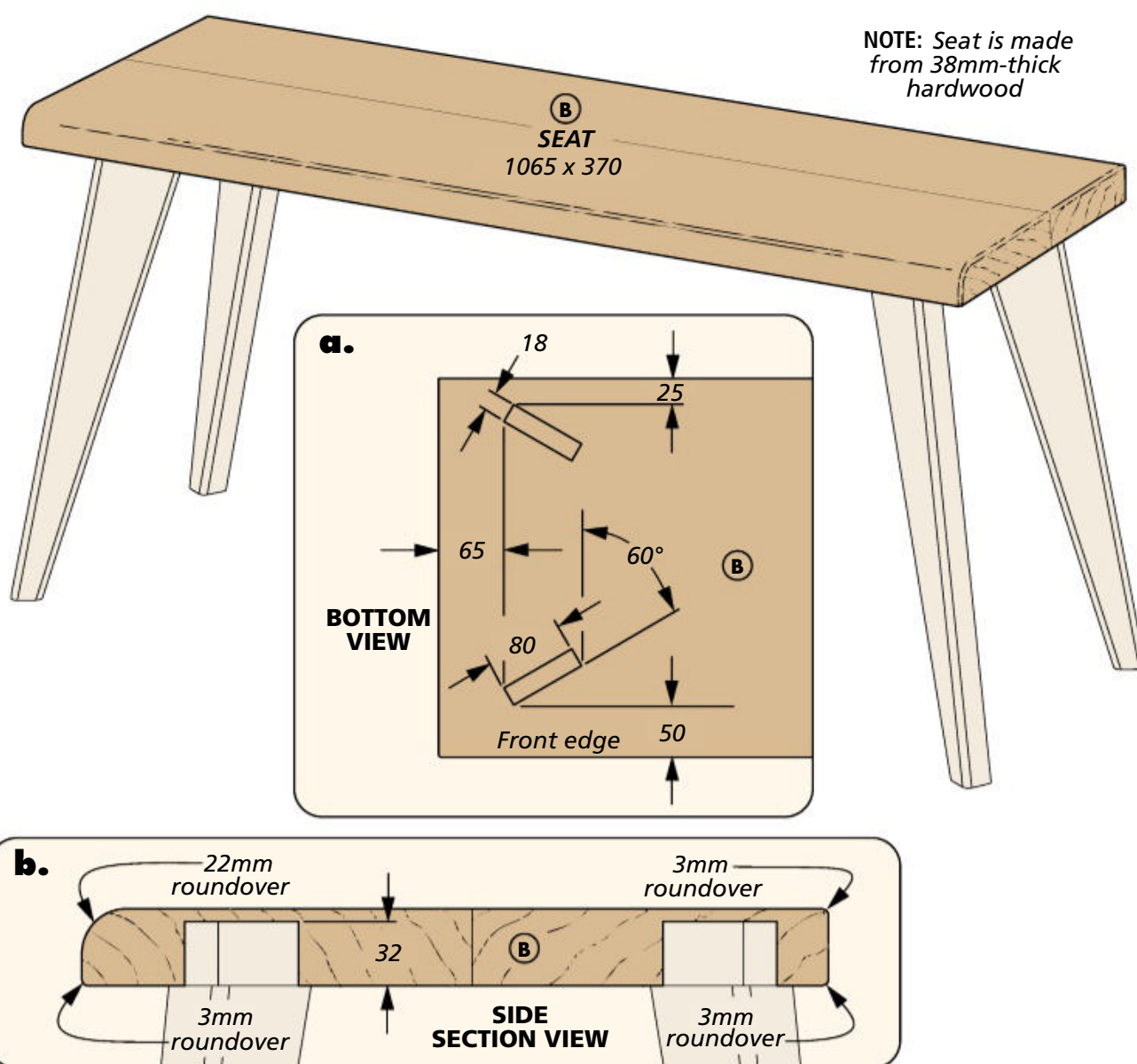
THE SEAT

The seat is the biggest, thickest, most visual part of the project, so when it comes to wood selection you want the best you can get. I'm talking about cosmetics and structure, it's important that both are on the mark for the seat.

Of course you want it to look good, so a straight grain pattern will help hide the glue joint. But you also want the material as flat as possible. A twisted seat means legs that wobble or rock. So unless you want to make some custom walnut shims to slide under the errant leg — make sure the seat is flat (or laminate 19mm sections of stock to form a stable 38mm-thick seat).

BEFORE MORTISES. After the seat is glued up and cut square, ease the edges (detail 'b'). Notice the big roundover on the front edge, there are several ways to tackle this. You could justify buying that big router bit since this is such a beautiful project. Or you could rout it with a smaller bit and finish shaping it with hand tools. Either way, when that's done, flip the seat and get after the mortises in the underside.

MORTISES. The mortises shown in detail 'a' above are positioned to help absorb the load evenly. To prevent the front legs from being a tripping hazard, they're set in from the edge.

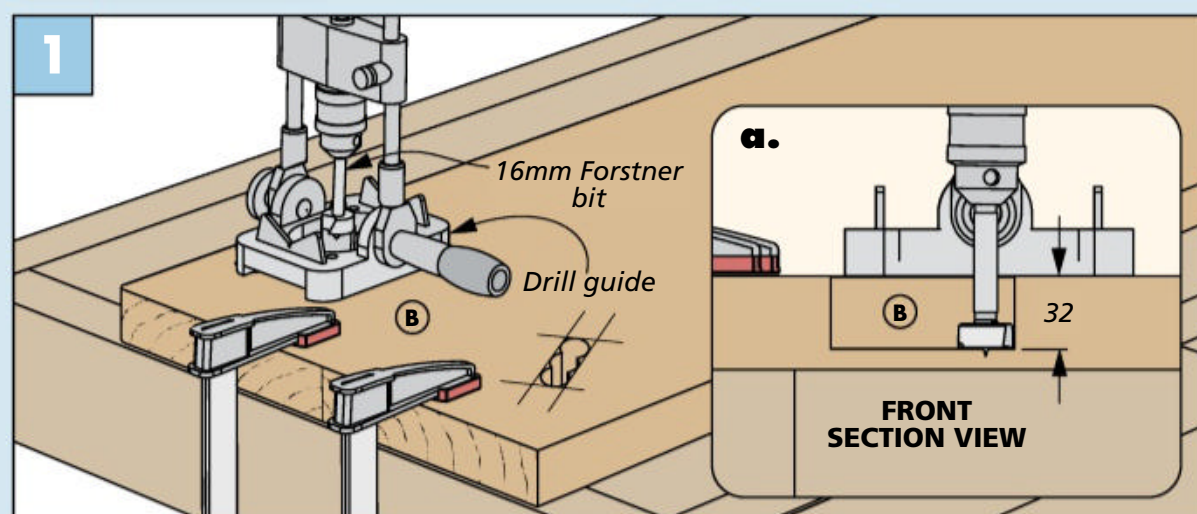


NOTE: Seat is made from 38mm-thick hardwood

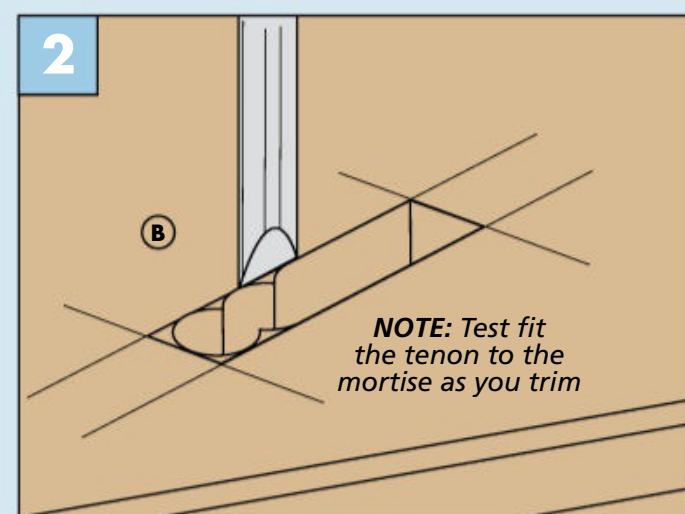
The angled legs do present one problem, there's no easy way to clamp up the legs to the seat, you want the fit of the mortise and tenon to be spot on. The box below addresses making the mortises (Figure 1). And tailoring them to the tenons (Figure 2).

GLUE UP. Like I said, there's no easy way to clamp the legs to the seat, so we resorted to epoxy. Epoxy creates an iron-clad bond that doesn't swell the wood while curing. While that's curing, you can start making the back that ties to the bench.

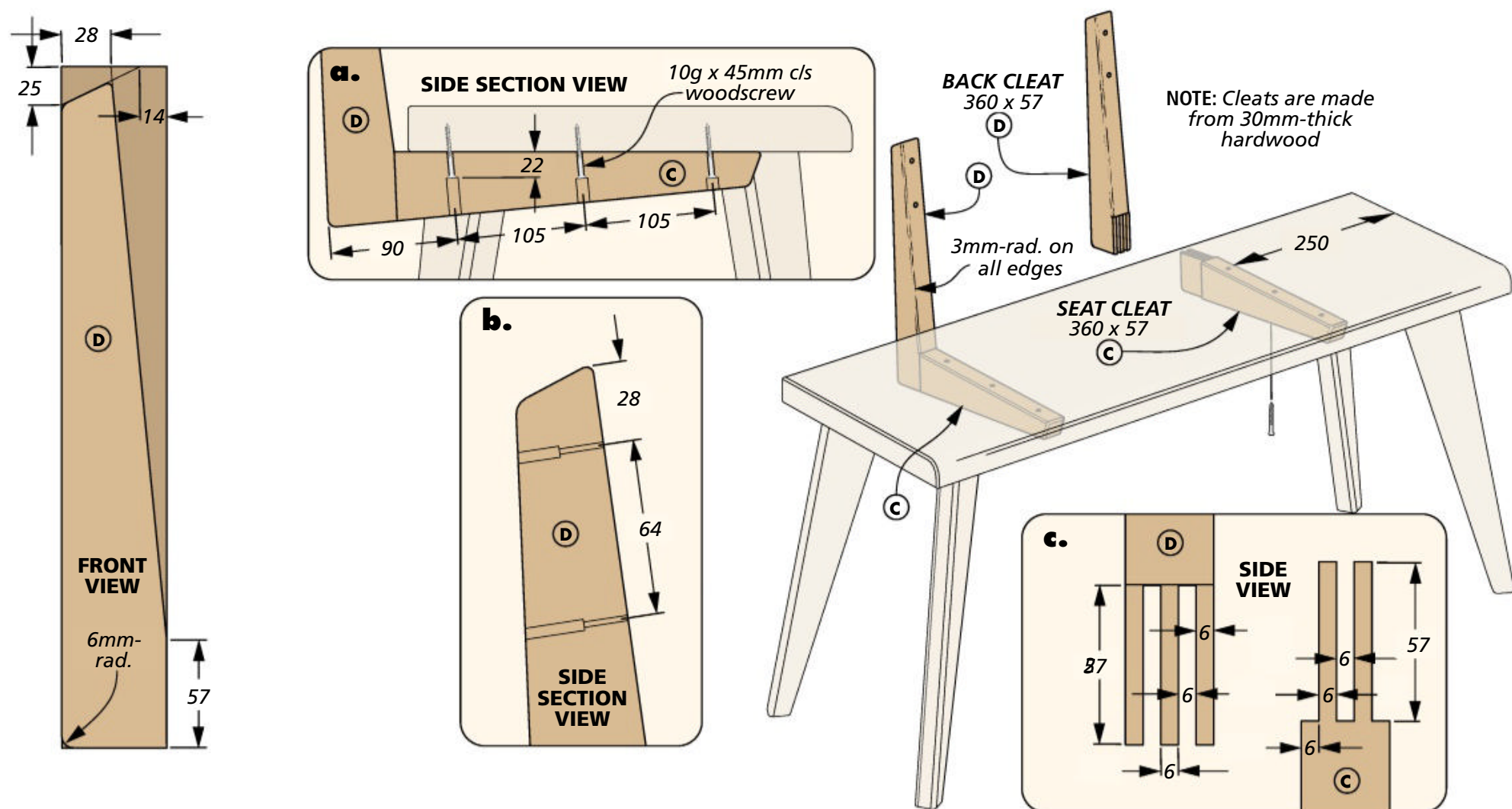
MORTISES



Big Mortises. The mortises for the legs are set at angles on the underside of the seat. After laying out their location, use a Forstner bit to remove most of the waste in each mortise. The drill guide helps you keep the mortises square to the surface.



Squaring Up. A sharp chisel and a little elbow grease will yield a mortise that mates well with its tenon.



Then it's the **BRACKET & BACK**

You're done with the lower portion of the bench so now you can concentrate on parts that you'll come to lean on: the brackets you see above, and the back that's on the next page.

The brackets are composed of two parts

— the seat cleats that attach to the underside of the seat (detail 'a'). And the back cleat that is screwed to the back (detail 'b'). The two cleats are joined together with the long finger joints that you see in detail 'c.'

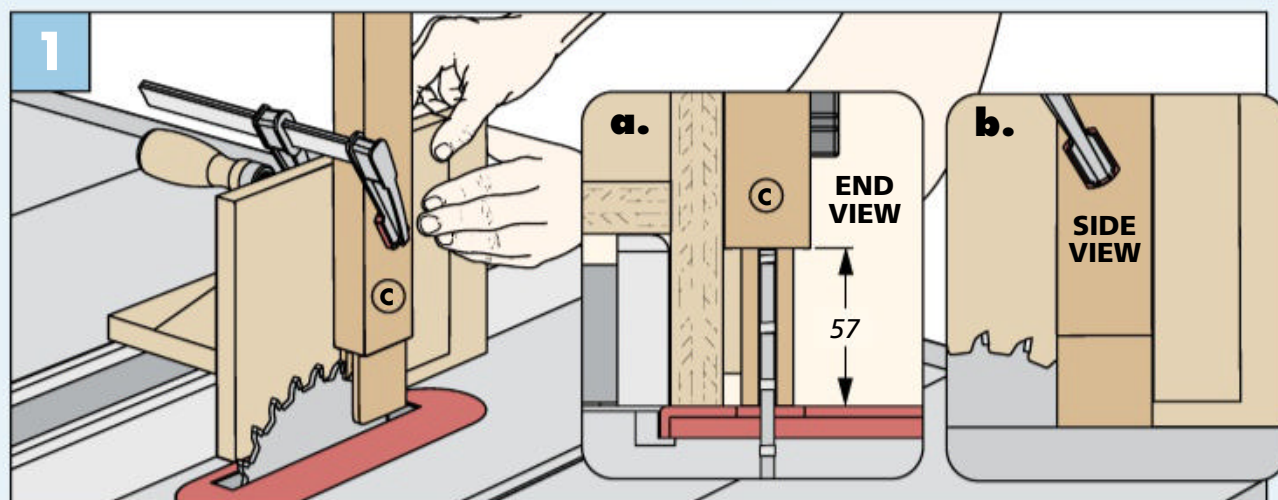
FINGER JOINTS. Finger joints take longer to make than, let's say, a simple lap joint. But in this case, when you want a really strong joint, it's sort of a no-brainer. The finger joints shown being created in the box

below yield four times the glue surface compared to a lap joint. So it's clearly worth the time you're going to invest.

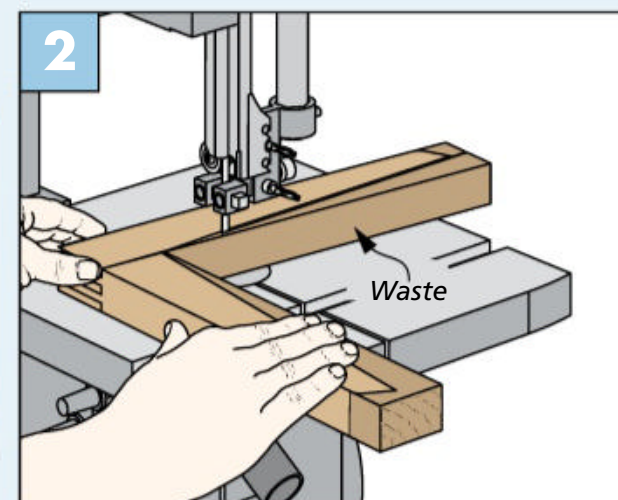
GLUE UP. When you're done at the table saw (Figure 1), move back to the bench and gather the supplies you need to glue the cleats together. You'll need a framing square and several clamps. Along with some warm water and rags for cleaning up, that's the only downside to all this glue surface. You're going to end up with



MAKING A STURDY BRACKET



Fingers First. The jig you see here rides on the fence of your table saw and holds the cleats while the finger is being cut. Cut the fingers in the seat cleats first, then trace their location onto the back cleats with a sharp pencil.



Profile Second. After the cleats are glued together, cut out the profile of the bracket at the bandsaw.

a fair amount of squeezeout that you want to wipe off immediately.

FINISHING THE BRACKETS. Now you can use the full-size template to trace the profile of the bracket on to the glued-up cleats. You'll find the template online at australianwoodsmith.com.au. With brackets in hand, head back to the bandsaw and cut out the profile (Figure 2).

After sanding the brackets smooth, attach them to the underside of the seat. To do that you first have to layout and drill the counterbore and shank holes that you see in details 'a' and 'b' on the previous page.

Then, with the seat upside down on the bench, position the brackets and drill the pilot holes. For ease of installation, I always apply a little beeswax to the ends of the screws. Now you're ready to tackle the last part of the bench, the back.

THE BACK

The back that you see in the main drawing on this page is nothing exotic. You'll notice that it's the thinnest piece on this project, but still plenty strong. This is all in the effort to keep the look of the bench as light and simple as possible and still be strong.

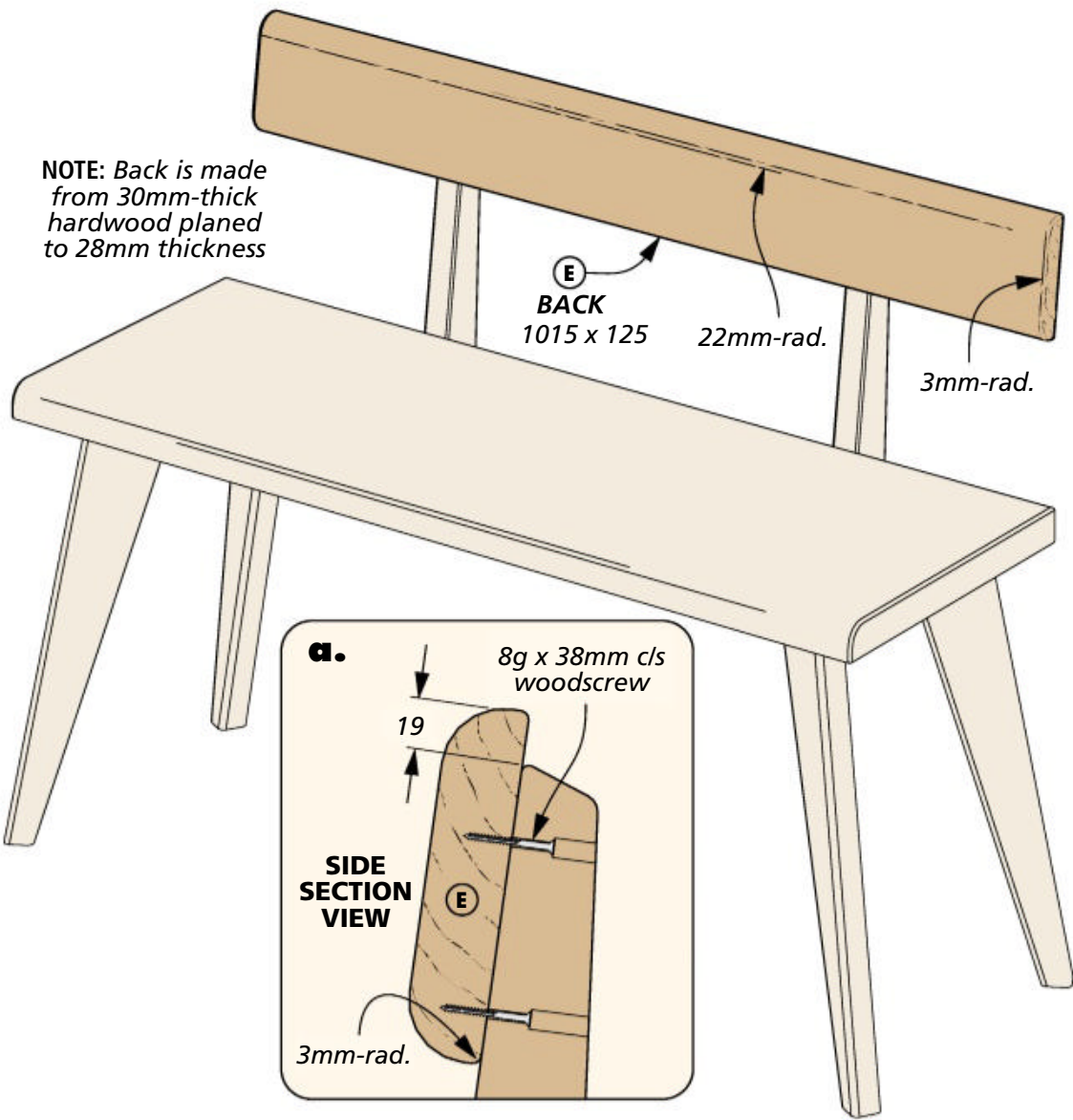
But as you see in the cutting diagram below, the back comes out of slightly thicker stock. It's just a matter of spending some time at the planer to make the

thinner profile. When the shavings are cleaned up, you need to dress the edges of the back. The top and bottom edge gets the same treatment as the front edge of the seat (detail 'a').

ATTACH THE BACK. A temporary cleat clamped to the brackets supports the

back while drilling the pilot holes. Once the back is screwed in place, all that's left is to apply the finish.

Oil and a couple of coats of lacquer protect the bench. With that, the bench is ready to take up residence in the hall, or whatever place your heart desires. [W](#)



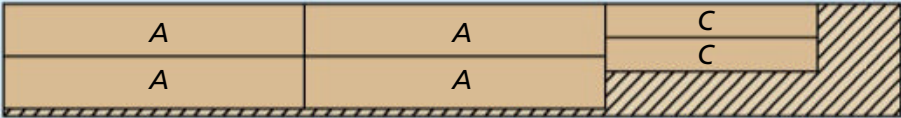
Materials, Supplies & Cutting Diagram

A Legs (4)	510 x 90 x 30	D Back Cleats (2)	360 x 57 x 30	• (6) 10g x 45mm c/s Woodscrews • (4) 8g x 38mm c/s Woodscrews
B Seat (1)	1065 x 370 x 38	E Back (1)	1015 x 125 x 28	
C Seat Cleats (2)	360 x 57 x 30			

2400 x 190 x 38mm Walnut or Blackwood



1500 x 190 x 30mm Walnut or Blackwood



1500 x 140 x 30mm Walnut or Blackwood





Backgammon Board

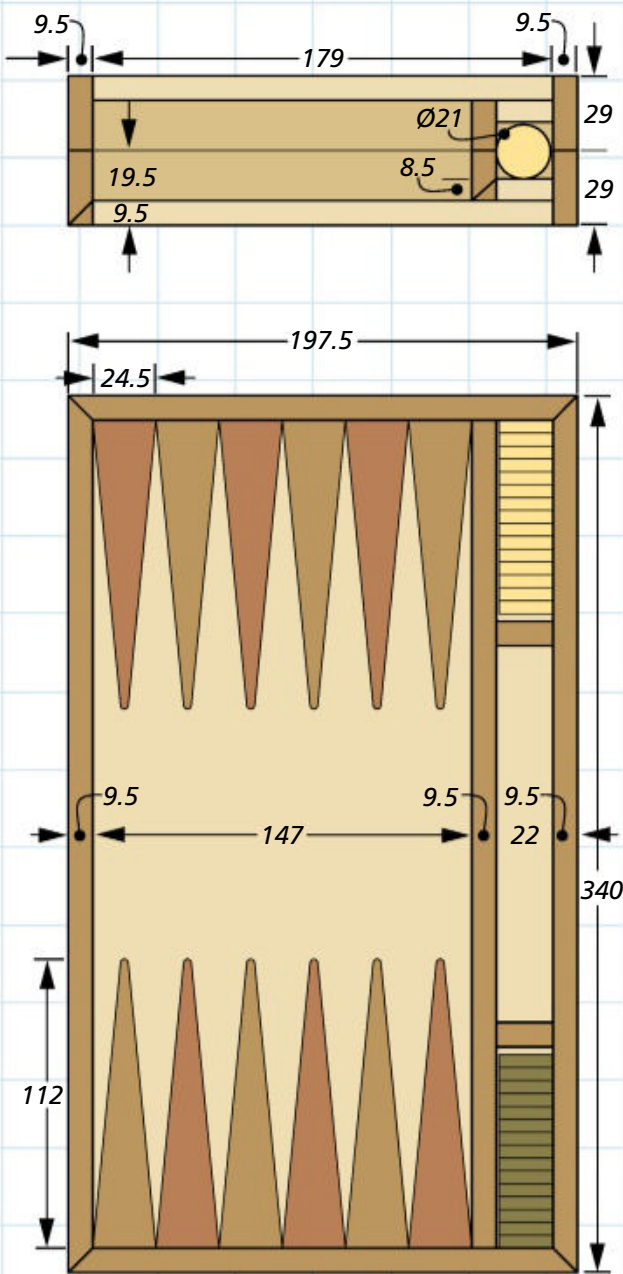
Anthony Bailey takes on the challenge of making his own game board.

The game of backgammon is one of the oldest board games and requires luck and skill to win. Each player has 15 checker pieces and there are two standard dice plus a special numbered dice thrown from a cup.

I thought making a backgammon

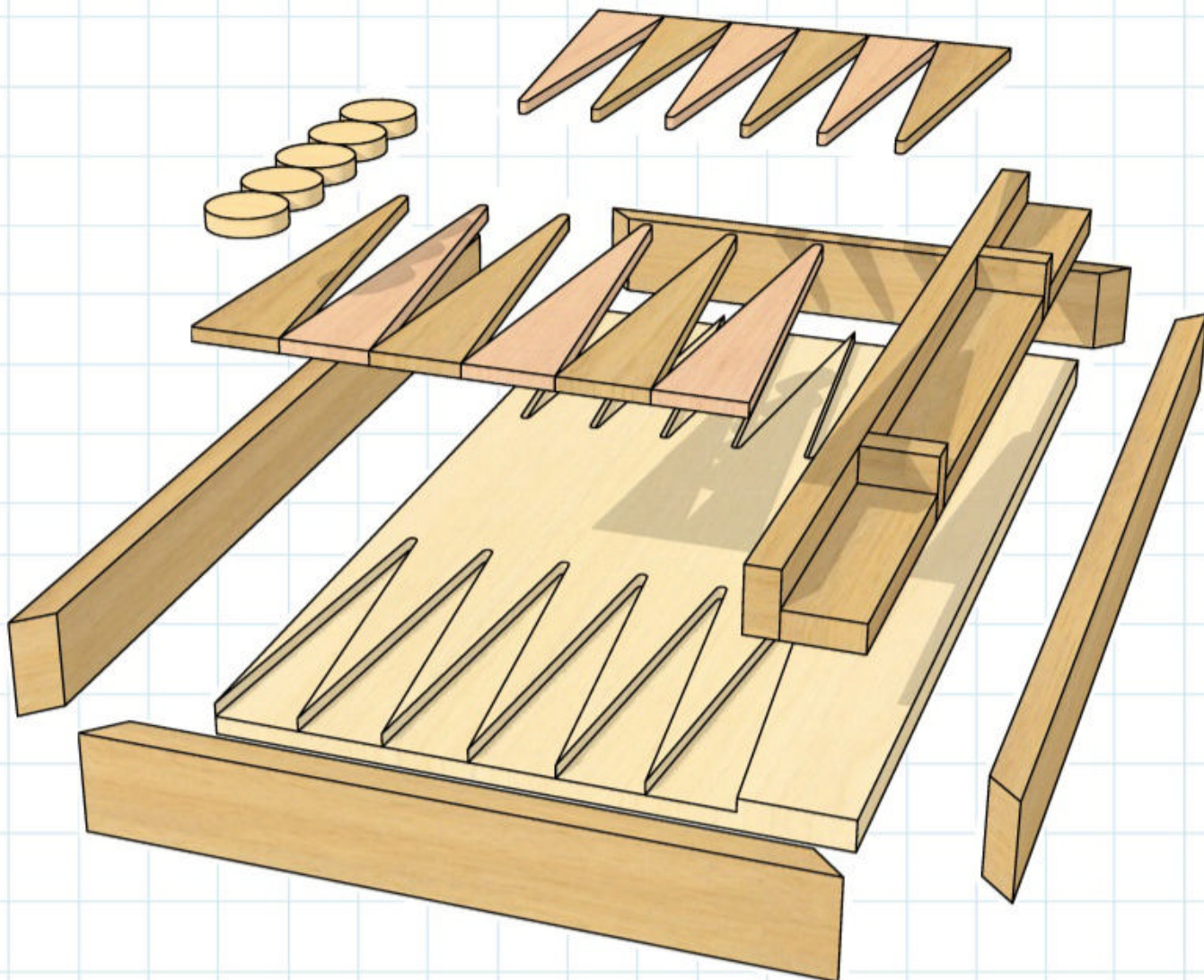
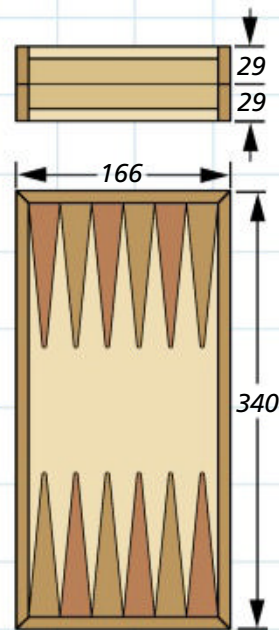
board would be a challenging and interesting project. The case hinges and catches can be bought online, as can the dice that are required to play the game. You can also find a lot of information about game play and strategies for backgammon on the web.

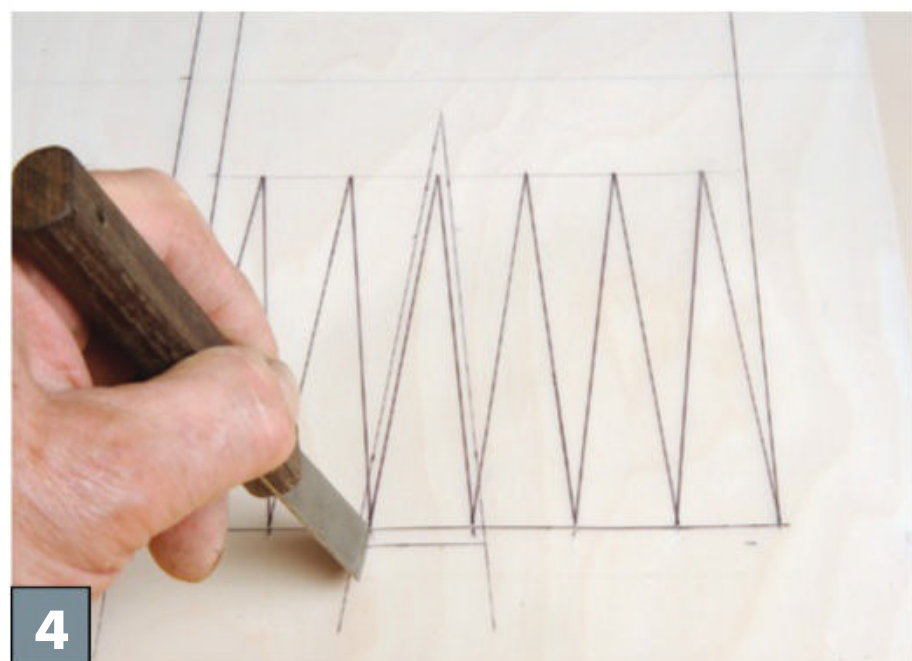
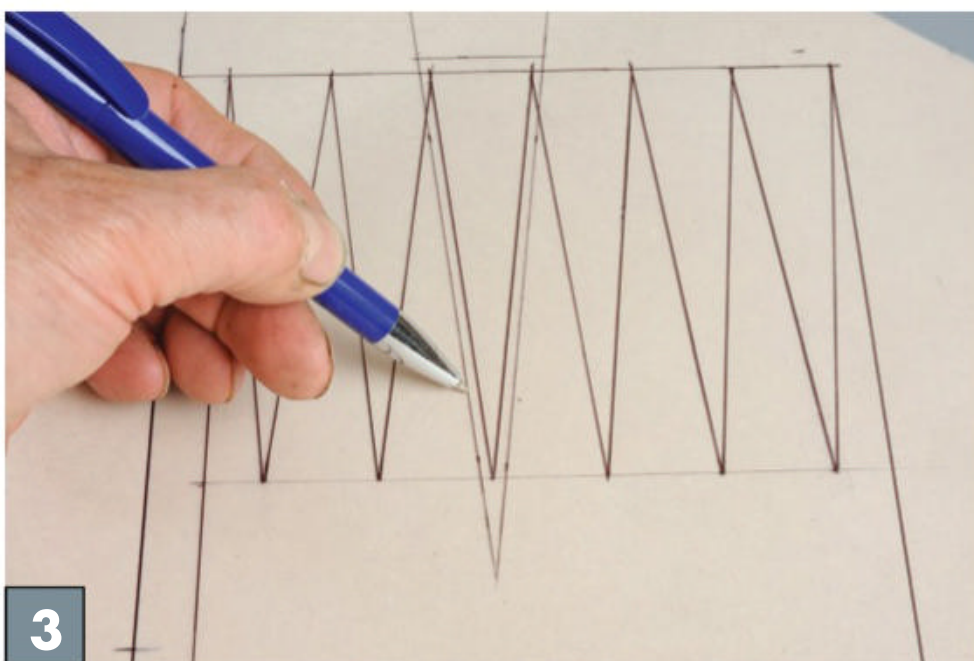
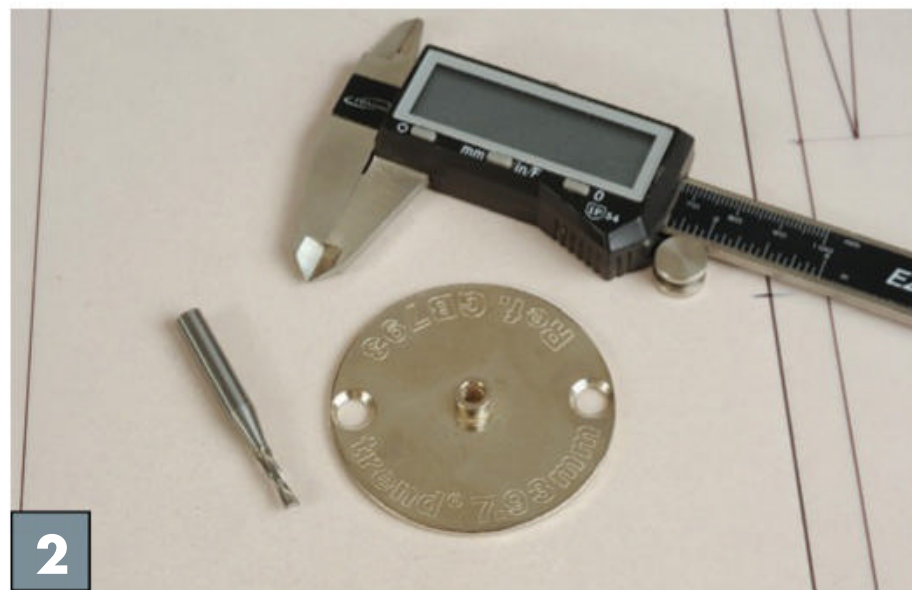
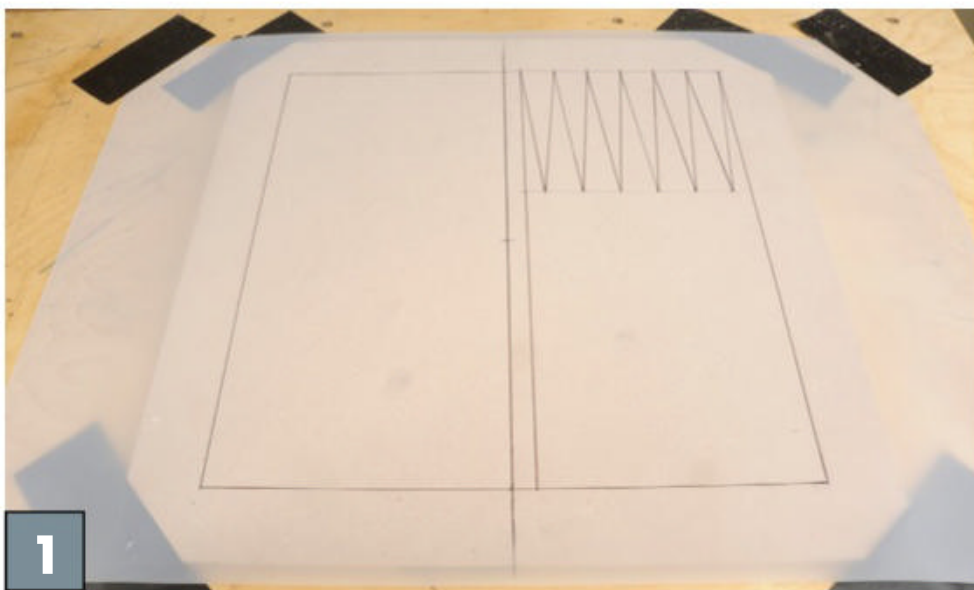
Plan & Section
Scale 1 to 4



Plan & Section
Scale 1 to 4

Without storage
All thicknesses standard





Making the boards

1 Start by copying the dimensioned drawing onto matte drafting film and tape it down, centred on a birch ply baseboard blank 400mm square. You only need one quarter of the pattern drawn out.

2 I used the Trend inlay kit because the spiral cutter is just 3.2mm diameter and comes with an equally small 7.93mm guide bush. The triangle shapes were too slender to use the kit as Trend intended, so instead of machining both the recesses and infill pieces to fit, these would have to be shaped by hand.

3 The guide bush allowance is approximate due to the diameters of the cutter and guide bush. Drawing it out on the drafting film with an 'overrun' at the outer edge allows you to design the template required.

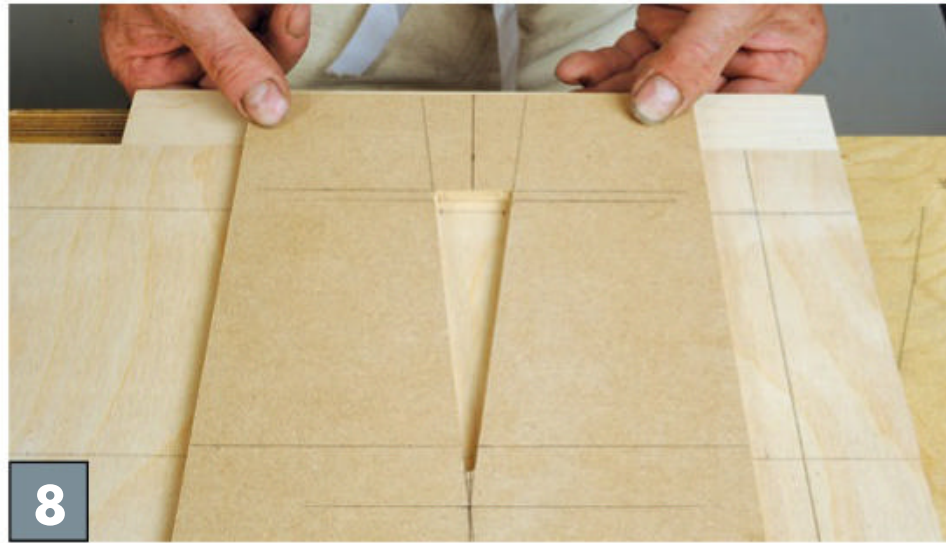
4 A sharp knife is used to 'prick' out all the key positions on the birch ply baseboard. This allows accurate positioning of the routing template. To do all four ends, turn the drawing around 180° and mark, flip it over and mark again, then turn it around 180°. Align it each time using the corner 'prick marks'.

5 Draw the triangle shape, including the guide bush allowance, on 6mm MDF. The fence is a piece of waste ply stuck down with double-sided tape. It is positioned by lining up the static cutter against the pencil line at both ends, then positioning the fence against the router base and pressing down firmly to fix it.

6 To machine the overrun end of the triangle, the fence batten is similarly placed. As the router could cut into the template, although it is not critical, I used a carefully positioned finger to pull the router base firmly against the fence.



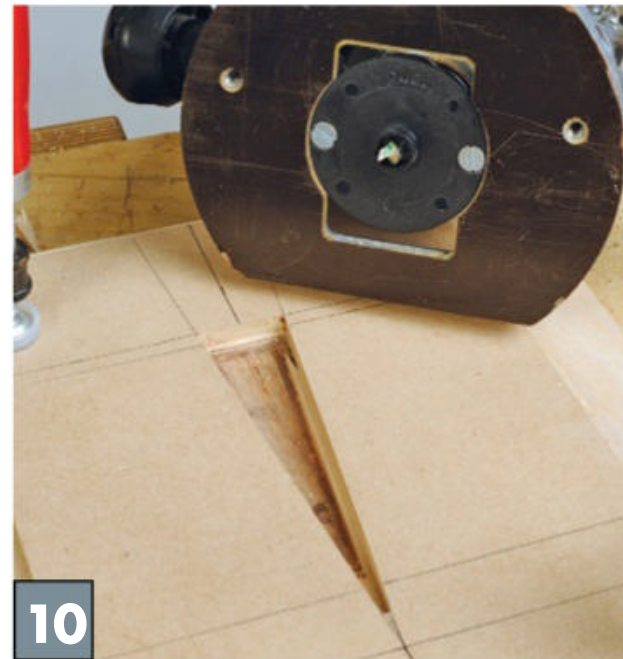
7 Having 'pricked out' the key board positions, the shape of each half of the board plus the centre waste allowance is carefully marked out with a fine-edged pencil.



8 The template is placed over the first triangle position – note the two small knife marks being used to set it accurately. A template fence of ply is stuck in position with double-sided tape once the template is aligned both for perpendicularity and projecting over the board correctly, then screwed onto the template ready for creating all the recesses.



9 The first recess is machined in outline; some ply will need to be removed at the narrow tip as well. The cut depth is fractionally less than the inlay thickness to allow for flush sanding later.



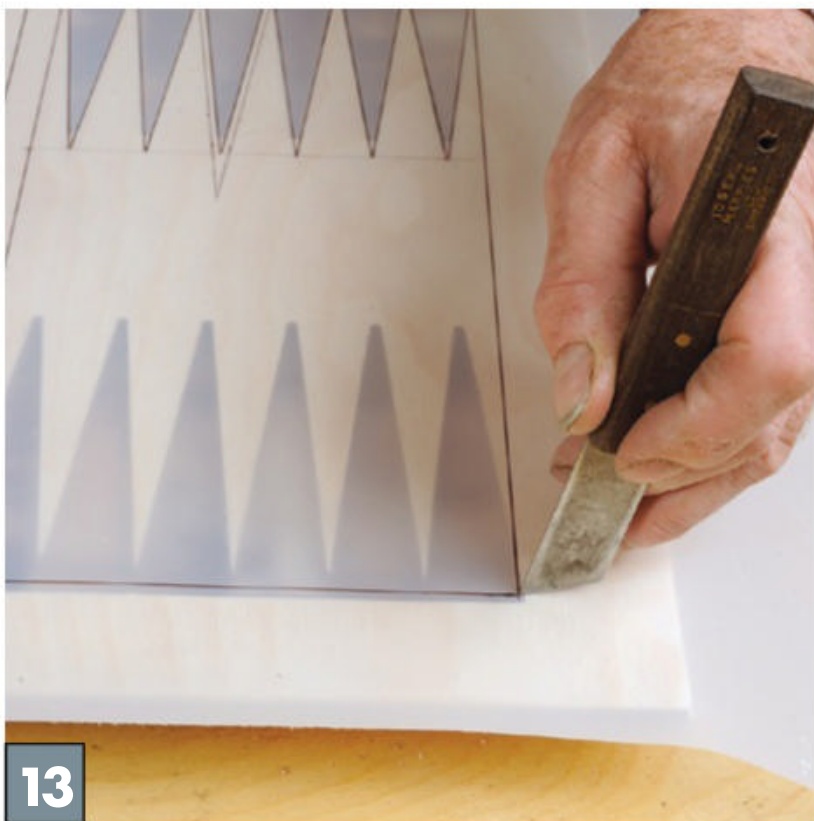
10 The bulk of the recess is taken out using a larger-diameter straight cutter and guide bush set at or fractionally above the depth of the outline cutter. Note that the guide bush offset should not bring the cutter closer to the template edge than the outline cutter, or the recess shape will get damaged.



11 Machining the last recess, note that two clamps are used each time, thus avoiding the template moving under machining stress. The slight height variations in each recess are not important at this stage.

12 The whole surface is sanded evenly. Work from side to side to avoid catching on the pointed shapes. Once the surface is clean and smooth it should be sprayed with clear lacquer to keep it clean and light in colour during subsequent operations.





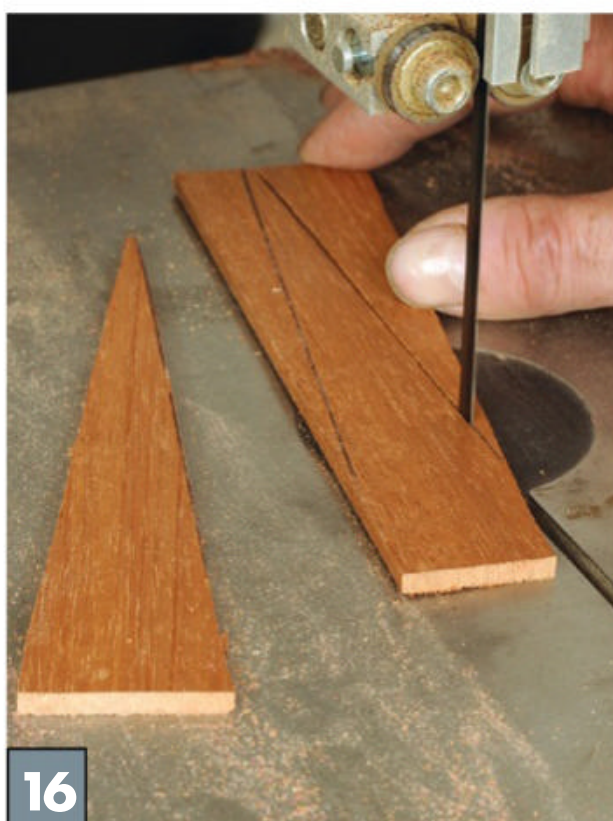
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13 Reattach the drawing and mark the corners ready for cutting the boards apart. This must be done accurately; a tablesaw is best, but alternatively it could be cut and planed by hand.

14 Here are the machined boards ready for their infill pieces. The points do not reach the ends because they are slightly over-length to allow for final trimming.

15 The template can be used as a crude method of drawing out the infill pieces on your chosen hardwoods. A slender-tip ball or rollerball is needed to get into the edges. Twelve pieces of each of the two coloured woods will be required for this.

16 Cut them out roughly on the bandsaw, ensuring you have drawn the grain running parallel with the shape – not at an angle, as it may look odd and complicate trimming them due to grain angles.

17 The next operation is interesting; using a technique that I find useful for small sections, each triangle is pushed over an inverted sharp hand plane, which is resting in the vice but not clamped, to avoid damaging it. It works well and very quickly, but keep your fingers clear of the blade and, just like an electric planer, most of the blade must be covered. Here I am using two layers of gaffer tape for safety.



19



20

18 Each piece is offered up to its own slot in turn, taking care to keep the correct alternating colour order. Trim each one on the plane until they line up – the point will overhang the recess end, so you need to ‘sight’ the fit. A sharp chisel is used to trim and round the ends. Try fitting again and trim as necessary until a tight all-round fit is achieved.

19 Alternate infills of the same colour and species are dry-fitted. A few light hammer taps will help bed the infills into place and ensure they look neat. They are plenty over-length to allow for re-trimming if needed.

20 Now the first set of alternate infills is glued in place. Start by applying glue to all meeting edges, then slide the infill towards the point, making sure it is bedded down well on the board.

21 Once the glue has dried, invert the board and trim off the excess from the infills. Now repeat the whole infill sequence with the other wood, filling in the gaps in between. You need to have done the previous set first so that the overhanging infills don’t get jammed against each other.

22 Both boards are placed together against a batten placed shallow in the vice, acting as a stop. The boards are carefully and evenly belt-sanded level with 120 grit before using a random orbital sander and 240 grit to give a nice scratch-free finish. A clear lacquer is sprayed on to keep the surfaces clean.

23 A T5 technical jack plane and shooting knob, with a blade sharpened dead straight, is used to trim the board ends on the shooting board. Any correctly sharpened jack plane will do this job.



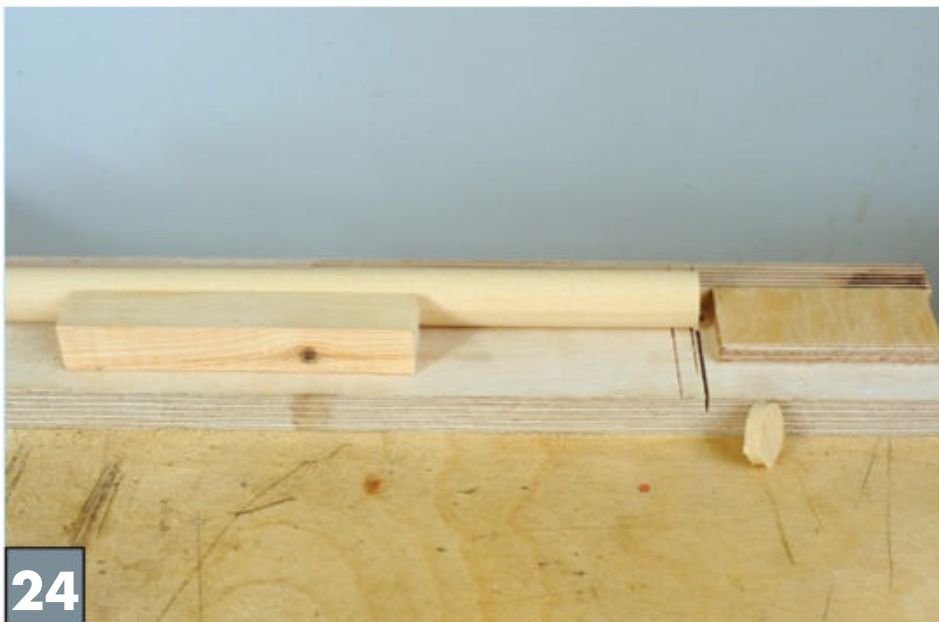
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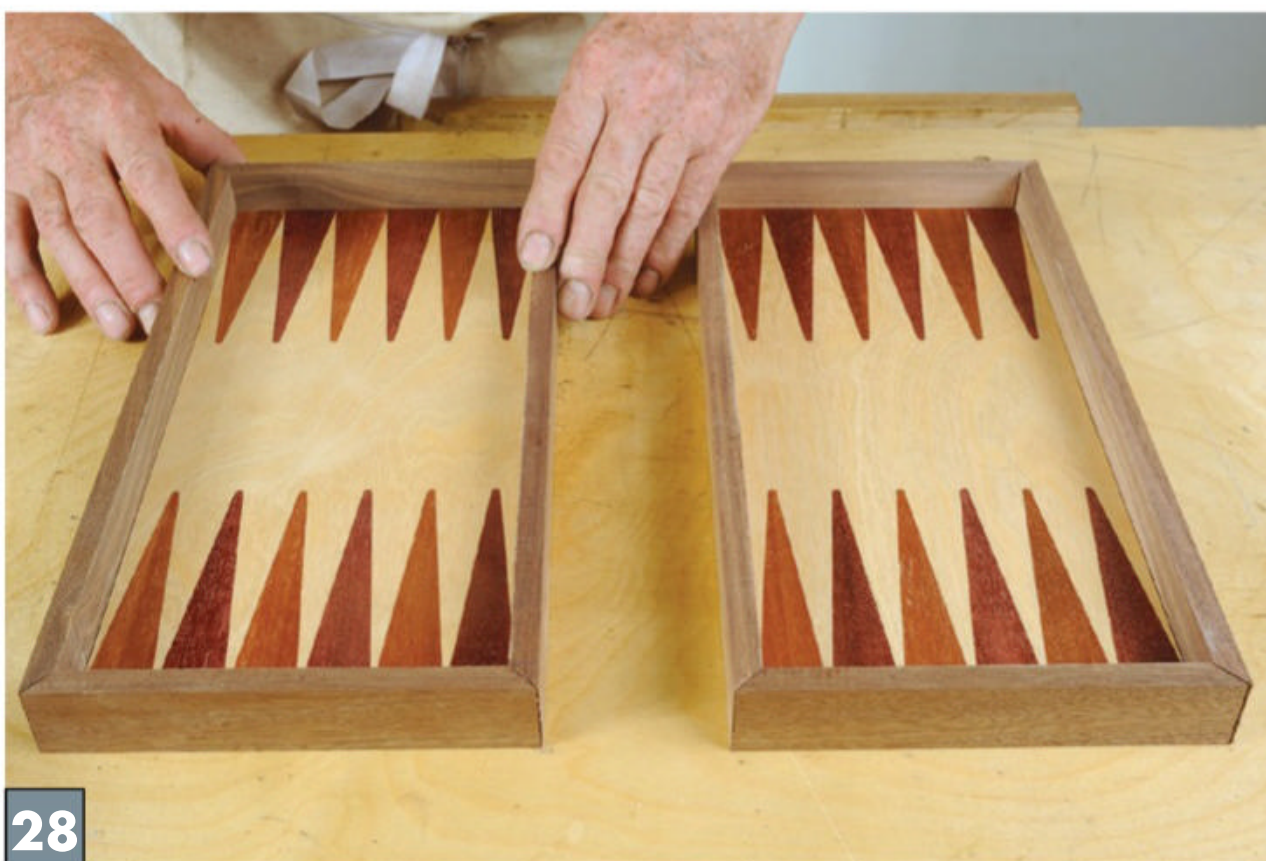
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The checkers

24 Before making the case, try making the checkers – the pieces that are moved on the board. These are made from 21mm-diameter hardwood dowel. Standard dowel may not be quite round, but some careful sanding will take care of this. A jig is required for cutting the checkers. I decided to use the brilliant little Z-Saw mitre saw set. It is very precise, quick and safe; on a powered machine this would not be so.

25 Two length stops are fitted to the jig: one determines the checker thickness, the other is for the Z-Saw mitre device to press against – between the two you can achieve repeatably accurate results. You need a minimum of 30 checkers, plus spares, but the production rate is actually quite fast using the fine-toothed pullsaw.

26 The counter faces are sanded on a sheet of medium and then fine abrasive. The edges will still need a final de-fluffing. Spray the natural-finish checkers with a clear lacquer to prevent them from getting dirty.

27 Now dye the other set black and leave them to dry, then re-dye them if necessary. Once they are fully dry, spray with more clear lacquer. All spraying operations must be done in a well-ventilated area, well away from naked flames.

The box lids

28 Normally, wide boards would be glued on and sawn down the

middle to separate them afterwards, creating two matching lids. However, I had some walnut that was nearly at the right size, so I made each board lid separately. The butt mitres were carefully measured and cut, again using the Z-Saw mitre kit for very accurate cuts.

29 Glue is run along the lower face where it will meet the board and on the mitre faces. When assembled, the surplus glue can be removed without it marring the board surfaces, as they have previously been sealed with lacquer.

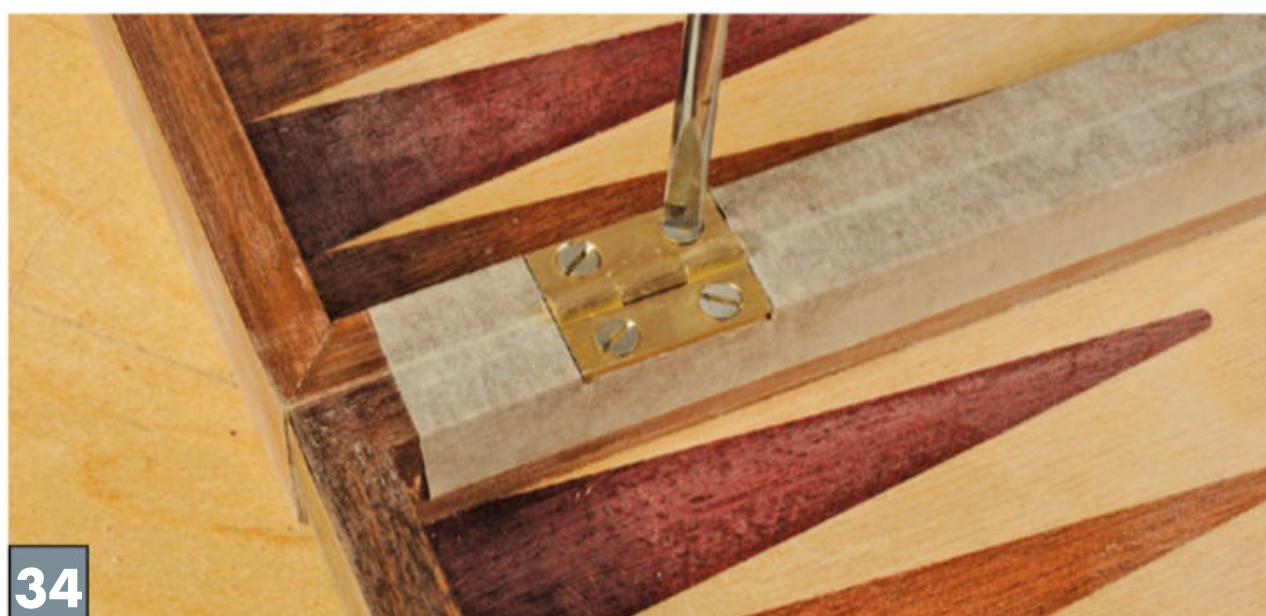
30 Masking tape was used to bind the corners closed, allowing the glue to exude. After that, a series of clamps were lightly applied to help close all possible gapping. The joints should then be tight enough to avoid needing any extra joint reinforcement.

31 Both outer faces are belt-sanded together for a longer – and therefore flatter – surface when sanding. The edges are belt-sanded together in the vice for completely flush surfaces. Gaffer tape is used to maintain alignment. After that, all arrises are lightly broken and all surfaces sprayed with clear lacquer to seal them, then re-coated once dry. All that remains is the fitting of box hinges and catches.

32 Masking tape holds the box halves together. The hinge positions were marked and an engineer's square and a marking knife used to complete the marking out.

33 A mortise cutter is set to just over the hinge leaf thickness and the recess is machined away. A sharp chisel is used to trim the ends and the hinge is checked for fit.

34 The hinge holes are drilled and screwed, then the hinges are carefully fitted without overstraining the brass. I always angle the screw heads so the slots form a pattern. The box stays closed thanks to 8mm diameter rare-earth magnets superglued into shallow holes. **W**



Fine Tool Cabinet

You can spoil yourself with this project. That's okay, you deserve a tool cabinet that houses the tools for the quiet tasks of your woodworking journey. And it's guilt-free — this beauty will last a lifetime and more.

Although this cabinet is being presented as a workshop project, it could've easily qualified for the heirloom category. It's not often that you see a Shaker piece like this getting such a facelift. That's right, at its core this is a Shaker-style cabinet. There's the tidy symmetry of the design, and solid no-nonsense joinery. The only hardware are the hinges and the screws for the drawer knobs. Looks and smells like Shaker to me.

But it's the black accents of the drawer knobs, drawer dividers and beads that trim the door panels that can throw you off the Shaker scent. Not to mention the added flair of book-matched ambrosia maple veneer on the doors and drawers.

Coming back down to earth you've got the perfect pairing of working with compliant cherry for the dovetails in the upper case and pine to give long life to the drawers. Did I mention the bridle joints on the doors? You've got work to do, my friend.

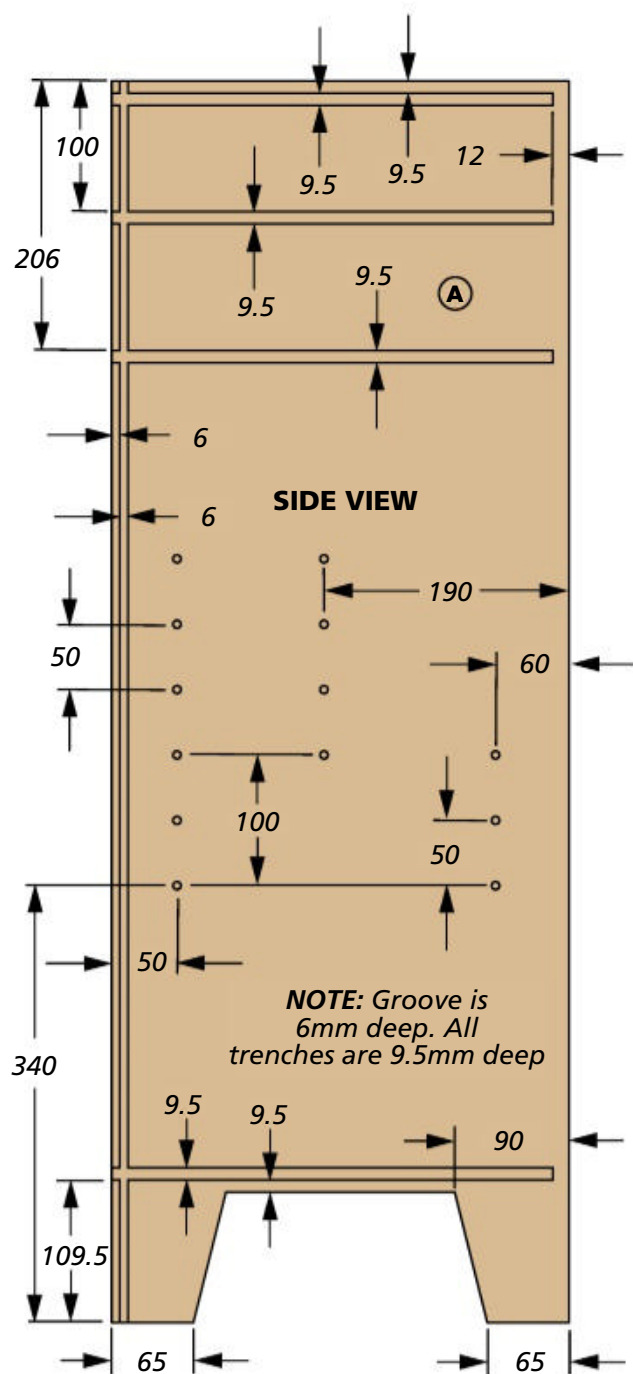


▲ The upper cabinet provides plenty of room for the larger woodworking tools that you have in your arsenal. The adjustable shelves give you maximum flexibility when arranging the space.

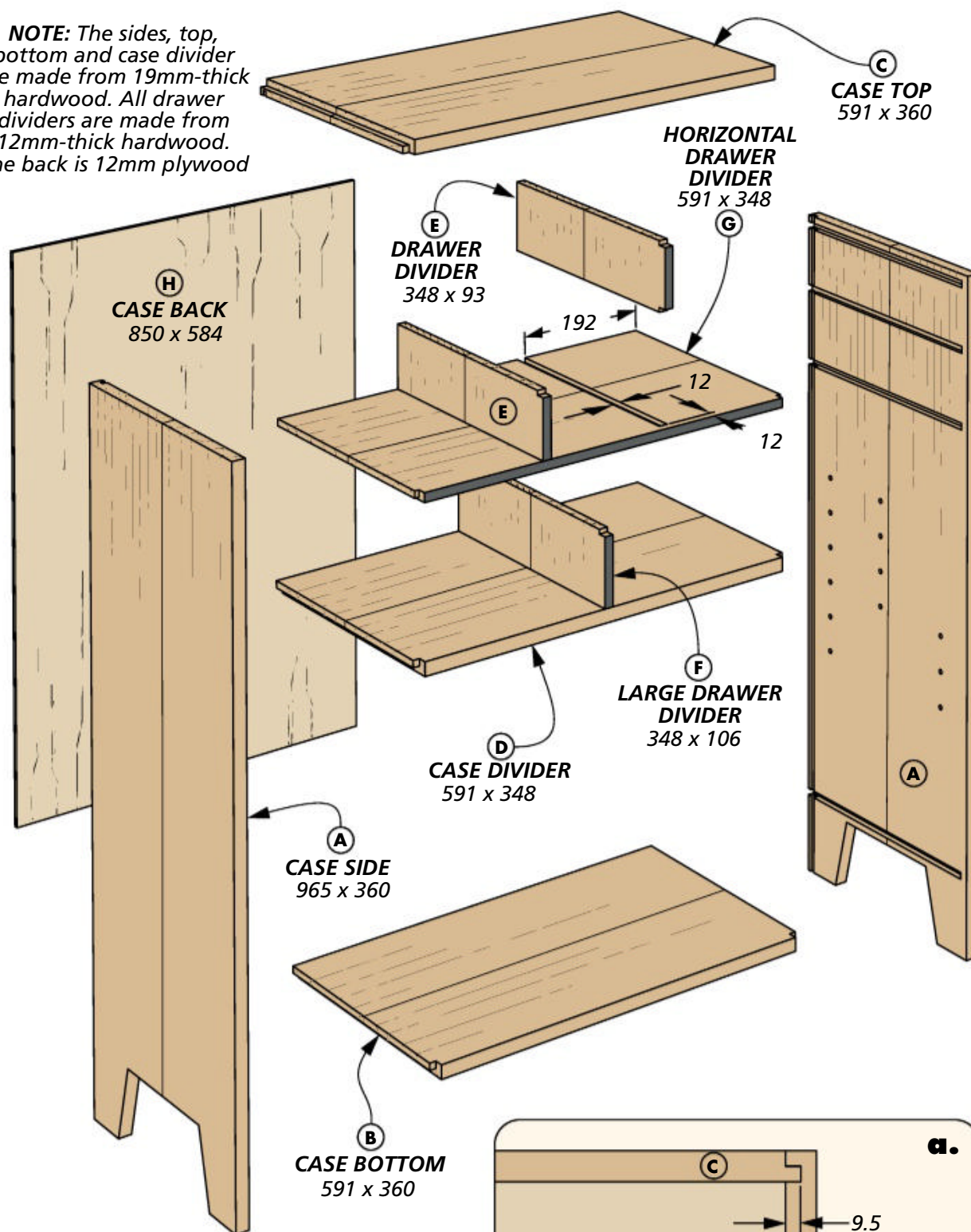


▲ Five drawers in the top of the lower cabinet are ideal for keeping order of all the hand tools and accessories that a respectable woodworker needs close at hand.





NOTE: The sides, top, bottom and case divider are made from 19mm-thick hardwood. All drawer dividers are made from 12mm-thick hardwood. The back is 12mm plywood

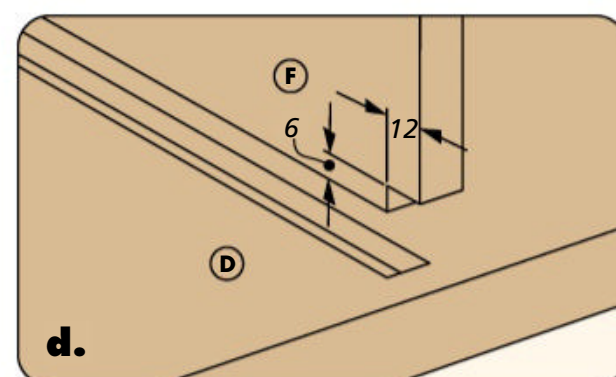
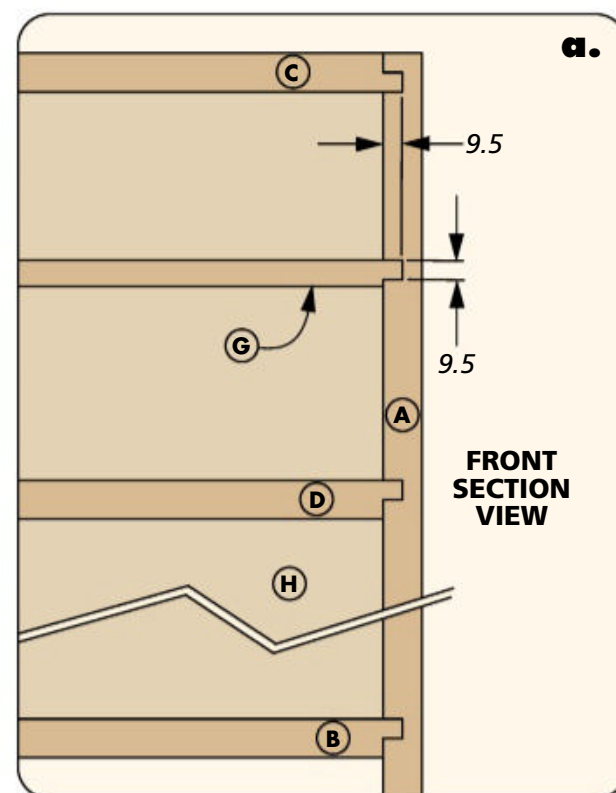
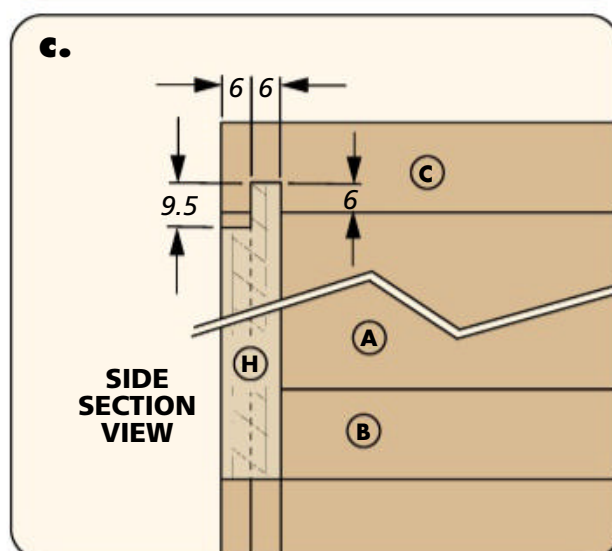
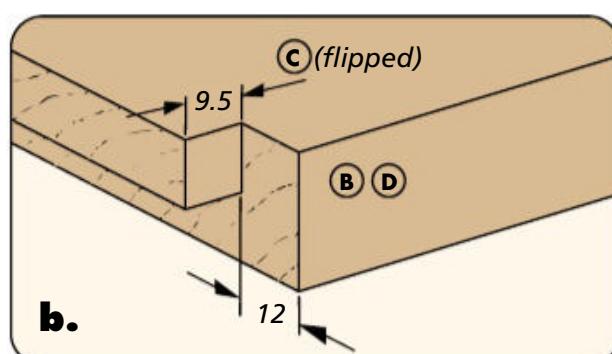


Kicking off with the LOWER CABINET

It would be easy to use plywood for the large panels in both of the cabinets on this project. But as I said in the beginning, this cabinet is going to be with me in the workshop for a long time. So all hardwood construction is in order, it's a splurge of time and material that I'm willing to make.

WOOD SELECTION. Out of the gate the first investment of your time is selecting and matching the best parts of the wood to the parts of the case that will show. Then you can glue up the material for the sides and dividers.

LEG PROFILE. Notice the profile at the bottom of the side panels. I roughed those with a jig saw. Then used a flush trim bit



PREPARING THE SIDES & DIVIDERS

and a straight edge to make the profile crisp (Figure 1).

Drilling the shelf pin holes are next up on the to-do list. The lower cabinet has two sizes of adjustable shelves that you'll make later. To guarantee perfect alignment during layout, I laid the panels face up and back to back. You can make a Masonite template to drill the holes.

GROOVES & TRENCHES. The stopped trenches for the top, bottom and dividers are made with a simple jig. The fence of the jig rides along the back edge of the side. Make the cut with a straight bit and a guide bushing (Figure 2). The long groove in the back is done at the router table.

PANELS & DIVIDERS

Next up are the horizontal dividers that bring the sides together. Also, you'll make the smaller drawer dividers. Notice that those drawer dividers (vertical and horizontal) are thinner than the other parts. Ultimately their front edges will be painted black to add some visual sass to the look of the cabinet.

TONGUES & TRENCHES. Start at the table saw making the offset tongues on the larger dividers. This is followed with some more stopped trenches for the drawer dividers. The process for making these trenches is the same as the ones in the sides. A notch in the front edge of the vertical drawer dividers is all that's needed to prep them for assembly. Speaking of assembly — that's what's up next.

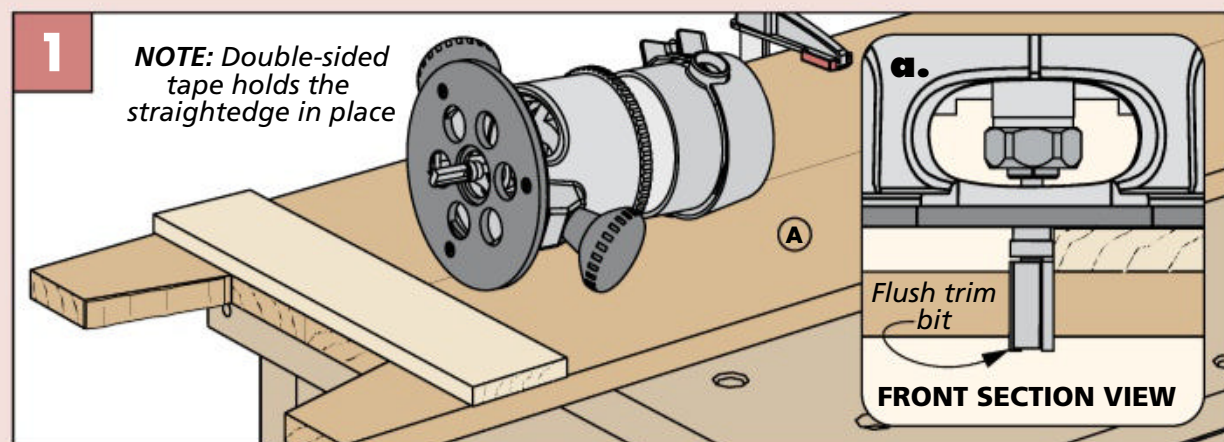
ASSEMBLE THE CABINET. Bringing together six large parts, three smaller dividers and a back can add up to what could be an anxious moment if you don't plan ahead. But that's not you, you're a savvy fellow.

You start with all your clamps pre-gapped and close at hand. A bucket of warm water and plenty of rags to address any glue mess that might arise. And using slow set glue is a good idea as well.

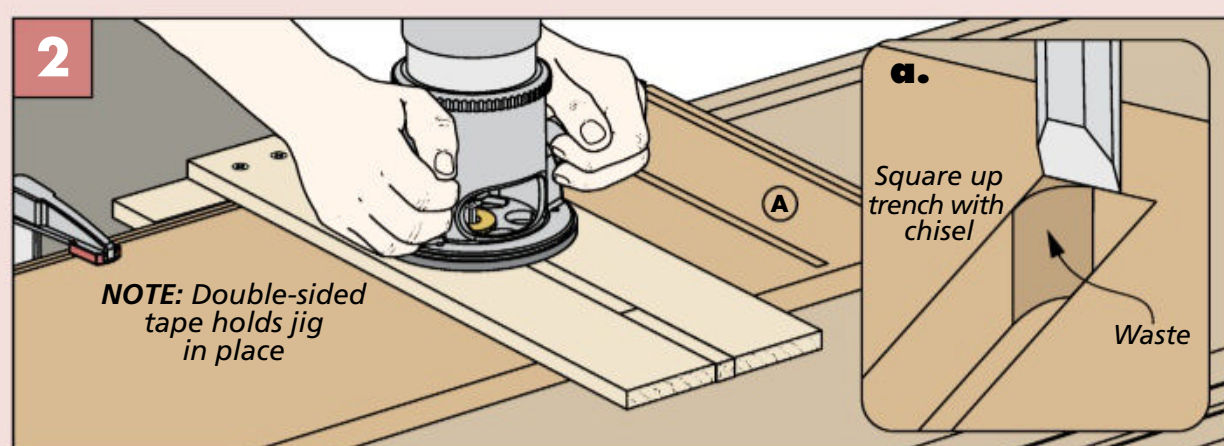
With one side of the case face up, glue and fit the horizontal dividers in their

respective trenches. Then you can apply glue to the trenches in the other side and drop it in place. To hold the assembly true, use several large plastic clamping squares in several of the corners.

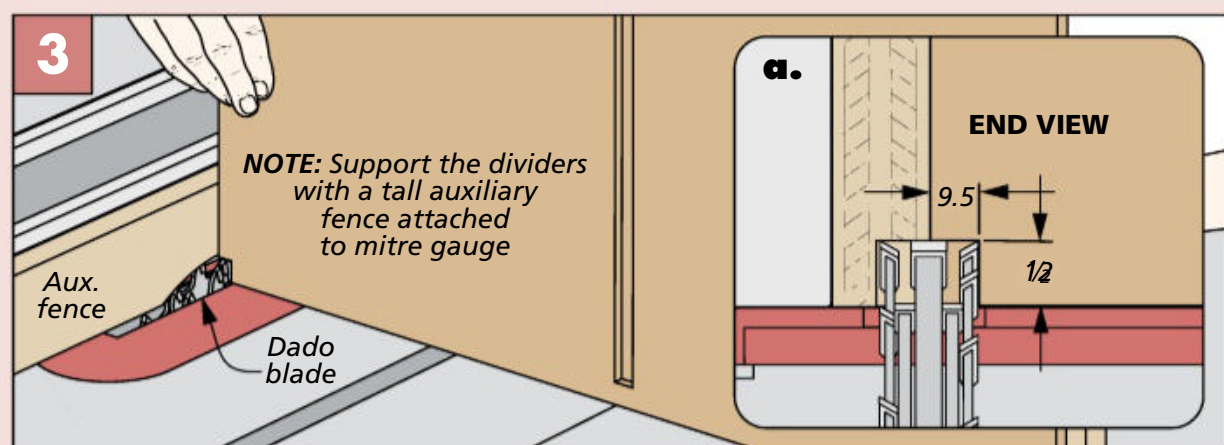
When the glue is dry and the clamps are out of the way, put the vertical drawer dividers in place from the back side and clean up any glue that happens to squeeze out. All that's left to do now is slide the plywood back into its groove



Refining the Legs. A jig saw gets the profile of the side's legs close, but not perfect. For a crisp contour I used a flush trim bit in my router and the straightedge you see here.



Stopped Trenches. Your router, with a straight bit and guide bushing is up to the task of making all the stopped trenches in the sides. Square the corners with a chisel.



Notches in the Panels. All of the horizontal panels are notched on the front corners. Use your mitre gauge with a tall auxiliary fence to support the panels while cutting.



For more on the stopped trench jig: visit our website at australianwoodsmith.com.au

and nail it to the top, bottom and horizontal dividers. Now it's on to making some drawers and a good sized door to complete the lower cabinet.

Next Up, Some **DRAWERS & A DOOR**

The five drawers you see below provide you with plenty of storage options in the lower cabinet. Each drawer is stowed in an opening that's created by the drawer dividers.

LOCKING REBATES. I like having the option of removing the drawer and taking it to the bench on occasion. This means you want a drawer that can stand up to some punishment — locking rebates are just the ticket in this instance. So, it's off to the table saw for this joinery.

Detail 'd' below shows that the first

order of business is to cut a centred groove in the drawer front. The depth of this groove matches the thickness of the drawer side.

Next you'll trim the drawer front along the back face to create the tongue. This tongue is half of the thickness of the side. That task finishes the locking rebate, now for the mating joinery that needs to be cut in the sides.

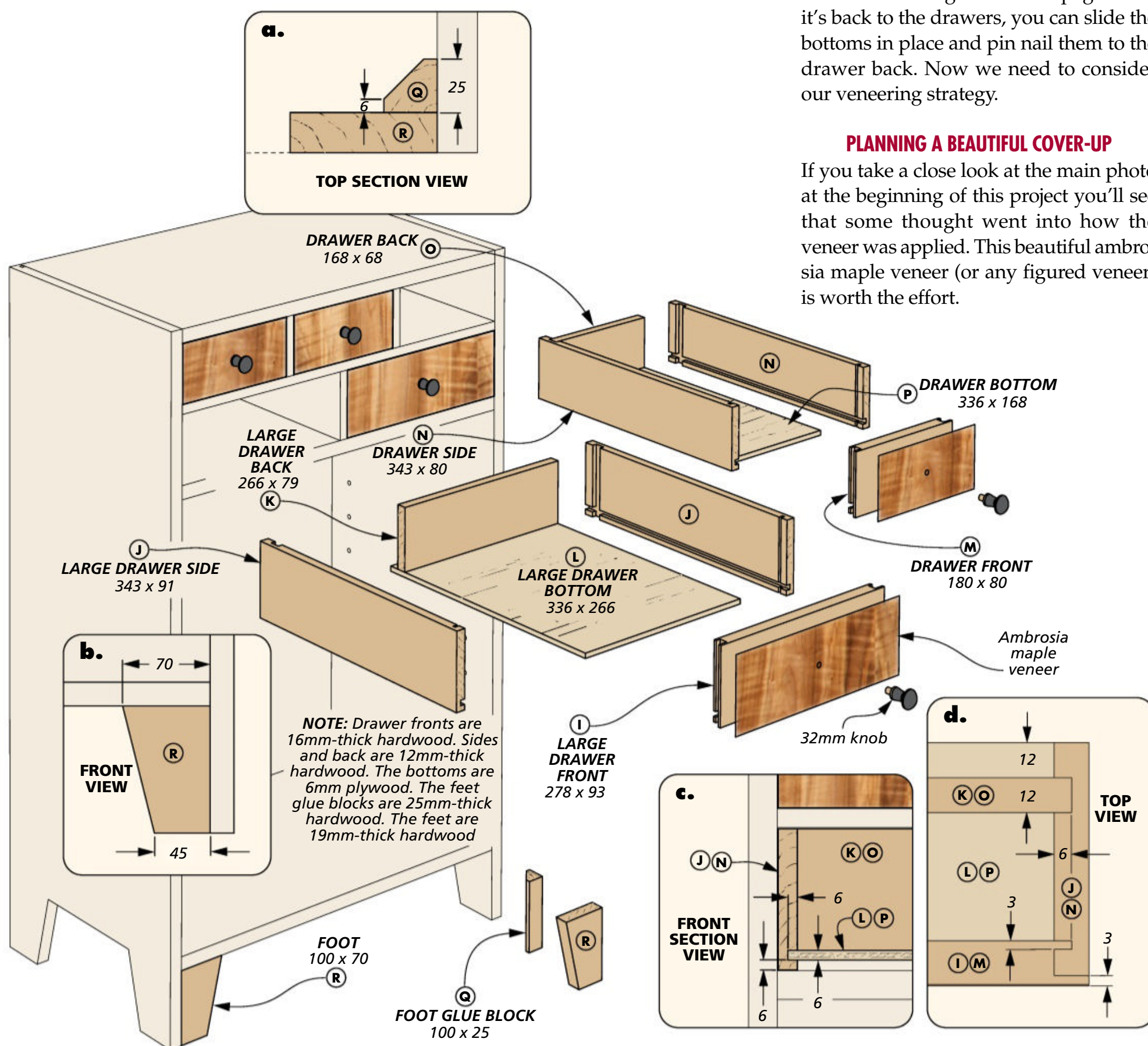
The drawer side gets a shallow trench to join with the front. The side also has a wider trench at the rear to hold the drawer

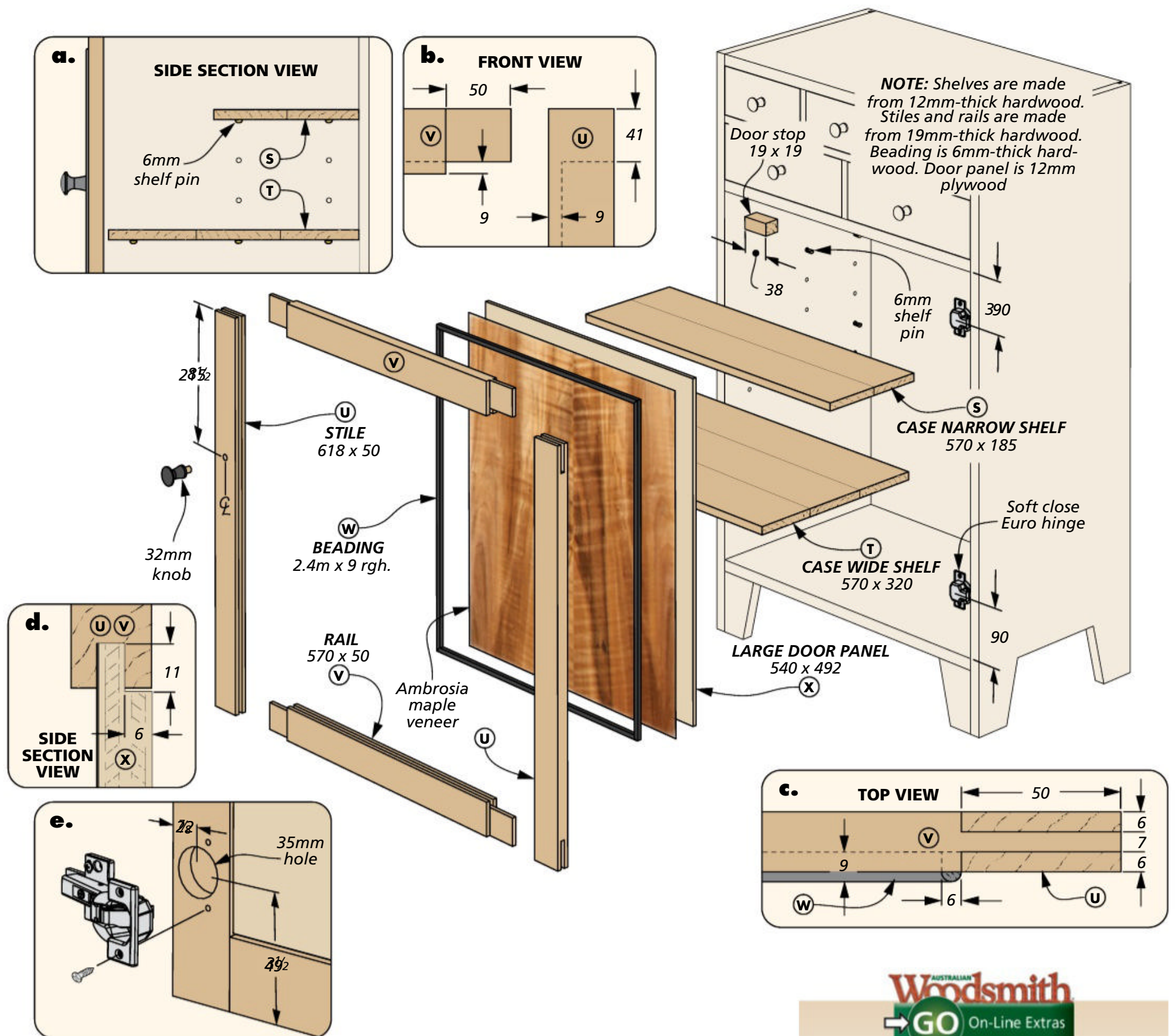
back. Both of these trenches are shown in detail 'd.' To finish the joinery phase of the drawer you need to cut a groove along the bottom edge of the drawer front and sides for the bottom (detail 'c').

Next up is assembling the drawers. Typically the joinery holds all the parts square, but I always double check just to be sure. While the glue is drying, there are a couple of things to do. Make and install the foot glue block and the foot that goes on the front of the lower cabinet (detail 'a'). Also make and fit the adjustable shelves in the main drawing on the next page. Then it's back to the drawers, you can slide the bottoms in place and pin nail them to the drawer back. Now we need to consider our veneering strategy.

PLANNING A BEAUTIFUL COVER-UP

If you take a close look at the main photo at the beginning of this project you'll see that some thought went into how the veneer was applied. This beautiful ambrosia maple veneer (or any figured veneer) is worth the effort.





From bottom to top you have three visual sections to navigate. The large bottom door called for a centred bookmatch. The drawer fronts are a visual transition so let the veneer speak to that with straight vertical grain and subtle patterns. The upper doors echo the bookmatch of the bottom door. This is an example of how you might approach the look of your veneer presentation.

As for how to apply the veneer I used a spray adhesive from 3M, Hi-Strength 90 Spray Adhesive, it's available at local hardware stores or online. You'll want to veneer the plywood panels for the doors before you build them, which is up next on the to-do list.

THE DOOR. The door you see above (and the ones for the upper cabinet) use a type of joinery that goes by a trio of names: open mortise and tenon, bridle joint or slip joint (details 'b' and 'c'). Regardless of the name, they're all made the same way. You'll find more on this technique on page 58.

To prepare for that joinery work you'll need to cut the groove on the inside edge of the stiles and rails for the plywood panel. And drill the holes for the hinges in the stiles.

SOME ASSEMBLY. As you see in the drawing above, before assembling the door you'll have to add the veneer and cut the rebates in the back, see detail 'd'. Now you can

glue up the door. While it's drying, there's some beading that needs to be made.

BLACK BEADING. The mitred beading that runs around the inside edge of the door frame (detail 'c') is made in several stages. First plane an extra-wide board to final thickness. Then rout both edges before cutting the strips free. Repeat this process until you have all the material needed for all the doors.

You can mitre and dry fit the beading, but for a crisp look, seal and then paint them before gluing them in place. Then install the hinges as shown in detail 'e'.



For instructions on making a bridle joint, visit our website at australianwoodsmith.com.au

Now, a Strong **UPPER CABINET**

The upper cabinet hovers around eye level so it's appropriate to show it off a little. Dovetail joinery answers that call nicely, with the added benefit of rock-solid strength. But before we start crafting dovetails, there are two other details to be addressed.

SHADOW BAND. In the main drawing, along with details 'b' and 'c,' you see that the cabinets are separated by a frame that's recessed on the front and sides. This recess casts a slight shadow between the two adding an accent that pairs well with the black drawer dividers that are the same thickness.

The shadow band is simply four boards. The front is mitred on both ends, the sides are mitred on the front and cut square on the back. The back board is square on the ends. You can glue the band together. Then set it aside for later.

Also, cut the plywood back to size and rebate the back edge (details 'a' and 'd'). Now you can turn your full attention to the case parts of the upper cabinet.

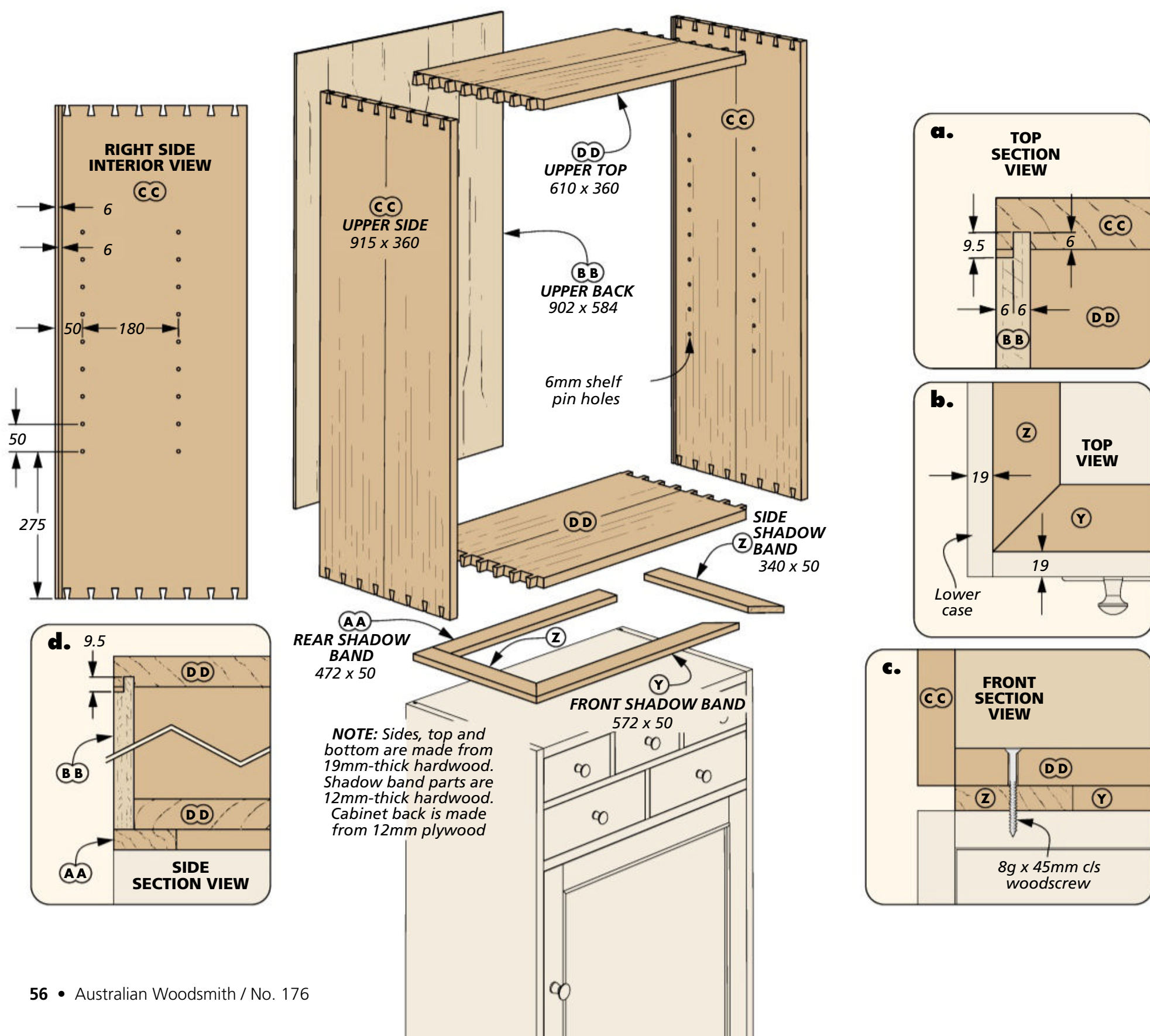
PREPARING FOR DOVETAILS

The actual cutting of dovetail joints, compared to the steps taken to make that task as effortless as possible, is the shorter of

the two duties. So let's get started with wood selection.

PICKY PICKY. I mentioned earlier that it's worth the time spent selecting the wood for this project. This is never more true than here. You want the sides, top and bottom to be flat, smooth and square. No twists, crooks, crowns or any other she-nanigans that will make you wish you'd stuck with photography as a hobby.

Now that you have these panels in proper shape, mark the outside face and the top edge of each board with a pencil. With that done, you can drill the shelf pin holes and cut the groove for the back in the



panels. You'll need to rip this groove off the bottom panel. But don't do that until the dovetails are done.

DOVETAILS

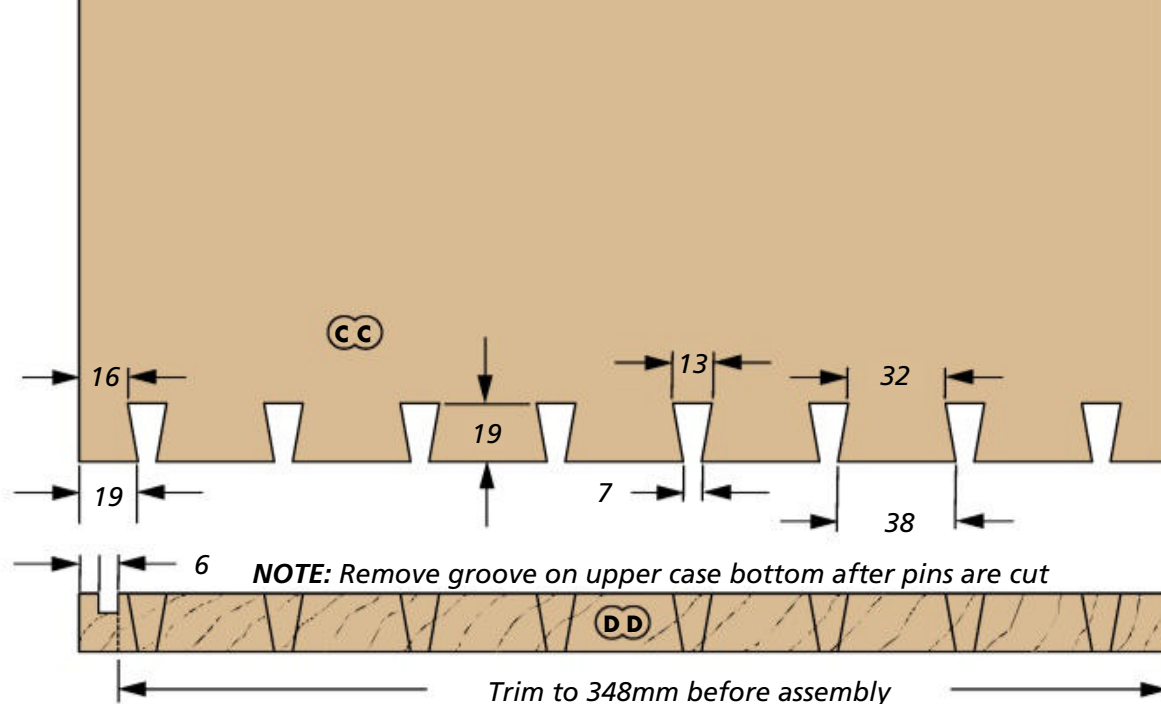
The drawing at right gives you the measurement for the tails that you need to cut on the sides. I drew this layout with a sharp pencil on one end of one of the sides. Figure 1 below shows how to transfer the layout to the other ends of the sides.

Figure 2 focuses on cutting the tails with a back saw. To end these cuts right at the baseline, keep the outside faces towards you. Detail 'a' shows how to clear out the waste evenly across the baseline. With all the tails cut and cleaned up, you can turn your attention to the pins.

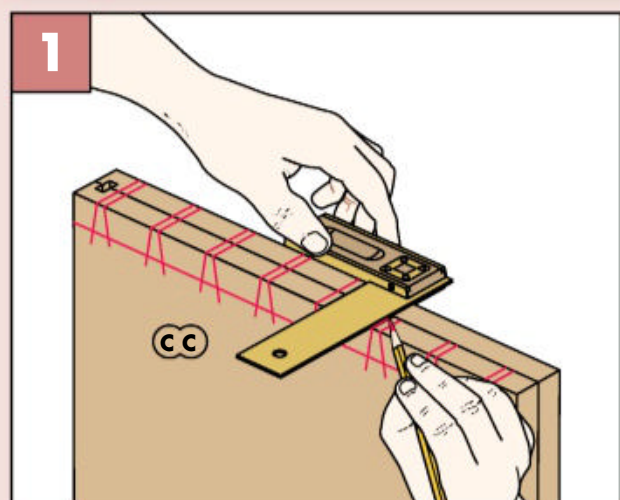
PINS. For perfectly mating pins use its mating tail as a template (Figure 3). Cutting the sides of the pins is the same routine as the tails. But there's a lot

more waste to remove, so I turned to the bandsaw for help. (Figure 4). To clean up and undercut the baseline, use a backing board like you did on the tails. Before gluing up the cabinet, cut the groove off the bottom at the inside wall of the groove.

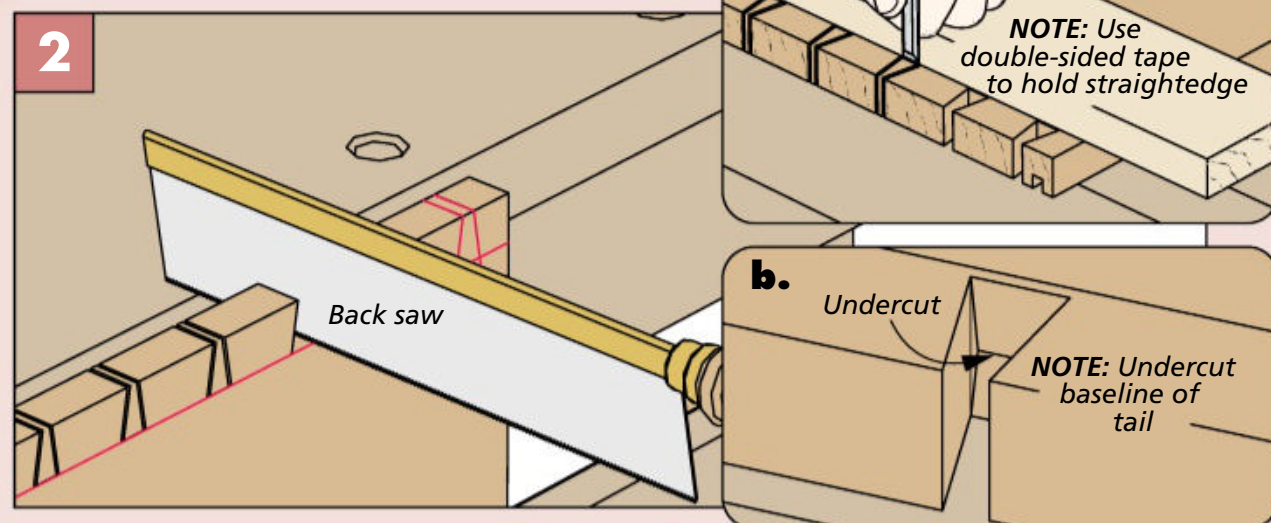
ASSEMBLY. Steve Johnson, one of our resident wizards in the workshop chose to use epoxy for the assembly of the upper case. It has a slower set time and no water to cause the joinery to swell. Clever fellow. Turn the page for the last few things to do on this project.



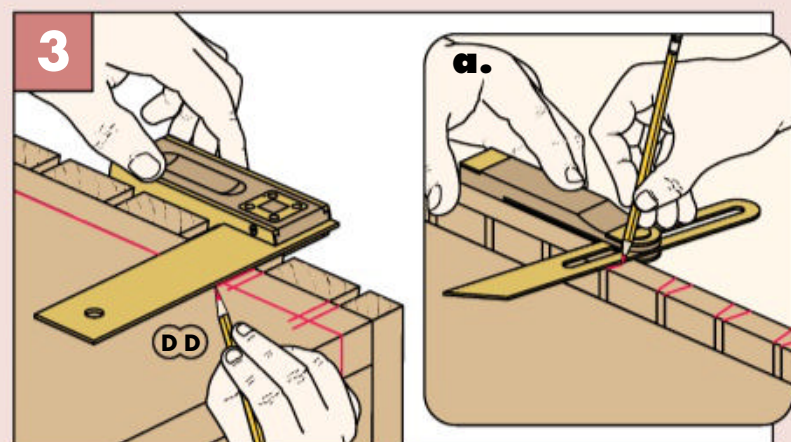
SUCCESSFUL DOVETAILS



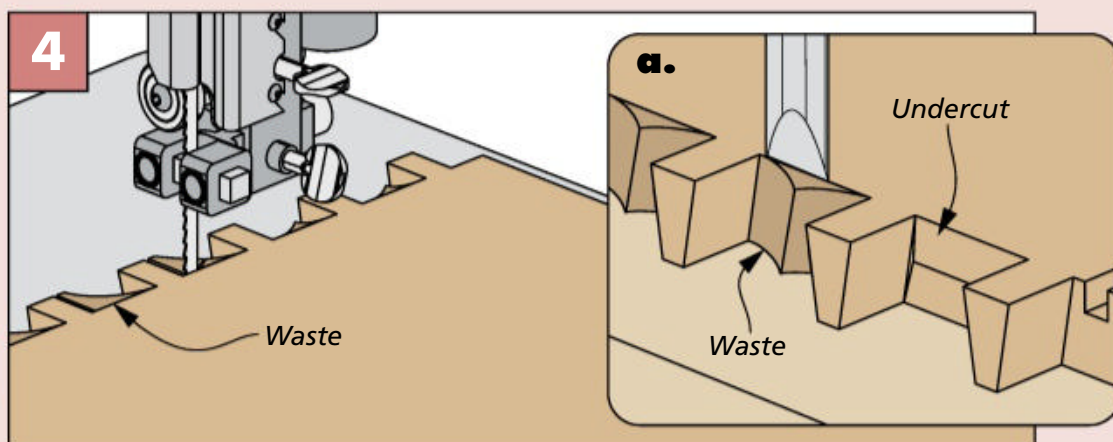
Error-Free Layout. Draw the tail layout on one board then use that as the master for the tops of the tails on the others.



Saw & Chop the Tails. Clamp the cabinet side in your vice at the bench and cut the sides of the tails. Clean up the tail with a chisel. For a crisp, square baseline, use a straightedge at the bottom of the tails.



Pins Meet Tails. For a perfect joint, use the tail to trace mating pins on the side's adjoining boards. A sharp pencil or marking knife works best.



Rough out the Waste. After defining the pins with a back saw, you can rough out the waste areas of the pins at the bandsaw. For a tight joint between the boards, undercut the shoulder of the joint (detail 'a').

WHAT IS AVAXHOME?

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Upper Cabinet **FINAL DETAILS**

Now that your adventure in making dovetails is in the rear view mirror, you can turn your attention to the rest of the upper cabinet. There's not much left, just two doors and four shelves. First, glue up the material for the shelves and set them aside while you work on the doors.

The doors for the upper cabinet employ the same joinery as the large door for the lower cabinet — bridle joints. There we talked quite a bit about the veneering process. So here, we'll focus a little more on the joinery that holds the door together.

But first, a little housekeeping. Start by cutting the groove (detail 'a') that runs along the inside edge of the stiles and

rails for the plywood panel. Then drill the holes in the stiles (detail 'b') for the hinges.

As you see below, the stiles have an open mortise on each end that mates with the tenons on the rails. All this glue surface makes for a strong joint.

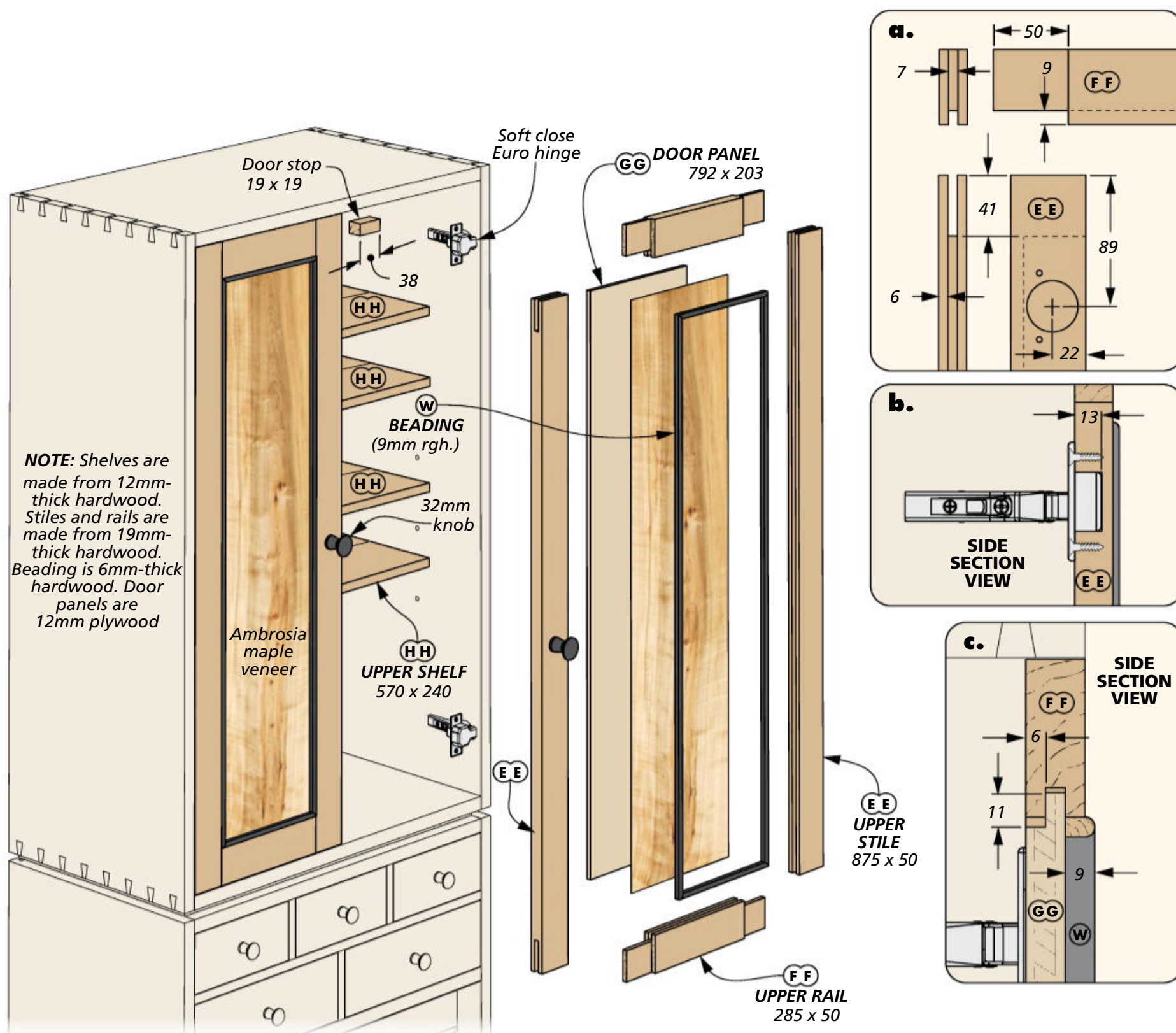
OPEN MORTISE FIRST. I started with the open mortises that are on the ends of the stiles (detail 'a'). To make this cut you have to stand the board on end and set the blade height to the width of the rail. To do this safely, you'll need a jig that rides along the fence and will hold the stile while making the cut.

I mentioned earlier that you'll

find instructions on making this joint at australianwoodsmith.com.au. You'll also find details about how to make the jig as well. The joint is visible on the end, so use a backer to prevent chipout.

TENONS NEXT. The tenon length, like the mortise depth, is the width of the stile. This part of the joint is a lot easier to make.

You don't want any chipout on the rails either, so use an auxiliary fence on your mitre gauge to support the rail. The fence acts as a stop for the shoulder cut of the tenons. Then you can nibble away the rest of the waste. That task finishes the joinery for the doors. Next, prepare the plywood panel for the glue-up stage.



HANGING OPTION

PLYWOOD PANEL. Start off by gluing the veneer to the outer face of the doors. Then cut the rebate on the back side (detail 'c'). That sets the stage for gluing up the doors. When the clamps are stowed away, all that's left to do is mitre and install the black beading along the inside edges.

Now trim the shelves to length and move the cabinets into their new home. If you've got a hankering to split the two apart, the box to the right addresses that. **W**

The upper cabinet can stand all on its own, well, hang on its own anyway. The 12mm plywood that's rebated into the back is strong to hold the cabinet without sagging. Just make sure that you hit at least two studs in the wall with four screws. Two towards the top, and two at the bottom of the cabinet.

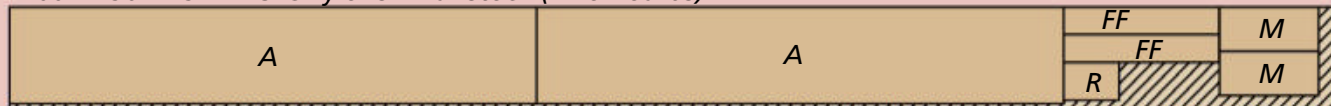


Materials, Supplies & Cutting Diagram

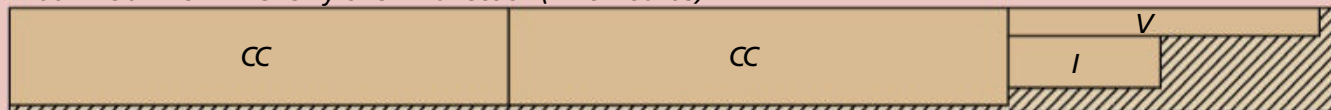
A Case Sides (2)	965 x 360 x 19	N Drawer Sides (6)	343 x 80 x 12	AA Rear Shadow Band (1)	472 x 50 x 12
B Case Bottom (1)	591 x 360 x 19	O Drawer Backs (3)	168 x 68 x 12	BB Upper Back (1)	902 x 584 x 12 ply
C Case Top (1)	591 x 360 x 19	P Drawer Bottoms (3)	336 x 168 x 6 ply	CC Upper Sides (2)	915 x 360 x 19
D Case Divider (1)	591 x 348 x 19	Q Feet Glue Blocks (2)	100 x 25 x 25	DD Upper Top/Bottom (2)	610 x 360 x 19
E Drawer Dividers (2)	348 x 93 x 12	R Feet (2)	100 x 70 x 19	EE Upper Stiles (4)	875 x 50 x 19
F Lrge Drwr Divider (1)	348 x 106 x 12	S Case Narrow Shelf (1)	570 x 185 x 12	FF Upper Rails (4)	285 x 50 x 19
G Horz Drwr Divider (1)	591 x 348 x 12	T Case Wide Shelf (1)	570 x 320 x 12	GG Door Panels (2)	792 x 203 x 12 ply
H Case Back (1)	850 x 584 x 12 ply	U Stiles (2)	618 x 50 x 19	HH Upper Shelves (2)	570 x 240 x 12
I Lrge Drwr Fronts (2)	278 x 93 x 16	V Rails (2)	570 x 50 x 19		
J Lrge Drwr Sides (4)	343 x 91 x 12	W Beading	6m x 9rgh.		
K Lrge Drwr Backs (2)	266 x 79 x 12	X Lwr Door Pnl (1)	540 x 492 x 12 ply		
L Lrge Drwr Btms (2)	336 x 266 x 6 ply	Y Front Shadow Band (1)	572 x 50 x 12		
M Drawer Fronts (3)	180 x 80 x 16	Z Side Shadow Bands (2)	340 x 50 x 12		

- 1500 x 600 Figured Veneer
- (8) 32mm Wood Knobs
- (6) 8g x 45mm Woodscrews
- (20) Shelf Pins
- (6 pr.) Hinges

2400 x 190 x 19mm Cherry or similar stock (Two Boards)



2400 x 190 x 19mm Cherry or similar stock (Two Boards)



2400 x 190 x 19mm Cherry or similar stock (Two Boards)



2400 x 190 x 19mm Cherry or similar stock (Two Boards)



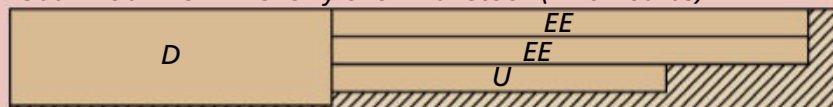
1800 x 190 x 12mm Cherry or similar stock



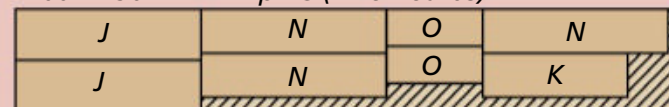
1200 x 140 x 19mm Cherry or similar stock (Two Boards)



1500 x 190 x 19mm Cherry or similar stock (Two Boards)



1200 x 190 x 12mm pine (Two Boards)



ALSO NEEDED: One 2400 x 1200 Sheet of 12 Plywood, One 1200 x 600 Sheet of 6mm Plywood



Getting in a Spin with Colour

Stand clear this month as Stewart Furini looks at ways to use centrifugal force to decorate wood with colour – will the workshop survive unspattered?

Spinning paint on a piece of wood is not new, as I was reminded by the much-missed Mark Baker when he was commissioning me to write these articles – it was a technique he'd used 30 years before, and it wasn't new then. But just because it's not new doesn't mean it's not great fun to do, or that there isn't room to be experimental. You probably know by heart the mantra about having fun with colouring wood, and the fun doesn't come easier than this – one paint brush, one blob of paint and 2000rpm. This might make it sound like this article will probably be rather short, but there are many variations you can try as you discover your own particular style or favourite approach.

Whenever I've mentioned doing centrifugal colouring at live demos for woodturning clubs, there has often been some hesitation – and this is mostly down to the fear that paint will go everywhere and the village hall, parish room, scout hut or whatever venue is used, will be a completely different colour by the end of the demo. Indeed, if there wasn't some protection, the paint would colour more than the wood, but it wouldn't go everywhere: just a thin line of it would be evident across the lathe bed and floor – I doubt it would reach the ceiling. It's quite a simple matter to prevent this happening, so put aside worries of covering your lathe, workshop and smock with paint as this will only happen if you want it to.

Getting ready for your first spin

If you have never tried this approach before, then be prepared to do some practice. Don't worry about ruining a piece of wood – any paint you've put on can be removed with a quick skim of the surface with a gouge or scraper, or by sanding it back. The only equipment you need is a paint brush, so this is a very inexpensive colouring technique. You'll need some paint too, of course. I started off with cheap acrylic paints, which worked just fine. The pigment content is not as good in these paints when compared to artist-quality paints, but you still get reasonable results; so, if you've got a tube or two lying around, then give them a go.

You can put the paint onto bare wood, but I usually seal the wood first

and then put on a couple of coats of eb-onising lacquer. I prefer to have the rim completely covered by paint, but this is just personal taste. If you're going to use several colours, you might need several brushes, and you'll need some water to clean them between colours. If your paint is a bit too thick you can thin it with water or acrylic medium. I like to have a water spritz bottle to hand as well to give a quick blast of water onto the paint if it's not moving enough, but go easy with this as you can quickly wash all your paint off.

Before your first colour goes on, make sure your lathe bed and surrounding area is protected from flying paint, unless you want to redecorate your workshop.



Sealer, lacquer and paint.

PROTECT YOUR LATHE

The best way to protect your lathe and workshop from the paint that is flung off the wood is to make a four-sided shield that clamps onto the bed of your lathe and surrounds the platter. It needn't be much deeper than about 10cm as the paint is only flung off in a very narrow band. My box shield is made from plywood and held together with pocket screws. You can see how effective it is at stopping the paint going where you don't want it to from its colourful inside walls. I use two strong magnet bars to hold it fixed to the lathe bed, but you can hold it in place with clamps as well. If you want something cheap and cheerful, then a cardboard box can be used instead.



Lathe protection.



Centrifugal colouring step-by-step

The images show the steps for preparing your blank and putting the first colour on. I've gone for yellow on black for the strong contrast this has.

If your lathe does not have variable speed, then you can put the paint on with the lathe turned off then start it spinning when the paint is on; alternatively, have the lathe spinning at one of its set speeds and see what effect you get. Your first spin will show you how your paint is spreading and you can then determine if you need to thin it or if it is fine as it is. This decision will depend upon what effect you are aiming for. Thin lines of colour need thinner paint; a swirling block of colour needs thicker paint. The first spin may not always give you the effect you want, but don't be disheartened. Wipe it off and try again, or have another go over the top. With time and practice you will be able to anticipate what the paint is most likely to do.

1 Sand your platter rim to 400 grit and seal.

2 Cut back sealer with a fine grit pad or abrasive paper.

3 Apply two coats of ebonising lacquer to create an opaque background.

4 Hold your paint-filled brush against the spinning rim, speed at about 800-1000rpm.

5 Withdraw the brush and put the speed up to about 1800-2000rpm.

6 Turn off and see what the paint has done.

CREATIVITY

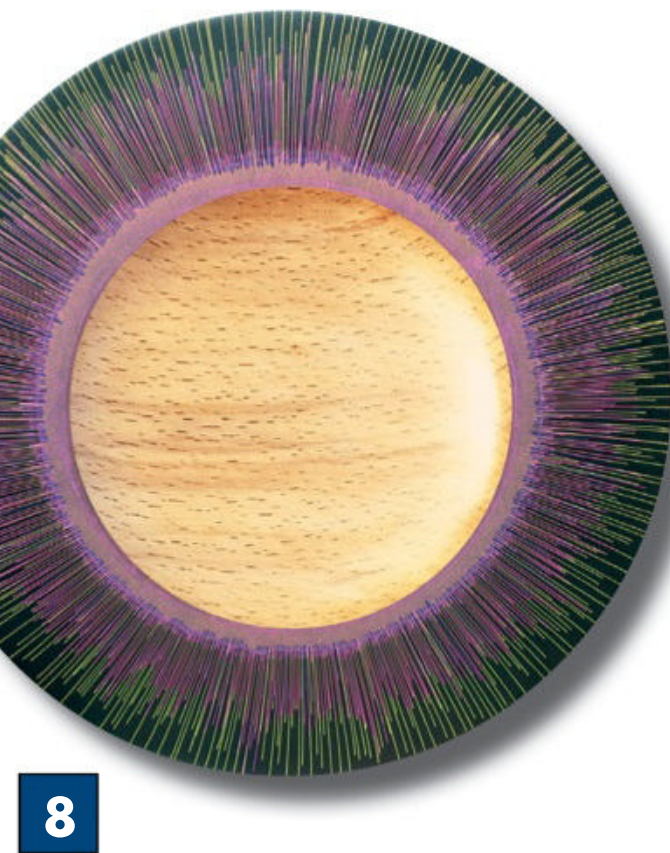
Taking a risk with colour combinations can lead to surprisingly beautiful outcomes. The advantage of centrifugal colouring is that you can wipe away a failure and try again and again until you find the right combination.

ADDING A SECOND COLOUR

You could wait for the first colour of paint to dry and then put another colour on; conversely, you could add a second colour while the first one is still wet and watch how they blend together. This is just play time – use it as a way of seeing what happens when you blend wet colours together. I recommend spending some time just trying different colours out and different speeds without worrying about an end result: this is the best way to get experience and knowledge, which you can then apply when you want to try to achieve a specific effect.

7 A second colour added once the yellow had dried.

8 With a bit of photo editing, an idea of what the platter might look like.



Variations

There are plenty of things you can vary with this technique. Try putting the paint on when the lathe is stationery and then spin it when the paint is on. You don't have to put a complete ring of paint on – just add it to some parts of the blank: you can put a different colour or colours in the gaps left. Try using a thicker paint with a thinner one over the top, or vice versa. Mix metallic paints with ordinary acrylics; give iridescent colours a go too; have a go over an existing colour with some transparent paint.

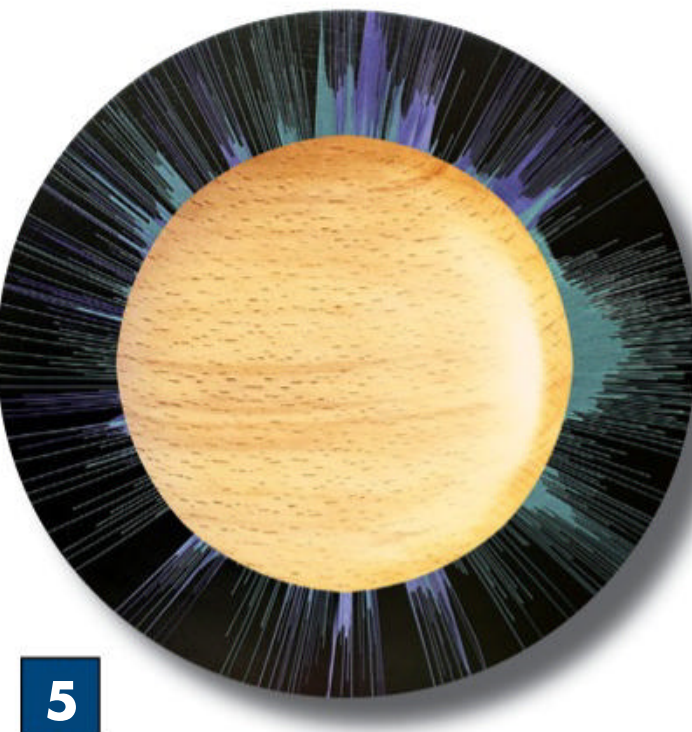
1 Iridescent paints come in a multitude of colours.

2 Try adding the paint with the lathe off so that you can achieve a more random pattern.

3 Turn on and spin for a few seconds to see what happens. If you don't like the result just wipe the slate clean!

4 The results – add flow medium to help the paint move more if necessary.

5 Again, some photo editing to show the final look after the centre has been turned and polished.

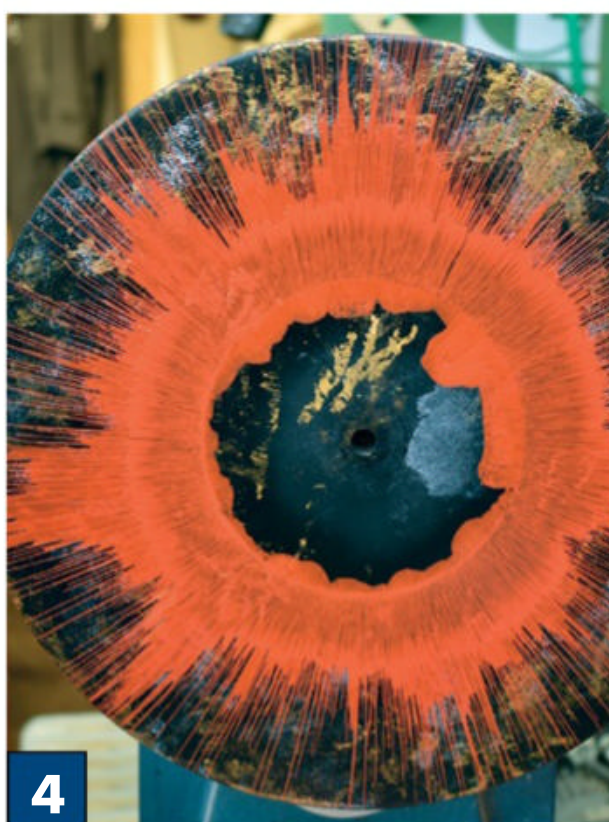
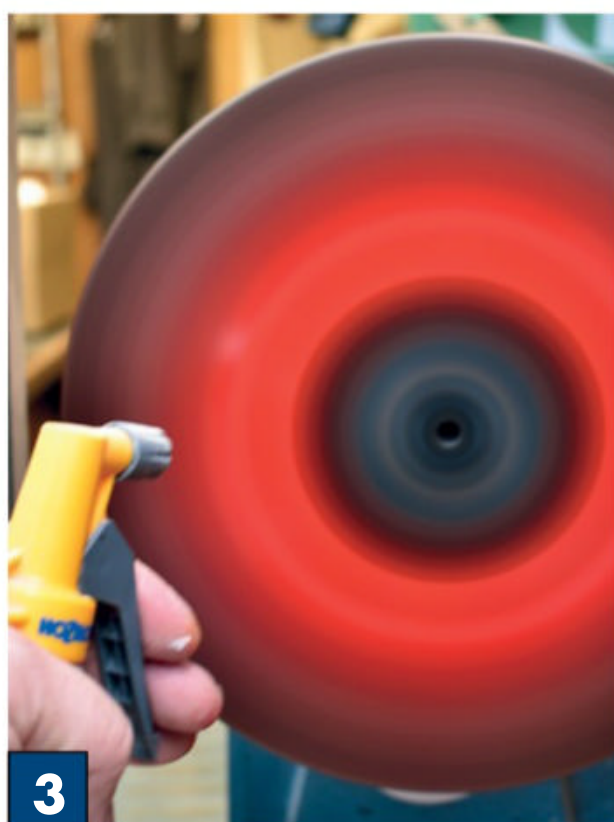


THINNING PAINT

Some paints work straight from the tube, can or pot as they are already thin enough to spread easily. If the paint does not move as much as you want it to, then you can thin it down. You could use water, but this will dilute the colour of the paint. If you want to maintain the colour, then an acrylic medium is best: this conditions the paint so it moves more easily but doesn't weaken the colour. If you want to loosen the paint once it is on the rim and while it is spinning, then a quick spritz with a water bottle will do this – though take care not to overdo this and wash all of your paint off.

Floetrol made by Flood is a professional conditioner for acrylic paints and is the most cost effective way to "thin" a thick acrylic paint. Floetrol is used by professional house painters to produce brush-free finishes on interior and exterior surfaces.

Use a proper medium for thinning paint.



Art Deco Influences

You don't have to use a plain background for the platter either – I sometimes dab silver or gold on the rim before doing the centrifugal painting. You could put some rings of colour on first for the centrifugal painting to cut across. Try using some stain or dye on the platter first – maybe create a gradient colour effect for a single colour to run across. More complex patterned backgrounds can be tried too, though the overall design may well become too 'busy' and look rather cluttered and messy.

Consider texturing the rim before any colour goes on if you want to add a further level of embellishment; or, you could add some texture afterwards and fill it with a gilt cream or coloured wax. How about masking off some of the centrifuge colouring and adding more colour to some areas of the rim? You could add a coloured border at the outside edge, or turn away some of the colouring to add a wooden border, or turn a couple of narrow wooden coves or beads on the rim to frame the colouring.

1 Some gold and silver dabbed over the lacquer.

2 Add some red acrylic paint. Don't worry about being neat.

3 A quick spritz with water to help the paint move.

4 Stop and see what you've got.



5 An inner ring of gold added to create a halo effect.

6 Some more photo editing wizardry to show the effect.

Final thoughts

I hope these articles have given you a bit of a nudge towards trying out some colouring on your woodturning, especially if you haven't done any before. Colouring adds another level of engagement with what you are making and opens up plenty of creative possibilities. You might like to add some colour to the lid of a canister or the edge of a deep flared bowl. The fortuitous patterns that flow when centrifugal forces are at play can be a delight to the eye and add a unique quality to each piece you make.

If you are already a 'colourist', then I hope you will have picked up some new ideas or have come up with some ideas of your own built on these techniques. Now, get into the workshop and start flinging some paint around: have fun. **W**



AUTUMN TONES

Autumn tones work best with light timbers. Remember that you will be turning a shallow in the platter and that the wood grain will be exposed. The ring of colour can complement or contrast: the choice is yours.



Gold, red and black – a classic combination.



Splining Saddle

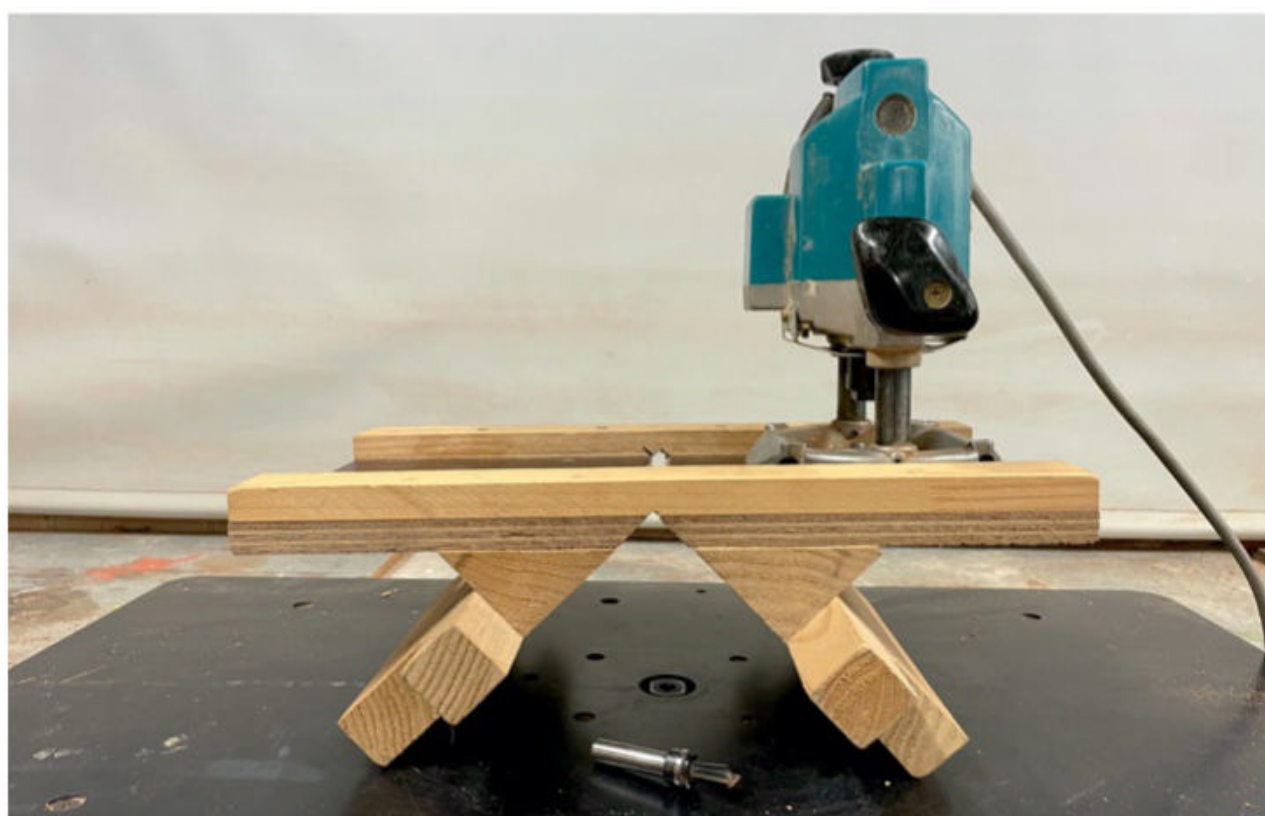
Commercial splining jigs are designed for router tables. We inverted the concept so you can spline any width of stock up to 19mm thick.

In Issue 157 of *Australian Woodsmith* we reviewed the clever Rockler Router Table Spline Jig and now often use it in the workshop when we want to quickly knock out boxes and drawers made from 12mm-thick stock.

The limitation of the Rockler jig is that it has a throat width of 208mm. This means that you could only install one dovetail key onto a 208mm-wide box because it would have to be centred on the jig. What you need is a minimum

of three dovetail keys for both visual impact and strength. This fact means that the Rockler jig can only be used with stock up to 120mm wide.

Other router table jigs have similar limitations. That is why we started thinking outside the box and had a go at designing a system that would set no limits to the width of the box. We also wanted to be able to cut splines in standard 19mm plywood and solid wood stock. You can see on these pages that our solution was



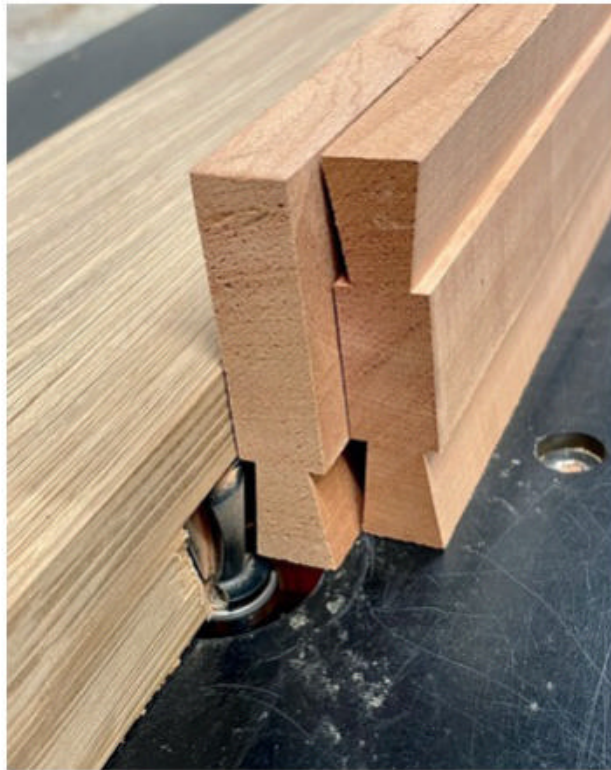
▲ The splining saddle is designed to be clamped to a mitred carcass. Notice how the exit and entry holes align with the bottom wings of the saddle.



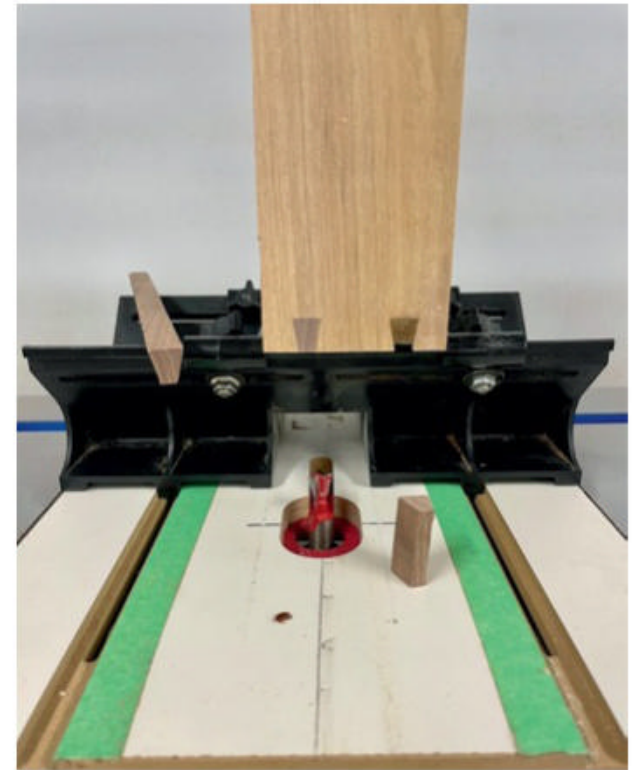
▲ The router sled needs to be a snug fit and have an entry and exit hole cut either end.



- ▲ Key stock needs to be machined so it matches the diameter of the cutter.



- ▲ Dovetail keys are cut with the same bit that was used to cut the dovetails.



- ▲ The Rockler router table spline jig caters for 12mm stock with a maximum width of 120mm.

to create a saddle that rides on the corner of the carcase to be splined.

THE SPLINING SADDLE

What you will need to make the saddle is two 450 x 45 x 19mm cleats to centre and guide the router on a piece of 450 x 250 x 18mm formply. Then you will need two lengths of 250 x 70 x 70mm pine stock for the saddle and two lengths of 450 x 33 x 33mm stock to create the clamping horns for the saddle. One piece of 70 x 70 stock is then cut on the diagonal to create the triangular prisms that form the foundations for the saddle. The next piece of 70 x 70 is then ripped down the centre to form the 70 x 33mm outer edges of the saddle.

The first step in the construction of the jig is to drill the two 45mm exit and entry holes on centre and 70mm in from either end of the formply. This is best done with a hole saw and a pedestal drill. Drill halfway through, remove the drill, invert and drill again on the same centre. This will create a clean hole with the plug of ply easy to remove from the hole saw. The next step is to mark a 9mm line either side of the centre line and then use a jig saw to create the slot that the router bit will move through.

The standard diameter of a Makita router base is 160mm. The router needs to fit snug on the sled so it doesn't wobble when under load. If your router has a different diameter face you will have

to adjust the width of the jig accordingly.

One cleat should then be screwed flush with an edge, then a 160mm board should be used as a spacer so cleat No 2 can be screwed home. The formply can now be turned over and two mitre cuts made on centre to create an 8mm-wide throat. It is wise to glue and assemble the saddle sides together separately before screwing them onto the sled. The final step in the construction is to create a clearance groove across the centre of the foundation blocks. This is done with a 19mm bit locked tight in the router and several 3mm-deep passes made over the jig until the clearance slot reaches a depth of 40mm.

MACHINING THE SPLINES

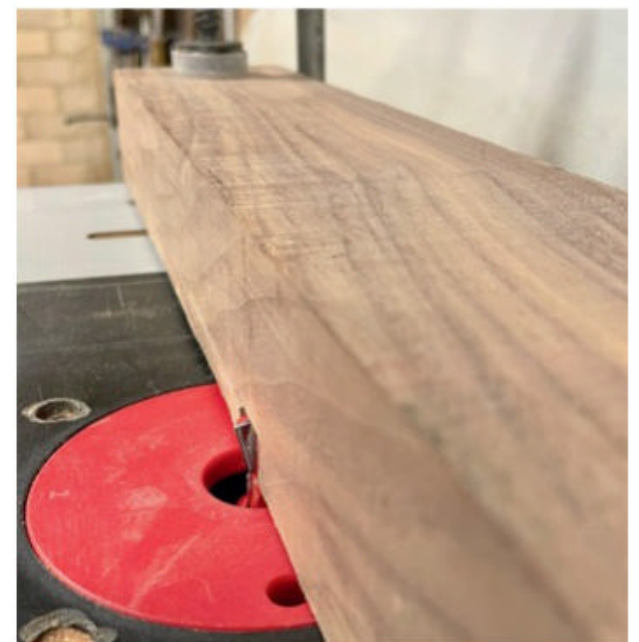
The jig is designed around a Gifkins router cutter because the length of the shank on the cutter gives it the reach needed to accommodate the 18mm thickness of the formply sled (we have also used Leigh dovetail bits with excellent outcomes).

A straight wooden fence is then carefully introduced to the spinning bit and a cove is created so that only its wing edge is exposed.

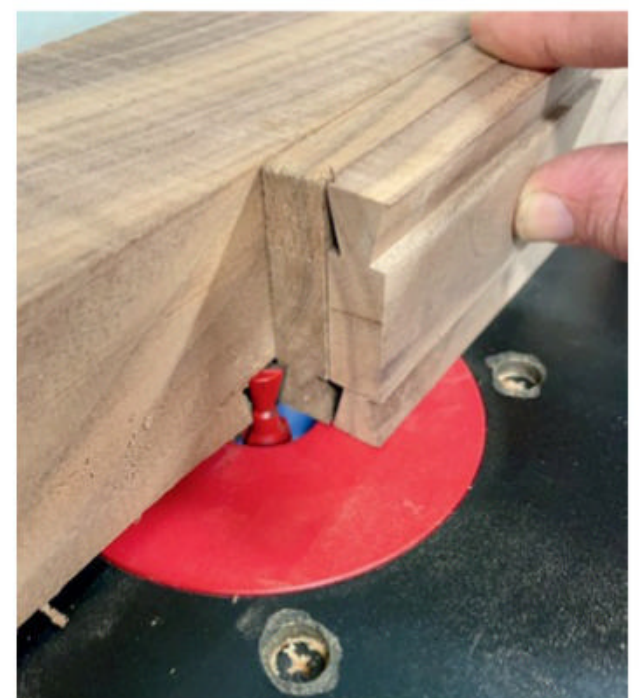
Bundling stock that has been machined to match the width of the cutter into groups of two creates a safe way to pass the stock across the exposed cutter.

The splining saddle has been a game changer in our workshop.

(See page 73 for sources) **W**



- ▲ Cutting the dovetail keys for any spline jig is best done with a wide sacrificial fence.



- ▲ Bundling two 600 x 70 x 12mm pieces of stock together makes routing the keys safer.



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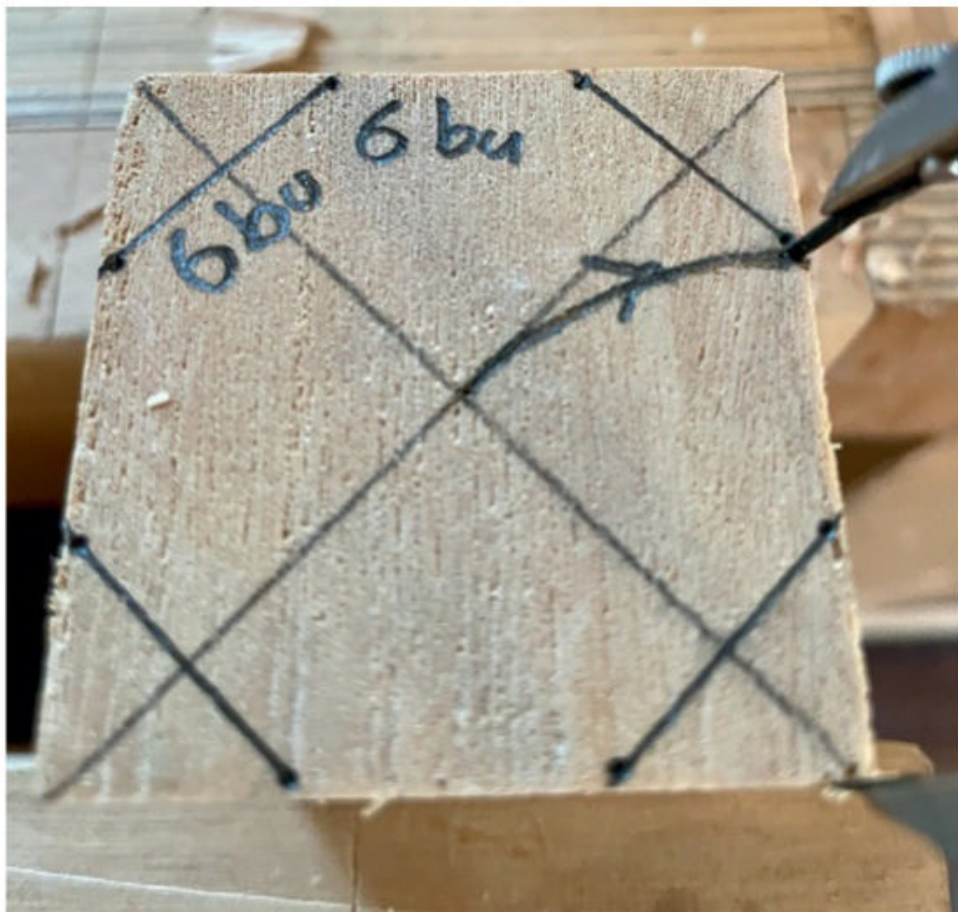
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Crafting Rounds

Crafting the sculling oar for the river boat on page 26 was an eye opener. Simple techniques soon had the shaft round and the blade symmetrical and smooth.

Crafting the sculling oar for the Japanese river boat on page 26 was traditionally done with a plane, adze and a spokeshave. No power tools entered the equation.

What was so profound about the process was the application of simple geometry and the use of Japanese units of measurement.

Japan, Korea and China used the same system of measurement right up until the last century. The base length was a shaku, being the distance from the outstretched thumb and the middle finger, this was standardised to become 303mm. This unit was broken down to create ten sun (30.3mm) or one hundred bu (3.03mm).

In most things Japan, Korea and China have moved on to metric, however temple and teahouse building, along with traditional wooden boatbuilding, still use the shaku as its base length. This is because the symmetry and balance that has been memorised by the builders only works with shaku.

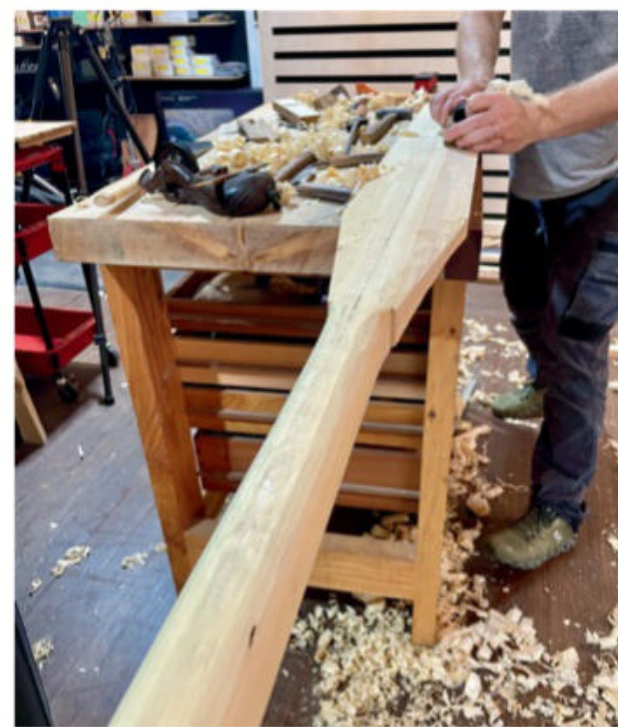
Master teahouse, temple or boatbuild-

ers did not write down dimensions accurately. They protected their knowledge with memorised dimensions and clever geometry to translate it into the proportions that we appreciate.

The oar shaft and top piece were cut from 12bu square (36.36mm) stock, the blades from 36 x 12bu stock. Striking an arc from the centre of the stock to the edge and then using this point to create the 8 sides of a hexagon was a simple application of the geometry of an octagon. Planing the edges to form an octagon was a simple and fast process. Knocking the edges from each facet soon had a polygon that conformed to a circle. At this stage we could have sanded the shaft smooth but decided we liked the worked look and feel of the shaft in our hands.

The sumitsubo on the bench was then used to create the centre line for the blade, followed by some careful crafting with a Japanese adze. This was followed by a couple of hours of plane and spokeshave work. The final result was a sculling oar that sat neatly in the oarlock on the transom.

One challenge a Japanese apprentice had was to "steal" knowledge from their master (as the master had done when he was an apprentice). This called for an eagle eye on behalf of the apprentice! **W**



▲ Notice the centre line snapped by the sumitsubo. This datum referenced the symmetry of the blade.



SOURCES CONTACT DETAILS

HARDWARE & SUPPLIES SOURCES

DOUGLAS BROOKS

Japanese Tools Australia stocks several books written by Douglas. There are still a couple of signed copies of *Japanese Wooden Boatbuilding* on the shelves at JTA.

DUST EXTRACTORS

In the past a cabinetmaker was referred to as a chippy because he chipped away at his bench crafting marvels in wood. These days he could be called a dust devil because of the number of power tools used and the nature of the manufactured boards he (or she) fabricates with. The glues in manufactured boards can be dangerous to your health, as can the fine dust liberated when sanding, routing and cutting with power tools. The tragic news that silicosis is cutting short the lives of stonemasons and those in the kitchen bench industry is shocking. Updating your dust extraction system with an M class machine is the way to go. Festool, Mirka, Makita, Milwaukee and Bosch manufacture M class machines that should be considered when setting up or upgrading your workshop.

INSTALLING CONCEALED HINGES

Euro hinges are clever but challenging to install. Carbatec stocks a range of Kreg jigs dedicated to making the installation of concealed hinges as easy and repeatable as possible. Timbecon carries a similar range made by Milescraft. Euro hinges (and a simple Kreg concealed hinge jig) are available from Bunnings.

JAPANESE RIVER BOAT

The skill we all took away from the boatbuilding workshop was the accuracy that can be achieved with a simple Japanese pull saw. Crafting a watertight joint between two 4m-long planks with just a saw was amazing! Not all saws are equal. If you can make it to Kogarah in Sydney you should drop into the JTA workshop and spend an hour testing out the wide range of saws on display. You are bound to find one that works well for you.

B&B HOUSE

Most of Australia's 2,000 species of native bees are solitary characters that don't live in colonies. This beehive allows solitary bees a place to nest. Mason bee nesting tubes are available online from Amazon Australia.

BACKGAMMON BOARD

The Trend Inlay Kit used to create the tight recesses for the inlay is available online from JPM Tools. Timbecon and McJing also have similar inlay kits in their catalogues.

FINE TOOL CHEST

The choice of veneer for the doors and the drawers will be the most challenging part of the build. The place to go to so you can check out a range of veneer options is Top Veneer. They have a wide selection of Australian and overseas veneers and specialise in the supply of small amounts of veneer for the furniture restoration trade as well as for the hobbyist.

Carbatec

carbatec.com.au

1800 658 111

WA: 1800 886 657

NZ: 0800 444 329

Kreg jigs

Japanese Tools Australia

japanesetools.com.au

02 9527 3870

books, pull saws

JPM Tools

jpmtools.com.au

03 9077 9135

inlay kits

Lie-Nielsen Toolworks Australia

lie-nielsen.com.au

0418 842 974

dowel plate

McJing Tools

mcjing.com.au

02 9709 8805

inlay kits

Timbecon

timbecon.com.au

1300 880 996

Milescraft, inlay kits

Top Veneer

topveneer.com.au

veneer

Trend Timbers

trendtimbers.com.au

02 4577 5277

wetstone grinders

Vesper Tools Australia

vespertools.com.au

0400 062 656

sliding bevets



◀ *Issue 154.*
Barn Door Cabinet.
Made by a father
and daughter
team.
Derek Latimer,
Grafton NSW.
Ally Latimer, Coffs
Harbour NSW.

Fine Crafts



◀ *Issue 57.*
BBQ Trolley.
Kerrod Hallett,
Gumdale QLD.



▲ *Issue 168. Campeche Chair.*
Andy Reid, Taroona TAS.



▲ *Issue 161 Candle Lantern and Issue 34 Classic Buffet.*
Kerrod Hallett, Gumdale QLD.

If you have made an *Australian Woodsmith* project, we'd like to see it. Email a quality image to us at julie@australianwoodsmith.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 used.



▲ *B&B House*. Invite bees and butterflies to your garden with this attractive habitat. All you need to know starts on page 32.



▲ *Fine Tool Cabinet*. This beautiful cabinet will house your tools and last a lifetime. Plans begin on page 50.

Final Details

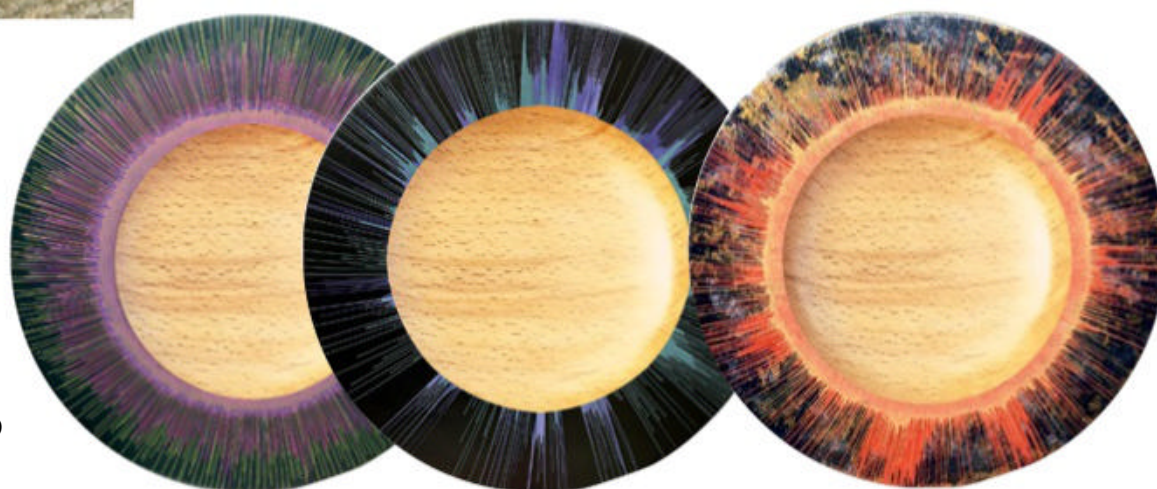


▲ *Elegant Hall Bench*. Most hall benches live a quiet life of service but that service doesn't have to be lived without style. We'll show you how starting on page 36.

▶ *Getting in a Spin With Colour*. Stand clear as Stewart Furini looks at ways to use centrifugal force to decorate wood with colour. Step-by-step instructions begin on page 60.



▲ *Backgammon Board*. Anthony Bailey takes on the challenge of making his own game board. Turn to page 42 to learn more.



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METALMASTER**

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**WL-18
Swivel Head Wood Lathe**
Order Code: W382



**WL-20
Swivel Head Wood Lathe**
Order Code: W384

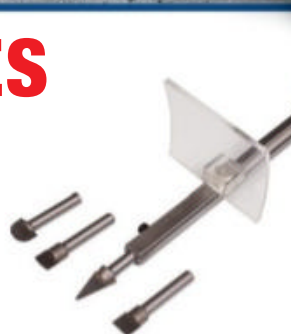


**WL-46A
Electronic Variable Speed
Wood Lathe**
Order Code: W387

ACCESSORIES



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Order Code: W300



Order Code: W305



Order Code: W302



Order Code: W301

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